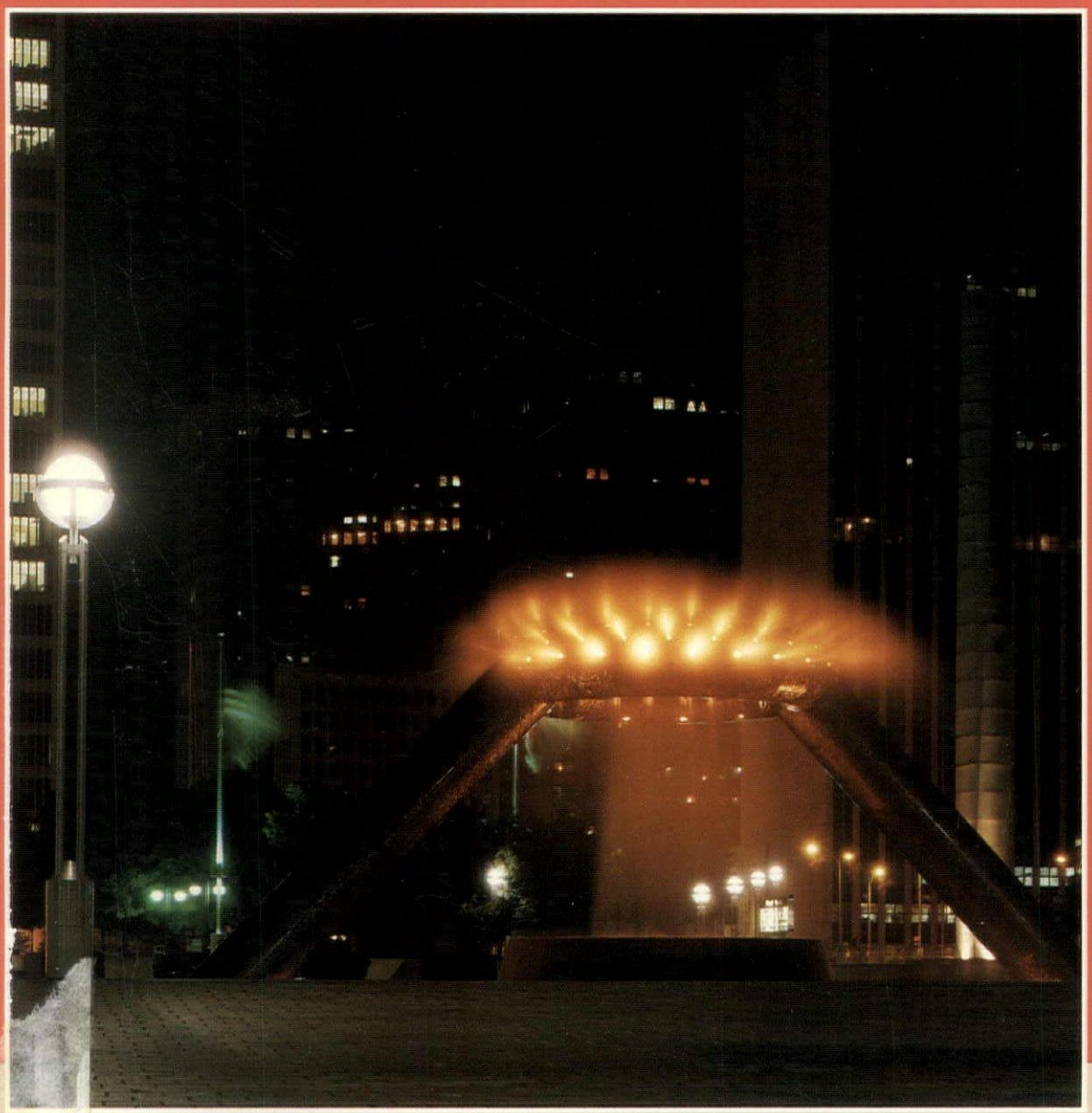
ARCHITECTURAL LIGHTING



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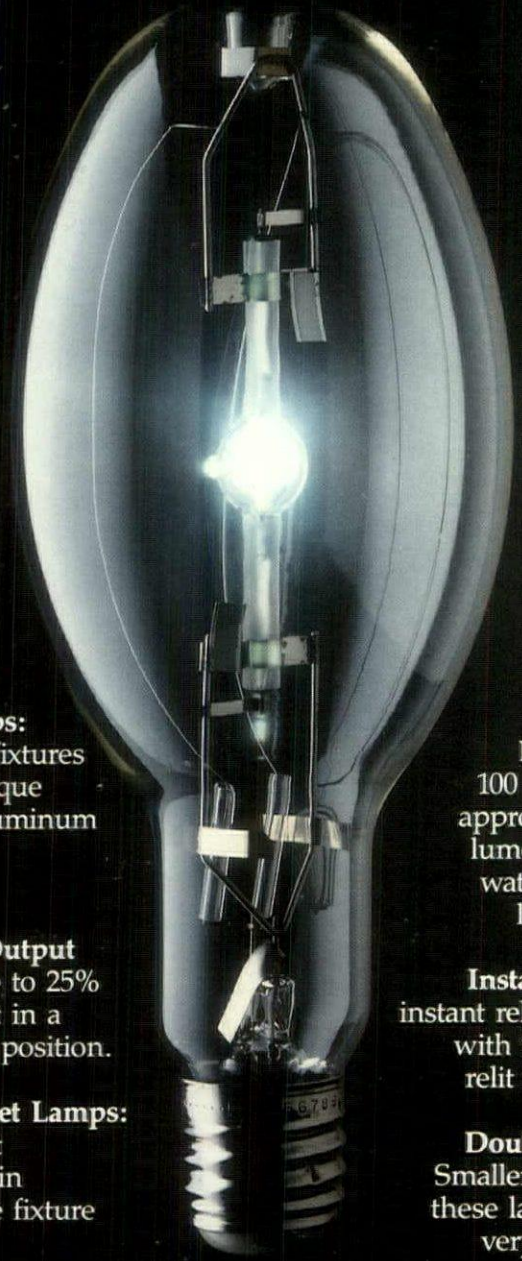

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ARCHITECTURAL LIGHTING

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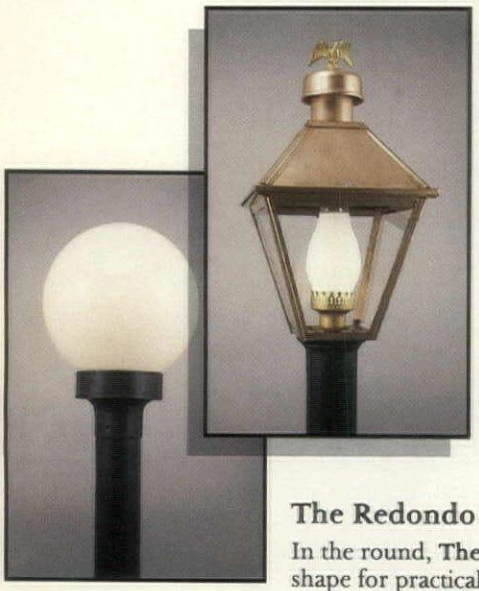
Old World Lighting

The Designer's SINGLE LIGHT SOURCE



Washington

Measuring 24" overall height, **The Washington** is an excellent example of New Country lighting. This natural copper fixture can be post, wall or pendant mounted.

The Redondo

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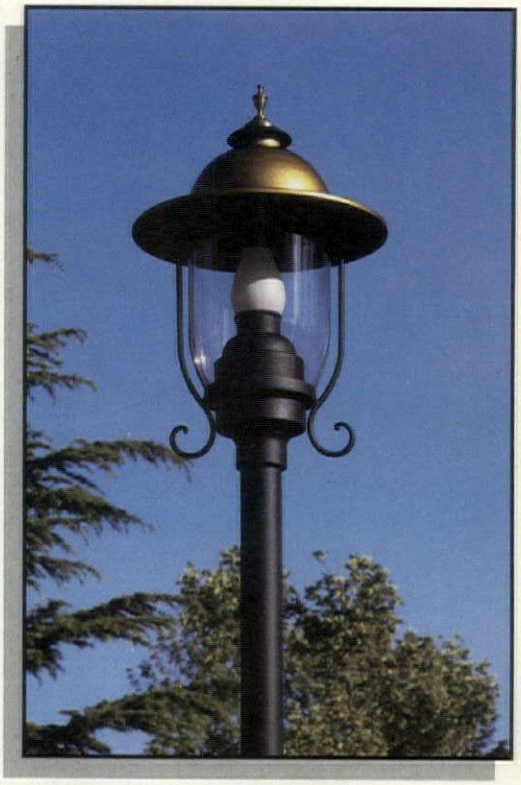
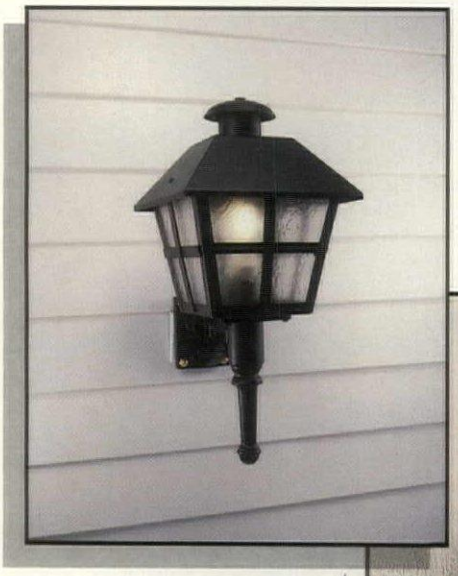


Nob Hill

Attractive and easy to maintain, **The Nob Hill** fixture from Old World Lighting produces a perfect model for creative, area lighting design. It can house either H.I.D. or incandescent light sources making it ideal for general building projects such as condominiums, office parks and shopping centers. The top frame is treated with one of our Natural Compound finishes including Verdi green, Rustone, Black iron or Antique brass.



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Circle 5

ARCHITECTURAL LIGHTING

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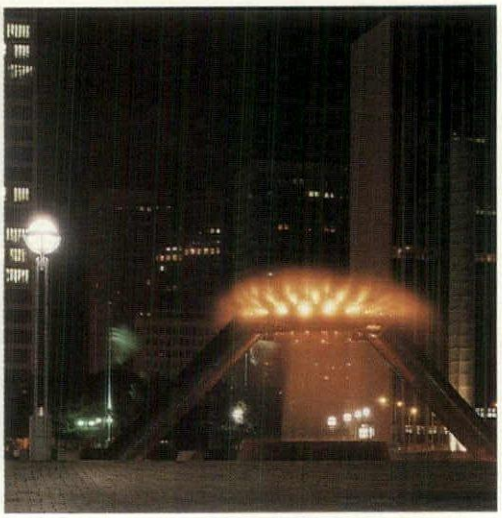
THE RIVIERA

ARCHITECTURAL LIGHTING

October 1988
Volume 2, Number 10



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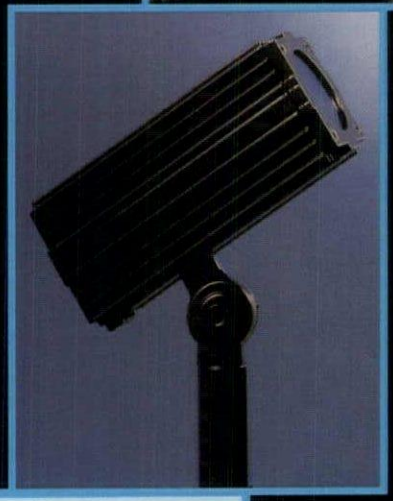

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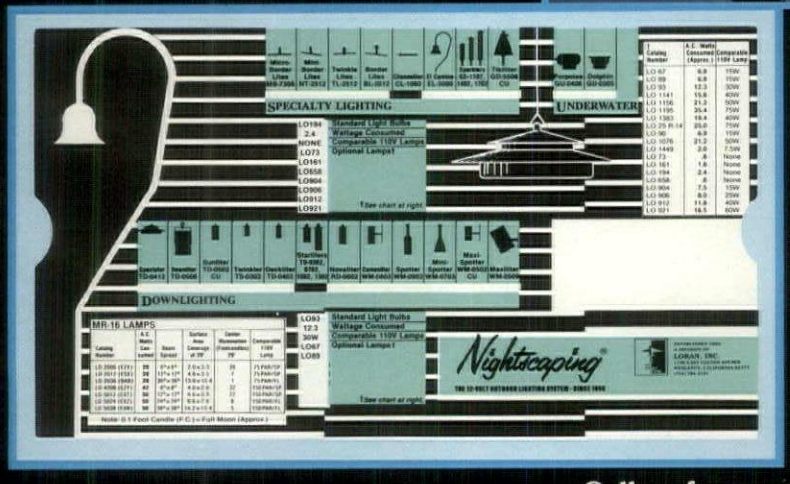

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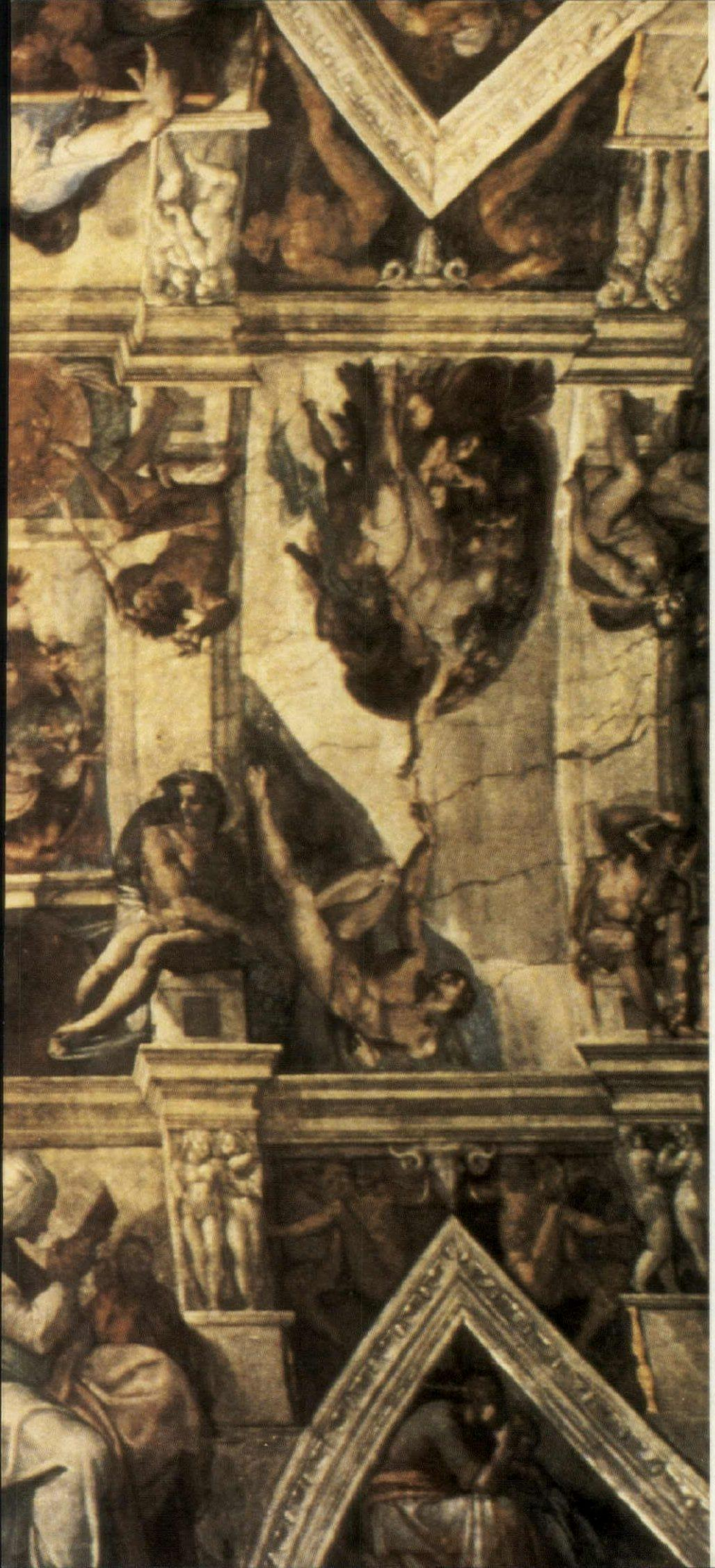

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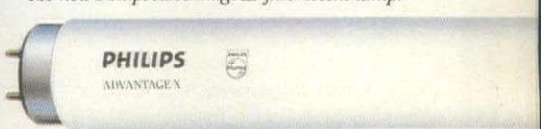
The new Philips Advantage X fluorescent lamp.



IT'S TIME TO CHANGE YOUR BULB.™

PHILIPS

Circle 9

From the Editor

The October issue of *Architectural Lighting* probably comes as close to being a theme issue as anything we've ever done. We don't do theme issues as a rule, because we want to appeal to a diverse audience and because we are supported by a wide range of advertisers. Neither group is well served by a magazine whose subject matter is narrowly focused.

What's more, we try to publish projects as soon after they come in as we can get them ready. So for the "theme" phenomenon to occur, we have to get an awful lot of examples of a single project type within a very short time. As a rule, that just doesn't happen. If it does, we notice.

In this issue, we have a lot of exterior lighting:

☐ Wrigley Field, which should capture an award as the year's most publicized lighting job.

☐ Avenal State Prison, I'd say the most appropriate symbolic use of massive quantities of HPS cobra heads in a project anywhere.

☐ The Landmark Building, still another illuminated edifice on the Boston skyline (see "Lighting a historic 500-foot clock tower with PAR lamps," *Architectural Lighting,* August 1988).

☐ And a master lighting design plan for the central business district of Detroit. This is really big: 43 exterior lighting projects that will eventually require hundreds, if not thousands, of light fixtures.

Not to mention Jim Benya's column; this month it's on exterior lighting and light pollution.

The significance of seeing all of these projects in this magazine at once? It shows that people are getting *extremely* serious about exterior lighting. Some of that has to do with the availability of lamps with unprecedented color rendering and some with more efficient lighting fixtures; together, they make exterior lighting more practical. Some of it has to do with off-peak electrical power rates that make exterior lighting economically attractive.

But mostly it signals a growing appreciation — by both designers and the public — of what exterior lighting can do for cities, for architecture, for security, and for people. And I hope you readers will appreciate this month's "theme" as well.

Charles Linn, AIA

Letters

Flynn's legacy is his students

The Guest Editorial in your August issue was almost appropriate, but one paragraph too long. I take exception to the last paragraph.

John Flynn's greatest legacy is perhaps his students and now students of his students. Agreed, it is disappointing that no one person has continued where John's work ended so abruptly. Then again, John was one of a kind. Indeed, he cannot be replaced.

People like Rick Shaver, Helen Diemer, Mary Ann Hay, Sandy Stashik, Randy Burkett, Andy Beldecos, and many more are now practicing lighting design thanks to the Penn State program nurtured by John Flynn and now Craig Bernecker (a grad student of Flynn's in the mid-1970s). These people are active in IES committees, particularly the Psychological Aspects Committee and Education Seminars Committee. In fact, these folks were responsible for founding the Psychological Aspects Committee in order to promote and continue John's work and establish new areas to be explored.

The *1981 IES Application Volume,* published just after John's death, included then-new information on Psychological Aspects as developed by John. At the invitation and urging of John's widow, Iris, I continued the revisions to John's 1970 book, *Architectural Interior Systems.* The second edition was released in February of this year by Van Nostrand Reinhold. John's work is prominently discussed and exemplified with applications.

Work does continue in this field, most of it directly attributable to John. Bernecker has done some work at Penn State, and a 1985 Psychological Aspects of Lighting Symposium at Penn State is to be followed with another in 1989. More importantly, The National Research Council of Canada has just embarked on an ambitious program to more clearly define some of the factors which John's work identified (for example, spaciousness).

It is not easy to continue without becoming emotional about the issues. Certainly we all know John's work was a cornerstone and that the man is irreplaceable. Anyone who is truly active in the lighting community, however, knows that John's work has not died with him. On the contrary, his work has spurred great, sometimes lengthy and at times quite emotional debate, leading to a variety of committee activities now under way in both the IESNA and the CIE and leading to continued research.

Now, may we get on with it?

Gary R. Steffy, IES, IALD
Penn State 1977, BAE
President, IALD
President, Gary Steffy Lighting Design Inc.
Ann Arbor, Michigan

Lee Boyack Memorial Scholarship

In September 1987, news of the passing of Lee Boyack touched the heart and spirit of the San Francisco Bay Area design community. Lee's genius at lighting design and his warm approach to colleagues, clients, and students had set him apart. He used to say "lighting is everything," and he proved it with his use of focal lighting that seemed to make the four walls of a space disappear.

Originally trained as an architect at Cal Poly, Lee became increasingly fascinated with interiors and, in particular, lighting design. During summer vacations he worked at W.J. Sloane, and after graduating from San Jose State University with a B.A. in interior design, he joined Sloane full time. He also taught beginning and advanced classes in lighting at San Francisco's Academy of Art College.

Lee pushed the limits of what was possible in lighting technology. After his first encounter with low-voltage lighting — a motorcycle headlight rigged in a coat hanger at a friend's house — he proceeded to explore all available types of lighting equipment. His "what if" approach led to many innovations that have since become industry standards.

Representatives and distributors will remember Lee's enthusiasm for new products and ideas, as well as his impatience when something as simple as a particular color of glass gel wouldn't fit a certain fixture. Clients will remember Lee's sensitivity and ability to visualize creative solutions to their particular design problems. Those fortunate enough to be present at one of his focus sessions know the magic he added as all the design elements of a room came together in a play of light.

Students will remember Lee's commonsense approach and his eagerness to teach and explore. He encouraged students to experiment with light and to examine light sources and effects wherever they went. His lectures could make even beam spreads fascinating. When he called for a break, everyone would go across the street to an ice cream parlor, where Lee would resume his lecture with a vanilla or strawberry moustache.

Lee's spirit of fostering excellence in his students has found a new avenue. Through the sponsorship of the Design Foundation and the California North Chapter of the American Society of Interior Designers (ASID), the Lee Boyack Memorial Scholarship has been instituted to assist students of interior design to achieve the highest professional goals. The Design Foundation and a review jury of design professionals will administer the scholarship. Student members of ASID who attend FIDER-accredited interior design programs are eligible to apply.

Funds for the scholarship were donated by Lee's professional contacts, clients, and friends. Additional tax-deductible donations will help to keep the light of Lee Boyack shining while assisting in the growth of an up-and-coming preprofessional. Checks should be made out to Design Foundation, side-marked The Lee Boyack Memorial Scholarship, and sent to the address below. For further information, please feel free to contact me at (415) 482-1875.

Jan Lennox Moyer, ASID
The Lee Boyack Memorial Scholarship
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2 Henry Adams Street, Suite 301
San Francisco, CA 94103

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Send your lighting design questions to *Architectural Lighting.* We'll track down a lighting designer with expertise in that area and seek advice about how to solve your problem.

Address your letters to
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Architectural Lighting
859 Willamette Street
P.O. Box 10460
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Lighting Clinic

Troubleshooting halogen lamp-life problems

Can you tell me why my T4 tungsten halogen lamps are burning out prematurely?
John Jolly
Anderson DeBartolo Pan, Inc.
Tucson, Arizona

If the fixture manufacturer is familiar with tungsten halogen lamp characteristics and has designed a fixture for a specific performance — as verified by independent testing — then the fixture spec sheets will identify the correct lamp. Check that the proper lamp is specified for the selected fixture. Compare the various lamp manufacturers. Quality differs from brand to brand and from lamp model to model. When problems come up, such as short life, a troubleshooter will ask these questions. Many of them also apply to conventional filament lamps.

Is it a clear or frosted lamp? A clear lamp runs hotter than a frosted one; it also produces an undesirable filament image in the beam distribution pattern.

Is the lamp properly seated in the lamp socket? All incandescent lamps need proper seating to avoid nuisance tripping and eventual disintegration of lamp and socket.

What is the ambient temperature in the ceiling plenum? Excessive heat without ventilation can cause problems.

Is insulation around the fixture? Again, heat can be a problem.

Does the line voltage vary? Tungsten halogen lamps are very sensitive to variations over 3 percent.

Are the fixtures through-wired? Too much extra wiring can raise temperatures in a junction box. Thermal tripping is an indicator of heat problems in the wiring and can deteriorate lamp life.

Is the lamp being dimmed below 35 percent of normal power for extended periods of time? It's important that the lamp be brought up to full power on occasion to prevent carbon on the filament — which leads to premature lamp burnout.

What are the temperatures inside the fixture? Excessive heat causes premature burnout. Check the fixture to see that it was designed with a heat sink sufficient to dissipate heat.

Is the reflector correctly designed to avoid redirecting light back into the filament? An incorrectly designed reflector can destroy the lamp seal.

Carol Chaffee, IALD
Lightsource Inc.
Venice, California

Festive nighttime lighting beckons shoppers

Project: Quailbrook Center
Location: Oklahoma City
Client: Quailbrook Investors, Inc.
Owner: Quailbrook Associates
Architects: Baumeister Mankin, Inc.; Terry Baumeister, design principal; Haven D. Mankin, principal-in-charge
Electrical Engineer: Paul Iser, Prime Electric Co.

Glowing red and yellow canvas pyramids promise fun and excitement, beckoning nighttime shoppers half a mile away. Below the colorful tentlike turret-toppers await the brightly lit storefronts of Quailbrook Center, a 100,000-square-foot community shopping center in one of Oklahoma City's fastest growing areas.

While most shopping centers present a broad surface to passing traffic, Quailbrook lies perpendicular to the area's main road. Only the short top of the J-shaped center is visible from the street. So, architect Haven Mankin used the luminous pyramids to define the center's depth and size to evening passersby. "The pyramids atop strategically placed turrets draw the eye back through the center," he says.

Reaching 28 and 38 feet high, the open-structure turrets each support a 25-foot-square, 12 1/2-foot-high canvas pyramid. Light from the pyramids is reflected in the copper-colored metal roofs of the stores below them. A pyramid-topped clock tower sentinels the parking lot.

Mounted on a turret crossbeam 8 to 10 feet beneath one edge of each pyramid is a 1500-watt metal halide floodlight with an anodized parabolic reflector. Aimed up at the underside of the canvas, the floodlight's bright beam fills the space defined by the canvas and the turret's open support structure. "We experimented with using more than one fixture and with different kinds of light sources," says Mankin, "but we found that one fixture placed a little farther away from the canvas had the best spread and produced an even glow over the whole pyramid. Using several fixtures or putting one too close to the bottom edge of the canvas made the pyramid look brighter at the bottom than at the top."

The glowing pyramids combine with fluorescent cove lighting, downlights, and landscape lighting fixtures to lend a festive mood to the center. Covered walkways and landscaped planter beds separate stores from the parking lot. Continuous fluorescent strips between sign fascias and walkway canopy soffits brighten the glass storefronts. Incandescent downlights recessed in the 5-foot-wide soffits cast soft light over nighttime shoppers.

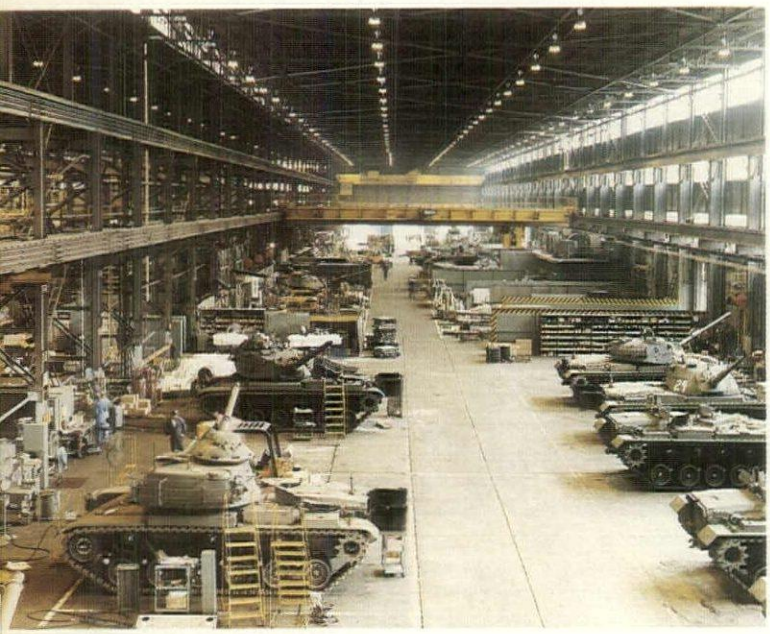
Lighting in planters outside the stores also brightens the center's nighttime ambience. "We used PAR 38 landscape lighting fixtures to highlight the landscaping in the walkways," says Mankin. "The angle of these lamps causes a mysterious shadow of the trees to be cast up onto the plaster sign band, adding to the feeling of activity."

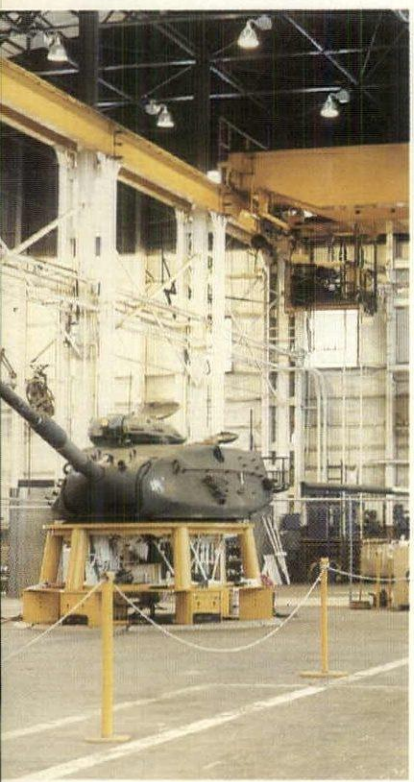
Along the far end of the center, a small lake reflects the glowing red and yellow pyramids in its waters. A bollard-lined roadway skirts one side of the shopping center and delineates the center's boundary. "We've gotten a lot of good feedback from people who tell us they can see those pyramids sticking up through the trees when they come over the hill," says Mankin. "The picture is bright, lively, and inviting to energetic, young-at-heart shoppers."

—Susan Degen

For product information, turn to page 70 and see Manufacturers.

Munitions factory retrofit saves money, eyes of the workers





Project: Anniston Army Depot
Location: Anniston, Alabama
Client: United States Army
Electrical Engineers: Tom Gabriel, Facilities Engineering Division, Anniston Army Depot; Aaron Acker, Acker Electric Company

Before the Anniston Army Depot installed a new high pressure sodium (HPS) lighting system in some of its key buildings, says a worker there, "it was so dark, we felt like moles in here." Most of Anniston's almost 2000 structures are 30 to 40 years old, and the original lighting fixtures — incandescent and mercury — were badly deteriorated.

At the Stanley Maintenance Facility, known as Anniston's heart, workers completely dismantle and rebuild tanks. Electrical contractor Aaron Acker worked with one of Anniston's electrical engineers, Tom Gabriel, to meet the facility's particular needs. Acker replaced 1500-watt quartz lamps in 330 fixtures with 400-watt HPS lamps in as many new luminaires — the existing wiring in this and most of the other buildings was still good enough to use — dropping the connected lighting load from 495 kilowatts to about 150 kilowatts.

"We save $48,000 annually in energy costs in that building alone," says Gabriel. "Payback is expected to be about three years."

The luminaires are spaced on 25-foot by 20-foot centers and mounted at 50 feet with loop, cord, and plug assemblies. Separable mounting hardware simplified installation. Light levels have increased from 7–12 footcandles to 30–40 footcandles in work areas. The new lamps have an average rated life of more than 24,000 hours, compared to the 1000- to 2500-hour life of the incandescents. Relamping need occur only every three years, not every three and a half months.

Three other retrofits are variations on the theme of the heart: the same HPS replacements for original sources and comparable results in energy and maintenance savings and in light increases. The differences lie in the ballasts and/or the shapes and sizes of the luminaires.

A turret finishing building had both remotely ballasted 1000-watt mercury fixtures and 1500-watt incandescents, which delivered about 35 footcandles to the work area. The new luminaires use 400-watt HPS lamps — reducing the connected lighting load from 148 to 58 kilowatts — and deliver 70 footcandles. In addition, Acker was able to use a slide-on primary electrical disconnect and a modified luminaire suitable for the limited clearance space.

The mounting height in a woodworking area is only 15 feet, so Gabriel chose a luminaire for it that features a wide distribution pattern. The fixture has a primary quick-disconnect plug for simplified installation.

Another building is a storage area with a mix of wall- and ceiling-mounted luminaires. Here the number of replacement fixtures is less than half that of the originals and the lighting load is just 25 percent of the previous level. Still, the light level was increased 500 percent.

Overall, the "Tank Rebuild Center of the Free World" has netted energy savings of 60 to 75 percent, with comparable cuts in maintenance costs.

—Michael Heffley

For product information, turn to page 70 and see Manufacturers.

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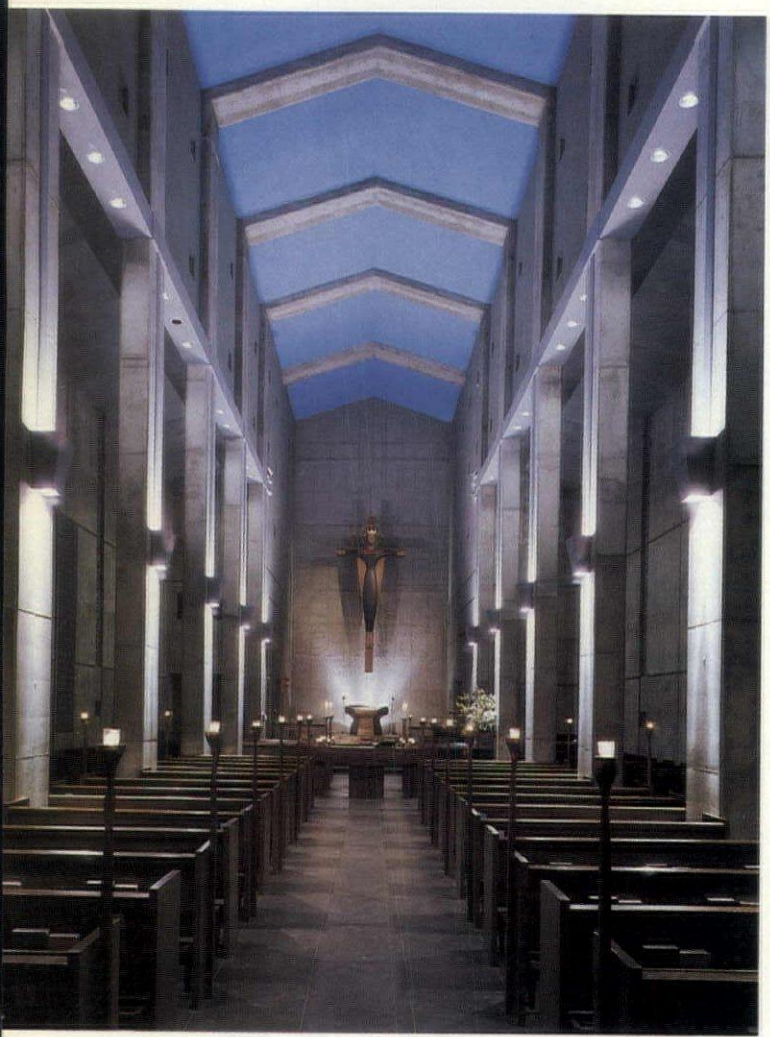
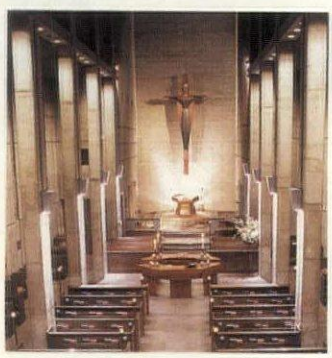
Circle 14

Church lighting: Meeting the challenge of a high, dark ceiling



Project: St. Stephen's Church
Location: Belvedere, California
Architect: Hansen & Winkler, Harold Hansen
Lighting Consultant: Randall Whitehead, Light Source
Electrical Contractor: Rich Aubin, Special Projects
Photos: Ben Janken



St. Stephen's Church has a ceiling with a 40-foot peak. When its parishioners painted the aging concrete vault an azure blue that no one could see from the ground, they realized it would take more than paint to lighten up their heights.

The cast concrete church structure was built in 1953. Its original wiring ran through the walls in conduit that accommodated a maximum of five circuits for the lighting of the 80-foot by 30-foot ceiling space. The original lighting — rows of 300-watt PAR 38 lamps in porcelain sockets inside a wooden trough between the columns — pointed down from 20 feet, leaving the ceiling in darkness.

When the congregation decided to bring light to the newly painted ceiling, they called in Randall Whitehead. His challenge was to solve the lighting problem within the power limitations imposed by the structure, and to find a way to hide any new wiring in a poured concrete building. He met that challenge. He created a system that allows members to light the church in a variety of ways for different times and purposes.

Whitehead fitted the existing trough with a new bottom and recessed adjustable fixtures, using 90-watt PAR lamps directed toward the walls. He extended the wiring from the troughs down the columns by routing the back of a trim board that is stained gray to match the concrete. Halfway down each column, about 10 feet from the floor, he installed custom luminaires that provide up- and downlighting. Uplighting comes from 250-watt, 4100K metal halide sources and downlighting from 150-watt R40 lamps — blue-filtered incandescent "jeweler's lamps" — with a color temperature close to that of the metal halide.

The three adjustable 45-watt quartz PAR 38 lamps are mounted on the wall near the floor to accent the Christ figure. The incandescents, whether dimmed to a reddish or turned up to a more golden glow, offer a pointed contrast to the rest of the lighting. The trough fixtures, accent lights, and downlights are manually dimmable, and there is separate switching for the uplights. This flexible system can create variations on intimacy and loftiness, with illumination from selective to full.

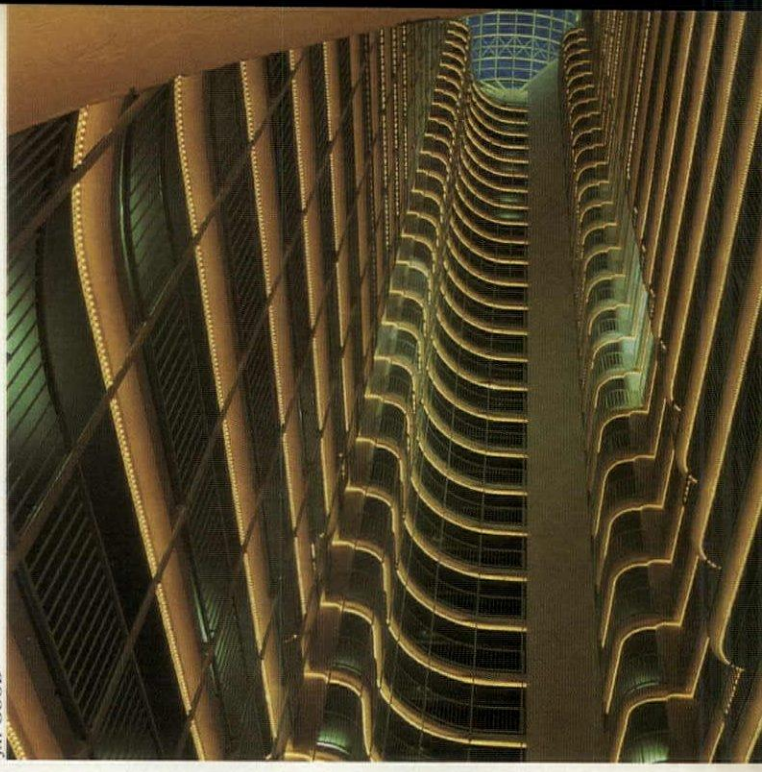
The previous system consumed 9000 watts; it provided 8 to 10 footcandles to the pews and no light at all to the ceiling. Whitehead's system uses 6000 watts and provides about 32 footcandles at the pews when all the lights are operating at maximum intensity. The dimming feature makes for long life as well as variable ambiences.

That the total project came in under budget naturally pleased the parishioners. Their greatest pleasure, however, is the effect on their windows. For the first time in the 35-year history of the church, the stained glass windows can be seen from the outside at night.

—M.H.

For product information, turn to page 70 and see Manufacturers.

We'd like to see your best lighting project: How to send it



JAY GOOD

It's easy to have your project considered for publication. You don't have to be a writer, but you do need to send enough information to let us "visit" the lighting project.

We want to see creative solutions to indoor and outdoor lighting problems, everywhere and anywhere a lighting problem has been solved with creativity, practicality, and innovation. We're interested in both electrical lighting and daylighting.

To make a preliminary evaluation, we need photographs and a brief written description.

Photographs

Sharp color transparencies focused on the lighting achievement are the next best thing to giving the editorial reviewers a tour of your project. Our first choice is 4×5 color transparencies, but we also accept 2¼×2¼ transparencies and 35mm slides. We prefer to review original slides or transparencies; we cannot review color negatives.

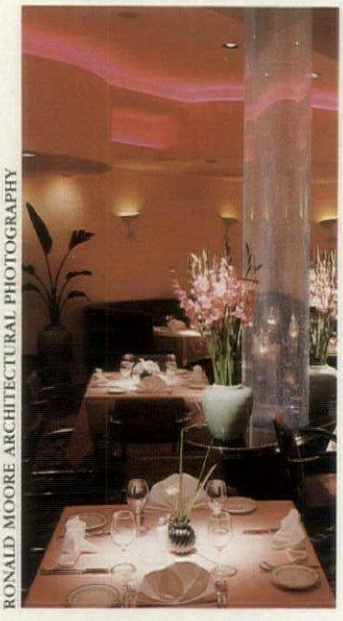
If your professional photos were originally shot as color negatives, please send full-frame prints. We prefer the following enlargements: 4×5 contact prints; 4×4 prints from 2¼×2¼ film; and 5×7 prints from 35mm film.

Be sure to provide the photographer's name and phone number, and indicate who owns publication rights. We return all photos promptly after review or publication.

Written description

Our editorial reviewers focus on information, not presentation; factual details are much more important than writing style. The best write-ups briefly describe the lighting design problem and the way it was solved, explaining the story behind what we see in the photos.

Objectives and scope. A brief statement about the effect the designer was after helps us evaluate whether and how well the objectives were fulfilled.



RONALD MOORE ARCHITECTURAL PHOTOGRAPHY

Philosophy. What broader, basic beliefs about what lighting should accomplish for the end user influenced your design objectives? Was the lighting solution chosen primarily for aesthetic effect? User comfort? Energy efficiency? Or for other reasons?

Calculations and planning. What did you do that might help our readers to approach their own work in some new and productive ways? Have you created or discovered a way to predict lighting results?

Light sources and luminaires. Why did you choose the particular lamps, luminaires, and/or glazing used in the project? What custom design or architectural detailing was involved?

Drawings

Drawings are optional. Include sections or details that illustrate the lighting achievement and any special luminaires, installations, or other notable features. If you send a reflected ceiling plan, please send an elevation with it.

The Review Process

Upon reaching our offices, your project submission enters our editorial review process. We send you an acknowledgment letter and circulate your submission among our reviewers. Usually, you can expect to hear from us within four weeks.

When a project is selected for publication, we usually request more information about the design team and your selection of light sources and luminaires. We may arrange a brief telephone interview to discuss design issues.

Finally, we offer contributors an opportunity to review article manuscripts so that we can correct any factual errors before publication.

Time to Publication

If the materials you submit for review are complete, and if the review and development processes are completed without any difficulties or delays, it is possible to rush a project into print in about 10 weeks. Typically, the time to publication — that is, from the time a designer submits materials for review until the published article is mailed to readers — is four to five months. If projects are complex, require additional art or photography, or are chosen to be cover stories, the total time to publication may be six to nine months.

To talk about your project or get more information, telephone our editorial offices at **(503) 343-1200.**

Send project submission materials to
Charles Linn, AIA, Editor
Architectural Lighting
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ARCHITECTURAL LIGHTING

Comprehensive master plan guides downtown Detroit lighting projects

ARTICLE BY
CHARLES LINN, AIA

PHOTOGRAPHS BY
DAN DANILOWICZ/PHOTOWN

A private fund-raising organization, in concert with the city of Detroit, has embarked on what is perhaps the most ambitious urban lighting program anywhere. That doesn't mean lights for just a few major streets here and there. That means, for starters, 43 separate lighting projects — new and historic buildings, churches, parks, monuments, boulevards, portals, gateways, and waterways. Orchestrated by a master lighting design plan, some of the lighting projects have been completed and now serve as an inspiration for downtown Detroit's renewal and growth.

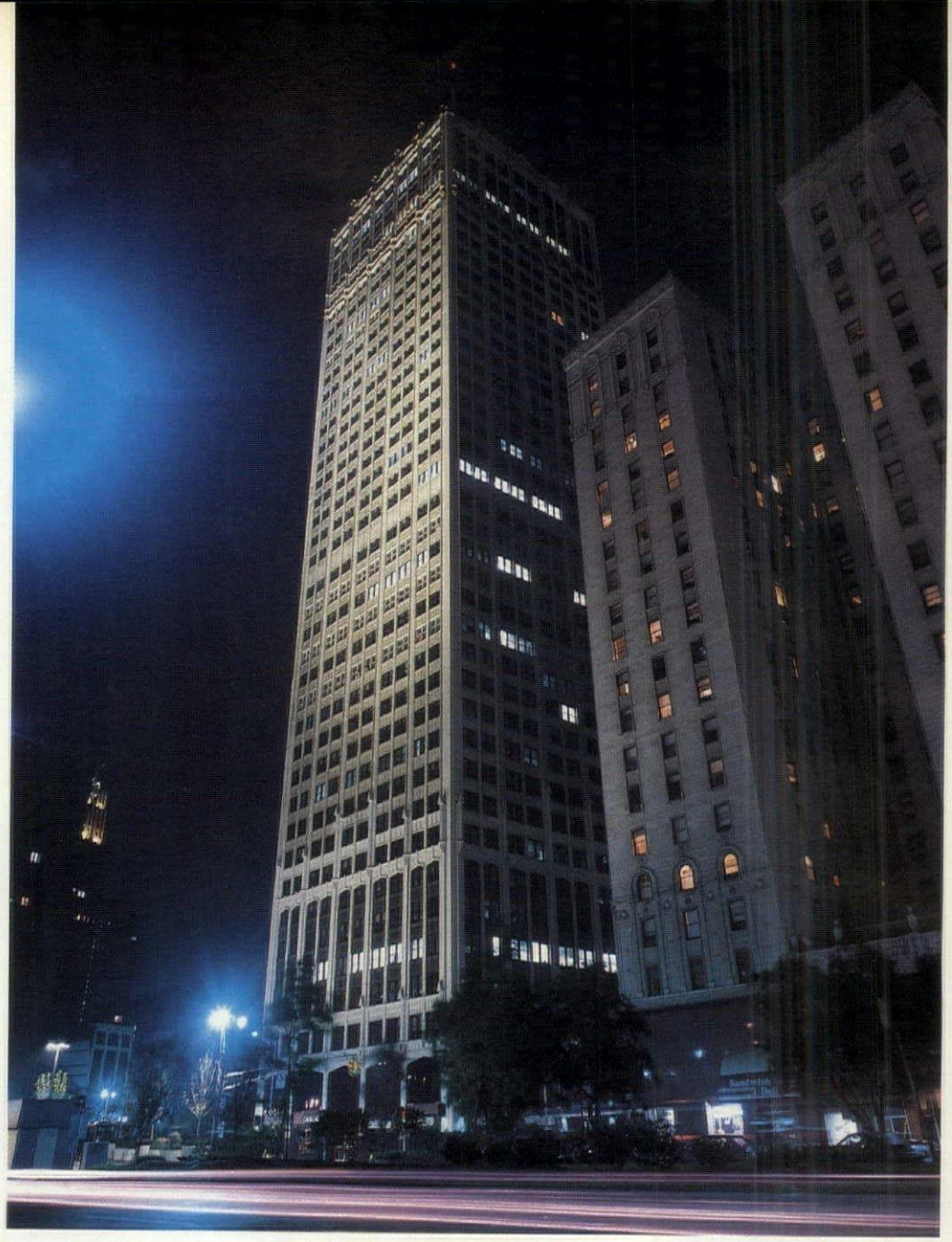
Howard Brandston Lighting Design began work on the master plan in 1984. It was financed by Detroit's Central Business District Association (CBDA), an organization whose involvement in lighting the central business district dates back over 30 years. For decades, the CBDA has acted as a liaison between Detroit's business community and city government, doing everything possible to make the best use of private, business, and government resources for the benefit of the largest urban center in Michigan.

The master plan has three goals, according to CBDA Foundation director Natalie Stocks: "The first is to improve safety and security through the lighting. The second is to improve the city's image, and the third is to encourage additional pedestrian traffic. Clearly, people have a poor perception of our downtown when it comes to crime. The sad part of it is that downtown Detroit is much safer than many people realize."

Hart Plaza (above and left), to date the largest project completed under the master lighting design plan.

Lighting designer Hayden McKay adds, "It would be incorrect to characterize the business district as dirty or rundown. But I do think they were finding that fewer and fewer people were willing to stay in there after dark. It didn't have the right

Project: Master lighting design plan
Location: Detroit, Michigan
Client: Detroit Central Business District Foundation
Lighting Designers: Howard Brandston Lighting Design; Howard Brandston, IALD, principal; Hayden McKay, AIA, IALD, partner-in-charge; Chou Lieu, IALD, partner; Thomas Thompson, associate; Alicia Kapheim, designer
Electrical Engineers: Giffels/Hoyem-Basso; Noray Sarkisian, PE, project engineer



atmosphere, and the CBDA wanted to encourage greater use of what was essentially an underutilized amenity.

"What was remarkable was that they focused on good lighting as a solution. They knew there was a big difference between quantity and quality of light and they saw lighting as a key element in making the place feel inviting and safe after dark. I think the CBDA realized that people didn't want to stay after dark because they didn't feel safe, so establishing that sense of security became a central criterion."

McKay cautions, "One of the things we emphasized was that lighting alone couldn't revitalize the area. If you have well-lit streets but nowhere to go, it's not going to work. The lighting isn't going to make the streets safe if there is nothing else to generate activity. People aren't going to get out of their cars and walk along the street just because it's pretty. Safety depends on numbers. The more people are out, the more people will join in, and soon these places become safe because of the activity."

Creating the Master Lighting Design Plan

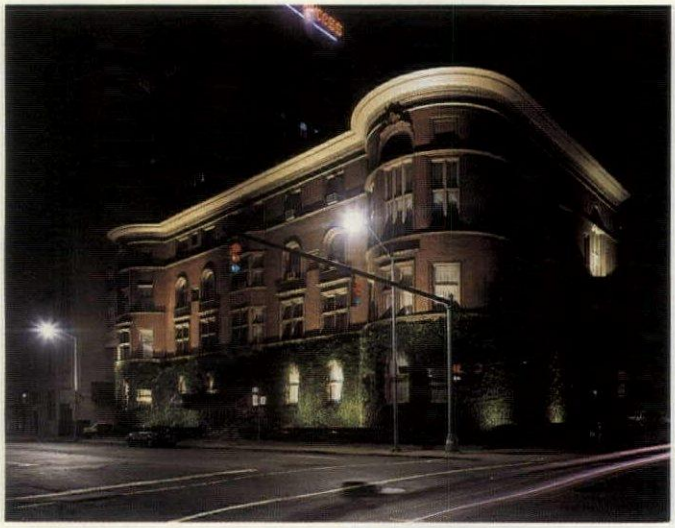
Howard Brandston describes the role of those who did research for the master plan as part recorder, part visionary, and part designer. One must observe, says Brandston, and then "write it down. The first house of worship you see, you write it down. The second one you see, you write it down. Then there are the monuments, the nodes, the main traffic flow, the main people flow, the main pathways, the secondary pathways, the key gateways, the portals. Which of them are important? We list them all.

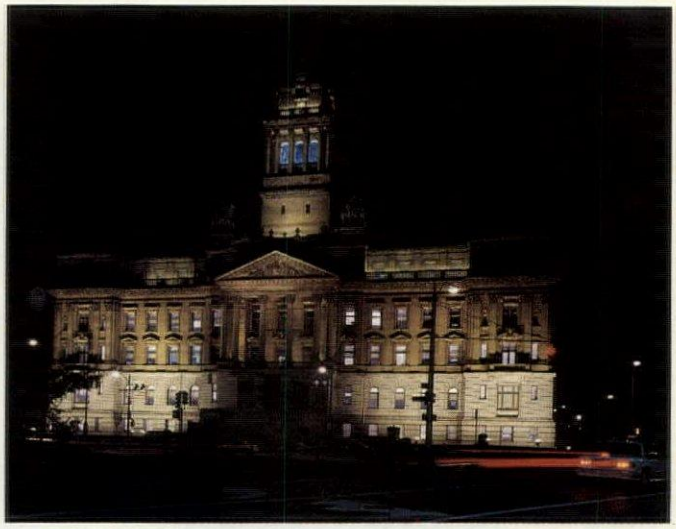
"If we look at the central business district of Detroit, four major freeways bound it, and they come in through distinctive portals. This ring of highways forms the boundaries. Then, main boulevards come in from that superhighway net. We located all of the parking structures and all of the means of transportation. We found all of the shopping districts, the restaurant rows, the theaters, the parks, and we mapped it all out. And patterns began to form.

"And we looked for the vistas and landmarks from Windsor — the city across the Detroit River in Ontario — as well as from Detroit. Now, we're starting to point out and weigh certain objects and areas for lighting within the vistas, and arranging visual priorities so that we know exactly the vista we're going to produce when the lighting is finally done. The resulting nighttime environment should give everyone a clear understanding of where they are and where they're going. It's some real research in environmental psychology and geography: what makes people go where they go, and why do they go there?

"So this plan sprang from the relationship of all these things; all of them form a pattern. And you write all of this down to answer these questions: what do you want to see? What do you want it to feel like in terms of how you see it, during both the night and the day? The lights we put out there are really a part of the street furniture for a city like Detroit; you see them during the day."

In describing the initial survey of the downtown area made by the lighting design team, McKay says, "I think that we had an advantage because we came in with very few preconceptions about the area and were able to take a fresh, objective look. We actually took a team there and stayed for almost two weeks, walking every single inch of the district during the day





The Cadillac Tower Building (opposite) and the Detroit Club (above left) have lighting designed by John Kennedy of General Electric. The Wayne County Courthouse (above right) has lighting designed by Smith, Hinchman & Grylls Associates. All are examples of privately owned buildings that have been lit since the master lighting design plan was adopted.

and the evening. We tried to get a sense of the different neighborhoods, both in terms of their architectural characteristics and what went on there. Some of the streets are narrow with tall buildings, like in the financial district. Other areas are quite wide open, with big wide boulevards and long vistas. These were very different in their nature and the way they were used.

"We also tried to get a feel for the activity going on in each neighborhood. Were there all-night restaurants and social activity or were they like the financial district — closed up after five o'clock? Starting with that, it was fairly easy to show diagrammatically what areas had potential for nighttime functions and how people would travel from one area to another. When the financial district businesses close down, for example, where do those people go for an after-work drink? What path would they take as pedestrians? Where is the parking? We try to look at how people move through the city in the day and the evening —their origins, their destinations.

"A helicopter ride from the police was also helpful in viewing the city from the air and getting a sense of the entire district. Not only was it just plain fun, it's also a good way of getting at a wonderful level of detail you really don't get from below — tall and short buildings, parks and open spaces, patterns, densities, shadows, and how the streets narrow and widen.

"So, on paper, we began to graphically locate districts and nodes; these are places of activity or potential terminus. And we came up with several ways to look at it. One was simply an analysis of movement, of how people move through a district, what they're looking at and where they're going. We tried to set up a hierarchy of visual importance for objects within the landscape — not only objects of visual importance that would create an image, but also recognizable objects that, if illuminated, would help orient people in the nighttime environment. Then, they could feel reassured and comfortable moving through the area and be encouraged by that to use it. All of these analyses begin to suggest priority areas to consider lighting.

"We also did an analysis of the amount of park space versus parking space in downtown Detroit, and found that the vast majority of the space in the downtown area was devoted to the automobile — either on the streets or in parking garages. There was a dominance of emphasis on the automobile and very little open space for people. But, we felt that you didn't have to shortchange the one in order to respect the other.

"If you're going to encourage activity, you're really going to encourage pedestrian activity. You not only want to feel safe on the streets, you want to have a lot of people on the streets, which in turn makes you feel safe. So to encourage this kind of pedestrian activity, the street lighting in particular had to be much more pedestrian related. We also found that the waterfront along the Detroit River was underutilized — it had almost no pedestrian walkways except for one associated with Hart Plaza. As outsiders who know the way other cities have responded to much less commanding waterways and vistas, we could see that this was really a missed opportunity."

Master Plan Recommendations and Design Development

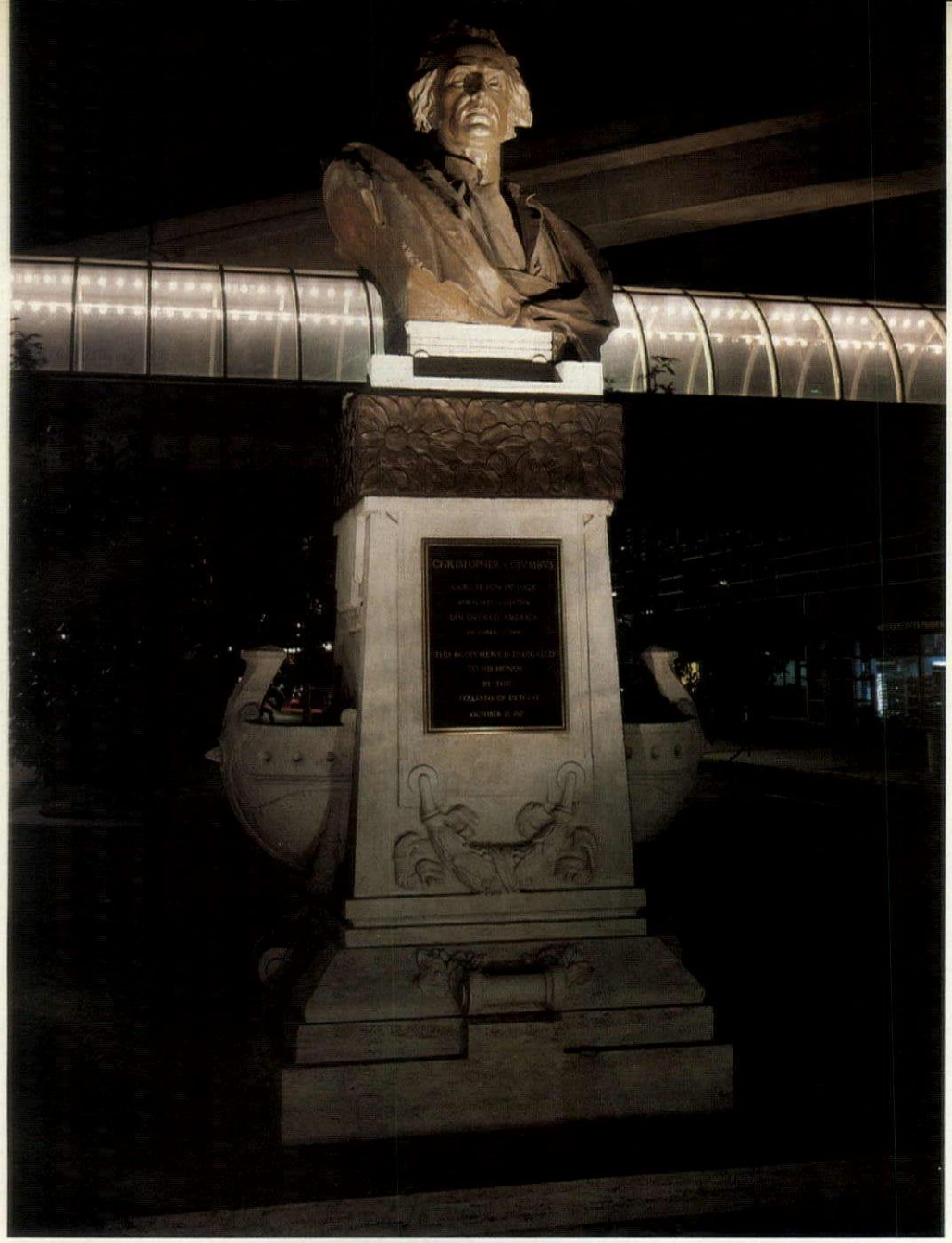
Howard Brandston Lighting Design was retained to prepare design development documents for 43 projects. The firm completed the final master lighting design plan in 1985, recommending that the projects be accomplished in three phases at a projected cost of just under $15.7 million. Projects to be completed during Phase I of the master plan are high-priority, high-visibility projects that, when completed, will have a major influence on perceptions of the area.

One of the most important projects is relighting the entry into downtown Detroit via the Detroit-Windsor Tunnel from Canada. The plan recommends a festive neon sculpture, says Hayden McKay, "to make that entrance seem like something very exciting and dramatic.

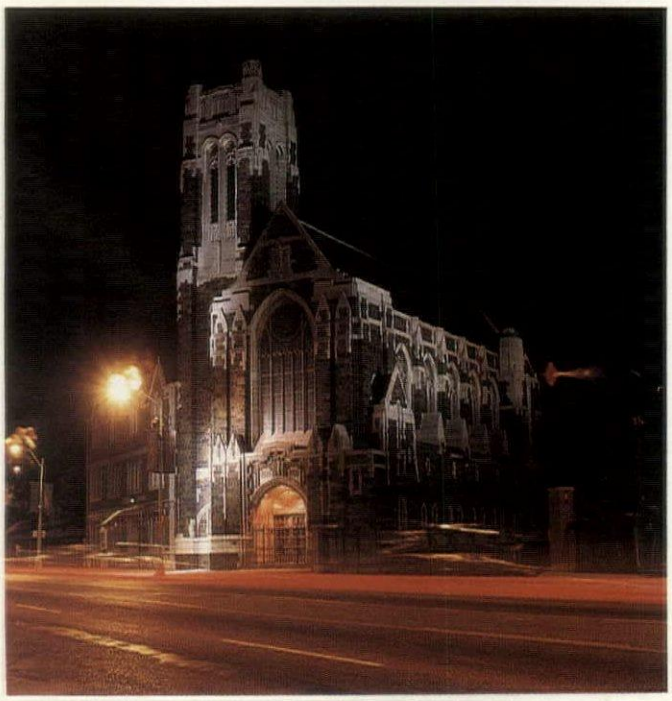
"In the central business district," she continues, "two avenues create a very strong symmetrical geometry; it's cut down the center by Woodward Avenue, and bordered parallel to the river by Jefferson Avenue. Those two streets are clearly the dominant transportation paths for both traffic and pedestrians.

"Jefferson Avenue, which is very wide and has a high volume of traffic, not only feeds into the Detroit-Windsor Tunnel at its east end, but feeds into a freeway system at its west end. When the cars hit the central business district on Jefferson, they are actually traveling quite slowly because there is a whole series of signals. Presently, it's lighted like a superhighway — not only because of the brightness levels, but also because of the use of high pressure sodium cobra heads. It gives the impression it's a highway cutting the river off from the central business district when, in fact, it should be viewed as a grand boulevard. Certainly no one is traveling any faster there


Fort Street
Presbyterian Church



Fort Street Presbyterian Church (opposite), the Christopher Columbus Statue (left), and Trinity Lutheran Church (below left) are all examples of lighting projects done under the master lighting design plan by Howard Brandston Lighting Design.



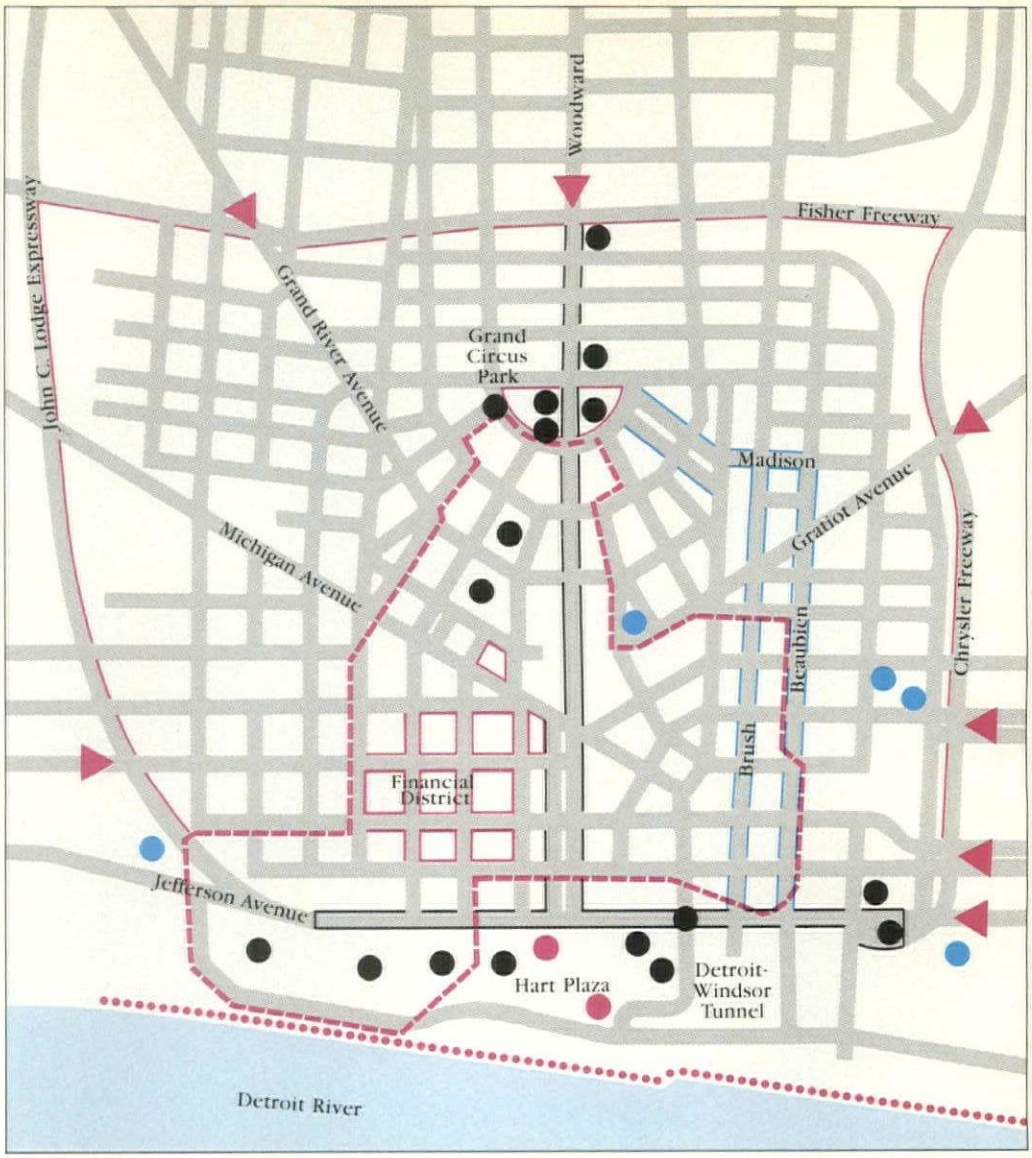
than they do on the Champs-Elysees.

"This avenue needed a change of image more than any other portion of the downtown area, because it just slashed through the key pedestrian activity. We saw the need to completely change its image from highway to grand boulevard — to have a good mix of traffic and pedestrians that always looks lively and human as the first introduction to the central business district. Relighting Jefferson Avenue is really a key way of inviting people into the district."

Major streets that provide access into the central business district from Jefferson will be marked by sleek, 65-foot, custom-designed, high-mast lighting fixtures with illuminated graphics at the base, uplighting for a series of stainless steel cables that will converge at the mast 30 feet from the ground, and hardware for securing banners. Similar fixtures, with a roadway luminaire mounted 30 feet above the ground and a second light at 15 feet for pedestrian scale, will line the roadway at 80-foot intervals.

Woodward Avenue, traditionally Detroit's grand boulevard to the Canadian border, will retain its historic character. Antique light fixtures at its southern end will be repaired or replaced with duplicate fixtures still available from the manufacturer from the original tooling. At the northern end of the avenue, multiple-globed modern fixtures will be replaced with this same new "antique" fixture. All fixtures will be lamped with metal halide.

The largest Phase I project completed to date is Hart Plaza. Nestled between the Detroit River and Jefferson Avenue, the plaza is the central business district's largest outdoor gathering space. It's primarily designed for



DETROIT

Master Plan

Phase I
- Lighting project site
- Street lighting project

Phase II
- Lighting project site
- Pedestrian kiosk lighting

Phase III
- Lighting project site
- Street, boundary, or park lighting
- People Mover lighting
- Waterfront lighting
- Gateway lighting

daytime use, but McKay noticed that although "it's very interesting to look at a plan of it, in three dimensions it's fairly confusing. When walking, there is a possibility a person could become disoriented — it's very difficult to tell where the plaza begins and ends.

"We thought a more three-dimensional approach was required to define the perimeter, so we proposed the use of lighting on large flagpoles at the boundaries and around the two amphitheaters. Uplights mounted on the poles illuminate the flags, and downlights provide infill ambient and security lighting. When activity is going on, the waving flags and all of the light coming out will indicate where the activity areas and boundaries of the plaza are. We also designed special post luminaires to light most of the perimeter pathways of the plaza; they also help to organize this very sculptural space and give it a more three-dimensional character. Because of Hart Plaza's proximity to the waterfront, we hope the same fixture will be used up and down pedestrian walkways along the Detroit River."

Other Phase I projects were designed to augment the lighting on the avenues and at Hart Plaza — lighting churches, buildings, and monuments near these major projects.

Most of the lighting under Phase II of the master plan will be more pedestrian-oriented. Lighted kiosks will illuminate pathways to encourage pedestrian activity and stimulate economic development between the theater, entertainment, and waterfront–civic center districts. Five other buildings are also to be lit under Phase II.

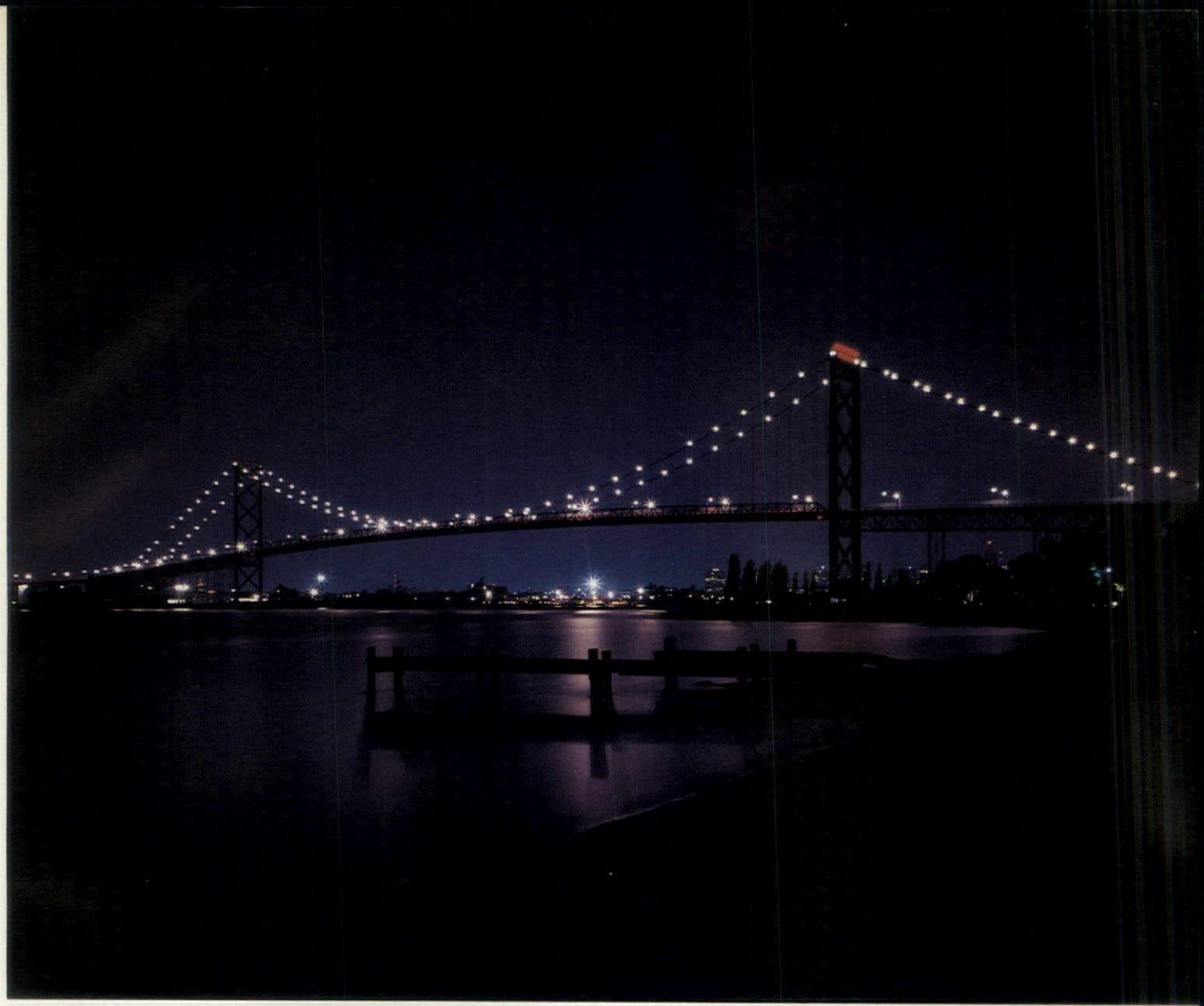
Phase III concentrates on further defining the central business district through lighting. Lighting will be used to create gateways into the downtown area, illuminating the boundaries of the central business district, the waterfront, the financial district, Grand Circus Park (where five of Detroit's major boulevards converge), and the People Mover (a light rail system that runs through the downtown area). Other projects will illuminate Capital Park, the Hart Plaza Promenade, Bagley Fountain, and Kennedy Square.

The Politics of Lighting

The work of the CBDA shows how much a civic organization can accomplish when working in concert with a city government. "We began working with the city on lighting projects in 1954," says Natalie Stocks, "when we started raising private money to provide decorative lighting during the holidays. We lit hundreds of trees and streetlight poles, and continue to do that today. That's how we came to have a long-standing relationship with the Detroit city government."

The CBDA's first permanent lighting project came in 1981, when in only eight weeks, it raised funds to light the Ambassador Bridge, a suspension bridge connecting Detroit and Windsor. The enthusiasm generated by this project convinced CBDA president Diane Edgecomb that it would be worthwhile to light other Detroit landmarks. Soon, the Wayne County Courthouse and Detroit's historic Mariner's Church also were lit.

"Diane had the idea to raise money for additional landmark lighting," continues Stocks, "and was introduced to Mike Ilitich, chairman of the board of Little Caesar Enterprises and owner of the Detroit Red Wings hockey team. He said he thought we needed a master lighting plan for all of downtown! Instead of raising funds one project at a time to light up one or two landmarks here and there, why



The Ambassador Bridge (above), lit in 1981, was the Central Business District Association's (CBDA) first permanent lighting project. Enthusiasm for this project inspired the CBDA's pursuit of a master lighting design plan for Detroit. The lighting design for the bridge was done by Motor City Electric.

didn't we just do a big master plan? Mr. Ilitich funded our search for a lighting designer, and from the many proposals submitted, we found Howard Brandston Lighting Design. The firm designed and wrote the master plan, and in 1985 we permanently lit the first projects under this plan."

The lighting master plan is an ambitious one, and Natalie Stocks is careful to share the credit. "We are raising about half the funds for these projects, and the city of Detroit has committed to funding the other half. Although most of the projects are on public property, it was felt that the private sector needed to contribute too, particularly because most of this is custom lighting and the city is just never going to have the money to do it. The citizens and businesses should also really be responsible. After all, they are the direct beneficiaries of the program."

Stocks is modest about the effects the program has had on current activity in the downtown Detroit area. "I can't say that our work has been *the* major catalyst, because there is so much going on downtown. We've just had a major expansion of Cobo Hall, a project that was to be lit under Phase I, so a lot of these projects just seem to happen together. We're all working on the revitalization of downtown.

"But as far as lighting projects are concerned, we've certainly had an influence, and we do help private building owners locate lighting consultants if they are interested in lighting their buildings." The Cadillac Tower Building and the Detroit Club are examples of two private buildings that recently were illuminated.

The Value of Master Planning

"The important thing," says Howard Brandston, "is that the master planning process gives you a guide to a city's potential to capitalize on the improvement of both the luminous environment and the daytime environment, in terms of the visual clutter that streetlights tend to gather. You get a real handle on what can be done, so things don't proceed in an ad hoc manner, which often becomes costly, and sometimes detrimental to the city. You get a real clear view of what you might look forward to achieving. But also, it clearly tells you what you're going to get — it doesn't lead to heightened expectations that may never be fulfilled.

"Aside from all of the design issues present at the city scale, it takes an understanding of how to deal with business, bureaucracy, politics — all of the elements that interface to make the master plan work, right down to the fund-raising it takes to make it go. And years later the master plan can serve as a record of the history of the time and the vision of what could happen. It's a record of what the people of the city thought of the place at the time and what they hoped to achieve." ■

Safety ranks first in prison's lighting priorities

Gareth Fenley

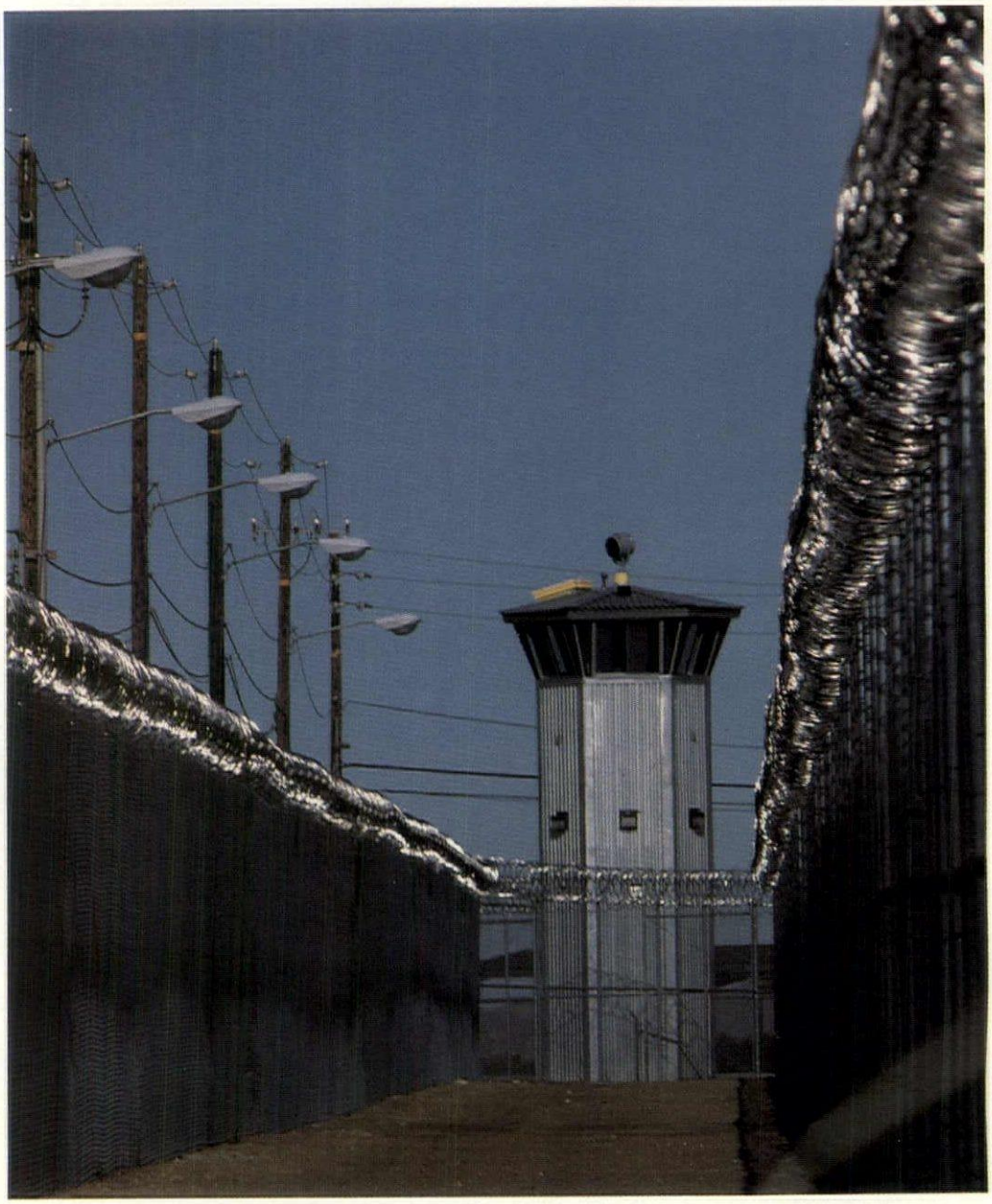
Gareth Fenley is senior assistant editor of Architectural Lighting.

In a prison yard, visual task performance is a paramount life safety issue. Guards must be able to discriminate between inmates and officers at all hours of the day and night. Mistaken identification can be life threatening.

To protect prisoners and staff, governments set stringent quantitative design criteria for site lighting at prison facilities. California, for example, requires minimum levels of 5 footcandles between dual perimeter fences and 0.5 footcandle within exercise yards. But there's more to design than matching these numbers. Color rendition, emergency backup, and the selection and placement of support poles also vitally affect the safety of a facility.

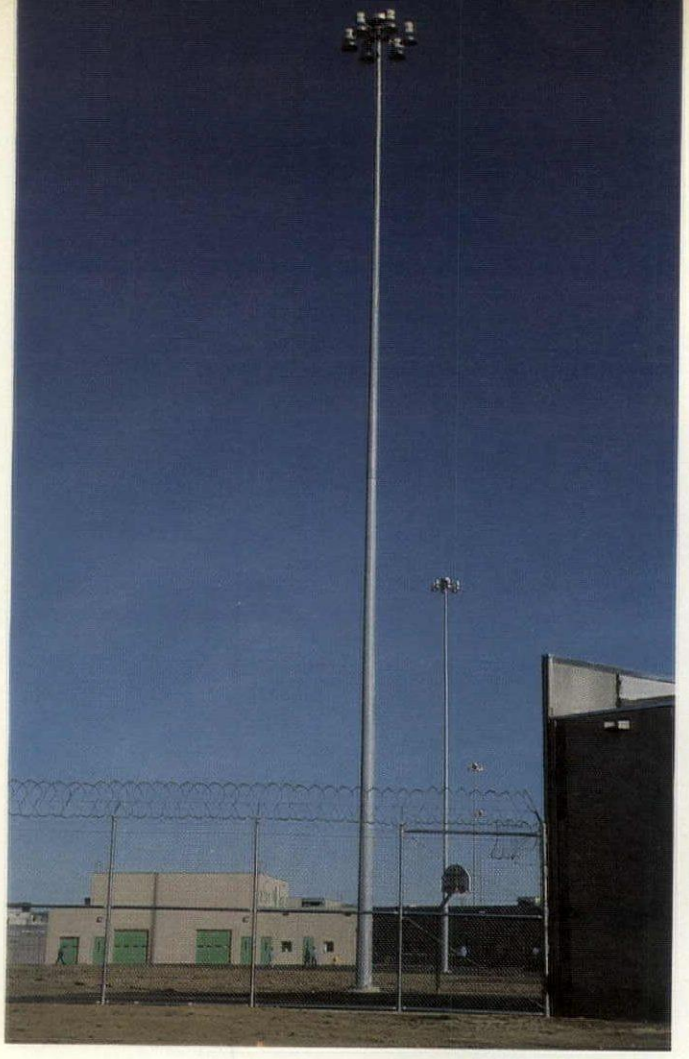
Although safety gets top priority, cost is a significant limiting factor. To accommodate increasing numbers of inmates, prisons must be built and maintained as economically as possible. Like many other states, California has a shortage of prison facilities. The population of its medium-security Avenal State Prison exceeded its designed capacity of 3000 inmates less than four months after it was completed.

Site lighting at Avenal covers the bases for safety while keeping cost down. Perimeter lighting is achieved with cobra-head high pressure sodium (HPS) luminaires that meet Highway Department specifications. They are mounted on wooden

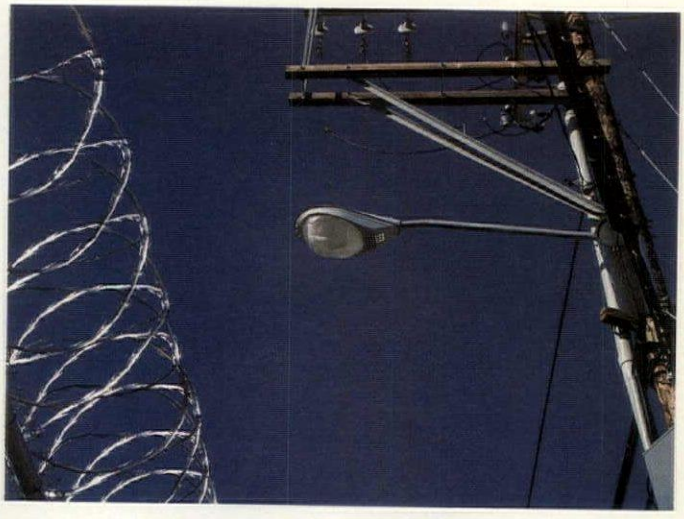


Cobra-head fixtures light the perimeter at Avenal State Prison.

Project: Avenal State Prison
Location: Avenal, California
Client: California Department of Corrections
Architect: NBBJ
Electrical Engineer: Lenny Zimmermann, Syska & Hennessy
Photos: Jerry Losik



High-mast luminaires light exercise yard. The fewer poles, the better, because clustered support structures here would pose a security risk.



Standard utility poles and highway lighting equipment enable quick maintenance at a remote prison site.

poles that meet utility company standards. The cost-effective solution uses one structure for two functions: lighting and overhead power distribution.

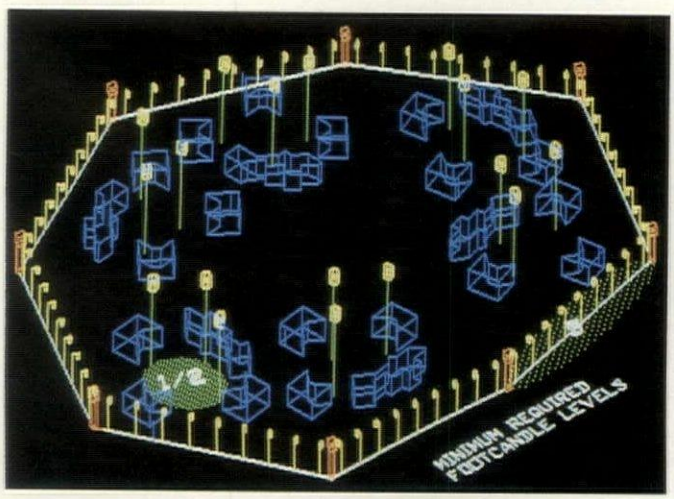
The monochromatic color rendering characteristics of low pressure sodium would have subdued the differences between inmate clothing and correctional officer uniforms. High pressure sodium has better color rendering qualities, and is therefore safer, yet it maintains a high level of operating efficiency.

High-mast HPS luminaires, which also conform to Highway Department specifications, are located in exercise areas. Their arrangement provides efficient, uniform illumination of large areas with a minimum of support structures, which can pose a security risk.

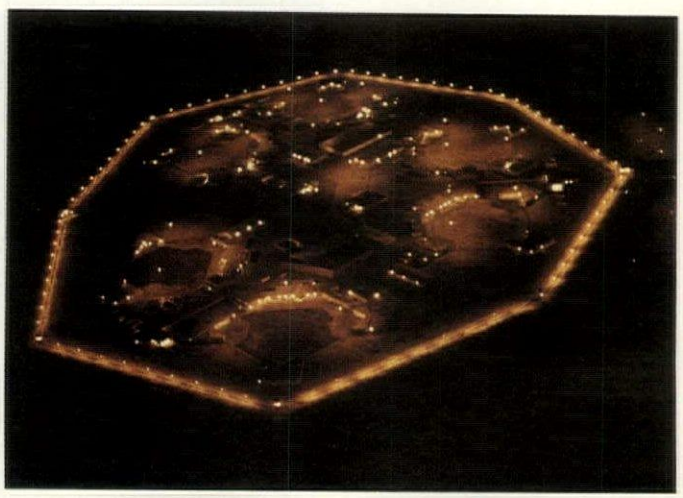
Instant action is required in a time of disaster at the prison — whether it's accidental or intentional. Traditionally, perimeter HID lighting is augmented with a separate quartz system for backup during power interruptions. At Avenal, uninterruptible power supply systems that support all security lighting have eliminated the need for costly, energy-intensive quartz backups. The standard Highway Department and utility company equipment also allows for quick maintenance at the prison's remote site.

All told, the selection of equipment and the lighting layout at Avenal help make the prison yard a safer place to be. ■

For product information, turn to page 70 and see Manufacturers.



Computer-generated design drawing shows layout of site lighting equipment and the minimum required footcandle levels.



Aerial view of the completed prison at night. The bright perimeter zone is a formidable barrier to inmates within.

Wrigley's lighting: Great for television, but will the Cubs win a pennant?

Jane Ganter

Jane Ganter is associate editor of Architectural Lighting.

The designers who lighted Wrigley Field faced more than the usual technical, functional, and aesthetic challenges associated with lighting a major league ballpark. The Chicago stadium had been home to day baseball, *and only day baseball,* for 74 years. Sometime during the last 40 or 50 years, the lack of electric lighting had turned to a virtue. Playing all home games in daylight became a sacred ritual — practiced in Chicago, but honored everywhere that baseball fans called themselves "purists."

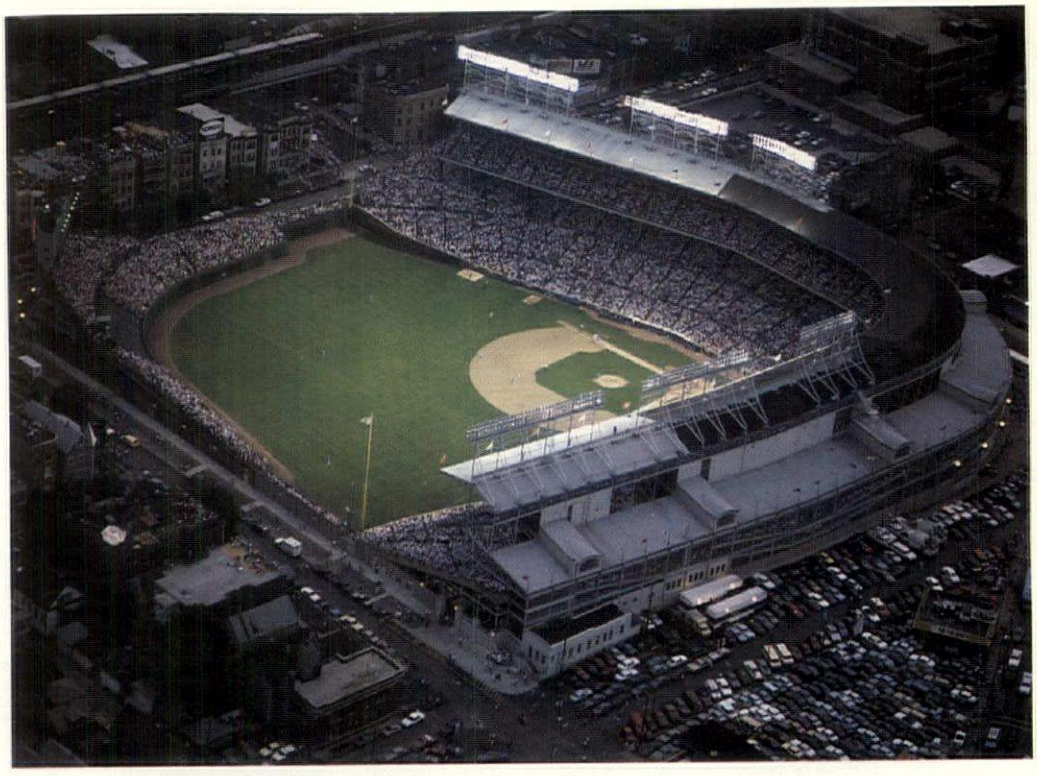
Even as it tried to put the emotional and political furor in perspective, *USA Today* referred to Wrigley Field as "a shrine, a museum of baseball landmarks." Ben Brown wrote, "In this post-nuclear age of solar energy and semiconductors, how curious that so many otherwise sane folks are preparing to go berserk over the debut of electric lights." Curious indeed, when the summer of 1988 might have been the Chicago Cubs' 47th season of night games. World War II postponed the lighting of Wrigley Field; that's when Philip Wrigley diverted to the war effort the structural steel that was about to become towers for banks of Wrigley Field lights.

The architects and engineers at The Osborn Engineering Company say they never before worked on such a high-profile project. Under the scrutiny not only of the clients and owners of the facility, but also of the national media, the designers coped with making the field lighting aesthetically pleasing for the fans, appropriate for the television cameras, and functional for the players, while minimizing light trespass for the stadium's North Side neighbors. The owner wanted the playing field unblemished by massive lighting towers and the curved and arching lines of the stadium undisturbed by overly obtrusive structures.

Because the stadium had been used only during daylight hours, only minimal work lights for clean-up crews and metal halide lighting in the main ground level concourse existed. The playing field, grandstands, bleachers, concourse, scoreboard, parking lots, and building exterior all had to be lit for night games.

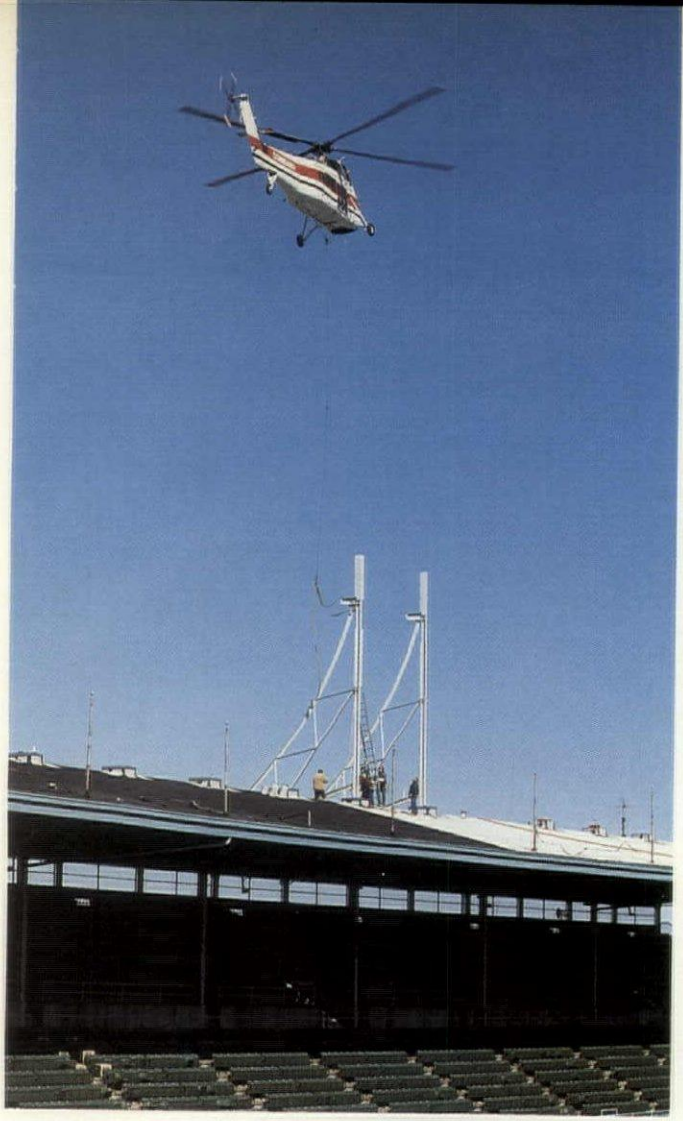
Field Lighting

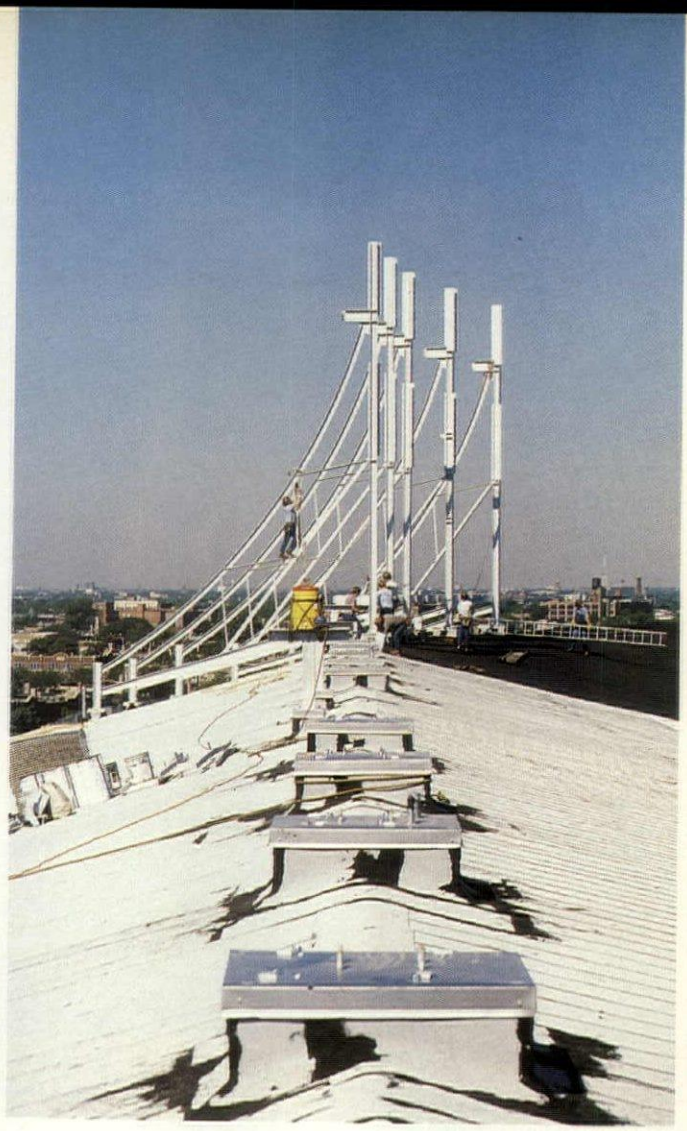
"It is such a historic ball park that we tried to incorporate the light towers architecturally with the motif of the stadium," says architect Dale Swearingen of Osborn Engineering. "That was a difficult challenge. There are no poles in the outfield." Mounting all the lights on the roof is unusual, but not unique. "Yankee Stadium doesn't have poles in the outfield, but their stands go a little farther out into the outfield than these do," says Osborn engineer Bill Tanruther. "At Wrigley, it's a long reach out into deep center field from where the outfield floodlights are mounted on the stadium roof. But advancements in floodlighting made that possible. The fixtures we used have a narrower beam spread than older ones had."



Some fans refused to join the sell-out crowd for the first night game — an event for which $10.50 tickets were being scalped for as much as $500 each. On National Public Radio, an annoucer said, "A so-called friend of mine called me up and said he could get me a ticket. I thought about it for about a second and then I said 'No.' It was a little bit like being invited to watch my old high school torn down."

Project: Wrigley Field
Location: Chicago, Illinois
Client: Chicago Cubs
Owner: Tribune Company
Architect and Engineer: The Osborn Engineering Company; Dale L. Swearingen, chief architect; William J. Tanruther, director of electrical engineering
Floodlighting Designer: John Frier, GE Lighting Systems
Photos: © 1988, Stephen Green





Structural steel stanchions and racks are designed to echo the arches of the stadium. The contractor, Commercial Lighting Company, first put up the frames, columns, vertical supports, and curved braces. The reach was too long for a crane, even if there had been a suitable place to put one. So, everything on the stadium roof was put up with helicopters.

John Frier, senior applications engineer with General Electric Lighting Systems department, points out some advantages of the roof-mounted lighting. "Looking out on the outfield from any position in the grandstand, you're basically looking into a situation much like that in a theater, where the lights are all aimed away from you. A black band around the outer edge of the reflector cuts off most of the high-angle light that you'd get off the lamp. So the reflector itself doesn't bother you unless you're looking right at it. With no floodlights in the outfield, you're not conscious of any brightness. If you have the outfield poles, there's no way to avoid looking at the floodlights because they are 10,000 times brighter — probably more than that — than anything else in the area."

Frier and the designers at Osborn worked together to establish the locations, mounting heights, and number of fixtures to use. "GE has a computer program in which you put the exact locations of every fixture, and so on, and then it determines the aiming point on the field and figures the footcandle level at any point on the field," Tanruther says.

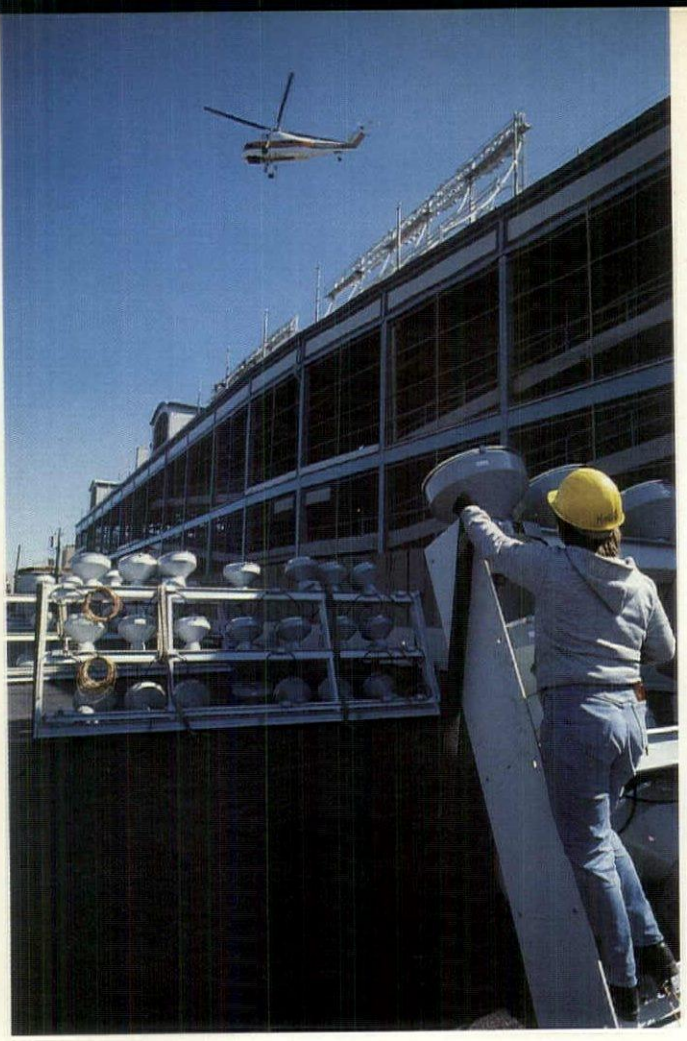
The six banks of lights are mounted on structural steel stanchions and racks designed to echo the arches of the stadium. "The first thing the contractors did was put up the frames, the columns, the vertical supports, and the curved braces. Next, over in another building, they prefabricated each rack — the piece that goes between the columns. They mounted all the fixtures on it and put the conduit on it before they put each rack on its frame. It would have been an awful tough job to do with a crane — too long a reach and really not much place to put a crane," says Swearingen. "Everything that's on the roof was put up with helicopters."

A catwalk immediately behind the banks of lights permits access to each of the three levels. "From the top of the roof to the top fixture is about 36 or 37 feet. So right at the very top of the roof we have a second catwalk that basically links all the light banks together. Once you go up into a light bank, there's a catwalk in that light bank to service the fixture. That makes service very easy, and it's a safety consideration, too; the wind comes off the lake pretty fiercely in Chicago," Swearingen says.

Each of the 546 fixtures holds a 1500-watt metal halide lamp. "They should last many years," says Tanruther, "but when replacement is necessary, it can be done without interfering with the aiming. A person need only rotate the fixture back and change the lamp inside; then the unit returns to the original position the computerized system established for aiming. It's like a lock that returns to its original position."

The position of each lamp was determined by target aiming — a technique that involves covering the field with cardboard targets on 30-foot by 30-foot centers. GE provided an aiming diagram and identified each floodlight, using an alphanumeric system that identifies each fixture by a letter and number. Corresponding letters and numbers — large enough to be legible from the positions of the floodlights — were printed on 14-inch by 22-inch cards. "Each floodlight is aimed at the target with the corresponding letter and number," Frier says. "It's the most accurate way of aiming the floodlights."

Computer aiming is done the same way. "Most fixture manufacturers have design programs," Frier says, "but really, they're not *design* programs. It's just a way of checking your design. Our program is called Illum. It



will calculate light in any direction from fixtures located wherever you want them. Also, it will calculate it from the location of a television camera or a player. So we could predict approximately what a player will see. We don't like surprises." But a few surprises arise anyway, before a system is fine-tuned.

"There were a few things that we had not anticipated," Frier says. "One of them was the brick wall at the end of each baseline. The way we had originally aimed it, we were aiming floodlights from the end of the rack right above that location, directly down. So we had a really intense shadow. So we brought the lights in from a little greater distance and a little higher angle to soften it." Because the center fielder reported a visibility problem at the July 25th batting practice, they added 6 more fixtures to the original 540.

Minimum illumination in the infield is 250 footcandles; in the outfield, 150 footcandles. "We have to calculate the light not only on the field itself in the direction of the play, but also in the direction of the TV cameras. So we calculate not only the field lighting but also the vertical lighting on the players from the different directions. We were concerned about the light in the outfield, so we did a vertical calculation all the way up to the maximum height of the ball (about 150 feet) to see how much vertical light we'd have on the side of the ball coming into the deep outfield. All those calculations were done before we ever finished the design," Frier says.

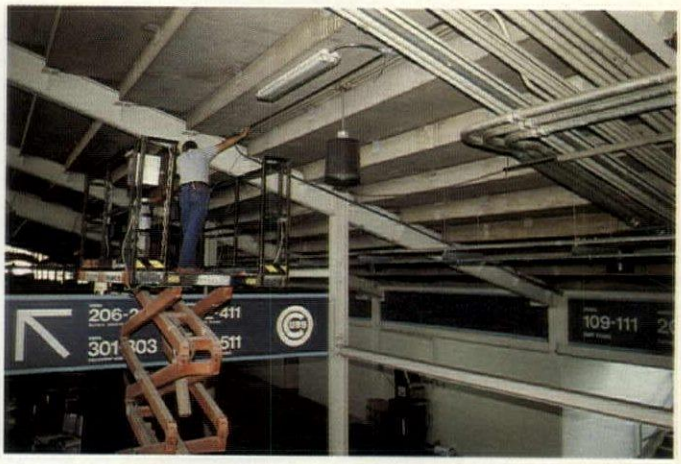
A lot of light strikes the side of the ball out in the outfield. "There's no question of the ball getting dark or disappearing," Frier says. "At Wrigley Field, the light is coming basically from the side, so you're looking at two crescents, really, if you actually stop the ball in the air. But the ball is such a small object that you're really only conscious of its location rather than exactly how it looks. So, as long as the ball can be seen from the infield all the way to the outfield, that's the only consideration. The outfielders generally make a decision about where the ball's going to be as it leaves the infield, and there's plenty of light on that ball leaving the infield."

The light levels are important for the television cameras, too. "It's important for depth of field," says Swearingen. "The more light you have, the more you can close down the lens opening to get more depth of field." Tanruther adds, "It lets the camera zoom in from the outfield, for example, to get the catcher's face and the catcher's signals. Another important thing for television cameras is fairly uniform lighting. The maximum to minimum ratio should not exceed about 2 to 1 in a given number of feet. Otherwise, when the camera pans across the field, your TV screen goes dark. You see that happen in high school games sometimes. They have a good picture, and then they pan around and it goes dark because the operator can't adjust the camera fast enough."

Frier is pleased with the fact that they were able to provide those high levels for the cameras without creating unpleasant glare in the grandstands. "When you're sitting in the stands," he says, "especially a little way back from the side of the field, the edge of the roof provides a complete shield of the lights. So you're not conscious of any lighting at all. You see just this huge lighted panorama in front of you and have no idea where the light's coming from. Television cameras can pan all over the place; they can follow a ball and never pan into the lighting equipment from the infield cameras. From the outfield camera, of course, you could. With that black insert in the fixture, the TV people can close down the lens on the camera and actually shoot into the lighting bank. That's the first time I've seen that done without completely washing out the TV screen. When they shoot it at an angle, there's not enough brightness coming sideways off those floodlights to wash out the picture."

When the cameras focus on the scoreboard in deep center field, they won't show a modern computerized one. Even Wrigley's major break with tradition had its limits: the classic scoreboard stayed. "They've got people behind there," one designer said. "I wonder what it would be like inside that place?" Outside, it is lit with floodlights that are typically used on billboards and highway signs. To make them as unobtrusive as

The racks that go between the columns and support the fixtures were prefabricated. The fixtures were mounted and the conduit installed before each rack was put into its frame. Catwalks link the light banks, not only to make service easy, but also for rooftop safety in the Windy City.



High pressure sodium was chosen to light the ramps and the concourse at the back of the seat deck because the back of the stadium is fairly open to the outside, where HPS sources are used in the parking lots and in the old-style street lamps with acorn style globes.

possible, Tanruther mounted the fixtures atop the structure instead of in their more usual uplighting configuration.

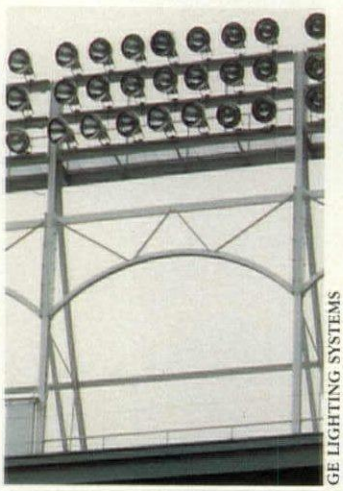
Grandstand Lighting

Lighting the playing field meant that all the public areas — ramps, grandstands, concourse, parking lot — also had to be lit. There were a few incandescent lamps on some of the ramps and some rudimentary lighting in the main concourse because that needed some lighting help even in the daytime. "The rest of it," says Tanruther, "all the public areas had to be lit up for nighttime operation. There wasn't a lighted exit sign in the whole place. So we had to put in something like 150 exit signs."

The lighting over the seat decks is 175- and 250-watt metal halide in square, enclosed, lensed fixtures. The owner chose metal halide for the grandstand and the main concourse because the light on the playing field is white light from metal halide sources. The lights outside of the stadium, from the street lighting, are high pressure sodium.

"New lighting around the stadium is in keeping with the period — the stadium was built in 1914. Old-style cast poles have acorn type globes. We had to have a break between the white light and yellow light someplace," says Tanruther. "The ramps and the concourse at the back of the seat deck are all high pressure sodium because the back of it is fairly open to the outside and people can see the yellow lights from the outside. And the seat deck — which is what the fans see and what the players see from the field — is metal halide."

Emergency lighting is often a tricky issue with HID sources. "If there is a power interruption, all the lights will go off. They will not come on again for about 10 minutes," says Tanruther. Although there is auxiliary lighting in the grandstand, there was none in the outfield or in the bleachers. The Wrigley system is designed so that an emergency generator comes on if a power outage lasts longer than momentarily. Half the fixtures over the seating decks, concourses, and ramps are on emergency circuits. Some have quartz lamps for emergency use; the HPS lamps have a hot lamp restrike feature.



GE LIGHTING SYSTEMS

A black insert in each fixture lets photographers shoot at the lights from an angle without washing out the image.

Eighteen of the fixtures that light the field have a special hot restrike ballast that will turn the 1500-watt metal halide floodlights back on instantly. Part of the reason for including those 18 floodlights in the emergency system is that the field lighting is the primary light source for the bleachers. "There's no convenient place to mount fixtures to light up the bleachers if the field lights are off," says Tanruther.

"It takes about 60,000 volts to reignite that lamp when it's hot," says Frier. "The lamps in those 18 fixtures are of special construction so you can apply 60,000 volts to them without blowing them out."

If playing baseball in the cool of the evening improves the team's statistics, the fans are likely to have a blowout that combines the liveliest features of New Year's Eve and the Fourth of July. The Cubs have won no pennant since World War II, no World Series in 80 years. Sports writers have statistics showing that the team batting average worsens in the heat of July and August. They're waiting to see whether adding home night games makes a difference.

The Cubs won their first full night game, after being rained out on August 8. If they ever make a run for a pennant, even the Citizens United for Baseball in the Sunshine (CUBS) may decide to start taking in night games. ■

For product information, turn to page 70 and see Manufacturers.

With lighting help, restoration outshines original

Mike Heffley

Mike Heffley is an editorial assistant with Architectural Lighting.

Lighting plays a key role in the restoration of historic buildings, such as Boston's United Shoe Machinery Corporation Building — now renamed the Landmark. In such restorations, modern viewers want to see the building and its spaces more clearly and dynamically than did the users of the original. At the same time, they want the illusion of historical accuracy untainted by blatantly modern fixtures.

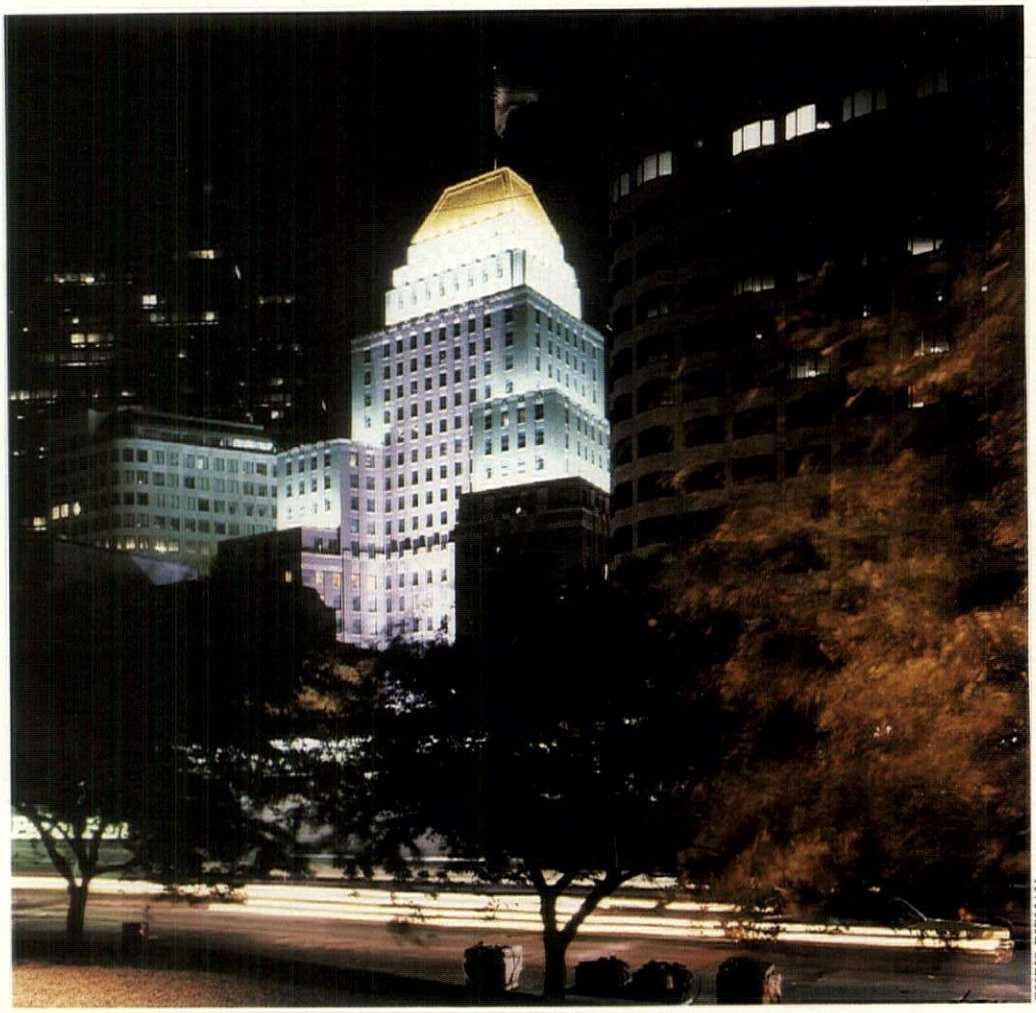
In 1930, the Landmark building was a pioneer project in several ways. It was the city's first skyscraper, with 24 stories. It was the first of a series of stepped buildings with ziggurat-like massing required by new restrictive zoning laws of the time. To allow air and light to reach the street, city planners removed earlier height restrictions with the qualification that buildings above 125 feet had to slope away from the street at an angle of approximately 68 degrees.

The building was also the first night-lit skyscraper on Boston's skyline. Its roof, a steep peak with a flat top supporting a huge American flag, is made of clay tiles with an orange-yellow glaze. In sunlight, the effect was of bright gold leaf, and at night spotlights kept it shining. The roof lights stopped coming on during World War II, were on only sporadically until the 1960s, and had been off completely for the past two decades. Lighting designer Chris Ripman turned them back on and extended the exterior floodlighting to ground level.

After studying the nature and general design of the original floodlighting, Ripman's staff experimented with various mock-ups at night to get the best rendering of the gold roof and the limestone walls and ornaments. High pressure sodium floodlights (150 watts) worked best for the roof, and the fixtures ringing its base served to light the flag as well. Planted at the base of the flag are 400-watt metal halide floodlights that bring out the blue and white of the flag.

Mercury vapor and 3000K metal halide lamps are used to uplight the building's six stepped layers. The mercury vapor source is used on the upper floors, where short throws make beam photometrics less critical, for its long lamp life and good color rendition of the green walls. Clear metal halide lamps are used for long throws from the 3rd to the 20th floor where a clear source is required for precise beam control. Quartz sources spotlight the lower flagpole, with its gilded eagle and second large flag.

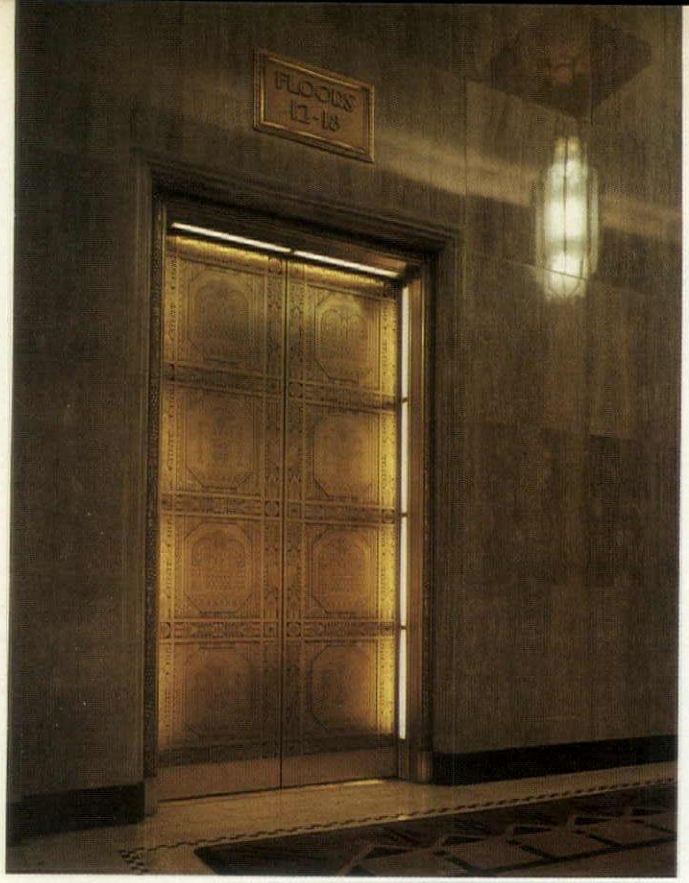
The main lobby is an Art Deco showpiece, its cast linear and ray patterns mixing with the floral motifs in the trim, fixtures, and grillwork. Ripman's challenge there was to highlight streamlined design and elaborate detail, both discreetly. "We wanted no break between the exterior and interior lighting," he says. "The fine Art Deco



CHRIS RIPMAN

Golden peak of the Landmark Building topped Boston's first night-lit skyscraper in the 1930s.

Project: Landmark Building
Location: Boston, Massachusetts
Client: Meredith & Grew, Inc.
Architect: Jung/Brannen Associates, Inc.; Neil Middleton, lead architect
Lighting Designer: Chris Ripman
Electrical Engineer: Cosentini Associates
Interior Designer: Jung/Brannen Associates, Inc.
Photos: Gregory Murphey



Light strips in the trim surrounding the elevator doors bring the brass Tree of Life etchings out of a half century of shadows.

detail of the main lobby really begins with the bronze grillwork outside the entry." Ripman had quartz wall washers cut into and painted to match the stone above both sets of entries to light the side walls and accent the grillwork; he also uplit the grillwork.

Ripman worked from the beginning of the restoration with architect Neil Middleton. They started with a building that, six years earlier, a prominent structural engineer had pronounced decayed beyond repair. Their first task was to strip away years of patchy attempts at modernization.

"The beautiful original Art Deco etched glass panes in the gold-plated cast aluminum pendant fixtures had been replaced with white acrylic panels," Ripman says. "We were all set to do some $10,000 worth of research and development to simulate some etchings of the period. Then an elderly maintenance man heard us bemoaning the loss of the originals and took us down to the basement. He had saved a sample of each different design on his own, and carefully stored them away, years ago. It was an incredibly fortunate thing."

The linear patterns created by the pendant and glass designs, Ripman says, set the Art Deco tone in the lobby that he'd worked so carefully to establish outside. Art Deco *light,* Ripman explains, is not to be confused with Art Deco *fixtures.*

"The light has a layered quality, like the architecture," Ripman says. "It isn't an even wash. It rather stops and starts between patterns of lines, maybe curved lines, kind of like waves on the beach." Multiple compact fluorescents replace the original incandescents. They give the appropriate sense of point sources even when diffused by the sandblasted glass. They also keep maintenance and energy costs low. Small PAR lamps were hidden in the tops of the pendants to uplight the ornate gold leaf ceiling medallions above them.

Twelve bronze elevator doors are the lobby's glory — and were Ripman's biggest challenge. Each door is brushed with a vertical grain and etched with eight panels in a tree-of-life motif, with black paint rubbed into the designs so they can be read. All were buried in shadow and resisted numerous attempts to bring them out. Already recessed from the wall, the vertical grain reflected what light hit it — from the chandeliers or from various mock-ups of sources from the opposite walls, from directly above, from the ceiling, from the side — down to the floor.

The lighting solution is a simple fixture that Ripman and his staff made by mounting sockets on a piece of metal strip to house F15 T8 fluorescent lamps within the trim surrounding the door. The fixtures, which hold 15 lamps each, brought the trim piece out about 3 inches all the way around and are set in frosted glass to diffuse the multidirectional light.

"The 1930s technique closest to this would have been neon," says Ripman, "which we decided was too much voltage near too much metal and too many people. We also tried low-voltage lamps, but decided we wanted a light strip rather than a series of visible discrete sources." The trickiest part, he adds, was remoting all 15 ballasts with twice as many wires per door in the basement.

No such light strips were in the original building — they may, indeed, be unique to this one. Nevertheless, the Landmarks Commission approved them because of the way they brought the doors out of the shadows.

At 50,000 watts, the exterior lighting substantially exceeds the energy budget allowed by the Massachusetts Energy Code for exterior lighting. Ripman was permitted to transfer the necessary wattage from the interior lighting power budget, however, which only slightly reduced the tenant allowance of 2.13 watts per square foot in office space.

The exterior and the lobby were the only parts of the building granted historic status; the rest of the space was completely renovated. The clients believe that the mix of quality renovation and restoration explains the fact that their building had a commitment of over 70 percent occupancy before it was even completed. ■

For product information, turn to page 70 and see Manufacturers.

The etched glass of the pendants was copied from samples of each pane's different pattern, previously stored away in the basement by an elderly maintenance man.

Moot court classroom has lighting variety, flexibility

Susan Degen

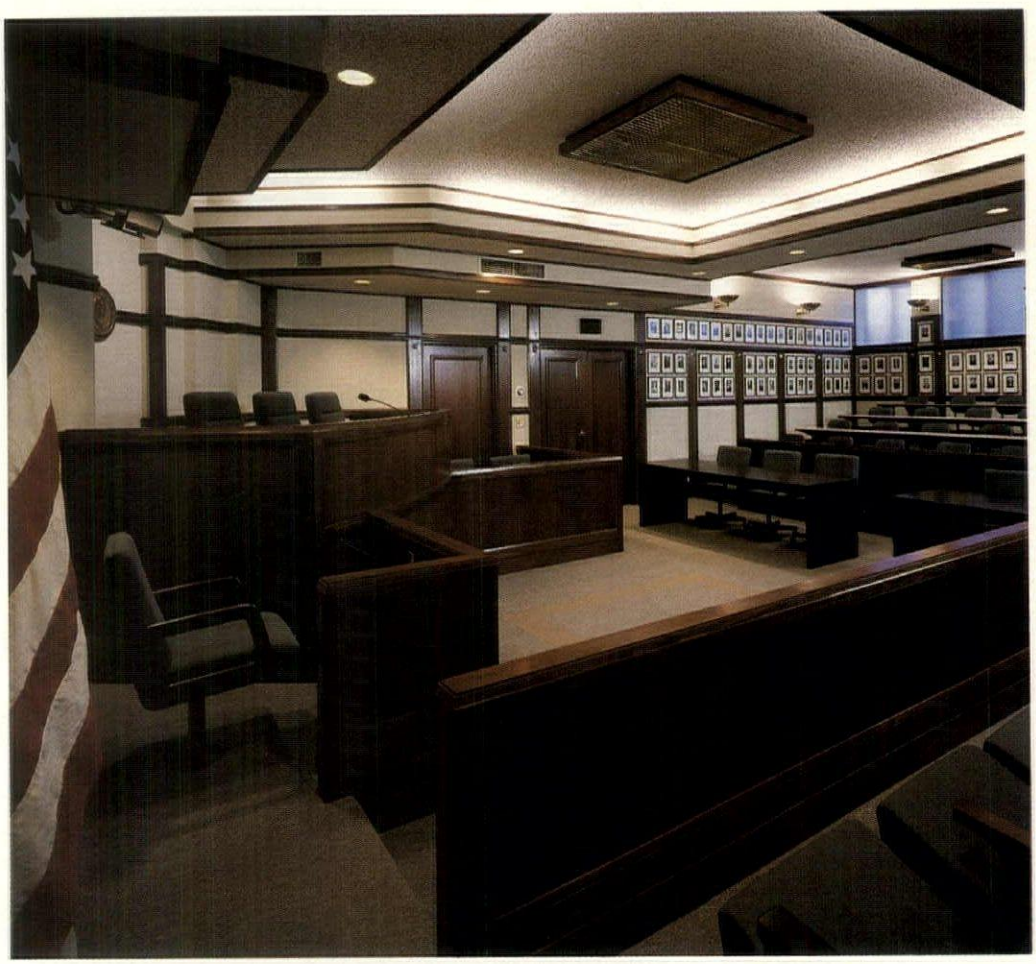
Susan Degen is assistant editor of Architectural Lighting.

Lighting a space that combines a classroom and a courtroom within the same four walls requires a design that supports and defines the activities that typically take place in each environment. Like a classroom — with a courtroom in place of its chalkboard-covered front wall — the new moot courtroom at the University of San Francisco's School of Law offered an unusual lighting challenge to architect Robert Pfauth.

At the front half of the room is a full-scale courtroom designed to accommodate both circuit and appellate courts. Two counsel tables and stepped ceiling soffits separate the courtroom from the classroom-audience area in the back half of the room. "The challenge," says architect Robert Pfauth, "was to house these diverse programmatic requirements within the confines of a relatively small space, while preserving the correct spatial disposition of the participants and respecting the predominance of the judges' bench."

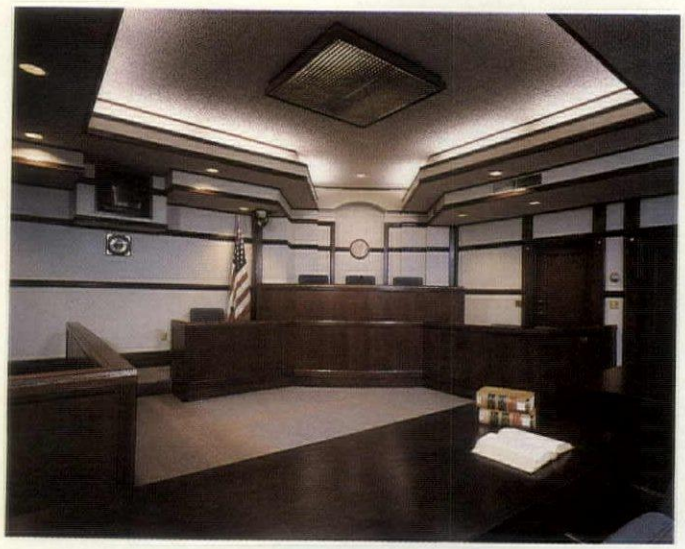
Pfauth used fluorescent cove lighting, a surface-mounted fluorescent luminaire, and recessed incandescent downlights to reinforce the unusual arrangement of the trial area: the judges' bench sits at a 35 1/4-degree angle in the right front corner of the room, rather than the usual location in the middle of the front wall. General ambient lighting here comes from a 4-foot-square fluorescent luminaire at the courtroom's center. Around this central fixture, a square outline of linear fluorescent cove lighting delineates the stepped ceiling plane. The corner of the square above the judges' bench opens up and stretches its two lines to the wall on either side, focusing attention on that part of the space and providing illumination for those seated at the bench.

Two levels of soffits — one 18 inches high, a second 12 inches — surround the fluorescent-lit cove. They house recessed incandescent downlights positioned over each specific task area in the courtroom — the witness box, jury box, court clerk and bailiff's box, and the two counsel tables. Visual focus comes from an illuminated seal on the wall behind the bench. A wall-washing downlight with a recessed eyeball aimed at the seal is mounted inside an exist-



View from the jury box shows surface-mounted fluorescent luminaires for general ambient lighting in both courtroom and classroom. Interior windows of rough-smooth obscure glass diffuse glare reflected from a neighboring building.

Project: Moot Courtroom
Location: San Francisco, California
Client: School of Law, University of San Francisco
Architect: Robert C. Pfauth, AIA
General Contractor: Pearson and Johnson
Mechanical Engineer: Glumac and Associates
Photos: David Wakely



The open-cornered square outline of cove lighting draws attention to the right front corner of the courtroom and illuminates the bench. A recessed wall-washing downlight with an adjustable eyeball shines on a wall-mounted seal behind the bench.

Brass-finished incandescent wall brackets provide soft uplighting for the alumni photo gallery lining the side and back walls of the classroom. Surface-mounted fluorescent luminaires with gold-colored louvers add general light for reading and note-taking.

ing 2-foot-square concrete coffer above the bench. Pfauth added flexibility to the system by designing the task and ambient lighting with separate controls.

In keeping with its primary function as a teaching facility, the courtroom is equipped with video cameras and monitors so that students and professors can tape and review practice trials. Although no special lighting equipment for videotaping is included, the existing illumination is sufficient for the practice sessions, according to Pfauth. Cameras are mounted high on the wall near the bench and the jury box; one monitor is recessed in the wall next to the witness box, and two more are in the back side of the soffit, facing the classroom-audience area.

Unlike the audience space in most courtrooms, the classroom-audience area has writing tables so that students can take notes during the practice trials. Two rows of 2-by-4-foot surface-mounted fluorescent luminaires provide illumination for note-taking and reading; they can be switched off when high illumination levels are unnecessary. Pfauth could not use recessed luminaires because the concrete structure overhead required installing the acoustical ceiling on furring strips to maintain a maximum ceiling height in both halves of the room.

The four tiers of eight seats each in the classroom-audience area are surrounded on three sides by a gallery that displays photographs of law school alumni in the judiciary. Pfauth used clear glass over the photos because nonglare glass tends to blur photographic images recessed by matting. This choice required that lighting reflections in the glass be kept to a minimum, something he accomplished with brass-finished indirect wall brackets above the portrait gallery. These provide enough light to view the photographs comfortably and produce relatively little glare. The pleasant, gentle light from the decorative brass uplights also contributes ambient light to the classroom.

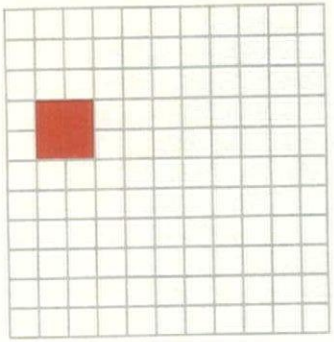
Mullion spacing for the existing patterned-glass windows along the back wall of the room was incompatible with the new symmetry of the courtroom, according to Pfauth. Glare reflecting from the building opposite the law school posed an additional problem. Pfauth's solution was to install new windows of 1/4-inch-thick smooth-rough obscure glass placed approximately 7 1/2 inches inside the existing windows. These interior windows diffuse the reflected glare, conceal the existing mullions, and reinforce the symmetry of the space's overall design.

To maintain a warm, balanced light temperature throughout the project, Pfauth used standard A19 incandescent and warm white fluorescent light sources, supplemented by gold-colored reflectors in the downlights and gold-colored parabolic louvers in the fluorescent luminaires. The warm sources and the gold-colored louvers and reflectors set off brass accents in the space, such as the wall brackets along the side and back walls.

Built to commemorate the 75th anniversary of the law school, the courtroom is a realistic setting where students can practice their legal skills in mock judicial hearings and trials before faculty and/or guest judges and an audience of their peers. Pfauth's lighting design lends a sense of increased volume to the space and exudes a warm, yet reserved air that complements the space's dual function as courtroom and classroom. ■

For product information, turn to page 70 and see Manufacturers.

Software Reviews



Engineering, math programs for lighting designers

David Lord, PhD

David Lord is a professor of architecture at California Polytechnic State University, San Luis Obispo.

Featured Programs

Shadow, Light, Floodware, Roadware
For the IBM PC or PS/2 and compatibles.
Elite Software Development, Inc.
P.O. Drawer 1194
Bryan, TX 77806
(409) 846-2340

MathCAD, version 2.0, $349
For the IBM PC or PS/2 and compatibles. DOS version 2.0, 512K RAM minimum.
MathSoft, Inc.
One Kendall Square
Cambridge, MA 02139
(800) 628-4223

Window 2.0
For the IBM PC or PS/2 and compatibles.
Bostik Construction Products Division
P.O. Box 8
Huntingdon Valley, PA 19006
(215) 674-5600

So many lighting programs are now available that choosing one from the crowd can be difficult. Most of these programs have a common ancestor, the *IES Lighting Handbook: Reference Volume,* where the calculation procedures are established. The similarity of the programs often ends there. User interface and the ability to communicate with other programs distinguishes some of the new lighting programs. One company, Elite Software, has a series of packages that go beyond IES calculations.

Elite Software began in the early years of the microcomputer industry (1979) to work toward the development of software modules that interact in a very organized manner. In addition to lighting programs, Elite has software for HVAC design, energy analysis, pipe sizing, short circuit, voltage drop, and panel design calculations. They also have a series of project management, estimating, and job accounting programs. Demonstration disks are available for most of these packages.

A nice feature of the Elite engineering programs is that they are all slated to become fully interfaced with AutoCAD, the computer aided design standard. This means that designers will be able to draw the system (ducts, rooms, pipes, electrical network, shaded windows, lighting layout, for example) and receive both a scaled CAD drawing and a printed engineering performance report. So far, however, only the Ductsize and Shadow programs interface with AutoCAD.

Shadow and Light

I have worked with two of the Elite programs, Shadow and Light, and have found them to be good for their intended purposes. The documentation that comes with these programs is particularly thorough, covering every contingency in great detail. The instruction manual has an almost military sense of precision and structure, and makes for good reading if you just want to learn more about the subject.

Shadow. Shadow is a glass shading analysis program that calculates the shaded area for up to 1000 glass exposures, each of which may have up to 11 different shading devices. Shadow is primarily intended as a tool to aid in the initial design of overhangs, fins, and louvers that shade critical glass exposures. In addition, Shadow can calculate shading from nearby buildings, trees, and other structures. Full screen input and editing features allow fast and easy input.

Printer reports contain plots of the isometric, front, right side, and top views of the glass sections and shading devices. The solar and transmission heat gains for each glass section are also included in the reports. Shadow not only calculates the amount of shaded glass at any hour, but also calculates the solar heat gain at each hour, with and without shading, so that energy savings due to shading devices can be determined.

Shadow's output files can be read by AutoCAD, which gives better control over the plotting of the shading diagrams. I tried the interface between Shadow and AutoCAD and it worked without a hitch, aside from the fact that it is tedious to run one program, stop it, begin another, export and import files, and so forth. I am looking forward to the new Microsoft OS/2 operating system for IBM computers; it will allow multitasking.

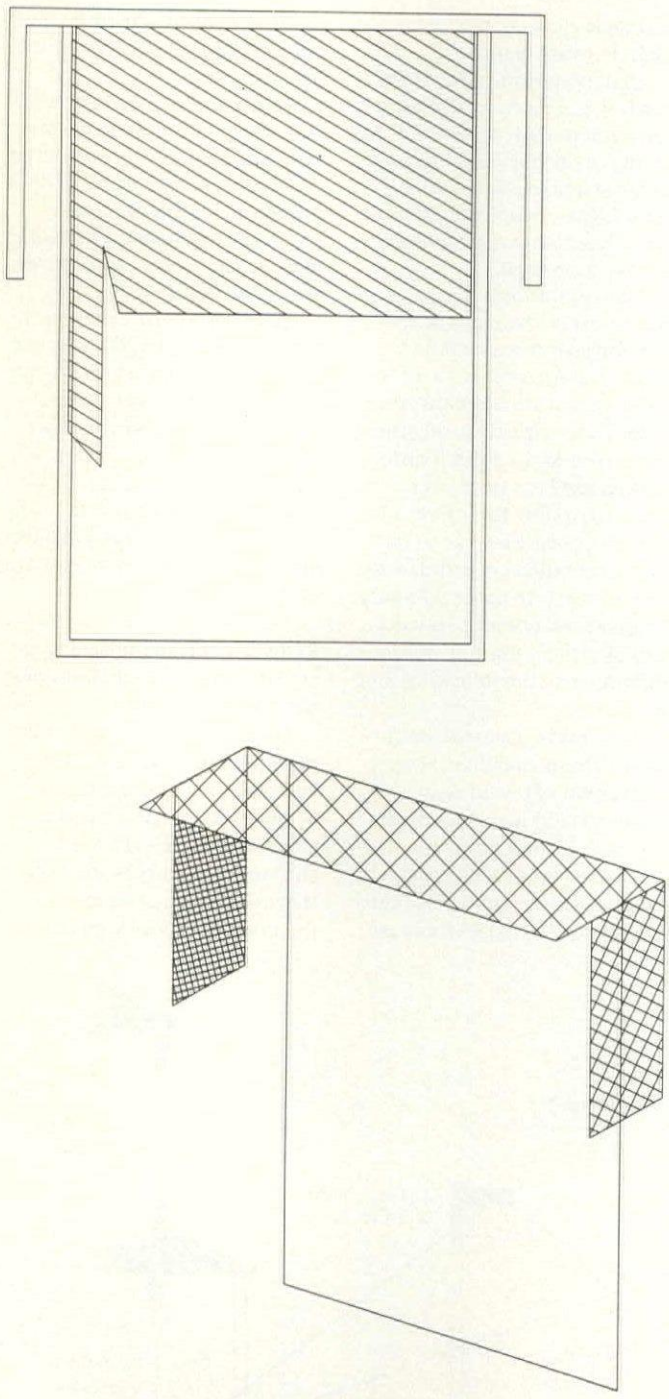
An interesting program that may be used in concert with Shadow is the public domain software, Window 2.0. Window calculates U-values and shading coefficients of windows, and is relatively simple in scope compared to Shadow, although its goals are different. Window 2.0 is readily available and there will soon be an updated Window 3.0 version, so every designer who wants to evaluate window performance should have this.

In addition to Shadow, which is useful for daylighting and heat gain analysis, Elite has three mainline electric lighting programs: Light, Floodware, and Roadware.

Light. Light is an IES zonal cavity program that calculates luminaire requirements and prints a luminaire schedule along with an energy economics report. Light determines the correct coefficient of utilization for any set of room conditions, including those with nonstandard effective floor cavity reflectances. Light allows up to 500 rooms per project, and each room can have up to three different types of luminaires.

After the user enters the required information, Light offers six basic reports that can be viewed on the screen or printed out: Data Input, Luminaire Requirements, Energy Economics, Luminaire Schedule, Luminaire Bill of Materials, and Luminaire Data.

Floodware. Floodware is a two-axis, point-by-point program that calculates lighting requirements for uses such as sports arenas, parking lots, and warehouses. It computes vertical and horizontal light levels in uniform grid points, provides for both floodlighting and spotlighting, allows aimed and unaimed luminaires, and accounts



Fins, overhang, and shading pattern for a window designed in Shadow (printed from AutoCAD).

for interreflection from adjacent surfaces. If the capabilities of Floodware are limiting, then Elite has a full point-by-point program available, Roadware.

Roadware. Roadware is used to calculate lighting requirements for applications, such as roadway lighting, that require the use of luminaires with complex three-axis photometry — "shoe box" and "cobra head" style luminaires, for example. Roadware produces gridded reports with numerical lighting levels at each point, shaded character graphics to show lighting levels, scale plots, relamping reports, and energy cost reports.

Elite Software is creating microcomputer workhorses that will be a welcome addition to the lighting designer's software library. The engineering practice that does more than lighting will benefit from the fact that the family of software from Elite has similar operating characteristics and menu styles.

MathCAD

MathCAD is another program that I recommend for general purpose engineering and technical calculation. MathCAD is not specifically for lighting applications, but is a multipurpose math package that can be used for lighting calculations as well as other complex engineering math. I have used it for both lighting and acoustics calculations with very satisfactory results. It is pleasing because it allows you to write and modify your own simple calculation programs to fill specific needs.

MathCAD, with its graphic capabilities, lies somewhere between a spreadsheet and a programming language. It lets you calculate on your PC with a freedom similar to what you get using a pencil and paper, but it has the depth and sophistication to allow you to perform matrix operations and fast Fourier transforms. You can type in equations using familiar mathematical notation, make notes as needed with a text editor, and plot or print out the results on almost any plotter, dot matrix, or laser printer.

If you are doing point-by-point or zonal cavity lighting calculations, it takes only a short while longer to set up the calculations on MathCAD. The average user should be solving simple equations less than an hour after starting MathCAD.

Because it is a mathematical program, it finds other uses in the office, much as spreadsheets do. As you enter each equation, the program checks it for errors. Undefined variables, mismatched units or other potential hazards are automatically flagged on screen with a red warning. MathCAD lets you know, for example, that candlepower divided by distance square (in feet) can't equal illumination in lux because the units don't match.

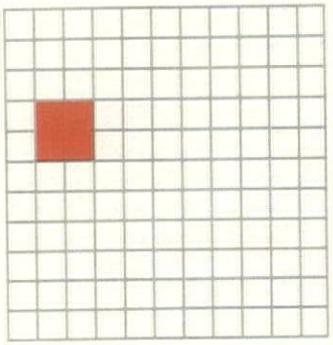
At the beginning of a set of equations, you can define variables, just as you would in a programming language. You can write "lumens: = 2600" and each time you use the variable name "lumens" anywhere later in your MathCAD document, the value "2600" will be substituted.

The result is a sheet of easily understood calculations and variables in plain English, with tables, explanatory notes, and plots that can be included as-is in reports. MathCAD has 66 predefined trigonometric, hyperbolic, logarithmic, and exponential functions, which should handle the most complex lighting calculations. MathCAD also allows you to import data from monitoring equipment, process it with statistical functions, and export it to a spreadsheet. You can also create a graph area with one keystroke, and change its size, shape, grid, or scale with a simple formatting command.

Like a fine sports car's road handling, MathCAD's operation gives you the feeling that nothing is coming between your intuitive process and the computational power of your PC. MathCAD is an informal yet elegant tool that automates the dirty work in mathematics. ■

The software review columnist welcomes reader comments. Write to David Lord, Architecture Department, Cal Poly, San Luis Obispo, CA 93407.

The Lighting Design Professional



Big cities, bright lights: Lighting the urban landscape

James R. Benya, PE, IALD

James R. Benya is senior principal and CEO of Luminae Souter, San Francisco. He is on the faculty of California College of Arts and Crafts, is active in IES and Designers Lighting Forum of Northern California, and teaches lighting design classes for the ASID, IBD, and AHLI.

Electric lights have changed the tempo and hours of normal daily life. Before cheap, clean, and efficient outdoor lighting, very little outdoor activity was possible at night. Now, we can travel on foot or by car, play baseball, swim, and do a host of other things almost any time we want.

Electric lights also alter our perception of security. We intuitively know that brightly lighted streets and alleys are safer, for we are able to see better and perhaps avoid those who might threaten us. Outdoor lighting offers a unique "security blanket" that covers almost any type of property or building.

A number of U.S. cities have embarked on relighting campaigns. Relighting is usually part of a renewal of all downtown street furniture and often includes transit systems, parks, and plazas. The trend is to increase lighting levels and to install equipment that is much more ornamental. New poles and luminaires are often used.

To a lesser extent, urban and suburban projects — such as apartment complexes, hospitals, shopping centers, and entertainment complexes — are also taking a new approach to lighting. Instead of providing the minimum necessary, design professionals are choosing higher illuminance levels and more aesthetically pleasing equipment.

Enthusiastic proponents of "better outdoor lighting" often want the obvious: more light, more uniformly distributed. But modern lighting designs for outdoor environments must also consider several principles and issues that only recently became part of the design process. Some of the issues are light pollution, light trespass, glare and veil, and color and color rendition.

Light Pollution

Light pollution is caused by stray light emitted or reflected up into the atmosphere. Dust, moisture, and some forms of air pollution are illuminated by this uplight, and their glow characterizes night in every major city.

Light pollution, as far as we can tell, is not physically harmful. But it does deprive us of the clarity of the heavens, limiting urban stargazing to especially clear nights. People in the most densely settled areas can hardly see the stars at all.

Light pollution's most serious threat is that it might render observatories useless. In California and Arizona, some of the world's finest astronomical observatories are already losing their effectiveness. Last-ditch ordinances and laws have been enacted to slow this deterioration. San Diego has one of the best light pollution ordinances; its purpose is to protect Mount Palomar and other observatories by strictly limiting outdoor lighting with the following four measures.

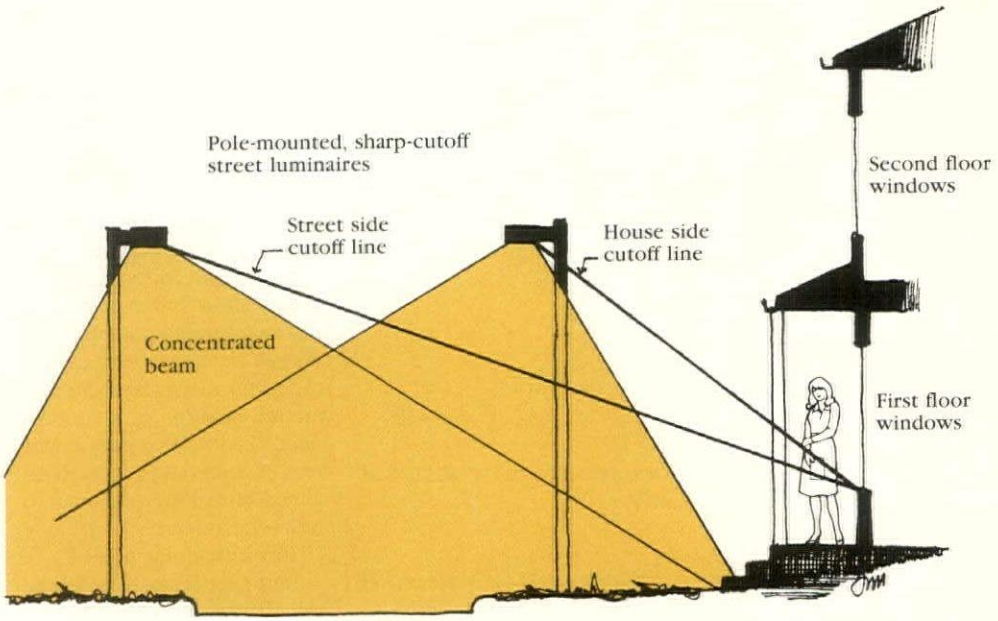
Minimize spectral emissions. The monochromatic spectral output of low pressure sodium (LPS) lamps interferes less with astronomical observations than the broader-range output of other lamps. By limiting the source to LPS for most outdoor lighting, the ordinance makes it easier for astronomers to see the stars.

Require sharp-cutoff lighting. Sharp cutoff prevents stray direct uplight, often considered the single greatest cause of light pollution. In order to qualify under the ordinance, luminaires must produce zero candlepower above the horizontal.

Limit hours of operation. Outdoor signs, building facade lighting, and architectural landscape lighting are sources of direct light pollution because they often shine up. The ordinance requires lighting of this type to be switched off at 11:00 p.m., so observatories will have greater sky clarity in the middle of the night.

Impose light control zones. Requirements of the ordinance are stricter for installations near the observatory sites.

For exterior lighting that is permitted at a particular time and place, the relative merits of spectral limitations and sharp cutoff are unclear. Low pressure sodium sources are a controversial choice because of their monochromatic coloration



Sharp-cutoff roadway and parking area lighting prevents light from trespassing into windows of adjacent properties.

— their color rendering index is zero! In locations without an important observatory, all arguments in favor of LPS quickly weaken. Sharp cutoff lighting is more readily accepted, though it may be hard to achieve in an ornamental fixture.

Light Trespass

Since the introduction of the sharp-cutoff luminaire, generically called the "shoebox," light trespass has become a legitimate design issue. Quite simply, light *trespasses* when it illuminates an unintended area, such as an upstairs bedroom window. The shoebox offered the first practical way for a designer to confine outdoor illumination to intended areas.

Light trespass can be avoided with luminaires that distribute no candlepower above a practical cutoff angle, typically between 70 and 80 degrees above horizontal as installed. By drawing a simple sectional elevation, a designer can check the cutoff line to make certain it falls on the right property.

Remember that light trespass is also a function of distance. In a park, for example, diffusing lollipop fixtures will light the tree canopies as well as the ground; as long as they are some distance away from the surrounding homes, the fixtures will not create trespassing light.

Four primary causes of light trespass

- ☐ Optically uncontrolled architectural outdoor lighting, such as lollipop globes and ornamental clusters.
- ☐ Roadway lighting using drop-refractor and ornamental equipment near homes and other private properties.
- ☐ Floodlights for security, parking, and other area lighting.
- ☐ Building uplighting on fenestrated facades, especially hotels and hospitals.

Light and Security

Light has been generally acknowledged as a security device since the first campfire. By providing a fair amount of uniform illumination, an area can be better secured against many types of crime.

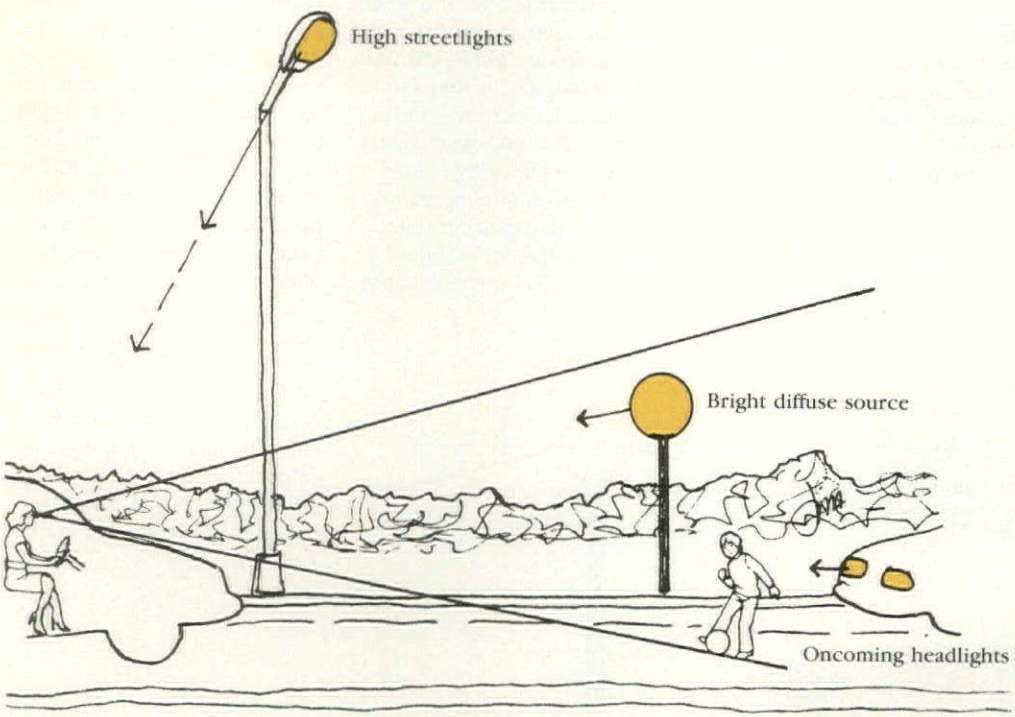
The Illuminating Engineering Society supports this principle by listing minimum illumination and uniformity requirements for various situations involving pedestrian safety and security. Like all IES standards, these are consensus standards, supported by research and empirical study. Virtually all other existing standards, ordinances, and laws are traceable to an IES standard.

Yet, a surprising number of relatively high-risk facilities, such as multifamily housing developments and hospital complexes, employ substandard lighting systems for areas of genuine security concern. The typical suburban apartment complex parking lot, for example, is often lighted with low-wattage incandescent lollipop fixtures, laid out without any calculations. The light trespass of the luminaire encourages the facilities manager to keep relamping with dim bulbs (small lumen packages, in engineering jargon). The resulting lighting system provides little or no security for the complex.

Super-high levels of illumination and uniformity are now being used in downtown areas and shopping centers as part of urban revitalization. The public perception of a very brightly lighted area is one of great security and genuine nighttime activity. San Francisco's Market Street, for example, has illumination levels as high as 15 footcandles, which keep even "shady" neighborhoods from appearing foreboding.

Avoid Glare and Veil

Every driver has experienced the oncoming lights of cars at night, occasionally with the added severity of high beams. Even when a driver avoids looking directly into the lights, their intense brightness causes uncomfortable glare; it also causes a desensitizing of the eye, as if a veil were pulled in front of the viewer. This everyday experience demonstrates *veiling luminance from off-axis bright-*



The eye attempts to adjust to the brightest source of light in its focal field of view. A bright source near the object being viewed reduces sensitivity, as if a veil were suddenly pulled in front of the viewer. High streetlights are usually above normal view and often are shielded by eyebrows or a car roof; lower bright diffuse sources and oncoming headlights cause the veil effect.

ness. The problem is caused by very bright sources immediately adjacent to the area of view, as the accompanying diagram shows.

If the source brightness is fairly low, and a number of bright sources are used, the veil effect is minimized. For instance, along a pathway, a row of "jelly jars" (simple glass-lensed diffusing fixtures) with 40-watt incandescent or 9-watt compact fluorescent lamps will be fairly pleasant and comfortable to view. From a distance, the fixtures will look like an attractive string of pearls. But a single jelly jar with a 50-watt HPS lamp will undoubtedly introduce glare and veil. With this type of fixture, the darker the ambient environment, the lower the lumen output must be.

Any fixture mounted near the ground has the potential to cause uncomfortable glare and veiling luminance. Of low-mounted light sources, pedestal lights are most likely to cause a problem, and cutoff bollards and landscape lights (such as pagodas and coolie hats) are least likely. The accompanying diagram shows how to predict these effects easily by using candlepower diagrams for the fixtures.

Older persons are more sensitive to off-axis brightness. For senior citizens' projects, avoid low-level diffusing or horizontal candlepower sources; use well-shielded cutoff lighting instead. Pay special attention to stairs, and be sure to use shielded sources that light the stair rather than the inside of the eyeball.

Color

The range of color options for outdoor light sources includes most modern electric lamps. Typically, high intensity discharge (HID) lamps are preferred because they offer longest life, relative insensitivity to ambient temperature, and high lumen output. High pressure sodium (HPS) lamps are the most popular because they offer all of these qualities plus a warm, golden-white light.

All too often, though, lamps are chosen for reasons of life and efficacy, and color is a secondary consideration. Among the usable and efficient outdoor sources, designers may wish to consider the full range of HID options.

High pressure sodium (HPS) lamps are warm and golden, but render the blues and greens of grass and landscapes as brown. Colors may appear dirty if HPS is not balanced with other sources, such as incandescent.

Low pressure sodium (LPS) lamps make a strictly yellow light; they turn everything a tone of yellowish gray. Designers will find this light color especially hard to work into an attractive design.

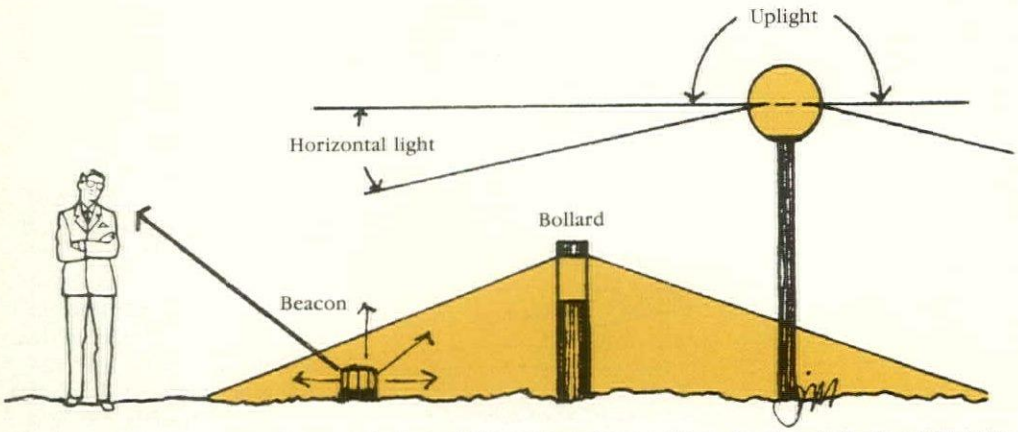
Metal halide (MH) lamps, especially the newer 3000K lamps, have a complete and rich spectrum with excellent rendition of landscape blues and greens. The 3000K lamps are very good choices for many applications, whereas the standard lamps (3400–4100 Kelvin) are preferred for stadiums and tennis courts. Standard lamps may appear too cold for landscape and parking lot lighting, but because of the blue-green strength, they are very flattering to landscaping.

Mercury vapor (MV) lamps are excellent landscape lighting sources because blue and green dominate their spectral output. These lamps are not as efficient as metal halide, but they last longer and have more consistent color. One phosphor coated lamp, the Styletone by Philips, has a 3000K color temperature and looks good in decorative lighting equipment. Standard coated and clear mercury vapor is often considered too cold-looking for architectural applications.

Fluorescent lamps are surprisingly good choices, as long as designers remember to consider their starting and bulb-wall temperature requirements. (For information on a compact fluorescent fixture that will operate outdoors in cold weather, for example, see Lighting Clinic, May 1988.) All fluorescent lamps have excellent blue-green spectra, even the 2700K compact and 3000K standard and compact lamps.

Incandescent and tungsten halogen lamps still have many applications. Landscape lighting can be effectively done with low-wattage, low-voltage halogen sources such as MR16 lamps and still enjoy reasonably long life (3000 hours). Although their green and blue color rendition is slightly less vivid than other sources, halogen lamps have an excellent natural color balance, and they offer the added versatility of dimming.

It is especially important to match the colors of exterior lighting when sources are varied. Successful combinations include a warm scheme, with HPS, compact fluorescent, and incandescent; a warm-neutral scheme, with 3000K metal halide, halogen, and 3000–3500K fluorescent; and a cool scheme, using standard metal halides (around 4000K), mercury vapor, and cooler fluorescent lamps. For more detailed information on color matching, see "Matching electric light sources," The Lighting Design Professional, April 1988. ■



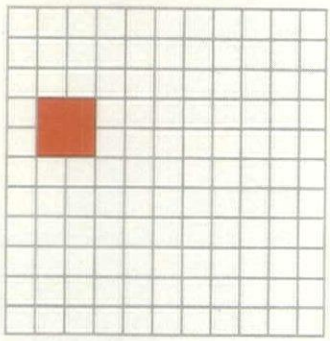
Horizontal light causes glare, as do two of these three types of low-level architectural lighting: beacons, which provide mostly uplight and cause glare; bollards, which usually give cutoff light; and post-top, lollipop, and other omnidirectional luminaires, which usually are wasteful and cause light pollution.

Lighting Graphics

The introduction of the compact fluorescent lamp has stimulated the development of a number of new light fixtures that incorporate it. The lamp has instilled new life into a part of the lighting industry that had seemed restricted forever to a partnership with the incandescent lamp. Fixture manufacturers are working overtime to find ways to use this relatively new source with its ideal characteristics: small size, high efficiency, long life, excellent color, and reasonable price.

These same advantages also are available to lighting designers who are selecting light sources for custom-designed installations. The lamps are furnished in sizes from 5 watts to 26 watts with light outputs that approximately equal 25- to 100-watt incandescent lamps. Using compact fluorescents in place of incandescent sources results in a significant reduction in energy usage for the same quantity and quality of light. It must be mentioned, however, that the diffuse light distribution characteristics of the compact fluorescents precludes the kind of precise optical control possible with many incandescent sources.

One popular luminaire for using the new lamps is the decorative wall sconce. I recently used this type of fixture for hotel corridor lighting — an application that makes sense even if based only on the 10,000-hour lamp life. The color and color rendering qualities were so impressive, I found myself peeking over the top of the fixture to see if it really had a fluorescent lamp inside.

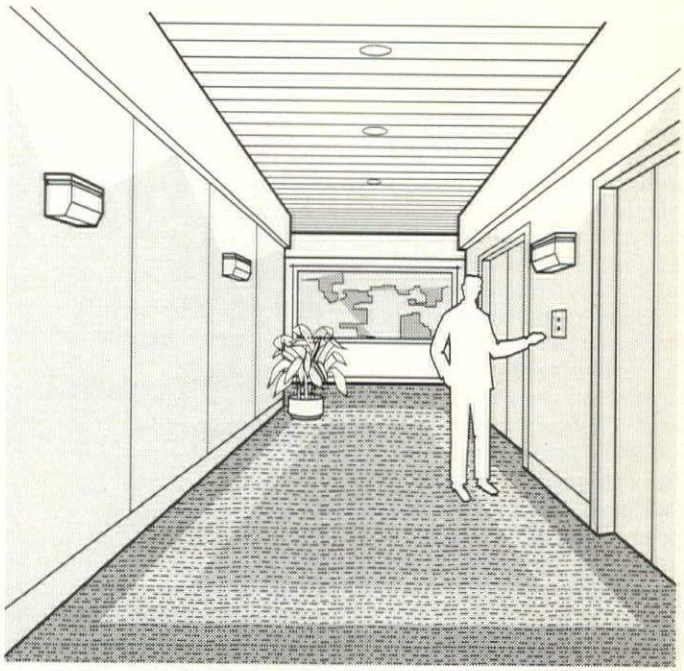


Custom-designed architectural wall sconce

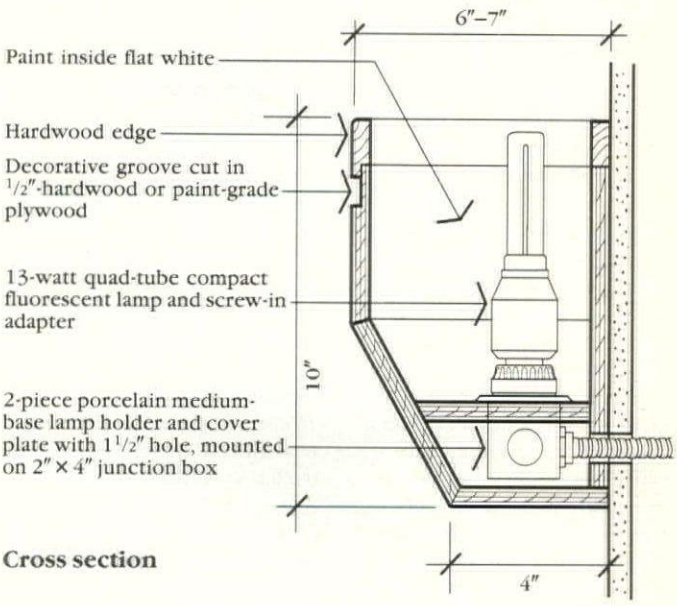
Sam Mills, AIA, IES

Sam Mills is an architect and lighting consultant with his own firm in Oklahoma City.

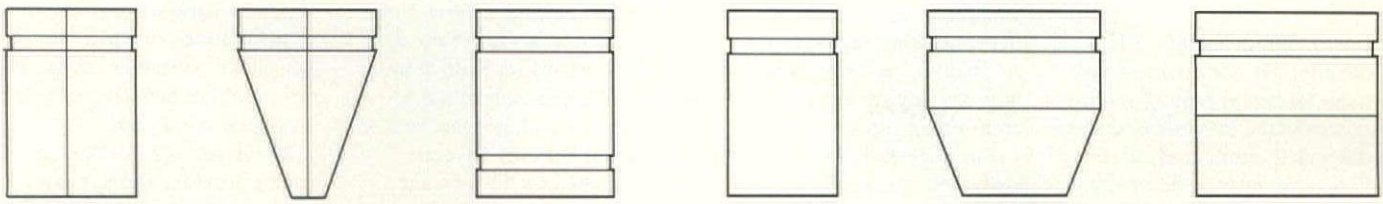
The accompanying illustrations show how these lamps might be used in a custom-designed wall sconce. The sconce is designed to use relatively inexpensive materials and components and can use one or two lamps for two levels of illumination. The simple geometric shape can be modified into any number of different custom designs and offers an opportunity to coordinate materials and finishes with the interior space. The low-level indirect lighting is well suited for circulation areas and provides a soft quality of illumination that places emphasis on the architectural finishes. ■



Custom-designed wall sconces use compact fluorescent lamps for soft lighting that emphasizes architectural finishes.

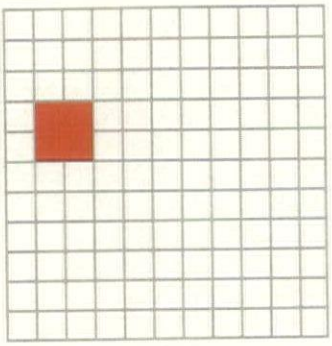


Cross section



A few of many possible design variations.

Daylighting Techniques



Daylight control techniques

Mojtaba Navvab

Mojtaba Navvab is an assistant professor of architecture in the College of Architecture and Urban Planning at the University of Michigan, Ann Arbor.

Recently developed products for solar and daylight control have greatly expanded daylighting techniques. Many types of systems are available to control daylight and solar heat gain in order to maintain luminous and thermal comfort in an environment. The control element is a major consideration in the design of any fenestration system, including windows, skylights, atria, and clerestories.

Architectural elements used as daylight controls should provide a sufficient quantity of visible light to interiors, yet block excessive luminance at windows (or other openings) that could cause sky glare and visual discomfort. Architecture must also control heat transfer. By taking into consideration related energy and cost requirements, designers can reduce the amount of heat introduced by electric lighting and cut seasonal increases in cooling loads.

Daylight is free, but its availability varies, and therefore so does the quantity and quality of daylight delivered to spaces. Control systems optimize interior illumination from the sun and sky made available by various daylighting techniques, starting with building orientation. Specific *control elements* can be classified as exterior, glazing, and interior components.

Various exterior architectural elements can reduce the greenhouse effect by blocking or reflecting sunlight before it is transmitted through the glazing. Exterior control elements include simple overhangs, light shelf shutters, vertical or horizontal fins, and combinations of elements. The glazing itself can be tinted, opaque, diffuse, or reflective and covered with a special film or coating. Interior controls include screens, shades, draperies, blinds, and curtains. Exterior controls effectively reduce solar heat gain, the glazing system provides a view, and interior shades satisfy occupants' need for personal control.

In *Architectural Lighting* Daylighting Department columns, April–November 1987, Norbert Lechner summarized IES recommended practice for daylighting control. New technology has introduced additional approaches.

Dynamic Envelopes

The latest glazing technology provides designers with a controlled variable-transmittance glazing system. The properties of the glazing are programmed to respond to outside conditions; the system could be controlled by a computer. Variable-transmittance glazing is being used in eyeglasses and automobiles, and researchers are now developing applications for architectural spaces.

Imagine a building wall that is divided into small units. Each unit can change its physical properties, including reflectance, transmittance, color, thermal capacitance, thermal conductivity, permeability to air, and ability to direct light. Each unit can be controlled separately, and can respond to interior and exterior climatic conditions, the needs and desires of the individual behind the wall, and perhaps a prediction algorithm for changes in these conditions and needs. A series of thermal, luminous, and occupant sensors provides input to an optimization algorithm that determines for any given instant the percentage and location of wall units that will yield a particular combination of physical properties.

Research at the Lighting Research Center at Rensselaer Polytechnic Institute in Troy, New York, under the direction of professors Walter Kroner and Russell Leslie, is developing *dynamic envelopes* that realize these capabilities. Several approaches are under study, including dynamic glass, multiple operable layers of materials, and operable spatial envelopes.

A *dynamic glass* wall is divided into units or pixels. Each has its own control address, so it can be controlled separately. Existing switchable glazing technologies, including electromechanical glazing and electrochromic glass, can be incorporated in the dynamic glass development project.

The control system can be programmed for energy optimization. For example, on a hot day when no occupant is present in an office, the wall may switch entirely to a reflective surface, reducing heat gain when daylighting is unnecessary. An occupant may override the system to darken the room for showing slides, create a spot of sunlight for visual relief, or maximize daylight penetration for a particular visual task.

The dynamic envelope research program, though in its infancy, offers tremendous promise for the future. Beyond

Dynamic glass

Dynamic glass, illustrated by the physical model in the accompanying photos, offers many advantages.

☐ Changes in task or view locations can be accompanied by change in "window" locations. This flexibility helps respond to the high churn rate (frequency of remodeling or reconfiguration) in commercial buildings.

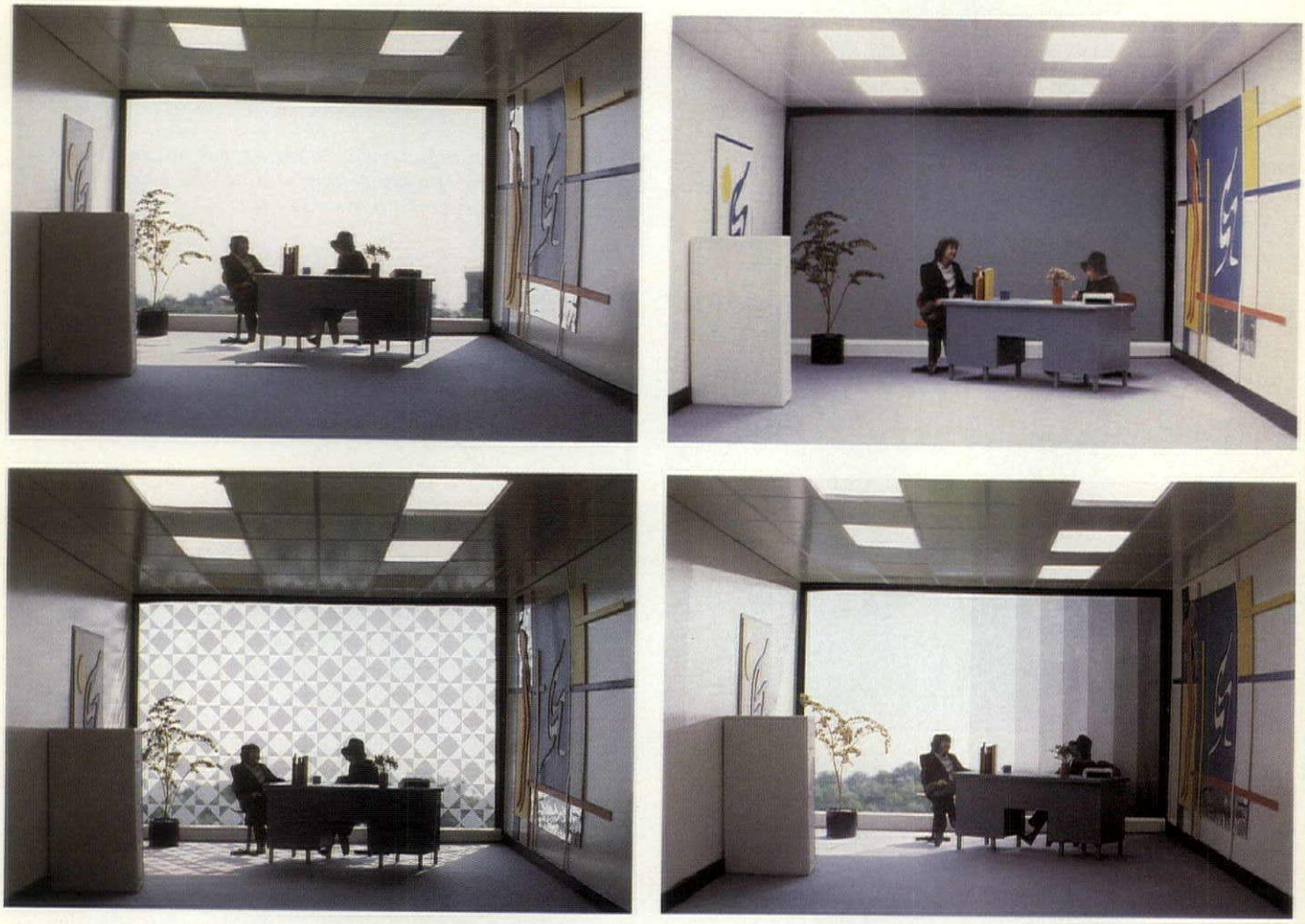
☐ A shading disk can automatically track the sun to keep a computer or desk area out of the sunbeam, reducing glare while allowing high daylight levels throughout the space. The shading area can completely disappear with overcast conditions, allowing maximum daylighting.

☐ Visual patterns can be created for aesthetic effect and to periodically provide visual relief from a monotonous visual environment.

☐ Remote view technologies may possibly transport realistic, three-dimensional displays to create the impression of offices without exterior walls.

☐ Optimum location and direction of daylight can be programmed while minimizing the percentage of the wall area that is transparent.

☐ Dynamic glass in a horizontal light shelf allows automatic switching from a shading device, to full-wall light penetration, to a reflective shelf that completely blocks sunlight. ☐



Model used for research on "dynamic envelope" structure demonstrates daylight control effects with dynamic glass. Top left, clear window; top right, opaque window; bottom left, shade pattern; bottom right, vertical bars pattern. Light transmittance through the switchable glass is controlled by electronic technology.

energy optimization, beyond responsiveness to tasks and building use, and beyond improved daylighting and thermal comfort, dynamic envelopes offer users the ability to influence the structuring of their environment. The program recognizes the importance of individual differences and the potential value of a responsive comfort environment in supporting individual creativity and productivity.

Systems and Studies

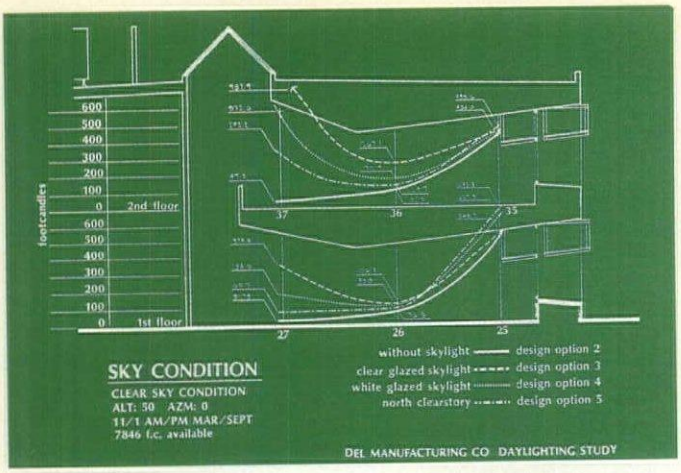
Architects and lighting designers can specify other system control strategies and operating characteristics to satisfy unique daylighting control design criteria. Automated shades or venetian blinds, for example, adjust to any desired position or blade angle in response to a clear or overcast sky condition, as reported to the control system by an external sensor.

Most fixed daylight control strategies are based on empirical measurements obtained in full-scale mock-ups or scale models of buildings. The accompanying illustrations show the model and results of a study for an office building for Del Manufacturing Company designed by Scott Ellinwood and Associates, Ventura, California. Light is distributed by light shelves in a shading control system on the building's south side and by top lighting at the north side.

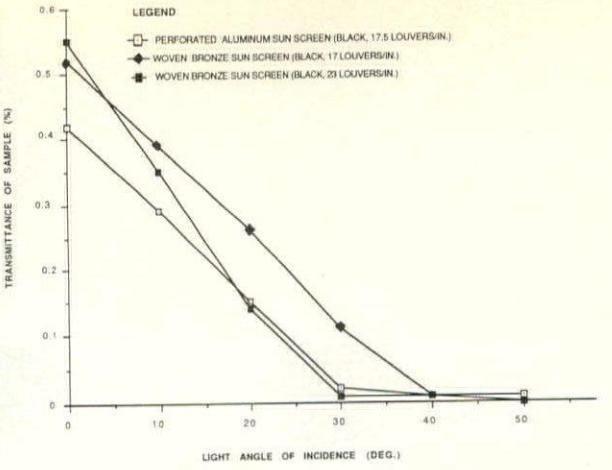
Two sections show the daylight contribution under overcast and clear sky conditions. These data provide the information that electric lighting designers need in order to integrate their lighting design with this fixed type of daylight control scheme.

The daylight distribution curves generated by these studies illustrate the sensitivity of internal illumination to outside lighting conditions as the conditions change with time and season. The light shelf reflects light from sun to ceiling, providing an indirect lighting system. Skylights transmit light that increases the daylight level in the back of the space in a way that produces a comfortable luminous environment throughout the year.

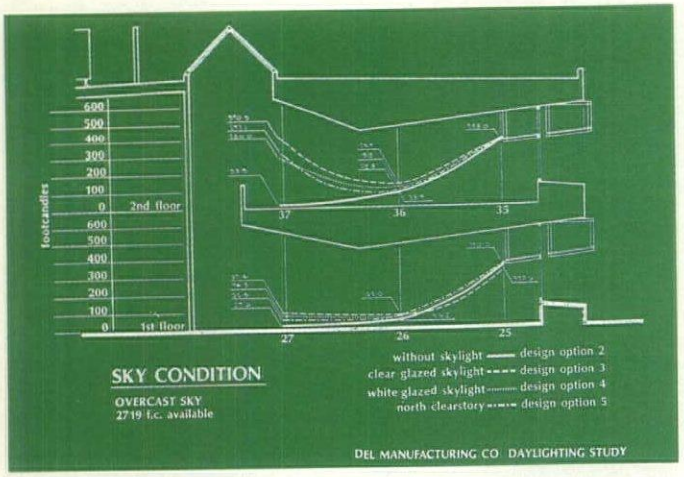
Automation has increased the opportunities for daylighting design in multistory buildings. Solar tracking systems and daylight control systems can be integrated with switching or dimming of electric lights. Famous buildings like the Lockheed building with its large light shelf and



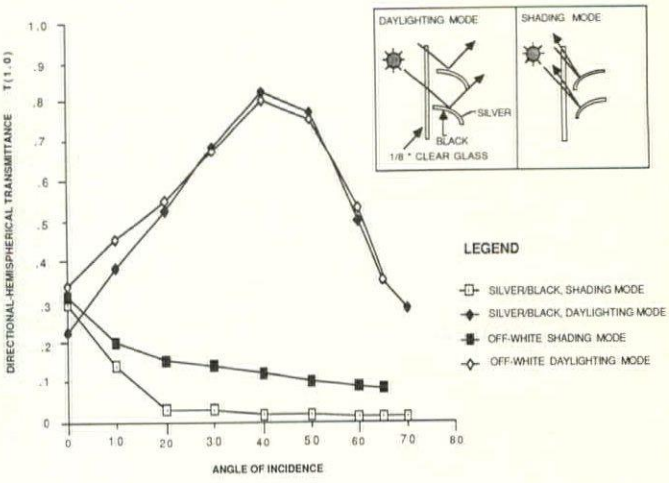
Interior daylight levels in the Del Manufacturing building for four design options under clear sky condition, as determined by measurements with the model.



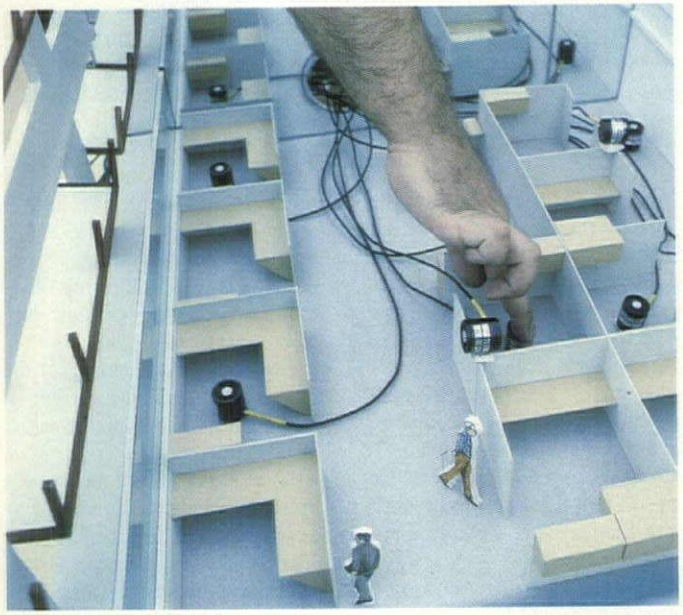
Transmittance of light through three types of sun screens. Designers will need more technical data like this as daylight control systems become more complex.



Interior daylight levels under overcast sky. The contribution of toplighting is dramatically reduced from that measured under a clear sky.



Transmittance of light through one of the classic daylight control devices — venetian blinds. Color and blade orientation affect light transmittance.



Scale model for daylighting study of proposed Del Manufacturing building. Most fixed daylighting control strategies are based on empirical studies of models like this one.

the Hong Kong Bank with an operable light shelf that tracks the sun, however spectacular, have been superseded by even more sophisticated designs.

As geometrically complex shading devices are introduced, and as more sophisticated controls become increasingly common solutions in response to the dynamic changes of daylight, designers need more technical data about the solar-optical properties of daylight control systems. The accompanying graphs show transmittance data for venetian blinds and for perforated aluminum and woven bronze sun screens. Each daylight control system was evaluated with an integrating sphere that measures directional hemispherical transmittance. Such data are used in computer programs to evaluate total energy and daylighting performance of buildings.

Designers can apply simulation methods at various stages of the design process, however, in order to study the performance of a daylight control system and its effect on the overall building performance. A life cycle cost-benefit analysis, for example, examines the trade-offs in cost and benefits between alternative designs, helping designers to make better use of resources. Researchers generate and use such data to develop automated control system strategies that address the interacting issues of daylight quantity and quality. ■

The daylighting columnist would like to hear from readers about unique daylighting applications. Write to Mojtaba Navvab, MIES, College of Architecture, University of Michigan, Ann Arbor, MI 48109.

Book Reviews

Interior Design Illustrated, by Francis D.K. Ching. New York: Van Nostrand Reinhold Co., 1987. 319 pages.

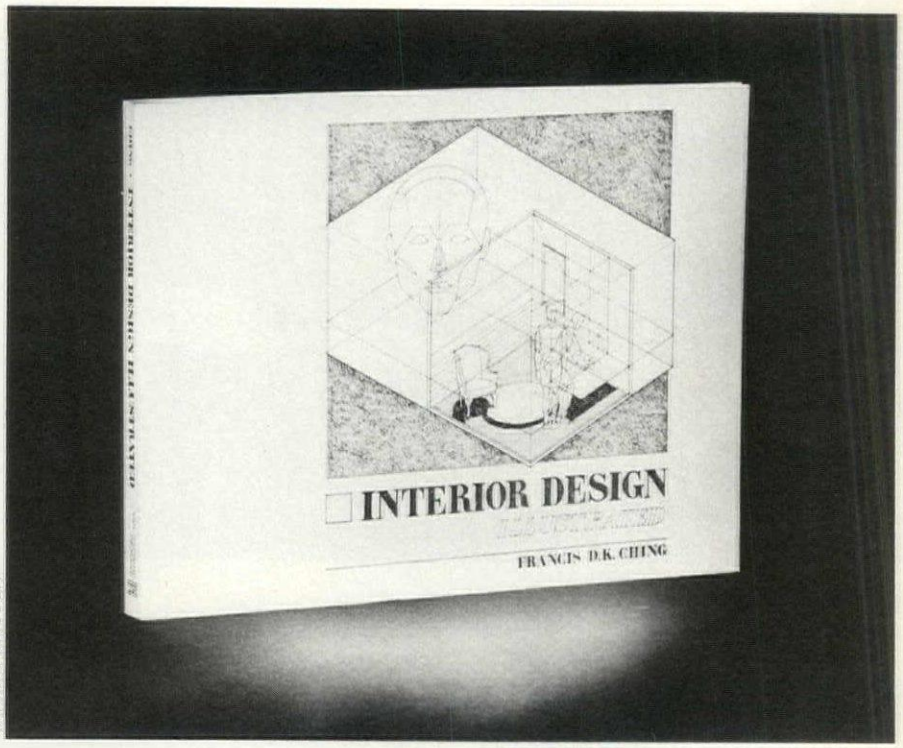
Most of our lives are spent experiencing architecture from within. From the workplace to the home, excellence in architectural design requires careful attention to interior details and to the spaces that most closely shape our daily lives. Francis Ching's latest book is a thoughtful guide to the design of interior spaces that takes us far beyond mere decoration or window trimming.

Architectural lighting is of primary importance to good interior design, and this is emphasized throughout. From the spatial effects achieved by the play of light on solids and voids to the texture of surfaces in a room, Ching never allows us to forget the presence of light.

Of particular interest to lighting professionals are the last two chapters, which cover the *elements* and environmental control systems found in interiors. By elements, Ching means the enclosure systems: columns, walls, floors, and roofs. For instance, he explains the functional and aesthetic requirements for floors based on their use as secondary light sources. Ceilings are described as having the power to affect light levels in spaces. The ceiling is a planar element that can either hold the luminaires or reflect other light sources. Windows are pictured in the many ways they control the quantity and quality of daylighting — and the character of interior space — depending on their size and orientation.

Ching presents the information as suggestions and rules for aesthetic and functional performance, never as a narrowly focused prescription for design. In taking the broader approach, the author also strikes a wise balance between theory and practice. This is not a pattern book, but a guide for the intelligent designer. Sometimes, however, the subtleties of certain design specialties are missed, as in the unreserved recommendation for larger and higher windows that maximize daylight. A student would need further guidance and interpretation to help avoid the pitfalls of excessive solar heat gain and the uncomfortable direct glare of sunlight.

This book will be appreciated by students, as well as by those whose professions bring them into close contact with interior design. The book is nontechnical without being simplistic, and therefore it is accessible to the layperson interested in interior design. The look and feel of the book are casual, yet on closer examination, highly ordered. The reader is invited to curl up and relax while systematically exploring the principles of good design.



WILLIAM BRITTON

Architectural lighting is of primary importance to good interior design, and this is emphasized throughout Interior Design Illustrated *by Francis D.K. Ching.*

The author's ease with the subject is transmitted to the reader, both by the incisive and plentiful drawings and by the lean, hand-printed notes and text. We get the feeling that we are peering over Ching's shoulder, or leafing through a personal sketchbook of secret recipes for successful design.

The interior environmental chapter establishes the importance and the place of hardware that makes for comfortable and convenient living. Plumbing, lighting, heating, and air conditioning systems are explicitly revealed in all their naked glory in a shower of engaging sketches and diagrams. Important here is the fact that the systems are not treated as isolated mechanisms, but are shown in their settings. This chapter is addressed to architects and interior designers, who must provide the proper spatial context for the diverse and specialized components.

I finished my first reading wanting to know more about each of the areas introduced by Ching. I suppose the text could not be more extensive without adding greatly to the size of the book, for hardly a statement is made without an accompanying friendly gaggle of illustrations. Many valuable ideas will come to the reader from the drawings as well as from the text.

For the beginning designer, Ching opens the door to each of the subjects of interior design, leaving exhaustive detail for another book. This book raises our level of excitement about the serious business of interior design by bringing it to life.

—David Lord

David Lord is a professor of architecture at California Polytechnic State University, San Luis Obispo.

***Interior Design Illustrated,* $21.95 (paper)**

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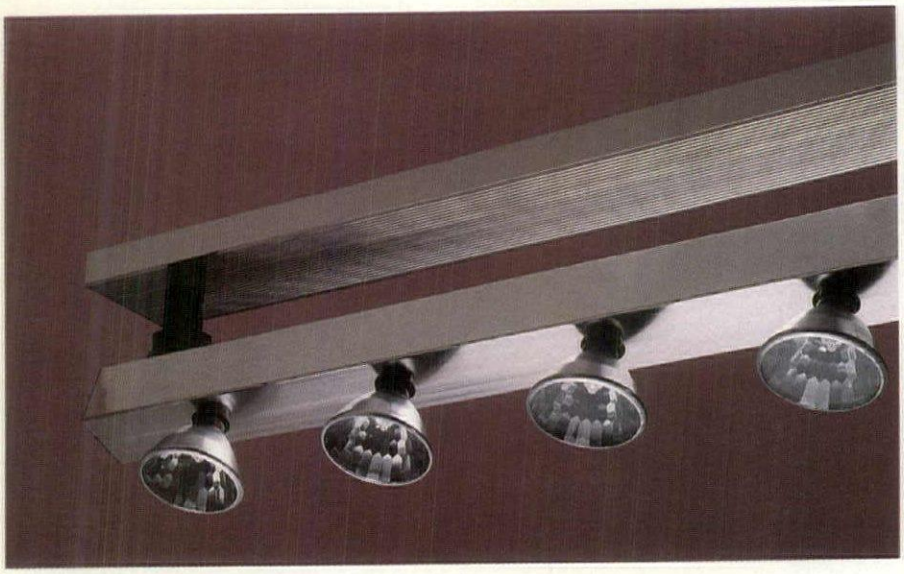
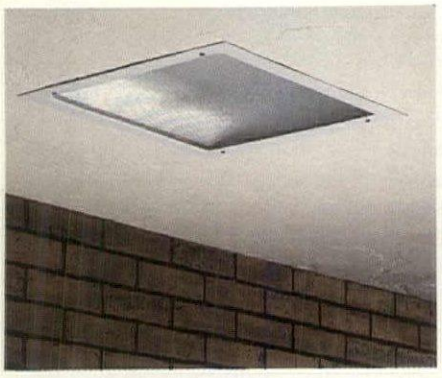


Halogen light strip

A light strip from Norbert Belfer Lighting is designed for metal reflector halogen accent lamps. The slim, extruded aluminum strip comes with lamps spaced 6 or 12 inches on center in a fixed position or on the adjustable raceway shown. Norbert Belfer Lighting, Ocean, NJ.

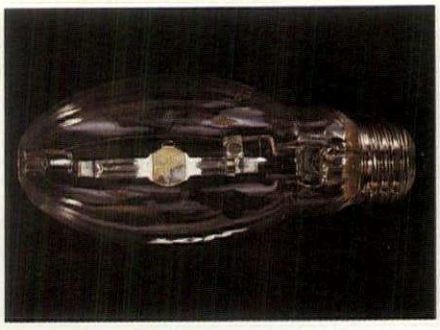
Circle 60



Recessed HID canopy light

Ruud Lighting's RC series recessed canopy light for low-wattage metal halide and HPS lamps has steel L brackets that can be adjusted to the thickness of most ceiling materials. The compact, watertight unit has a seamless die-cast aluminum housing, a high-impact tempered glass lens, and a UL-listed thermal protector. Three optical systems are available. Ruud Lighting, Racine, WI.

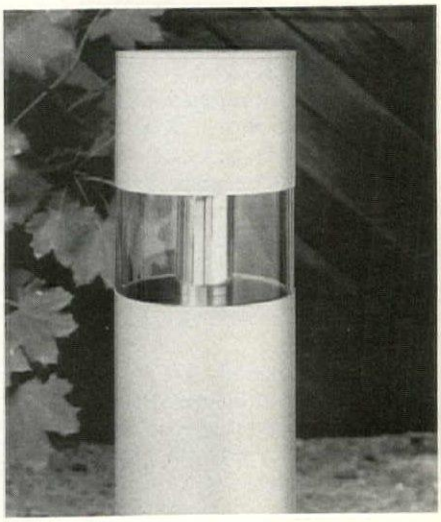
Circle 61



Metal halide lamp

Venture Lighting offers a single-ended 70-watt metal halide lamp that provides mean lumens comparable to the output of a 250-watt halogen lamp, according to the manufacturer. It can be used in fixtures designed for compact metal halide lamps and is suitable for commercial downlighting from 8-foot ceilings. The lamp comes in a universal burning position model and has a clear glass outer bulb. Venture Lighting International, Cleveland, OH.

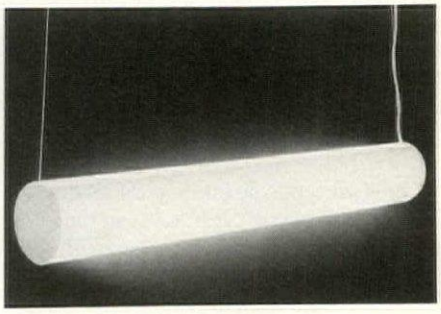
Circle 62



Cylindrical bollard reflector

Lithonia has added an optional cylindrical reflector to the KB Series of bollards. The cylindrical reflector directs light downward for use by pedestrian or auto traffic. The reflector fits Hi-Tek 6-inch and 8-inch round and square bollards and is available in four finishes. Lithonia Hi-Tek, division of Lithonia Lighting, Conyers, GA.

Circle 63



Tubular fluorescent

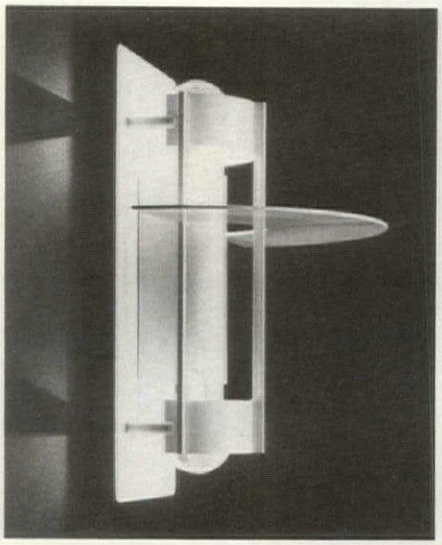
New Horizons Lighting offers the Series 4000 tubular fluorescent system in sizes from 2 to 9 inches across and in six custom-extruded shapes. Versions are available for direct, indirect, and combination direct-indirect lighting; some also have tracks. They can be mounted on walls or suspended on stems or cables. Pictured is the 6-inch up- and downlight. New Horizons Lighting, Inc., Stuart, FL.

Circle 64

■ Circular HID area lighting

Emco Environmental Lighting's Infiniround HID luminaire produces light distribution patterns like those of square luminaires. It has a one-piece, weatherproof aluminum housing; a clear tempered glass lens; and a faceted, adjustable reflector of semi-specular aluminum. Nine interchangeable, field-adjustable optical assemblies and five light distribution patterns are available. Emco Environmental Lighting, Milan, IL.

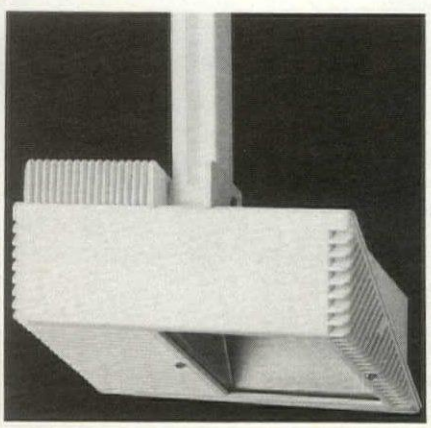
Circle 65



■ Wall luminaire

The Saturn Wall luminaire from Poulsen Lighting is designed for contemporary architectural settings. Its design features three vertical metal struts that support upper and lower glare shields and a reflector ring that redirects spill light above and below 180 degrees. Poulsen Lighting Inc., Miami, FL.

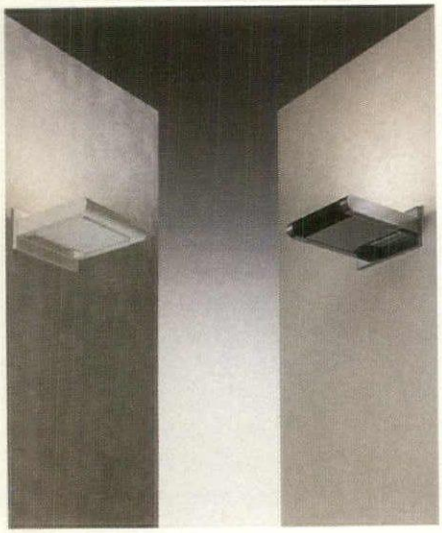
Circle 66



■ Asymmetric beam luminaire

Miroflector's Stiletto luminaires accommodate the 70-watt Osram HQI metal halide lamp in a fin-cooled, die-cast aluminum body. The pivoting luminaires incorporate a ballast and an asymmetric aluminum reflector. They come in ceiling-, track-, and wall-mounted models and in a floor lamp version. The fixtures are thermally protected, suitable for damp locations, and feature a white epoxy powder finish. Miroflector, Inwood, NY.

Circle 67



■ Halogen wall bracket

The award-winning Brayton wall bracket from Boyd Lighting provides maximum light transmission from a highly efficient asymmetrical reflector and curved Pyrex shield assembly. Both its die-cast zinc and aluminum armature and its aluminum cylinder are available in three finishes; the cylinder also comes in translucent white alabaster and three colors of marble. The wall bracket accommodates a 300-watt RSC-base halogen lamp. Boyd Lighting Company, San Francisco, CA.

Circle 68

■ Historic lamppost

The Newburyport Post from Spring City Electrical Manufacturing, designed to resemble a historic cast-iron lighting post, comes in heights from 9 to 13 feet, has a 13-inch-square base, and accommodates a variety of interchangeable luminaires. Light sources may be incandescent, mercury vapor, metal halide, or HPS. The posts are corrosion and vibration resistant, according to the manufacturer. Spring City Electrical Manufacturing Company, Spring City, PA.

Circle 69

■ Brass ceiling luminaire

Rejuvenation Lamp & Fixture offers the three-arm, solid brass Portsmouth ceiling luminaire in seven finishes. Two- and four-arm models and other shade styles are available. It accommodates 60-watt incandescent lamps. Rejuvenation Lamp & Fixture Company, Portland, OR.

Circle 70

■ Illuminance meter

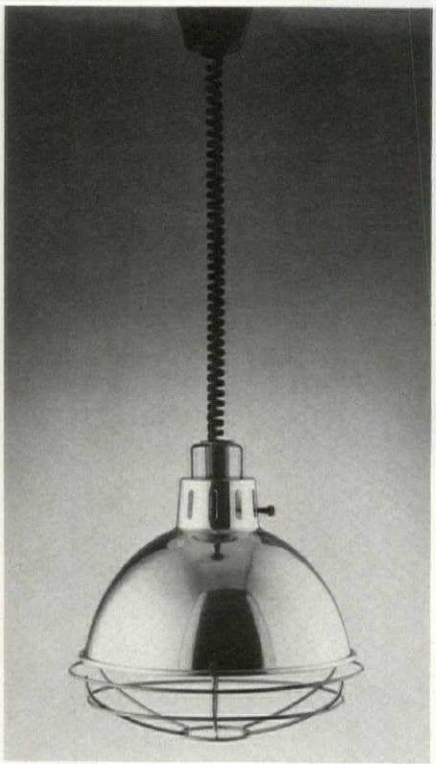
Minolta's T-1 illuminance meter features a sensitive silicon photocell for rapid and continuous measurement of illumination. The hand-held instrument comes with a microprocessor and an LCD. It provides immediate readings, calculates illuminance over a period of time, and measures deviation between sources. Minolta Corporation, Industrial Meters Division, Ramsey, NJ.

Circle 71

■ Commercial chandelier

The MA series of commercial chandeliers from RWL is part of the Odyssey Illumination line of contemporary interior luminaires. The fixtures are manufactured of brass, aluminum, or steel shells with reinforcing bands as required. Their one-piece lenses are molded of white acrylic. The chandeliers come in diameters from 20 to 45 inches and accommodate three metal halide lamps of up to 250 watts each or incandescent lamps totaling 600 watts. RWL Corporation, New Haven, CT.

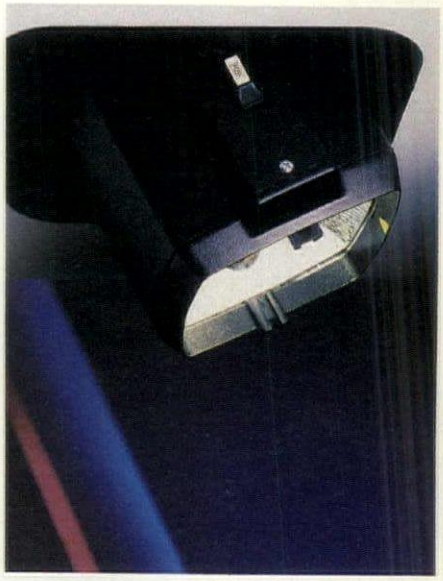
Circle 72



■ Pulldown pendant

The Pulldown Phantasy pendant from Progress Lighting features a polished aluminum reflector with a red cage on a coiled black cord and pulley that adjusts the height from 27 to 49 inches. The pendant is from a collection of 11 groups for residential and commercial use. Progress Lighting, Philadelphia, PA.

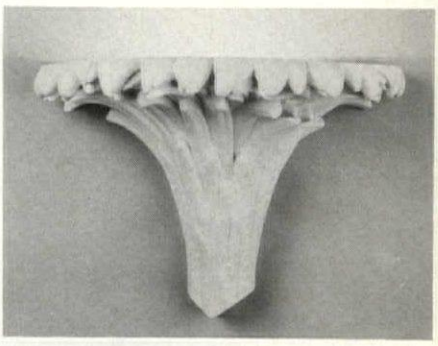
Circle 73



■ Semirecessed display light

A semirecessed, adjustable display light from Amerlux fits in a ceiling cavity but can be pulled below ceiling level to adjust the beam position. The die-cast, extruded aluminum fixture has a 15-degree beam spread reflector of anodized specular aluminum. It accommodates an Osram HQI metal halide lamp. Amerlux, Fairfield, NJ.

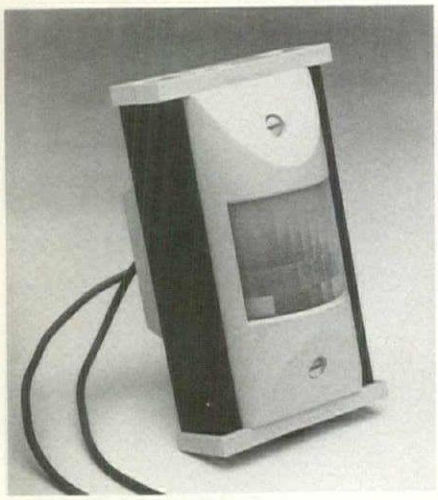
Circle 74



■ Wall sconce

The G6001 wall sconce from Gross Chandelier's Baroque Collection is made of fiber glass–reinforced resin. The UL-listed sconce measures 16 inches wide and $10^{1}/_{2}$ inches high with a 9-inch extension. It accommodates one 100-watt incandescent lamp. Also available is a 24-inch-wide version of the same design. Gross Chandelier Company, St. Louis, MO.

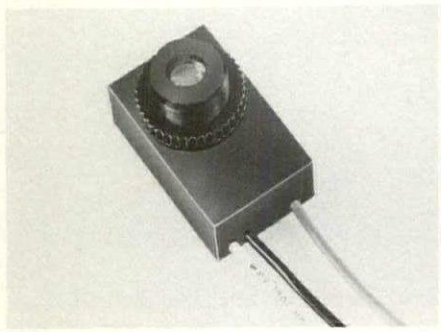
Circle 75



■ Occupancy sensor

Sensor Switch's Wall Switch II passive infrared occupancy sensor automatically turns fluorescent or incandescent lights on when it detects body heat in a room. It turns them off 30 seconds to 20 minutes after it senses an absence of occupants; users determine the delay interval. The device controls an area of 800 square feet and has a load capacity of up to 1200 watts for 120- or 277-volt systems. Its indicator light meets California Title 24 code requirements. Sensor Switch, Inc., Branford, CT.

Circle 76



■ Wire-in photocontrol

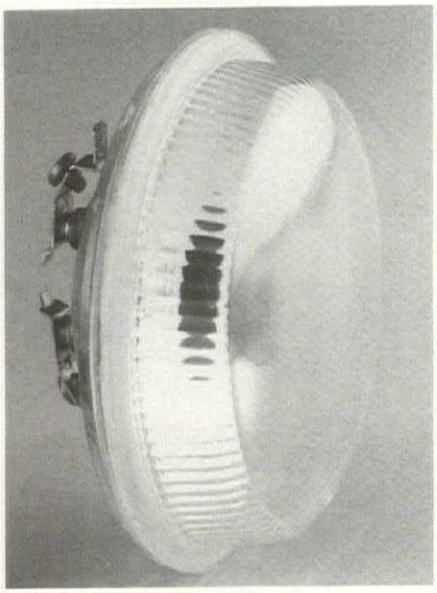
Precision Multiple Controls offers the A-105 waterproof photocontrol for outdoor lighting. Features include a high-impact Lexan housing, color-coded lead-in wires, a standard turn-on level of 1 to 3 footcandles, and a minimum time delay of 15 seconds. The device fits most post lantern and ornamental lighting fixtures. Precision Multiple Controls, Inc., Midland Park, NJ.

Circle 77

■ Wall sconce

The Apollo sconce complements luminaires in the Original Cast series from Art Directions. The fixture's solid brass trim, accented by three chrome ball finials, surrounds an opal white diffuser. The sconce measures 18 inches by 9 inches by $6\frac{1}{2}$ inches and accommodates two 60-watt lamps. Art Directions Inc., St. Louis, MO.

Circle 78



■ Halogen PAR 36

The 50-watt halogen PAR 36 low-voltage lamp from Philips Lighting offers brighter and whiter light than its incandescent counterpart without consuming additional energy, according to the manufacturer. It features a multipurpose screw terminal base that makes it interchangeable with similar PAR 36 lamps. Philips Lighting Company, Somerset, NJ.

Circle 79

■ HID area lighting

GTE's MultiKat lighting system combines a precise optical system and a compact HID source to achieve overall efficiencies of up to 80 percent. It allows precise beam control with extremely low veiling glare and delivers high lumen output per watt, according to the manufacturer. Reflectors and lenses come in various combinations to produce rectangular and circular beam patterns that range from narrow to very wide. The unit's die-cast aluminum housing is available with several mounting options. GTE/Sylvania, Danvers, MA.

Circle 80

■ Edge-lit exit signs

DEE Series AC edge-lit exit signs from York-Lite have a $\frac{3}{16}$-inch-thick Plexiglas panel with a polished-edge; engraved 6-inch-high letters and directional arrow; and a beveled, brushed stainless steel faceplate. They come in 120-volt, 270-volt, and DC versions in a choice of colors. York-Lite Electronics, Inc., Austin, TX.

Circle 81

■ Table lamp

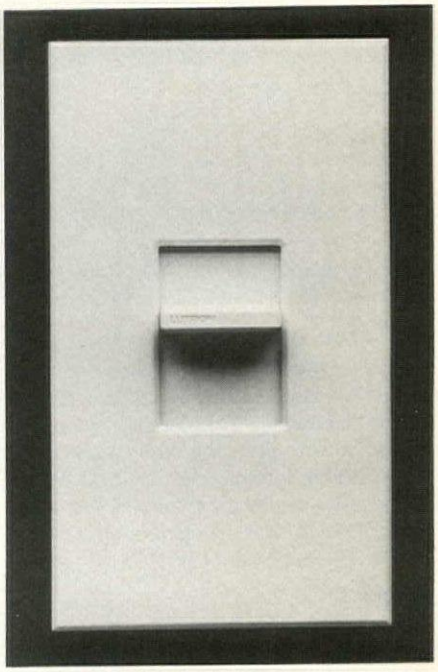
Koch + Lowy offers PAF's Logo 50/1 table lamp. The lamp's stems come in a choice of anodized black or aluminum. Its base and socket are gray, the diffuser black. The 13-inch-high luminaire has an arm 35 inches long and accommodates one 12-volt, 50-watt bipin halogen lamp. Koch + Lowy, Long Island City, NY.

Circle 82

■ Spotlight hood

LSI's Sparkle Hood reduces spill light and glare while adding sparkle around the front of the 280 Series spotlights. The hood is especially effective with glass color filters and can be used alone or with other accessories. The 280 Series spotlight takes a PAR 30 halogen lamp and produces short throws for display or accent lighting. Both come in three finishes. Lighting Services Inc., New York, NY.

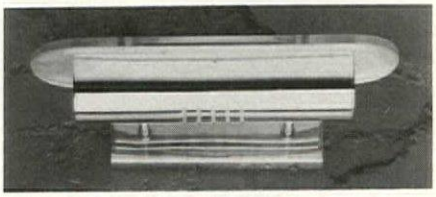
Circle 83



■ Electronic low-voltage dimmer

Lutron's Sol-Lo dimmer provides quiet, full-range dimming of low-voltage lighting systems with electronic transformers, according to the manufacturer. It can control low-voltage lamps alone or in combination with standard incandescent lamps. Models match three current product families and handle load capacities up to 450 watts; versions for systems with magnetic transformers are available. Lutron Electronics Co., Inc., Coopersburg, PA.

Circle 85



■ Halogen wall lamp

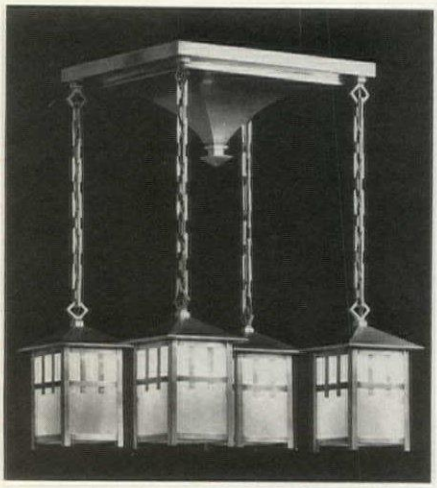
Lighting by Kenneth offers the model 450-10 wall lamp with a glass diffuser and a choice of brass or chrome trim. The lamp is 18 inches long, 5 inches wide, and extends 9 inches from the wall. It accommodates a 250-watt halogen lamp. Lighting by Kenneth, Inc., Miami, FL.

Circle 86

■ HID wall luminaire

The wall-mounted Mon 4 HID luminaire from McGraw-Edison provides poleless lighting for exterior spaces. It has a heavy die-cast aluminum casing, a drop down impact- and heat-resistant borosilicate glass or acrylic lens for easy relamping and maintenance, and a removable mounting plate for installation on a vertical surface or a junction box. The optical system and a calibrated bracket for the fixture's enclosed porcelain lamp socket both adjust easily for precise, glare-free beam control. McGraw-Edison, Vicksburg, MS.

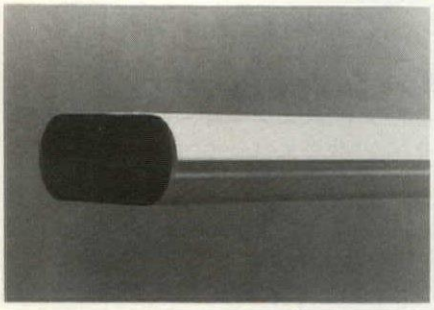
Circle 84



■ Brass ceiling luminaire

Brass Light Gallery's Dearborn ceiling luminaire comes in a version with reproductions of original Craftsman-style lanterns. The four pendant lanterns are suspended on square-link chains that come in several lengths; their art glass panels come in several colors. A matching single-lamp version is available. Brass Light Gallery, Milwaukee, WI.

Circle 87



■ Indirect fluorescent

Peerless offers a 10-inch-wide indirect fluorescent lighting fixture that can be mounted as close as 12 inches from a ceiling. It provides excellent illumination to a 12-foot by 15-foot office with a ceiling as low as 8 feet, even where VDTs are in use, according to the manufacturer. Peerless Lighting, Berkeley, CA.

Circle 88

■ Silver reflector

The Megalux silver light reflector from Badger USA saves energy and increases lumen output per watt when installed inside a fluorescent luminaire, according to the manufacturer. Reflectors come in specular silver film, aluminum film, and anodized aluminum, with reflectivities from 82 percent to 95 percent. The reflectors are custom designed and manufactured for each retrofitting installation. Badger USA, Inc., Baraboo, WI.

Circle 89

Brass luminaire

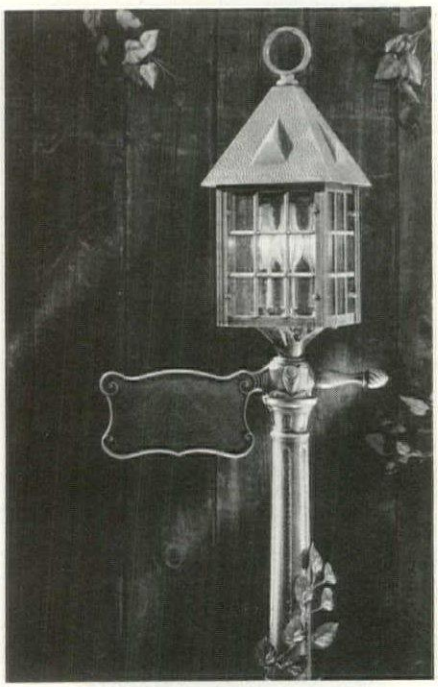
The Mission luminaire from Arroyo Craftsman comes in four sizes and several glass colors. Each solid brass lantern is individually assembled and has a verdigris patina. Matching flush wall-mounted, hanging, and post fixtures are available. Arroyo Craftsman, Arcadia, CA.

Circle 90

Fluorescent luminaire

H.E. Williams offers the Wood Classics line of fluorescent luminaires. Their 3/4-inch-thick solid oak and walnut frames have mitered corners and a hand-rubbed oil finish. Louvers, doorframes, and diffusing panels come in a choice of styles and finishes. H.E. Williams, Carthage, MO.

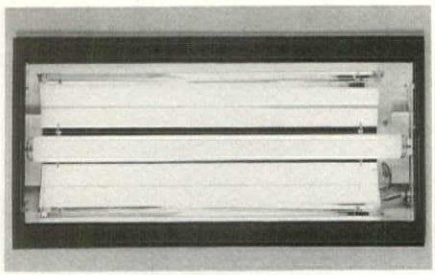
Circle 91



Lanterns

Dinico's Revere series 260-2600 lanterns are made of cast aluminum and come in three sizes for a variety of mounting configurations. They can be adapted to accommodate compact fluorescent, HPS, mercury, or incandescent lamps. A variety of matching accessories are available for all sizes; both lanterns and accessories come in eight standard and four pastel finishes. Dinico Products Inc., Hackensack, NJ.

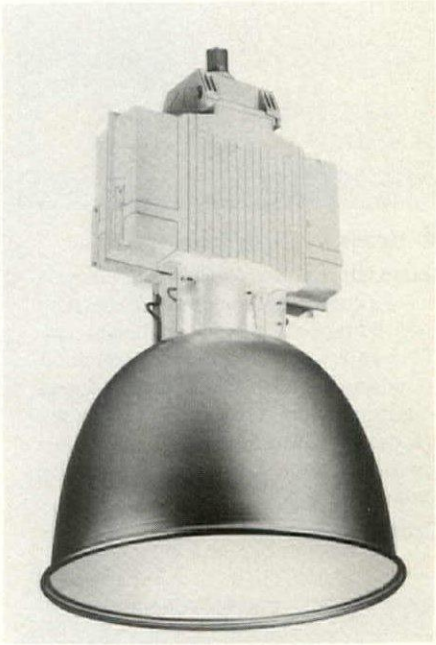
Circle 92



Optical reflector

Maximum Technology's optical reflectors for fluorescent lighting fixtures are covered with a 0.025-inch-thick layer of silver film that reflects 96 percent of incident light. Use of the reflectors reduces the number of ballasts and lamps necessary, thereby cutting energy consumption as much as 50 percent, according to the manufacturer. The reflectors are designed for new and retrofit applications, are available for most fluorescent luminaires, and can be ordered in custom sizes. Maximum Technology, Brisbane, CA.

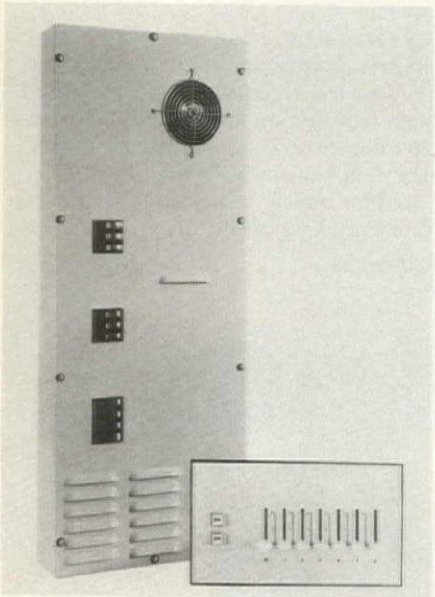
Circle 93



High-bay luminaire

Appleton Electric's Baymaster 250/400 high-bay luminaires have a die-cast copper-free aluminum ballast housing and a heavy-gauge Alzak-finished aluminum reflector with stainless steel spring locks for adjusting light distribution patterns. Its open-top design allows for cooler, cleaner operation and uplighting, according to the manufacturer. Models for incandescent and HID sources, including instant hot restart high pressure sodium lamps, and for integral and remote ballasts are available. All are designed for use in high ambient temperatures. Appleton Electric Company, Chicago, IL.

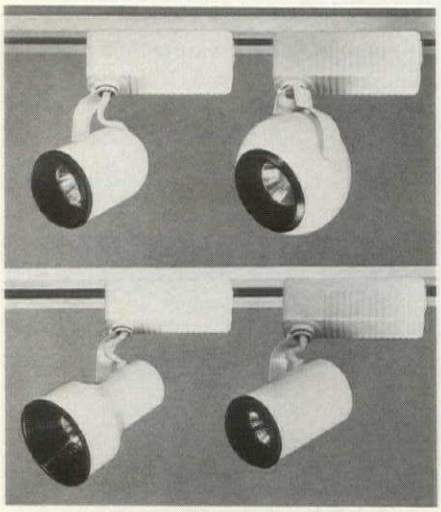
Circle 94



■ Dimming system

Lehigh Electric's Sunburst dimming system fills the gap between specification-grade wall box dimmers and small custom systems, according to the manufacturer. It comes with up to nine 2000-watt solid-state dimmers for incandescent, fluorescent, and low-voltage sources. Users can control lighting from remote stations with manual sliders or multiple preset buttons. Lehigh Electric Products Company, Allentown, PA.

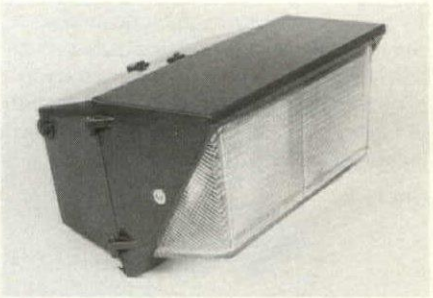
Circle 95



■ Track lights

Fixtures in Con-Tech's low-voltage track light series use MR16 and PAR 36 lamps for directional lighting. Each fixture attaches to a compact electronic RFI-filtered transformer that converts 120 volts to 12 volts. Each transformer has its own on-off switch. Five fixture styles are available, all with deep, baffled apertures that minimize glare. Con-Tech Lighting, Northbrook, IL.

Circle 96

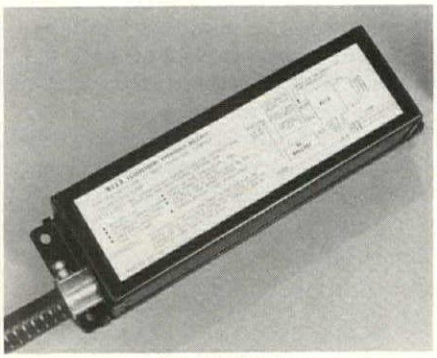


■ Heavy-duty wall luminaire

Hubbell Lighting's heavy-duty Perimapak wall-mount luminaire provides optimum

HID light output at mounting heights from 18 to 25 feet. Features include a die-cast aluminum housing, an isolated ballast chamber, and a heavy-duty prismatic refractor of borosilicate glass designed to work with the stippled reflector. Hubbell Incorporated, Lighting Division, Christiansburg, VA.

Circle 97



■ Emergency ballast

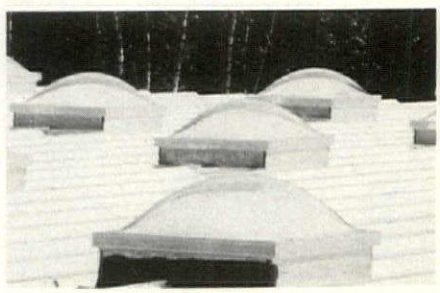
Bodine's B113 emergency ballast starts and operates 5- to 13-watt compact fluorescent lamps, including those with preheat starters. It operates at full power during the first few seconds after AC power fails, then reduces output to between 500 and 600 lumens to conserve battery power. The dual 120- and 277-volt unit is UL listed for retrofit installation. The Bodine Company, Collierville, TN.

Circle 98

■ Electronic controller

Paragon Electric offers the EC11 24-hour controller for switching a single load on a time-of-day schedule. It provides daily repetition of up to 288 events in intervals as short as 5 minutes and allows a schedule to be skipped for one or more days. A manual override capability and 12- and 24-hour clock formats are included. The controller is available in NEMA 1 or DIN panel-mount enclosures. Paragon Electric Co., Inc., Two Rivers, WI.

Circle 99

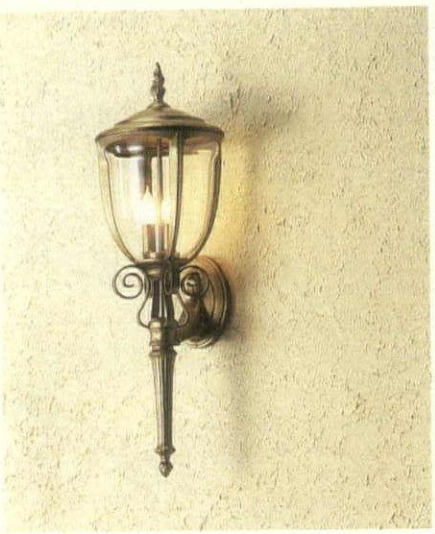


■ Skylights for metal roofs

Wasco's Super-Thermalized Skydome venting skylights for metal roofs are integrated

with standing-seam metal roof panels in an assembly that can be installed like a standard metal roof panel. Models come ready to install in frame heights of 4 and 9 inches with curb tops of extruded thermoplastic and integral gaskets fused at the corners. Wasco Products, Inc., Sanford, ME.

Circle 100



■ Decorative lantern

ELA's cast-aluminum Vienna lantern has a hood that removes easily for relamping. The smallest of the three sizes has a glass bowl and accepts three incandescent candle lamps. The two larger versions have acrylic bowls, accept five candle lamps, and can be converted for some HID sources. The lanterns come in four finishes and can be mounted on posts or walls. A frosted glass bowl and custom finishes are optional. Environmental Lighting for Architecture, Inc., City of Industry, CA. ■

Circle 101

Product Literature

Decorative luminaires

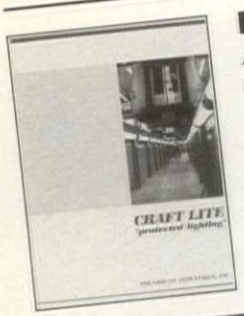
A brochure lists dimensions, finishes, colors, lamp requirements, and switching options for a collection of contemporary table lamps, torcheres, and pendant luminaires in three styles. Casablanca Lighting, Valley Forge, PA.

Circle 120

Replacement lamps

GE has issued a 12-page brochure that describes replacement lamps and includes tables on energy efficiency for standard and halogen incandescent lamps, fluorescent lamps, and HID lamps. GE Lighting, Cleveland, OH.

Circle 121



Industrial fluorescent

A brochure illustrates Craft Lite heavy-duty fluorescent fixtures for wet, damp, cold, vibrating, and chemically harsh environments. It includes descriptions and color photographs of eight models. Paramount Industries, Croswell, MI.

Circle 122

Backlighted awnings

Insight Graphic Systems designs and manufactures modular illuminated awnings in two styles. A brochure contains sketches and descriptions of system components. Insight Graphic Systems, division of Lighting Systems Inc., Cincinnati, OH.

Circle 123

Contactors, controllers

A brochure from Square D features Class 8903 and 8931 contactors and control panels for lighting systems. It includes descriptions of components, options, and applications for different load types. Square D Company, Milwaukee, WI.

Circle 124

Electromagnetic ballast

The Watt Reducer electromagnetic ballast for energy-saving fluorescent lamps helps cut lighting costs as much as 28 percent. A color brochure shows energy savings and comparisons with standard ballasts. MagneTek Universal Manufacturing, Paramus, NJ.

Circle 125

Fluorescent fixtures

A brochure explains advantages of PowerMaster 9008 and SuperStrip 9008 fluorescent fixtures. Reflectors have a specular silver film and optional parabolic louvers. The Lighting Corporation, Chicago, IL.

Circle 126

Recessed reflector

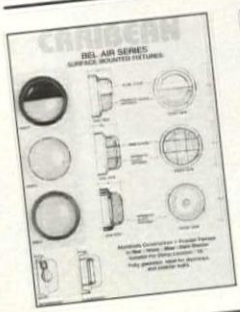
The model 6300 recessed walk and patio reflector has a Pyrex glass cover and a cast aluminum shade that prevents upward glare and produces a broad downlight pattern. Wendelighting, Burbank, CA.

Circle 127

Track lighting

A 7-page catalog features ESP's low- and line-voltage track systems, including fixtures for R and MR16 lamps. Energy Saving Products, Inc., Huntington Beach, CA.

Circle 128



Surface fixtures

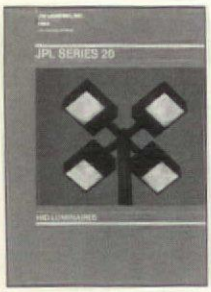
Bel Air fully gasketed, surface-mounted aluminum fixtures have a prismatic glass diffuser and an optional visor or wire guard. A data sheet includes side- and front-view sketches. Caribean Worldwide, Inc., Miami, FL.

Circle 129

■ Outdoor HID luminaire

The Grande Trenton commercial outdoor luminaire from Hanover Lantern is made of cast aluminum and has clear, UV-stabilized prismatic polycarbonate panels. An illustrated data sheet lists features and options. Hanover Lantern, Hanover, PA.

Circle 130



■ HID luminaires

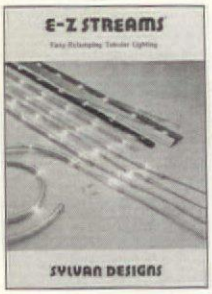
JPL series 20 HID luminaires combine precise photometrics and attractive appearance in a variety of sizes. An 8-page color brochure provides technical specifications and illustrates components, beam patterns, and mounting options. JW Lighting, Inc., Houston, TX.

Circle 131

■ HPS floodlight fixture

Iwasaki's aimable Watchman floodlight fixture uses a new weatherproof, reflectorized, high pressure sodium lamp with a hard glass envelope that protects it from the weather. A brochure shows features and installation. CEW Lighting, Dallas, TX.

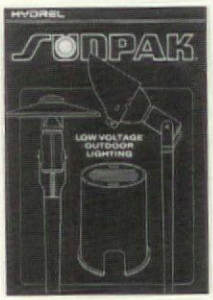
Circle 132



■ Relampable tube lights

E-Z Streams tube lights allow users to replace the miniature incandescent lamps without removing or disassembling installed tubes. A color brochure contains electrical and mechanical specifications, relamping instructions, and application photos. Sylvan Designs, Inc., Northridge, CA.

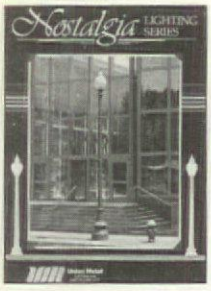
Circle 133



■ Outdoor lighting

Hydrel's Sunpak low-voltage halogen landscape lighting system includes an accent light, a spread light, a well light, a glare shield, a transformer, mounting accessories, and colored lenses. Hydrel, Sylmar, CA.

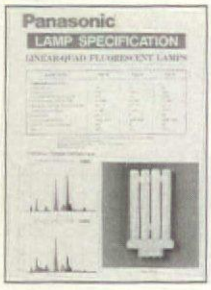
Circle 134



■ Street, area lighting

The Nostalgia lighting series includes 11 families of lamp posts and fixtures in styles that date to 1906. Applications and sketches of models and luminaire configurations are shown. Union Metal Corporation, Canton, OH.

Circle 135



■ Linear quad lamps

A data sheet lists the spectral power distribution, performance data, and dimensions for three wattages of linear quad-tube compact fluorescent lamps. Panasonic Industrial Company, Secaucus, NJ.

Circle 136

■ Outdoor lighting

Luminaires in Hadco's Quick-Ship program can be shipped within 72 hours of being ordered. A color catalog includes photographs, dimensions, and features of bollards, poles, and luminaires for decorative outdoor, area, and landscape lighting applications. Hadco, Littlestown, PA.

Circle 137

■ Passive infrared controls

A technical brochure describes features and installation procedures for JWP Infracon's passive infrared lighting controls and occupancy sensors. It includes photos, wiring diagrams, technical drawings, and complete specifications. JWP Infracon, Inc., Fairfield, NJ.

Circle 138

■ Spherical floodlights

Sterner's 571/575 series of spherical Infranor outdoor floodlights provide 16 preset rectangular beam patterns. A brochure details components and specifications. Sterner Lighting Systems Incorporated, Winsted, MN.

Circle 139

■ Fluorescent floodlights

A data sheet describes features of the Omegalux 1200 series of floodlights, which use compact fluorescent lamps and have Lexan lenses. Western Lighting Industries Incorporated, North Hollywood, CA.

Circle 140

■ Incandescent dimmer

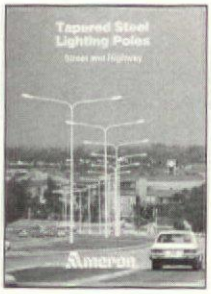
The DCI dimmer for 120- to 277-volt standard incandescent and quartz lamps features modular plug-in dimmer units and five control options. A data sheet describes system components and lists specifications. Macro Electronics, Austin, TX.

Circle 141

■ Fluorescent ballasts

A 16-page illustrated brochure describes the operation and function of ballasts for fluorescent lamps. It addresses typical operating concerns and application criteria. Certified Ballast Manufacturers, Cleveland, OH.

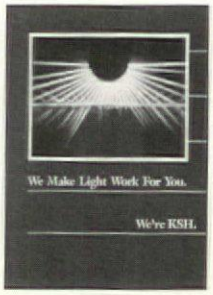
Circle 142



■ Lighting poles

A brochure contains sketches and design information on Ameron's tapered steel lighting poles for streets and highways, which can be custom-made to meet special code requirements. Ameron, Fillmore, CA.

Circle 143



■ Prismatic lenses

A brochure from KSH illustrates a selection of nine prismatic lenses for fluorescent fixtures and suggests applications for each lens shown. KSH Inc., St. Louis, MO. ■

Circle 144

Calendar

October 19–December 21, 1988

Introduction to lighting design, Pacific Gas & Electric, San Francisco. Includes process of visual perception, lighting system design, new lighting products. Fee. Instructor: Brian Liebel. Cosponsors: IES Golden Gate Section, Northern California DLF. Contact: Heide Kawahata, Kreiger-Walker & Associates, P.O. Box 26107, San Francisco, CA 94126-6107, (415) 982-9832.

October 20, 1988

Lamp technology, IES panel discussion, Hall of Flowers, Golden Gate Park, San Francisco. Sponsor: IES Golden Gate Section. Contact: Mike Mazzi, Program Chair, California Architectural Lighting, 150 Fourth Street, Suite 555, San Francisco, CA 94103, (415) 777-5111.

October 23–26, 1988

IFMA '88, conference and exposition, Westin Peachtree Plaza and Atlanta Market Center, Atlanta. Includes session on VDT lighting with Stephen Spier, IES president-elect. Contact: Nancy G. Minni, Director of Education and Research, International Facility Management Association, 11 Greenway Plaza, Suite 1410, Houston, TX 77046, (713) 623-4362.

October 31, 1988

Submission deadline for AIA 1989 Honor Awards entry forms. Projects completed since January 1, 1982, are eligible. Contact: Awards Director, The American Institute of Architects, 1735 New York Avenue, NW, Washington, DC 20006, (202) 626-7390.

November 3–4, 1988

Lighting management, course, Boston. Basics of energy-efficient design and retrofit. Repeats December 8–9 in Orlando, FL. Contact: Association of Energy Engineers, 4025 Pleasantdale Road, Suite 420, Atlanta, GA 30340, (404) 447-5083.

November 5–9, 1988

ASLA annual meeting and educational exhibit, Seattle, WA. Contact: American Society of Landscape Architects, 1733 Connecticut Avenue, NW, Washington, DC, 20009, (202) 466-7730.

November 11, 1988

IALD awards presentation, Willard Intercontinental Hotel, Washington, DC. Contact: International Association of Lighting Designers, 18 East 16th Street, Suite 208, New York, NY 10003, (212) 206-1281.

November 14–15, 1988

Light sources — characteristics and applications, seminar, Royal Sonesta Hotel, Cambridge, MA. Contact: TLA–Lighting Consultants, Inc., 72 Loring Avenue, Salem, MA 01970, (508) 745-6870.

November 14–16, 1988

Light and color for human performance, seminar, Georgia Tech, Atlanta. Alexander F. Styne, IDSA, FIES, discusses recent research and how to perform calculations. Cosponsors: ASID, IES Georgia Section, AIA Atlanta Chapter, IBD, IDSA Atlanta Chapter, Georgia Tech College of Engineering. Contact: Education Extension, Georgia Institute of Technology, Atlanta, GA 30332-0385, (404) 894-2547.

November 15–16, 1988

Philadelphia Lights, exposition and conference, Adam's Mark Hotel, Philadelphia. Cosponsors: IES Philadelphia Section, Electrical Association of Philadelphia, and Philadelphia chapters of AIA, ASID, IDC, and Preservation Techniques. Contact: Dennis Neff, The Electrical Association of Philadelphia, 9 Presidential Boulevard, Bala-Cynwyd, PA 19004, (215) 668-1700.

November 16, 1988

Laser technology, joint IES-DLF meeting, Morrison Planetarium, San Francisco. Cosponsors: IES Golden Gate Section, Northern California DLF. Contact: Mike Mazzi, Program Chair, California Architectural Lighting, 150 Fourth Street, Suite 555, San Francisco, CA 94103, (415) 777-5111.

November 29, 1988

New energy-efficient lighting systems, workshop, Marlborough, MA. Repeats November 30 in Providence, RI. Contact: Randa Jazairi, Northeast Solar Energy Association, P.O. Box 541, 14 Green Street, Brattleboro, VT 05301, (802) 254-2386.

December 15, 1988

Application deadline for the first Lee Boyack Memorial Scholarship in lighting design for student ASID members in FIDER-accredited interior design programs. Sponsors: Design Foundation and ASID California North Chapter. Contact: Jan Moyer, Design Foundation, 2 Henry Adams Street, Suite 301, San Francisco, CA 94103, (415) 482-1875. ■

Classified Directory

ACCENT AND DISPLAY LIGHTING (INTERIOR)

AMERLUX, 23 Daniel Rd., Fairfield, NJ 07006 ..... 201/882-5010

BEND-A-LITE (see ad this section)

DANALITE, 16392 Gothard St. #A, Huntington Beach, CA 92647 ..... FAX 714/848-1669 714/841-4325
Low voltage / slim profile linear lighting system / high intensity halogen lamps / extensive apps.

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Full line of recessed accent lights, down lights & wall washers. Architectural cylinders for HQI, incandescent compact quad fluorescents and HID lamp sources.

NL CORP., 14901 Broadway, Cleveland, OH 44137 ..... FAX 216/662-9069 or 216/662-2080
Recessed HID and incandescent; decorative; custom; church; 20, 30, & 60 amp track; fluorescent lighting systems. Call for more information.

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H.E. WILLIAMS INC., P.O. Box 837, Carthage, MO 64836 ..... 417/358-4034

LITHONIA LIGHTING. We cover the lighting spectrum 404/922-9000

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PEERLESS LIGHTING CORP., P.O. Box 2556, Berkeley, CA 94702 ..... 415/845-2760

AREA LIGHTING (EXTERIOR)

ADJUSTA-POST MFG. CO., P.O. Box 71, Norton, Ohio 44203 ..... FAX 216/745-9746 800/321-2132
Residential & commercial outdoor fixtures. Stds. & Acces., HID, fluorescent, low volt. & incandescent.

AMERICAN ELECTRIC, 1555 Lynnfield Rd., Memphis, TN 38119 ..... 901/682-7766
HID luminaires for area, facade, roadway, sports, and industrial lighting applications.

C.P.I. CONCRETE PRODUCTS, P.O. Box 13324, Memphis, TN 38113 ..... FAX 901/775-9883 or 901/775-9880
Concrete light poles & bollards. Fourteen decorative colors & exposed aggregate finishes such as dark bronze, black, & granite to match any setting. Square tapered design up to 65 ft.

ELA CO., 17891 Arenth Ave., City of Industry, CA 91748 ..... 818/965-0821 FAX 818/965-9494
Mfgs. of decorative outdoor fixtures, poles and arms for the commercial and residential mkts. Custom designing and mfg. of decorative interior/exterior fixtures.

J.H. BAXTER & COMPANY, P.O. Box 10797, Eugene, Oregon 97440 ..... 503/689-3020
Manufacturer of Timberwood Lighting Standards. A superior pressure-treated Douglas fir laminate for decorative outdoor lighting support. Contact Richard Baxter.

PEMCO CORP., Philadelphia, PA, Exterior HID & Custom Lighting & Poles 215/236-9020

RUUD LIGHTING, 9201 Washington Ave., Racine, WI 53406 ..... 800/558-7883

STONCO, 2345 Vauxhall Rd., Union, NJ 07083. Contact Phil Henry at 201/964-7000
Outdoor lighting; fixtures and accessories for industrial, commercial and residential markets.

UNION METAL CORP., 1022 9th St. SW, Canton, OH 44707 ..... 216/456-7653
Steel, aluminum and concrete poles for area, roadway and sports lighting. Hi-mast raise-lower systems. Ornamental nostalgia lighting poles and luminaires.

W.F. HARRIS LIGHTING, 4015 Airport Ext. Rd., Monroe, NC 28110 ..... 704/283-7477
Indoor/outdoor decorative & vandal-resistant rustproof lighting for wall, ceiling, post & landscape applications. U.L. listed H.I.D., FL, INC & emergency fixtures.

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LEE COLORTRAN, Inc., 1015 Chestnut St., Burbank, CA 91506 ..... FAX 818/954-8520 or 818/843-1200
VIEWPOINT, a field-configurable system of off-the-shelf Architectural Dimming and Control Components from Lee Environmental Lighting—a division of Lee Colortran, Inc.

LUTRON ELECTRONICS, 205 Sutter Rd., Coopersburg, PA 18036 ..... 215/282-3800

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LIGHTSPACE DESIGN, 2111 Vine, Suite B, Berkeley, CA 94709. Consultant & MFG. 415/540-6023

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INTERNATIONAL LIGHT, Dexter Industrial Green, Newburypost, MA 01950 ..... 617/465-5923
Radiometers, photometers, spectroradiometers, laser power meters for radiometry, photometry, UV curing, UVA/B phototherapy, germicidal radiometry & UV hazard use.

LAMPS

GTE/SYLVANIA LIGHTING, Sylvania Lighting Center, Danvers, MA 01923 ..... 617/777-1900

USHIO AMERICA, 20101 S. Vermont Ave., Torrance, CA 90502 ..... FAX 213/329-3641 or 213/329-1960
Manufacturer of MR11, MR16, T3 Quartz, Minican and DC Bayonet Halogen Lamps.

VENTURE LIGHTING INTL., 625 Golden Oak Pkwy., Cleveland, OH 44146 ..... 800/437-0111
Metal Halide, High and Low Pressure Sodium, Mercury, MR-16 and MR-11 Display Lamps. Many new and unique products not available from other manufacturers.

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ABEC LIGHTING, 4084 Arnold Ave., #8, Naples, FL 33942 ..... 813/643-4242 or 813/643-3305
Quality outdoor landscape & security lighting. PVC construction. Fluorescent/low voltage available—all styles. Custom color & design. Commercial, residential, marine.

HADCO, P.O. Box 128, 100 Craftway, Littlestown, PA 17340 ..... 717/359-7131

IDAHO WOOD, Sandpoint, ID, Landscape Lighting (Wood) ..... 800/635-1100 or 208/263-9521

LIGHTING DESIGNERS AND CONSULTANTS

FREDRICK RAMOND INC., 16121 S. Carmenita Rd., Cerritos, CA 90701 ..... FAX 926-1015 213/926-1361

LIGHTING POLES (WOODEN)

WOODFORM, INC., Portland, OR 97220-1230 ..... 800/624-5091

OEM MANUFACTURERS

EDWIN GAYNOR CO., 200 Charles St., Stratford, CT 06497 ..... 203/378-5545 or FAX 203/381-9019
For more information about fluorescent wiring devices, switches and lamp holders, call and ask for Jill Sapak.

OTHER LIGHTING SYSTEMS AND LUMINAIRES

CUSTOM NEON Mfg., Install interior neon. Portable & wall-mount art & signs. 213/937-6366

LIGHTING TECHNOLOGIES INC., 2540 Frontier, Suite 107, Boulder, CO 80301 ..... 303/449-5791
Complete luminaire design and lighting system analysis software and consulting service.

PARADISE DESIGN & MFG. INTL., 2633 E. 28th, #602, Signal Hill, CA 90806 ..... 213/427-5756
Portable neon fixtures, custom cove lighting & neon art, stock figures for residential, commercial, & architectural applications. For information call Don Narbone.

OTHER SERVICES

ALCOA, Sheet & Plate Division, P.O. Box 8025, Bettendorf, IA 52722 ..... 319/344-3007

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CAREER OPPORTUNITIES

ARCHITECT/PROJECT MANAGER

WILLIAM LAM ASSOCIATES, an international lighting consulting practice with work focusing on the integration of natural and artificial lighting with architecture, urban design and building systems, seeks associate level architect with minimum 3 years project management experience, writing ability and excellent design and graphic skills. M. Arch. and registration preferred. Will train individual with strong commitment to career in architectural/urban design lighting. Some travel required.
Please send statement of interest and resume to: William Lam Associates, 101 Foster Street, Cambridge, MA 02138

The Classified Directory is a monthly feature of ***Architectural Lighting,*** offering readers easy access to lighting products and services for commercial, industrial, and institutional applications. Listings in this reference section are sold on an annual basis at the rates outlined below. For full information and closing dates, contact Gordon Exe, (800) 822-6678 or (503) 343-1200.

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In This Issue

Manufacturers

Page 15. *Festive nighttime lighting beckons shoppers* (Quailbrook Center, Oklahoma City, Oklahoma).
Bell: Die-cast PAR lamp holders.
Hubbell: Metal halide uplights, bollards, area luminaires, perimeter luminaires, and parking lot light standards and fixtures.
Markstone: Recessed soffit downlights.
Mid-West Chandelier: Exterior fluorescent cove lighting.
Sunray Awnings: Canvas pyramids.

Page 16. *Munitions factory retrofit saves money, eyes of the workers* (Anniston Army Depot, Anniston, Alabama).
GE Lighting Systems: HPS luminaires and lamps.

Page 18. *Church lighting: Meeting the challenge of a high, dark ceiling* (St. Stephens Church, Belvedere, California).
Lightolier: Adjustable downlights.
Nova Industries: Custom fixtures.
Osram: HQI metal halide lamps.
Special Projects: Light trough.

Page 28. *Safety ranks first in prison's lighting priorities* (Avenal State Prison, Avenal, California).
GE Lighting Systems: High-mast and cobra-head luminaires; 1000-watt HPS lamps and ballasts.
Valmont: High-mast poles.

Page 30. *Wrigley's lighting: Great for television, but will the Cubs win a pennant?* (Wrigley Field, Chicago).
Asco: Remote control lighting contactors, automatic transfer switches.
GE Lighting Systems: 1500-watt metal halide floodlights; metal halide and HPS lamps.
Holophane: Outdoor sign lighting fixture.
J.H. Spaulding: Square outdoor fixtures over seat decks.
Miller: Round outdoor fixtures over ramps.

Page 34. *With lighting help, restoration outshines original* (Landmark Building, Boston).
Custom Metalcraft: Elevator door surround fixtures.
Elliptipar: Wall washers.
Hubbell: Exterior floodlighting.
Rambusch: Chandelier and basket pendant reconstruction.
Sterner: Exterior floodlighting.

Page 36. *Moot court classroom has lighting variety, flexibility* (Moot Courtroom, School of Law, University of San Francisco).
Arrowhart: Single-pole switch controller.
Day-Brite: Fluorescent strip with hot rapid start electronic ballast for cove lighting.
Halo: Recessed incandescent downlights with specular gold reflectors (wall washer with regressed eyeball over bench).
MG Products: Surface-mounted fluorescent luminaires with gold parabolic cube diffusers.
PPG: 1/4-inch smooth-rough obscure glass.
Visa: Polished brass incandescent uplight wall brackets.

Manufacturer credits reflect the products specified for the projects; it is possible that other products were installed during construction or maintenance.

Photographers

Dan Danilowicz/Photown, 7523 Intervale, Detroit, MI 48238, (313) 834-4949

Stephen Green, 6737 North Hermitage, Chicago, IL 60626, (312) 761-6034

Ben Janken Photography, 1612 Fulton Street, San Francisco, CA 94107, (415) 931-5158

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