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Circle No. 940
Frank O. Gehry & Associates

Editor in charge: Pilar Viladas

Introduction: What You Know, You Question
Frank Gehry's innovative work challenges traditional lines between art and architecture. A retrospective of his early works, from furniture design to large company headquarters, indicates his versatility. An essay by Esther McCoy discusses his early life and the philosophy of the firm. Pilar Viladas, Daralice D. Boles

Illuminated Manuscripts

Archetype and Stereotype
Two crocodiles 'swimming' overhead are included in Frank Gehry's unique design for Rebecca's, a restaurant in Venice, Calif. Joseph Giovannini

The Malls of Academe
The Information & Computer Sciences/Engineering Research Facility at the University of California, Irvine, is a complex composition of simple, utilitarian materials, of the type often used by Frank Gehry, that clearly defines its place on the campus. Leon Whiteson

The Next Wave
A discussion of Frank Gehry's views of his own work, in an article by Adele Freedman, is followed by some of his works in progress. Daralice D. Boles

TECHNICS

102 Sports Coverage
Larger sports enclosures, made possible by lighter roofing materials, provide not only protection from the weather, but an enhanced city image. Thomas Fisher

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Frank Gehry in his office. Photo: Eric Myer.
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Circle No. 324
Is your firm getting the kind of commissions it wants? the kind of recognition? Maybe it's time to consider "positioning," a well established concept in the world of advertising.

JUST about every architecture firm has a kind of job to dream of getting: Those in small firms may yearn for something bigger than a house; the firm with a reputation for office buildings or apartments may seek something institutional; the health facilities firm may want the security that comes with diversifying into other areas of work.

All those firms trying to carve a niche for themselves—and make sure it is not too confining—would do well to consider the concept of "positioning." According to Al Ries and Jack Trout, authors of the book *Positioning: The Battle for your Mind* (McGraw-Hill, 1981; paperback from Warner Books), this concept was first used in print by them in 1969 to identify the "mental positions" occupied by competitors.

Their subject was advertising, and they were stressing positions of companies or products, as perceived from outside. By the early 1970s, the concept was widely applied in publishing, and I recall discussions of the ways to "position" a magazine in the minds of readers and advertisers.

One effective device for analyzing your present position can be found in the matrix generated by The Coxe Group and David Maister (P/A, May 1986, p. 61). Their matrix shows all firms divided into three types by the ways they are organized, but this three-way split corresponds as well to the ways such firms are perceived by clients. The client who wants a personal or innovative approach will go to a firm positioned in his mind as the "Strong Idea" type; the one who wants a complex problem solved reliably will go to the "Strong Service" type; the one who wants a routine product will go for the "Strong Delivery" type. If they do otherwise, serious mismatches occur.

It should not be hard to identify your firm's place in the Coxe-Maister matrix. The crucial next step—by "positioning" strategy—is to locate likely rival firms on it as well, then see what you can do to give your firm some kind of perceived edge. This can involve reinforcing a recognized position, discovering an unfilled need to address, broadening your position (which Ries and Trout call "line extension"), or radically repositioning your firm.

Too often, firms try to alter their positions simply to gather more prestige. A firm with a sound reputation as a "service" or "product" firm will try to acquire additional merit as an "idea" firm, as well. So they will add to their staffs some recognized designers. Such moves seldom work out, because the acquired star is rarely accepted by the cadre of professionals that make service and delivery type firms effective, and because this attempted "line extension" suits neither the clients who want high creativity nor those concerned primarily with service and delivery.

To apply the positioning concept fully, you have to consider how your firm can reposition its competitors, simply by what you do and how you present that to the world. (A Ries and Trout example: The German beer that is the largest seller in the U.S. finds this distinction sharply devalued when a rival asserts that it is the largest-selling beer in Germany.)

Such marketing/advertising strategies may sound crassly commercial, but architects continually do such things, whether consciously or not—and have such things done to them. The firms that generated a public taste for Post-Modernism have surely been repositioned by the innumerable other firms now perceived to be offering the same style.

We should not leave the subject of positioning without considering the firm that is the subject of this special issue. The Gehry firm represents, in fact, a fine example of a clearly positioned one. Gehry's design approach has long been viewed by critics and other influential architects as experimental yet fundamentally practical, satisfying to both clients and users—after those first moments of shock. The only firms doing comparable design are younger ones in his region, who are readily perceived—despite national recognition for some—as his followers. Yet Gehry's position does not win him large-scale commissions in his city or, so far, any of the internationally sought-after jobs that go to his colleagues on prestigious boards and lecture platforms. It appears to me now (and I may be wrong) that to get such big bounty Gehry would have to change his methods and outlook, in ways that would compromise what he produces. Like many others, Gehry has a position that needs only maintenance and reinforcement. It's important to recognize good positioning when you've got it.
Foreign Intrigue: The Richard Sapper Collection


Circle No. 334 on Reader Service Card
Barcelona Reflections

Congratulations on bringing out one of the most stunning issues of P/A in recent years [Aug. 1986]. Not only did "the most beautiful building built any-where this year" grace its cover (Stan Abercrombie concurred as expressed in the photographs) but the editorial spelled out a big problem in contemporary architectural design—the lack of tenacity and dedication to one "set" of principles that is a prerequisite in creating anything lasting and lasting and lasting.

The dazzling colors and textures of the Barcelona Pavilion as expressed in the photographs was a feast for my eyes, but not without some apprehension. Let us hope and pray that this does not bring about a plethora of buildings in the inadequately understood "Miesian style." Architects and academicians would do better to step out of their fixation for "figurative architecture" to rationalize the "Schinkel connection." One particular influence did not wholly contribute in producing the "set of principles" which made Mies's architecture great. One may note that there was an overlap in the time the Farnsworth house and the Crown Hall were being designed. It may be worthwhile to investigate the impact Laszlo Moholy-Nagy and Walter Peterhans had on Mies. His closest pupils, unfortunately, have chosen to build and not talk about him at all.

"It is a great service, however, in publishing projects of Robert Stern in the same issue— a sumptuous illustration of "talking and building too much" at the same time. Personally, I deem it more appropriate to replace the "tir-fried classicism" with "stir-fried architecture" to categorize his buildings.

Wazi Chowdhury
Berkeley, Calif.

I have often wanted to learn more about the pavilion which Peter Behrens once described as being possibly the most beautiful building of the century, yet your report of the Barcelona recon-

struction came as a great disappointment.

The plan is too small, the scale can hardly be read; the juxtaposition of materials, contrast of colors and textures are nowhere indicated. There is neither section nor detail. The colored photogra-

pical height is 3 meters—about 10 feet—throughout. The mar-

building appears bluer than expected, but most of it shown is in shadow, which color film picks up accurately as bluish; the exterior view on page 61 shows a truer color. The statue's correct name is "Evening." The red curtain, missed by at least one reader, had not yet been hung when our photos were taken. The author's book on Boffil will be out in December.—Editors

I read with interest the article on the Barcelona Pavilion but feel that a few areas of the article are misleading. While in Barcelona this spring, I had the good fortune of meeting Professor Juan Bassegoda Nonell, the famous architect and head of the Catedra Gaudi in Barcelona. During our talks, he mentioned that originally Mies was excited about the prospect that his pavilion was going to be reconstructed, and would assist in any way that he could. At that time, Mies was under the impression that the pavilion still existed in parts which had been stored in Spain, and that the pavilion would be reconstructed in a more advantageous site. When it became known to Mies that the original structure had been destroyed and that a new pavilion was going to be constructed at the original site, Mies forbade the reconstruction. Professor Juan Bassegoda Nonell has a copy of the letter from Mies.

In reconstructing the pavilion, the architects have made two small changes which probably would go unnoticed, except by a few astute preservation archi-

1) The architects used Philip's head screws which weren't used at the time, and 2) the north wall of the service annex was originally stucco in 1929 and has been reconstructed with travertine. Rumor has it that the workers working on the site have put down more than 4000 square feet of travertine panels to complete the building before the deadline, so stucco was substituted.

Philosophically the important question is this: does someone have the right to reconstruct a building against the architect's wishes? My only hope is that someday someone will want to reconstruct one of my buildings. I'm sure I'd let them, regardless of the site! Bill Lutosa
Chicago, Ill.

The question of reconstructing without the architect's permission—or altering or destroying without such permission—is strictly philosophical. Another factor here: the setting of the pavilion is being altered (P/A, Aug. issue, p. 28) to make it more sympathetic than the one Mies objected to.—Editors

Cooper, Eckstut Cityscape

Notwithstanding a number of attractive elements and detailing in their work, it is hard to escape feeling that Cooper, Eckstut's kind of city planning (P/A, July 1986, pp. 98-105) is hardly planning at all but is really a kind of urban decoration. Looking at the plans for Battery Park City, the detail of the streets and avenues all focus on pretty waterfront vistas but there is no sense that the pattern corresponds to the normal flow and energy of human events.

And this is the basic thing. If you consider planning as the art of providing a framework for human activity, even in New York City's much criticized grid with its narrow long blocks feed-

ing into the wide North/South avenues, you have a real division between the private spaces of the brownstone side streets and the public spaces of the avenues. If New York failed, it was in adequate control of its public spaces—everyone loves the side streets. In Battery Park City, there is no sense of this kind of structure. The avenues are massive without the population to feed them. It reminds me of modern day Vienna, a city scaled for an empire and now filled with the Austrian population equivalent of Detroit. BPC contains all the big bold formal gestures that architects yearn to make in the city itself, realized out of proportion in this up-scale yuppie ghetto.

We live in a facade period like the 1920s with a facade President, facade economics built on deficits, facade politics focused more on the unborn than the born, and facade architecture of which this, facade planning, is the accurate expression. It does not escape the old saw: Architects cover their buildings with mistakes, planners cover their mistakes with buildings.

Daniel Beecker, Partner
Wadsworth Terrace Equities Group
New York, N.Y.

[The Battery Park City plan shows small-scaled streets as well as broad avenues. These distinctions, as a continuation of the Manhattan street grid, will become more evident as development proceeds. "Facadeism," as the reader calls it, is not a wholly negative attribute: Here, it generates a unified streetscape preferable to the isolated, competitive towers of earlier urban development.—Editors]

Library Credit Extensions

Woodworking and cabinetry in the Catalog Room and Salomon Room of the New York Public Library were by Jaff Bros. Rudolf de Harak & Associates was responsible for all architectural signage for the renovation. The Ehrenkrantz Group was responsible, under separate contract, for exterior stone restoration.
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Picture windows have always been nice to look through. But they didn't do much, such as open to provide ventilation.
Andersen decorator blinds, on the other hand, are much more practical. They fit nicely between the moveable sash and insect screen. So when the sash is opened, the blinds stay in place. Beautifully.

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Awning and roof windows in high-up and hard-to-reach places are difficult to open and close. Which is why Andersen came up with an electric window opener.

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Electric openers are easily added to existing Andersen Perma-Shield awning and roof windows or installed in new construction. They're a convenience a lot of people shouldn't be without.

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P/A Reader Poll

Compensation

By a margin of nine to one, P/A readers agree that the architectural profession as a whole is inadequately rewarded. But the picture shifts a bit when they consider their personal compensation; one third of the readers responding felt satisfied with that. Least satisfied were the younger professionals and the women—who tend to be relatively new to the profession.

P/A's first Reader Poll drew more than 2200 responses, providing an ample pool from which to draw 1000 randomly chosen forms for analysis by Morrison & Morrison, marketing and research consultants. A "demographic" profile of these 1000 readers shows characteristics similar to the P/A subscriber list as a whole, except that—since the primary subject of the poll was obviously the architecture profession—a higher percentage of architects and architects-in-the-making responded than, say, interior designers or architects on corporate staffs. About 76 percent of responses came from readers in architectural firms (Figure 1).

Compensation for Firms

While over 95 percent of readers polled felt the profession is inadequately compensated (Figure 2), the variations in answers reveal that the problem is felt more acutely by architectural professionals than those who work closely with them. Among the graduate and registered architects, and among all respondents who work for architectural firms, about 97 percent agreed on the inadequacy. Among those employed in engineering firms, only 90 percent agreed; among those employed in business and government, only 85 percent; among those who are neither registered nor architecture graduates (typically designers), only 83 percent—high majorities all, but clearly architects in firms have a darker view of their revenue situation than close outside observers.

When readers were asked for the causes of this shortfall (Figure 3), the factor considered most important was "misconception of the profession's value"—the issue behind last year's AIA theme of "Value Architecture." Every category of respondent put this cause first—the nonarchitects as well as the registered and graduate architects. The second most important factor—again among all categories of readers—was "competitive bidding among firms." This factor appears to gain in importance with the size of the respondent's firm: While it was seen as major by barely half of the respondents from small firms (1–4 people), its importance increased fairly evenly with firm size and was identified as a major factor by 67 percent of those in firms of 100 or more people. Apparently, those in large firms feel the impact of competition on fees more directly.

The other factors listed on the poll were seen as distinctly less crucial. "Overcrowded profession" was cited as a serious factor (though less serious than those above) mainly by those with the least experience and incomes (designers/draftsmen and those with five years or more) and the graduate and registered architects. The other factors listed on the poll were seen as distinctively less important—more than competition among firms, as such.

Competition from other professions was also not seen generally as a major fee depressing factor. It was apparently taken more seriously by those in firms of fewer than 20 people; less so in larger ones. "Declining demand for the profession's services" was the least important factor in everyone's view; respondents from larger firms gave it less importance than those from smaller ones; designers/draftsmen were more concerned about this than other respondents—again suggesting...
P/A Reader Poll Report

The income structure for architecture and A/E firms almost exactly matches that for the poll as a whole. Among the 25 percent of the sample who worked elsewhere, typical incomes varied a great deal. In design firms made on average almost $5000 less per year, with larger concentrations of respondents in the under $30,000 categories, fewer in the middle ranges, and the smallest fraction (8 percent) making over $75,000. Those in commercial/institutional/governmental positions, on the other hand, made on average the $3000 more per annum, but their salaries were heavily concentrated in the middle ranges—$30,000 to $50,000—with much smaller percentages in the top and bottom categories of income; other poll statistics confirm that this is a field for experienced staff professionals, not just sole occupies but with limited opportunities for advancement. The respondents in engineering or E/A firms made on average $5000 more per year, probably because those responding from this type of firm showed, in general, several more years of experience than the sample as a whole (but since only 4 percent of the sample was from such firms, the data may not be conclusive).

Size of firm has no direct correlation with how much those people make. There is a higher concentration of respondents making under $20,000 in the smallest firms (1-4 people) and that proportion drops consistently with increasing firm size, but it appears that this is due to a shift only up to the next range, $20-30,000, with the total of employees making under $30,000 staying quite close to the overall average (43 percent) regardless of firm size. The numbers of respondents reporting incomes in the categories above $50,000 also remains remarkably constant regardless of firm size (about 19 percent of the total).

An increase in income over the past year was reported by 62 percent of respondents to firms of all sizes (Figure 6). The larger the firm, the more likely that its members have had increases; the percentage reporting increases rose steadily from 47 percent in firms of 1-4 to 81 percent in firms of over 100. A higher incidence of increases was also reported from firms in major metropolitan areas (65 percent) compared to those in other places (60 percent). Decreases, on the other hand, were left by very small percentages of those in middle-sized or large firms, by 10 percent of those in firms of 5-9 people, and by 26 percent of those in the smallest category of firms; this seems clearly related to the fact that the only "role" category that reported a comparable rate of decreases (22 percent) was the owners/principals group who, of course, comprise a high proportion of the smallest firms. The group experiencing the second highest percentage of decreases (9 percent) was the designer/draftsmen. Apparently, when pay has to be cut, the owners cut their own first, then that of their most junior employees, protecting their experienced staff members from decreases. As any as 6 percent of all respondents reported decreases of more than 10 percent.

Among those working outside of architectural or A/E firms, income changes for design firms followed a pattern similar to that of architects. Readers in (continued on page 21)

The cause most often cited—misconception of the profession’s values—is an external problem, but one that could be substantially reduced if the profession were to mount a concerted public education campaign. The second crucial factor—competition among firms—demands an education effort within the profession, to convince practitioners that competitive fee-cutting hurts all professionals; fee guidelines should be established to the extent that “restriction of trade” laws allow.

The question on how fees were charged clearly showed fixed fees as the most common method for all firms, followed by straight percentage and “cost plus” (Figure 4). Significantly, 40 percent of designer/draftsmen “were not in a position to know” about fee arrangements. Fixed fees were most common among the smaller firms (used by 73 percent of firms under 20 people, but only about 64 percent of firms of over 20). Equity in the project was a form of compensation for only 5.5 percent of respondents.

Personal Compensation
Personal income varied, as expected, by years of experience and role in the profession and whether the respondent works in a metropolitan location (Figure 5). There are also differences corresponding to sex, registration, and education (as Figure 5 shows) but these variations are largely attributable to the factors of experience and role in firms. (Differences between women and men are discussed in later paragraphs.)

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You design the American dream, we light it. For example, the Parisian Plaza in Huntsville, Alabama designed by Schafer Associates. Whether it’s a mall, museum, restaurant or corporate headquarters, all express the dreams of the American entrepreneur. Architects and designers play a critical role in their realization and in the pride of fulfillment. We at Progress Lighting take a great deal of pride in the supportive role we play, and we build that pride into all our products. We offer the largest, most diversified selection of commercial and residential fixtures... including track and recessed lighting, fluorescents, outdoor, 'non-destructibles', HID...and more. All are quality Progress Lighting, helping to make the dream you design, a reality.
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the commercial/institutional/government category, as well as those in engineering firms, reported no decreases at all, but modest increases where they occurred, indicating a more stable overall income picture. When asked about their sources of income, readers indicated that they depend on salary for about 90 percent of their income; only 1 percent earn more than half of their income from other sources (Figure 7). Moonlighting turned up as a significant source of additional income for all categories of respondents—even those in non-architectural firms; those with less than three years experience, not surprisingly, gained the smallest part of their income from this source. Bonuses, profit-sharing, and other business activities all made comparable contributions to that top 10 percent of income, with no discernible pattern in relation to other variables in the poll.

When asked what determines their personal financial success (Figure 8), respondents listed "effective management of the firm" as the primary one. The owners/principals group subordinated this factor (though still assigning it high importance) to the personal factors, "personal performance" and "my relationship with clients." Women gave it a rating corresponding to the overall junior status. The perceived power of office politics varies more sharply with experience: It is seen as very important by 30 percent of those with under three years experience, by only 14 percent of those with over 20. In terms of roles in the firm, there is a distinct break on this point between owners/principals, only 10 percent of whom consider office politics very important, and all others, whose perceptions vary from 25 for project managers to 36 for designer/draftsmen. Here, too, the percentage of women considering this factor very important (30) seems to fit their experience and roles.

On the subject of factors affecting individual income, Morison & Morrison observe that here, as on the subject of firm income, P/A readers concentrate on factors over which they have some control. It is reassuring to learn that, with more experience, architectural professionals place decreasing importance on sheer luck and put their reliance on real performance factors rather than office politics. On the other hand, owners/principals may be underestimating the power of office politics, considering the greater importance their employees see in it.

In judging their satisfaction with their own income, one third of the respondents as a whole were satisfied (Figure 9). The strongest variations occurred where satisfaction was compared with income. Among those earning less than $20,000, only 13 percent expressed satisfaction, and the degree of satisfaction rose steadily with income, reaching 34 percent for the 10,000-$20,000 group and topping out at 69 percent for those making over $75,000—the only group over half of which expressed satisfaction. It may sound like a truism for those with the highest incomes to express the most satisfaction, but it is not inevitable: At the highest levels of the profession, income apparently does catch up with expectations—or perhaps expectations have been scaled down by years of reality.

Women's Compensation

The issue of women's compensation seems to reveal a discrepancy between perception and reality. A majority of readers of both sexes agrees that women are "generally paid less than their male counterparts" (Figure 11). While the income statistics for women in our poll differ markedly from those for men, most of this difference can be accounted for by the sharply differing positions held by women and men (Figure 10). Women among the respondents were clustered at the low end of the experience profile, about one third reporting one to three years experience, while only 10 percent of the men fell into this category; at the most experienced end of the scale, only 4 percent of the female respondents had been in the profession more than 20 years. And women, in general, are more dependent than men on salary for most of their income.

Much of the difference in income reported between men and women in our poll resulted from differences in experience—but not all of it. If we compare the incomes of men and women responding to our poll by categories of experience (Figure 12), certain correspondences emerge: For both men and women with under three years experience, the largest number of respondents is making under $20,000; similarly, if we take those in the profession four to ten years, the largest block makes $20,000-$30,000 per year. There is a large number of women with over ten years experience, but nevertheless not quite the same. If we return to those respondents with less than three years experience, we see that the proportion of women earning less than $20,000 is higher than among the men: Of the women in this experience category, 27—or 60 percent—earn less than $20,000; for the men, the figures are 40 out of 84—or 48 percent. At face value, such data indicate differences—for instance, the median income for men in this category is slightly over $20,000 (since they split 48 to 52 percent around this figure), while for these women the median is slightly under $20,000. At the other end of the experience scale, 80 percent of the women with over 20 years experience report earning less than $50,000 per year, while the corresponding figure for men is 57 percent.

Morison & Morrison caution, however, against drawing conclusions about male/female income differences from these
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PROGRESSIVE ARCHITECTURE announces the seventh annual competition recognizing outstanding furniture and lighting design proposals, not yet being marketed by any manufacturer as of entry deadline, January 9, 1987. The competition is intended to give the design professions a forum to express ideas about the next generation of furniture design, at a time when architects and designers are increasingly custom-designing furniture for their projects and manufacturers are increasingly open to fresh ideas. The competition is specifically aimed at furniture intended for use, but the design need not be constrained by existing production or marketing practices. Entries may be based on either fabricated pieces or project drawings. Designers are encouraged to consider the aesthetic and ideological implications for furniture design implied by the current concerns within architecture and other design disciplines.

WINNING PROJECTS will be published in the May 1987 P/A and they will be displayed at major industry events during the year. Winners will be honored in New York City at an awards ceremony in early May attended by press, designers, and industry manufacturers.

In addition to the exposure afforded the submissions, the competition will encourage further discourse between the entrants and respected furniture producers. Any ongoing discussions will, of course, be up to the individual designers and manufacturers, but benefit to both is anticipated.

SUBMISSIONS are invited in all categories including chairs, seating systems, sofas, tables, desks, work stations, storage systems, lighting, beds, and miscellaneous furniture pieces.

THE JURY FOR THIS COMPETITION
Bruce Burdick, principal, the Burdick Group, San Francisco, Calif., industrial and furniture designer.
Paul Haigh, principal, Haigh Space Ltd., New York, architect and furniture designer.
Michael Kalil, New York, interior and furniture designer.
Jeffrey Osborne, Vice President of Design, Knoll International, New York.

JUDGING will take place in New York City during the month of February. Designations of first award, award, and citation may be made by the invited jury, based on overall excellence and advances in the art.

Deadline for submission
January 9, 1987
Entry form
International Furniture Competition

Please fill out all parts and submit, intact, with each entry (see paragraph 11 of instructions). Use typewriter, please. Copies of this form may be used.

ENTRANT:
ADDRESS:

ENTRANT PHONE NUMBER (day):
(evening):

CATEGORY:

FURNITURE COMPETITION
Progressive Architecture
P.O. Box 1361, 600 Summer Street,
Stamford, CT 06904

(Receipt)
Your submission has been received and assigned number:

ENTRANT:
ADDRESS:

SIGNATURE
NAME (typed)

ELIGIBILITY
1 Architects, interior designers, industrial designers, and design students from all countries may enter one or more submissions.
2 Design must be original. If found to be substantially identical to any existing product design, entry will receive no recognition.
3 Designer may be under contract to or in negotiation with a manufacturer for this design, but design must not be available in the marketplace as of entry deadline.

PUBLICATION AGREEMENT
4 If the submission should win, the entrant agrees to make available further information, original drawings or model photographs as necessary, for publication in the May 1987 P/A and exhibition at major industry events.
5 P/A retains the rights to first publication of winning designs and exhibition of all entries.
6 P/A assumes no responsibility for the entrant's rights. Concerned designers are advised to document their work (date and authorship) and seek counsel on pertinent copyright and patent protections.

SUBMISSION REQUIREMENTS
7 Submissions will not be returned under any circumstances. Do not use original drawings or transparencies unless they are sent with the understanding that they will not be returned. P/A will not accept submissions with outstanding custom duties or postal charges.
8 Drawing(s) and/or model photo(s) of the design should be mounted on one side only of one 20"x 30" foamcore board presented horizontally. Any entry not following this format will be disqualified.
9 There are no limits to the number of illustrations mounted on the board, but all must be visible at once (no overlays to fold back). No actual models will be accepted. Only one design per board.
10 Each submission must include a 5" x 7" index card mounted on the front side of the board with the following information typed on it: intended dimensions of the piece of furniture, color(s), materials, components, brief description of important features, design assumptions, and intentions. This information is to be presented in English.
11 Each submission must be accompanied by an entry form, to be found on this page. Reproductions of this form are acceptable. All sections must be filled out (by typewriter, please). Insert entire form into unsealed envelope taped to the back of the submission board. P/A will seal stub of entry form in envelope before judging.
12 For purposes of jury procedures only, projects are to be assigned by the entrant to a category on the entry form. Please identify each entry as one of the following: Chair, Seating System, Sofa, Table, Desk, Work Station, Storage System, Lighting, Bed. If necessary, the category "Miscellaneous" may be designated.
13 Entry fee of $35 must accompany each submission, inserted into unsealed envelope containing entry form (see 11 above). Make check or money order (no cash) payable to Progressive Architecture.
14 To maintain anonymity, no identification of the entrant may appear on any part of the submission, except on entry form. Designer should attach list of collaborators to be credited if necessary.
15 Packages can contain more than one entry; total number of boards must be indicated on front of package.
16 Deadline for sending entries is January 9, 1987. First class mail or other prompt methods of delivery are acceptable. Entries must show postmark or other evidence of being en route by midnight, January 9. Hand-delivered entries must be received at street address shown here by 5 p.m., January 9.

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Office buildings at PortAmerica with controversial tower at rear.

**Port in A Storm on the Potomac**

When you land to the north on the main runway at National Airport in Washington, D.C., you sail alongside a large wooded area on the eastern banks of the Potomac River. On clear days from a right-hand window seat you see, just south of the Woodrow Wilson bridge, across the water from Alexandria, a swampy lagoon and one of the largest open green areas remaining in the national capital area. This is the future site of PortAmerica, a 480-acre, $1 billion project that will include luxury condominiums, shops, hotels, marinas, a Potomac River ferry terminal and, maybe, the tallest building between Atlanta and Philadelphia.

Designed by John Burgee Architects with Philip Johnson and (continued on page 38)

**Commentary:**

**Richard Rogers at Lloyd's of London**

The once universal dominance of British capitalism has shrunk in the late 20th Century to just one sector—financial services. It is no accident that this sector has commissioned the two most significant British architectural projects of this decade: the headquarters of the HongkongBank from Foster Associates (P/A, March 1986) and the new Lloyd's insurance market building from Richard Rogers & Partners, which opened officially this month. What may be more difficult to explain is why these clients have chosen to represent themselves in forms derived from the industrial manufacturing culture that has so conspicuously failed to flourish lately in the U.K., (continued on page 35)

**Modernism in Frankfurt**

The Deutsches Architekturmuseum opened its doors in 1984 with a panoramic exhibition of Post-Modernism titled "Revisions of Modernism" (P/A, Sept. 1984, p. 26). With "Revisions" now on world tour, DAM has inevitably acquired a reputation as a "PM" promoter. In the (continued on page 34)

**GSD at 50: Having its Cake . . .**

The Graduate School of Design, at fifty, was called upon by its parent institution, Harvard University, to fashion, and finance, for a rumored $100,000, an extensive party in September for its graduates, donors, and friends. The assignment: to celebrate its own achievements while honoring the University, whose 350th anniversary festivities were taking place the same weekend.

Charles, Prince of Wales, keynote speaker at the University's main convocation and focus of all attention, accepted the GSD's invitation to attend its first symposium on "The Future of the City." He also agreed to allow an anonymous award of $25,000 for urban design projects that advance "traditions of humanism" to carry the name of the Prince of Wales Prize.

At a reception, attended by Prince Charles and the Aga Khan, alumni guests and professional friends, a masterpiece of "pastry-architecture" in the shape of Gund Hall was cut with a T-square by Dean Gerald McCue and University President Derek Bok.

The Fiftieth celebration was rich. The excellent exhibition of drawings from the "Founding Decades," co-curated by GSD graduate Anthony Alofsin and former *Oppositions* executive editor Julia Bloomfield, was a visually stunning revisionist interpretation of the School's history. Here was physical proof (continued on page 36)
**Pencil Points**

*Artists' housing is the subject of a national design competition sponsored by Vision, Inc., and The Artists Foundation, with funding from the National Enowment for the Arts. The program calls for 12 residential units and common work space on a small urban lot. Bernard Spring, president of the Boston Architectural Center, will chair the jury. The sponsors intend to build the winning scheme. To register, send a $45 check payable to Vision, Inc., with name, address, and phone number to Michael Robinson, Vision, Inc., 219 Concord Avenue, Cambridge, Mass. 02138. Revised registration deadline is October 31.*

*Leon Krier has been named director of the new SOM Institute for Research on Architecture in Urbanism (P/A, July 1986, p. 25).*

*Cesar Pelli is designing the master plan for Fan Pier in Boston. Prospective architects designing individual buildings for the project include Pelli, Hammond Beeby Babka, Frank Gehry, Koetter Kim, Rafael Moneo, and Venturi, Rauch & Scott Brown.*

*Alexander Cooper has replaced Helmut Jahn as principal planner for Donald Trump's Television City in Manhattan (P/A, Jan. 1986, p. 25). Jahn remains as architect of the "world's tallest tower" proposed for the site; other buildings, however, are to be given to other architects to design.*

*Hugh Stubbins of The Stubbins Associates, Cambridge, Mass., has been selected as architect for The Ronald Reagan Presidential Library on the campus of Stanford University.*

*Atlanta joins the reheated race to build the world's tallest skyscraper with a 2015-foot contender proposed as developer Tom E. Crowder and architect Walter F. Young, brother of Mayor Andrew Young. The tower tops Donald Trump's proposed TV City skyscraper in New York (P/A, Jan. 1986, p. 25) and a French scheme for Phoenix, temporarily stalled while developer Georges Schriqui answers Federal Aviation Administration objections caused by his proposed tower's proximity to Sky Harbor Airport.*

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**Frankfurt**

(continued from page 33) The catalog preface, however, museum founder and director Heinrich Klotz denied partisanship, criticizing the simplicity of the Modernist/Post-Modernist polarity, and promising an exhibition of equivalent scale and ambition on Modernism. This summer, he delivered that second show.

With the help of ex-Archigrammers Peter Cook and Ron Herron, DAM's galleries were transformed for "Visions of Modernism: The Constructive Principle." Through nearly 700 drawings and models, many rarely seen before, the exhibition traced Constructivist and High-Tech tendencies from the Crystal Palace to Centre Beaubourg and the HongkongBank, via visionaries Buckminster Fuller and Archigram. Although self-consciously designed to redress a balance, the exhibition has unleashed considerable controversy concerning the DAM's version of Modernism, both its history and prospects.

From its opening gallery of Constructivist drawings from the Schusseh Museum in Moscow to selections from DAM's own rich archive of Frei Otto, Konrad Wachsmann and Archigram (including the color originals of Peter Cook's 1964 "Walking City"), the exhibition is full of delightful discoveries and telling juxtapositions. Wider in scope and more revisionist in historical perspective than "Revisions," "Visions" sets out to isolate a continuous commitment to the frank display of technology as the key to a modern architectural idiom. This principal claim is announced in front of the museum itself, where the young Darmstadt firm Eisele & Fritz has erected a huge silhouette billboard "Hommage à El Lissitzky." Soviet Constructivism is for Klotz and his colleagues and Modernist threshold that has been underestimated, if not entirely neglected, by historians and exploited too little by contemporary architects.

The heroes of the exhibitions are those who seek "synthesis" by mining the Constructivist language for wholly new, if not antithetical, ends. According to Klotz, in the work of Helmut Jahn, J.P. Kleihues, Jean Nouvel, Miguel Angel Roca, Lebbeus Woods, or Rem Koolhaas, "construction is the material of fiction." Projects such as Frank Gehry's Aerospace Museum in Santa Monica or Reichlin and Renhardt's Factory at Coesfeld-Lette, Switzerland, exploit modern materials and means to achieve ends generally associated with Post-Modernism: multivalent readings and historical references, as well as a frank acceptance of the fragmentary and incomplete.

In reaction to the exhibition's controversial interpretation of history and its contemporary prescriptions the magazine *Casabella* plans a special issue in which prominent historians and critics will respond. In its deliberate blurring of the boundaries between Modernism and Post-Modernism, "Visions" is far more provocative than the more equivocating "Revisions"; yet the show's historical substructure offers dubious and confusing support for its claims. The supposed cleavage between Constructivist and "white, purist abstracting" trends in early Modernism is hardly tenable, the result, it would seem, of an anachronistic projection of the "shades of gray" arguments of the 1970s into the 1920s. Objections multiply as one tests the show's didactic distinctions and curious omissions in an overly rigid schemata. Where are the Italian Futurists, the French pioneers of concrete, or more contemporary experimenters with continuous surfaces and plastics?

What does emerge in this 60-year chronology is the growing gap between contemporary technology and technological imagery in design. While Constructivism proposed an architecture at the limits of feasibility in post-Revolutionary Russia, Western High Tech of the 1980s celebrates a technology long surpassed in this age of information science. Foster and Rogers, for instance, continue to create compositions of overseamed and often redundant symbolic technology in an era of microchips and their digital derivatives. Walker Fischer suggests in one of the catalog's most stimulating essays, the architecture of the computer age has yet to find a formal expression. *Barry Bergdoll*

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**Boston Update: Johnson/Burgee**

Even as two towers of International Place rose in Downtown Boston this summer, the rest of the project, designed by John Burgee Architects with Philip Johnson, ran into troubles that may eventually halve its square footage. Also, the block-long New England Life Building proposed by Johnson/Burgee for Back Bay is headed back to the courts this month. Although demolition on the site has been substantially completed, the advocacy group Citizens for a Better New England Life are optimistic that a more modest
and whose decline, indeed, some have attributed to the indifference of City investment institutions.

Actually, the decline of manufacturing and the growth of services in the British economy may be said to find in Lloyd's new building a metaphorical representation, for the new building itself is about nothing if not servicing. Its design can be said to represent the triumph of servicing over material substance, process over form, behavior over object, performance over style.

Lloyd's is not a corporate headquarters but a phenomenally successful private marketplace that has outgrown its housing three times in this century. By the 1970s, the underwriters again required more space for their transactions, which have always taken place within a single floor known as "The Room." Also inspiring was the pressure of new information technology, whose electronic facilities could no longer be incorporated piecemeal and empirically. The directors looked to Rogers for a definitive solution to their problem, one that would ensure that they would never again outgrow their quarters or be outgrown by their technology.

The kind of technological rationalism found in Lloyd's gains much of its appeal, indeed charisma, from claims that it can, through the fine analysis of functional criteria, find optimal solutions to defined problems. The building is swaddled in a massively persuasive technical discourse, yet its actual appearance is anything but the strict outcome of necessity. Furthermore, the failure to admit certain conflicts between the ideologies of architecture and of business leads to an irresolution and instability not only in the exterior of the new building but, most tellingly, in the directors' rooms and boardroom.

The entire Robert Adam-designed boardroom has been transported from the old building, together with period furniture, and preserved in the new one like a beautiful casket in a high-tech frame. The move might be accounted simply a sentimental attachment to an institutional heirloom. Moreover, Adam's domestication and merchandising of Roman archaeology by means of interchangeable molds (still available from a London interiors firm) was an early antecedent of the prefabrication techniques upon which the new Lloyd's building is predicated.

But the rest of the floor on which the Adam room stands has also been given over to the "embellishments"—Doric columns and quilted doors—of the French interior decorator Jacques Granges. These classical pretensions suggest that although work may be done and money made in modern surroundings, its fruits and the good life are still ideally consumed in the traditional settings of aristocratic classicism and handicrafts. The kitsch and classical trappings of the executive rooms constitute a subversive criticism of the building housing them.

It is claimed that the kind of architecture found in the new Lloyd's is about honesty, frankness, visibility, and control. But these categories apply here only to mechanical matters. In fact there are many things in this building that are not admitted, not visible but repressed, and ultimately in some places out of control. Electronic facilities for communication and data processing are spread integrally and invisibly throughout the building. The point where these surface and manifest themselves is at each Syndicate's workstation, or "box," as it is traditionally known. User participation in the design of Lloyd's is nowhere more evident than in these boxes which, at the underwriters' insistence, were constructed of hardwood in the traditional format of stiff-backed pews facing each other across a long table.

The rationale behind Lloyd's runs broadly as follows: Just as the company is a confederal infrastructure of brokers, so the building is basically a concrete shelving stack designed to carry facilities that have a range of shelf-lives from short-term (computing) through longer term (elevators, toilets) to very long term (the Adam boardroom). In order to enable easy replacement of components, which comprise (continued on page 36)
**SITE Selected for Pershing Square**

James Wines of SITE Projects, Inc. describes his winning scheme for Pershing Square in Los Angeles as a "chessboard that allows artists, vendors, and community people to combine in a big civic game." Juror Craig Hodgetts calls it "Jeffersonian." Jury chairman Charles Moore feels it will be "a sanctuary."

The chessboard's 1000 squares, each 13.5' x 13.5', undulate in a pattern inspired by the Los Angeles topography of mountains surrounding the city. A trellis-covered promenade connects a crystal palace restaurant and an outdoor performance area at opposite ends of the five-acre space.

SITE, working in collaboration with architects Charles Kober Associates, engineers Delton Hampton Associates, and landscape architects EDAW, Inc. and Burton & Spitz, competed against four other finalists (P/A, Sept. 1986, p. 23) for the $12.5 million commission. The Los Angeles Community Redevelopment Agency has contributed $6 million towards construction. Despite worries as to who will fund the remainder, all Los Angeles seems united in praise of SITE's scheme.

**Harvard (continued from page 32)**

that the Graduate School, as constituted in 1936, successfully married preexisting departments of architecture, landscape, and city planning. Further, there was evidence that collaboration between the fields predated the Gropius era.

The exhibition, the most delectable of GSD offerings and the most lasting (a book is planned), was overshadowed, however, by the three symposiums. Media interest transformed the first symposium, a discussion of urban design, into the "Prince Charles Symposium." This misapprehension—for the popular event was sold out before the Prince accepted Harvard's invitation—was made accurate by the precision and sincerity of his observations in a discussion otherwise awash in generalized projections of megatrends. In extemporaneous remarks, Prince Charles wondered, "How do you design cities for the future?" He referred to Liverpool, "a decimated city with industrial decay on a scale you wouldn't believe," where "the tenant cooperatives' determination has created small oases amongst urban decay. People get on best when they live in village communities. (There) you have villages showing the actual style and interests of the people that live in them. Who plans, designs, decides? I wish I could stay here and pick your brains."

The second symposium on "Propositions and Practices: The Last Fifty Years of the Design Professions," defined such trends as the rise of contextualism and of ecological planning, the introduction of social and behavioral factors into design, and the use of new technologies.

All three symposiums reaffirmed that urban design resides wholly, and healthily, in Gund Hall. The mood was confident, bolstered by gifts from major local developers. The new confidence, however, stems greatly from recent changes in the curriculum and the student body. Reflected Henry Cobb, former chairman and author of some of the GSD's more experimental innovations in curriculum, "the events of the 1960s almost crippled architectural education. In the early 1970s, architectural education almost ceased. You cannot know how difficult it was to answer students' criticisms, their accusations of the corruption of urban design. The McCue era is the first time since the Sert decades that the GSD has any kind of self-assured identity. Today (at the fiftieth) the GSD, through symbols and rituals, is reaffirming architecture in the widest sense, including urban design."

Helene Lipstadt

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**Riverwalk Opens in New Orleans**

New Orleans' new marketplace, Riverwalk, opened over Labor Day weekend with a five-day extravaganza that included a Mardi Gras-style parade, marching bands, balloons, fireworks, and movies projected onto a barge in the Mississippi River. The latest in the series of Rouse Company Festival markets, this $58 million, 180,000-square-foot shopping/entertainment experience is located on the riverfront in the Warehouse District of New Orleans, occupying part of the site of the 1984 World's Fair. Riverwalk is important to New Orleans for three major reasons. First, its completion attests to the skill and perseverance of the various parties involved—Rouse officials, Perez Associates, architects; and city officials who waded through the legal com-

(continued on page 38)
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Circle No. 314
In Progress

The nine projects shown here range from a heart clinic to an elementary school, history museum, and convention center.

1 New Mexico Heart Clinic, Albuquerque, New Mexico. Architect: Antoine Predock, Albuquerque. Sited on a freeway near a major medical facility, this clinic houses the offices of six cardiovascular specialists. The office "village" is protected from the highway by a monolithic masonry wall, while presenting a residential-scale assemblage to arriving patients. The doctors' offices occupy a second floor above examination and waiting rooms.

2 Norwest Center, Minneapolis, Minn. Architects: Cesar Pelli & Associates, New Haven, Conn. This elegant 57-story office tower, reminiscent of Rockefeller Center's RCA Building in New York, is the second tower designed for this site by Cesar Pelli. The project was revived by Gerald D. Hines Interests; Norwest Corporation remains the office tower's principal tenant. Artifacts saved from the old Northwestern National Bank Building, which occupied the site until its destruction by fire in 1982, are to be incorporated into the new tower; these include six monumental chandeliers to be hung in the new rotunda, sculptured bronze plaques and cast plaster medallions. The new tower's façade is composed of local Kasota stone and glass, accented with white marble and polished gold elements at setbacks. The building is to be completed by the summer of 1988.
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3 Washington State Convention and Trade Center, Seattle, Wash. Architects: TRA + HNTB, Seattle; design consultant: Pietro Belluschi. This 370,000-square-foot convention center spans Interstate 5, and its 60-foot-high, glass-enclosed lobby overlooks downtown Seattle and Elliott Bay. The 1 million-square-foot, phase-one development includes a 1000-car parking facility, a retail galleria connecting to a historic building that is to be restored privately as part of the project, and a major new park adjacent to Freeway Park. The second phase proposes an 800-room hotel and office tower adjacent to the convention center. The revitalization of New Jersey's state capital continues with this $160 million complex, which includes a 32-story office and hotel tower; a 10-screen movie theater and retail galleria; a 10,000-seat civic arena; and 20,000 square feet of exhibition space.

4 Trenton Center and Civic Arena, Trenton, N.J. Architects: The Hillier Group, Princeton, N.J. and Clarke & Caton, Trenton. The revitalization of New Jersey's state capital continues with this $160 million complex, which includes a 32-story office and hotel tower; a 10-screen movie theater and retail galleria; a 10,000-seat civic arena; and 20,000 square feet of exhibition space.

5 Miami Beach Convention Center addition, Miami Beach, Fla. Architects: Thompson, Ventuletti, Stainback & Associates, Atlanta, with Borelli, Frankel, Blitstein, Miami Beach. This addition will provide Miami Beach with the largest exhibit hall on a single floor in the country, totaling half a million square feet. The program also calls for 70,000 square feet of meeting rooms and a new lobby concourse facing the ocean. The expansion is to be completed in early 1989.
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6 Sioux Valley Indian Reserve School, Manitoba, Canada. Architects: Smith Carter Partners, Winnipeg, Manitoba; architectural consultant: Douglas J. Cardinal. The fan-shaped plan for this K through 9 school in the Sioux Valley Indian Reserve is cut into four quadrants by north/south and east/west axes. At the point of their intersection is a common activity space, inspired by the traditional "power source" of Sioux communities. The higher gymnasium building forms an abstracted eagle, symbol of strength. The school is to be constructed with community participation.

7 Minnesota History Center, St. Paul, Minn. Architects: Hammel Green & Abrahamson, Inc., Minneapolis. Selected through a national design competition sponsored by the Minnesota Historical Society, this $50 million center occupies a site near Cass Gilbert's State Capitol precinct. Collections are stored below grade, with archival reference areas, including a teaching gallery and reading room, located at grade. Galleries and administrative offices are on the second floor. Construction is scheduled to begin next summer.
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8 Sutter Square, Sacramento, Calif. Architects: Leon Pomroy-Felderman Associates, Los Angeles. This skylighted, three-story retail arcade adjoins one of two four-story office towers that flank a freeway. The façades of the $4 million, 83,000-square-foot commercial center, now under construction, are to be constructed of concrete block, pigmented plaster, ceramic tile, green and gray glass, and ornamental metal. Sutter Square is one of several projects, including storage-locker facilities and manufacturing plants, proposed for sites along and beneath Interstate 80, a 20-year-old highway that bisects downtown Sacramento.

9 Central Bank of the South, Administrative Headquarters, Birmingham, Ala. Architects: Kidd Plooser Sprague Architects, Birmingham in association with Morris Architects, Houston. This 300,000-square-foot, $20 million brick and precast concrete structure will form the electronic nerve center for the statewide bank. Large, flexible floor areas surround a three-story skylighted galleria; a separate building houses public functions and training facilities. The complex is to be completed in early 1988.

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Visions of the City: City Life and Hugh Ferriss: Metropolis. Walker Art Center, Minneapolis.

Through November 9

Through November 9

Through November 16
The Architecture of Frank Gehry. Walker Art Center, Minneapolis.

Through November 23

Through November 23

Through December 1

Through December 21
New Architecture: Foster, Rogers, Stirling, Royal Academy of Arts, Piccadilly, W.1, London.

Through December 28

Through January 1

Through January 4

Through February 28

Through March 2
Twentieth Century Design. The Brooklyn Museum, Brooklyn, N.Y.

October 26–March 22

November 9–January 4
Oskar Schlemmer. Walker Art Center, Minneapolis.

November 9–January 4
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(continued on page 54)
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Failures: Raymond DiPasquale reports on a wood truss failure.

**Law:** Norman Coplan discusses "vouching in," used to involve an architect in a dispute between owner and contractor.

**Research:** Thomas Fisher reviews a software study by Harvard's Laboratory of Computer Graphics.

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**PA Practice**

**Failures: Wood Truss Roof**

The wood truss is a building "workhorse." It is economical and efficient, easy to fabricate and erect, and allows clear spans with a minimum of material and weight. Although generally used for framing roof systems, it also has been used in long-span floor construction. Failures are often reported in the Northeast during the winter months when heavy, wet snow loads push roof systems beyond their ultimate capacity. In addition to overload, there are other factors that can precipitate a failure in a wood truss system. The case study below illustrates some of these factors.

1. **The Problem**
   A 60-foot-long clear-span wood roof truss system collapsed about an hour after the last truss had been erected and the workmen had left the site. The trusses involved formed the lower section of a two-part "piggyback" type triangular truss with a final pitch of 7/12. Trusses had been erected with a truck crane and spreader bar, and were spaced 24 inches on center.

2. **Background Data**
   Wood trusses are designed and made to order. The architect or builder specifies the overall profile of the truss and the live load (generally snow load) requirements. Orders are generally processed by lumber supply companies and fabricated either by them or by a specialty manufacturer.

   There are several consulting firms that specialize in the analysis and design of wood trusses for the many lumber companies that fabricate these trusses in their own facilities. The truss designers assume that all the joints are pins and loads are applied only at the panel points or joints. The members are then designed in either pure compression or pure tension. Most of the analysis and design today is done by computer since it is fast and accurate and can handle secondary effects. Computer output includes a graphic dia-

   gram of the truss configuration along with the size of each member and notes about the connections. Most states require that the structural design be done under the supervision of a licensed professional so the documentation that the fabricator uses to make the truss usually has an appropriate seal. The actual fabrication, however, is seldom supervised by a licensed professional—a basic problem.

   Even though designers assume that the joints in a truss are pinned or free to rotate, we know that, in actual fabrication, the connection is made with a gusset plate that provides some restraint or rigidity to the connection and that results in some secondary stresses during service loading. Some computer programs account for this restraint in the design of the members and the joint connection. The gusset plates are rectangular or square and made of light-gauge metal with either holes for gang nailing or pre-formed lugs that only require hammering to make the connection. The metal gusset plate detail allows the fabrication to proceed very quickly when joining the pre-cut wood members. (Some gusset connections are made with plywood, which is either nailed, or glued and nailed, resulting in considerably more restraint at the joint than that provided by the light-gauge metal plates.)

   The other assumption made in the design of the truss system—that the loads, whether dead or live, are applied at the panel points—is also not completely satisfied in actual use since the sheathing is nailed to the top chord and load is applied continuously along the chord's length. This introduces local bending in the top chord. The same occurs if a ceiling is attached directly to the bottom chord. The full consideration of these secondary stresses in the final design depends upon the sophistication of the computer program. It is important that the end user, designer, and specifier understand that these conditions (continued on page 58)
Failures (continued from page 57) could cause over stressing which could result in performance failures of the truss.

3. The Cause

In failures of this kind, there are usually several causes of the complete collapse of the system, but only one “trigger” that sets the system in motion. An examination of the collapsed pieces “as they lie” is the only reliable way to determine the probable “trigger.” At the time of installation, this roof structure consisted of closely spaced truss elements unsupported at the top and bottom chords. Since the roof sheathing was not yet in place and temporary bracing between elements was “nominally” attached to adjacent members, there were no elements in the system strong enough to buttress the momentum of a progressive collapse.

On the basis of the collapse pattern and the way the trusses had failed, it was possible to pinpoint the area where the collapse had begun. The direction and inclination of the temporary horizontal and diagonal bracing installed between the trusses also influenced the collapse. The investigation concentrated in the trigger, or location, and implicated a specific truss that had serious material defects at one end.

Within inches of the first lower chord panel point at the end of this truss, there were two knots aligned in the lower chord approximately 1 1/2” and about 2 1/8” apart. Directly above these knots, located in the web member which comes into the same joint, were two more knots of the same size and configuration. In general, knots decrease the strength of wood because their weakening effect is greatest when wood members are in tension and torsion rather than in compression. Where shear stresses are present, a knot reduces strength not so much because of the shear stresses per se, but because of the probable chord tension that is produced as a result of the shear.

The stress situation in these trusses is anything but precise and straightforward. At the joint in question, the bottom chord was in tension, and the diagonal web member and the diagonal chord were in compression. The gusset plate provided some joint restraint, so there were some local bending stresses (tension and compression in the same member) and shear stresses in the joint plate itself and in the members which met at the joint.

During the erection process, the trusses also are subjected to all kinds of erection stresses: stress reversals, torsion, out-of-plane bending, buckling, and localized stress concentrations. The truss members are absolutely unstable in a direction perpendicular to their own plane. When they are transported and lifted into place, they are invariably bent in the wrong direction, so in addition to all the other stresses noted above, there can also be local yielding at the gusset plates. In some rare instances the metal itself yields. In most cases the wood yields (because it is softer) at the points where the connector lugs are driven into the wood. The connector is thereby loosened and, as was observed in the wreckage, is easily dislodged under slight impact.

4. Implications

Material defects in prefabricated wood trusses are manufacturer related, whether or not these defects are latent or obvious, and are the result of improper quality control prior to shipment. In this case, it may very well be that there were other factors that contributed to the total collapse of the system. Material defects in themselves will not necessarily lead to total system failure. When there is redundancy (alternate load paths) in the system, a structural member with a defect that is subjected to stress levels beyond its capability will fail locally, but the system itself will remain intact. During the early phases of the construction of any building, there is very little redundancy, so it doesn't take much of an irregularity to cause extensive damage. But a defect is a "defect," and if it does not result in failure during the early life of the structure, it could cause a failure under full load many years later, in which case the results could be more catastrophic.

Here, a more substantial temporary bracing system might have prevented the total collapse of the roof, but its adequacy or lack of adequacy was not the primary cause of this failure. The contractor was given guidelines by the truss manufacturer for bracing the trusses during installation. There was evidence in this case that the contractor did not follow all the recommendations; however, many of them, he did.

Inadequate bracing is often cited as the major cause of roof truss collapse during construction. This investigation, however, found several other areas of non-conformance with good practice and standard specifications. Some of the defects noted were:

• Use of lumber of inadequate dimension at joints where forces were high.
• Knots located in gusset plate contact area.
• Gusset plates not centered on several joints.
• Gusset plate lugs not adequately embedded in the lumber.
• Defective lumber used. Attempt to repair split lumber with a plate. Truss should have been rejected and never shipped to the site.
• Lack of fit-up at truss end.
• Inadequate connector sizes. Post-fit-up of joint. Reduced lumber section at joint due to improper finishing.

In view of the material defect trigger and the many other deficiencies noted in the fabrication of the truss components, the truss manufacturer bore the burden of responsibility for this incident.

5. The Fix

Since the failure was confined to the roof system, the fix was easy. New trusses were fabricated and installed. Anchorage of the truss over the wood bearing walls was nominal at the time of the failure so the walls remained intact.

In the rebuilding, the contractor followed every recommendation promulgated by the Truss Plate Institute (TPI) for bracing the system. The trusses were long and high with unusual stability problems.

6. How To Avoid (A Checklist)

a. The architect or engineer should make a cursory inspection of the trusses at the time they are delivered and before they are erected in place. Things to look for:

• Use of inferior lumber. Since trusses are generally hidden from view, the fabricator may be tempted to use material with excessive knots or splits, or of a stress grade below that assumed in the design.

• Installation of the gusset plates. They have to be large enough to embrace all the members that meet at a joint.

b. The architect or engineer should check out the fabricator and his operation. Since trusses are relatively easy to make, many lumber dealers may be willing to fabricate them, but may not have the quality control procedures in place to assure a good product. When the manufacturer is under pressure to fabricate a large order in record time, quality control can suffer.

c. The specification for the trusses should cover the performance type. It does not dictate how the manufacturer will produce the truss but only that it will perform satisfactorily under service conditions. The performance specification should also insist that the design be produced (continued on page 63)
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Failures (continued from page 58)
and be fabricated under the direction of a licensed design professional (not necessarily the same person). The shop drawings representing the design of trusses are usually sealed by a professional, but having a professional direct the fabrication is something new.

The performance specification should be very explicit about the roofing and ceiling materials, and the loads to be applied to the top as well as the bottom chords. Sometimes information is sketchy and all the loads anticipated are not delineated. Failures have been caused by such underdesign.

7. Lessons To Learn
a. The potential for failure can begin during the very early life of a truss. Units that do not meet standards should be returned to the fabricator for replacement. Once the truss is incorporated in the job, it is very difficult to replace.

b. Bracing of trusses during installation is critical and often done in a haphazard manner. Almost all the failures of wood trusses during erection are caused by instability—and bracing is what prevents it.

c. The design professional has to get more involved with every step of the building process and develop a total approach that follows through the last detail. Depend on others, yes; but check on them! If you look at all the caveats on supplier's shop drawings, you'll soon realize that in the final analysis, the back stops with the design professionals.

8. Legal Case Reference
No legal action was taken. The fabricator supplied new trusses and the contractor paid for the erection since there was some question that, if additional bracing had been installed, the failure may have been confined to a local area.

9. Other References
a. "Design Specifications for Light Metal Plate Connected Wood Trusses." Truss Plate Institute, Inc. (TP1), 583 D'Orofrio Drive, Suite 200, Madison, Wisc. 53719 (608) 833-5900.

b. "Bracing Wood Trusses: Commentary and Recommendations"; "Handling and Erecting Wood Trusses: Commentary and Recommendations"; "Quality Standards"; all published by the Truss Plate Institute, Inc.

Law (continued from page 57)
Comed by the architectural profession: W.J. Barney Corporation v. Long Island Jewish Hillside Medical Center.

The contractor involved in this case had been engaged by the owner to construct an ambulatory care service area at a medical center. The contractor commenced an arbitration proceeding against the owner seeking damages of approximately $1,700,000. It was the contention of the owner that the contractor's claim arose out of delays allegedly caused by the architect and the architect's consulting engineers. The owner-architect contract provided that the architect would "indemnify and save harmless the Medical Center from and against all expenses, including but not limited to claims, liability, penalties, losses, fines, attorneys' fees and judgments resulting from the negligent performance of the services of the Architects, their agents, servants and employees under this Agreement." The owner, faced with contractual terms that prohibited him from bringing the architect directly into the contractor's arbitration proceeding or from commencing a separate arbitration against the architect and then consolidating the two arbitration proceedings, wrote a letter, through his attorneys, to the architect stating: "In view of the fact that (the contractor's) claims against (the owner) in this proceeding are based on alleged inadequate design and other acts and omissions of (the architect), the (owner) is entitled to indemnification. Accordingly on behalf of (the owner) we hereby vouch you into the arbitration proceeding and tender to you the defense against (the contractor's) claims." The purpose of the letter was to commence a legal process known as "vouching in." This process is an archaic procedure little used today since most states have adopted a third-party practice that normally permits an indemnity to impede an indemnitor in the same action or (continued on page 65)
Burnished Bronze... inspired by the beauty of nature's elements. Created by Spectrum Glass Products for new VariTran® 500 Series coated glass. Burnished Bronze on clear substrate is a high performance solar control glass designed to reflect the sun's rays, minimize solar heat gain and reduce air-conditioning equipment and operating costs. Burnished Bronze. Art created for functional design. Spectrum Glass Products, Clinton, NC 28328, (919) 592-7101.

Circle No. 357
Law (continued from page 63) proceeding instituted by the claimant. "Vouching in" is a common law procedure in which a defendant, by notifying his indemnitor of an impending suit based upon the indemnitor's inadequate performance and by offering him its defense, makes the judgment rendered against the defendant as binding on the indemnitor as on the defendant, whether or not the indemnitor participated in the suit or proceeding. Vouching a party into an action or proceeding does not technically make him a party to that proceeding and imposes no obligation on him to defend, although, if he is properly vouched in, he may be bound by the decision or judgment therein. If, in the case under discussion or proceeding, he was not deemed a party in that arbitration, he would have skirted the restrictions contained in the owner-architect agreement, it might make the architect bound by any award made to the contractor against the owner. The architect then would be liable to the owner as if he had been a party to the arbitration. The court pointed out that, while the architect agreed to submit his disputes with the owner to arbitration, he had expressly rejected submitting to arbitration any dispute in which others' claims are also being arbitrated. It has long been the rule, said the court, that parties to a commercial transaction may agree to arbitrate any dispute that arises from the forum for the resolution of their disputes without an express, unequivocal agreement to that effect. Absent such an explicit commitment, neither party may be compelled to arbitrate. Since the plaintiff did not agree to participate in an arbitration involving a third party, he cannot be compelled to do so indirectly through "vouching in" just as he cannot be compelled to do so directly through a third-party suit.

Norman Coplan, Hon. AIA

The author is a member of the law firm Bernstein, Weiss, Coplan, Weinstein & Lake, New York.

Research: Microcomputer Software

The Laboratory for Computer Graphics and Spatial Analysis at Harvard's Graduate School of Design has completed an extensive review of 63 microcomputer software programs. Supported by IBM, the research focused on software in ten areas: design representation, drafting, thermal analysis, acoustics, lighting, structural analysis, undergrounding, transportation planning, and geographic information systems. The researchers identified and evaluated software most useful for design education. Because of that goal, some of the research, such as a study of design school curriculums, may have little relevance for practitioners. Some of its conclusions, such as the observation that many programs require advanced knowledge, also may not apply to specialists in a field.

Given those qualifications, the research has much to offer design professionals. It found, for instance, that most of the software analyzed suffered from difficult or confusing input and output, poor graphic capabilities, and unclear documentation—issues that affect all users, regardless of their expertise. The research also showed that the more limited the scope of the software, the easier it was to use. What emerges is a paradox. Microcomputer software vendors, as if to outdo each other by focusing on the most complex alphanumeric applications, have tended to neglect novice or graphically oriented users, some of the people most in need of microcomputer software.

The 19 volumes of the study are available separately or as a package from the laboratory at the GSD, 48 Quincy Street, Cambridge, MA 02138.

Small Firm's New Golf Ball Draws Hole-in-One Letters from All Over U.S.

Seller Guarantees Ball Will Cut Strokes — or Money Back

64 Times More Accurate

By Mike Henson

NORWALK, CT — A small company in Connecticut is selling what might be the most hook-free, slice-free ball in golf. Unsolicited hole-in-one letters from men and women all over the U.S. suggest it is 64 times more accurate than a well-known distance ball. Some report holes-in-one the first time they use it!

The ball is called Guidestar and its unusual accuracy comes from a new, oversized core that helps control it like a gyroscope. Because the core maintains near-perfect balance, it reduces the chance of an abnormal spin caused by an imperfect stroke. Abnormal spins are what cause a ball to hook or slice.

The company has conducted many tests on the ball, but the best proof of its accuracy comes from a file-full of letters like these: "Shot my first hole-in-one the first time I used Guidestar on my home course. Great Balls! ... " After 26 years of golf during my first round with Guide­ star I made a hole in one! There is even a letter from New Zealand where a minister scored a hole-in-one with the ball.

The ball is extremely lively and high compression. Bounce it on a concrete floor and it comes back at you like a rifle shot.

According to a spokesman, "The Guidestar will equal any pro-line ball on distance, but on accuracy they are no match for it, and accuracy is what counts. It's not fun hacking through bushes looking for a ball that suddenly went left or right. These hole-in-one letters are the best proof we could have that Guidestar's unique, gyro-core helps keep shots down the middle."

In light of tests and that file-full of hole-in-one letters, the company guarantees Guidestar will cut a golfer's score dramatically. If it doesn't, they will take back the balls within 30 days used, and refund their price promptly.

They also guarantee Guidestar's rugged construction will save a golfer money. If he ever cuts one, he can get three new ones free, if he returns the damaged ball with 50¢ for postage.

If you want to save money on lost and damaged balls, cut strokes and (who knows?) watch breathlessly on a par 3 as Guidestar's new, gyro-core carries your tee-shot toward the cup! — then try this new ball. You can't lose. A refund is guaranteed if you don't cut strokes.

To order Guidestar send your name and address to the National Golf Center (Dept.G-324), 500 S. Broad St., Meriden, CT 06450; (or call 203-238-2712). Include $21.95 (plus $1.75 shipping) for one dozen; $19 each for two dozen or more. Six dozen cost only $99.

To order Guidestar conform to U.S.G.A. Rules and can be used in tournament play.
KALEIDOSCOPE. A subtle way to add interest to bored rooms across America. Four multicolored pointillist patterns that bring a new design sophistication to laminates. Available in Textured Finish with Nevamar's exclusive ARP SURFACE® or in Mirror Finish. Kaleidoscope. It's good for business...residential or contract. For samples, call 1-800-638-4380. In Maryland, call 1-800-233-9485. Nevamar Corporation, Odenton, Maryland 21113.
What You Know, You Question

Controversial, idiosyncratic, and highly innovative in his challenge of the traditional lines between art and architecture, Frank O. Gehry and his work are the focus of this issue of P/A.

Mezzanine interior, Rebecca's, Venice, Calif.
Retrospective

24 California Aerospace Museum
Los Angeles, Calif. 1982–84

25 Loyola Law School
Los Angeles, Calif. 1981–84

26 Temporary Contemporary
Los Angeles, Calif. 1983

27a Wosk Residence (also 27a)
Beverly Hills, Calif. 1982–84

28 Mediatheque
Centre d'Art Contemporain
Nîmes, France 1984

29 Camp Good Times (also 29a), with Claes Oldenburg, Coosje van Bruggen
Malibu, Calif. 1985

29a
In recalling some of Frank Gehry's earlier work, P/A correspondent Esther McCoy discusses the philosophy behind the firm whose buildings took the architectural profession by surprise.

HE had a blessed childhood in Toronto. His baby sitter was a blind boxer; the slot machines an uncle stored in the basement put Gehry in touch with the pop culture and made him the most popular boy in his class. When he came to Los Angeles at 17 it was like moving from one frontier town to another. In an uncle's bar in Hollywood he brushed against the boxing crowd, the movie crowd, and the gangster crowd.

His first easy knowledge of Los Angeles came from the cab of a Mack truck he drove while studying—first art, then architecture—at USC. When seen from an eminence, the miles of endless tract housing in San Fernando Valley, laid out on a grid between section lines, was dramatically monotonous. He saw how exaggeration can lift the commonplace to an art form. Others perceived this in time—painter Ed Ruscha, for one, drew on repetition of the commonplace. To isolate the commonplace is not easy; the eye refuses to see it. Gehry's path to it led past the lumber yard (construction grade, the throwaway bin), to the cost sheet, to an office as unlikely as a three dollar bill.

From his first office in an old house across from the Greyhound terminal in Santa Monica, to the proper kind on San Vincente in Brentwood, to the light industry loft on Cloverfield Avenue, to the present one in Venice, they were one and all places that seemed just being reconverted or remaindered. As I walked into the Cloverfield loft one day, a puzzled delivery man asked me, "Are they just moving in or just moving out?"

They were just being comfortable, and that meant a constant interchange among themselves, and between architecture and the art objects in the office. The delivery man that day leaned against a 12-foot-high painted stake by Charles Arnoldi as if it were a post. Under the high truss, screen walls had been set up in the 5000-square-foot space, and on them hung three enormous canvases by Ed Moses, and a few Ron Davises, one an 8 x 10-foot in scale with the high space. You walked around a three-sided, head-height glass enclosure by Larry Bell to get from a table (made of corrugated cardboard) to a model of a beach house swathed in chain linking.

The only art that had any semblance of museum treatment were five Ed Moses lithographs in Gehry's alcove office. It was live-in art. It was environment, not display. The flow of space was interrupted by endless pieces of corrugated paper tables, chairs, and just fantasies, and these were interrupted by work nooks as snug as the toe of a boot. Walking from one nook to another was as pleasurable as going from one Italian hill town to the next.

The uniqueness of the office went beyond the live-in art. Idle talk was also a way of life. Most offices have special departments for (or farm out) acoustics, lighting, department store display, and so on, as they do for engineering, soil analysis, traffic, etc. But as this is the sure way to discourage inventiveness, the whole Gehry office brushes against a problem.

Once Gehry gave a lecture series he called "The Available Technology." That said it: with the budget we have and the problem to solve, what are the alternatives to time-worn materials, practices, and forms? Asking such questions brought about a change in department store display. With the interiors of two stores to redesign for Joseph Magnin in 1968, Gehry drew upon the things learned in designing shows for the Los Angeles County Museum of Art. This was not a new route; Albini and Helg in Milan had found identical requirements for lighting art objects in museums and department stores.

Sound and light became Gehry's passions. He himself went to the experts and soon the whole office was talking light and sound. In the early 1970s, when the noise level from the freeway, air traffic, and the introduction of sound amplification made the old acoustical system of the Hollywood Bowl inadequate, the solution was not esoteric. It came from the lumber yard—Sonotubes were installed on the stage to improve the sound. The Neo-Classical aspect of these freestanding tubes, which have since been replaced by fiberglass spheres (Retrospective, 21), may well have led to the columns of the forecourt of the Loyola Law Building. Two other music shells, the Merrieweather Post Pavilion in Columbia, Md., and the Performing Arts Pavilion in Concord, Calif. (8), were acoustically successful, despite the proximity of the latter to a freeway. Gehry threw up berms (asymmetrically, as does a volcano) to deaden traffic sounds. His favorite photograph of the pavilion shows it disappearing in the berms.

It was not the first—or last—time Gehry had minimized his work. For the 1964 Danziger Studio (2), he put a blank wall to the street and surfaced it with gray concrete plaster to make it cove into the sidewalk; he purposely used a rough finish to guarantee that it would collect dust from the traffic on Melrose Avenue. In this combined studio-residence, there are no eye-level windows facing the street, only screened courts. Interiors are lighted by clerestories in the 22-foot-high studio and by windows above eye level. In separating the studio from the rest of the plan, there are two strong, clear masses balanced by skylights escaping upward. Melrose is now an in-group street known for art galleries and pricey restaurants. Writing about it in the 1968 AJA Review, I called it "a street on the make, with miserable buildings siting there waiting for land values to rise." The street, I added, "does not receive many presents but the Danziger studio is one." Since 1968 the street has received another present by Gehry, the 1978 Gemini G.E.L. workshop and gallery (11). "Available Technology" is the name of any young architectural office, not "the edge of absurdity," another Gehry description of his own work. Chain-link fencing fits both availability and absurdity. It was an answer, however, to a search that had plagued Gehry: where to find a translucent material tougher than glass. An office that could discover cardboard crating as a material for furniture is up to stretching from glass to chain link. In phase one it was used for screens, but in phase two the constructivist play began. Gehry said of the ten layers of chain link used at the Cabrillo Marine Museum (12), "The figures on the other side are ghastly. You can see into the souls of the people on the other side." Nothing is more ghastly than the cars inside the parking structure at Santa Monica Place (16); they shimmer into sight, then fade into ghastly presences behind the sea-colored steel links.

Of the many problems around to be solved, it is, as always, the small office with no research department, and no strict time allocation per job, that solves them. Greg Walsh, a former classmate at USC, who is Gehry's left hand and right eye, and who has been part of the office since it opened, once gave me a clue to their principles. He had taken me to see the 1971 Ron Davis house (4). He pointed out a bare electric meter on an exterior wall. Most architects would detail such items out of sight. "We don't do that anymore," he said.

It reminded me of Gehry's comment about asphalt paving he wanted in a front yard: "They'll add it later for parking so I want to get there first." (He had given the black top a roll at the end, like the capitals of an Ionic column.) The principle seemed to be: Don't overdetail, except when you think the owner may later have to depend on the aesthetics of a subcontractor when adding something. To a degree, this applies to many Southern California offices. Match Northern and Southern Californians on an architectural jury and the North admits the vigor of the South's ideas but deplores the detailing. The North now grants the vigor of Gehry's designs, deploring only the various spinoffs in Los Angeles and Orange counties. Chain link at Google angles is now visible on many a back street. Freestanding columns bloom everywhere.

But it was only after Philip Johnson visited Gehry's art-laden office on one of his trips to the site of the Crystal Cathedral that Gehry was admitted to the east-west axis. His head is now in the line of fire.

Esther McCoy
Illuminated Manuscripts

To replace a public library building that was destroyed by arson, an unusual joint effort of city government and private-sector philanthropy was aided by Gehry & Associates, who produced a library that is inviting, comfortable, and surprisingly classical in its composition.

When the Hollywood Regional Library was destroyed by arson in 1982, 80,000 books and an important collection of material on the film industry—not to mention a place that many members of the Hollywood community had often visited over the years—were lost. The books and the special collections could be, and were, replaced, but the building was another matter. Proposition 13 had severely reduced the capital spending program of the City of Los Angeles, so there was little hope of finding public money for the project. It was one thing to get private citizens to donate books and money, but who would donate a public library?

The answer came from the Samuel Goldwyn Foundation, a philanthropic organization founded in 1945 by the late movie producer to fund community service projects in Southern California, and which is headed by Samuel Goldwyn, Jr., president of The Samuel Goldwyn Company, the motion picture production and distribution company founded by his father in 1924. Sam Goldwyn, Jr., realized that the library's misfortune offered him the opportunity to give the Hollywood community what he calls "a state-of-the-art library," as well as a fitting memorial to his mother, Frances Howard Goldwyn, who was an avid reader and frequent visitor to the old Hollywood library. The Foundation offered to build the new library for the city and oversee the project until its completion. In this case, Los Angeles, represented by City Librarian Wyman Jones, would be the client, and the Goldwyn Foundation the patron. Part of the deal, however, was that the patron—not the client—would choose the architect, oversee the design and construction process, and deliver a completed building to the city. Goldwyn hoped to give Los Angeles an architecturally distinguished building, which was why he commissioned Frank O. Gehry & Associates, who had previously designed the Goldwyn Company's offices. He also hoped that the endeavor would offer a shining example of the possibilities of public and private-sector cooperation.

Both the client and the patron had strong feelings about what went into a state-of-the-art library. As City Librarian, and having acted as a consultant on 35 library building projects, Wyman Jones believed that "most public libraries are failures, because they aren't interesting enough, or because they don't function well—or a combination of the two." He was adamant on the subject of light. "One of the first failures of libraries is glare. But an interior shouldn't be dark and heavy. There should be natural light, no direct sun." While he left matters of architectural design to Gehry and Goldwyn, Jones wasn't interested in what he called "the typical library, with nine-foot ceilings and pendant light fixtures." Neither, however, was he interested in a building that was difficult for visitors to "read." But he also believed that the new library should be inviting: "You should want to go there and stay there."

On that point, Sam Goldwyn was in total agreement. He felt that the new library should have the drawing power of the old movie palaces: "It ought to grab you and pull you inside." But he wasn't (continued on page 84)
Maximizing daylight while minimizing glare was a primary concern in designing the library. On-site sun studies made it clear that only north and east glazing were possible (although there is a south-facing clerestory on the south wall of the central pavilion, above the children's reading room, and a west-facing window above the main-floor reference desk). Metal canopies shade the outer corners of the two side reading rooms (corner of north reading room, facing page), and Gehry was going to place them atop these pavilions as well, but he felt they looked too thin, and turned them into the light-monitor boxes. The reading rooms sit in shallow reflecting pools (facing page) that were Gehry's solution to the problem of landscaping—or rather, the lack thereof (the city vetoed his suggestion for a palm garden, saying it would be too costly to maintain). The combination of the window placement, the solid south-facing walls, and the pools creates a series of varied views from each reading room. The library's arrangement of boxlike forms makes it blend easily with the low-rise commercial and industrial buildings in its immediate vicinity (above right), and the color scheme—a light peach for the stucco and a pale green for the painted metal boxes and window frames and mullions—suits the light of Southern California.
The space of the ground-floor lobby and circulation desk (below left) were kept to a minimum, to allow more space for the reading rooms. The light well above the lobby opens to the main-floor children's reading room and card catalog (facing page); its thick glass walls deaden noise floating up from the floor below. The sweeping stair at the back of the lobby leads directly to the main floor, where it is topped by a skylight (below right, with stacks visible at left).

In the two adult reading areas (the north, above left), visitors can sit out in the tall, open space or under the shelter of the metal canopies. Oak tables and chairs surround benches covered in colorful ceramic tile patterns. In the central children's reading area (above right), furniture is smaller scaled, in marked contrast to the soaring space of the 40-foot-high room. Artificial lighting is supplied by metal halide fixtures, uplights atop the stacks, and pedestal lamps at the reference and circulation desks. In keeping with the history and spirit of the Hollywood movie community, the library's only artwork consists of oversized painted replicas of vintage movie posters (as well as a few original posters). At night (overleaf), the library, illuminated from within, becomes a glittering jewel box in the cityscape.
Rebecca's is a living laboratory for many of Frank Gehry’s experiments in form and materials. The view through the bar area toward the entrance (right) reveals two painted tin crocodiles, 16 feet and 19 feet long, which are illuminated from within—another variation on Gehry’s well-known fish and snake lamps. They are suspended from a ceiling littered with pastel flotsam and jetsam, against the backdrop of the backlit orange onyx mezzanine over the bar, which is slightly sunken (above, inside bar). The copper-clad, octagonal dining pavilion, like the entrance portal and the mezzanine structure, relates to Gehry’s concept of a landscape of buildings within a building. The windows along the Pacific Avenue side of the restaurant (not shown here) are blacked out and adorned with tarantula murals by Ed Moses. While the interior is most dramatic at night, its colors and textures also glow by day (top, view past corner of bar, through entrance, to dining area).
The project's architectural given was the ground floor (two stores)

P/A Awards Update
ICS/ERF
University of California, Irvine

A university computer and engineering science complex, for which Gehry & Associates won a P/A Design Citation in 1984, is part of an ambitious master plan to bring a new generation of architects—and a new architectural outlook—to a sprawling, 1960s-vintage campus.

“THE ugliest building on campus,” says one student, of Frank Gehry's new $1.5 million Information & Computer Sciences/Engineering Research facility at The University of California at Irvine. “Looks like a hardware store,” says another. “I don't have to like it,” comments UC Irvine Chancellor Jack Pelton. “But it's important that people come to see.” Associate Vice Chancellor and campus architect David Neuman declares that “the ICS/ERF building is very positive for Irvine. We need a different sort of architecture here.”

Gehry's building is certainly different. Set on the outer edge of the campus's circular ring mall (part of William L. Pereira & Associates' original master plan), behind a pair of typically lumpish engineering school blocks built in the glum, concrete University of California style of the 1960s and early 1970s, the now-completed phase one of the proposed three-phase ICS/ERF complex is a tonic to the eye and a lift to the spirit.

The small (18,000 net square feet) Gehry composition holds its own on the UCI campus by sheer force of personality. Organized in three pavilions—one each for computer and engineering research, faculty offices, and general assignment classroom space—the design makes the most of its minimal mass and mundane materials.

The double-story, light-green classroom block sits forward on the ring mall, detached from the inside-out “L” formed by the setback junction of the other two pavilions. The research wing, a three-story, gray stucco box, is joined to the faculty offices’ gray-blue metallic cube by a galvanized sheetmetal-clad stair tower. The tower's bulk is lightened by open vertical slits that call to mind the arrow-launching apertures of a medieval fortress. The bold shaft of the central stair not only joins the administration and research buildings, but also anchors the complex to the back of the site. Without it, the separate ICS/ERF pavilions would look like boxes afloat in the parched terrain surrounding the campus.

Other outside stairways sprout from all three sections, flying off at angles to the main blocks. This complex composition is further dramatized by putting sunshade canopies and witty gestures, like the bright orange tongue of the main staircase edge licking the walls of its silvery metal cage. A wide ramp up the left-hand side of the classroom section, ending in an asphalt plateau, will create a central axis when projected later phases of the ICS/ERF complex are in place by the early 1990s.

The classroom block’s two ground-floor classrooms open directly off the campus mall. Putting the building right on the edge of the circular road and walkway helps mark the mall's perimeter, which is otherwise confused by the recessed frontages and poor definition (continued on page 94).
A view of the east side of the complex (above) shows the clerestory box atop the classroom building, the corner where the research and administration buildings connect to the stair tower (closeup, facing page), and the pitched metal roof of the painted-metal-clad administration building. Another exterior stair juts off from the south (rear) side of this building (top), and its canopy, which rests on a square metal column, is intended to form a pair of “bookends” with that of the classroom building. The architects had originally wanted to use a different material on each building to make them as distinct as possible, but budgetary considerations mandated a minimal material palette, so metal and two different stucco finishes were used.
of existing structures. Gehry wanted to emphasize further this hard edge with an extension wall that continued the classroom block's façade, but budgetary constraints denied him this option. On the first floor is a 150-seat lecture room with bright blue seats, lighted by a big skylight box. A large porch, capped by a bold lid resting on a fat metal-clad column, leads to a dark-green outside stair constructed of wood frame and painted plywood.

The faculty office building is a metal-clad box capped by a pitched metal roof. This block provides space for workshop modules, faculty offices, and conference rooms. A second-floor, glass-walled section in this block has an east-facing porch, which shelters vistas of the undeveloped acres of the surrounding Irvine ranch.

The three-story stucco research wing provides 10,000 square feet of flexible loft space, which is illuminated by big punched windows. A double-height space at the back of the building is topped by an open terrace.

In typical Gehry fashion, all finishes are simple and utilitarian, including seminautical touches like the steel pipe railing, cables, and turnbuckles used in the stair balustrades. Interior partitions are
white-painted drywall, which is already showing signs of wear in student scuff-marks and the inevitable scribbling. At a construction cost of $105 per square foot, including site work and landscaping, the ICS/ERF building is "a lot of space for our dollar," says campus architect Neuman.

Gehry comments that "the ideas I used at UCI developed out of the pavilion-type layouts of Loyola Law School and some of the houses I've designed in the past few years." These houses include the 1983 Norton house in Venice, Calif., and still-unfinished residential projects such as the Benson house in Los Angeles, the Sirmai-Peterson house in Thousand Oaks, Calif., and the Winton guest house in Wayzata, Minn. But the ICS/ERF complex is, like Loyola, an urban design seeking to enhance and exploit an essentially civic environment—and one that is undergoing major changes at that.

UCI, like the 88,000-acre totally new city of Irvine to the north, has had to invent itself out of emptiness. The 1510-acre Irvine campus was planned by Pereira in the early 1960s. Conceived as a grand ring mall around a central park, his long-range scheme, updated in 1970, featured six radiating spokes with each segment of the ring serving a separate academic discipline. Pereira's master plan aimed at establishing a "heart and sense of place (in the) open and undeveloped landscape." Built mainly in the monumental Parthenon-modern manner Pereira favored for public buildings in the 1960s, UCI's original structures seem to be striving for some kind of cultural weight in the scrubby wilderness.

Campus architect Neuman's influence seems crucial in Irvine's evolution from an architecturally mediocre campus into a more urbane and visually provocative one. In the eight years he has been at UCI, Neuman has increasingly persuaded an aesthetically conservative administration to take some flyers in design.

Apart from Gehry, the roster of architects who have built, are building, or will build at Irvine reads like a who's who of current stars. Charles Moore with UIG designed the university extension building. Moore Ruble Yudell and Ratcliff Architects are planning a psychiatric hospital. Robert Stern has developed a master plan for a fine arts village. Arthur Erickson is working on a $40 million biological sciences complex. Venturi, Rauch & Scott Brown are designing a home for the graduate school of management, and Eric Moss is at work on a housing office.

Other architects who have built or are building at UCI include Robert Kennard, Bobrow Thomas, Kaplan McLaughlin Diaz, and MBT. UCI has a plan to develop, design, and construct $350 million worth of projects over the next eight years, half of which have already been funded.

"We now have outstanding architectural short lists," Neuman says with justifiable pride. "Design is a hot topic on campus these days." Neuman talks bravely of Irvine's "discovery of character," by which he means that each spoke of the campus wheel is engrossed in a search for its own focus in the abstractions of the master plan. "That's why we need highly resourceful and individual designers," he says. "The administration appreciates this, without necessarily loving every new building we commission." Indeed, as Neuman points out, Gehry's new building does arouse passions—both pro and con.

Gehry says, however, that Pereira liked his ICS/ERF design. A year or so before his death late last year, Pereira, as the consultant on campus development, supported Gehry in his presentation to the administration. "It's time now for the next generation to have its say," Pereira is reported to have urged at the time. "Frank was one of my best students at USC in the 1950s, and he worked in my office for a spell. He's a true original." Pereira would probably have been pleased to know that Gehry was recently chosen to carry out his proposal for the phased expansion of the ICS/ERF complex, which has all the promise of becoming a minor masterpiece. Leon Whitson
Frank Gehry's views on his work—where it came from and where it's going—are the subject of an article by Adele Freedman, followed by a look at some of Gehry & Associates' works in progress.

Gehry doesn't presume to tell people what to think, but he is offering a way to think and something to think about.
"I'm very up-front," Gehry says. "I'm not trying to seduce a client. I won't tell them I'll do something they want if I'm not having with himself ever since Charles Jencks applied the word Post-Modernism to describe and promote the work of architects such as Charles Moore and Michael Graves, for whom eclecticism is the wave of the future. Gehry admires Graves for "sticking his neck out and taking a lot of flak," but he has no reverence for the imagery in his work. "I'm committed to the 20th Century," he

Main Street Building, Venice, Calif. (above). This three-story, 75,000-square-foot office building sits atop three underground stories of parking for 300 cars. The stucco-clad L-shaped building, to be completed in December 1987, will be occupied entirely by the Chiat/Day advertising agency. Casting about for a centerpiece for his site plan, Gehry tried a pair of mock binoculars designed by Claes Oldenburg for a previous collaboration—a performance piece in Venice, Italy. The struts appended to one wing are similar to those used at Newbury Street (facing page), but exaggerated in response to the overscaled sculpture.

Winton Guest House, Wayzata, Minn. (right). In this 1600-square-foot guest quarters for a house designed by Philip Johnson in 1952, Gehry avoids the problem of competing architectural styles by treating the guest house as sculpture. His abstract forms are distinguished by shape and material—Kasota stone, brick, painted metal, and plywood. While related to earlier projects such as the Loyola Law School or the Work House, in which Gehry articulates pieces of program as discrete parts, the Winton design is composed of opaque, sculpted solids that disguise rather than reveal structure. The house is to be completed by Thanksgiving.

Yale Psychiatric Institute, New Haven, Conn. (left). This $16 million, 60,000-square-foot facility houses a population of 80 patients, most of them severely disturbed adolescents. The complex is made a village community, a microcosm of the real world. Common rooms for art classes or group therapy are pulled away from the main dormitory blocks and articulated as separate structures around a courtyard, inspired by Yale University quadrangles. The internal organization of the three patient buildings—two clad in stucco, one in silver-colored metal—reflects levels of treatment, from closed units for the most severe cases to open, apartment-style living quarters. The ground floor of one building is given over to commercial space, another to administrative offices. Occupancy is scheduled for January 1989.
360 Newbury Street, Boston, Mass. (right). The first three floors of this renovated commercial building will be dedicated to retail, the fourth and fifth to offices and art galleries, and the top three, including a new eighth floor treated as a giant cornice supported on treelike struts, to offices. The building's two principal brick façades on Massachusetts Avenue and Newbury Street are to be reconstructed.

The former “rear” façades, one facing the turnpike, are to be completely reconfigured, the present concrete infill stripped and replaced with a lead-coated copper grid. Gehry’s metaphor is that of two buildings, one wrapping up and over the other. The corner niche of the new, eighth floor will be occupied by a Claes Oldenburg sculpture. The $9.5 million building is now under construction.

Turtle Creek Development, Dallas (left). This preliminary design for a mixed-use complex on Turtle Creek Boulevard proposes three towers and eight townhouses, with four levels of parking underground. An oval, glass-skinned office building is flanked by another gridded office tower and a similar residential condominium building stacked atop a 100-room hotel.

Photos: Eamonn O'Mahony

Sirma Peterson House, Thousand Oaks, Calif. (above). This 3600-square-foot residence is composed of a main building housing the dining room, den, kitchen, and navelike living room, and two satellite structures for the master and guest bedrooms. Views to and through the house have been carefully orchestrated. From the entrance, three dramatic vistas extend through the living room with its exposed roof joists, diagonally across the den to the ravine beyond, and out to a terrace. The main house and stairwell are roofed in unpainted galvanized sheet metal; cladding is stucco. The house should be completed by March 1987.
PIA Technics
Enclosed Stadiums

P/A Technics
Sports Coverage

Covered stadiums are in demand by spectators and teams alike. They represent, not just the power of cities and the profitability of professional sports, but the prowess of designers able to enclose ever larger volumes with roofs ever lighter in weight.

ONLY seven North American cities have enclosed stadiums for professional sports, most of which date from the mid-1970s or early 1980s. Interest in such stadiums, however, has grown rapidly in the last few years. At least a dozen cities have covered stadiums under study or in construction, and other municipalities are expected to follow.

Several factors explain such interest. Climate, according to architect Ronald Labinski of HOK's Sports Facilities Group, prompted the early domed stadiums, most of which were either in extreme southern or northern cities. "But climate," adds Labinski, "is no longer the major motive—it's image."

The construction of a new, covered stadium usually requires between $75 to $100 million. For a city to undertake such a venture is "an expression of its civic power and enthusiasm," says engineer Horst Berger of Horst Berger Partners. In cities such as Cleveland and Saint Louis, proposals to build new stadiums are, indeed, seen as a way of upgrading their image.

What these stadiums symbolize, though, is not just the vitality of a city, but support for its professional teams. Following the Baltimore Colts' move to Indianapolis, in part because of that city's new Hoosier Dome, the enclosed stadium has become a new bargaining chip in the politics of professional sports. St. Petersburg and Phoenix have begun construction of covered stadiums with the hope of luring teams away from cities that, in turn, are planning stadium improvements to keep their teams at home. At stake here is more than just sports. The possession of a professional team confers upon a city a status and importance far more valuable than the cost of a stadium.

That covered stadiums also make a profit only increases their appeal. "Open stadiums," says architect Ronald Turner of HNTB's Sports Facilities Group, "used to be a financial drain on communities; many facilities were dark over 200 days a year. Enclosing a stadium increases not only the number of event days, but the revenue." It also "creates opportunities for new kinds of events," says Ronald Labinski, "such as the paper airplane flying contest in Seattle's Kingdome."

A turning point in the financing of enclosed stadiums came in 1982. "Because of changing federal policies," says engineer David Geiger of Geiger Associates, "municipalities began to pull out of stadium projects. Developers, recognizing the potential profitability, have since taken the lead, sometimes with little involvement from the city."

The stadiums themselves are just part of the attraction for developers. The amount of related construction, such as hotels and restaurants, that stadiums can stimulate, and the amount of money stadiums can generate for a community are enormous. "One Superbowl game," says Ronald Labinski, "can bring $100 million into a city."

Home Runs
With so much at stake, the proper location and siting of a stadium is critical—and inevitably controversial. Some people argue that stadiums belong in downtowns, or at least in urban locations. "Stadiums," says Ronald Turner, "can stimulate the revitalization of a downtown and can take advantage of a city's existing infrastructure." Implicit in this argument is the idea that, as a symbol of a city, a stadium should be in that city. A few miles can make a big psychological difference, as New Yorkers discovered when the Giants moved across the Hudson to the New Jersey Meadowlands.

Others see benefits in both suburban and urban locations. "Different cities have different needs," says Ronald Labinski. "The suburbs allow less expensive surface parking and ease the assembly of the necessary 150 acres. But urban locations often don't require the building of dedicated highways and parking areas, allowing the stadium to occupy as little as 12 acres."

Factors other than access and acreage can affect location decisions. Barry Wyer of Owens-Corning Fiberglas, in a paper delivered at a recent international symposium on architectural fabric structures, cautioned that, because of the low sound transmission class of the fabrics now used to enclose stadiums, "high exterior noise levels from airplanes, highways, or other sources will be heard within the structure (and) . . . high noise levels during sports events or rock concerts will be
heard outside the structure . . . leading (ing) to complaints from residents living near (by)."

Once a site is found, placement of the stadium requires care. The recent trend toward retractable roofs, in particular, makes the orientation of the stadium an important design consideration. Baseball fields should have the sun behind the batter, with the third base line running approximately north-south. In football, the sun should be parallel to the 50-yard line at half time, which "in most North American cities," says Ronald Labinski, "requires that the field run northwest-southeast at about a 45-degree angle."

The easy access and evacuation of spectators also affects the siting of the stadium. "It's best," says Labinski, "to load the stadium from all sides, with a walking distance of no more than one-half mile from the furthest parking space to the building." Parking structures, he adds, can reduce that distance, although "it's hard to justify them unless there are other nearby facilities that need parking."

Getting Seated

The trip from the car to the seat, if it isn't getting shorter, at least has become more convenient. "Before about 20 years ago," says Ronald Turner, "not much attention was paid to the areas behind the stands. Now, concourses have become much wider, and concession areas more sophisticated, with elaborate kitchen facilities. Concession booths and toilets also have become more numerous to reduce time waiting in line, with video displays of the game to make the wait less aggravating."

The wait to evacuate a stadium has more dire consequences. "Most building codes don't address stadiums adequately," says Labinski, "so, for each project, we conduct time/exit analyses that take into account such factors as the number of people exiting, the capacities of the openings, and the rate of movement on concourses and ramps. We aim for a complete evacuation of a stadium in 15 minutes."

While convenience has led to an increased use of escalators, ramps remain the primary means of vertical circulation in stadiums. "Spiral ramps," says Labinski, "work well because they have fewer landings, accommodate vehicles more easily, and allow a faster, safer movement of people. The drawbacks are that they take up more space and are more expensive than switchback ramps."

Once spectators arrive at their seats, creature comfort takes over. The best example of that is the now widespread use of private viewing suites, complete with wet bars and plush furnishings. Stadium owners, at both the professional and collegiate sport level, have eagerly built such suites because of the revenue they generate. In some stadiums, suites rent as high as $100,000 to $150,000 a year.

Ordinary spectators' seats, too, have become more plush. Because interior surfaces no longer need be weather-resistant in enclosed stadiums, more comfortable theater-type seating can be used. Retractable roofs won't affect that trend much, since many will close upon demand.

No amount of convenience or comfort, though, can compensate for a poor view of the field. The roughly square field of baseball is best viewed from V-shaped stands centered on home plate; the rectangular football and soccer fields, from rectangular stands centered on the 50-yard line. While single-purpose stadiums allow the optimum viewing, most stadiums accommodate several sports, requiring the use of movable stands. Here, no two stadiums are alike. Some have bleachers that telescope out from under the permanent seating; some, movable stands that wheel into place; and some, permanent tiers that change in shape or orientation. The trade-off seems to be between the amount of movable seating and the proximity of seats to either the baseball or football field.

The construction of stadiums usually involves a poured concrete structure supporting precast concrete tiers. But, "that depends upon the availability of materials and labor at a given location," says Michael Kerr of the construction firm of Huber, Hunt & Nichols. "If labor is expensive, we might switch to a steel structure; if the quality of local precast isn't good, we might switch to poured concrete stands. There is no set method."

Rainchecks

If the design of concourses and stands has followed an evolutionary course, the design of stadium roofs

The proposed New World Center in Columbus, Ohio (1a, b, c), designed by HOK's Sports Facilities Group and Geiger Associates, will feature a movable two-tier seating and concourse section. When fully extended, that section will form a 65,000-seat football stadium; when partly extended, a 15,000-seat arena and a 200,000-square-foot convention center; and when completely retracted, a 300,000-square-foot convention center. Adjacent to the structure will stand additional convention center facilities and parking for 3500 cars. A Takonaka truss roof (see P/A, Aug. 1984, pp. 94–99) would span the entire stadium, 100 feet above the field.

The proposed covering of Arrowhead Stadium in Kansas City by HNTB's Sports Facilities Group and Horst Berger Partners (2a, b) will have a saddle-shaped cable roof. The roof system, patented by Berger, will have two layers of cables running perpendicular to each other. A compression ring and compression struts between the two layers keeps the cables in tension.
PIA Technics
Enclosed Stadiums

The Hoosier Dome in Indianapolis (below) has an air-supported roof. Designed by HNTB and Browning Day Mullins & Dierdorff, it stands on a 12-acre site and seats 61,000 for football, soccer, and track events. The air-supported roof, designed by Geiger Berger Associates, utilizes David Geiger's patented idea of skewed symmetry. The roof's cables run perpendicular to the corner tangents of the stadium, and are kept in tension by the perimeter compression ring and by a few pounds of positive air pressure. To maintain that pressure, the stadium has pressurized doors, air locks at truck docks, and additional fan rooms. To avoid heating or cooling the entire volume, conditioned air is directed to the seating areas.

has been outright revolutionary. "Most engineering projects involve the selection of accepted design practices from handbooks," says Horst Berger. "These roofs demand a totally different approach; everything must be invented, requiring skepticism of every design decision."

The first enclosed stadiums used steel or reinforced concrete domes. While they offered the advantage of conventional technology, such roofs were expensive, heavy, and difficult to waterproof. The glazing and trusswork of stadiums such as the Astrodome also created so much pattern that outfielders would lose fly balls amidst all the visual clutter.

Such problems led to a second generation of air-supported stadium roofs, the largest of which were designed by David Geiger. To make these structures work with the flat-sided, superelliptical shapes often used for stadiums, Geiger developed and patented the idea of skewed symmetry, which ran the cables in the fabric dome perpendicular to the tangents of the curves' symmetry points. That "equalized the size and load of cables," says Geiger, "and freed the architect, since it worked regardless of the stadium's shape." Geiger later discovered that, as long as the cables in the center of the dome were perpendicular to the tangents, the cables along the perimeter could vary somewhat in their angle, simplifying their connections at the compression ring. The result was a very lightweight and inexpensive structure, capable of almost any span.

Air-supported roofs, though, had their problems. Their concave inner surface and the fabric's reflectance of high frequency sound made the stadium interiors so noisy that football teams have considered using radio transmitters and receivers in their helmets. Fabric inner liners or banners have reduced the noise somewhat, but they have not eliminated the focusing of sound inherent in such shapes. Also, the few pounds of positive air pressure necessary to support the roof required that the stadiums have revolving doors, air locks for trucks, reinforced elevator shafts, and additional fan rooms. That added not only expense, but inconvenience.

But the real decline in popularity of air-supported stadium roofs, at least in the U.S., came with increasing litigation. Some projects have had several lawsuits stemming just from damage to the
fabric during construction. Deflations of the roofs after completion, caused by malfunctioning or poorly operated mechanical or snow removal systems, led to further lawsuits. While Geiger sees their continued use overseas, “air-supported stadium roofs have had it in a society as litigious as the U.S.”

Enter the third generation of enclosed stadiums, just now being designed and completed. They have fabric roofs supported, not by air pressure, but by tension cables held taut either by large masts or arches, or by smaller compression struts and a compression ring. Both David Geiger and Horst Berger have been involved in the engineering of these cable domes, and both have patents or patents pending on most of their designs.

The advantages of cable domes over those air-supported are many. Cable domes are more easily insulated, rigged with catwalks, darkened with black-out curtains, and retracted during pleasant weather. They also can take greater snow loads and demand less exacting maintenance. Their higher cost and greater demand for on-site labor remain their major drawbacks, although the elimination of the equipment and details required for pressurization makes them competitive with air-supported roofs.

**High Tech Tarpaulins**

The first fabric roofing used on large stadiums was Teflon-coated fiberglass. While fiberglass has an extremely high tensile strength, much of that strength is lost if exposed to moisture. The Teflon coating, a polyfluorocarbon resin made by Du Pont, provides that moisture protection as well as resistance to most chemicals, high temperatures, and ultraviolet light. “The projected life of the fabric,” says John Dunn of OC Birdair, “is 25 to 30 years. It passes all the accelerated weathering tests, and, in its first installation—now 14 years old—the material shows no signs of deterioration.” With flame spread and smoke developed ratings of 5, it also meets the code definition of a noncombustible material.

The drawbacks of Teflon-coated fiberglass are its higher material cost and lower translucency than the competition, and its tendency to crease and thus lose strength if not shipped and handled carefully. Still, among large stadium roofs, it remains the most frequently used material.

The recently approved Phoenix Stadium by HNTB and Horst Berger Partners (below) will be one of the first retractable roof enclosed stadiums. Patented by Horst Berger, the stadium roof will consist of two tilted arches with steel trusses connecting them to a perimeter compression ring. The steel trusses will be in compression as the arches are built, but will then become tension members once the cable-supported roof is installed and loaded. The central, retractable portion of the roof will contain a fabric-covered steel frame, 480 feet long and 380 feet wide, that will move along a track, supported and stabilized by cables. The stadium will accommodate 73,000 for football, 47,500 for baseball, 19,000 for basketball and hockey.
This baseball stadium designed by HNTB (below), not yet announced, will have a cable dome designed and patented by Horst Berger. The dome will contain radial steel-truss arches springing from a perimeter compression ring. Supporting the arches will be compression struts, as large as 18 inches in diameter, that will be supported, in turn, by cables kept in tension by the compression ring and the struts themselves. The struts and cables, during construction, will act as scaffolding, supporting the arches as each segment is installed. Another version of the cable dome, patented by David Geiger, has concentric rings of cables and struts that are supported by radial cables running from the top of one ring to the bottom of the next.

Its major competitor is silicone-coated fiberglass. Silicone also protects the glass fibers from moisture, and also resists ultraviolet light, high temperatures, and most chemicals. Its advantages over Teflon-coated fabric are its higher translucency (up to 80 percent), its greater pliability (simplifying shipping and handling), and its lower material cost. The higher translucency, in particular, allows natural turf to grow in enclosed stadiums and provides high daylight levels, even when double layered and insulated.

Yet, silicone-coated fiberglass too has some drawbacks. For example, it is more difficult to repair than the Teflon-coated glass because of its adhesive-made joints. (Teflon fabrics have a thermoplastic outer layer that allows the heat welding of joints.) And when the material first became available, some people questioned its flame spread characteristics and a tendency to look dirty. However, the material now “passes all of the major fire tests,” says Pam Strickland of ODC, “such as ASTM E-84, 108, and 136. And it is now available in a white pigmented fabric that will counter any perception of it looking dirty.”

A third type of fabric—vinyl-coated polyester—has yet to be used on the largest stadiums because of its shorter life and greater attraction of dirt than either silicone- or Teflon-coated fiberglass. But “that will change,” says Bala Venkataraman of Seaman, “now that we coat the fabric with Tedlar, a polyvinylfluoride film made by Du Pont. Pigmented Tedlar extends the life of the vinyl close to 20 years, and as a homogenous film, it is self-cleaning.” With the lowest material cost, “Tedlar-coated vinyl polyester,” adds fabric roof consultant Todd Dalland of FTL, “offers the greatest cost benefit of these fabrics.” Whether it will replace the fiberglass fabrics on large stadiums is another question. To match the translucency of Teflon-coated fiberglass, the vinyl polyester must use a nonpigmented Tedlar, which has a life of only 15 years. The polyester also has a greater elongation, which, while predictable, may present problems over very long spans with large loads. As David Geiger puts it: “The jury is still out on these newer fabrics.”

The verdict, however, remains good for the stadiums those fabrics enclose. “For the last few years,” says John Dunn of OC Birdair, “there’s been an average of one enclosed stadium built each
year—a rate that will probably continue." Add to that the interest among European and Pacific Rim cities for enclosed stadiums, and, as Ronald Labinski says, "the market for them looks very strong."

It's not a market in which many architects will work. A few architectural, engineering, construction, and fabrication firms design or build most of the large stadiums—a specialization that is probably inevitable given the complexity and expense of the building type. But it's a market that has put architecture very much in the public eye. "What other type of building," asks Ronald Labinski, "will make headlines on both the sports and the front page?" Motivating that public interest is not just boosterism for the city or the team, but, says Horst Berger, "an almost mystical interest in these stadiums. They are the cathedrals of our time."

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**Further Reading**


The stadium at Riyadh, Saudi Arabia (below), was designed by Ian Fraser, John Roberts & Partners of London, with Geiger Berger Associates providing the engineering for the fabric roof. Because of the climate and client requirements, the fabric roof does not cover the stadium's playing field, even though the structural system is more than capable of spanning the roof's 945-foot diameter. Each of the stadium's 24 bays has a sail-shaped fabric stretched between one upright and one tilted mast. Cables stabilize the fabric and masts. The perimeter of each bay is open to enhance cross ventilation. Demand for such elements as concession booths, private suites, and press boxes is less in Saudi Arabia.
Vestar® architectural fabrics combine glass fiber with the weather protection of silicone polymers. The fabrics are resistant to UV degradation, temperature extremes, moisture, and most chemicals. Weighing an average of less than half a pound per square foot, the fabric enables savings in structural support systems. An eight-page brochure provides a table of typical properties and outline specifications. ODC, Inc., Subs. of Dow Corning Corp.  
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Shelter-Rite® synthetic fabrics are used for architectural applications such as air structures and tensioned membrane structures. The material has a base woven of Du Pont Dacron polyester coated with vinyl and clad in Du Pont Tedlar® PVC. It withstands extremes of weather and temperature as well as the effects of atmospheric contaminants. Seaman Corp., Industrial Fabric Div.  
Circle 102 on reader service card

Tedlar® PVC cladding on outdoor vinyl fabrics makes them more resistant to the effects of weather, soil, and fading. The cladding is available as a clear, UV-screening film and as a pigmented film offered in more than 20 colors. Both films help to reduce cracking and embrittlement of PVC-based fabrics. A simple patch kit will allow fabrics protected by Tedlar to be repaired on site. The film does not burn readily or support combustion. Du Pont Company, Finishes and Fabricated Products Dept.  
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Portomod® structures come in a variety of membrane colors and fabricated patterns to blend into the environment or to stand out. They install quickly with unitized galvanized steel trusses and sectionalized roofing membrane. Trusses also handle electrical conduit, pipe ducting and sprinkler systems, lighting, temperature control systems, and insulation. Seaman Corp., Building Systems Div.  
Circle 104 on reader service card

‘Creating Permanent Fabric Structures’ discusses design considerations, advantages, applications, and structural choices. A series of color photos show installations serving a variety of uses. A table provides winter and summer thermal and optical properties of Sheerfill architectural fabric roof systems using single, double, and triple membranes. OC Birdair.  
Circle 201 on reader service card

Unistrut® space frame brochure describes three systems intended to meet a variety of structural requirements. Detail drawings show sections and structural supports, and color photos show each system as it was used in actual buildings. Specifications are provided for the three types. Unistrut Corp.  
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Spandomes are clear-span membrane structures with structurally independent wall and roof sections. Walls can be vertical, made of many types of building materials, and have openings of any size. A roof can be used alone, supported at ground level, but is usually raised, supported on corner tripods. A four-page brochure explains Spandome features and provides specifications. Span Systems, Inc.  
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The Powr-Spot floodlight system for arena lighting uses 1500-watt Multi-Vapor metal halide lamps. Following installation of Powr-Spot, a portable aiming sight mounts directly to each light, allowing adjustment up or down, right or left. A 32-page guide describes the Powr-Spot lighting system and provides the amount of light for each watt of electricity used. In the Atlanta/Fulton County stadium, the Powr-Spot lighting system uses 774 floodlights, compared with 1608 floodlights in the old system. Two overlapping arrangements were designed by GE to meet the requirements of both football and baseball. General Electric, Lighting Systems Dept.  
Circle 106 on reader service card

Air-supported and tensioned membrane frame structures are described and illustrated in a four-page brochure. Air structures have two basic stress-relief systems—a balanced web or an integrated polyester web for buildings that are frequently relocated. Tensioned frame structures are segmented parallel arch clear spans with canted end arches. Components of each type and accessories are included in the descriptions. Air-Tech Industries, Inc.  
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Of Symphonies and Synagogues

Buildings can simultaneously be categorized by describing the evolution of the various ways they have accommodated similar programs and by describing the historical circumstances that produced those programs. Two recent examples of such an approach, Michael Forsyth's Buildings for Music and Carol Krinsky's Synagogues of Europe, exhibit both the strength and the limitations of such a method. They succeed in providing annotated and alluring catalogs; they fail where they do not provide a convincing enough narrative or mythology to validate the project of assembling such a catalog.

Forsyth's Buildings for Music provides a plethora of pictures and a thorough, and one must assume correct, technical analysis of public rooms used for listening to music. But while the images convince us of the beauty and variety of the spatial variations on the simple box for listening, the text gives only a scientific rationale, which explains the horseshoe and the shoebox, the glittering opera spectacle and the austere shrine to the composer, all in terms of decibels. One is never sure how to judge these buildings. The reader receives neither a broad cultural picture, nor the critique of the composition or design of buildings one expects from an architectural history.

The sudden appearance of profitable rooms devoted exclusively to listening to music for its own sake marks the starting point of the volume. Yet why did the gentlemen of England begin to demand such rooms? What defined their design? If one is to believe Forsyth, only the happenstance of which entrepreneur converted what space to meet a sudden and mysterious demand for concert halls started the traditions of this type. And even though he remarks that the first such building, which opened in 1675 in London, was described as "a great room . . . with proper decorations as a theater for musick," he does not explore the tantalizing notions of what a "theater for musick" might mean to a new urban gentility escaping the allegorical masques of the Stuart courts, or what might make the architecture "proper" for such an audience.

Perhaps such criticism goes beyond the scope of this work. The problem is in the expectations raised by the integrated design, lavish presentation, and breezy text. Forsyth keeps promising to set his buildings in their context, and then reverts to such evasive phrases as "interesting" and "interrelated," interspersed in a panoramic and often scattered narrative of the opening of building after building devoted to the evolving tastes in concert going. The complex evolution of opera and opera houses, which served as a metaphor for debates leading to the French Revolution and which displayed the relationship between changes in social mores, technical advances, and architectural modes, is exhibited in the following manner: "... first, the opera houses were built for known musical demands, and second, they were built as a projection of the current social needs associated with operagoing. The two are interrelated, and, interestingly, changes in social habits would themselves affect the acoustics."

Forsyth sees every built form as a reflection of the needs of a new type of musical composition, instrument, or audience. He discusses at length how Haydn adapted his music to the hall in which it was to be played, and how Wagner's Bayreuth hall increased the mystery and impressionistic feeling of the music by hiding and muffling the orchestra. But nowhere does he relate the German and English churches and rooms in which Haydn's music was played to contemporary architectural themes, nor does he comment on the bizarre mixture of neo-folk architecture, eclectic space-making, and technological imagery of Bayreuth. In fact, he does not even describe the spatial or ornamental characteristics of these buildings in any detail. By the end of the book, one is left with endless speculations on the meaning of acoustical experimentation and its influences on current building practices, and one must believe that our orchestra halls always have looked and sounded as they do. The type has been subsumed by the criteria that define it.

Carol Krinsky's Synagogues of Europe is much clearer in its structure and purpose. Rather than promising the chronologically arranged technical themes Forsyth sets out, this volume is divided into a thematic introduction, a chronological survey, and an illustrated catalog of prototypical synagogues from most countries in Europe from the Middle Ages to the present. And even though the examples might be as far separated and as located only in the footnotes of commission and construction as Forsyth's, here the author makes no claims otherwise.

Krinsky identifies several internal and external determinants for the evolution of the Jewish religious type in its European diaspora. The space of the synagogue is opened up in the tension between the bimah, or place from which the Torah is spoken or sung, and the ark, the shrine to the unseen origins of Jewish law. This space, both centered and elongated along a devotional axis, then is always present to emphasize the word and remain hidden from an alien and suspicious outside world, generating its own light and solidity from the mysteries revealed only in the abstract language of the Torah. At the same time, the appearance of this hidden sanctuary both conforms, because of direct or indirect peer pressure, to prevailing architectural tastes and appears exotic, not of its place or time. Krinsky ably delineates these themes, though she does not sufficiently refer them to the wealth of examples that follow the chronological exploration of the issues.

What is fascinating is to watch (continued on page 118)
the transformation of the same basic plan, the same tensions between hidden and revealed, known and imagined, received order and wishful escape, appearing through the wooden structures of the Pale, the stone shelters of Spain, the cultured churches of Holland, the Moorish extravagances of emancipated Germany, and the archaeological Modernism of England. The synagogues of the shtetls, or villages, recall the austere power of the pioneer home and the Protestant Church, reminding one of the nonrepresentational abstraction of architecture. The giant temple on the Oranienburgerstrasse in Berlin is an opulent cathedral of a monied congregation meeting for social purposes, yet its ecletic grandeur must have made even these polite German Jews sense the structural difference represented by their history and private memories.

What hampers Synagogues of Europe is not the author’s solid exposition of the type, but the lack of documentation of the type. The black-and-white photographs preserve glimpses of a culture whose very adaptability doomed many of its structures, and which even at the point of its assimilation was destroyed. Peering at the damaged documents reproduced from Poland, Hungary, and Russia, one can only wish for images to match the description by El Lissitzky of a synagogue he visited in 1916: “It is like a child enveloped by a netting, opening his eyes upon awakening and being startled by insects and butterflies glittering in the rays of the sun . . . the whole structure . . . is full of a few simple colors, giving you the impression of a world alive and blooming.”

That world is now lost, which is why it is perhaps easier in this book to imagine and mythologize the type. Without a scientific description of the kind of tent or tabernacle that might have best housed a certain number of people, one reads this typological catalog like a magically real enumeration of the kind of synagogue that might have been. One almost wishes that Krinsky had not illustrated the few disheartening post-War synagogues included in the book.

Krinisky’s book does not make easy reading or looking, as the Forsyth volume does. One is left to make up stories, as one is in the volume on musical buildings, but one is constrained neither by a vague chronological promise nor by a technical dogma. Synagogues of Europe is thus closer to realizing the potential of typological analysis. By collecting fragmentary facts, images, and a structure given by the evolving relationship between function, user, and designer, the author has set the stage for the exploration of the forms of an architectural project in terms of the mode of self-representation of both the culture that produced these structural artifacts and of our myth of that culture.

Aaron Betsky

The reviewer is an architect and architectural journalist working for Frank O. Gehry & Associates in Los Angeles.
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(continued on page 132)
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Fullspace high-density storage systems brochure covers light-, medium-, and heavy-duty mobile shelving. It discusses maximizing shelf space by eliminating fixed aisles, and includes information on design, storage capabilities, floor load considerations, architectural constraints, and safety features. The brochure offers advice on rail placement and fitting a mobile storage system into existing space. Lundia.
Circle 214 on reader service card

Europa II appliances have gray surfaces with accents of pinstriping. The group includes ovens, cooktops, a dishwasher, hoods, and a trash compactor. Cooktops are made of tempered glass with four burners, two with built-in temperature controls. The dishwasher uses steam to loosen soil before washing with water. An eight-page brochure illustrates the appliances and provides information about dimensions and electrical requirements. Thermador/Waste King.
Circle 215 on reader service card
Architectural Hardware catalog covers door stops, bolts, pulls and plates, closers, knobs, and levers, as well as cabinet hardware. The eight-page catalog includes descriptions, illustrations, and a list of finishes available. H.B. Ives.

Circle 216 on reader service card

Greenhouse brochure illustrates several models, both attached and freestanding. Several feature a 44-inch radius curve and have sliding doors and vent awning windows. One-inch thermal glass is standard. Units are 100 percent thermally broken. Roofs are made of tempered and laminated safety glass; vertical panes are tempered glass. Accessories include fans and insulating shades. Solite Solar Systems.

Circle 217 on reader service card

Structural Glazed Silicone (SGS®) Systems, described in a catalog, create a seal designed to impede water and air infiltration. Essential to good SGS systems installations are proper joint design and tooling, curing time, compatible cleaners and primers, and suitable handling methods for glazed frames. O'Keeffe's Inc.

Circle 218 on reader service card

Space system walls can be used for a single work station or a whole office. The system has a curved wall, a straight wall, and a flexible wall called Snake that can be curved in any desired radius, which can be combined in many configurations. Three walls range from transparent to opaque, with four types of windows in the opaque walls. There are vertical and horizontal wiring channels and several hang-on components. A series of fins accents the curves of the partitions. Sacea.

Circle 126 on reader service card

Elastoprene® Compression Seals architect's guide and installer's manual includes specifications, definitions of terms, and construction and installation procedures. The seals are used in expansion joint fillers to prevent water from penetrating the joint and entering the infrastructure. The 20-page manual reviews improperly formed concrete joint installation, splicing metal retaining lines and top cover plates, cross, tee, and L intersections, and changing directional planes. MM Systems.

Circle 219 on reader service card

Building Materials

Major materials suppliers for buildings that are featured in this month as they were furnished to P/A by the architects.


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Circle No. 306 on Reader Service Card
The New Atrium
Michael J. Bednar, AIA
240 pp., illus. . . . $37.50
This book presents new ways to think about atriums in urban planning, architectural design, and historic preservation. The author shows how atria can be utilized to enhance the desirability of a structure's design.

Art and the Computer
By Melvin L. Pruett
240 pp., illus. . . . $35.95
This book provides a report on some of the fine works of art being produced by artists using computers. It includes discussions of problems in computer picture production and explains how they have been solved. The book also demonstrates various methods of displaying scientific data and mathematical formulations that are used in various fields.

The Design Connection
Edited by Ralph W. Crump and Martin L. Hamma
184 pp., illus. . . . $26.95
This book presents a series of essays on the relationship between architectural design and human values. It brings the gap between architectural theory and practice.

By Richard L. Austin, ASLA
159 pp., illus. . . . $26.95
This guide demonstrates ways to ensure that the design of one's home is functional, technologically feasible, and aesthetically pleasing. It provides helpful tips and realistic guidelines for designing a residential project.

Three Centuries of Architectural Craftsmanship
By Colin Amery
167 pp., illus. . . . $17.95
This book contains a broad, international selection of architectural drawings that represent the most outstanding contributions to the field. It provides a survey of architectural drawings from the Renaissance to the present day.

New Techniques of Architectural Rendering
By Helmut Jacoby
25 Archıtectural Rendering
By DuBo Dickinson
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This book offers a multitude of ideas to help both architect and homeowner. It provides techniques for using computer programs to create effective and beautiful designs.

Residential Design
By Paull Wallach
218 pp., illus. . . . $19.95
This book will help you turn out high quality architectural illustrations quickly, easily and confidently. It demonstrates proven techniques for clearly expressing a wide variety of architectural forms.

Anatomy for Interior Designers, 3rd Ed.
Edited by Edward & The Editors of "Design Magazine"
111 pp., illus. . . . $49.00
This book encompasses the role of the individual components and units of furniture for contemporary design, and includes chapters on area rugs, tile, furniture, lighting, wall coverings, and lighting fixtures.
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PA in November

Isozaki’s Museum in Los Angeles
The bold geometries of Tokyo architect Arata Isozaki have taken their place in downtown L.A., in the Museum of Contemporary Art (Associate Architects: Gruen Associates). Designed to be the centerpiece of a high-rise office development, the $23 million structure gains presence through form and materials such as the rough-faced red sandstone. Inside, galleries of imposing scale have refined systems of skylighting.

Restored Theaters
Two of the world’s landmark theaters—the Schauspielhaus in East Berlin by Schinkel and the Opera House in Dresden by Semper—have been re-created out of ruins.

P/A Technics
Fire Safety
A thorough discussion of life safety in historic buildings will center on the trade-offs and various alternative safety measures now allowed by code.

Future Issues
December will bring P/A’s first Information Sources issue, a guide to all the information you need. And in January, P/A will publish its 34th annual P/A Awards issue.

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In the Division of Architecture at the University of Virginia has open the following faculty positions:
1) Assistant or Associate Professor of Architecture in tenure track position to teach and conduct research in the area of architectural technologies. All candidates should have proven capability of teaching design studio.
2) Assistant or Associate Professor of Architecture in tenure track position to teach architectural design with expertise in development and urban studies.

Please send letter of interest, current resume and the names of three professional references to Bruce Abbey, Chairman, School of Architecture, University of Virginia, Charlottesville, Virginia 22903.

DEADLINE DATE FOR APPLICATIONS: February 1, 1987. The University of Virginia is an equal opportunity employer.

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Texas Tech University—Dean of College of Architecture—The college previously operated as a division and recently was organized into an independent college. Candidates should have strong interest in teaching and the administration of a college. The university is a regionally accredited institution with a strong tradition in architectural education and research. The position is available June 1, 1987. Salary competitive. Send applications to: Dr. Carl H. Stem, Chairperson, School of Architecture, Texas Tech University, Lubbock, Texas 79409.

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