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"Edge City" and real people

"Edge City" is not the right word, nor is "urban village," but Joel Garreau is describing not only the state of urbanizing America, but the current expression of a universal desire. Your reviewer [ARCHITECTURAL RECORD, August 1992, page 52] accepts blindly the "experts" whose case against suburban "sprawl" says more about their personal notion of a rational order than about their knowledge of real people.

In the stable society of ancient Rome, those who could afford it had their country villas. The concentrated and walled medieval town we idealize was only a necessity—a defense against a lawless countryside. As soon as social stability and modern technology made it possible, Americans who could afford it moved to places in the country by railroad. When other Americans had to leave the farms as machines took over, they still brought with them to the city the "rural ideal" of Sam Warner's Streetcar Suburbs... And so with the advent of that "villain," the automobile, Americans have found it possible to recapture some of that ideal and to live outside the city center.

Clarence Stein, Henry Wright, and Lewis Mumford, in a report to the AIA in 1920, said that the way to a decent life was to leave the dirty city behind, whence were born the several new towns in the 1930s which are still held up as models...

It is ridiculous to charge the suburbs to "speculators." They were political responses to a widespread desire to raise a postwar family in the best surroundings... 

Robert S. Sturgis, Architect
Weston, Massachusetts

Family Values

In his article "Shattering Old Housing Myths [ARCHITECTURAL RECORD, July 1992, page 70] Robert Campbell makes the mistake of equating the existence of something with the proof of its worth. Just because the composition of families has changed, it does not follow that those changes are inherently for the good of society. It certainly does not follow that what the family changed from was a "myth"; in fact, if it was a myth, there would have been no change to notice. If the family composition we have now is better than the "myth" of the two-parent household, there is no need to decry the high divorce rate and economic strains inherent in single-parent-families. My advice for future articles is to drop the amateur social philosophy and stick to architecture.

Paul Ashley, Architect
Madison, Wisconsin

Mr. Campbell replies:

Our private opinions about appropriate or inappropriate family structure shouldn't keep us from recognizing that divergent family models have always existed, are becoming more common, and deserve the best housing architects can give them.

Corrections

Jonathan Cohen was project manager for Delancy Street Embarcadero Triangle [ARCHITECTURAL RECORD, July 1992, page 72].

Elizabeth Bull was lighting designer of JPB Advisors, Inc., Miami [ARCHITECTURAL RECORD, September 1992, page 78].

Bob Shaye is chairman of New Line Cinema and client for the company's offices in New York and Los Angeles [ARCHITECTURAL RECORD, September 1992, page 122].

November 18-20, 1992

Lighting conference for architects and contract interior designers, GE Lighting Institute, Cleveland, Ohio. For information: 800/255-1200.

Through November 30


Various dates

A national lecture series conducted by Simpson Gumpertz & Heger Inc. on "Building Envelope" design. Boston, 11/18-19, Seattle, 12/7; Los Angeles, 12/9.

For information, contact: Archimedia, 617/951-2199.

December 1

1992 Gabriel Prize Competition. Requests for application forms are to be made in writing and received no later than December 1, 1992 at the Western European Architectural Foundation, c/o The Boston Society of Architects, 50 Broad St., Boston, Mass. 02109.

December 6-8

An international exhibition of products and services on building restoration, Hynes Convention Center, Boston. For more information: Ellen Glew 617/933-9699, fax 617/933-8744.

Through January 3, 1993

"Framing American Cities," an installation by architect/sculptor Mark Robbins, Wexner Center for the Arts, Ohio State University. Contact: Mark Robbins, 614/292-9567 or 614/292-3182.

January 30

"Call for Vision, San Francisco Embarcadero/Waterfront Competition." Sponsored by the Center for Critical Architecture and a coalition of community organizations. For competition kits, send $75 to CFCA/2AES, 1700 17th St., 2nd Floor, San Francisco, Calif. 94102.
Not Again! Dade County Fixup Plans Threaten Replay of Old Mistakes

If, as Le Corbusier reportedly said, an airplane is a small house that flies, then there were a lot of airplanes flying about Southern Dade County, Florida, as Hurricane Andrew passed through that tragic morning of August 24. As I write this now, two months have passed, and a picture is beginning to emerge of the effort to turn around the human suffering and physical decimation that flattened 75,000 houses and left an area of 140 square miles a wasteland.

The way things look, this effort is a recipe for failure. First, the understandable pressures to put a roof over the heads of the homeless are threatening to repeat the very mistakes that supposedly caused the damage in the first place—a building code with an Achilles' heel in the form of a tough performance version coexistent with a weaker prescriptive version open to watering down; pressures by the insurance companies to build the replacement structure just like the original that failed; a shortage of inspectors; delay in translating state-of-the-art wind-design savvy from testing labs to field practice; the advent in droves of mobile-home suppliers competing to replace the trailer parks that, as one architect said to me, resembled a field of Kleenex after the storm (see also a report in RECORD, October 1992, page 35.)

Still, serious as these concerns are, none to my mind is so potentially tragic in the long term as loss of this opportunity to create, out of the shambles, viable neighborhoods and communities. Instead, we are seeing a return to the status quo by cost-conscious officials defending the re-use of existing road and infrastructure networks. Wrecked townships such as Florida City and Homestead, along with the various unnamed migrant camps, were essentially characterless developments with few or no community facilities (had these existed, by the way, they may well have served as community centers to manage disaster relief and reduce the suffering). On the plus side, dramatically reconceived land-use planning, backed up by an adopted zoning resolution prepared for Dade County by Andres Duany and Elizabeth Plater-Zyberk, could create livable communities at every income level, from migrant to upper-middle-class housing, help protect the fragile marine environment from future disasters, and replace the inefficient infrastructure with a less sprawling, more energy-conscious network, including public transit.

So there is hope. Committees of architects, developers, homeowners, and public officials, working through the federally appointed "We Will Rebuild" committee, as well as Florida International University, the University of Miami, and the Miami AIA chapter, are taking steps in the right direction. For example, a charette planned for later this month is to lead to a plan of action. The intent is in part to edit out the duplicated efforts that have slowed progress through too much good will and not enough coordination, and to bring proven expertise to bear on key opportunities. Case studies will focus on replanning some 20 prototypical site-specific places, such as migrant camps, shopping centers, and Homestead Air Force Base, with a special eye on those where plans are more likely to succeed due to single ownership of large parcels. One joint University of Miami/AIA group has produced a manual for homeowners, with over 50,000 copies distributed.

Yet, despite the good will, the danger is real that the drive to rebuild now is elbowing out the drive to rebuild right. The homeless need to be provided for. But doing things the same old way will, with the next hurricane, bring the same destruction, to the same people. Stephen A. Kliment
It's like your old plotter on ten cups of coffee
Berlin

Murphy/Jahn and Renzo Piano Win Potsdamer Sites; Golden-Age Approach Ignores 60 Darker Years

Plans are underway for two office/hotel/retail/residential/entertainment complexes in the Potsdamer/Leipziger Platz development area. Daimler Benz (lower left photo and 1 on map) has chosen a scheme by Renzo Piano with Christoph Kohlbecker that injects a waterway system into the site, and proposes breaching Hilmer & Sattler's masterplan in order to give Scharoun's 1978 State Library (2) an eastern approach worthy of a united Germany. The library's west facade faces Mies van der Rohe's 1968 New National Gallery (3).

Sony's European headquarters (center right photos; 4 on map) by Murphy/Jahn with Ove Arup as structural environmental consultant and Peter Walker as landscape designer should begin construction in mid-1994. The program calls for video monitors with 24-hour broadcast capability to "replace flower pots and more traditional urban ornaments," and a large video wall dominating a roofed urban forum. The scheme, criticized by some as "too American," includes a tower well over masterplan limits, links to Scharoun's 1963 Philharmonie (5), and exact restoration of the Beaux-Arts facade of the Esplanade Hotel as "an icon and memory of turn of the century Berlin."

Both projects deliberately appeal to an earlier Berlin, where the facing plazas were Europe's busiest and most glamorous venues, surrounded by hotels, ministries, embassies, offices, entertainment establishments, and department stores. However, a once-and-future Golden Age design approach leaps over the 60 most recent years in development-area history. During the Third Reich, it was ringed by the entrance to Hitler's bunker system (6), Goebbels's Enlightenment and Propaganda Ministry (7), the Air Ministry (8), Gestapo headquarters (9) where basement cells and torture chambers still remain, SS headquarters (10), the main SS Security office (11), and the infamous People's Court (12) that was one door over from Sony's hotel restoration.

In 1961, the development area was pierced by the Berlin Wall and engulfed in the weeds, barbed wire and armed patrols of No-Man's Land. Since the Wall fell on November 9, 1989, Kristallnacht's 51st anniversary, violent reaction against "difference" has escalated, recalling the menace that reigned, along with the glamour, the last time Berlin was the capital of Germany. Judith Davidsen
Aga Khan Award winners are Indonesia’s Kali Cho-de where Yousef B. Mangunwijaya exchanged cardboard/plastic shanties for A-frame variations on local design; Istanbul’s Palace Parks Ottoman compound restorations; Panafriean Institute for Development (top) in Burkina Faso, where ADAUA used mud brick in a Volta-village type plan; Turkey’s Demir Holiday Village, where Turgut Cansever’s volume and massing variety challenges area tourism concepts; Cairo’s Culture Palace by Abdelhalim I. Abdelhalim with a plan that local schools use for geometry lessons; Amman’s East Wahdat Upgrade, which turned Palestinian refugee squats into an area of serviced homes and small businesses; Syria’s Stone Building System (center), where the family computer-analyzed uncut local black basalt curves for a low-cost arch-and-vault alternative to cement-block; India’s Entrepreneurship Institute, where Bimal Patel drew on Indo-Islamic design for cost/maintenance/ climate-controls; and Tunisia’s Kairouan Conservation (bottom), where new uses occupy sites that honor religious and historical themes. Jury: architects Balkrishna Doshi, Frank Gehry, Fumihiko Maki, Adhi Moersid, Ali Shuaibi, and Dogon Tekeli, University of Pennsylvania art history chairwoman Renata Holod, University of Florida religion chairman Azim Nanji, and Unesco World Heritage deputy director Said Zulficar.

Radiation Medicine Center for Victims of Chernobyl

Ellerbe Becket’s Minneapolis office is designing a Radiation Medical Center at Bryansk to provide continuing treatment for victims of the Chernobyl nuclear-plant explosion and to research improved diagnosis protocols and dosimetry and radiometry methods. Preliminary design uses a center circulation spine to unite polyclinics, library and auditorium, a diagnostic and treatment block, and two separate hospitals—260 beds for adults and 90 for children. Scattered winter gardens provide a refuge from the rigors of medical care.
To adjust to the growing visitor-rate at the King Center, Stanley, Love-Stanley plans a 2,400-seat Ebenezer Baptist Church facing the original (model right) where Martin Luther King, Jr.'s father and grandfather were both pastors. The central axis passes a 150-seat choir, with baptismal pool and orchestra pit, to King’s crypt at the King Center for Nonviolent Social Change. Weave-patterned brick cladding echoes the old church, the “mud-trade” history of Southern Black-American brick masons, and African surface-pattern traditions. Roof ribbing recalls African thatch, and fenestration in a rotunda connecting classrooms and pastoral offices is arranged in a classical African drum image. The bell tower is a weave-and glyph-patterned obelisk. Stained-glass teaching windows chronicle the march to freedom, from Africa and the middle passage, the diaspora, the civil rights movement (when old Ebenezer hosted the Southern Christian Leadership Conference), current times and future hope. Round windows in the dome of peace above the choir map King’s ideal of harmony for all continents.

James Joyce and Frank Lloyd Wright share the distinction of having spawned entire industries devoted to researching, interpreting and preserving their legacies. One might expect the third annual conference of the Frank Lloyd Wright Building Conservancy, held this fall in Manchester, New Hampshire, to be yet another gathering picking over the minutaie of the well-known corpus of work and life.

Yet most of the presentations about the practicalities and thinking behind preserving Wright’s built legacy proved to be informative and highly charged. For one thing, Wright’s willingness to try out details such as a one-inch deep gutter and a “hole” instead of a drain in the roof at Fallingwater, or his use of built-up roofing to line gutters in the Isabel Roberts house, River Forest, Illinois, proved not to be minor decisions, after a certain amount of rain fell.

Some vicious encounters with nature were alleviated by design. The structural repairs for the Hanna House at Stanford University, which suffered earthquake damage in 1989, are costly. The roof had to be stabilized with steel elements acting as seismic collectors that extend from the fireplace. But “the hexagonal module did save the house from collapse,” reported Jonathan Ryan, the restoration architect.

Building Conservancy meetings now attract not only owners of Wright’s houses, but also historians, architects, and preservationists. Pedro Guerrero, a former apprentice and photographer whom Wright had invited to document art and life at Taliesin between 1940 and 1959 (below), presented slides of his work. Suzanne Stephens

Mark Hoistad’s Omaha Tribe Interpretive Center outside Macy “caused [the architect] to redefine architecture . . . as part of a larger nature/culture continuum.” With a plan echoing the tribe’s symbol for the world and shape of its homes, grass roofing, and rough stone cladding to collect soil and plant matter, it will be less a building than an environment in the Omaha’s spiritual landscape. It will house sacred artifacts of great spiritual power, including the Old Omaha, or Sacred Pole, recently returned by the Peabody Museum after more than 100 years.
They assert, in some cases, that what they do is traditional practice and, in others, express happiness at being free of it. Over 90 percent say they are content, but 37 percent say they would like to go back—under the right circumstances.

Senior to medium range in architectural firms). They tend to have picked occupations in which there are motivations other than money: city commissioners, nonprofit-foundation volunteers, archeologists, parks personnel, or working with the poor in remote (and affordable) rural areas.

What do the people who make the most do? Of those who make more than $75,000, real-estate developers win hands down with close to 20 percent. The next highest group (14 percent) is project managers for the government, banks, retail organizations, and developers. About evenly split (9 percent each) are interior designers, contractors, and design-builders. Also evenly split (6 percent each) are facilities managers, construction managers, and people who make products such as maps, cabinets, and a manufacturer of kiosks. One response each is products consultant, local-government administrator, offshore drilling-rig designer, and bank risk manager.

Did architectural school prepare them? A surprising 74 percent said that architectural school prepared them for what they now do, although some 20 percent of those said that they would have been happier with more practical courses, especially business, (5 percent of this group also have MBAs) and a few said that architectural schools should spell out career options. Several who had been exposed to schools after leaving said they are not what they used to be—that there is a decreased emphasis on problem solving and more on “fashion.” And several said the obvious, especially for those choosing alternate careers: The only true teacher effect: “Consider whether you can make a difference.”

The answers are much more varied on how to go about picking a career option outside private practice. The most agreement (8 percent) is on getting a rounded architectural background before anything else. “Learn to be an architect first,” says Gary Molenda, a development-group manager in Tucson. A similar sentiment is expressed by James Leggitt, an architect and planner with the Denver Museum of Natural History. Almost as large a number say to get a broad general education. “Get an MBA and learn business theory and language,” advises Eugene Bittinger, architect for the Cuyahoga Community College in Cleveland, with whom 5 percent share this opinion. “Try before you decide,” is the essence of advice from some 4 percent. “Talk to others,” say 2 percent.

“Go with your gut instinct of what you’d really love to do,” advises Ron Paterson. But, cautions Barry Lynch, senior architect for RJR Nabisco in Winston-Salem: “Know where business trends are headed and figure out how to fit in.” Indeed, there is even more caution from some—especially in the private sector—who point to the growing trend to streamline by dumping support staff. “Corporations are getting lean and mean,” is the way one respondent puts it.

“You have to be creative in finding niches where you can truly exert skills and do what’s interesting,” says Douglas Govan, chief designer for Acorn Structures in Concord, Massachusetts. “Start early,” advises Robert Wagner, a rehab developer in the Bronx. “The longer you wait to break out, the harder it is. Know your strengths and follow them. What you enjoy will ultimately yield money and happiness. There will be few to help you along. But don’t give up.”

Charles K. Hoyt
Dodge/Sweetts's Construction Volume Outlook for 1993

By Robert A. Murray

Recovery of the construction industry from its post-'80s crash was never going to be "business as usual." The excesses of the previous decade—commercial overbuilding, the banking crisis, the federal-budget deficit—all meant that the upturn would take place against a backdrop unlike any seen before. Indeed, cyclical recovery within the context of structural change is a good way to look at what has happened so far in 1992, and what is expected to occur over the next several years.

Where does the construction industry's recovery stand three-fourths of the way into 1992? After hitting bottom during 1991's opening quarter, the Dodge Index of construction contracting climbed more than 15 percent through the start of 1992. Although not up to the standards of previous recoveries (the corresponding gain in 1982-83 was 40 percent), the advance was nevertheless welcome. The industry's measure of construction put in place behaved in its typical lagging fashion by bottoming out in mid-1991, and then heading back up.

Yet by 1992's second quarter, the modest recovery became derailed, at least temporarily. Contracting for new construction fell back more than 5 percent, and then was unable to show any improvement in the third quarter. The main culprits: a soft house-building market amidst sagging consumer confidence, and weakening of the type of construction dependent upon public funding—institutional building and public works. With the shortfall in contracting, the first year of recovery for the building industry has turned out to be more wobbly than anybody expected.

Assuming that some of the lost momentum is regained by year's end, the advance of total construction-contract value for 1992 as a whole is now estimated at 6 percent, which adjusted for inflation translates into a 3 percent real gain. By contrast, the first year of the previous cyclical upturn in 1983 witnessed a 22-percent real gain. Clearly, the start of the current building cycle has already assumed a much different character. And, given the vulnerable condition of commercial real estate, which was still slipping as 1992 began, this usual second-year boost to the building cycle is highly in doubt.

To more fully examine the industry's near-term prospects, it is useful to combine building types under the two broad headings used in recent Outlooks: stable and cyclical.

- **The stabilizer group**—institutional building and public-works construction—has constituted about one-third of total construction during the past decade. Predominantly publicly owned, these types of construction are reasonably well insulated from the instability of the banking system. Funding comes from bond issues, tax revenues, and user fees. Often, a built-in continuity is present through such long-term programs as the five- or six-year highway bills. Significantly, this group actually increased 7 percent in dollar volume from 1989 through 1991, when the industry as a whole was falling 15 percent. Whether this group can maintain its steady 3- to 4-percent gains per year will have an impact on 1993's overall pattern of contracting.

- **The cyclical group**—single-family housing, income properties (commercial and multifamily building), and manufacturing building—accounts for about two-thirds of total construction activity. These categories are largely privately financed, and are highly sensitive to financial and economic conditions. True to their name, the cyclical categories were entirely responsible for the industry's 1990-91 downturn, sliding 25 percent from the 1989 peak. The behavior of this group will largely determine if recovery can get back on track.

Several key issues that will be important to the progress of this uncertain recovery:

- **What will be the response of institutional buildings to the budget squeeze on state and local governments?**
- **How will the constraint of a sluggish economy and deficit-reduction pressures affect spending on public works, and how will the outcome of the November election impact these categories?**
- **Has single-family housing gone about as far as it can go, or is there still some room for further improvement?**
- **Will the commercial and industrial market continue to drag down the industry as a whole, or is it close to bottoming out?**

The economic background against which these events will play out is anticipated to be continued slow growth. Weak employment, corporate downsizing, sagging consumer confidence, and deficit-reduction pressures will remain as limitations. Growth in real GDP will be kept under 2 percent for 1992 as a whole, and within the 2- to 3-percent range for 1993.

The positive side to a half-speed recovery is that inflation will remain in check. Single-digit mortgage rates will still be present in 1993, remaining supportive of single-family house sales. (Low rates have also helped commercial banks show improvement from their precarious balance sheets of the past several years.) Availability of funds to developers, however, will stay tight, due to the ongoing scrutiny of bank portfolios by regulators. With real-estate values depressed in many parts of the country, it's unlikely that banks will rush to increase real-estate lending for the near term.

**The stabilizers:**

**Institutional building**

From 1980 through 1991, schools, healthcare facilities, and public-administration buildings made small but steady gains each year, growing from $20 billion to last year's $45 billion. This was in sharp contrast to the boom-and-bust pattern of commercial and industrial building, which gained and lost more than 50 percent over that period. One of the more noteworthy aspects of 1991's construction volume is that institutional building exceeded the commercial and industrial sector, on a dollar basis, for the first time in 20 years, and is likely to this year and next, despite some loss of momentum by the institutional categories.

The basic trend of institutional building is closely tied to the slow rate of change of demographic development. Back in the 1960s, the largest institutional category, educational building, reflected the impact of the '50s generation on school enrollments. In similar fashion, the increase in births since the mid-1970s—the baby boom "echo"—has led to an extended rise for school construc-
tion since 1983. Last year’s total of school projects, at 165-million square feet, was easily more than twice what was reported at the start of the 1980s. Not surprisingly, primary-school construction paced the early stages of this resurgence, with new secondary-school starts adding more recent support.

Growth at the other end of the age spectrum, the 65-year-old-and-over group, has contributed to the demand for healthcare facilities. For some time now, contracting has held fairly stable in the range of 70- to 75-million square feet. Since clinics and nursing homes in the mid-1980s experienced their own mini-boom, induced at least partly by real-estate tax shelters, the continued stability of this category with little hint of collapse attests to the benefits of ongoing demographic support.

A third institutional category, public buildings, climbed from 20-million square feet at the start of the 1980s to last year’s 50-million square feet. Demographic forces are joined by sociology here; much of the increase is due to an expanding volume of prison starts (one of the few building types not burdened with excess space).

But whereas demographics shape the broad overall trend for the institutional market, periods of fiscal stress can modify the near-term pattern. With state governments coming under severe budget pressure in 1992, the gradual upward trend for this market has been put on hold. The drag on revenues resulting from the weak economy, combined with the increased cost needed to cover welfare and unemployment benefits, has caused a shift in state budgets away from discretionary spending—which includes institutional-building projects.

A recent study by the National Conference of State Legislators noted the emphasis on spending cuts in trying to achieve better fiscal balance. The other alternative, increased taxes, is particularly difficult to achieve given the current economic and political climate. Bond issues too face close scrutiny by voters hesitant to add to the debt burden.

Already, 1992 has seen a reduction in the value of educational starts (down 8 percent

### 1993 National Estimates: Dodge Construction Potentials

#### Nonresidential Buildings

<table>
<thead>
<tr>
<th>Floor Area (millions sq. ft.)</th>
<th>1993 Preliminary</th>
<th>1993 Forecast</th>
<th>Percent Change 1992/93</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office Buildings</td>
<td>85</td>
<td>85</td>
<td>-</td>
</tr>
<tr>
<td>Stores and Other Commercial</td>
<td>168</td>
<td>177</td>
<td>+ 5</td>
</tr>
<tr>
<td>Other Commercial</td>
<td>192</td>
<td>183</td>
<td>+ 1</td>
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<tr>
<td>Manufacturing Buildings</td>
<td>85</td>
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<tr>
<td><strong>Total Commercial and Mfg.</strong></td>
<td>530</td>
<td>540</td>
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<tr>
<td>Educational</td>
<td>143</td>
<td>142</td>
<td>- 1</td>
</tr>
<tr>
<td>Hospital and Health</td>
<td>75</td>
<td>69</td>
<td>- 8</td>
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<tr>
<td>Other Nonresidential Buildings</td>
<td>162</td>
<td>159</td>
<td>- 2</td>
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<tr>
<td><strong>Total Institutional and Other</strong></td>
<td>389</td>
<td>370</td>
<td>- 3</td>
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<tr>
<td><strong>TOTAL NONRESIDENTIAL BUILDINGS</strong></td>
<td>910</td>
<td>910</td>
<td>-</td>
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#### Residential Buildings

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<thead>
<tr>
<th>Dwelling Units (thous. of units)</th>
<th>1993 Preliminary</th>
<th>1993 Forecast</th>
<th>Percent Change 1992/93</th>
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</thead>
<tbody>
<tr>
<td>Singlefamily Houses</td>
<td>960</td>
<td>1,050</td>
<td>+ 9</td>
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<tr>
<td>Multifamily Housing</td>
<td>165</td>
<td>175</td>
<td>+ 6</td>
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<tr>
<td><strong>Total Housekeeping Residential</strong></td>
<td>1,125</td>
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<tr>
<td>Singlefamily Houses</td>
<td>1,685</td>
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<td><strong>Total Residential Buildings</strong></td>
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<tr>
<td>Singlefamily Houses</td>
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<td><strong>Total Residential Buildings</strong></td>
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#### Nonbuilding Construction

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<th>Contract Value (millions $)</th>
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<th>1993 Forecast</th>
<th>Percent Change 1992/93</th>
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<tr>
<td>Transportation Construction</td>
<td>$32,000</td>
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<td>Environmental Construction</td>
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<td><strong>Total Public Works</strong></td>
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<td>$51,600</td>
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<td>Utilities</td>
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<td><strong>TOTAL NONBUILDING CONSTRUCTION</strong></td>
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#### All Construction

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<th>Contract Value (millions $)</th>
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<tr>
<td>Total Construction</td>
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<td>Dodge Index (1987=100)</td>
<td>96</td>
<td>103</td>
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## 1993 Regional Estimates

### Dodge Construction Potentials

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<thead>
<tr>
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<tbody>
<tr>
<td><strong>Northeast</strong></td>
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<tr>
<td>CT, ME, MA, NH, NJ, NY, PA, RI, VT</td>
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<tr>
<td>Nonresidential Building</td>
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<tr>
<td>Commercial and Manufacturing</td>
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<td>Institutional and Other</td>
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| **North Central**                                |                |              |                        |
| IL, IN, IA, KS, MI, MN, MO, NE, ND, OH, SD, WI   |                |              |                        |
| Nonresidential Building                          |                |              |                        |
| Commercial and Manufacturing                     | $8,835         | $10,000      | +13                    |
| Institutional and Other                          | 10,925         | 10,825       | -5                     |
| Total                                             | $19,750        | $20,825      | +8                     |
| Nonbuilding Construction                         | $11,400        | $11,800      | +4                     |
| Residential Building                             |                |              |                        |
| Singlefamily Houses                               | $22,950        | $25,425      | +11                    |
| Multifamily Housing                               | 2,725          | 2,850        | +5                     |
| Total                                             | $25,675        | $28,275      | +10                    |
| TOTAL CONSTRUCTION                               | $56,825        | $60,400      | +6                     |

| **South Atlantic**                               |                |              |                        |
| DE, DC, FL, GA, MD, NC, SC, VA, WV               |                |              |                        |
| Nonresidential Building                          |                |              |                        |
| Commercial and Manufacturing                     | $7,000         | $8,675       | +10                    |
| Institutional and Other                          | 7,975          | 8,575        | +8                     |
| Total                                             | $14,975        | $16,250      | +9                     |
| Nonbuilding Construction                         | $8,325         | $9,025       | +8                     |
| Residential Building                             |                |              |                        |
| Singlefamily Houses                               | $34,450        | $38,475      | +16                    |
| Multifamily Housing                               | 1,900          | 2,250        | +18                    |
| Total                                             | $36,350        | $40,725      | +17                    |
| TOTAL CONSTRUCTION                               | $49,650        | $55,600      | +13                    |

| **South Central**                                |                |              |                        |
| AL, AR, KY, LA, MS, OK, TN, TX                   |                |              |                        |
| Nonresidential Building                          |                |              |                        |
| Commercial and Manufacturing                     | $5,700         | $6,975       | +22                    |
| Institutional and Other                          | 6,875          | 7,000        | +2                     |
| Total                                             | $12,575        | $13,975      | +11                    |
| Nonbuilding Construction                         | $8,550         | $9,225       | +12                    |
| Residential Building                             |                |              |                        |
| Singlefamily Houses                               | $16,150        | $19,150      | +19                    |
| Multifamily Housing                               | 1,900          | 2,250        | +18                    |
| Total                                             | $17,050        | $21,400      | +19                    |
| TOTAL CONSTRUCTION                               | $37,825        | $43,350      | +15                    |

| **West**                                          |                |              |                        |
| AK, AZ, CA, CO, HI, ID, MT, NY, NM, OR, UT, WA, WY|                |              |                        |
| Nonresidential Building                          |                |              |                        |
| Commercial and Manufacturing                     | $11,200        | $9,850       | -12                    |
| Institutional and Other                          | 10,275         | 10,075       | -2                     |
| Total                                             | $21,575        | $19,925      | -8                     |
| Nonbuilding Construction                         | $13,000        | $14,200      | +9                     |
| Residential Building                             |                |              |                        |
| Singlefamily Houses                               | $24,735        | $36,825      | +8                     |
| Multifamily Housing                               | 2,650          | 2,725        | +3                     |
| Total                                             | $27,375        | $39,550      | +8                     |
| TOTAL CONSTRUCTION                               | $61,000        | $66,675      | +9                     |


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Channel through September) while the institutional total has barely been able to hold steady with last year’s amount. Given the degree of austerity pushed through in fiscal year 1993 budgets, which for most states began on July 1, there’s not much impetus for greater state funding of institutional projects until at least mid-1993. Accordingly, the deferral of this sector’s upward trend will continue into next year, as the reductions spread from school projects to other types.

A moderately improved 1993 economy should allow some measure of relief for state governments by the time their next fiscal year begins. Rising employment will expand the tax base while alleviating income-maintenance payments, making possible a return to pre-recession priorities. Although down for the year as a whole, institutional contracting during 1993’s second half is likely to renew expansion, aided by still supportive demographics. And to keep the near term pause in perspective—the 1993 estimate of institutional square footage (370 million square feet) is still a full 40 percent above the early 1980s trough.

### Public-works construction

While institutional building won’t be giving much help in the near term, the public-works categories offer more promise. New highway legislation is already in place, and greater spending on public-works projects is being viewed increasingly as the way to jump-start the economy. Accordingly, this sector of the construction market is poised to climb above the narrow $43- to $45-billion plateau where it settled during the 1987-91 period.

A less positive picture comes through for the environmental public-works categories due to the recent shift in funding responsibility away from the federal government. The case of sewer and waste-disposal systems is perhaps the most telling.

The result of this financing transfer is that sewer contracting has slipped back about 10 percent during the 1990-91 period from the previous three years, as states have struggled to offset the phase-out of federal support. In 1992’s more difficult fiscal climate, sewer projects will be hard-pressed to
Metal Grid System for Glass-block Floors, Skylights, and Walls

300. A mortarless aluminum assembly supports 1-in.-thick glass pavers in free-span configurations of up to 7-ft 6-in. These grids, supported in turn by structural spanning members and L-shaped steel retaining rings, (see drawing, left, and detail, upper right) can be mullioned together edge to edge to form continuous glass floors without conspicuous joints. The floor grid can also accommodate unusual shapes. Made with engineered-metal parts, the grids are assembled on-site without screws or welds, and can be installed at any point in the construction process once the support structure is in place. A Neoprene gasket that encases the pavers cushions the glass from traffic deflection, which can cause hairline cracks, and accommodates expansion and contraction. Damaged blocks are said to be easy to replace if necessary.

The assembled floor weights 17 lb psf, and the narrow, 1/2-in.-wide joint between 6-in.-sq pavers permits a glass area of 87 percent (cement-mortar systems restrict glass exposure to about 64 percent.)

A similar aluminum grid, with deeper flanges that accept full-size glass blocks from any manufacturer, is available for wall construction, weather-sealed with silicone caulk that gives an all-glass appearance on the exterior. A mechanically connected version of the IBP grid can achieve segmented barrel vaults up to 28 ft wide. In wall and skylight applications, the aluminum grid offers an extra level of security against break-ins. Innovative Building Products, Inc., Fort Worth, Texas.
Simulated-granite Finish

301. An architectural exterior finish for cast-in-place or precast concrete, masonry, cementitious scratch coats, or EIFS, Granstone replicates the appearance of natural stone with a variety of esthetic joints, arches, and dimensional effects. A water-based filled coating with graded aggregates of different colors and sizes in an acrylic-resin binder, the spray-applied material comes in 12 standard colorations that mimic reddish, gray, and beige granites in sawn or shot-ground finishes. The dimensional mortar-joint is achieved by applying a self-adhesive foam tape prior to spraying on the Granstone finish. After the surface cures, the tape is stripped off to reveal a grout-colored base coat. The "double joint" shown below was done by alternating applications of tape and Granstone finish. Thoro Systems Products, Miami.

Architectural Metalwork

302. Metal fabricators A. Zahner Company has added still another decorative option to its line of architectural sheet-metal products (a custom embossing technique was introduced last year). This time, it’s MetaPERF, a fabrication method in which computerized robotic cutting machines perforate metal sheets in any pattern desired. Depending on the complexity of the design, cuts are either by laser or mechanical; the lotus motif, top left, by the Pfister Partnership, was laser-cut into the copper. For both interior and exterior installation, MetaPERF sheets can come in stainless steel in natural and five Interference colors, copper and alloys, anodized aluminum, and enamel on steel. Perforated metal can also be curved, embossed, or crimped, lower left. The technique is especially useful for lighting fixtures and decorative acoustic partitions; completely assembled elements are delivered ready to install. Ceiling treatment (lower right), designed by Raffle Architects, incorporates both perforations and integral flange. A. Zahner Sheet Metal Co., Kansas City, Mo.

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range of programs and solutions. We’re proud to present this as number 700, and look forward to number 1,000 in or around the year 2017. S. A. K.
Labs Come of Age

By Nancy Levinson

Colleges and universities have been constructing science buildings for only about a century. Already, however, the evolving nature of scientific investigation has forced this relatively new building type through several phases. Built in the early decades of this century when mechanical ventilation systems were rudimentary, early science facilities were designed in one or another prevailing campus style, often collegiate Gothic or neo-Georgian. The labs then were little more than classrooms outfitted with plumbing and special casework. By mid-century, academic science buildings began to change; inside and out, they reflected both the growing sophistication of building systems and the quickened pace of scientific discovery and technological advance. By the 1960s and '70s, their interiors were crowded with mechanical systems; laboratories overflowed with instruments and apparatus. And building exteriors often expressed all this. As John Nunemaker of Perkins & Will in Chicago observes, "There was a strong trend, then, towards expressing science buildings as such—as places of research. This led, for example, to a generation of buildings whose mechanical systems were articulated in the elevation."

Today, lab planners and users are again rethinking science buildings. To explore the issues that now determine the design of these facilities, RECORD spoke with designers, facility managers, and science professors across the country. Most agreed that the mid-'80s marked the start of a new era of academic laboratory design, in which architects have come to focus on the following issues:

The research environment versus technology

Academic science buildings vary greatly in size, form, organization, and image, but mostly they provide some combination of laboratories, lab-support space, classrooms, offices, and meeting rooms. They also differ from most other campus structures in that they typically house a complex network of mechanical and other equipment.

Lab designers agree that one critical task is balancing the needs of the building's occupants with those of its machines. "Lab buildings significantly affect the morale of a research community. Above all, they must support, in humane fashion, the working lives of scientists," says O. Robert Simha, director of planning at Massachusetts Institute of Technology. "But, inevitably, their mechanical systems will powerfully influence the building's dimensions." In acknowledging the need for balance, designers today are reacting to the shortcomings of earlier science buildings. As Ian Adamson, of Payette Associates in Boston, notes, "Many lab buildings of the '60s and '70s were designed more for mechanical convenience than human comfort. Because it was efficient, they often had few windows—in one case, windows were actually value-engineered out of most of the building. As a result, scientists were spending long hours in dismal spaces."

Architect Alton Parks of the Howard Hughes Medical Institute—which has co-sponsored construction of research centers on more than a dozen U.S. campuses—is also critical of this machine-centered approach. "Too often, the complexity of lab buildings is defined mainly as mechanical complexity. The real complexity involves understanding how a group of scientists works." The layout of laboratories—the dimensions of benches and aisles, the location of equipment, the delivery of services—must be painstakingly worked out. "Labs are such high-intensity, design-conscious spaces," notes Peter Samton of Gruzen Samton Steinglass in New York City. "They are used to the hilt, and architects must think about every inch of them." Lab planners also stress that architects must carefully resolve how laboratories relate to lab-support space and to offices, and how all these relate to formal and informal meeting rooms.

Even when emphasizing the user's comfort, lab designers should not underestimate the importance of hvac, plumbing, and electrical systems. "With lab buildings, it's as if you're designing duplicate, even triplicate, systems," says Michael Reagan of Ellenzwieg Associates in Cambridge, Massachusetts. "Hvac systems, for instance, are complex, because so much experimentation is done in controlled environments like fume hoods, which may require dedicated air supplies. Plumbing multiplies when you add—besides the usual lines—pipes for lab waste, de-ionized water, vacuum, compressed air, and various gases. And electrical systems are intensive not only because labs need many outlets, but because they require about twice the illumination of typical classrooms."

Taken together, ventilation and plumbing systems can account for 60 percent of the volume of a science building, and, in most cases, as engineer Brian Moore, of CUHSA in Princeton, New Jersey, says, "They will significantly determine that volume. Ductwork alone usually dictates floor-to-floor heights of 14 to 16 feet."
Today's academic science buildings must confront rising mechanical costs—in dollars and energy—and a new focus on the wellbeing of their users.

Energy efficiency
Campus facilities managers describe science buildings as by far the costliest to operate, often using two or three times the energy of conventionally serviced structures. (One average six-foot fume hood, for example, requires 1100 to 1200 cfm of 100 percent fresh, conditioned air.) For this reason, most schools insist that these buildings be as energy-efficient as possible. Current consumption-cutting strategies include variable air-volume systems (for fume hoods as well as building air), electronic energy-management controls, daylighting, and, climate permitting, heat-recovery techniques. Unfortunately, these conventional means rarely achieve big savings.

"Certainly they help; but even in the best cases, labs use staggering amounts of energy compared with classroom buildings," says Jerry McFarland, director of planning and construction at Drexel University in Philadelphia. As Adamson says, "In the long-term, energy use may be the most vulnerable aspect of today's lab."

Flexibility and adaptability
Lab planners agree that science buildings must be flexible. Their focus on flexibility is due partly to the current emphasis on interdisciplinary research. As lab consultant Ulrich M. Lindner, of Earl Walls Associates in San Diego, says, "This is the day of the hybridized scientist." It is due also to cost. Science buildings can cost as much as $300 per square foot, and, according to consultant Nolan Watson, of McLellan and Copenhagen in Seattle, "most schools expect to use these buildings for 25 to 50 years, before major renovation." More than program or cost, however, concern with flexibility is due to the pace of scientific discovery. Writes Watson, in the chapter on "Laboratory Facilities" in The Handbook of Facilities Planning: "The very nature of research is to discover new ways to render present techniques obsolete and, in turn, render the research facility obsolete." Clearly, this intensifies the designer's challenge, and flexibility must be carefully defined (3). Jon Schleuning, of SRG Architects in Portland, Oregon, notes that the flexible lab is often misunderstood to be the generic lab. "The fully flexible lab—one that can be used by chemists, biologists, physicists, and engineers—is not a usable prototype. It's far too expensive. Each discipline has its own equipment, and no institution can afford to supply all this." For this reason, lab designers often prefer the term adaptability, which they define not in terms of lab space itself—which is often generous and not hard to retrofit—but of mechanical capacity. "Lab buildings become adaptable when their mechanical systems are adaptable," says Moore. "You can't easily predict change, but you can upsize the main ducts, install air-handling equipment with extra-large casings, allocate extra chase space, and build spare capacity into electrical systems. And you can make these easily accessible."

Life-safety, environment-drive design
A generation ago, health and environmental concerns had comparatively little effect on laboratory design. Today, environmental and life-safety laws affect science buildings enormously. Most obviously, they contribute to the complexity of mechanical systems. Codes require, for example, that more chemical experiments be done in fume hoods; they require also that these hoods use 100 percent fresh air, and, in some cases, that they be separately exhausted to avoid undesirable mixing of gases. Contemporary chemistry labs thus have more hoods and fewer benches—and far more ductwork. Regulations also influence the layout of labs. Years ago, a principal investigator's office was typically located within or next to his or her lab. Today, however, largely due to heightened awareness of the danger of exposure to toxic substances, the professor's office and graduate student's workstation have moved out of the lab, sometimes across the corridor and sometimes even to a separate wing.

Regulations even affect the variety of spaces in science buildings. In today's strictly controlled labs, occupants are forbidden by code to eat, drink, smoke, or apply makeup. As a result, science buildings now include "interactive" spaces. As the projects on the following pages show, these can be seminar rooms, common rooms, lounges, stairhalls with window seats, roof terraces, atria, landscaped courtyards, or spacious front lawns. "Good science buildings," says Simha, "encourage the sharing of ideas, which is essential to the success of the enterprise."

New interest in building image, amenity
Designers and users agree that many lab buildings of the '60s and '70s—with their blandly rational exteriors, their cramped and dreary interiors—have aged poorly. Today, in reaction, schools are keenly interested in the image and amenity of their science buildings. "These used to be backlot facilities. Now they're prominent buildings, even gateways," says Perkins & Wills' Nunemaker. This new

Continued on page 120

4. At Engineering Unit II at University of California, San Diego, exhaust fans are placed in locations remote from air intakes. Ove Arup & Partners California, engineers; Zimmer Gunsul Frasca Partnership, architects. 5. Materials and Life Sciences Building at Northwestern University (by Perkins & Will) has large rooms with overhead piping for equipment flexibility.
Physics is the fundamental science, the study of matter and motion and the relationship between the two. At the University of Miami, the James L. Knight Physics Building takes heed of that in subtle ways, with copper-clad vaulted rooftops that, by implication at least, show human mastery over material. The building sits at the northern edge of the campus (to the right of axonometric), shielded by a thicket of trees from the surrounding residential neighborhood of Coral Gables.

The university wanted a “science quadrangle” at this end of the campus. Thus the Knight Physics Building forms one part of the perimeter of a quadrangle it creates with the engineering school to the east and a school of sciences to the south. “We tried to stretch the building as much as we could,” says Michael Kerwin, the Spillis Candela & Partners vice president who conceived the building’s design, which the Enrique Marcia team then completed.

The need for highly secured lab space produced a program that included a strict hierarchy of uses from accessible to inaccessible—a public auditorium, undergraduate classrooms, semiprivate graduate student labs, private faculty offices, and the large protected labs. In the tall part of the building, undergraduate classrooms and labs are on the first floor, graduate facilities are on the second, and faculty offices and a small physics library are on the third. A glass-roofed arcade between the high and low parts of the building is meant to be a meeting place for everyone.

It is in the large laboratories in the low part of the building that the main experiments are done. These are bare-bones spaces in which environments are built to test the behavior of such phenomena as sound, movement, and light. The activities often resemble a construction site as much as a science facility. Each lab has its own climate controls, but there was no need for these to be especially elaborate. Spillis Candela did set the labs on isolated, movement-free slabs to prevent vibration transmission from one lab to another and to avoid vibration from the elevators. Ceilings are high, with exposed-steel fireproofed roof-trusses. Huge “garage” doors at the end of each lab allow for the delivery of new equipment. Most technical innovation here is left to the physicists themselves. The auditorium, which opens out onto a small courtyard, is designed with a catwalk and a back-of-the-house storage and preparation area to allow for the theatrics that are necessary to many a physics lecture.

The architects studied the original campus plan done in 1926 by Coral Gables architect Phineas Paist (which envisioned a now-truncated major boulevard extended through the campus), and then studied the reality. The dominant historical style in Coral Gables is Mediterranean Revival, but the University of Miami campus is more a confusion of comparatively dreary postwar institutional styles. The Knight Physics Building makes reference to both. Thus, openings are squared off rather than arched; aluminum-frame windows and steel railings are austere. But the precast concrete panels cladding the tall concrete-frame structure and the stucco over concrete block of the low one are painted in Mediterranean colors. The main stair (previous page) is the most classical gesture in the building, while the piers along the open corridors give it a steady cadence and solidity. Beth Dunlop

The main entrance (above) is on the axis of what was to have been a major boulevard in the 1926 Coral Gables masterplan. To reinstate some of the original plan, the architects hope to see it used as a campus entry as well. Named for the late chairman of Knight-Ridder Inc., the media company, the building cost $11.2 million.
Collegial Crosstalk
Yale’s new center for multidisciplinary biomedical research connects with the broader campus community.
The 183,000-square-foot Boyer Center disposes flexible loft space for research labs in 30- by 30-foot bays along the south facade's 350-foot-long curve (1). Across the central corridor, support/service spaces are interspersed with staff offices which are clustered around reception/conference areas and offset (3) to provide corner windows that escape head-on views of the power plant. Break rooms on each floor and benches in halls and stairwells encourage casual contacts among researchers; more formal shared spaces are in the headpiece. On the first floor a modest lobby flanked by conference rooms introduces an administrative suite to the rear; second-floor conference space includes a small auditorium adjacent to a terraced common room. Core resource labs occupy the two upper floors, with additional support facilities in the basement. Scrubbers housed in the mechanical penthouse exhaust air through missile-like stacks (2). The two-story entrance lobby (4, 5) is paneled in maple-trimmed oak that continues in wainscoting along the center corridor, whose gentle curvature and generous borrowed daylight from re-
cessed glass-paned doors and clerestories lessen the visual impact of its daunting length. Inside the loftlike stretch of laboratories (6), an internal passage links U-shaped 10-foot-wide lab modules organized in bays of three. Wood-trimmed cabinets soften workmanlike lab fittings, which include constant-exhaust fume hoods and "wet" utilities.

**Credits**
Boyer Center for Molecular Medicine
Yale School of Medicine
New Haven, Connecticut

**Owner:** Howard Hughes Medical Institute/Yale University

**Architect:** Cesar Pelli & Associates—Cesar Pelli, design principal; Fred Clarke, project principal; Bruce W. Sielaff, project manager; Robert Taylor, design team leader; Timothy McGrath, Roger Schickedantz, project architects; Richard Brown, Roberto Espejo, Mark Hesselgrave, Michael Hilgeman, Walter Miller, Susan Papadakis, Benjamin Schreier, designers; Julann Meyers, Karen Koenig, Charlotte Breed, interiors

**Engineers:** Martin Horton & Associates (structural); vanZelm Heywood & Shadford, Inc. (MEP)

**Consultants:** Balmori Associates, Inc. (landscape)

**General Contractor:** Turner Construction Company

**Manufacturer Sources:** See Contents page

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![Diagram of Boyer Center for Molecular Medicine](image)

**Second Floor**

**Fourth Floor**

*Architectural Record November 1992  73*
The Oregon Institute of Marine Biology lies on a small sliver of beach between a sheltered boat basin just off Coos Bay and a bluff covered with undisturbed old-growth forest. The sights, sounds, and smells of the sea permeate what feels more like a fishing camp than a college campus, and justly so. This site has history. The Institute's first lab and dorms were recycled from 1930s Civilian Conservation Corps buildings, some of which in turn had been recycled from Corps of Engineers buildings built here in the 1910s.

The Institute operated in these buildings from the 1960s until the early 1980s when, as Nora Terwilliger, a longtime teacher and researcher at the Institute says, "the termites were eating them up faster than we could fix them. We needed a new facility to keep attracting good people. The old place had a tremendous kind of social success; groups that came there became cohesive very quickly." University planner Fred Tepfer adds wryly, "Sometimes that happens with bad facilities. But we didn't want to lose that positive quality when we took out the element of adversity."

The University of Oregon's pattern language-based planning process allowed university planners to help the OIMB users establish program requirements for the new campus before the SRG Partnership was hired as architect. SRG's design team, headed by partner Jon Schleuning, then held workshops with users to discuss and refine their ideas and come up with a design. The resulting campus comprises 18 buildings, 14 of which are new. The buildings are arranged to form courtyards that open toward Coos Bay on the east, and back up toward the bluff on the west.

A curving sidewalk links four courtyards, starting at the campus's south end with the space formed by the administration building and research lab buildings. A second court is formed by the research building and south teaching lab-dorm. The walk continues north to the "hearth" formed by the dining hall and south and north lab-dorm buildings, and goes northward again to a "staging" courtyard where equipment and people are assembled for field trips. Cottages for faculty are located north of the field trip and equipment buildings. Though the buildings here were deliberately laid out to create sightlines and paths, the campus has an informal quality, as if it grew spontaneously over time without surveyor's equipment.

The new structures are clad in gray-stained cedar shingles, fitted with white-painted wood trim, operable wood windows, and wood doors. SRG used wood in lieu of metal throughout the buildings to reduce maintenance in the corrosive coastal atmosphere. The climate is mild enough not to require cooling equipment, and all buildings have been kept less than 28 feet wide for better cross-ventilation and daylighting. Windows on south elevations are much larger than those on the north to limit winter heat loss.

The laboratories require a constant supply of running seawater. The low-tech system pumps it from the Bay to a storage tank on the bluff above the campus. It is gravity-fed from storage to the labs through one of two identical pipe systems. The second system assures a backup whenever the first is being cleaned or repaired. In each lab the seawater flows overhead through plastic pipes that can be tapped anywhere seawater is needed. After use, the water flows into a trench drain in the floor that runs parallel to the supply piping, and is released outside into a stream that returns to the sea. Seawater is highly corrosive, so all light fixtures, light switches, electrical outlets, and other equipment in the labs is corrosion-resistant and vaporproof. Charles Linn
The dining hall (plan, bottom, and opposite top) with dormitories upstairs is the heart of the Institute's informal campus (site plan, left). Here, students and faculty enjoy a variety of spaces for dining and conversation, from the very open areas to a semi-private alcove with a corner window overlooking a stream, volleyball court, and nearby buildings.

Research labs (opposite bottom left), teaching labs, and specimen holding tanks (opposite bottom right) feature running seawater and corrosion-resistant materials (light fixtures, switches; wood in lieu of metal) where they would not normally be expected. SRG deliberately kept all buildings on the campus narrow in width to facilitate daylighting and cross-ventilation.

Credits
Oregon Institute of Marine Biology
University of Oregon
Charleston, Oregon
Owners University of Oregon—Fred Tepfer, University planner; Mike Greybill, Jan Hodder, Don and Betty Rogers, Jerry Rudy, Bob and Nora Terwilliger (user group)
Architect SRG Partnership—Jon R. Schleuning, partner-in-charge; William Tripp, project designer; Jon Deckerd, project architect; Alan Osborn, Julie Chupatch, Terry Dieter, Naomi Caplin, design team; William C. Church, design consultant
Engineers: Stanley Carlson & Associates (structural); Carson, Bekooy, Gulick, Kohn (mechanical/electrical)
Consultants: Walker & Macy (landscape design); Doug Hollis (artist)
Contractor: Wildish Construction
Manufacturer Sources: See contents page
With labs serving a wide variety of needs, Kling-Lindquist dispensed with the neat rows of modular bays typical of most research buildings (plans left). The architect used glass to make much of LeBow/CAT's work visible. The ground-floor IMPAQT lab combines closed offices, a demonstration room, and a glass-walled lab that opens onto the courtyard (plan far left). Noontime loungers may be startled by a six-legged robot being put through its paces. Bridges one level above grade tie the new building to older ones. The orange brick is a Drexel signature, but the courtyard's intimate sense of enclosure (above) departs from Drexel's past, in which projects (including some by Kling-Lindquist) typically have been undistinguished boxes, each unrelated to its neighbors.
The LeBow Engineering Center offers a face to Market Street, an important artery, that abstractly suggests a Classical division (above). Within an arcade, a glass-enclosed computer lab "advertises" the university's engineering program. Two-story-high windows bring ample north light to third- and fourth-floor labs; the mechanical penthouse is indicated by round attic windows. The architect's original diagram proposed offices facing the courtyard and labs facing outward. Ever-changing research and teaching realities required a less "pure" approach (sections right), but one that creates places that support more interaction among students and researchers. One basement classroom, for example, was supplanted by a vibration-sensitive lab.
For LeBow/CAT, Drexel sought to depart from a research tradition of closed doors and windowless corridors and create a more visible research presence. Curving window walls frame views toward the inner courtyard from a stair in LeBow (top left) and from the double-height lobby lounge (bottom left). On the other side of the courtyard, experiments in computer-controlled manufacturing processes are visible to passers-by. The rooftop is a constructivist display of fume-hood exhausts (below). In the fibrous materials lab (as in other materials-science areas) most work is done with freestanding equipment rather than on more-familiar lab benches. A new fiber-strand braiding device (foreground of photo opposite) shares lab space with a nearly 100-year-old predecessor (device with metal loop in background).

**Credits**

LeBow Engineering Center/
Center for Automation Technology, Drexel University
Philadelphia, Pennsylvania

**Owner:** Drexel University

**Architect:** Kling-Lindquist Partnership—Charles E. Bailey, partner-in-charge; Eric A. Chung, design principal; Gene Spurgeon, Peter Dustin, project managers

**Engineer:** Kling-Lindquist Partnership (structural, mechanical, electrical)

**Consultants:** Shen, Milsom Associates (acoustics)

**Contractor:** Daniel J. Keating Company

**Manufacturer Sources:**
See Contents page
Friendly Fellow
A state-of-the-art facility respects its academic neighbors and fosters chance meetings.

Burke Laboratory, Dartmouth College
Hanover, New Hampshire
Ellenzweig Associates, Architects
R. M. Kliment & Frances Halsband, Architects, Associated Architects
The design of Burke Laboratory at Dartmouth College posed for its architects—Ellenzoewig Associates of Boston with associated architects R. M. Kliment & Frances Halsband Associates of New York City—a three-fold challenge. First, the new building had to provide the school's chemistry department with up-to-the-minute teaching and research laboratories, offices for faculty and graduate students, and formal and informal meeting rooms. Next, through careful siting and exterior design, the building had to bring coherence to a stylistically diverse complex of science buildings constructed over 50 years. Finally, to strengthen the department's identity within the college, it had to hold its own architecturally yet fit in with Dartmouth's idyllic New Hampshire campus.

With its long experience in lab design, Ellenzoewig Associates has accommodated a detailed program within a strong, clear parti: laboratories and research support spaces are all in one section of the 81,000-square-foot building, while most offices and meeting rooms are grouped around a handsome three-story stairhall. The parti separates spaces that must be kept clean, controlled, and conditioned from areas with looser requirements. (In labs, for instance, eating and drinking are forbidden by code, while offices are subject to no such rules.) It also sharply cuts operating costs, by allowing laboratories, whose fume hoods must be supplied with 100 percent fresh air, to be serviced separately from offices, whose air is recirculated. And splitting laboratories from offices—a break with department tradition—acknowledges the school's concern with occupant safety, by limiting researchers' exposure to potentially toxic chemicals and gases.

Some Dartmouth professors may miss the old proximity of office to laboratory, but few will regret the old labs themselves. Located in gloomy Steele Hall (1922), these spaces had over the years become crowded with benches, shelving, ducts, pipes, and all manner of retrofitted instrumentation. In contrast, the new labs are spacious and light, with large windows looking to the hilly countryside. To enhance the sense of openness and for easier access to its mechanical systems, the architects chose to leave exposed the building's ducts, pipes, and poured-in-place concrete structure.

In their choice and use of exterior materials, and through skillful manipulation of proportions, Kliment & Halsband have made Burke distinctly contemporary, yet contextual with Dartmouth's older buildings. With its Flemish-bonded brick, granite portico, and regular pattern of large metal windows, the building fits neatly into the red-brick, neo-Georgian campus. Closer by, Burke's materials acknowledge its neighbors. Its warm gray metal windows and penthouse complement the purplish precast concrete of Fairchild Hall, the 1974 structure next door; its rosy brown waterstruck brick extends the brick palette of Steele.

In siting the building, the architects responded to the College's charge that Burke, along with Fairchild, Steele, and nearby Wilder hall, form a unified science complex. The connection of Burke's stairhall to Fairchild, then beyond to Steele, encourages contact among the scientists and students. After considering, then rejecting a hillside site, they chose to link the new structure directly (and successfully) to Fairchild. The adjacency serves to deemphasize the undistinguished street facade of Fairchild. Says Gordon De Witt, Dartmouth's director of facilities planning, "The consensus here is that Burke actually improves Fairchild—improves this whole part of the campus." Nancy Levinson
Like most laboratory buildings, Burke's design is strongly influenced by its high density of mechanical services. The ground-floor mechanical room and penthouse together comprise almost 17,400 of the total 81,000 square feet. According to project manager Leslie Sims, of Ellenzweig Associates, these spaces, along with shafts, account for 25 percent of the building's volume. Floor-to-floor heights are 14 feet—a dimension taken from adjacent Fairchild, but which accommodates the necessary ducts and pipes. Burke's poured-in-place concrete structure was chosen in part to reduce vibration—of major concern to researchers—and in part because the architects preferred the sleeker and more finished look of exposed concrete to a fireproofed metal deck.

You approach Burke along one of the two diagonal paths (opposite).

Spaces that must be kept clean and conditioned are separated from spaces with looser requirements, such as offices. This cuts operating costs, since only laboratories with fume hoods require 100 percent fresh air.
Product Literature

412. Carpet-maintenance guide
A booklet for architects, interior designers, and facility managers discusses the importance of planned maintenance in keeping commercial carpet at maximum appearance levels throughout its specified life span. Chapters range from picking the right color and pattern for anticipated traffic to on-site carpet repairs. BASF Corp., Williamsburg, Va.

413. Illuminated slide storage
Equipment for the large-volume graphic requirements of design offices is shown in a fold-out brochure. Flat trays hold 120 slides each, ready for viewing, project by project. Compact Abodia units can hold as many as 64,000 slides. Elden Enterprises, Charleston, W. Va.

414. Washroom accessories
A 48-page catalog illustrates stainless-steel soap and towel dispensers, mirrors, cabinets, shelving, grab bars, and other accessories for commercial, institutional, hospitality, and healthcare applications. Units that meet federal ADA guidelines are included. Dimensions are given for all products. A&J Washroom Accessories, New Windsor, N. Y.

415. Screening systems
Aluminum grilles for sight screening, building facades, and solar control are pictured in an eight-page brochure. Designs specified by I. M. Pei and Partners and Kohn Pedersen Fox demonstrate the custom capabilities of modular, geometric grilles. Finish options and mounting details are illustrated. The C/S Group, Cranford, N. J.

416. Acoustical treatments
Brochure describes ceilings designed to control sound and unwanted acoustic reflection, absorption, and transmission. Fiberglass-core panels and other components are covered with vinyl or fabric to provide a custom solution to noise problems while resisting abuse and high humidity. AVL Systems, Inc., Ocala, Fla.

417. Anodized colors
A pocket-size selection chart contains actual metal samples anodized using Swiss-made Sandoral dyes. Colors range from yellows, through various golds and reds, to turquoise and dark blues. Architectural Anodizing Corporation of America, Elkhart, Ind.

418. Railings
A colorful catalog has 52 pages on railing systems for all applications, from high-end retail to wastewater treatment. It describes the nonwelded Connectorail and site-specific Carlstadt product lines, along with customizing components of wood, glass, and acrylic. Julius Blum & Co., Carlstadt, N. J.

419. High-security fencing
A European design, the Irfen palisade fence is made of hot-dip galvanized steel in three finish options, including custom-color PlusGalv polymer coating. A distinctive, three-point Triad head design combines entry deterrence with a uniform esthetic that can accommodate varying ground levels. Irfen Industries, Inc., Chicago.

420. Opacifier
Design guides explain how Fluorocerm GC coatings are factory-applied and oven-fused to properly prepared structural glass substrates, and illustrate the appearance options offered by applying the 70 percent fluoropolymer resin to inboard and exterior lights of glass. Morton International, Chicago.

421. Access doors
Flush and recessed doors and hatches may be specified to blend or complement any wall or ceiling finish. A 16-page catalog shows all door and frame choices, including fire-rated and security units. Karp Associates, Inc., Maspeth, N. Y.

422. Toilet compartments
A six-page catalog describes melamine component-panel partitions, said to have the decorative range of laminate surfaces for the lower cost of steel compartments. Floor-mount, overhead braced, and door-and-frame configurations are shown in different layouts. Marlite, Dover, Ohio.

423. Exit devices
Manufacturer Sources

For your convenience in locating building materials and other products shown in this month’s feature articles, RECORD has asked the architects to identify the products specified.

Pages 62-67
James L. Knight Physics Building University of Miami
Spillis Candela & Partners, Architect
Cast-in-place and precast concrete: Stresscon.

Pages 68-73
Boyer Center for Molecular Medicine, Yale Medical School
Cesar Pelli & Associates, Architects

Pages 80-85
LeBow Engineering Center/Center for Automation Technology, Drexel University
Kling-Lindquist Partnership, Architect and Engineer

Pages 86-91
Burke Laboratory, Dartmouth College
Ellenzenwrig Associates, Architects
R. M. Kliment & Frances Halsband, Architects, Associated Architects

Stainless-steel entrances: Dawson Metal Co., Inc.

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D U P O N T A N T R O N  T H E R E  I S  N O  E Q U A L
Designing Against Malice

By Joseph F. Wilkinson

The designers of schools are, quite literally, circling the wagons. The newest development in school design is either a quadrangle or a circle enclosing a courtyard. The school, accessible by only a single gate, presents an impregnable face to the world.

The steadily rising incidence of burglary, vandalism, and violent crime has led the administrators of schools, private as well as public, to require school architects to underscore security in their designs. The security measures protect not only property, but students and staff.

In earlier days, a school was like bread in a restaurant, there for the taking. But (at the same time), according to Richard Passantino, president of LEA/Passantino+Bavier, Roslyn, Virginia, when kids broke into a school there would be vandalism, obscenities written on blackboards, and wastebasket fires. In recent years, Passantino says, schools have been equipped with TVs, VCRs, computers, and laboratory equipment and electronic devices that have high market value. This expensive gear, not the blackboards, gets the attention of trespassers.

Burglaries occur five times more often in schools than in businesses, according to Sonitrol, an Orlando, Florida-based supplier of security systems. Further, says the firm, vandalism costs schools more than $250 million annually; moreover, 8,500 fires in elementary- and high-school buildings in 1990 caused $136 million in property damage. Some architects estimate that the demands of security account for 10 percent of the cost of school construction.

The face of security

A current LEA/Passantino+Bavier project illustrates some of the challenges to school architects. The school is divided into three separate education wings, plus community activities, including a day-care center for children of unwed teenage mothers, a latchkey facility, and a well-baby clinic for high-school mothers.

"Initially, we considered an exterior playground, because that was more cost efficient," says Passantino. "When security, protection, and maintenance concerns were evaluated for this urban setting, the design of the building was affected in several ways. For instance, it had to be redesigned so there would be courtyards inside the building that could be accessed only by coming through controlled security points within the building.

"Compared with schools designed a decade ago, we dramatically limited the number of exterior doors. None of these has any exterior hardware except the designated entrance points. Now we also greatly reduce the amount of glass on the school’s exterior, though we use more glazing in the courtyard. Today, school boards aren’t even happy with polycarbonate substitutes for glass. Kids using an ordinary roadside flare can burn through that material and gain access to the building. [Editor’s note: Polycarbonate can also be burned through by sticking bubble gum on it and igniting the gum after it dries.]

"Many school districts set limits of 100 feet around school buildings to create a drug-free zone and these areas are policed by outside security forces. The U.S. State Department, in planning its embassies, coincidently also uses that 100-foot setback as a counter-terrorist measure. I am amazed how closely school design resembles embassy design for use in hostile countries.

"School architects are also concerned about rooftop access or entry through skylights. Buildings are frequently broken into that way. Consequently, our office now designs parapets that slope so steeply they do not encourage kids to climb on a roof. When you have gravel on the roof, vandals are going to drop it down the vent stacks and they are going to mess up your air-intake system or damage the mechanical equipment on the roof."

Passantino’s schools, like many designed today, are equipped with electronic motion sensors to detect unauthorized persons moving in the school after hours and frequently provide closed-circuit television cameras for surveillance. This expensive equipment has to be solidly mounted and enclosed so that it can’t be removed and sold.

"Today, when you’re designing a building for small children, you’ve got to design to prevent child molestation," says Passantino. "We design easy-operating doors that small children can open if they are trapped. We don’t use doors on accessible low-storage cabinets. In the bathrooms where the very young kids go, the walls are low so that teachers can see over them. There are no doors to the toilets. We haven’t made the next jump, how to monitor the adult bathrooms, but people are very worried about children being taken to adult toilets."

Influencing the basics

"Security not only affects the things you install in a building or site after it’s finished," says Passantino. "It influences the intrinsic, basic design philosophy of the project. Security is affecting basic design."

Gaylord Christopher, of Wolff, Lang and Christopher, Rancho Cucamonga, California, takes security seriously but doesn’t think it influences design. "Security is one of the major concerns people are looking at these days, but I haven’t seen it as something that changes the way that schools are designed completely," says Christopher. "It hasn’t been the tail wagging the dog. School districts are concerned about security, but they don’t let it dominate their programs."

Like most school architects, Christopher is bothered by the F-word—fortress. "I think it is very important not to make the school look institutional or even approaching a prisonlike appearance. We’ve tried to do a number of things with colors and wainscoting and masonry. We try for a material and appearance that looks good, but is almost bombproof." Most of the schools planned by Wolff, Lang
and Christopher are equipped with electronic central security systems that include motion detectors in every room.

One of the pioneers in protecting schools through design was John Zeisel, a sociologist on the faculty of the Harvard Graduate School of Design. In the early 1970s he wrote Stopping School Property Damage, which was published by The American Association of School Administrators and Educational Facilities Laboratories.

The premise of the book is that slightly less than half the damage to schools, except theft of property, was caused by malicious vandalism. The rest of the damage he attributed to accidental damage, nonmalicious property damage, and poor maintenance.

Zeisel urged architects to design schools that eliminated opportunities for these kinds of damage. Most of his 20-year-old suggestions are included in today's security guidelines. Zeisel advised against accessible rooftops, hidden niches, vulnerable windows, exterior door hardware, walls that invite graffiti, drop-in ceiling panels, accessible wall fixtures, excessive glazing, and unsubstantial floors and walls.

Conquering the fortress
In New York City, school security is big business. If the New York Board of Education were a city, its security organization would be the fourth or fifth largest police force in the country. The city's school builder, The New York City School Construction Authority, has a set of security standards that all designers must meet.

"In terms of materials and the finishes of the building, they must be vandal-proof," says Michael Stevenson, of Ehrenkrantz, Eckstut, Whitelaw, New York City, which has designed many New York City public schools. "The Board of Education assumes that a lot of times there will be things happening that simply cannot be controlled, so the building should be able to withstand pretty abusive situations. For example, I was talking with a Board of Ed official who had problems with roof leaks caused by bullet holes. People in nearby taller buildings could shoot down on the school.

"A school is for little kids and it should be welcoming in character. We don't want it to be a fortress, but at the same time we have these security and security-related maintenance concerns. Windows, for instance. In New York City it is clearly spelled out that they be shielded. Most schools have wire screens or expanded metal. We worked with a fabricator to come up with a perforated metal window guard that we had seen on college campuses. We thought it looked less like something you might see on a detention center, more in keeping with the character we wanted for the building.

"The corridors are designed with straight lines of sight, leaving no hiding places or nooks and crannies where people could be hiding from teachers or dealing in drugs.

"Our schoolyards are completely fenced and gated and laid out so that they have no areas that can't be seen by a passing patrol car.

The Handwriting on the Wall
Graffiti is a challenge to most school designers, and there are three basic solutions: make it impossible to apply, make it easily and quickly removed, make the school so attractive that it defies disfigurement.

John J. Castellana, TMP Associates: "We cope with graffiti by very carefully choosing the material palette of the school. We try to come up with materials that are easily cleaned, and are washable. If you provide a very pleasant learning environment for the kids, there is more respect paid to that structure and graffiti is minimized."

Gaylord Christopher, Wolff, Lang and Christopher: "Immediate removal is the biggest deterrent to graffiti. A big part of graffiti is to see your art work later on. If it is taken off immediately, you get no recognition."

Bernard Zipprich, Richard Dattner Architect: "We use materials that are resistant to graffiti—structural glazed facing tile or glazed concrete block in the corridors and glazed face brick for the exterior first floor."

The face of Desert View High School, Tucson, is windowless, has a single entry and split-face concrete block cladding that defies graffiti. The wing has an arcade entry secured in off hours by steel bar gates.

“The school has to be rugged enough to withstand abuse. For example, we don’t use lay-in ceiling tile. It is too easily destroyed. Kids can stand on one another’s shoulders and get at it. Also, it can be lifted and things hidden up there. We don’t use dry wall, either. It is all some sort of masonry or glazed material. If it is wood, it is a solid piece of wood, no veneer, wood that can age more gracefully and from which scratches can be sanded.

“We’ve looked at a lot of buildings that have been around 50, 60, and 70 years and withstood abuse with some degree of grace. We try to incorporate some of their features in our schools.”

School without Big Brother
Among the commissions held by Gruzen, Samton, Steinglass, New York City, is design of the new Stuyvesant High School. Stuyvesant is one of the New York City’s four elite high schools, where students are admitted on the basis of competitive examinations.

“The challenge was to produce conditions safe for students and teachers and to keep it from looking like a prison,” says associate partner Timothy Schmiderer. “Because of the nature of the student body, we made some deviations from the Board of Education guidelines in design and systems. The school was not comfortable having a lot of TV cameras watching critical areas, which is the Board of Education standard. We provided the infrastructure and if there is a problem, the cameras can be mounted. But the school was not opened with that Big Brother look.”

“At the other extreme, there is more very valuable equipment in this school than in most schools. We put a lot of effort into protecting it. There are motion detectors to monitor movement in the high-tech labs and card-entry systems that record whose card was used to enter a room and at what time that person entered and left.

“A pilot project at Stuyvesant High School is to use magnetic locks on street-level doors. They release automatically with a fire alarm. In a nonfire situation, they will open if they are pushed for five seconds, but the opening sounds an alarm.”

Richard Dattner Architect, New York City, has six public school projects under way for the City of New York. Bernard Ziprich, an associate, defines the firm’s design philosophy: “We try to take very utilitarian materials and through creative use of them make the buildings attractive and not threatening or fortress-like.

“We have been fairly successful with that approach. By using different colors of brick with a transparent glaze we have been able to create attractive designs at very modest cost. We have custom-designed the security grills to coordinate with the windows and make them look less institutional. The city allocates a certain percentage of construction cost to art works and we have used that to create attractive fences.”

The elaborate and expensive electronic security devices fitted into many schools can be used for more than protection, says Lee Brockway, a principal at Fanning/Howey, Michigan City, Indiana. “We have over the years put a lot of electronic devices in buildings and in most cases they were entirely separate systems. Now we try to take advantage of the money spent on fire-alarm, energy-management, reporting and communication systems by interfacing them,” says Brockway. “For example, the motion detector that would tell the police someone is in the building at night can be used during the day to turn off the lights and turn off the fresh-air supply to classrooms that are not being used. When students leave a classroom to go to the gymnasium or cafeteria, the system turns off the lights. This conserves energy.”

Healthy circulation
Not only electronic equipment, but simple common sense can resolve a lot of the security challenges, according to William Brubaker, vice chairman of Perkins & Will in Chicago.

“School designers can take a lesson from office buildings,” says Brubaker. “Thousands of people come and go in a big corporate office building and they use a single main entrance that is watched by a control desk in the lobby.

“A variation on that is schools designed as a quadrangle, which makes all the buildings easy to secure. Attractive iron gates swing shut at night. We designed a school in Florida that is a two-story ring around a circular courtyard. Good-looking fences make it easy to secure without damaging the character of the place. It is still welcoming and pleasant.

“We adopted the airline-terminal restroom design, using baffles instead of doors. They provide a visual barrier, but not an acoustic barrier.”

Earl R. Flansburgh, president of Earl R. Flansburgh & Associates, a firm that has designed many public schools, blames frustration for a large share of vandalism. “In a large school, we reduce the frustration level by making movement easier,” he says. “We have streets—corridors—big enough for two cars, 18 to 20 ft wide. They make for a relaxed environment.”

John J. Castellana, vice president of design of TMP Associates in Bloomfield Hills, Michigan, is another advocate of easy circulation and high visibility. “I think security presents more of an opportunity than a challenge. There are certain things an architect can suggest in planning and layout to give a school a lot more open atmosphere as far as circulation goes. The important thing is good visibility throughout the school. That is the best security you can have. From an external standpoint, it is a good, recognizable front-door entry. The schools of the 1950s had doors all over the place. People from the outside gained uncontrolled access. There is a lot we can do to facilitate security, but do it in a human kind of way.”

Visual control is particularly important in schools attended by very young children. “School administrators are always concerned that the wrong person will pick up a child from school,” says Lee
Brockway, a principal of Fanning/Howey. "The wrong person might be the other parent or the parent who doesn't have custody or even something worse. In the beginning design we look at the layout, how automobiles access the area, how a member of the staff can see the pickup point and supervise arrival and departures from an office."

Designers usually try to keep a visual corridor between the parking area and the school entrance so that a parent can observe a child all the way to the door. Play areas are usually well fenced and often screened from public view.

An aspect of schools that complicates security design, but adds to school security, is the use of schools by the community during nonteaching hours. Use of a school during off-hours discourages break-ins, but the school must be designed with interior security zoning. For instance, locked doors deny access to the rest of the school by users of an auditorium or swimming pool.

**Security for architects**

"Architects have to consider the quality of the security they design into schools," says Richard Passantino. "Say you have designed a molestation spot, a place under a stairway where somebody could be raped or assaulted. You may be facing another area of liability as a designer because you did not use professional caution to prevent that attack from occurring. I don't think architects have thought about that yet. I'm waiting for the first case."

Society pays for security in several ways. School buildings, no matter how architects strive to avoid the fortress look, are likely to appear more forbidding. The elements of security, such as the monitored single entrance, the shielded windows, and the TV observation cameras, lower the quality of life for students. The whole school operation pays, too. As Richard Passantino says, "In terms of school budget, all this security takes away from the school programs. I would estimate that security's architectural elements and its electronic systems were from 5 to 10 percent of school costs. School budgets are not going up but down, and the impact of security cost is meaningful."
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Academic Buildings: Showcase Focus

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Architectural Record
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Dodge-Regupol, Inc.
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Academic Science Buildings
continued from page 61
attention to design is underscored clearly by the growing trend to team a firm with lab-planning expertise with another known for design skills.

Concern with looks and comfort is spurred also by competitive pressures. Just as researchers must now compete more fiercely than ever for public and private grants, so too universities vie for top-notch faculty (meaning those who get the grants). Many schools regard handsome, well-equipped buildings as crucial to recruitment.

Uncertain future
Schools may recognize the importance of science buildings, but fewer and fewer can afford to build them. According to F. W. Dodge, total construction volume of laboratory buildings—corporate and government as well as academic—more than doubled from 1980 to 1985; since then it has declined somewhat. "State universities are strapped for cash, and most private schools can't afford the high cost of science buildings," says Dr. Richard R. Rietz, a lab planner in Foster City, California. Thus, when asked about prospects for the next decade, most planners were equivocal: uncertain about funding, but certain that new facilities will be needed.
Says MIT's Simha, "There's no doubt we'll need new buildings. Many labs of the '50s and '60s are reaching the end of their useful life, and will have to be renovated or replaced."

Given the general need for facilities, what is the outlook for particular types of labs? Planners and consultants predict that the fields of bioengineering and biotechnology will continue to grow and to need new space. Biotechnology, especially, "will lead the field for some time to come," says Gerald Roschwalb of the National Association of State Universities and Land Grant Colleges in Washington, D.C. Laboratories for applied research should also become increasingly important. This continues a trend begun in 1986, when Congress passed the Technology Transfer Act designed to encourage a closer relationship between academia and industry (2). And, in the next decade, universities are likely to need more labs for multidisciplinary research. "Scientists of different disciplines are working together more and more, so distinctions between different types of labs should become less and less pronounced," says Watson. "In some cases, it's already hard to tell if you're in a chemistry, biology, or physics lab."
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![Architectural Bollards Image]

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Bombay Connection, Laredo, Texas
Tarik Currimbhoy, Design & Architecture
Tarik Currimbhoy, Lighting Designer

Oregon Coast Aquarium, Newport, Oregon
SRG Partnership, Architects
Robert Dupuy and Mark Ramsby, Lighting Designers

W. K. Kellogg Foundation Headquarters, Battle Creek, Michigan
Luckenbach/Ziegelman + Partners Inc. Architects
Gary Steffy Lighting Design Inc.

Sportsgirl Centre, Melbourne, Australia
Anthony Belluschi Architects, Ltd.
Hayden McKay Lighting Design

Lighting Design News
Skylights and Incandescents Lend a Link to Life/IESNA Presents Guth, Waterbury, and Energy-Efficiency Awards/Tennis Lighting Aces Out Multiple Problems/Lightened Loads at Busy Workstations/Abe Feder Tells All/Spanish Design, the Canadian Way/Pirates and Steelers Save Energy by Dumping 1,024 Luminaires

Lighting Design Practice
ESCos Changing the Lighting Industry, By Lindsay Audin
DSM: A Lighting Design-Services Market Opportunity, By James R. Benya

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Skylights and Incandescents Lend a Link to Life

Cove's Edge Long Term Care Center in Damariscotta, Maine, is a combination 65-bed nursing home, adult day-care center, and hospice that depends heavily on natural lighting to keep its clients and visitors grounded in the world. Rothman Architects of Boston cued lighting design to five skylights topped with wood-frame-and-lattice cupolas that cast hourly and seasonal shadows throughout the entrance lobby and the patient wings. Incandescents in Michael-Graves-designed pendants provide a complementary glow. The 5500K fluorescent uplights tucked into moldings lengthen the daylight effect into the evening hours. Natural light enters the hospice area (above), through high clerestories, mullioned to cast moving shadows; recessed uplights shine on a pale sky-blue ceiling.

IESNA Presents Guth, Waterbury, And Energy-Efficiency Awards

W. L. Thompson has won the IESNA Guth Award for Carolina Place Mall, Charlotte. Citations went to 30th Street Station, Philadelphia (Lighting Practice/Dan Peter Koppel); Cascade Plaza Dome, Banff (Falcon Engineering); Ohrstrom Library, Concord, N. H. (Cline Bettridge Bernstein); St. Matthews Church, Alberta (Grice Maskell/TIR); 3M, St. Paul (HGA/3M). Waterbury Awards went to London's Albert Bridge (Philips Lighting), Stardust Hotel & Casino, Las Vegas (John Renton Young/Vegas Lighting), and Toyota, Tokyo (Nikken Sekkei), with citations for St. Paul Ice Palace (Frat-talone/Hunt) and Harumi Terminal, Tokyo (right; Minoru Takeyama/TL Yamagiwa Laboratory). Energy Awards went to Boogies, New York City (left; WGFS Lighting) and Health Park Center, Fort Myers, Fla. (Craig A. Roeder Assoc.).
Connecticut

Tennis Lighting Aces Out Multiple Problems

"TV is the driving force in any sport these days," says Van Zelm Heywood and Shadford associate Donald K. Segee, lighting consultant on New Haven's 15,000-seat Connecticut Tennis Center. Four rows of 20 narrow-beam 1500-watt metal halides mounted on the stadium structure 100 feet above the playing surface, and tilted 15 degrees from the vertical to accommodate the tilt of TV cameras, provide a glare-free game for spectators and color-integrity for home viewers, as well as optimal comfort for players dealing with tennis balls traveling up to 125 miles per hour. Half concentric louvers in the bottom of the reflectors shield the surrounding community from light pollution. Metal halides shining up the exterior (above) create a floating effect.

Pennsylvania

Lightened Loads at Busy Workstations

To help reduce the fatigue that pervades computer-based offices, lighting designer Mitchell Kohn used indirect color-corrected triphosphor SP35 energy savers in 92-ft courses below the 24-ft-high barrel vaults that float over 400 loan-servicing workstations at the Student Loan Marketing Association (Sallie Mae) in Wilkes Barre. They provide 45 glare-free footcandles, minimal ceiling brightness, and even distribution, and a complement to well-shielded natural sources.

Briefs

Abe Feder Tells All

- The legendary Abe Feder, considered the first independent lighting designer in the U.S., is writing his memoirs. His career, sparked at the age of 12 when a magician invited him on stage, began in the theater, where he lit his first Broadway production in 1938 and used light to replace scenery for Orson Welles in 1957. By the end of World War II, he was firmly ensconced in architectural and interior lighting. Now 88, he recently finished a major commission in Virginia and continues his never-ending projects at the Rockefeller Center complex.
- Newly renamed Fisher Marantz Renfro Stone is the lighting component on the team assembled to bring back the pizzazz to New York's 42nd St. now that plans for Times Square office towers are on hold.
- Osram has reached an agreement to acquire GTE's North American lighting business, including Sylvania, which has 29 plants in the U.S. and Canada. The deal should almost double Osram sales figures.
- Strand Lighting won a film-studio award from the American Society of Lighting Designers for its 18K HMI retrofit, and "Product of the Year" from the Lighting Dimensions show for its CD90 dimmers.
- The July issue of the journal Cancer Causes and Control contains a hypothesis that any extremely bright light, 400 nanometers or above, in hospital nurseries may contribute to childhood leukemia.
- Chip Israel, Julia Rezek, and Alex Pappas are the core of the new Lighting Design Alliance, which has purchased the West Coast operations of Grendal Associates. The address is 3710 S. Robertson Blvd., Culver City, Calif. 90232, 310/204-2274.
- The Lighting Post moves to 327 N. 17th St., Philadelphia 19103, 215/241-9115.
- Upcoming San Francisco Designers Lighting Forum programs include a holiday party on December 8, and for 1993, certification in January, neon in February, UL problems in March, light artists in April, Lightfair in May, and a show-and-tell of recent work in June. Contact: 415/626-1978.
- San Francisco IES plans include a holiday party in December, awards deadline and installation tour in January, and a glare update in March. Contact: 415/626-1950.
Seville

Spanish Design, the Canadian Way

Horst and Marion Thanauser photos

"I wanted to build a Spanish building in a Canadian way," says Bing Thom of his Canadian Pavilion for Seville's Expo '92, which drew crowds seven hours long, and which the Spanish government hopes to use as an engineering school. During the day, the titanium zinc cladding changes color as it catches light at different angles; at night, incandescents tucked into folded tile create a firefly dance (above, left). The wall blocks the Seville sun from the courtyard, where theatrical lighting targets a water-washed wall of off-the-shelf holographic grating (left; detail above, right) to call forth an effect of flickering flame and surfaceless infinity. Reflections in the pool change shade as the visitor climbs a spiral ramp. Twinkle lights and a mirrored frieze lend a little infinity to the small Aurorales restaurant (above, center).

Pittsburgh

Pirates and Steelers Save Energy by Dumping 1,024 Luminaires

Advances in lighting technologies recently enabled Caplan Engineering to offer Three Rivers Stadium $100,000 in annual energy savings by using 608 1,500-watt metal halides, roughly one-third of the 1,632 1,000-watt lamps installed when the Pirates/Steelers facility opened in 1970. The new luminaires circle the roof in banks 145 ft above the field. Each was positioned individually at 45 to 65 deg vertical aiming angles to produce precise and uniform results. The field was sectioned into 30-ft sq grids, and TV camera readings of horizontal and vertical projection were taken at home plate and centerfield to insure the minimum 100 footcandles required from every point. Caplan worked with CBS and the American League for baseball, and ESPN and the NFL for football. "In a fast-moving game like baseball, it's hard to follow the ball to center field," says Al Taylor, an independent operations producer for ESPN. "I don't remember anyone having difficulty focusing opening night, and we were using older cameras, which need more light. There wasn't a dark spot in the whole stadium."
By Lindsay Audin

I've recently engaged in a number of discussions on the state of the lighting industry. A lamp manufacturer speaks of the recent burst of technical innovation in lamps, at the same time noting the purchase of one large lamp manufacturing company by another. A fixture manufacturer says, "We've come up with several new products, but our production is down. There's not as much new construction as there was a few years ago."

His view was echoed by an electrical contractor: "I've got some of my best employees changing lamps just to keep them working."

The only optimist on the block is the head of an energy services company (ESCo.) "I'm getting so many calls for lighting upgrades that I'm subbing out work!"

It seems that, like the fabled blind men describing an elephant by touching only its tail, trunk and leg, each of these members of the industry has a different perception of where the work is. And there is an "elephant" of sorts that many have not yet perceived: the burgeoning energy-efficiency upgrade market. Now a few are beginning to regard it as a source of both competition and megasales, as entire institutions—and even whole state governments—begin re-lighting their millions of square feet in the quest for lower utility bills.

The status quo

But how have things really changed? Let's follow a product on its usual path to a client.

A typical job starts with the design phase, during which lighting-product agencies representing manufacturers work closely with architects or engineers to choose appropriate fixtures. Configuring the agency's product lines into one comprehensive proposal is usually called "packaging" the job. This is not always done, but where a competitive price is critical it is the norm.

When the job goes out to bid, electrical contractors try to make their bids more competitive by substituting less-expensive alternate equipment. The lighting agencies try to keep the package intact in order to hold onto the sale. The designers' intent is to hold specs as necessary to maintain the aesthetic and technical quality of the job.

Once a bid for the equipment has been accepted, the fixture distributor supplies the equipment it purchases from the manufacturer. A general contractor oversees the entire job, while an electrical subcontractor installs the fixtures. Markups, conflicts, and negotiation are common. Some are mystified that anyone can complete a job and still make money at it.

The new market...

Large facilities are grasping the potential economic impact of high-efficiency lighting systems on their buildings' operating budgets. With urging from the EPA's "Green Lights" program, they are becoming amenable to major lighting upgrades that will be worth tens of billions of dollars over the next decade. The simultaneous need for more electric-generating capacity has led many utilities to prime the economic pump with rebates for equipment that cuts electrical demand and costs less than building new plants.

...And a new way of doing business

Some members of the lighting industry are not interested in what they see as low-quality work, or feel energy efficiency is a passing fad. As a result, new companies have sprung up to supply personnel, equipment, capital, and services to satisfy this market. Several lesser-known fixture makers have adapted to supply low-cost, high-efficiency fixtures, supplanting some of the usual industry stalwarts. Smaller firms are developing and supplying energy-efficient fixtures and devices aimed at hotel and restaurant chains.

The chain of events and control over the job have been re-arranged in this new market. A company making high-efficiency lighting equipment directly secures a job, guaranteeing that its products are used. They hire their own electrical contractor, design and manage the installation with their own people. No outside agents, architects, engineers, designers, or distributors ever enter the picture. Total job cost is lower for the client, the job gets done quickly, and early payment is ensured by a quick utility rebate—plus the savings generated by the client's reduced electric bill.

Alternatively, an ESCo obtains and manages the job, sublets the design and equipment to a fixture maker, and capitalizes the project under a long-term agreement with the facility's owner.

In a reversal of the usual roles, when working under contract to an ESCo, the electrical contractor is relegated to competing for the work after the job has already been let, so the contractor can no longer use the product selection or its price as a bargaining chip. Instead, the contracting company may be forced to use its least skilled and least profitable employees in order to compete for the fixture maker's or the ESCo's business. Some enterprising fixture manufacturers—once forced to take a back seat to the contractor—are now instead driving the market.

Both vertical and horizontal corporate integration is underway. ESCos are expanding so rapidly that one recently bought its own fabrication company, while another purchased a West Coast lighting design firm. At the same time, some contractors are struggling to keep their staffs working, and lighting agents, designers, architects, and engineers are being laid off due to a lack of work.

Since each job is a promotion for the rest, this takeover is gradually eating away at the renovation and replacement markets that keep lighting people fed between bursts of construction—such as the dip we are in now.

While this is happening most often in areas hit hardest by the recession and high electrical rates, its expansion is inevitable as older power plants are retired and new ones are blocked by high costs, siting problems, and environmental constraints. Rebates and utility energy savings provide large incentives for real estate and facility managers to renovate their presently inefficient lighting. This trend is having a major ripple effect in the lighting industry. Entrepreneurs will seek ways to "catch the wave" or else be inundated by it.
This column explains Design Side Management (DSM) from the perspective of a lighting designer whose firm, Luminae Souter Lighting Design, recently became the wholly owned subsidiary of Provenae Alternatives, Inc. an energy-services company, or ESCo. While most of the Luminae Souter staff will continue to work on high-end lighting design projects, some of the staff, including Mr. Benya, are now working in the energy-services area as lighting specialists. C. D. L.

By James Robert Benya
Demand Side Management is the management of electrical-power consumption and distribution on the customer's side of the meter, thus known in utility parlance as the "demand side." As a lighting-design firm working in the energy-services area, our goal is to produce retrofits that respect the original design and, when appropriate, to improve the quality of the lighting system while saving energy.

The result of a major governmental reform. Prior to DSM, most state utility rate-setting agencies allowed electric companies to set their rates based on an acceptable profit after expenses, including capital investments in power-generating plants. DSM allows electric companies to invest capital in conservation on the customer's premises instead of building more generating and distribution capacity, and still profit from the investment. This is a revolutionary change.

DSM is a direct result of a nationwide movement toward more energy-efficient buildings. The EPA's Green Lights Program, the DOE's Federal Energy Management Program, and other codes and ordinances have also invigorated the DSM movement.

How does it work? There are two major types of DSM projects: Subsidized ("whole-sale") and private ("retail"). Many utilities subsidize DSM programs through rebates and fees paid to ESCos. The ESCos in turn take this subsidy and use it to achieve large savings in one of the utility company's specific service areas by working on the facilities of many of the utility's customers. In "retail" DSM, the utility rebate is obtained by and used by the property owner directly. Typical projects include the lighting retrofits performed by lighting-maintenance companies. Lighting is only about 25 to 30 percent of the electric load in the United States, but improving the efficiency of it will reap the biggest benefits fastest. Lighting is conservation's cream of the crop.

While opportunities in electric-energy conservation exist for all loads, including electric motors and hvac equipment, lighting is the only portion for which changes in technology and technique have allowed for a 50 to 80-percent reduction in consumption from the standards of 1973. Moreover, these improvements are cost-effective, and frequently result in other benefits, such as the improved color rendering of T8 lamps.

The designer's role in DSM.
The lighting-energy business is currently preoccupied with hardware-efficiency retrofits. The most typical of these, the "reflector-electronic ballast-and-T8 lamp" retrofit, doesn't exactly require a trained lighting professional for implementation. The genuine science of lighting, let alone the art of it, is often completely ignored. This is not to say that there isn't a highly competitive hardware-oriented retrofit business; there are plenty of situations where the reflector-electronic ballast-and-T8-lamp solution is appropriate, and it doesn't take a lighting designer to figure this out. But it does take genuine illumination engineering to determine the illumination levels correctly in these cases.

I believe it is necessary for people who really understand lighting and architectural design to become part of the DSM industry. The absence of design professionals in the mainstream energy-efficiency business has allowed esthetic nightmares and snake-oil sales tactics to flourish. I cringe at the sight of screw-in compact fluorescent R lamps sticking out of downlight cans!

By taking a leadership role in the emerging DSM industry, design professionals can bring their expertise to the retrofit lighting-design process, and to take advantage of a market that is bound to expand at the same time. The cost of new buildings now significantly exceeds the cost of remodeling and retrofitting older buildings, many of which already have significant advantages over new buildings, such as location, identity, mature landscaping, and so on. So retrofit buildings can be made as valuable as a new building for a fraction of the cost.

Since most lighting DSM work involves paybacks of four years or less, building owners are often hard pressed to discover better ways to spend money and earn a rapid—and fairly guaranteed—return as a result. All of this points to DSM as an area of potential business growth for the 1990s.

What role will lighting-designer certification play in DSM programs? A large one, I hope. The technical nature of lighting design alone demands that utility companies or building owners who offer DSM contracts should be able to establish the qualifications of those they are dealing with. Hence, the sudden interest in developing certification programs in the lighting industry.

EPA's Green Lights Program already recognizes certification programs sponsored by the Association of Energy Engineers (AEE) and the National Association of Lighting Maintenance Contractors (NALMCO) while the National Council for the Qualification of Lighting Professionals (NCQLP) certification program is still on the drawing board.

Their NCQLP program is being developed with input from many different professional design organizations, including the IESNA, the IALD, the ASID, IBD, and others. I hope when this certification program is complete, it will recognize the rapidly evolving and very important realm of DSM, and perhaps the need for multiple certification programs will be eliminated.
Cable-hung halogen lighting for corporate offices

The Halogen Bridge was designed by Californian Damon Peterson to span space point-to-point, with pairs of horizontally tensioned conductor cables six inches apart strung between walls or crossing diagonally in unsupported lengths of up to 30 feet. Light sources are primarily MR-11s and -16s held in interchangeable pendant- and rod-mounted lampheads that can be clipped anywhere on the cables. A simpler, more architectural and rugged-looking version of European bare-cable systems such as Ingo Mauer’s YaYaHo, the Bridge is made with metal parts—turnbuckles, stud ends, cables, and universally jointed aluminum mounting cradles—that have been machined to exact tolerances for multiple-unit commercial applications. System and all components are E. T. L. approved.

Lamp-holders include Sing, upper left, a pendant with two angled conductor rods connected to a 4-in. dichroic shade. A cap ring holds lenses and honeycomb filters. Next to it is Byrdy, a completely adjustable accent light that comes in natural aluminum and anodized-metal colors. The Glass Scarf, detailed at right, diffuses ambient light from a bi-pin halogen bulb through a flashed-white shade suspended between the cables from an aluminum framework. The installation pictured below left, offices for a software manufacturer in Mountain View, California, was designed by Primo Orpilla. SF 12V, Inc., San Francisco.
According to the National Electrical Manufacturers Association (NEMA), it's a triphosphor lamp with 70 CRI and 3500K color temperature. Recently, lamp manufacturers who are members of NEMA approved a new standard nomenclature for indicating the range of color-rendering index (CRI) within which various triphosphor fluorescent lamps operate. This will eliminate the minor confusion that existed when each manufacturer had its own way of designating CRI and color temperature.

What used to be called a thin-coat triphosphor, which operated between 70 and 79 CRI, will now be called RE 70. Thick-coat triphosphors, which operated between 80 and 89 CRI, will now be called RE 80. A designation called RE 90 will cover rare-earth phosphor lamps with a CRI over 90. Color temperature may also be indicated by the new designation system. A 3500K lamp that had a color-rendering index of 70 would be designated as an RE 735, for example.

This development affects only the way triphosphor coatings are designated. NEMA and the lamp manufacturers are still working with manufacturers to try to standardize the actual color of the lamps so that different brands of, say, an RE 841, could be used in a single room with no noticeable difference in color from lamp to lamp.

These new designations will make it easier to identify, specify, and replace fluorescent lighting products, and thus take us a few steps closer to the day when high-quality fluorescent lamps will be the rule—rather than the exception—in buildings. Charles Linn
If Luis Barragán had designed a night club, it might have resembled the Bombay Connection wholesale/retail outlet, which is the largest store in downtown Laredo, pop. 133,000 at night and more than 300,000 during the day when people cross the border from Mexico to shop till they drop. A certain wild-west aura lingers in Laredo, even though the legendary cowboys have given way to merchants, the pickup truck is the new horse and wagon, and lighting has replaced lasso as a means of persuasion.

According to Sunil Gurnani, vice president of the 40,000-sq-ft border-town fashion emporium, "The lighting is a magnet that pulls people from both ends of the street to the entrance cylinder on the corner. You see the entire store from the entrance and you want to venture onwards and onwards. Even if you don’t feel like shopping, you wind up shopping; it looks so good."

New York architect Tarik Currimbhoy marched sparkling bays of glass block, diamond-faceted and back-lit by yellow neon, along two sides of the exterior; they converge at the entrance, a dark mauve metal cylinder dominated by a large display window and a tilted acrylic cap lit from within by daylight white fluorescent lamps. A stainless-steel serpentine cornice reflects the glow of blue airport landing-strip lights set into the entablature and a strip of red neon along the edge. These lamps create, in turn, an entirely new set of colors on the mauve-painted, saddle-curved canopies over the doors. (See cover detail.)

MR 16 beams bounce off the display window’s copper-leaf backdrop, where a punch-out provides a view into the rubbed and varnished burnt sienna vestibule lit by incandescents, and from there to the terraced retailing area, where MR 16 task lights zero in on the merchandise and twinkle back from mirrored fascias.

The view climbs upward to the junction where retail and wholesale meet in a great play of Barragán-esque color and form, seen through light-bouncing lacquer finishes that reveal new palettes as the shopper changes vantage point.

The space is filled with clean geometric forms covered in saffrons, rag-rolled blues, and combed raspberries, all sealed in lacquer; not-quite-whites in an eggshell finish; platinum leaf underlaid with saffron and lit by blue airport landing-strip fixtures; metal finished in a high gloss or painted red; floors of polished granite or rich carpeting.

Everything pulses beneath a black ceiling, from which hang what must be the most startling devices in the space, metal-halide street lamps. "Haggling over merchandise needs to be done in light bright enough for a football stadium," says Currimbhoy. (The metal halides were turned off to avoid bleached-out photography.)

Even in booming Laredo, possibly the fastest-growing city in the U. S., Bombay Connection shines: The store earned Currimbhoy the mayor’s award of distinction. Judith Davidsen

Judith Davidsen is a freelance writer based in New York.
Top left: Dramatic light and color distinguish the couture section. Bottom left: A black and white photo stands out on a wall of saffron with graphite scribbles fronting the staircase to couture. A punk bustier on the platinum-over-saffron rear wall reminds Currimbhoy of a light fixture. Opposite: The route to couture is by way of Barragán, seen through a gloss, brightly.

Credits
Bombay Connection
Laredo, Texas
Owners Ishwar Gurnani
Architect: Tarik Currimbhoy
Design & Architecture
Lighting Designer: Tarik Currimbhoy
Manufacturer Sources:
See Contents page

1. Vestibule
2. Retail section
3. Cash counter
4. Wholesale section
5. Perfume counters
6. Negotiable counters
7. Offices
8. Storage
9. Warehouse
10. Private lounge
11. Couture

![Floor Plan]
Oregon’s Light House

Oregon Coast Aquarium
Newport, Oregon
SRG Partnership, Architects
Robert Dupuy and Mark Ramsby, Lighting Designers
The new Oregon Coast Aquarium is a departure from aquaria designed in past years. Gone are dark, dank hallways featuring tanks full of weird species from faraway places. Gone are the recessed tanks and spooky backlighting that made them look two-dimensional, like color television sets or luminous paintings. At the OCA, interior and exterior exhibits re-create a dozen different local aquatic habitats, from small streams in the upland forests of the Coastal Range to the wide-open waters of the Pacific. Exhibits are brightly lit and freestanding to emphasize free visitor circulation and interaction: the glass barriers between the viewer and the viewed seem to disappear.

Even the aquarium building is at home here on Yaquina Bay, inspired by the traditional materials and proportions of boatsheds and seafood-processing plants across the bay in Newport's Old Town district. In the lobby of the building, a school of fiberglass salmon sidelong by adjustable 70W metal-halide spots leads visitors into a series of brightly lit display halls where freestanding tanks, shallow wave tanks, wall displays, and hands-on exhibits are located. Electric light from nautically inspired shades fitted with metal-halide lamps blends with the ambient clerestory daylight.

Lighting designer Robert Dupuy used an accent approach similar to retail display lighting for the interactive hands-on displays and wall exhibits employing marine-grade track lighting, fitted with 90W PAR 38 lamps. Ambient lighting for interior circulation is provided by 3000K fluorescent lamps housed in fiberglass fixtures, which are fastened to the bottom chords of the wooden roof trusses. Lighting for the freestanding tanks was designed by the exhibit designers, BIOS, Inc., and employs 250W metal-halide lamps in vapor-proof fixtures suspended 2 ft over the surface of the water.

Exterior exhibits are constructed of concrete surfaced with gunite, dyed and sculpted to appear as natural-rock formations to produce caves, cliffs, and tunnel-like passageways, and fitted with glass viewing ports so visitors may view the sea lions, otters, octopi, seabirds, and other creatures from above and below the surface of the water. Night lighting for the exterior exhibits is used occasionally for special events. To avoid disrupting the animals' circadian rhythms, the lighting comes on before dusk to replace the sunlight that is gradually fading away. This extends the effect of the natural twilight. When the event is over, the electric lighting gradually dims until it is turned off, in effect, emulating the sunset.

Mark Ramsby took a very theatrical approach to lighting the exterior habitats, and the outdoor dimming system used to extend the hours of these exhibits also allowed flexibility in setting lighting levels to gain the best effect at each area. JR halogen PAR 38 lamps in hidden corrosion-resistant lampholders are aimed both at the rock formations and at the surface of the water, so the light picks up moving reflections.

Below the surface of the water, submersible narrow-beam fountain lights fitted with 250W halogen T lamps project mysterious shafts of light. Fixture lens are protected by fiberglass louvers; the fixtures themselves are wired through plastic conduit using portable cable so they may easily replaced if they become damaged. Outdoor exhibit circulation paths are lighted by vapor-proof A-lamp fixtures, concealed inside recesses created in the artificial rock structure.

Charles Linn

Nautically inspired industrial metal shades reflect pools of metal-halide light onto the entry doors of the Oregon Coast Aquarium (above.) The shades are also used in the lobby of the clerestoried, fish-processing shed-inspired building. Track lighting at the perimeter of the lobby will be used to highlight traveling exhibits that will be displayed at the museum in the future.
1. Outdoor Exhibits
2. Gallery
3. Theater
4. Introductory Exhibit
5. Bookstore & Gift Shop
6. Lobby
7. Food Service

The Sea Otter Pool (top) and Wave Crash Tide Pool (above) are actually built of concrete, and lit theatrically with IR halogen PAR 38s controlled by dimmers. Lighting Designers Mark Ramsby and Robert Dupuy discovered one difficulty with outdoor dimming: dimmers can create electrical noise that will trip the ground-fault interrupt (GFI) circuit breakers required outdoors. Solving the problem required running a separate neutral wire for each fixture and designing circuits so that no dimmer was loaded to more than 50 percent of its capacity.

A school of fiberglass silver salmon suspended from wooden trusses in the lobby directs visitors to the exhibit areas (opposite, top left.) Lighting designer Robert Dupuy used lighting techniques typically found in retail to punch up the wall displays, and interactive “hands-on” exhibits (remaining photos opposite) using easily adjustable, marine-grade track lighting, with 90W PAR 38 lamping.

3000K fluorescent lamps in noncorrosive fiberglass fixtures provide a cheerful level of ambient light in exhibition areas (opposite), not often found in aquarium exhibits. Freestanding tanks are lit from the inside by 250W metal-halide fixtures suspended over the water.

Credits
Oregon Coast Aquarium
Newport, Oregon
Owner: Oregon Coast Aquarium
Architect: SRG Partnership—Jon Schleunig, design principal; Dennis Cusack, managing principal; Richard Farrington, project architect; Laura Hill, interior design; Doug Reimer, construction architect
Lighting Design: Robert Dupuy, Mark Ramsby
Exterior Aquarium Design: Fulton Gale Architects
Exhibit Design: BIOS: Inc.
Landscape Architect: Walker & Macy
Life Support Systems: ENARTEC
Engineers: Holmes/Enntenman Engineers, Inc. (structural); Carson Bekkl Gulick Kohn (mechanical/electrical)
Manufacturer Sources: See Contents page
As tempting, commonplace, and incredible as campaign promises, the program for the W. K. Kellogg Foundation headquarters included a computer on every desk, full-height window views equally shared by workers, and freedom from eye-straining glare. Recognizing the near incompatibility of these goals, architects at Luckenbach/ Ziegelman + Partners called in Gary Steffy Lighting Design to handle the problem. A strong egalitarian theme ran through the program for the open-plan areas to be used by the highly educated staff, who distribute humanitarian grants totaling more than $200 million a year. Views of river and park were to be seen from the modules stretched along two wings. No offices were to be located along the perimeter, because not everyone could have one.

Steffy explained to the client and architects that the key to avoiding computer-screen glare is to have consistent, balanced luminance. From a worker’s seat, views in all directions should have about the same brightness, but never so bright as to cause discomfort. There should be no dramatic adjustment of the pupils needed for the person gazing alternately at computer screen and paper documents, occasionally looking up at other objects or visitors, and glancing for a restful look out the window. In addition, a room peppered with computers must avoid the classic trap of screen glare: display terminals will reflect images of anything unusually bright, such as windowpanes or 2 by 4 fluorescent fixtures. In the ideal environment, screen, paper, walls, ceiling, and sky views should all measure within a fairly narrow range of luminance, with the ratio of brightest to darkest area no greater than 4 to 1.

Clearly, solar control would be key to the Kellogg project. Appropriate indirect lighting would make the ceiling a softly glowing plane. Then, the window brightness would be stepped down to that of the ceiling. At Steffy’s recommendation, ceiling heights were set at 10 feet, primarily to work better with indirect lighting. The design team then proceeded to review a full range of options for daylight control, including awnings, louvers, coated and modified glass, and mechanically operated fiberglass shades. Typical venetian blinds were excluded because the designers wanted consistently open views rather than haphazard individual use.

Steffy’s firm calculated that, based on local solar conditions, building orientation, and the amount of glazing desired, the windows should have a net transmittance of 3 percent to 4 percent. The final selection of a daylight-control system was made by the design team after visiting a glazing manufacturer to view a mockup of four possible window systems, complete with a computer terminal. The chosen system uses double panes of bronze-tinted glass (8 percent transmittance) with a frit coating on the innermost surface from 6 ft 6 in. to 9 ft above floor level, for a 5 percent transmittance where sky brightness is harshest. The horizontal stripes of white ceramic frit are permanently fused to the glass.

For the electric lighting system in the offices, a two-lamp T8 fluorescent pendant is combined with electronic ballasts for excellent energy efficiency. Other areas of the building use standard and compact fluorescent fixtures wherever possible: in strip lights, downlights, wall washers, step lights, sconces, and even in decorative custom pendants. Incandescent lamps are reserved for use where dimming is needed or for areas like the cafeteria, where a lively sparkle provides relief from the deliberate uniformity of the office. This is one building that delivers on its promise to be a comfortable place for people. Gareth Fenley

Gareth Fenley is a frequent contributor to RECORD LIGHTING.
Product Literature

424. Landscape lighting
A 24-page, four-color catalog explains how the addition of low-voltage lighting can improve the evening beauty, safety, and security of grounds and structures. It describes the variety of lighting effects, recommends fixtures to achieve these effects, and details the Intermatic line of accessories. Intermatic, Spring Grove, Ill.

425. Switches and receptacles
A color brochure on contemporary-design Piano and Grand Piano light switches, receptacles, and accessories illustrates the devices in room settings. Made of FR plastic in 10 colors, the piano-key-like plates conceal fastener screws. Elements fit any standard outlet box from 2- by 2-in. to 4- by 6-in. U.S. Switch, Inc., Miami.

426. Designer lighting
The CAD-Room Vienna model lamp allows for strict light control to illuminate reference documents and computerized drafting while maintaining high contrast levels on the VDT. It has a parabolic louver with a matte-black finish. A catalog sheet gives specifications and describes accessories. Waldmann Lighting Co., Wheeling, Ill.

427. Ceramic table lamps
The 11 styles of The Architectural Collection draw their inspiration from building designs, shapes, and finishes, recalling ancient temples and modern skyscrapers. The 33 finishes include white stippled plaster, unglazed terra cotta, and metallic glazes; lamp shades are hexagonal, square, rectangular, and round. Design Technics, New York City.

428. Outdoor lighting
The two-part BEGA Catalog Number 5, totaling 154 pages, is devoted entirely to outdoor lighting for public, residential, and commercial architecture. Part 1 deals with building-mounted luminaires and Part 2 with site-located luminaires. The selection is exhaustive and the standard color is black. BEGA/FS, Carpinteria, Calif.

429. Recessed fixtures
The LiteBox downlighting line, originally for incandescent only, now offers housing and optics for compact-fluorescent, low-voltage, and HID sources as well. A 24-page catalog includes 10 pages of specifications, and illustrates downlight fixtures for each source. Installation advice is included. USI Lighting, Inc., San Leandro, Calif.

For more information, circle item numbers on Reader Service Card.
Manufacturer Sources

For your convenience in locating lighting fixtures shown in feature articles, RECORD has asked the architects and lighting designers to identify the products specified.

Pages 17-19
Lighting Design News


Pages 32-37
Bombay Connection, Laredo, Texas
Tarik Currumbhoy Design & Architecture
Tarik Currumbhoy, Lighting Designer

Pages 38-41
Oregon Coast Aquarium, Newport, Oregon SRG Partnership, Architects
Robert Dupuy and Mark Ramsby, Lighting Designers

Pages 42-45
W. K. Kellogg Foundation Headquarters
Luckenbach/Ziegelman + Partners Inc., Architect
Gary Steffy Lighting Design Inc., Lighting Designer


Pages 46-47
Sportsgirl Centre, Melbourne
Anthony Belluschi Architects, Hayden McKay Lighting Design
Fixtures: custom designs, fabricated in Australia. Sources: Osram, GE, and Philips.

Correction
In the body of the text for the article on Three Nationwide Plaza Atrium [RECORD LIGHTING, August 1992, page 36, "Tropical Light"], the credit for the lighting design should have also included the principal-in-charge, Len Auerbach.
Higher perceived illumination with lower perceived brightness. Ideal for office, classrooms, conference spaces, or any areas utilizing VDT's and where visual comfort is paramount. Uniform ceiling luminance from wide spread indirect distribution. Luminaire and ceiling luminances and ratios meet IES RP-24. Perceived brightness, low glare from parabolic louver for controlled direct lighting. Fixture efficiency is greater than 82%. Variety of lamping options. One two or three T8 or T10 lamps, one or two T12 lamps.

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Thinking Tracklight? Think Inlite!

Pictured here are just two models from Inlite's European Styled EPIQUE COLLECTION... Designed for our 3000 Series DUO-TRACK.

THE ECLIPSE
Model 5112G
150W OCL
T3-Halogen

THE GEMINI
Model 5026BP
50/75W PAR30 or
50W PAR20 Halogen

Please call or write for further information and free literature.
Product & Literature Spotlight

Here are some lighting products, catalogs, brochures, and technical literature available in the architectural lighting market today. To receive your copy of any of them, circle the corresponding number on the Reader Service Cards bound to this issue.

**Wall Fixtures With Low-Voltage Accents**

**Liteline's Litetube** boldly compliments this new line of fixtures. Interiors take on a new brilliance, creating a sensational architectural statement with accent & task lighting. **Liteline's Litetube** creates this dramatic illumination effect with a life expectancy of over 50,000 hrs., transformers are not needed; & Litetubes are easily replaced. Catalog available. 1-800-24-LIGHT.

**Liteline Ltd.**
Circle 127 on the inquiry card.

**COOL AND BEAUTIFUL**

Ushio America
Circle 128 on the inquiry card

**New Decorative Patient Bed Lights from Alkco**

A new 8-page, 4-color catalog introducing Alkco's new light fixture which both decorates & illuminates a patient room. With Impressions Plus™ your patient room can convey a feeling of hospitality. Select from 4 distinctive profiles & 3 unique inserts in any combination of solid & textured finishes. Offered in lengths of 1', 2', 3', & 4'; with Blax & Octron lamps. Impressions Plus is more than just a bed light.

**Alkco**
Circle 129 on the inquiry card.

**New Art Deco Fitter Gives Feeling of 1920**

Sternberg Vintage Lighting announces the introduction of the new Art Deco I, cast-aluminum fitter for use on Sternberg ornamental poles or to slip-fit existing poles with 3" tenons. Shown here with an 18" white acrylic globe. This is just one of many new products shown in the 1993, 64-page, 4-color catalog.

**Sternberg Lanterns, Inc.**
Circle 130 on the inquiry card.

**Not Just Another Pretty Faceplate**

The distinctive look of the Touchplate decorative switch cover puts the finishing touch to any business or home decor. New catalogs and literature are available for the complete Touchplate product line, including our lighting control systems and occupancy sensors. For more information on how you can specify Touchplate to achieve your look, call (219) 426-1565 or FAX (219) 426-1442.

**Touchplate Lighting Controls**
Circle 131 on the inquiry card.

**Series Fifty/Fifty from Neo-Ray**

Embodies the latest computer aided luminaire design technology. Benefits are: a visually comfortable environment, the use of fewer luminaires, reduction of energy costs. Features include: 92% efficiency, 1.9 to 1 spacing to mounting ratio, 28° cross baffle shielding. Low glare direct component & wide spread indirect component. Continuous parabolic baffles for 60/40 light distribution. Low iridescence baffles, 2 or 318 lamps & integral ballasts. Exact incremental hanger locations, top or bottom relamping. 718/456-7400 or fax 718/456-5492.

**Neo-Ray Lighting**
Circle 132 on the inquiry card.
**Product & Literature Spotlight**

**HID Dimming at its best!**

Broasted dimming range in the industry for all Metal Halide and HPS lamps up to 1500 watt. Patented remote ballasts can interface with any brand incandescent controllers. Arenas (indoor and outdoor), multipurpose rooms, auditoriums, churches, atriums, anywhere the best available HID light control is desired. Hundreds of jobs; a decade of experience.

Payne-Sparkman Mfg., Inc.
Circle 133 on the inquiry card.

**REGGIANI USA INTRODUCES WETSCAPE**

The first interior/exterior low voltage lighting fixture, Wetscape fixtures are suitable wherever landscape accent lighting effects are required. Wetscape is weather tight & UL listed. The fixtures are constructed of die cast aluminum & are fully adjustable with a "cool grip" device for maximum aiming possibilities. They are available in 4 finishes and accommodate MR-16 50 watt lamps.

Reggiani USA
Circle 134 on the inquiry card.

**The Right Chemistry**

Ushio's new compact Metal Halide lamps provide energy efficiency, long life and excellent color balance. It's in the chemistry. An enhanced sodium scandium mix, less sensitive to voltage or temperature change than multichemistry dysprosium lamps gives you color stability; crisper whites, richer colors.

Ushio America
Circle 135 on the inquiry card.

**Limited Numbered Edition**

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ARCHITECTURAL RECORD, Circulation Department, 1221 Avenue of the Americas, New York, NY 10020.

**Graphical Outdoor and Sports Lighting Analysis**

The Advanced Graphics Interface is a completely graphical, mouse-driven, 3-dimensional outdoor and sports lighting design system. Users have the ability to locate luminaries, aiming points and multiple planes of analysis on top of CAD or internally created drawing backgrounds using intuitive graphical commands. AGI operates with IES standard photometric reports.

Lighting Analysts, Inc.
Circle 137 on the inquiry card.

**Back Issues of Record Lighting**

Add to your files by ordering back issues of RECORD LIGHTING, the exciting color supplement to Architectural Record. The price per issue is only $3.50 each (includes postage and handling). Send check or money order to Architectural Record, 1221 Ave. of the Americas, New York, NY 10020. Attn: Back issues.

Record Lighting
Circle 138 on the inquiry card.

**"Pinckneyville Lighting Standards"**

"Pinckneyville Lighting Standards" by TrimbleHouse offers expertly crafted extruded aluminum and steel fluted poles with cast bases, reminiscent of Colonial, Federal and Victorian styled lighting standards from America's historic past. These lighting standards, along with TrimbleHouse luminaries, offer unparalleled quality, durability, engineering and ease of maintenance for traditional streetscaping projects.

TrimbleHouse
Circle 139 on the inquiry card.

**Keep Dodge In Your Plans!**

Don't forget to provide your local Dodge Reporter with the details and plans for your next job. You don't want them to miss out on the best bid for your next job. Contractors can't bid on jobs they don't know about. Thank you for your input. We appreciate your cooperation. F.W. Dodge, McGraw-Hill Construction Information Group.

F.W. Dodge
Circle 140 on the inquiry card.
A New Twist
In Energy Savings

Duro-Test is introducing the Ultra-9 fluorescent tube, the first and only one specifically designed to operate in both T-8 and T-12 systems. Perfect retrofit for any T-8 fluorescent system. Features exclusive patented Energy-Twist design for increased light output. Costs less to operate than any T-8 on the market. Life-rated at 22,000-26,000 user hours.

Duro-Test Lighting
Circle 141 on the inquiry card.

The Original Cast®
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New 20th anniversary catalog features energy-efficient compact fluorescent lamps & HID sources in exciting new indirect fixtures. Our “classic technology” assures excellence in design, craftsmanship, quality, material selections & energy conservation. Function & design are blended together for perfect appearance & performance. 6120 Delmar Blvd., St. Louis, MO 63112-1204. Please call (314) 863-1895.

The Original Cast Lighting, div. of Art Directions, Inc.
Circle 142 on the inquiry card.

MARINER III Series

Eclipse Lighting Inc. introduces the MARINER III Series. A decorative, durable & energy efficient solution for compliance with new ADA standards. UL listed, & available in three attractive models, plus the option for tamper resistant or custom modifying to meet every demand.

Eclipse Lighting Inc.
Circle 143 on the inquiry card.

The Archetto Series
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U.S. Architectural Lighting
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56 Architectural Record Lighting November 1992
When it came to lighting a project like this—selecting AREA, ROADWAY, FLOOD AND GARAGE LIGHTING, the engineering firm of Store, Matakovich and Wolfberg specified Quality Lighting fixtures. Their engineers working on the newly expanded and redesigned Towson Town Center, were impressed with Quality Lighting's superior performance. As a result of better light distribution there also was a substantial savings in the number of fixtures and poles. Another factor was the unobtrusive blend of fixture design to the surrounding architecture.

So when it comes to fixture performance, design and engineering, there is no substitute for Quality Lighting.

For a free copy of our catalog, call, write or fax us today. After all, doesn’t your project deserve Quality Lighting?
It's tough all over.

Inside and out, our VRB Series Vandal Resistant Bollards are designed to perform and built to endure the most demanding environmental conditions.

One-piece louver casting provides maximum strength. Shafts are available in aluminum or concrete. Matching unlighted concrete bollards are also available.

Two luminaire configurations are offered: The VRB1 with 360° of total cutoff downlight, and the VRB2 with a combination of cutoff downlight for pathways and uplight for accenting walls and landscaping. H.I.D. lamp modes are available up to 100 Watts.

KIM LIGHTING
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