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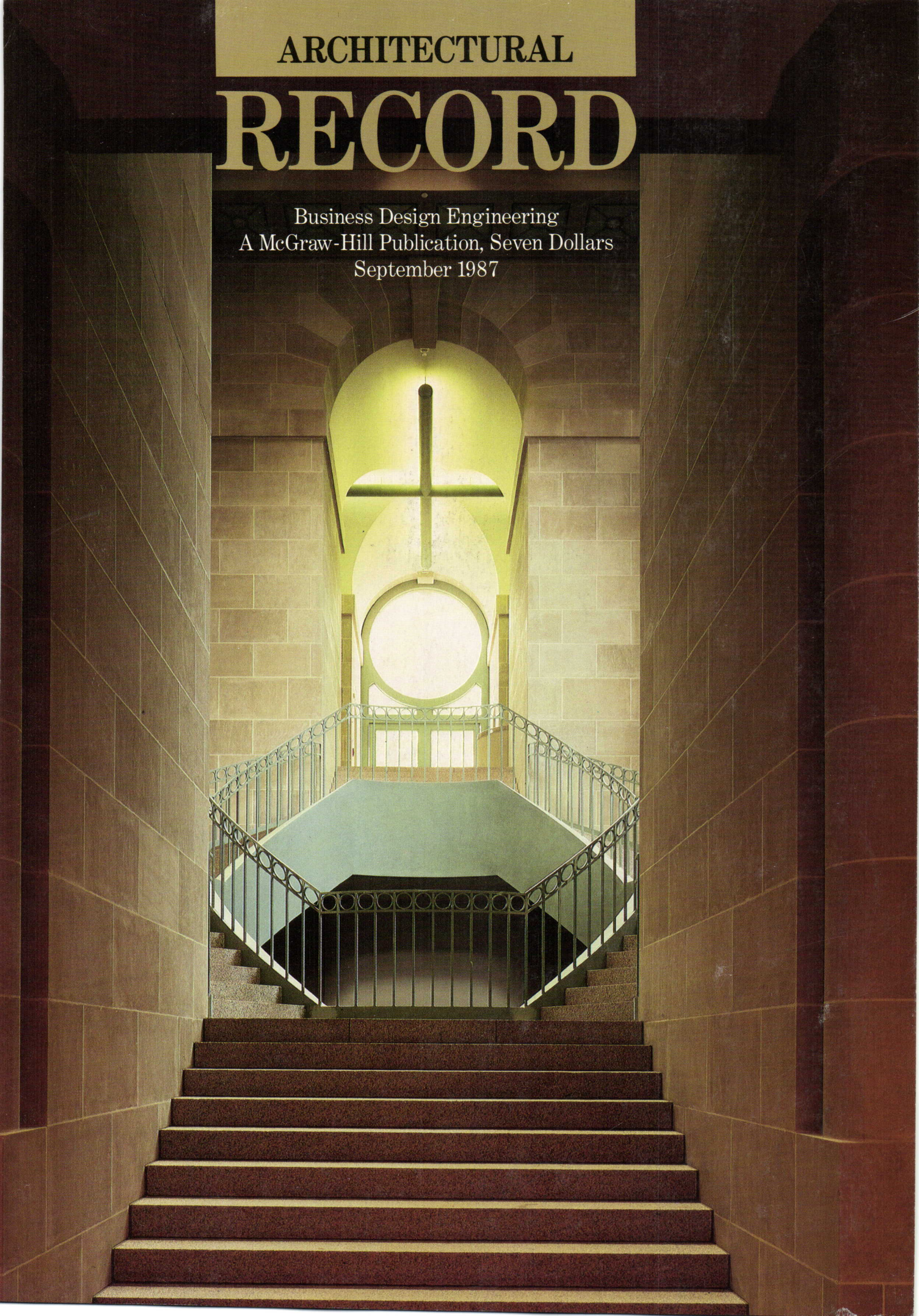


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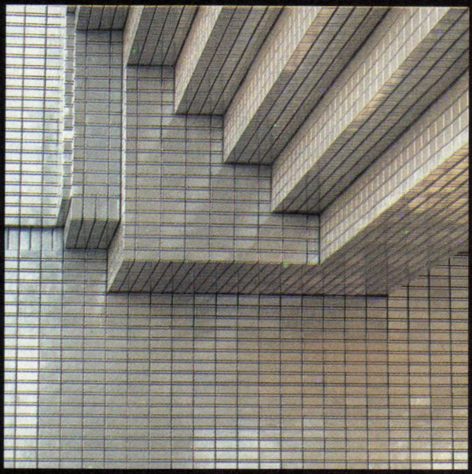
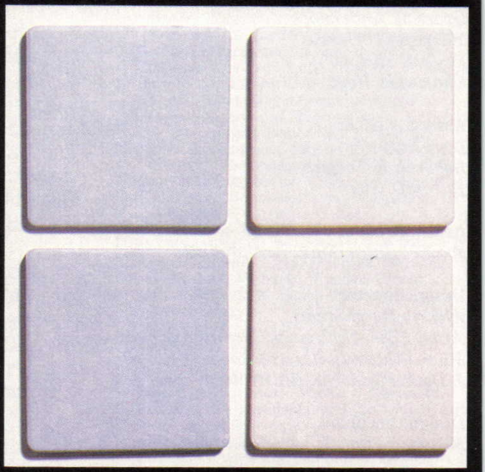
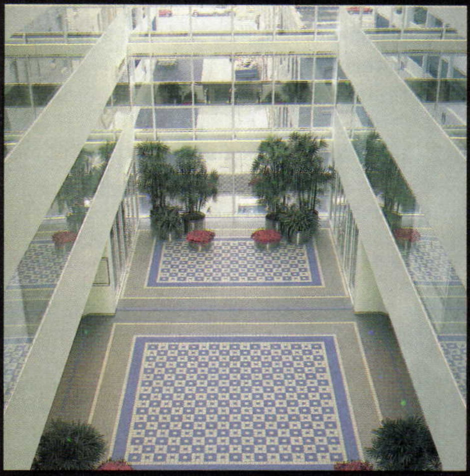
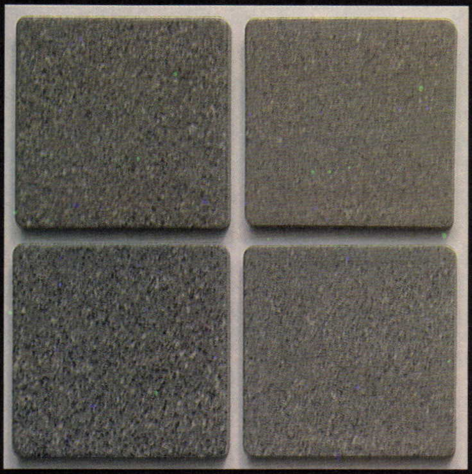
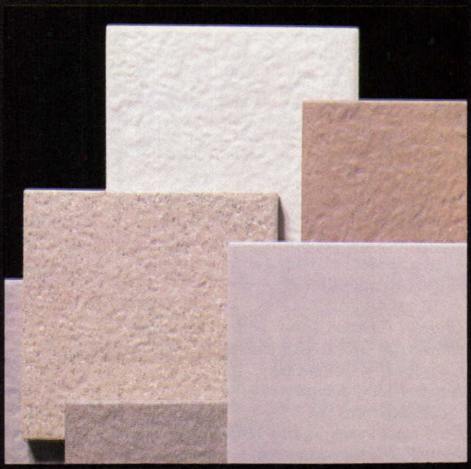









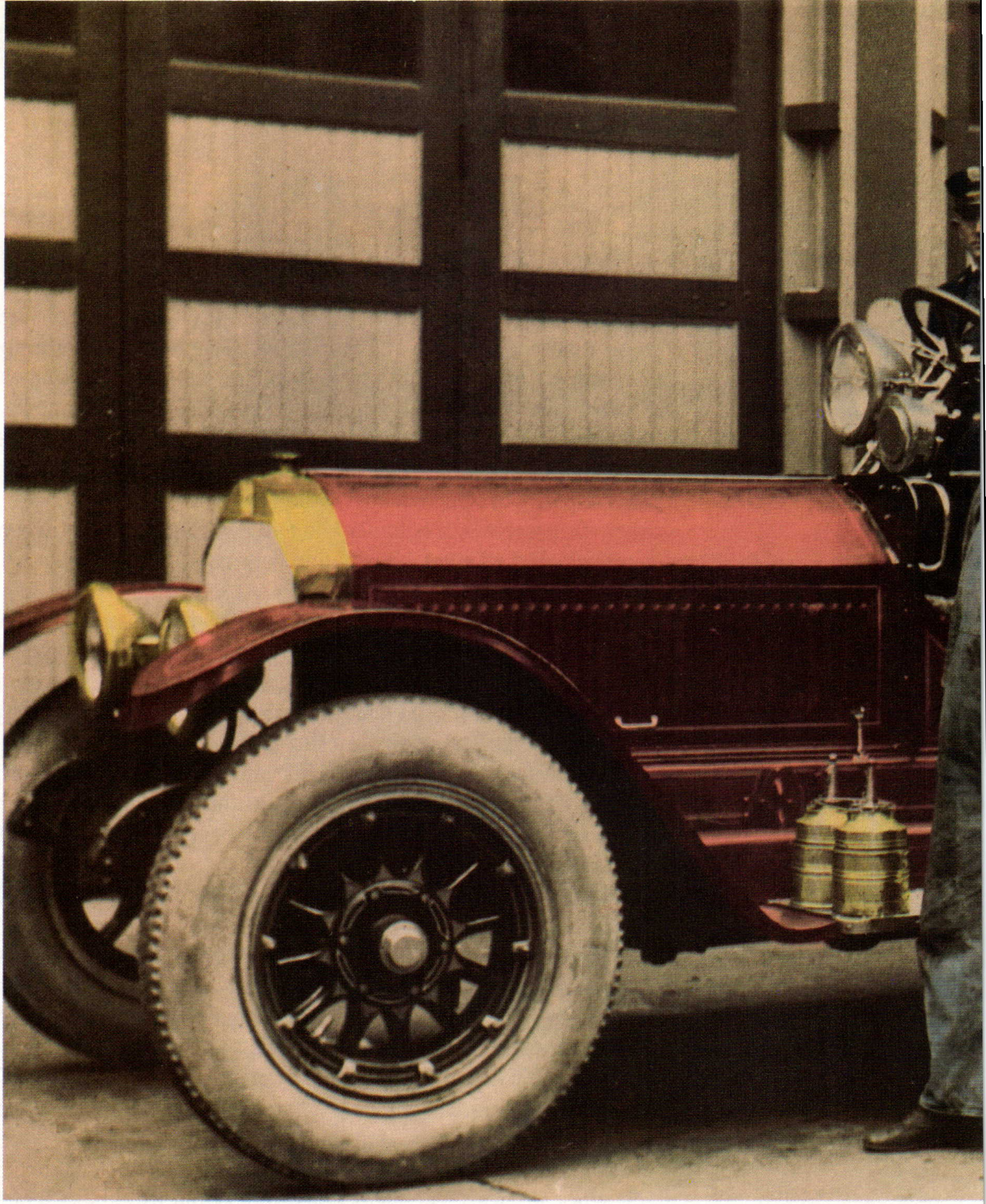
Making the most of your micro

Rather an odd, "how-to-do-it" title for the RECORD editorial page, you may think, but I have my reasons. More and more of you use microcomputer systems, which you are steadily expanding and upgrading. You have learned that there is architectural software galore to be had, but still are insufficiently informed as to what to buy and when. Many of you are or soon will be using your micros to research building-products catalogs, and will soon begin computer-aided specifying, the technology of which is not far behind. Both interrelated developments will greatly transform and enhance the daily work of architecture, making it more economical and efficient, simplifying code compliance, and offering greater protection against liability.

Since the technology for computerized product research and specification is not restricted to large offices with mainframes, even the smallest firms can play. To get started, one microcomputer is needed (see page 135 for minimum capacities required) and a single operator who learns the tasks by means of an array of special software the industry calls "tutorials." In this issue, to help you get on with it, RECORD offers a tutorial of its own: "Using your micro to specify" by software expert Steven S. Ross (pages 134-137). The first in a projected series on computer technology to be written by Ross, it will be followed by monthly reviews of available or forthcoming architecture-related software of all kinds.

These reviews, averaging from one to three per month, are planned to be useful to microcomputer users in large, medium, and small firms, who at present get little help from software suppliers. Ross will not address the needs of those of you who have mainframes, since firms that sell to you do a better tutorial. If you are already using micros, and want to enhance or upgrade your existing system, you will be kept up-to-date on various add-on capabilities. Software categories Ross will be covering include graphic design, project management, documentation, facilities management, and record-keeping. He will vary his reviews within the course of a year to include as many subjects of interest as possible.

Ross and RECORD welcome your comments and suggestions. Write and let us know what software packages and add-ons you would like us to review. Share your experiences of what works and what doesn't, successful applications, frustrations, mistakes. To say it again, make the most of your micro. And let us help.
Mildred F. Schmertz



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Introducing the densest carpe

Construction-economy update: Rising interest rates won't help the short-term outlook

By George A. Christie

The more you see of 1987, the less there is to like. This year started off well enough for the construction industry, with contracting for new projects still clinging to its peak 1986 rate of close to $250 billion. By midyear, the pace had slackened by $10 billion (annualized), and it isn't going to stop there.

During the first quarter, retrenchment in the overdeveloped office and apartment markets had already dragged construction activity down. Delayed highway legislation, which interrupted federal funding, created a secondary complication. Then came April's credit-tightening interest rates that led to second-quarter declines of single-family housing and institutional building. Even though highway projects rebounded in the spring as the new transportation act unlocked the Highway Trust Fund, total construction contracting slipped back another notch as interest rates rose.

Earlier forecasts of 1987 construction contracting in these pages (issued in November 1986, pages 35-43, and May 1987, pages 39-43) anticipated the inevitable weakness in office buildings and other commercial structures that, in fact, developed as a result of developers' and investors' adjustment to tax reform.

But as long as interest rates remained reasonably stable, there was reason to look for continued support from other sectors such as housing and institutional building. Our experience in the first half of 1987 has borne out the bleak prospect for commercial building, but the recent volatility of interest rates now requires a re-evaluation of what we have come to think of as the industry's comfortable "safety nets."

The decline of commercial building has gathered considerable momentum; public-works construction, however, looks stronger

Commercial building (loosely defined here as the total of offices, shopping centers, warehouses, hotels/motels, and apartments going up) is now into its second year of decline as tax reform provides another reason to build less. The best reason: double-digit vacancy rates—the hangover that followed the five-year celebration of the availability of real-estate tax shelters. Six quarters of decline (commercial building peaked in 1985's third quarter at the extraordinary rate of 1.9-billion square feet) have reduced the start of new construction by 25 percent. But with so much space still reaching completion and spilling onto the market, vacancy rates have yet to recede.

The severity of the overbuilding malady varies widely, ranging from mild discomfort for shopping centers to acute indigestion for offices. All the commercial-building categories share several common features, however.

- Overstimulation by the availability of accelerated depreciation since the Economic Recovery Tax Act of 1981.
- Adjustment to full-term depreciation as required by the Tax Reform Act of 1986.
- Concentration of vacant space in the Sunbelt (and particularly in the Oil Patch).

The regional imbalance of the commercial vacancy problem is a mixed blessing. Despite a national average of close to 20 percent for office vacancies, demand remains reasonably strong in the Northeast and North Central states where building proceeded at a more moderate pace during the early 1980s when the South was booming. But, with most of the vacant space concentrated as it is in less than half the country, its absorption will be a long and painful process.

In its second year of "the return to reality," the decline of commercial building has gathered considerable momentum, as expected. With offices leading the way, total commercial building (including apartments) is headed for a setback of 15 to 20 percent, following last year's 9-percent decline. Regional differentials in 1987 continue to point up the geographical diversity of the commercial-building market. Contracting for offices, apartments, shopping centers, and hotels faces a decline of up to 25 percent in the South, but in the Northeast and the North Central regions, the reduction will be more like 10 percent. The rest is vulnerable to a drop of 15 to 20 percent this year—close to the national average.

Public-works construction (highways, bridges, and mass transit; water resources and waste-water treatment facilities) now looks stronger by almost a billion dollars in value than it did only a few months ago. The increase belongs in transportation construction, bringing the revised 1987 estimate to $24.9 billion—virtually even with last year's value rather than slightly below it as previously forecast.

The reason for the current upgrade: The 1987 highway bill, which was still in legislative limbo at the time of the first update in this year's series, came through with more than had been anticipated. As federal funds were released during the second quarter, above-average contracting just about eliminated the 10-percent shortfall that existed at the end of the first three months, and a strong second half under the new federal program is in prospect. Environmental construction (water resources and waste-water treatment) is currently on target at $14.4 billion, bringing total public-works contracting to an estimated $39.3 billion, up 1 percent from 1986.

In a longer time frame, three recently passed major legislative acts—the Water Resources Development Act of 1986, the Clean Water Act of 1987, and the Surface Transportation Assistance Act of 1987 together have established a new course for federal funding of public-works construction. Their provisions will soon reverse a recent decline of contracting for transportation and environmental projects as they provide a base of stability that extends well into the future. Because two of the three programs were passed by Congress over the President's veto, they indicate a change for the better in federal priorities for badly needed improvements to the nation's infrastructure.

The second-half performance of two other types of construction is more difficult

Single-family housing and institutional building, the construction markets that are most sensitive to credit conditions, slipped from "safe" to "shaky" in the second quarter. As interest rates on mortgages and municipal bonds advanced sharply during April and May, contracting for both types of buildings fell approximately 5 percent from their strong first-quarter rates. And, because commercial building and public-works construction are virtually locked into their current paths for the short run, these newly vulnerable parts of the construction sector will govern the outcome of 1987's second half.

Getting a fix on house building and institutional construction requires some bold assumptions about the behavior of interest rates over the next several quarters. Is there a plausible explanation for tightening credit (as the Federal Reserve Bank did in April), when the economy is burdened with excess capacity and the need to reduce the federal deficit imposes the drag of fiscal restraint? There aren't many reasons that would justify the risk of tipping an already sluggish economy over the brink of recession.

A threat of severe inflation might be grounds for a round of monetary restraint, and there was a period in the spring when cost indexes moved up alarmingly. Supporting the sale

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1987 Regional Estimates
Dodge Construction Potentials

Second Update
July 1987

Northeast
CT, MA, ME, NH, NJ, NY, PA, RI, VT

Contract Value (millions of dollars)

	1986 Actual	1987 Forecast	Percent Change 1987/86
Nonresidential Buildings			
Commercial and Manufacturing	$ 9,433	$ 9,050	− 4
Institutional and Other	4,893	5,350	+ 9
Total	$14,326	$14,400	+ 1
Residential Buildings			
One Family Houses	$14,149	$14,225	+ 1
Multifamily Housing	6,130	5,375	− 12
Nonhousekeeping Residential	1,200	1,100	− 8
Total	$21,479	$20,700	− 4
Nonbuilding Construction			
Transportation	$ 5,163	$ 5,000	− 3
Environmental	2,465	2,575	+ 4
Utilities	448	525	+ 17
Total	$ 8,076	$ 8,100	—
Total Construction	$43,881	$43,200	− 2

North Central
IL, IN, IA, KS, MI, MN, MO, NE, ND, OH, SD, WI

Contract Value (millions of dollars)

	1986 Actual	1987 Forecast	Percent Change 1987/86
Nonresidential Buildings			
Commercial and Manufacturing	$11,052	$10,375	− 6
Institutional and Other	6,282	6,600	+ 5
Total	$17,334	$16,975	− 2
Residential Buildings			
One Family Houses	$14,190	$16,375	+ 15
Multifamily Housing	5,378	5,000	− 7
Nonhousekeeping Residential	1,204	1,100	− 9
Total	$20,772	$22,475	+ 8
Nonbuilding Construction			
Transportation	$ 5,476	$ 5,475	—
Environmental	3,387	3,400	—
Utilities	304	200	− 34
Total	$ 9,167	$ 9,075	− 1
Total Construction	$47,273	$48,525	+ 3

South
AL, AR, DE, DC, FL, GA, KY, LA, MD, MS, NC, OK, SC, TN, TX, VA, WV

Contract Value (millions of dollars)

	1986 Actual	1987 Forecast	Percent Change 1987/86
Nonresidential Buildings			
Commercial and Manufacturing	$18,574	$15,550	− 16
Institutional and Other	11,608	11,375	− 2
Total	$30,182	$26,925	− 11
Residential Buildings			
One Family Houses	$32,649	$31,200	− 4
Multifamily Housing	10,081	7,725	− 23
Nonhousekeeping Residential	2,593	2,325	− 10
Total	$45,323	$41,250	− 9
Nonbuilding Construction			
Transportation	$ 9,442	$ 9,400	—
Environmental	5,196	5,575	+ 7
Utilities	478	500	+ 5
Total	$15,116	$15,475	+ 2
Total Construction	$90,621	$83,650	− 8

West
AK, AZ, CA, CO, HI, ID, MT, NV, NM, OR, UT, WA, WY

Contract Value (millions of dollars)

	1986 Actual	1987 Forecast	Percent Change 1987/86
Nonresidential Buildings			
Commercial and Manufacturing	$13,086	$11,800	− 10
Institutional and Other	7,544	7,300	− 3
Total	$20,630	$19,100	− 7
Residential Buildings			
One Family Houses	$22,388	$22,900	+ 2
Multifamily Housing	9,847	8,075	− 18
Nonhousekeeping Residential	2,315	2,000	− 14
Total	$34,550	$32,975	− 5
Nonbuilding Construction			
Transportation	$ 4,946	$ 5,050	+ 2
Environmental	2,897	2,850	− 2
Utilities	896	775	− 14
Total	$ 8,739	$ 8,675	− 1
Total Construction	$63,919	$60,750	− 5

When interest rates go up, construction activity comes down. It's one of the axioms of the business, and 1987 is no exception. It is now forecast that, as the average mortgage rate approaches 11 percent during the summer of 1987, potential demand for at least 50,000 dwelling units that would have otherwise been built will be deferred, reducing total housing starts this year to 1,650,000—a decline of 10 percent from the 1986 peak.

The timing of the second quarter's boost of interest rates was unfortunate because it caught the construction industry leaning the wrong way—more dependent than usual on its credit-sensitive markets. Housing and institutional building had been providing a valuable counterpoint to the deteriorating commercial-building market that was occurring all through 1986 and early 1987, but this support is now fading.

If, as expected, the surge of interest rates proves to be short-lived, some of this year's lost potential (mainly single-family houses) should be recovered in 1988 as rates retreat again. In the meantime, however, both nonresidential and residential building—for different reasons—will be shrinking in each of the remaining quarters of 1987, leaving only public-works construction as a source of stability.

Back-to-back declines of total construction-contract value in the third and fourth quarters will reduce the full year's total to $236.1 billion. Compared with earlier forecasts of 1987 contracting, which were based on more favorable credit assumptions, this last look at 1987 shows that the risk of decline has been heightened in the past few months from a negligible 2 percent, concentrated mostly in commercial building, to a more significant 4 percent affecting most types of building. Adjustment for a modest 3- percent inflation in construction costs this year means that in "real" terms, 7 percent less new construction will be started in 1987 than in 1986.

The regional variations on this theme of cyclical decline haven't changed much. The South (or more precisely, the Southwest) continues to be the area under greatest strain—the result of past overdevelopment and current economic distress. Nearly three-quarters of the expected $10-billion national decline of construction contracting in 1987 will occur in the South. The West, as usual, is behaving much like the national average—in this case, a 5-percent decline. The Northeast and the North Central regions, which were least caught up in the commercial-building binge of the early- to-mid-1980s that affected the other regions, offer the best prospects for 1987: down only 2 percent, and up 3 percent, respectively.

A preview of 1988 indicates the possibility of new stability through a match-up of strengths and weaknesses

Although this year's outlook for construction contracting has deteriorated due to an untimely surge of interest rates, prospects for 1988 are more promising. Assuming that rates subside to a level that is more appropriate to the economy's fragile condition, the demographic potentials of the construction sector should be better served next year. However, there's no avoiding the inevitability of yet another down year for offices, apartments, and other commercial building as the vacancy problem persists.

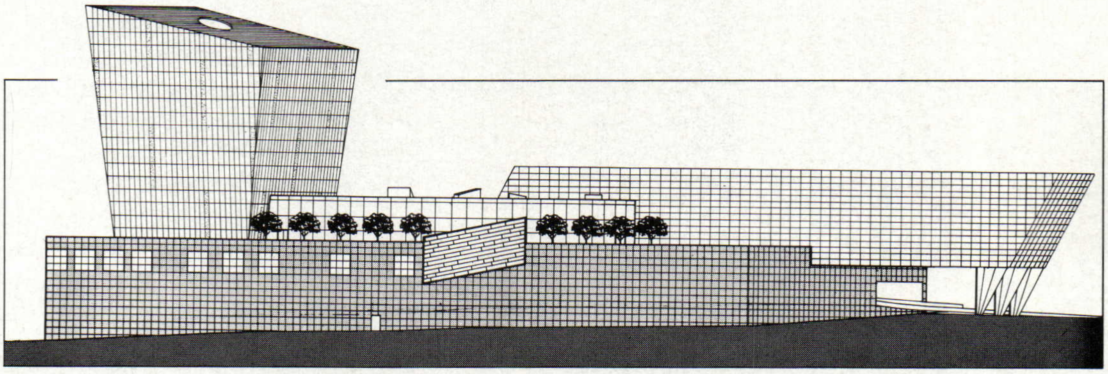
This suggests that 1988 could be what 1986 was for the construction sector and what 1987 should have been—a match-up of strength in housing and institutional building with weakness in commercial building that leads to overall stability.

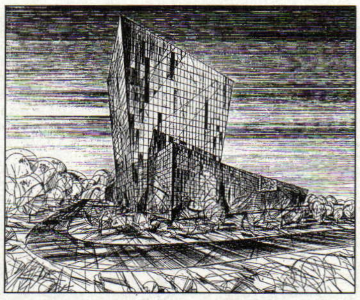
Prepared by the Economics Department McGraw-Hill Information Systems Company, George A. Christie Vice President and Chief Economist.

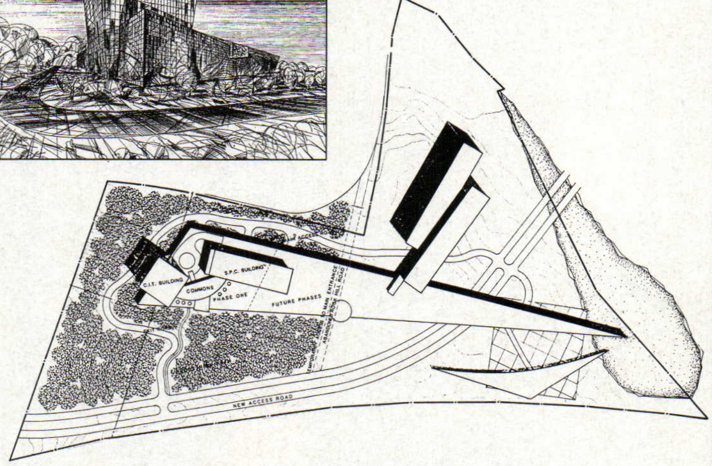
billing, specifications, and working drawings.

sophisticated software." There was a general agreement that software

Arquitectonica goes high-tech

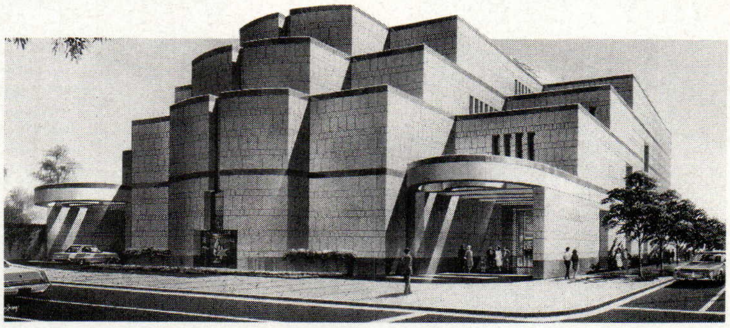


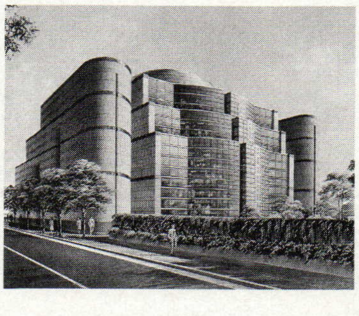




A striking addition to the landscape surrounding Dulles International Airport in Fairfax County, Va., the new Center for Innovative Technology is one of a growing number of office and research facilities that individual states are helping underwrite in order to attract high-technology business (see RECORD, July 1987, pages 96-99 for another example in Michigan). Designed by Arquitectonica International working in joint venture with Ward/Hall Architects, the Virginia complex will feature as its primary elements a flaring seven-story tower clad in uneven vertical strips of reflective green, gold, and black glass; a long, three-story structure, sheathed in silver, blue, and black glass, that will house a consortium of computer-software companies; and a landscaped parking podium clad in a black egg-crate grid.

New Los Angeles museum will be a somber archive of memory





While plans for the United States Holocaust Memorial Museum in Washington, D. C., continue to evolve (RECORD, July 1987, page 55), and as New York City debates the formation of a similar institution, a museum documenting man's intolerance and the rise of anti-Semitism is currently under construction on Pico Boulevard in Los Angeles. The 78,000-square-foot Museum of Tolerance is being built by the Simon Wiesenthal Center, a nonprofit group whose founder has devoted much of his life to tracking down Nazi war criminals and bringing them to justice. Designed by Maxwell Starkman Associates, the museum will exhibit two distinctive public faces: the building's street facade (top) will be clad in light beige granite, accented by narrow bands of dark beige granite and vertical strips of green glass block; the museum's rear elevation, by contrast, will consist of a curving, 50-foot-high glass curtain wall overlooking a formal memorial garden (left). Inside the seven-level structure, permanent exhibition halls, seminar rooms, a research library, and an auditorium will be organized around a full-height, glass-domed atrium that will feature a spiral ramp connecting the main floor with two major exhibition floors above.

News briefs

The Beverly Wilshire Hotel, the 1926 Italian Renaissance Revival landmark in Beverly Hills, will undergo a $40-million renovation and restoration. Project architects are Gruen Associates.

News from Pennsylvania's two largest cities involves major performing-arts centers. In Pittsburgh, the ornate 1928 Stanley Theater has undergone a $42-million renovation and will reopen this month as the Benedum Center, a 2,800-seat facility housing four local opera and dance companies. Architects for the restoration were MacLachlan, Cornelius and Filoni. Across the state, the Philadelphia Orchestra has selected Venturi, Rauch & Scott Brown to design a new 2,800-seat concert hall, planned for a site on Broad Street one block south of the Academy of Music, the orchestra's current home. Schematic drawings of the new hall are expected early next year.

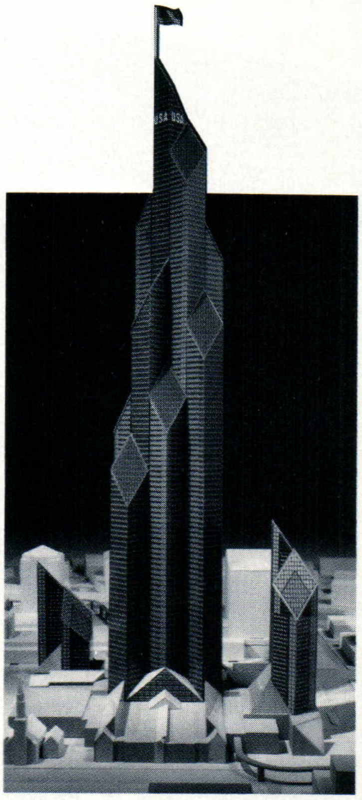
Michael Hopkins and Partners has triumphed over James Stirling Michael Wilford and Associates, Richard Rogers and Partners, and several other prominent British firms in winning a limited competition to redevelop a site near St. Paul's Cathedral in London now occupied by the headquarters of the *Financial Times.*

Artemide, the manufacturer of the classic *Tizio* lamp, recently won a legal decision in the U. S. District Court in New York that will protect the lamp from cheaper knock-offs. The Italian company was awarded a preliminary injunction against Grandlite Design and Manufacturing, a Taiwanese firm that had been producing and marketing small copies of *Tizio,* which was designed by Richard Sapper in 1972 and is in the permanent collection of the Museum of Modern Art.

Spillis Candela & Partners has been selected over 75 competing architectural firms to design a 350,000-square-foot corporate headquarters for the American Automobile Association. The new building will house 900 employees on a 39-acre site in Seminole County, Fla., near Orlando. The AAA is moving to Florida from its current home in Falls Church, Va.

Herbert Beckhardt Frank Richlan & Associates will design a new rectory, chapel, gymnasium, and parish hall for the St. Francis de Sales Church in Muskegon, Mich. The landmark concrete church, noted for its hyperbolic paraboloid sidewalls, was designed by Marcel Breuer and Beckhardt in 1967.
News briefs continued on page 61

On top of the world in Newark



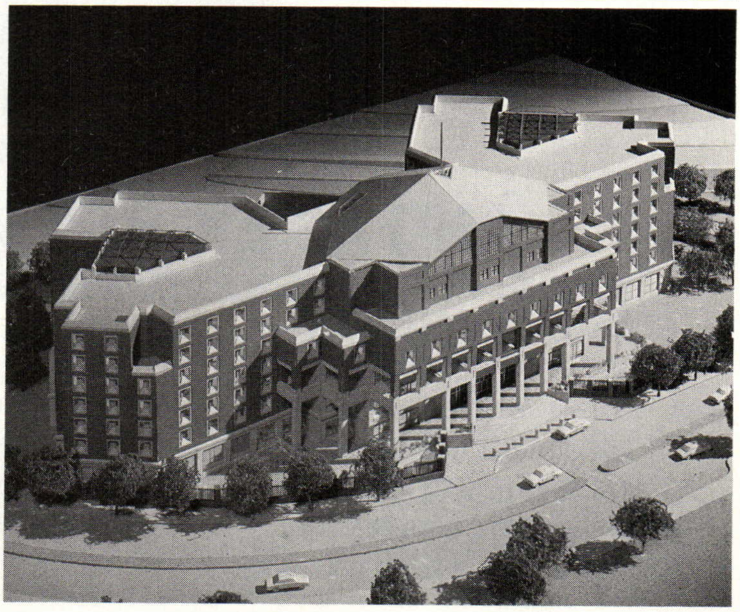
If the powers-that-be in Newark have their way, the New Jersey metropolis will be, by 1991, the site of the world's tallest building. Dubbed Grant U. S. A. Tower, the proposed 1,750-foot structure would be nearly 300 feet taller than Chicago's Sears Tower, the current champ, and is planned as the centerpiece of Newark Renaissance Center, a two-block mixed-use downtown development scheme that shares the name—and the underlying philosophy—of Renaissance Center in Detroit. Designed by Kober/Belluschi Associates, the 3-million-square-foot, 121-story tower consists of nine 70-foot-square tubes whose sleek profile is meant to symbolize the future of Newark and whose faceted green-glass sheathing refers to New Jersey's nickname of "The Garden State." *Jeff Trewhitt, World News, Chicago*

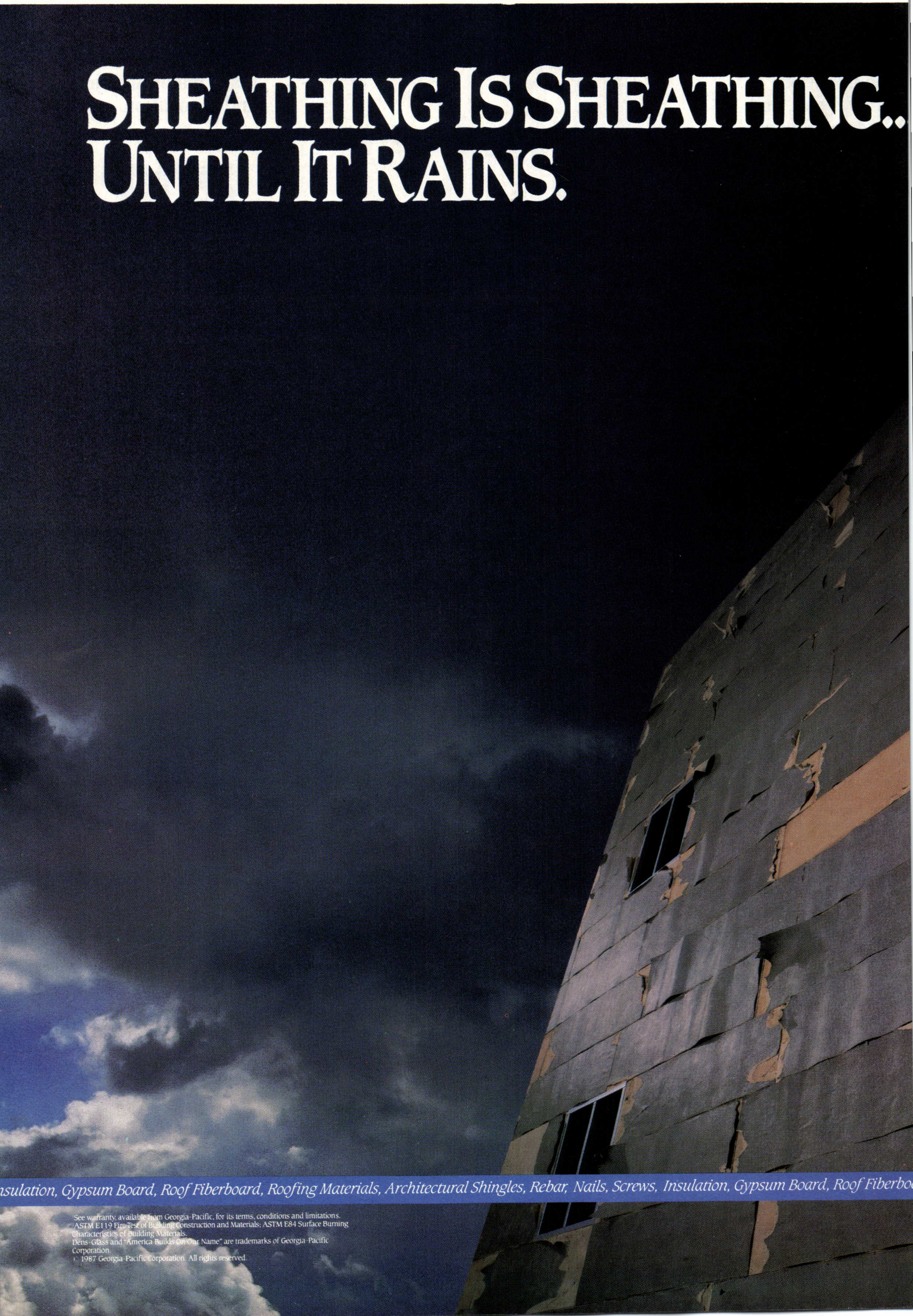
Economics and the environment do battle in Massachusetts

Although the Berkshire Hills of western Massachusetts have long been known for their sylvan charms, several old mill communities in the area have not shared in the region's general prosperity. The town of Adams, for example, has been totally bypassed by gentrification, and its red-brick factories sit forlornly along the Hoosic River. In order to stimulate economic revitalization, the Massachusetts Legislature in 1985 authorized the Department of Environmental Management to come up with a master plan for 1,040 acres in Adams situated on the eastern flank of Mount Greylock, the state's highest peak. In addition to specifying open-space zones, the DEM invited developers to submit proposals for a year-round resort-style community organized around golf, skiing, and water activities. At recent ceremonies in Adams, Governor Michael Dukakis announced the winner of the competition—a team consisting of the Heritage Development Group, architects Shepley Bulfinch Richardson & Abbott, and landscape architects The SWA Group—and he unveiled early designs for a $260-million complex dubbed Heritage Greylock. The premiated proposal comprises 1,275 condominium units, a conference center, a 180-room hotel, and substantial retail facilities—all housed in buildings that SBRA principal H. Jan Heespelink claims will "consistently and evocatively use the architectural vocabulary of New England." The question in some observers' minds, however, is whether any project this large, no matter how sympathetically designed, can reconcile Adams's economic goals with the public's environmental concerns.

A new jail for central Boston

After over 10 years of debate, the Commonwealth of Massachusetts has selected The Stubbins Associates to design a 453-bed addition to the 135-year-old Suffolk County Jail in Boston. Stubbins's brick- and granite-clad proposal consists of a central administrative block flanked by two housing wings that wrap around outdoor exercise yards. Voinovich Monacelli is associated architect.





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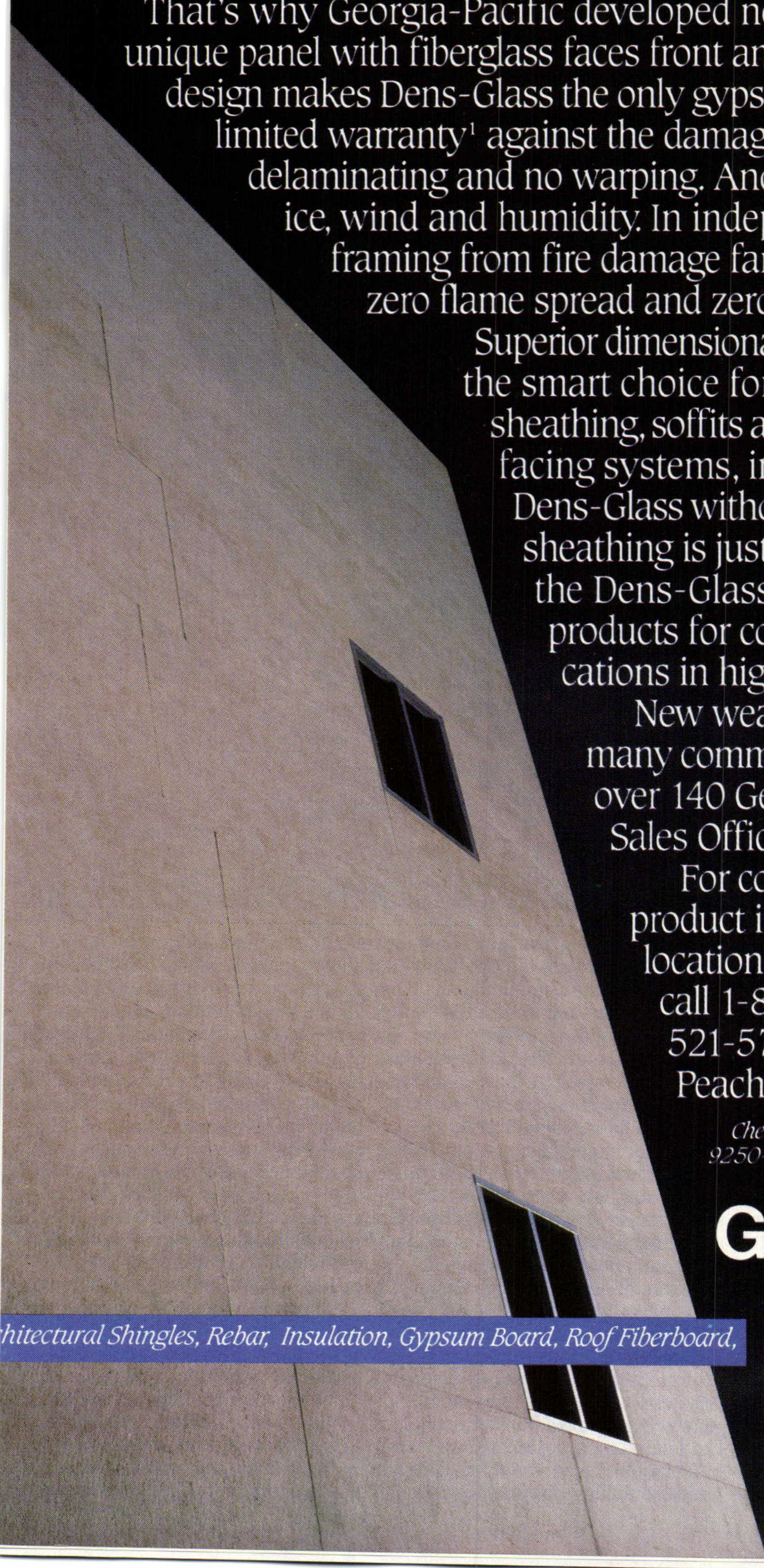

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The new American downtown: Tyson's Corner as a case study

Just when the central business districts of many American cities have begun to resurface after years of decline, a new economic threat—large-scale, quasi-urban commercial and residential developments clustered around freeway interchanges from Boston to San Diego—looms on the suburban horizon. In his analysis of one such center—Tyson's Corner, Virginia—Robert Miller concludes that, aside from questions of esthetics, these new auto-oriented "downtowns" represent an insidious trend toward the privatization of America's public realm.

By Robert L. Miller

Eight a.m., Downtown, U. S. A. Office workers grab a cup of coffee and hit the pavement, their footsteps blending with the sounds of newshawkers, traffic cops, buses, and taxis in the symphony of the city. In hazy canyons of stone and steel, captains of industry and shoeshine boys alike man their stations while reporters roam seamy back streets in search of the day's big scoop.

Give or take a few parking lots and festival marketplaces, this 1940s B-movie scene could still be downtown Baltimore, Cleveland, Milwaukee, or Cincinnati. What it could not be is Tyson's Corner, an unincorporated part of Fairfax County, Virginia, about eight miles west of Washington, D. C. Twenty years ago Tyson's Corner was, as its name implies, an intersection of two state highways, with a grocery store and a couple of filling stations. By 1989, according to one realtor's projections, it will have about 20 million square feet of office space—more than the downtowns of Baltimore, Cleveland, Milwaukee, or Cincinnati. It will also have seven large department stores, 2.5 million square feet of retail space in two shopping centers, 12 full-size hotels, and major buildings by Skidmore, Owings & Merrill and Burgee/Johnson, as well as many well-known local architects. It will probably also continue to lack parks, sidewalks, underground utilities, and public transportation. Meanwhile, though it contains only about one-quarter of the office space in Washington proper, Tyson's Corner is already the largest "downtown" in Virginia.

Tyson's is part of a phenomenon that Christopher B. Leinberger and Charles Lockwood, writing in a recent issue of *Atlantic* on "How Business is Reshaping America," call "urban villages." Seen as a fundamental restructuring of city and suburb (to which suburban sprawl was a mere prelude), urban villages are focal points—mini-downtowns with maxi-gridlock in a new kind of low-density cityscape. The business that dictates this reshaping is office work, the much-heralded service and information economy. Leinberger and Lockwood find that people whose parents moved to the country to avoid living near the factory now like living near the office; they prefer commuting by car and shipping by truck, and they see advanced telecommunications as a way to escape the city core and save on office rent. Still, they remain

Robert L. Miller, the head of a communications consulting firm in Washington, D. C., and New York City, is also an architect and freelance writer.

Blue Ridge Aerial Surveys

Tyson's Corner, Virginia, viewed from the air.

attached to certain downtown amenities like restaurants, hotels, and shopping. Combine these with parking and close-in, low-density housing, and voilà: Tyson's Corner.

There are problems, of course, with the term "urban village": these are surely not the "urban villagers" Herbert Gans had in mind, and there is nothing less urbane or villagelike than the Route 7/Beltway interchange at 5:30 p.m. But the phenomenon exists, and examples from Newport Beach and Century City in California and Schaumburg near Chicago, to Perimeter Center outside Atlanta and the Princeton, N. J., corridor confirm that Tyson's is not alone.

Even in northern Virginia, Tyson's Corner has serious rivals. Office centers of 5 million square feet and up are sprouting within 20 miles of Tyson's in such equally unheard-of places as Westfield, Merrifield, and Herndon. The established new town of Reston and old towns like Fairfax and Vienna are also participants in the boom, which, contrary to the logic of Northeast Corridor development, has not concentrated on filling the gaps between Baltimore and Richmond, but instead has wandered out past the capital's most affluent northwest suburbs toward Dulles Airport and the rural reaches of Interstate 66. Legendary traffic snarls, slow-growth politics, and "scarcity" of land (based on a maximum floor area ratio of 1.65) are invoked as caps on Tyson's future growth, driving new projects out to these greener pastures.

Still, if only because of its unsurpassed location, Tyson's seems likely to remain more than first among equals, and even to challenge Washington itself, as the region's preeminent business and retail center. Its site, presciently chosen for Fairfax County's courthouse in the 18th century but soon abandoned because of its remoteness, includes the county's highest point. Development was assured when the new Dulles Airport access road and the Capital Beltway met here in the 1960s near the crossroads of Routes 7 and 123. A regional shopping mall and a strip of automobile dealerships soon followed—as did Washington's 1968 riots—and there began a slow but accelerating exodus of office tenants from the city to Tyson's.

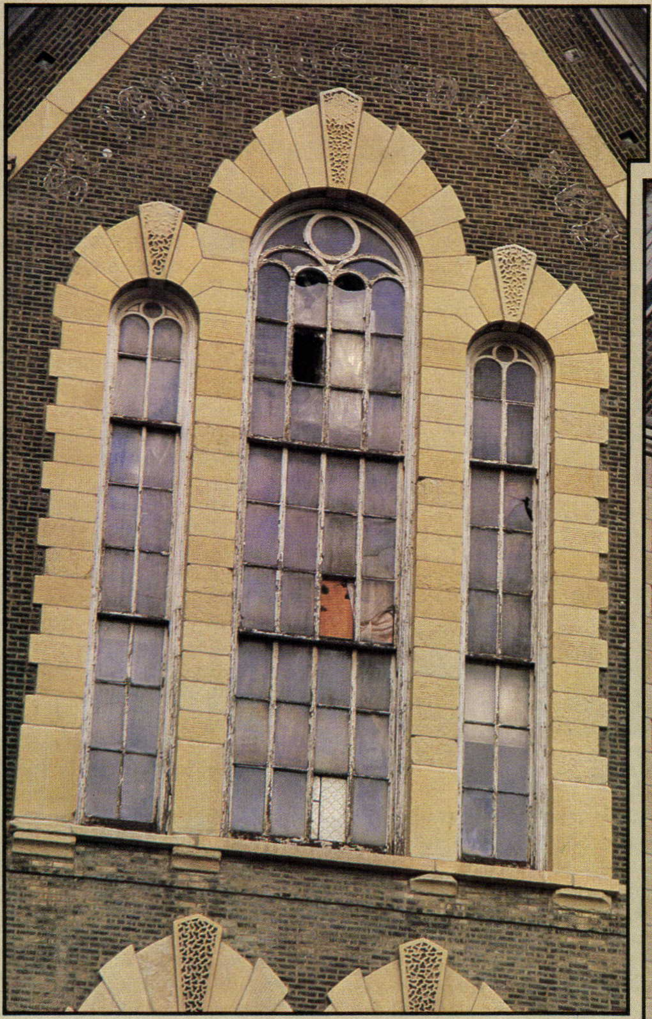
At first Tyson's Corner was a raw encampment of corporate back-of-house operations, "beltway bandit" consultants, low-budget trade associations, and the like. The less affluent found rudimentary office space in the Route 7 lowland next to Tyson's Toyota and Leather Living; for more substantial tenants, office parks with winding streets were plotted on the heights east and west of the Beltway. Architecture tended toward the strip-window precast boxes of Washington's K Street, except that at lower Virginia rents the boxes had to be even cheaper. Site planning was on the model of a suburban single-family house, with each box placed in the middle of a lot overlooking a broad "front lawn" of surface parking. A second wave of tenants—law and accounting firms, high-tech and other corporate headquarters among them—brought a demand for somewhat higher standards in planning and building design, including mixed-use development, indoor parking, and the occasional jogging trail. But at small scale the tone of Tyson's had been set: unlike the proposed new Reston Town Center, it was never to be an axially planned city of plazas and boulevards, but would always to have the violent, unfinished look of a latter-day Colorado mining boomtown, littered with metallic BMWs instead of silver-ore tailings.

By conventional urban-design standards, things have turned out better at the larger scale. Well-defined boundaries—highways, existing single-family subdivisions, and the Courthouse Spring Branch valley—were reinforced by planning and zoning guidelines. The 1977 Tyson's Area Study, based in part on a design charette by local architects, set broad design criteria later incorporated in the county's comprehensive plan. There followed in 1984 a building-height study, suggesting that rigid restrictions be replaced with area-by-area approvals that would let some tall buildings mark "gateways" and define a central focal point. Already the result is a distinctive *stadtbild*, with edges that taper from midrise office blocks, to low condominiums, to single-family houses.

Meanwhile, as competition among office developers heated and architectural fees inched upward, some provocative building design emerged. Rarely did it happen on the "office-park" heights, where visibility was assured and a corporate look emulated. At lower elevations, however, an advantage of the suburban office building—the ability to provide maximum windowed perimeter with an irregular footprint—combined with a desire for attention-getting image to produce buildings whose entire shapes were swooping curves, hexagons, octagons, and other forms recognizable from a fast-moving car. A second approach to visual impact was the application of some big, iconic shape to the still preferred strip-window box. These two basic strategies, roughly following Robert Venturi's and Denise Scott Brown's categories of "duck" and "decorated shed," continue to define Tyson's most interesting buildings.

For impact alone, the boss duck remains VVKR's design for the National Automobile Dealers' Association, imperially sited halfway up Tyson's one big hill; angled, it commands a view of much of its membership. It is the sort of obsessive, Modernist diagram that Postmodernism rails against—a featureless black-glass box with three white, silo-like stair towers pulled out in front. Seen from a distance, its verticality appears against the backdrop of the equally featureless Rotonda Apartments, by Holle & Graf, up on the ridge. It is ominous enough to deserve its name, the NADA Building.

HISTORY REPEATS ITSELF



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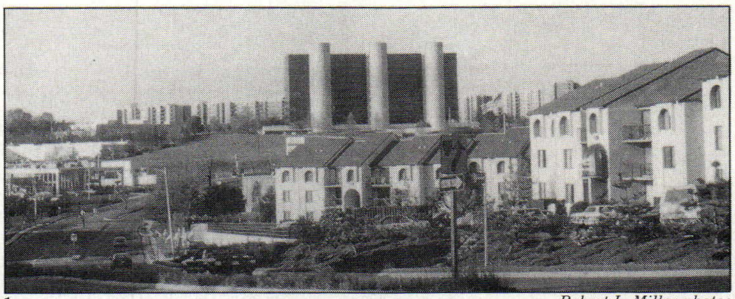
1. A typical Tyson's Corner landscape. Background high-rise is the NADA Building by VVKR Architects.
2. Tycon Courthouse, Zinser & Dunn, architects.
3. 8521 Leesburg Pike, Stinson Capelli, architects.
4. JTL Tycon Towers, John Burgee Architects with Philip Johnson.
5. Tyson's International Plaza, Skidmore, Owings & Merrill, architects.
6. Westwood Center, Ward/Hall Architects.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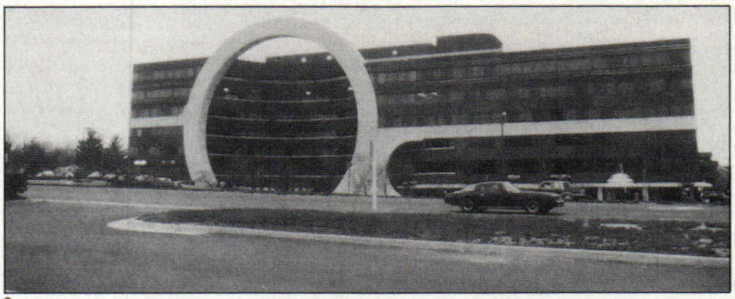
Robert L. Miller photos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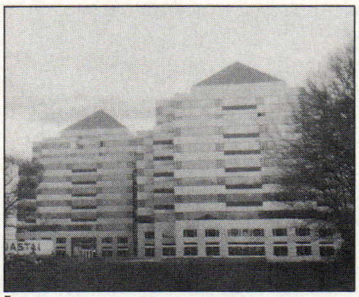
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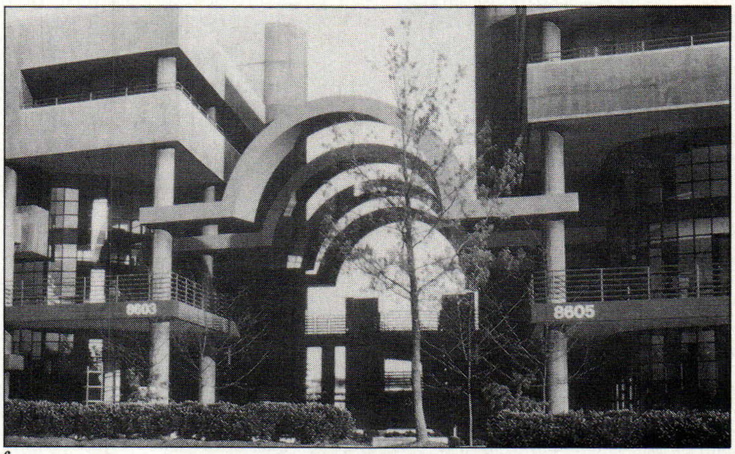

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Across the highway, the recently completed office building at 8521 Leesburg Pike, by Stinson Capelli, may be Tyson's preeminent decorated shed. Its ordinary siting on Route 7 and ordinary strip-window box are deadpan setups for its one big symbolic splash—an on-center front entrance comprising a reflective-glass half-cylinder supported by two colossal stainless-steel columns with finned capitals in the style of a Van de Graf generator. The imagery continues inside, with compressed versions of the same columns reflected in black marble floors. It is accomplished glitz, and high-tech tenants must feel at home.

James T. Lewis, the Gerald Hines of Tyson's Corner, is a self-described "architecture nut" whose projects often transcend the categories of duck and shed. His first Tycon office buildings were designed in the early '70s by Janson Associates in the manner of I. M. Pei. Lewis then went to Arthur Cotton Moore for the design of his own house and began to see the possibilities of that architect's metabolist shapes and cartoon inventions as applied to a speculative office building. Tycon III, Moore's first design for Lewis, is, like NADA, a black box used as a background for strong imagery facing the highway. The originally proposed main icon was a narrow Edwardian commercial facade salvaged from downtown Baltimore, to be recreated for use as a white, freestanding column "supporting" two top floors pulled out in a deep S-curve overhang. As built, the architectural fragment was replaced by an all-new column, resembling the T-bone of some enormous alien steak, surrounded by various architectural garnishes in red, black, and natural oak.

There followed Lewis's most original achievement. Tycon Courthouse (on the supposed site of the 18th-century original) is a sprawling 500,000-square-foot office complex, again almost all black except for a white, nine-story concrete moongate spanning the mouth of the building's bowl-shaped entrance courtyard and outdoor café. (Both the project and its young Tyson's-based architects, Zinser and Dunn, had origins in Moore's office.) This giant doughnut's quasi-landmark status upstages the building's skill in dealing with structured parking: concealed by the building's long wings, it has its own, "first-class" drop-off entry into the double-height main lobby.

Ever restless, Lewis has gone on to hire the architects he considers the best in the country. John Burgee and Philip Johnson's design for JTL Tycon Towers, although generic to them, is an escalation in scale and perceived level of taste for Tyson's Corner: three 500,000-square-foot towers in a crescent reminiscent of their work in Dallas, complete with scale-disrupting neoclassical window groupings and bulls' eyes familiar since AT&T. With their unerring eye for parody, the architects have selected a flat, orange "Virginia" brick with the look of a cut-out model kit of Monticello, using it to make enormous open arches atop 175-foot-high freestanding brick columns, said to be the world's tallest. At present, one completed Tycon Tower dominates Tyson's lowlands, recalling 1906 photos of the gutted Fairmont Hotel looming above the ruins of San Francisco.

Nearby, the new Tyson's International Plaza consists of two stubby office towers by Skidmore, Owings & Merrill, each containing 250,000 square feet. They have a complex and expensive-looking polished gray granite-and-glass curtain wall and, with their pyramidal tops, appear to be blowups of Latrobe's famous tombstones for the Congressional Cemetery. Handsome as they are, there is something about these buildings seen from the neighboring K-Mart parking lot that suggests a tuxedoed gentleman about to get beaten up in a redneck bar. By comparison, SOM's nearby McLean Hilton and office building plays coolly and knowingly with the idea of the ubiquitous strip window.

As national firms move in, reflecting both Tyson's prosperity and the increased complexity of its projects, local firms are also getting the chance to go beyond formula buildings. Ward/Hall Architects' gateway building to the Westwood office enclave mixes the indoor-outdoor American Café with shops and offices in a sophisticated strip center (it's set at right angles to the highway) done up in stylish grids, glass brick, and pipe railings. Up near the incongruous green water tank and red-and-white microwave tower that crown the skyline, another restaurant, Clyde's, is the sort of Frenchy's Saloon that every real boomtown needs: the elegant hip-roofed building by John Richards Andrews is filled with original artwork in the neo-Edwardian bordello mode, including fine ironwork by Albert Paley.

The issues that seem most urgent at Tyson's, however, have little to do with arts and crafts or even with building design. As one columnist summarized it: "Tyson's Corner—The Movie. Tyson's II—The Search for Parking." Everywhere, one is reminded that Tyson's founding fathers were car dealers. As for someone to design relationships, there is the Fairfax County

Continued on page 83

Observations continued

planning staff, which when pressed will admit that it has taken a somewhat more casual approach to planning a major city center than its opposite number in, say, Milwaukee. For example, now that over 60,000 persons a day come to work here, the county is putting out a request-for-proposal for a "non-motorized transportation study" to consider, mainly, whether Tyson's should have usable sidewalks.

In fairness, this low voltage should also be attributed to both state and county politics, and to a more deep-seated attitude that all but a few Tysonians have about themselves. Politically, highway and other public funds must be spread around Virgina, even though they are mostly needed right here. Socially, Fairfax County residents have been happy to profit from development but have had no real interest in city-building. The huge county's park system, its cultural centers like the Wolf Trap Farm arts complex, and even most of its public buildings are determinedly rural in character. Unlike the proud boosters of past generations, these pioneers—including developers and architects—are backing into the future as reluctant urbanites. In this sense the unfinished sidewalks, the telephone poles, and the streets that abruptly drop from six to two lanes are no aberration, but pure, ornery denial.

To fill this gap in the public will comes an organized private sector. Across the country coalitions of local government, developers, and employers have formed transporation-management associations (TMAs) to combat traffic problems, creating a potential "new echelon of government," in Leinberger and Lockwood's opinion. The Tyson's TMA is called TYTRAN. Its early ventures, a local bus route using London double-deckers and a van-pooling service, folded for lack of interest. (A shuttle bus to the Metrorail station a mile away, however, seems to be succeeding. Other projects include a child-care center, seen as a strategy for reducing total car trips.) Hence TYTRAN's current direction, which is road-building. TYTRAN is erecting a remarkable number of very public roads—a new Route 7 overpass leading to JTL Tycon Towers is one example—with over $25 million in private money to date. These improvements are being conceived, not by the county, not even by TYTRAN (it has no staff), but by the architects and engineers who happen to be working for the developer-members of the TYTRAN board at any given time. It is no exaggeration to say that Tyson's is being planned on a pick-up basis.

In fact, TYTRAN's road-building may produce quite satisfactory results—a hierarchy of through and service roads crossed by winding feeders, a kind of Olmsted park without the trees. Nor is the messiness of Tyson's Corner really a permanent worry (in fact, it is more enjoyable than many planners' rigid visions). What *is* worrisome is the place's relentless privatization, its explicit denial of the public life, and the people this leaves out. Fairfax Country does have lower-income residents, and some of them live near Tyson's, but living and working in this downtown is not a choice everyone shares. Leinberger and Lockwood are here describing an "urban village" outside Atlanta, but they could be on Route 7 in front of Bloomingdale's:

"[At 5:00 p.m.] executives and professionals get into their Cadillacs and BMWs for the relatively easy drive home or a visit to one of the nearby 'formula' restaurants for a drink. At the same time, many black employees are walking through the parking lots—Perimeter Center has few sidewalks—on their way to the bus stops, which are little more than a pole with a bus sign on top, planted on a flat, grassy spot that usually turns into mud when it rains. With one or maybe two transfers, many bus passengers endure a one-to-two-hour ride twice a day [to and from black neighborhoods]."

Tyson's private alternative is particularly striking given its location a few miles from Washington, D. C., which is both America's most ambitious experiment with public urbanism and the home of mostly black, mostly nonaffluent people with a large stake in public support for public services. Tyson's can be viewed as pernicious because of the economic development it and its sister urban villages theoretically drain from Washington—money that might otherwise flow into rebuilding 14th Street and other avenues that L'Enfant laid out to be centers of commerce, and which remain underdeveloped 200 years later because they are in black neighborhoods. But the real danger is its power as a model, both for newer suburbs and for changing cities. Tyson's Corner has set up an alternative development ethic, less purely racist than escapist, that preaches leaving urban ills behind and starting over on a new frontier—a persistent theme, of course, in American history. As on the frontier, troubles will be dealt with by a few people banding together, minorities and the poor not among them.

Do we have to go through this again? Has our society painfully learned tolerance, acceptance of diversity, and all the other difficult lessons of urbanity only to chuck it all to go off and play fort? The scariness of Tyson's Corner is not that its architecture and planning are all that bad, but that Tyson's itself is disinclined to get better, and yet seems likely to influence what many urban centers will become.

A new season for schools

Design

After a general hiatus, schools are again being built, updated, and added to across the continent. Though certainly a less sensational upturn than the school construction frenzy of the baby boom following World War II, this revived building impetus seems to be spurred by a variety of causes. Population shifts and changing neighborhoods are possibly the biggest factors—many existing schools are becoming white elephants in areas where they are not needed, while other locales are confronted with a big shortage of facilities. General deterioration and lack of proper maintenance of structures built too quickly during that earlier onrush is another noticeable cause—and some see mini-boom effects of the "grandchildren of Baby Boom I."

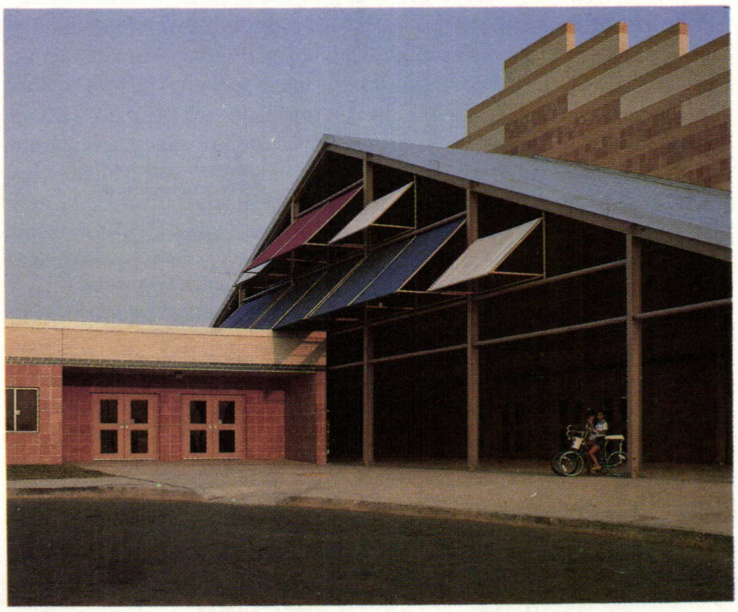
It gives a slightly unsettling sense of *déjà vu* to find schools resurfacing now as a significant item on the boards of architects we visit, and in the economists' building forecasts. In earlier days at RECORD, we ran as many as four Building Types Studies on schools each year—so much was happening, not only in the enormous quantity of structures, but in the new thinking and experimentation that was taking place, both educationally and architecturally. Team-teaching, instantaneous divisibility of teaching spaces, carpets, sometimes improbable combinations of café-gym-atoriums, systems building with ready-made parts—for whatever their long-range value may be, these items only scratch the surface of the many ideas that were realized.

By and large, the new wave of schools appears to represent a retrenchment from educational experimentation—outside of trying to teach the computer to teach. Most have standard (nondivisible) 30-pupil classrooms, and separate, finite spaces for gyms, auditoriums, band rooms, cafeterias, and libraries (though the latter are still sometimes called learning resources centers). Strict cost controls and speed of construction, still, too often, seem to be bigger concerns than what you achieve with the monies spent. A lot of fresh thinking and design aplomb is around, though. This study presents four schools that have a spirited appropriateness for their locales—and for their budgets.

Herbert L. Smith, Jr.

Beyond their fondness for the general design of the school complex—as well as for all that air-conditioning—the citizens of the area are especially proud of the two big gymnasiums, which are nicely designed and very well equipped (opposite center). Each gym has a direct outside entrance for spectators. Grouped with the gyms are locker rooms and spaces for ROTC and the performing arts—band, chorus, and a small teaching theater. The kitchen and the vocational shops are ranged along the east side of the school, where they have easy access from a flanking city street. The entire complex is located toward the eastern end of the 42-acre site, leaving ample room for athletic and drill fields, future expansion, and separate parking areas adjoining the entrances of each of the two schools. Nearby, there are also individual entrances for the two groups of special education rooms. At first glance, the blocklike arrangement of the classrooms of both schools seems to be a somewhat strange and cumbersome one (see plan, preceding page). A good percentage of the rooms in this arrangement are interior ones, and the lateral corridors give little interconnection. However, this was done deliberately—and with

The main entrance to the high school and to the administration offices (right) has a sun-screened portico (above), flanking one of the gyms, that provides shelter for those awaiting transport. The administration and classroom blocks are low, flat-roofed structures suggestive of vernacular adobe buildings. Colored tile trim and sun baffles give a popular, folk-art quality to the basically simple buildings.



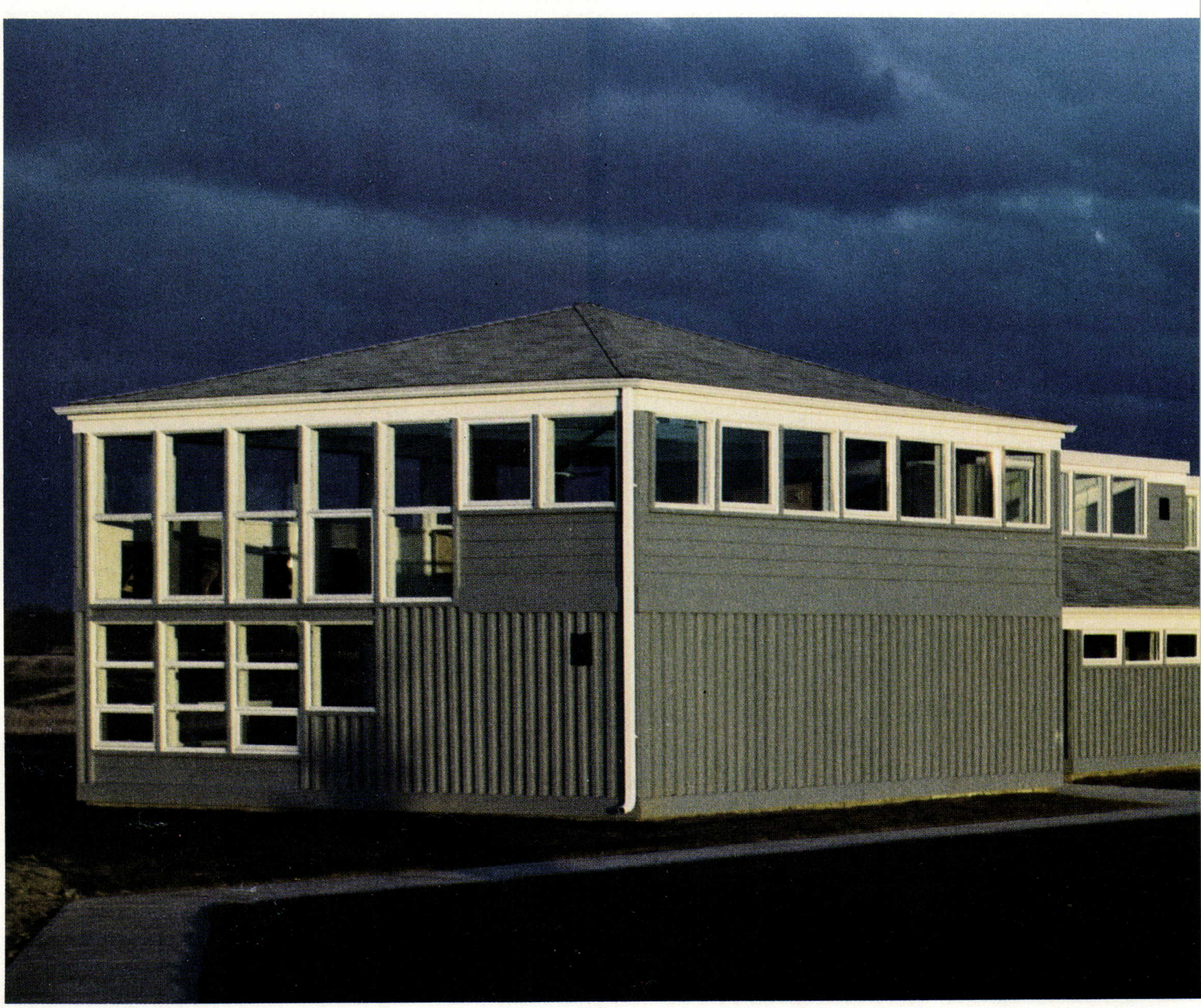
considerable architectural thought. The classrooms have a pleasant, very controlled environment, with good artificial lighting—but (for most) no views or visual relief. The plan forces the pupils to go into the outdoor plaza areas between classes. These courts are surrounded by covered walkways, and become the circulation arteries for all parts of each school—including the shared cafeteria and resource center.

Individual lockers and gathering spaces are also located in the courts, including the "Toro Ring" ampitheater in the high school court (top right). Such outdoors circulation is apparently quite acceptable in the dry, hot climate of Laredo—where shade from the sun is the most vital protection needed. Smaller, walled-in courts also adjoin the cafeteria and resource center for al fresco dining or study.

Leo Gonzales Cigarroa High School and Joaquin Gonzales Cigarroa Middle School
Laredo, Texas
Owner:
Laredo Independent School District
Architects:
JONESKELL, Architects (formerly Chumney Jones & Kell)—J. Carlos Jones, principal-in-charge; John H. Kell, Jr., project designer; Ronald L. Biediger, project architect; Jerry M. Sparks, Daniel Wigodsky, Judith H. Urrutia, project designers
Engineers:
W. E. Simpson (structural); Silber & Associates (mechanical/electrical/plumbing); Variable Acoustics Corporation (acoustics)
General contractor:
Rogers Construction, Inc.

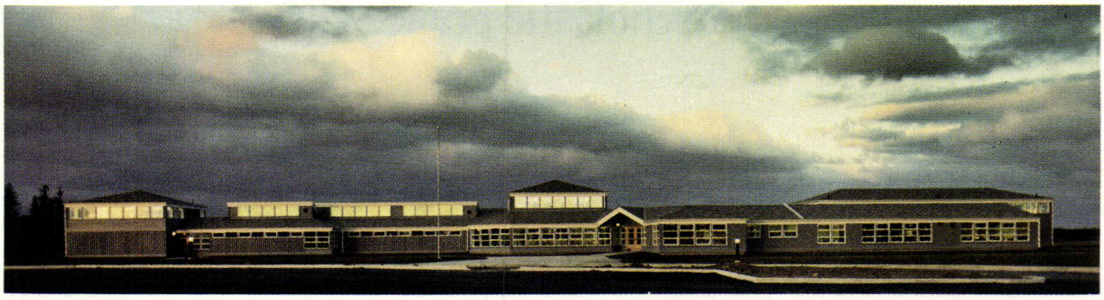
The Country Day
Secondary School
Township of King,
Ontario, Canada
George Robb, Architect

Simplicity and light for the exurbs

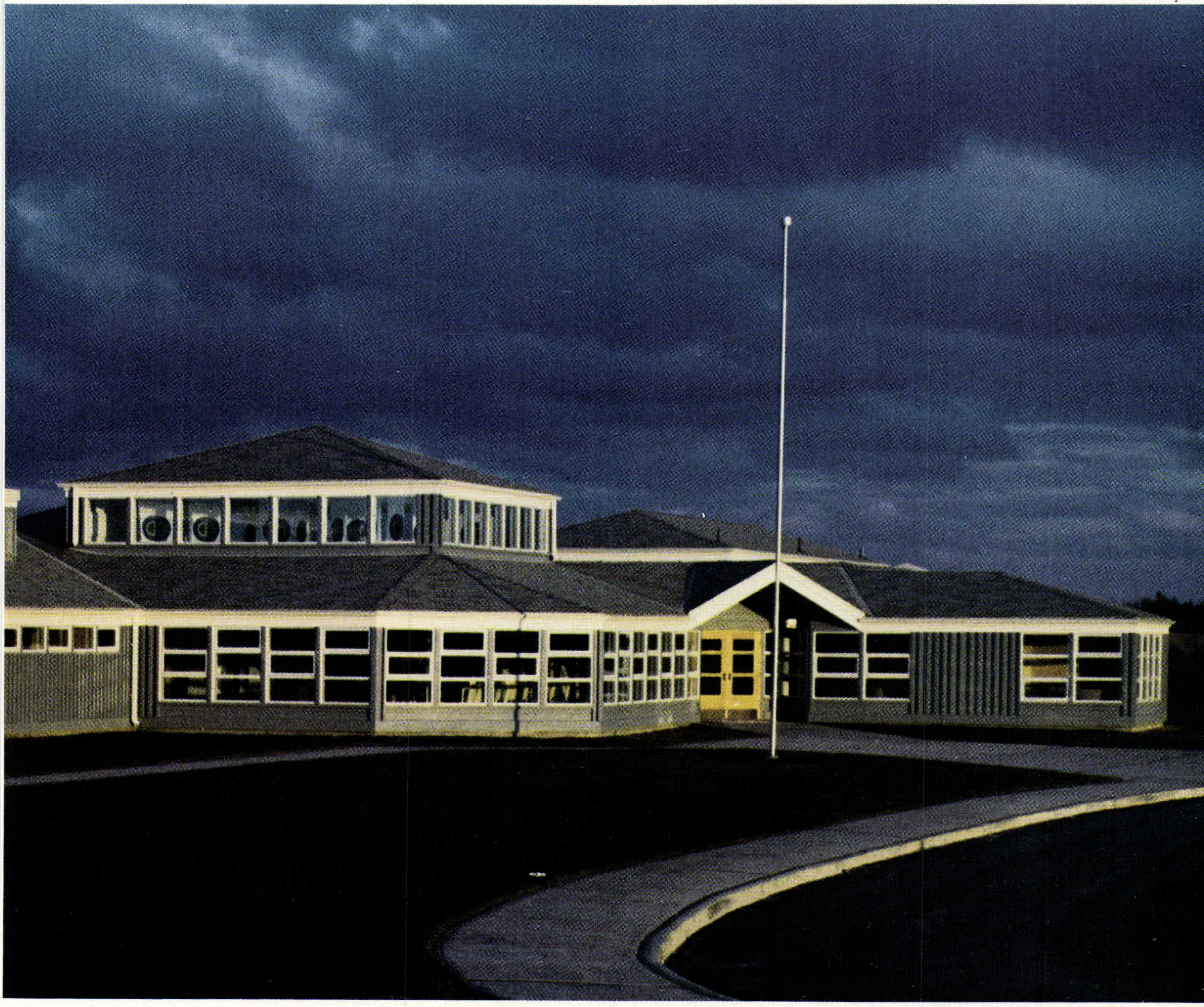


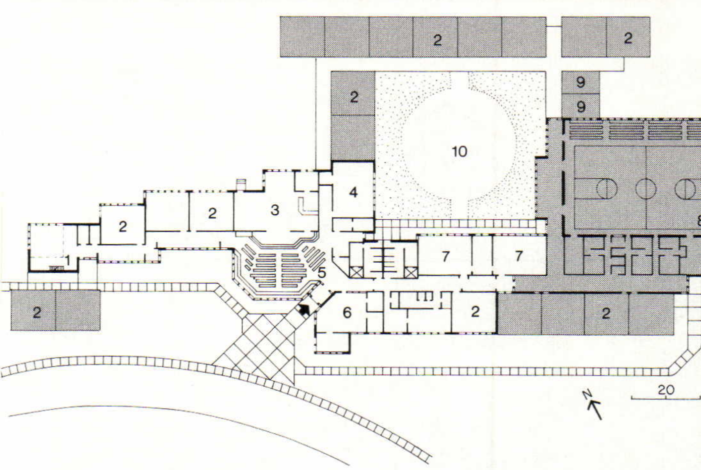
This cheerful, rather sophisticated, little independent Country Day School strives to make the most of its setting: great banks of awning windows open onto a rolling countryside devoted to the raising of prize cattle and thoroughbred horses, and sprinkled with fairly affluent country houses. It is located near King City, an exurb of Toronto, and many of the residents commute daily to the metropolis.

This secondary school is being built in two phases, and forms an extension to an existing junior program housed in facilities nearby on the property. The initial phase, shown here, provides a core of specialized facilities—science labs, library, computer lab, art and music studio—and four classrooms for twenty students each. These center on a high-ceilinged, multipurpose "Meeting Place" for assembly, socializing, and eating. A few steps lead to the library, where sliding doors open to create a stagelike area. Daylight and sunshine fill all areas of the school—even classrooms have bilateral lighting, with clerestories along the corridors. Special fixtures give both direct and indirect artificial lighting. The second phase of the master plan, now under construction, adds a large gym and banks of additional classrooms around a courtyard. Everything throughout is gray and white, sparked with bright banners. *H. L. S.*



Will Santillo photos



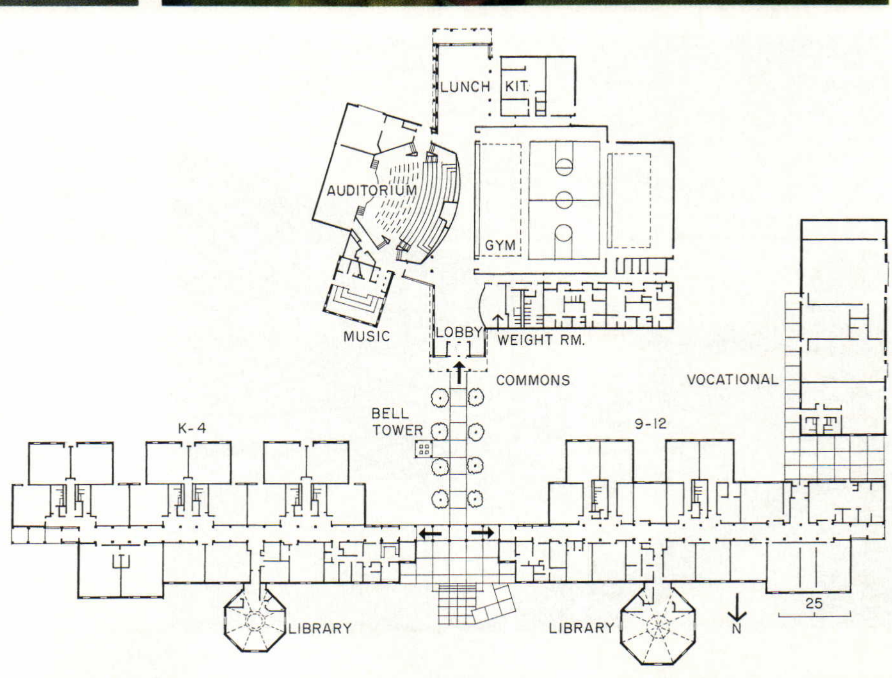


1. Arts
2. Classroom
3. Library
4. Computer
5. Meeting place
6. Office
7. Science
8. Gymnasium
9. Workroom
10. Courtyard

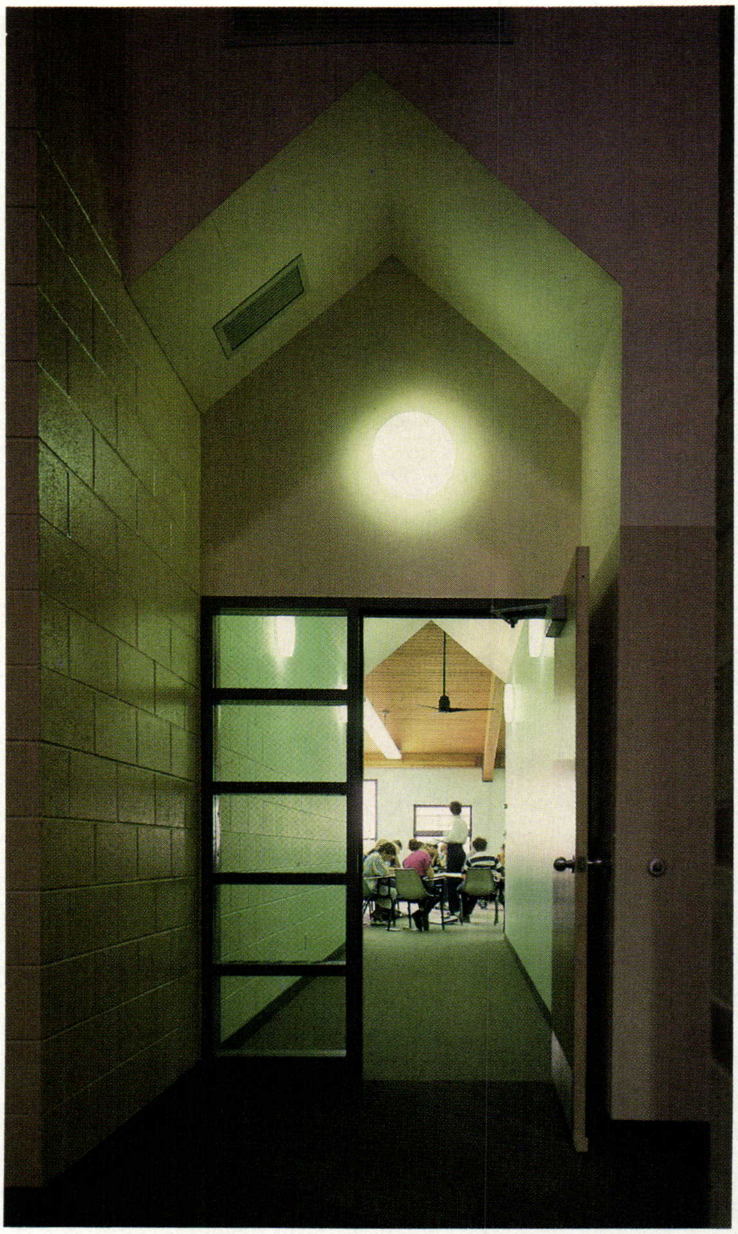
The school has a rather domestic scale that hugs the country terrain (above) and stretches along a gentle ridge well back from the highway. It is of timber frame construction on a concrete foundation. The exterior is surfaced with rough-sawn, overscale board-and-batten siding, painted gray with white trim. It is roofed with mottled gray shingles. Inside, the roof structure is exposed and painted white, as can be seen in the central Meeting Place (opposite bottom). Most floors are carpeted, and the interior walls combine birch plywood and painted wallboard. Heating is by electric baseboard units supplemented by overhead fans for redistribution. All in all, the school fulfills its design objective to create "a stimulating friendly environment responsive to a country setting—a place that is sensitive to the seasons of the year and the time of day."

The Country Day Secondary School
Township of King,
Ontario, Canada
Owner:
The Country Day School Foundation
Architect:
George Robb—Peter Stewart, associate architect; Donald Scott, assistant architect
Engineers:
O. T. Baggio & Associates Ltd. (structural); Boyle-Laken Engineering Ltd. (mechanical/electrical)
General contractor:
E. M. J. Investments Ltd.

The most dramatic of the interior spaces in the schools is the arcade spine, which continues as major circulation from the entrance loggia (below left) through the length of each school. As can be seen in the elementary wing (below), it is spacious enough (and widens more at intervals) to allow for a variety of planned or impromptu activities. Carpets and clerestory windows help create an ambience and spatial experience that is unusual for a school. All the buildings are air conditioned and have infrared heaters and hot-air furnaces. For added comfort, the windows are multiglazed with green-tinted, solar-absorbing glass. As can be noted in the plan (bottom), a group of small administrative offices is placed just inside the entrance of each school, and octagonal structures housing the libraries are placed midway



along each corridor. To somewhat shorten the length of the arcades, classrooms are arranged in small clusters at the wider points. Entrances to the classrooms (below) are sound-buffered against noises and commotions in the corridors. Shops for vocational training are housed in a prefabricated metal structure to reduce costs for the larger, practical spaces required, and placed (for noise control) across a covered court at right angles to the high school wing. Special parking adjoins the shops for the supply and maintenance of heavier equipment. The central commons building, which serves both schools (and eventually the future middle school), continues the same interior style and finishes as the other buildings to preserve the strong sense of design consistency—as can be seen in the lunch room/cafeteria (below right).



The Wray School
Wray, Colorado
Owner:
East Yuma County School District RJ-2
Architects:
Anderson Mason Dale—John D. Anderson, programming; Ronald L. Mason, design; Thomas A. Gilmore, project manager; Donald A. Grody, project architect; Douglas R. Porterfield, R. Michael Schomo, Timothy G. Tafoya, Carl M. Detwyler, project team
Engineers:
Richard Weingarot Consultants, Inc. (civil); KKBNA Inc. (structural); Beling Consultants, Inc. (mechanical/electrical)
Consultants:
David L. Adams Associates (acoustical); Cini-Little Associates (food service)
General contractor:
Haseloen Construction, Inc.

A cluster of one-room schoolhouses

Jim Dow photos, except as noted

Gilles Delisle

The "little red schoolhouse" as a metaphor was taken quite literally in the unusual plan and design of this elementary (K-6) school for a suburb of Edmonton, Alberta. The new 300-pupil school, in effect, clusters 12 schoolhouses with extremely interesting results.

From program briefing on, the architects clung to the following concept as a design catalyst: "The one-room, red schoolhouse evolved as one of the first traditional icons in the harsh climate of the Canadian prairie .... These structures created their own sense of place—with steep pitched roofs, vestibules under little bell towers, masonry or clapboard exteriors, and double-hung sash windows. The overall image of the school, while quintessentially simple, was at once welcoming, and uniquely identifiable." The problem became one of making a functional, contemporary translation of the one-room icon.

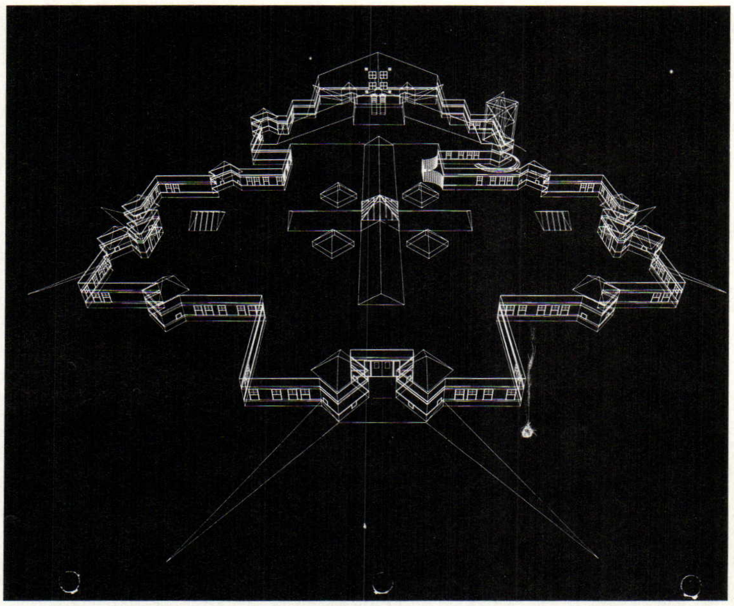
Inherent, of course, in the above concept is a return to the philosophy that the classroom should be the center of the learning process. Thus planning for the new school started with making something special —and a little playful—of that homeroom. This developed into a basic space of 1,000 square feet, wellfitted with built-in counters and movable furniture, and incorporating an angled, stagelike "cosy corner" area for small-group instruction. Each of these little areas is topped by a

Julia Kiniski School
Edmonton, Alberta
Barry Johns Architect Ltd.,
Architect

pyramidal skylight that, from the articulated exterior, suggests a small belltower—to give each room its own "sense of place in the neighborhood." There are 12 of these units, grouped into "houses" of four units each, and flanking a central, open, multilevel learning resources center. As the resources area is recessed below grade level, the classrooms around it become windowed lofts projecting above. Each house has its own entrance and mud room, as well as access from the resources center and the main foyer.

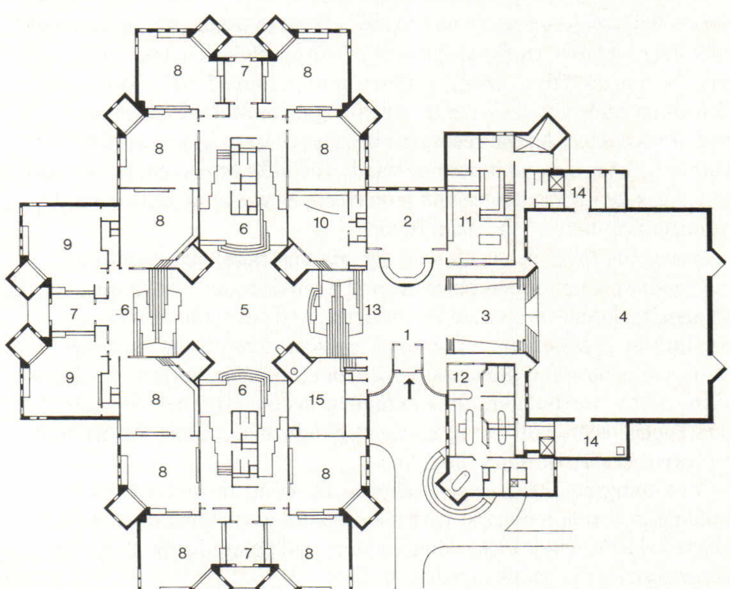
Across the foyer is a wing housing administration areas, plus a gymnasium, a multipurpose room, and a music room. The music room is planned to double as a stage for the gym, and permit its use as an auditorium. A sliding metal screen is used to close off the learning resources center and the classrooms from the foyer, permitting the use of the rest of the building for community events after school hours. For very special events all can be opened up to form a grand allée from the resources center through the gym.

Continuing the little red schoolhouse allusions, the exterior of the building is clad in red brick, with a horizontal pinstriping of split-face concrete brick; windows are double-hung and painted pink. A *real* bell tower signals the main entrance. *H. L. S.*

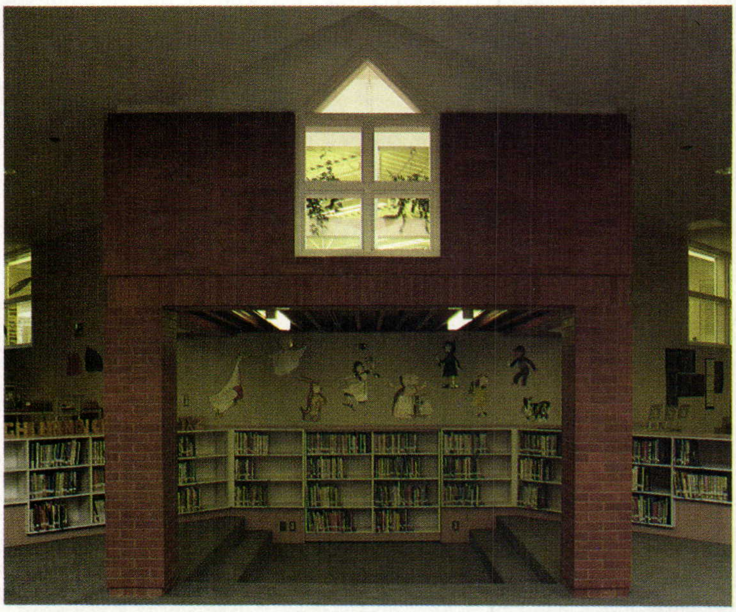


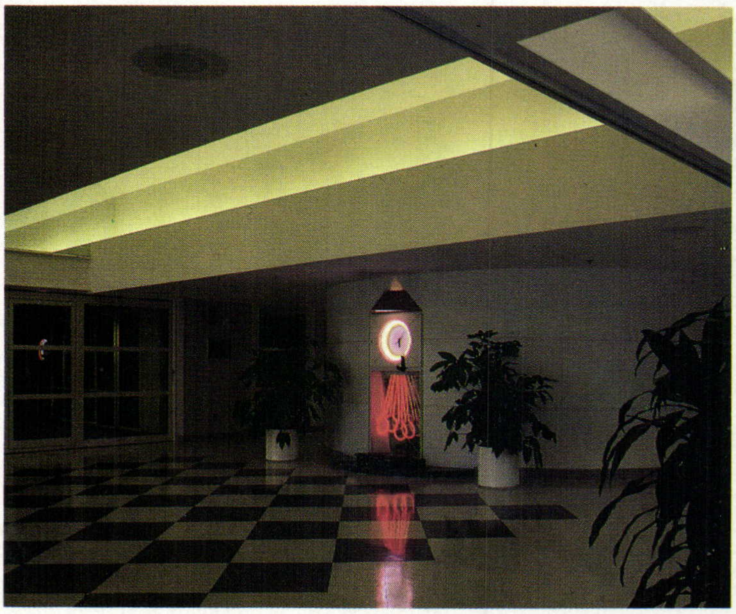
The central learning resources center (below) also serves as a sort of theater in the round, and has wide expanses of stairs and ramps (dubbed "stramps" in the school) that serve as sitting areas and provide circulation to the classrooms. Though an internal space, the big room is amply and dramatically skylighted (opposite right). "Cosy corners" are also provided here beneath the windowed classroom lofts (opposite, top left). One of the lofts serves as a little playhouse with a fireman's pole to the lower level. As another playful touch, the entrance foyer (opposite, bottom left) features a fun grandfather clock, with colored neon lights and a kinetic neon pendulum; an inverted number 7 on the clock face indentifies the school district—the other numbers "have fallen to the floor, like little building blocks."

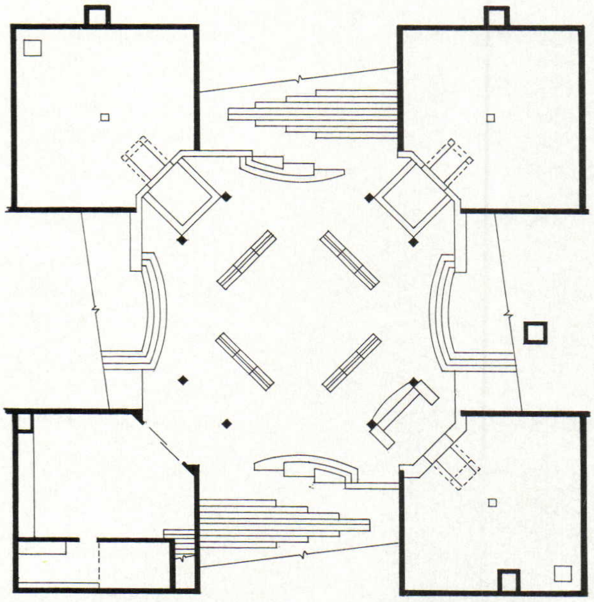
1. Foyer
2. Multipurpose room
3. Music room
4. Gymnasium
5. Learning resources
6. Shared learning
7. Mud room
8. Classrooms
9. Kindergarten
10. Staff room
11. Staff workroom
12. Administration
13. Security screen
14. Storage
15. Computer



Julia Kiniski School
Kiniski Gardens
Edmonton, Alberta
Owners:
Board of Trustees, Edmonton School District No. 7
Architect:
Barry Johns Architect Ltd.—Barry Johns, partner-in-charge; Marshall Opyr, Erwin Rauscher, Ann Jalbert, Allan Partridge, Mitch Vance, project team
Engineers:
Read Jones Christoffersen Ltd. (structural); Vinto Engineering Ltd.(mechanical); AME Engineering Ltd. (electrical)
Consultants:
Hanscomb (costs); Earthscape (landscape)
General contractor:
C&I Consultant and Management Services Ltd.







Vollum Institute for
Advanced Biomedical Research
Oregon Health Sciences University
Portland, Oregon
Zimmer Gunsul Frasca Partnership,
Architects

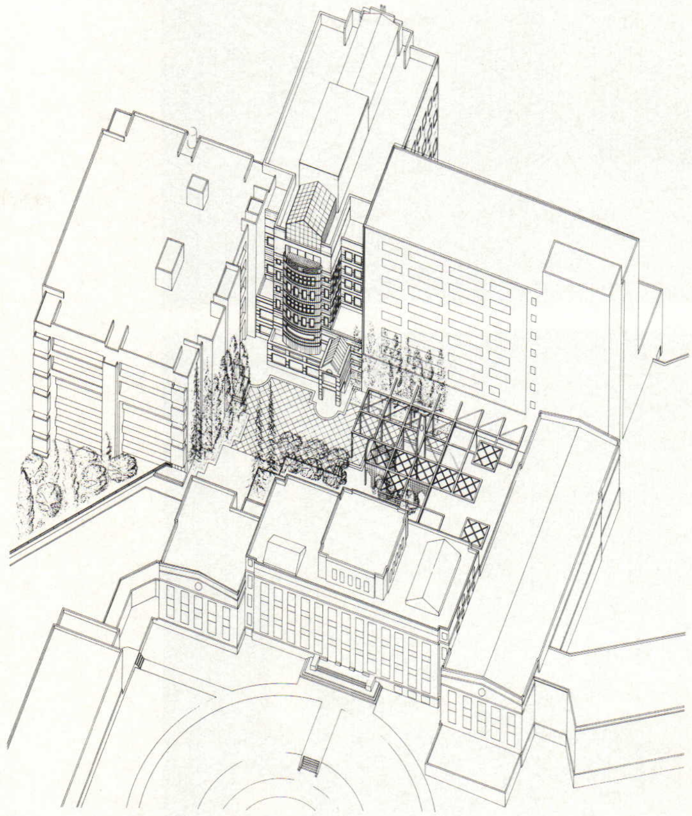
Minds over matter

Besides demonstrating new vitality in well-tried laboratory design concepts—the "humanistic" meeting place and the interstitial service zone —a neurobiological research facility eases the growing pains of a regional medical center.

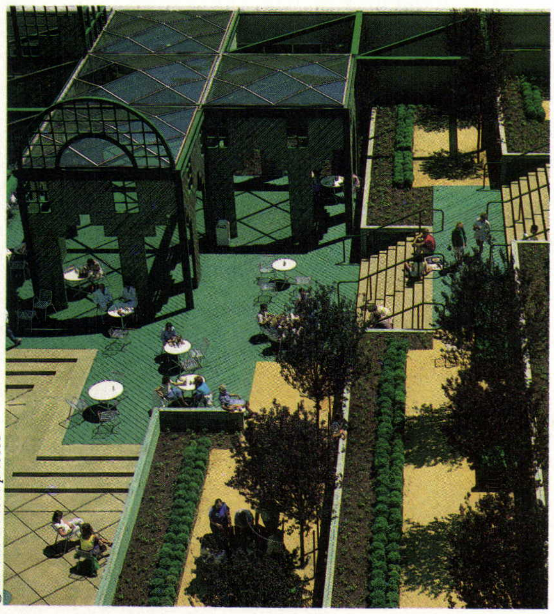
Pill Hill is a popular nickname for the campus of Oregon Health Sciences University, in the wooded heights just to the south of downtown Portland. Dr. Leonard Laster, the president of O.H.S.U., prefers to call the lofty enclave "a citadel of healing." The contrast in nomenclature reflects a duality basic to the institution itself. Even though O.H.S.U.'s administrators and faculty aspire to national eminence as a research and teaching center, most of their 26-building physical plant embodies the dreary, lowest-common-denominator architectural pragmatism of state-run academic and medical facilities. "This campus began in 1917 with a noble image of an acropolis," Dr. Laster explains. "It was to have Grecian-style structures within a beautiful landscape, visible from the city as a beacon to health. It grew, however, in epileptiform fashion, with mixed styles and painful attention to the need for parking. Gradually, the sense of identity was lost." Ambitious efforts are now underway to revive the original ideals, at least in spirit, while organizing future growth through a master plan whose most notable architectural achievement to date is the $15.5-million Vollum Institute for Advanced Biomedical Research, designed by Portland's Zimmer Gunsul Frasca Partnership. Funded by a combination of public and private support, the Institute was conceived both as a necessary catalyst for university-wide development and as a prerequisite for attracting new staff in the vanguard of scientific discovery. At the same time, it was imperative to assure incumbent University faculty that the new structure would not be an ivory tower-fortress hermetically sealed against would-be intruders.

Responsibility for coordinating these goals in a single program fell largely upon the architect, who was obliged to begin work before the University could determine the Institute's specific focus of biomedical research or recruit appropriate personnel. The only given, besides the budget, was an assignable area of roughly 67,000 square feet, of which 41,000 had to be laboratories and lab-related spaces. To the client's puzzlement, Z.G.F. principal Robert Frasca started out by selecting what was seemingly the least desirable of four available sites—a leftover strip of land 90 feet wide and 130 feet deep, bounded by a parking lot, existing Basic Science and Research buildings, and a precipitous 45-degree drop. Tight space and the difficulty of future expansion notwithstanding, Frasca insisted that a tricky infill job was worth the trouble. Literally and symbolically, he argued, this location would link the Institute to resources already in place—laboratories, libraries, the university cafeteria, as well as the teachers and students who frequent them. Simultaneous conversion of the parking lot into a sorely needed pedestrian plaza would fuse an architectural hodge-podge into the semblance of a coherent quadrangle. Besides meeting the internal desiderata of campus planning and politics, this strategy offered a measure of the external prominence Dr. Laster and his colleagues sought, since the north, or downhill, aspect of the Institute, away from the new courtyard, could be treated as a grand emblematic facade in full view of central Portland. That the location also commands a vista beyond the city skyline to Mt. Hood was a splendid bonus.

The primary determinant of the scheme was Z.G.F.'s own research into the inward life of biomedical exploration. Robert Frasca began with the germ of an idea suggested by a television show about the extraordinary number of Nobel laureates in the research laboratories of Cambridge University. The architect was struck by how many observers attributed this success to stimulating talk among scientists in different fields of work "at this little cafeteria where they get together every day for tea." The informal English precedent in turn reminded Frasca of the deliberate provisions for social and intellectual intercourse at the heart of Louis Kahn's original Salk Institute project. Kahn liked to relate how "Salk told me that he wanted to have a laboratory to which he could invite Picasso . . . . I came up with the idea that what he wanted was a place of the *measurable*, which is a laboratory, and a place of the *unmeasurable*, which would be the



AXONOMETRIC



©Strode Eckert photos

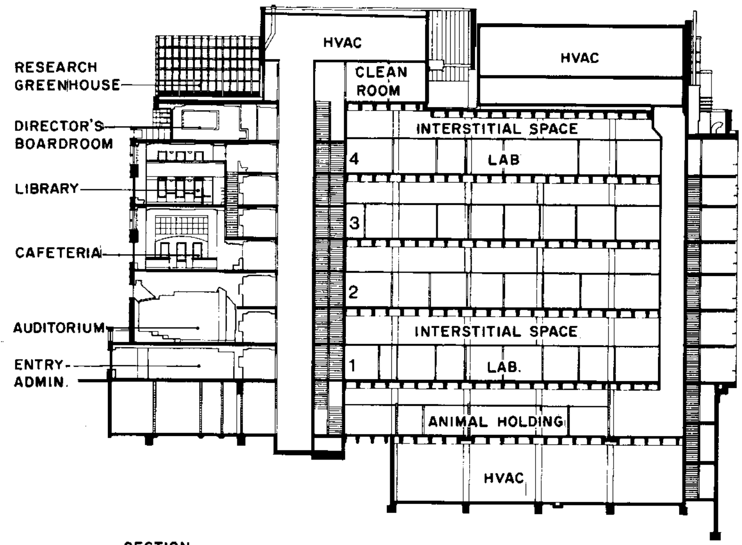
Inside the Vollum Institute, researchers study the relation of basic brain functions to disorders such as schizophrenia, Alzheimer's disease, and drug addiction. Outside, light-colored facades perpetually aglow (biomedical research continues around the clock) make Vollum the "beacon to health" University president Leonard Laster sought. The terra-cotta-clad south front (opposite) is flanked by the School of Medicine's Basic Science Building, to the left, and a general research facility, to the right. Mackenzie Hall (not shown), on the opposite side of the new plaza, houses the School of Nursing. The Institute's brick-faced north facade (page 102 and top photo above) towers above central Portland.

meeting place. Biology is not just scientific or a simple task of finding that which is measurable. There is an *unmeasurable* quality, even in matters scientific." Thinking along similar lines, Frasca devised a binary parti for the Vollum Institute, rather like a double-lobed brain. The analogy is especially apt in light of the building's ultimate dedication to molecular neurobiology (the study of brain functions at the level of genes and proteins), even though the basic layout is flexible enough to suit many other scientific endeavors. Such adaptability is in any case vital to the Vollum's present charge, since no area of biomedical research is as dependent as neuroscience on a continuous interdisciplinary exchange of data and insights.

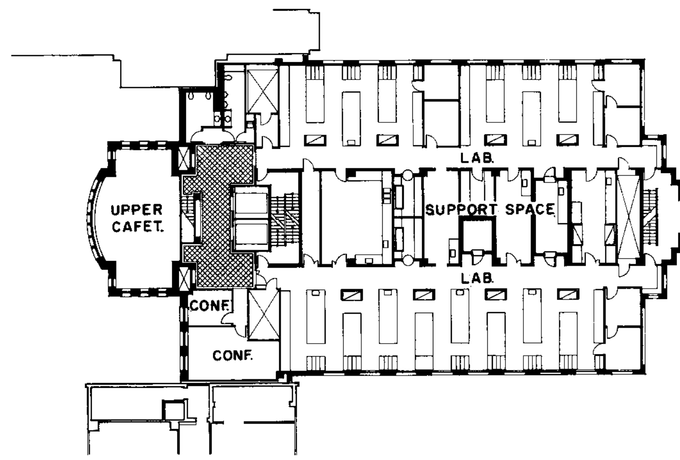
In essence, Frasca envisioned a tall building split vertically, or two narrow buildings back-to-back: laboratories would be stacked on the north side and meeting places on the south, with circulation forming connective tissue between them and, in turn, joining the entire Institute to the greater university. To supply concrete inducement for researchers to leave the "introverted" pursuits of lab and office from time to time for more "gregarious" encounters with colleagues in other parts of the building, the architects amplified the program—without expanding the set square-footage or budget—to include an auditorium, cafeteria, library, and conference rooms (which, as a welcoming gesture toward the university, face the plaza). Detailed interior planning was postponed, however, until Z.G.F.'s project team could visit research facilities at the Salk Institute, Brandeis, Cal. Tech., M.I.T., Scripps, and U.C.L.A. This comparative study addressed quantifiable issues, such as optimum lab-module dimensions, equipment storage, and bench locations, as well as more subjective problems, such as agreeable wall colors, surface finishes, daylight levels, and outdoor views. Frasca resolved that "humanistic" sensitivity to the latter concerns should prevail even in the most strictly utilitarian areas. Dr. Eckard Weber, acting director of the Institute, points to six- by six-foot windows and glazed balconies overlooking evergreens and mountains as palpable assets in a laboratory—and boons to recruitment—just as he also commends the relative ease with which open work spaces can be reconfigured to suit varying research requirements. Although about half of the total projected 200-person staff has yet to be hired, installations already run a complex gamut from wet labs for isolating fragments of DNA to insulated quiet rooms where electrophysiologists measure ion flow in and out of cells. With labs and offices at the perimeter of a service/support core, scissor stairs at either end of the building, and 18-foot floor-to-floor heights incorporating a six-foot overhead mechanical zone on each level, researchers can readily subdivide their space and move apparatus without logistical crises or code violations. And because interstitial volumes are defined by laid-in ceilings without cumbersome trusses or exposed ductwork, future rerouting of the hvac, plumbing, or electrical systems they enclose need not clutter a neat environment.

The architectural ambience shifts unmistakably as one moves from labs to the meeting rooms and other common areas a half-story away, which Frasca has dubbed "Oxbridge" in tribute to English prototypes. Here mullioned bay windows, fine woodwork, upholstered furniture, and elegant sconces and chandeliers are meant to evoke a comfortable Old-World civility. Short flights of domestic-scale staircases ease the transition between the staggered floor levels of the Institute's two habitats, and placement of washrooms, vending machines, and other basic amenities on mezzanines along the way further encourages casual discussion among scientists whose paths might rarely cross in the normal course of work. Cafeteria-level passageways also provide direct access to flanking buildings. For more ceremonial entrances and exits, a lobby adorned with paintings by Oregon artist Carl Morris (a regional alternative to Salk's Picasso) furnishes some of the grandeur O.H.S.U. desired. Save for the rather hectic Postmodernism of courtyard trelliswork, designed by landscape architects Peter Walker and Martha Schwartz, the Institute's public face is a tactful exercise in quiet good taste, circa 1987. The multifarious program is expressed in discreetly contrasting facades: shades of Collegiate Gothic and Classicism on the Oxbridge frontispiece, and a hint of Moderne appended to the laboratories, whose ziggurat-crowned tower is already a Portland landmark. Z.G.F.'s materials—terra-cotta to the south and brick elsewhere—reflect local antecedents, although the present architects have keyed their buff-to-pink palette appreciably brighter than the campus's prevailing sallow tones. It is too soon to gauge the long-term effects on Pill Hill of a dose of Oxbridge, but Dr. Laster's hopeful prognosis already foresees a Nobel Prize. *Douglas Brenner*

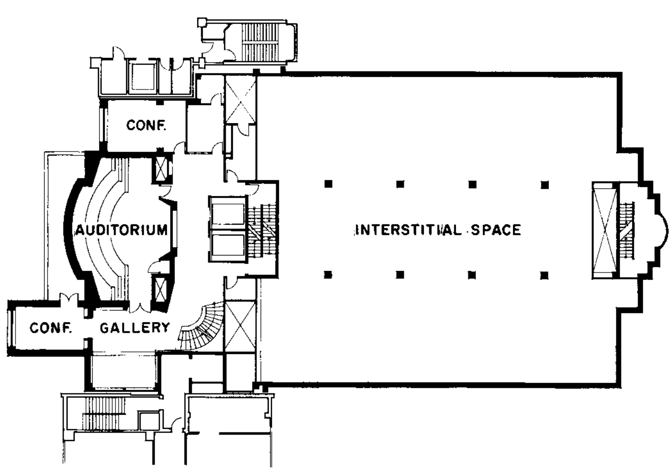
Segregation of 18-foot-high lab stories, which cost approximately $190 per square foot to build, enabled Z.G.F. to stack lower-ceilinged common rooms on the south, at $80 per square foot. Staggered floor levels and short flights of stairs nonetheless foster communication throughout the Institute. Open-plan labs on a 10- by 23-foot module allow for flexible layouts. Principal investigators, who direct projects occupying as much as an entire floor, have private offices. Other researchers share open offices nearby, and gather casually in stair-landing belvederes inside the north tower. Lab "servant" spaces (to use Louis Kahn's terminology) are articulated in plan and section, if not expressed as esthetic components. Owing to demands for positive air flow, frequent air changes, and 100-percent exhaust, ventilation is the most extensive mechanical system in the vertical core and horizontal interstices. Air is drawn in at grade and released through rooftop stacks. A stepped northern parapet conceals exhaust fans and a heat exchanger, part of a heat-recovery network designed to lower energy costs. South-facing common rooms are not air-conditioned, although deep terra-cotta frames on operable windows act as sun shades. Terra-cotta walls, alternating matte and glossy surfaces, reflect daylight into the plaza—a welcome glow in the Northwest climate. Besides acting as forms for reinforced concrete during construction, the extruded ceramic tiles compose a frontispiece that harks back to Portland's many early 20th-century terra-cotta landmarks. Square terra-cotta bosses adorn brick veneer on other facades.



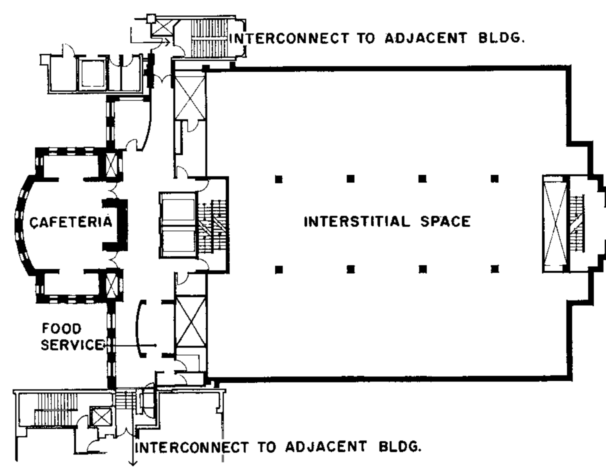
SECTION



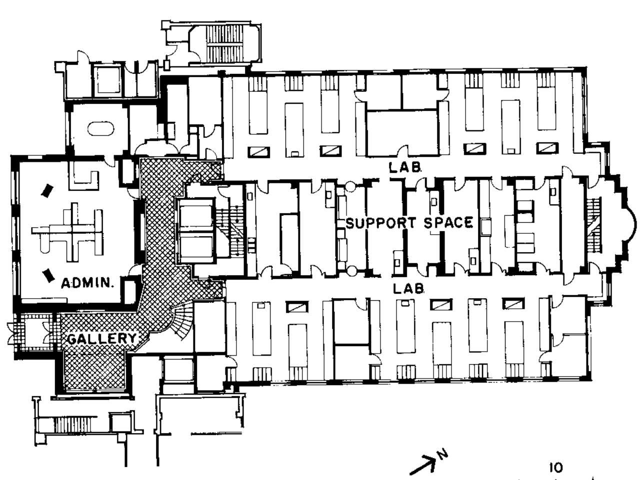
THIRD FLOOR



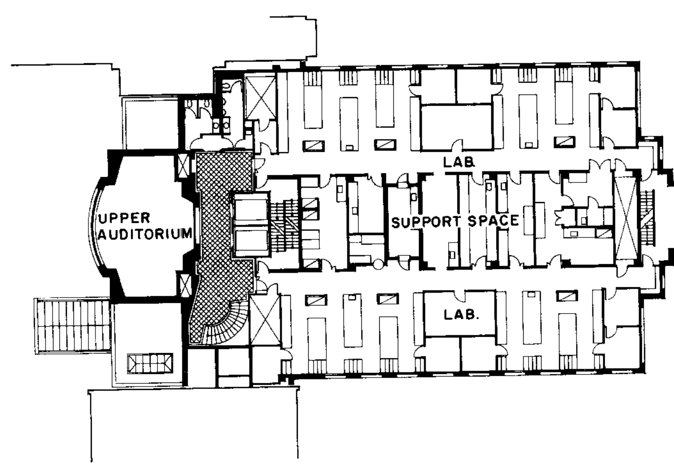
FIRST MEZZANINE



SECOND MEZZANINE



FIRST FLOOR



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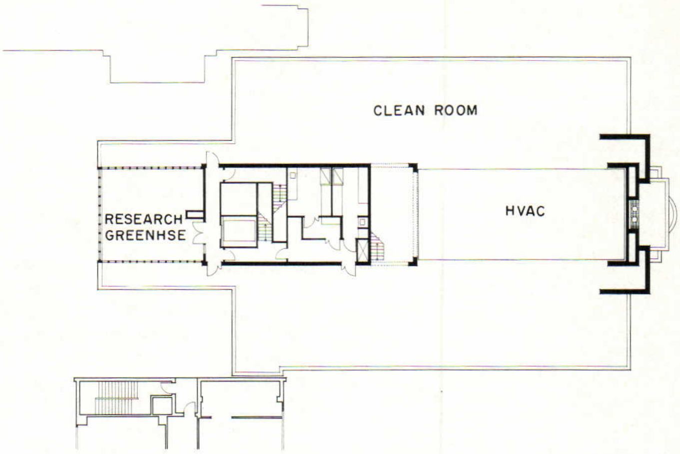
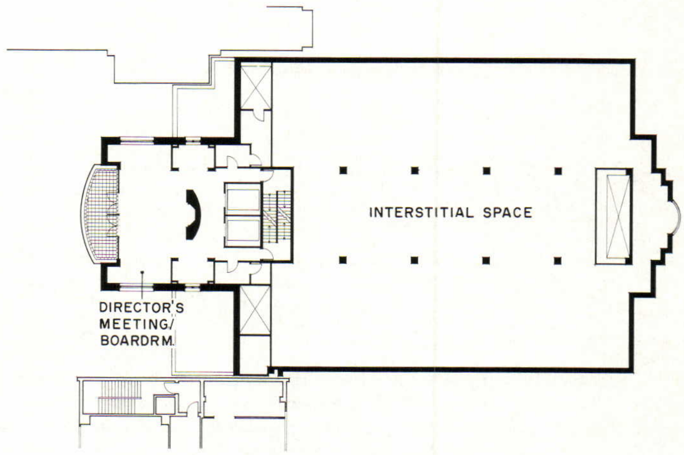
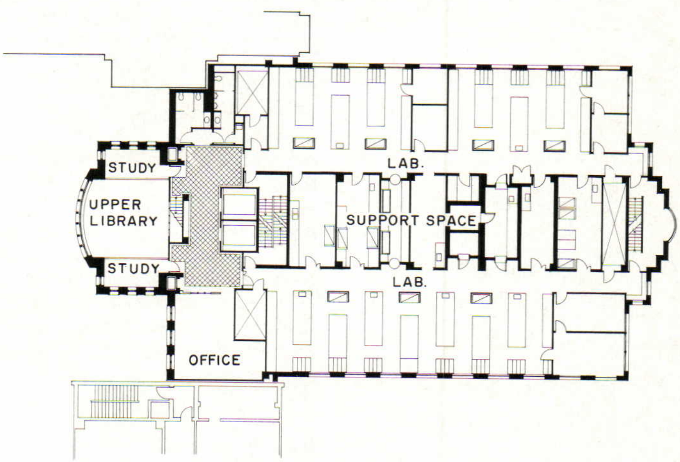


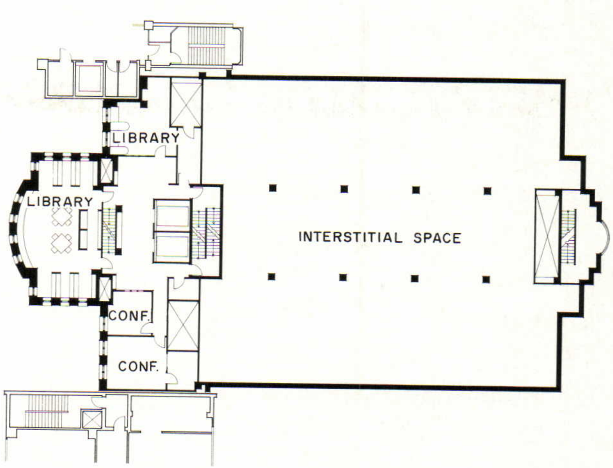
GREENHOUSE ROOF



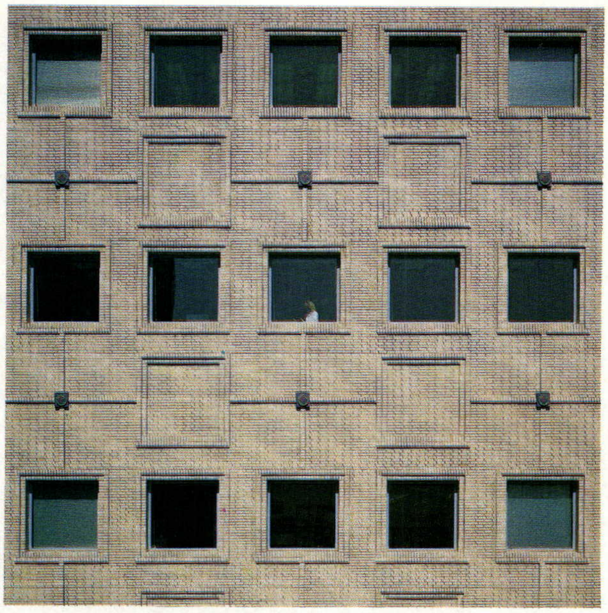
FOURTH MEZZANINE

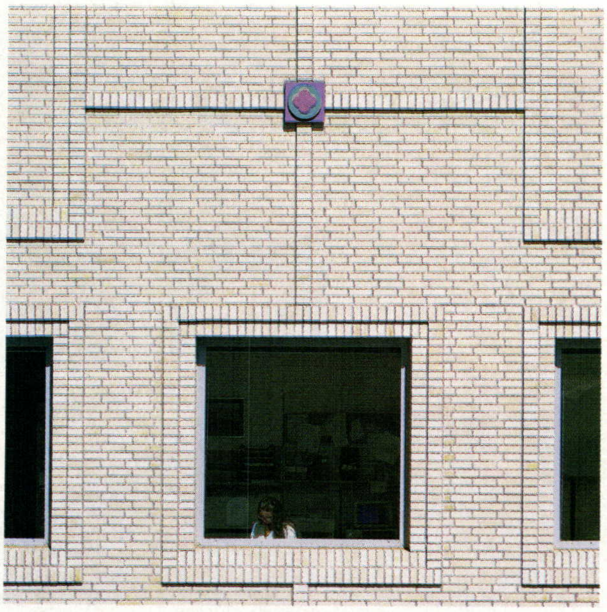


FOURTH FLOOR



THIRD MEZZANINE





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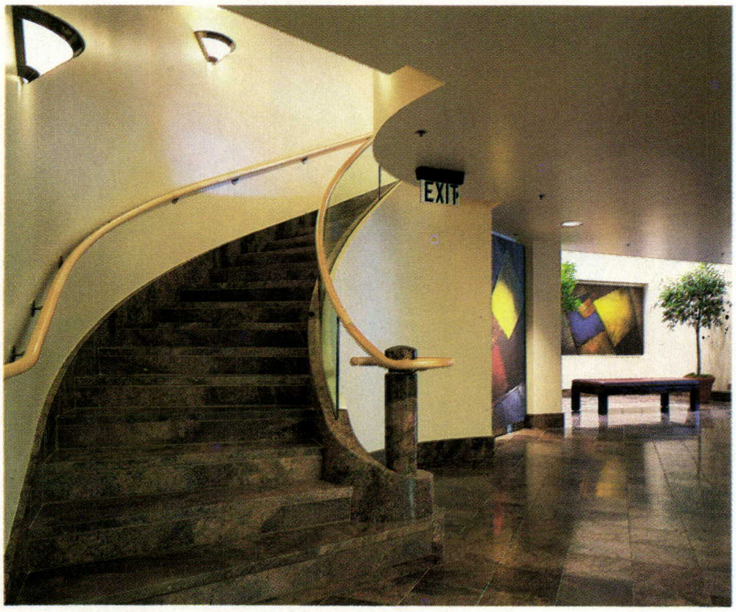

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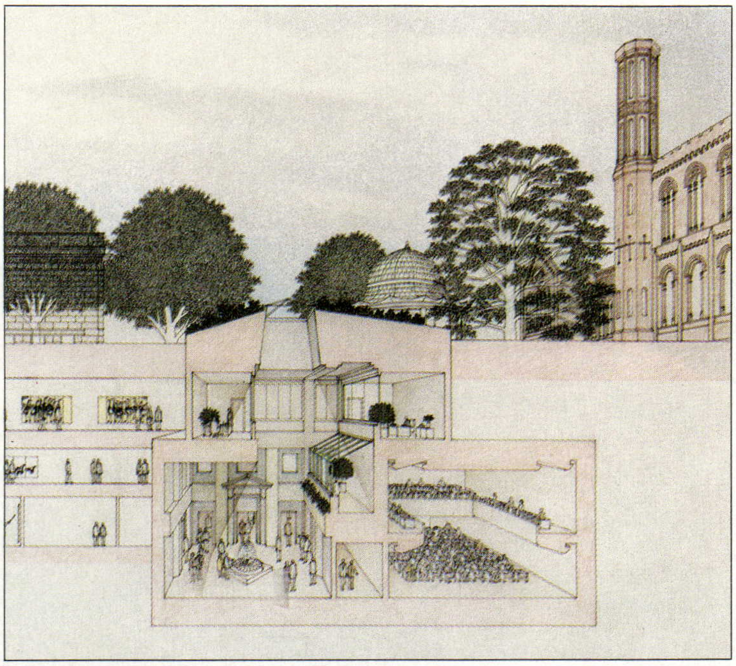
During design development, rectangular niches were added to the granite-tiled lobby/gallery (top and center left) to receive a series of nine paintings entitled "Intersecting Light," donated to O.H.S.U. by the artist, Carl Morris, of Portland. The resulting ensemble embodies Z.G.F.'s—and the Institute's—attempt at fusing science and art, or what Kahn termed the "measurable" and "unmeasurable" elements of research. Relating this installation to the neurobiologists who pass through daily, Dr. Laster has observed, "To achieve their goals, they will need not only the ingenuity, devotion, and experimental facility of the scientist, but also the unbounded imagination and . . . creativity of the artist . . . . The scientists will recognize in Morris a companion spirit engaged in a search parallel to their own." Morris himself commented, in an interview in Northwest Magazine, *"Most artists think, well, if they could only do a chapel—because that's the only place in our society where art is done collectively . . . . I think this is a marvelous chapel that fits our time much better than any particular chapel representing any particular religion or faith. This is faith of man here." The prosaic reality of life among the fume hoods and autoclaves on the far side of the sweeping lobby staircase is also suffused by the beauty of scenic views and by daylight. Epoxy-resin counter tops, seamless vinyl floors, and washable lay-in ceilings are strictly utilitarian. At present, first-floor labs (the province of molecular pharmacologists studying brain cell membranes and receptors) and work spaces on the top two stories (where molecular cloning techniques are in use) require "wet" facilities, supplied with plentiful water, gas, and ventilation, along with accommodation for centrifuges and other apparatus. In second-floor labs, where electrophysiologists insert miniature electrodes into thin slices of brain tissue to measure electrical conductance, insulated rooms must be capable of shielding specimens from even a micron of vibration. The Institute urges scientists to compare notes, both at organized conferences and at informal meetings in common rooms such as the cafeteria (opposite). Vending machines immediately outside serve the same purpose for a sizable nocturnal contingent.*

Robert Frasca's idea of collegial "Oxbridge" spaces began with a cafeteria and expanded to include small conference rooms (opposite), a director's suite and boardroom (top), a reference library (bottom), and a 70-seat auditorium (center left), which Leonard Laster hails as "perfect for announcing Nobel prizes." Warm finishes usually associated with residential and club décor deliberately contrast with the relative austerity of the labs. Oriental rugs are laid on parquet floors of beech, cherry, and walnut. Anigré and cherry paneling glows in the soft illumination of table lamps and sconces, and in sunlight filtered through louvers. Chandeliers gently highlight the contours of coved ceilings. Besides enriching everyday life for Institute researchers, these spaces will also be available for appropriate use by the University, which till now has lacked public interiors worthy of its standing in the medical world.

Vollum Institute for Advanced Biomedical Research
Oregon Health Sciences University
Portland, Oregon
Owner:
State of Oregon, acting by and through the State Board of Higher Education
Architect:
Zimmer Gunsul Frasca Partnership—Robert J. Frasca, design principal; Larry S. Bruton, Brooks Gunsul, Jack Cornwall, Ernest L. Grigsby, William Hutchinson, John S. Walling, project team
Engineers:
KPFF Consulting Engineers (structural); Bouillon Christofferson & Schairer (mechanical/electrical); CH2M Hill (civil)
Consultants:
Earl Walls Associates (laboratory); Cerami Associates (acoustics); Office of Peter Walker/Martha Schwartz (landscape)
General contractor:
Todd Building Company

Underneath a garden



The new addition to the Smithsonian possesses many of the qualities its former secretary, S. Dillon Ripley, and its architects, Shepley Bulfinch Richardson and Abbott, hoped and dreamed it would have. It is an architectural success story, up to a point. Two major museums have been hidden underneath a garden, in response to demands by environmentally concerned community groups that the 4.2-acre quadrangle behind the Smithsonian should remain predominantly open space. Ripley and the institution concurred, challenging the architects to invent a 368,000-square-foot underground environment as attractive below stairs as the interiors of buildings constructed in light and air.

Opening this month with 96 per cent of its space subterranean, the Museum and Research Complex announces its presence by means of three beautifully proportioned and executed pavilions arranged in a garden donated by Enid A. Haupt and framed by three registered landmarks. To the north is the original Smithsonian Building (the "Castle") designed by James Renwick (1849), on the east is the Arts and Industries Building (1881) designed by Cluss and Schulze, and on the west is the Freer Gallery of Art (1923) designed by Charles A. Platt. The quadrangular site is framed on the opposite side of Independence Avenue to the south by the Forrestal Building (1970).

Each of the three new pavilions serves as a foyer and monumental stairhall for a segment of the three-story complex below. The domed bay (opposite) belongs to the National Museum of African Art's pavilion, the vestibule from which the visitor descends to the African collection. From a pyramidally roofed pavilion, directly opposite, an octagonal stair leads to the Arthur M. Sackler Gallery of Near Eastern and Asian Art. A small circular kiosk, visible in the drawing (left), encloses a third stair which connects to a skylit mall and auditorium, also visible in the drawing.

Experiencing the lovely garden and pavilions is to expect the exhibition galleries to be of the same quality. In design, model form, working drawings, and other bid documents, they were. Unfortunately, with the retirement of Ripley, a new team of curators came to disagree with the Shepley Bulfinch team about such basic matters as the introduction of daylight into the galleries and, indeed, the configurations of the galleries themselves. SBRA's design partner for the Smithsonian's addition, Jean Paul Carlhian, fought to maintain properly filtered skylights (similar to those in the section) only to be defeated by Smithsonian experts who decreed that daylight, no matter how filtered, has no place near art. All but a few skylights were sealed.

Worse, the building's principal exhibition space, designed to be used in common by both museums or separately with a movable partition in place, has been permanently halved by the construction of a fixed partition. Originally conceived as a two-story-high room, one half of it now has an extra floor. A band of interior windows overlooking the space has also been blocked up on both sides of the now-permanent wall. Equally disappointing is the fact that almost all of the architectonic elements that were to shape the interior, including axial sequences of carefully proportioned rooms, were altered by the curators. The original ceiling systems, for example, in which exposed beams artfully baffled the lighting fixtures, are now screened by gyp board. The curators, by concealing or underplaying the architectural envelope, have made sure that visitors will have nothing to directly look at or indirectly perceive but the exhibits themselves. Few outstanding museums or galleries could be thus described. Perhaps because it isn't a gallery, and therefore lacked a strong curatorial hand, the architects had more success with the underground mall of the complex (pages 120-121 and section at left). Here, skylights illuminate a monumental space.

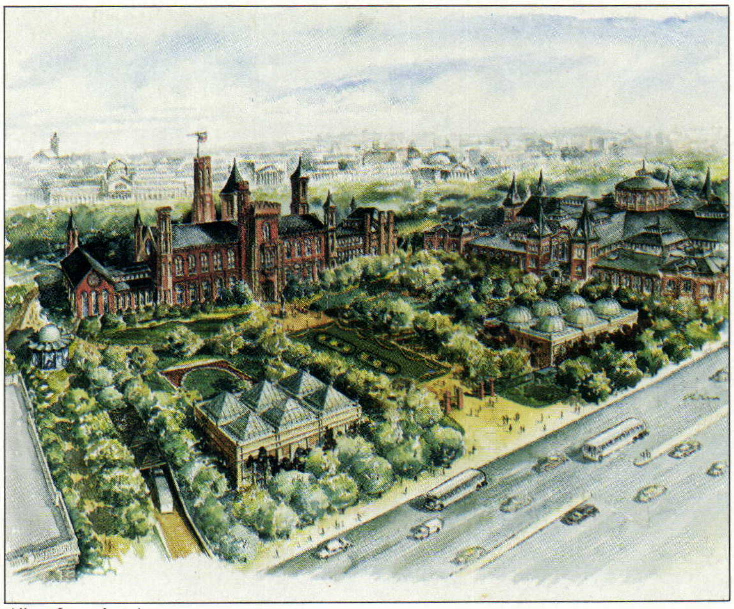
At the time of this writing, the galleries were not photographed. The plans and sections that follow delineate the complex as originally designed and approved. Perhaps the Smithsonian will one day go back to the interiors that Dillon Ripley and his architects once envisioned. SBRA and particularly Carlhian can always hope. *Mildred F. Schmertz*

All is not well with the architecture of the Smithsonian Institution's Center for African, Near Eastern and Asian culture. The monumental pavilions and the garden that surrounds them are distinguished designs, but the architects lost control of the underground exhibition galleries, and it shows.

New Museum and
Research Complex
for the Smithsonian Institution
Washington, D. C.
Shepley Bulfinch Richardson and
Abbott, Architects

©Nick Wheeler/Wheeler Photographics photos

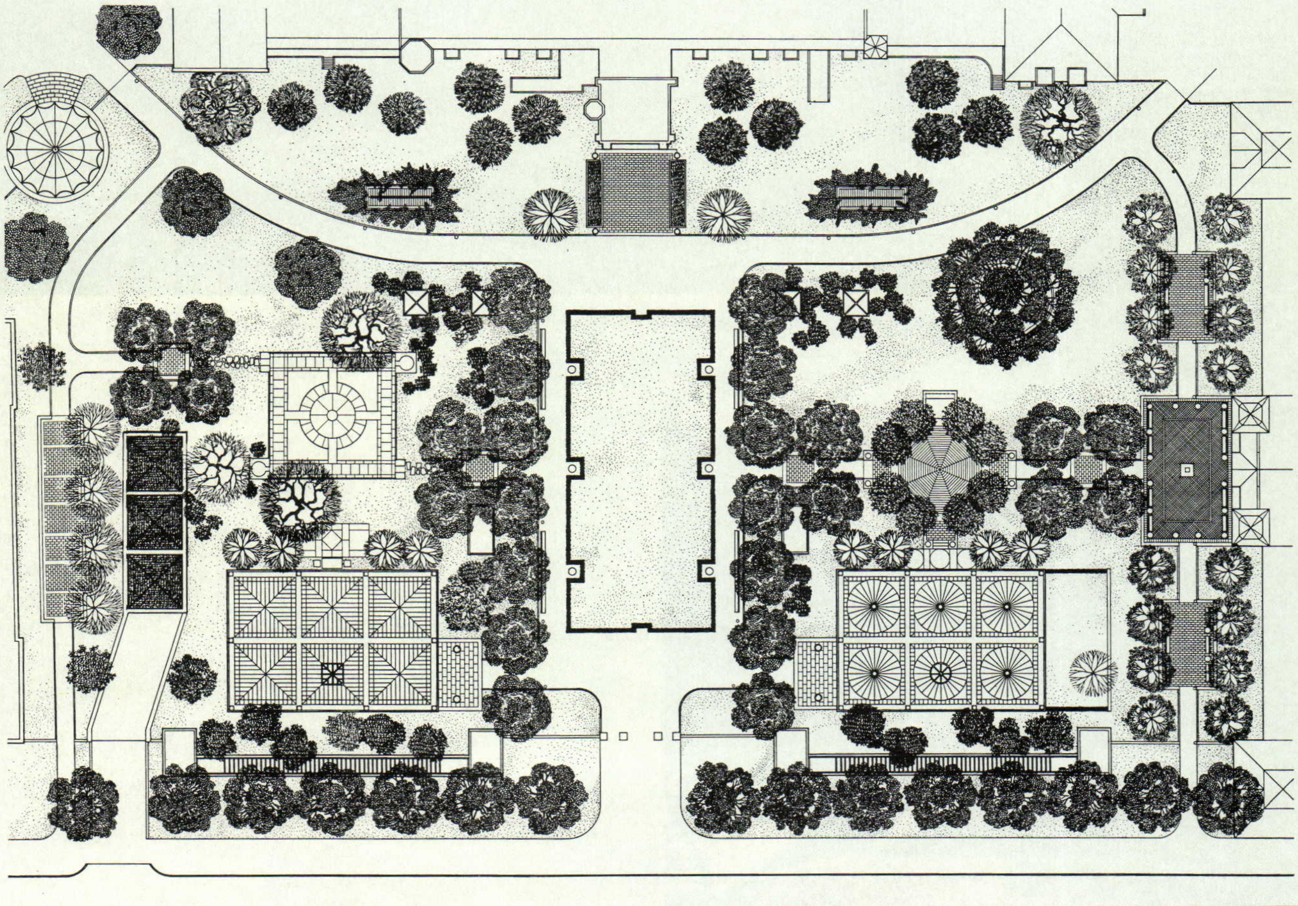
The garden pavilions appear monumental, but are much smaller than they look. The harmony inherent in each and the stylistic commonality they share is formed upon a set of proportional relationships based on the golden mean and influenced by the classical system of the 17th-century French mathematician and engineer, Nicolas-François Blondel. The basic proportions are derived from the 30-foot structural grid. The cornice lines of both are 24 feet above grade to accommodate the desired hemispherical shape for the domes of the African pavilion. These cornices also more or less align with entablatures and other bandings of the adjoining landmark structures, including the Smithsonian Castle (perspective this page), the Arts and Industries Building (opposite page, bottom photo), and the Neoclassical



Albert Lane drawing

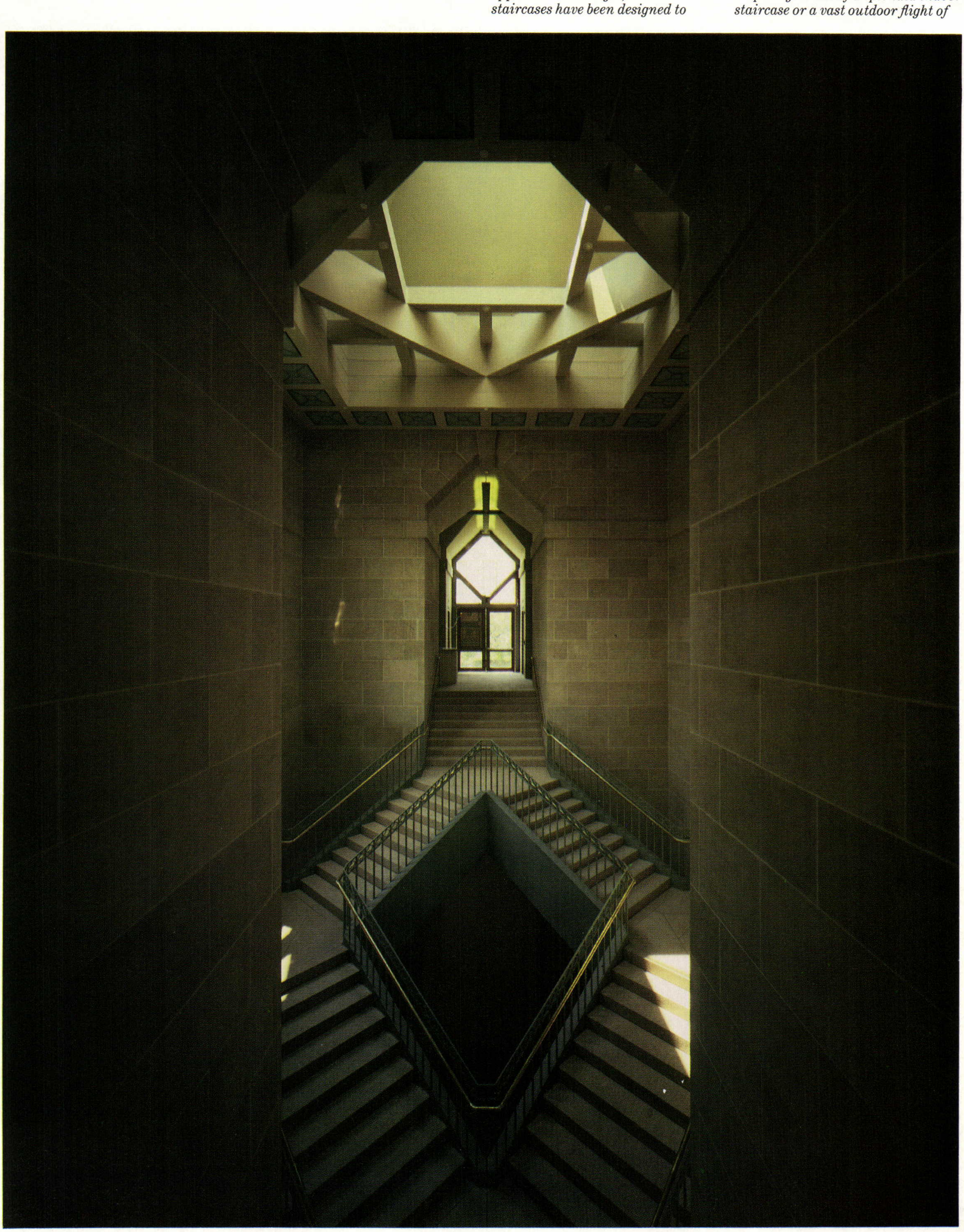
Freer Gallery of Art on the opposite side of the garden. Relatively low (averaging 37 feet high at their apexes), they screen the lower levels of the Forrestal Building across the street as viewed from within the garden. The pavilions represent an effort to reconcile the Victorian styles of the Castle and the Arts and Industries Building with the Neoclassicism of the Freer. The pavilion (opposite page) crowns and forms the entrance to the three underground stories of the National Museum of African Art, while the pavilion below does the same for the the Arthur M. Sackler Gallery of Near Eastern and Asian Art. Design for the foreground garden of the African museum has Muslim precedents, while that of the Sackler has Chinese connotations, including a moon gate.

The Enid A. Haupt Garden (photo and site plan below) consists of 4.2 acres of ground that reach a depth of three feet above the roof of the three-story underground museum and gallery and full depth near the Castle. The garden was put in place as a mature landscape made possible by Haupt's grant of $3-million, which went a long way toward the purchase of fully grown specimen plants and large trees. A 100-year-old linden (the largest tree shown in the site plan) was carefully protected from the shock of inhabiting a construction site, and now shades a popular seating area. A Victorian embroidery parterre design based on a similar planting for Philadelphia's 1876 Centennial Exposition forms the main axis. A complete array of antique cast-iron garden furniture, urns, and wicket borders from the same period has

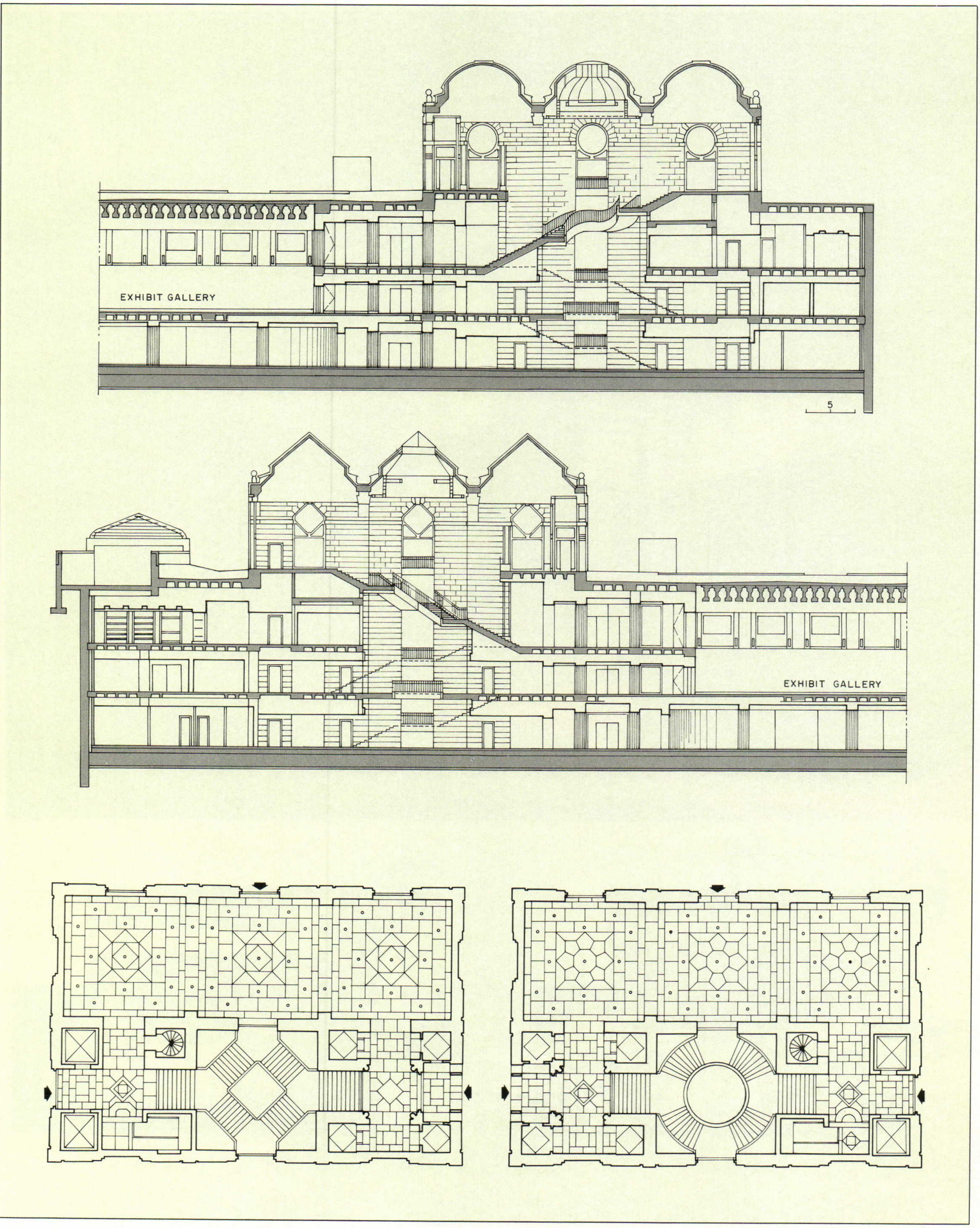


been gathered from the Smithsonian's collection and set off by reproductions of 19th-century Washington lampposts. The Islamic and Asian gardens are on opposite sides of the parterre. The kiosk at the northwest corner (opposite below) serves as the public entrance to the third basement level which, since it functions as an education and conference center when the rest of the museum is closed, requires separate access. Carlhian credits Bramante's Tempietto of St. Peter as well as a sketch by Humphry Repton as sources for this kiosk. Shown in the photo below is a typical bay of the Sackler wing. Like its counterparts in the African museum across the garden, it is framed in concrete with solid concrete masonry unit-block infill set off by panels of granite. The standing seam roofs are copper.

Each of the two pavilions houses a monumental staircase interconnecting the three floors of the underground museum. The steps follow a diagonal pattern in the Oriental portion of the complex (photo below, plan opposite bottom left, section opposite middle) and a circular pattern within the African (section opposite top, and plan opposite bottom right). These staircases have been designed to celebrate the procession downward, not an easy architectural problem. Said architect Carlhian: "We saw this as a basic and unprecedented challenge. Downward is a direction traditionally identified with visits to bargain basements. Ceremonial introductions to hallowed destinations are traditionally upward—achieved through the awe-inspiring thrust of a splendid indoor staircase or a vast outdoor flight of

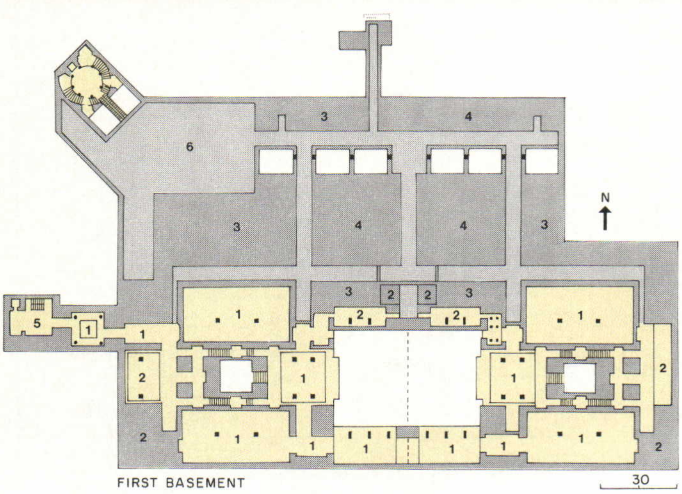


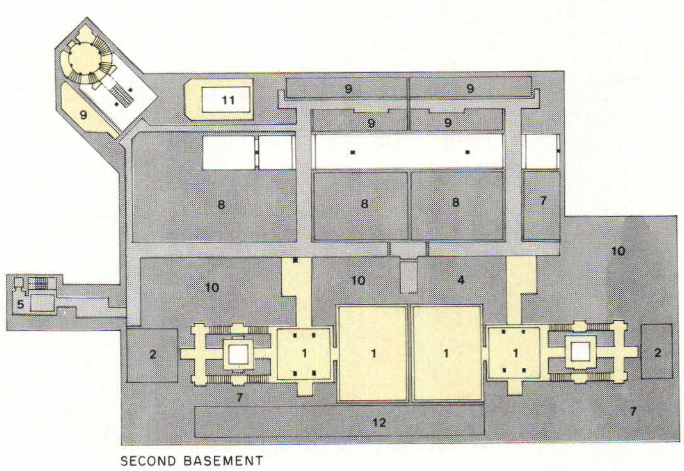
steps." In Carlhian's hands the downstairs walk is celebrated in nobly proportioned yet geometrically complex skylit shafts sheathed in limestone. The six-bay pavilion interiors have been designed to be empty and grand—uncluttered narthexes with coffered ceilings, granite-paved floors, and large north windows offering untinted views of the garden and the Castle. A layer of tinted glass is provided at the south window of each pavilion in order to minimize the impact of the ugly Forrestal Building across Independence Avenue. Light shining through the tinted glass enhances the nighttime illumination of the pavilions as seen from the avenue. As the sections indicate, the building has been constructed to carry the heavy load of three feet of earth for a tree-planted garden.



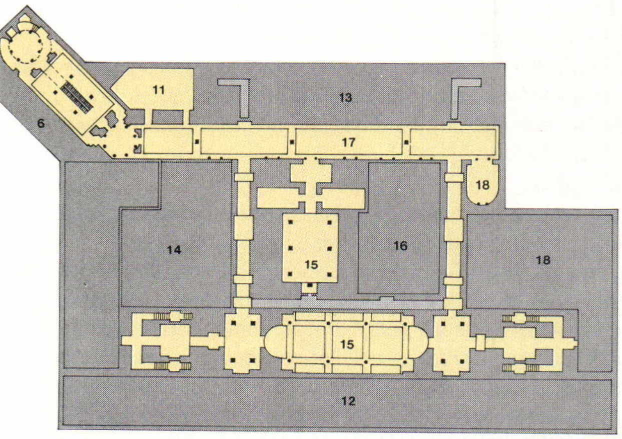
The underground mall (photos below and opposite) is parallel to the south facade of the Castle and extends from the Freer to the Arts and Industries Building. Muralist Richard Haas featured garden and architectural elements in his trompe-l'oeil *painting to evoke recollections and connections with the garden above. A line of skylights, each 10-feet square, bring natural light to the concourse.*

New Museum and Research Complex for the Smithsonian Institution Washington, D. C.
Architects:
Shepley Bulfinch Richardson and Abbott—Richard Potter, principal-in-charge; Jean Paul Carlhian, design principal; Robert T. Holloran, project architect; Albert Huang, Ronald Finiw, Lawrence Man, Ralph Jackson, designers; Fred Montague,





architectural/mechanical co-ordinator
Engineers:
Ewell W. Finley P. C. (structural); Mueser Rutledge, Johnston & DiSimone (geotechnical); Shooshanian Engineering Associates, Inc. (mechanical/electrical)
Consultants:
Sasaki and Associates, Inc. (landscape architects of record); Shepley Bulfinch Richardson and Abbott (garden design and architectural features); Lester Collins (landscape architect); James Buckler (Horticulture Director, Smithsonian Institution); Jules Fischer & Paul Marantz Inc. (museum lighting)
General contractor:
Blake Construction Co.



THIRD BASEMENT

1. *Exhibition*
2. *Visitor service*
3. *Exhibition support*
4. *Collection support*
5. *Freer connection*
6. *General support*
7. *Education*
8. *Research*
9. *Administration*
10. *Collection storage*
11. *Education center auditorium*
12. *Mechanical*
13. *Education center*
14. *Membership*
15. *International center*
16. *Visitor information*
17. *Mall*
18. *Smithsonian Traveling Exhibition Service*

Ove Arup & Partners: The engineer as designer

"Progress in engineering has always depended on ingenuity and invention, it is a creative thing which cannot be arrived at by statistical methods or any rational techniques." Ove Arup

Most architects envision engineers as unimaginative, bespectacled eggheads, armed with calculators, ballpoint pens, and mechanical pencils stuffed into plastic pocket protectors. Consulting with one is frequently regarded as a dreaded but necessary occasion, undertaken in the hope that the requisite structural columns and hvac ducts won't interfere with the design. Ove Arup & Partners is a firm of engineers that refreshingly counters the stereotype. Headquartered in a series of low-rise buildings and townhouses scattered around London's Fitzroy Square, the 51-year-old company has built a reputation for being "architect's engineers" through close collaboration with designers in the early stages of their projects. Its engineers are renowned for forging synergistic relationships with Britain's leading architects, most notably Norman Foster, Richard Rogers, and Michael Hopkins, whose structural exhibitionism most visibly relies on the custom craft of engineering. Arup and Partners' strength, however, does not stem from a doctrinaire view of technology or a narrowly focused specialty ("high-tech" architects account for only a fraction of its clients). Rather, it is based on a creative application of engineering principles without compromising an architect's vision, no matter how unbuildable it might initially appear. This willingness to support the concept of a design in addition to fulfilling technical requirements is reflected in such diverse projects as James Stirling Michael Wilford and Associates' Neue Staatsgalerie in Stuttgart (photo 3 opposite), Rem Koolhaas's almost winning competition scheme for The Hague's new city hall, Venturi, Rauch & Scott Brown's recently unveiled extension to the National Gallery in London, and Zaha Hadid's design for a dining table.

The firm's longstanding affiliation with the most adventurous of this century's architects began with its founder, Ove Arup. Born in England of Danish parents, he pioneered developments in reinforced-concrete slab construction during the 1930s and '40s, translating the Tecton Group's International Style designs into dynamically poised forms, including the spiral-ramped Penguin Pool in London's Regent's Park Zoo (2). Arup's interest in integrating design and construction led him to open an engineering and contracting company with his cousin in 1938, which, eight years later, resulted in the establishment of his own consulting practice. Today, at age 92, Arup still maintains an office in the partnership that bears his name, a multinational organization that has grown to encompass separate companies devoted to engineering, architecture, computer systems, acoustics, economics, research and development, and management. "He's our resident philosopher," explains director Robert Emmerson of the nonagenarian's role in Ove Arup & Partners, the building engineering division of the Ove Arup Partnership, which currently totals 3,029 employees in 56 offices situated in 24 countries, including an American subsidiary with offices in San Francisco and Los Angeles.

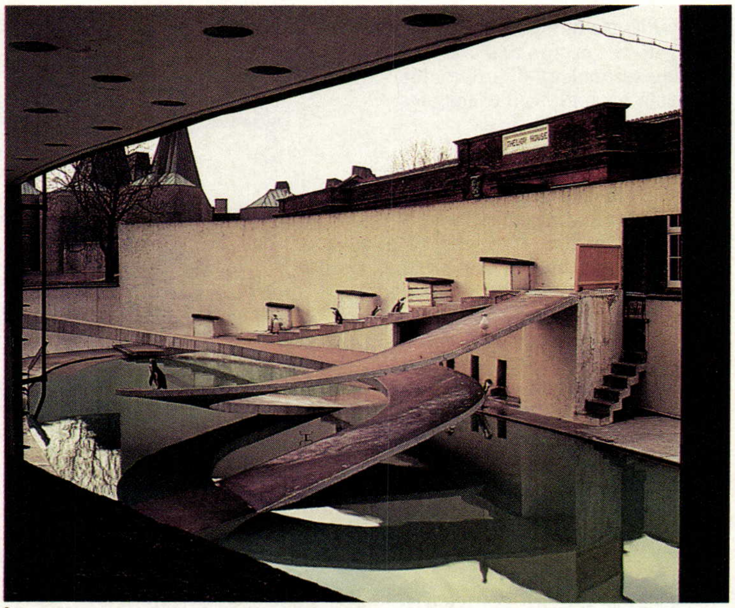
Despite its international scope, the firm has managed to maintain the progressive spirit of its founder and to avoid a cumbersome, impersonal bureaucracy by creating design teams of engineers who focus on a particular project, rather than on an exclusive discipline. Several of the teams are multidisciplinary, each composed of structural, mechanical, electrical, civil, and public-health engineers. Though autonomous, the groups share extensive research facilities and the expertise of specialists in areas ranging from cost estimating and building appraisal to geotechnics, fire safety, transportation, and lightweight structures. This practice mirrors the project-by-project approach of architectural offices, including in-house critiques and lectures by outside consultants. It also promotes interaction between the various engineers involved with a single project and integration of structure and services within a building as it is designed. "We don't separate the mechanical engineer, who tends to be the 'tail-end Charlie' on a project, from the structural engineer, who usually takes precedence," explains Richard Haryott, a structural engineer who directs one of Arup's multidisciplinary groups and serves with 15 other team leaders on the firm's board of directors. "With both types of engineers working together on a project at the same time, there is a feeling of belonging to the building, as opposed to doing just your isolated bit." The collaborative teamwork, however, is tempered with a peculiarly British regard for individual eccentricity. "It's the people that matter here and we recognize that different people like to work in different ways," reports Jack Zunz, the engineer responsible for Foster Associates' HongKong Bank (5) and co-chairman of the Ove Arup Partnership. "Each group takes on the flavor of the engineers involved." Though his claim may sound like managerial hype, colleagues outside the firm echo the sentiment. Robert Silman, a New York City-based engineer who worked in Arup's London headquarters in the mid-1960s and has since been involved in joint ventures such as Richard Rogers's PA Technology facility in Princeton, N. J. (4), cites his former employer as the model for his own office. "It's one of the largest engineering firms in the world, but I never got the feeling that I was a number. They pushed you to perform—not for production, but for ideas."

Arup & Partners' emphasis on concept over technique continues to produce well-versed generalists who view building engineering as an interpretive art rather than a number-crunching science. "The feeling that there is a correct solution to a technical question is very common [among architects]," points out director Peter Rice, who directs a multidisciplinary group and supervises the firm's lightweight-structures unit. "But a technical solution, like any decision, is a moment in time. It is not definitive. What is often missing is the evidence of human intervention, the black-box syndrome. So by looking at new materials, or at old materials in a new way, we change the rules." It is this resourcefulness that led Rice to adapt an obscure structural member invented by a 19th-century Bavarian engineer, Heinrich Gerber, into the bonelike, cast-steel "Gerberettes" of the Centre Georges Pompidou (6); to utilize ductile iron and ferro-cement for the skeletal trusswork and leaflike lamellae of the Menil Collection (following pages); and currently to reflect upon the possibility of designing a building with a glass curtain wall that billows in the wind. Epitomizing Arup's inventive spirit, Rice has become one of the firm's current stars. Since joining the firm in 1958, he has contributed to the most technically ambitious structures associated with the practice, beginning with the design of the Sydney Opera House (1) in which he played a major role while only in his 20s. After a brief stint with Frei Otto, Rice teamed up with Renzo Piano and Richard Rogers in 1971 on the Centre Georges Pompidou, which led to a partnership with Piano from 1977-81. In the meantime, he continued to consult for Arup & Partners, including the engineering of buildings designed by Rogers such as his Fleetguard factory and Lloyd's of London headquarters (RECORD, November 1986, pages 104-117). What led the 52-year-old Irishman to rejoin the organization is the depth and sophistication of its internationally based resources which permit him and other Arup engineers to research building methods and materials exhaustively, a practice no doubt facilitated by a higher fee structure for engineers in the United Kingdom.

To illustrate Arup & Partners' ingenious attitude toward structure, services, materials, fabrication, and other aspects of building engineering, a portfolio of four recent projects follows. These built and, as yet, unbuilt schemes were chosen to portray the firm's impact on architecture that derives its imagery from technology. Beyond issues of style, the projects demonstrate a model of collaborative practice that depends on engineering as much as on architecture to initiate design innovation. "The adventure of discovery is one of the key elements to give value to building," declares Rice, who exemplifies Arup & Partners' investigative pursuit when he asks, "How can we recapture some of that simple confidence, some of the form of structural experiment in a time when we have so much opportunity?"
Deborah K. Dietsch

1. Sydney Opera House; Jorn Utzon, Architect; 1957-65
2. Penguin pool, London Zoo; Tecton Group, Architects; 1933
3. Neue Staatsgalerie, Stuttgart; James Stirling Michael Wilford and Associates, Architects; 1977-84
4. PA Technology facility, Princeton, N. J.; Richard Rogers and Partners, Architects; 1982-83
5. HongKong Bank; Foster Associates, Architects; 1979-86
6. Centre Georges Pompidou, Paris; Piano + Rogers, Architects; 1971-76


1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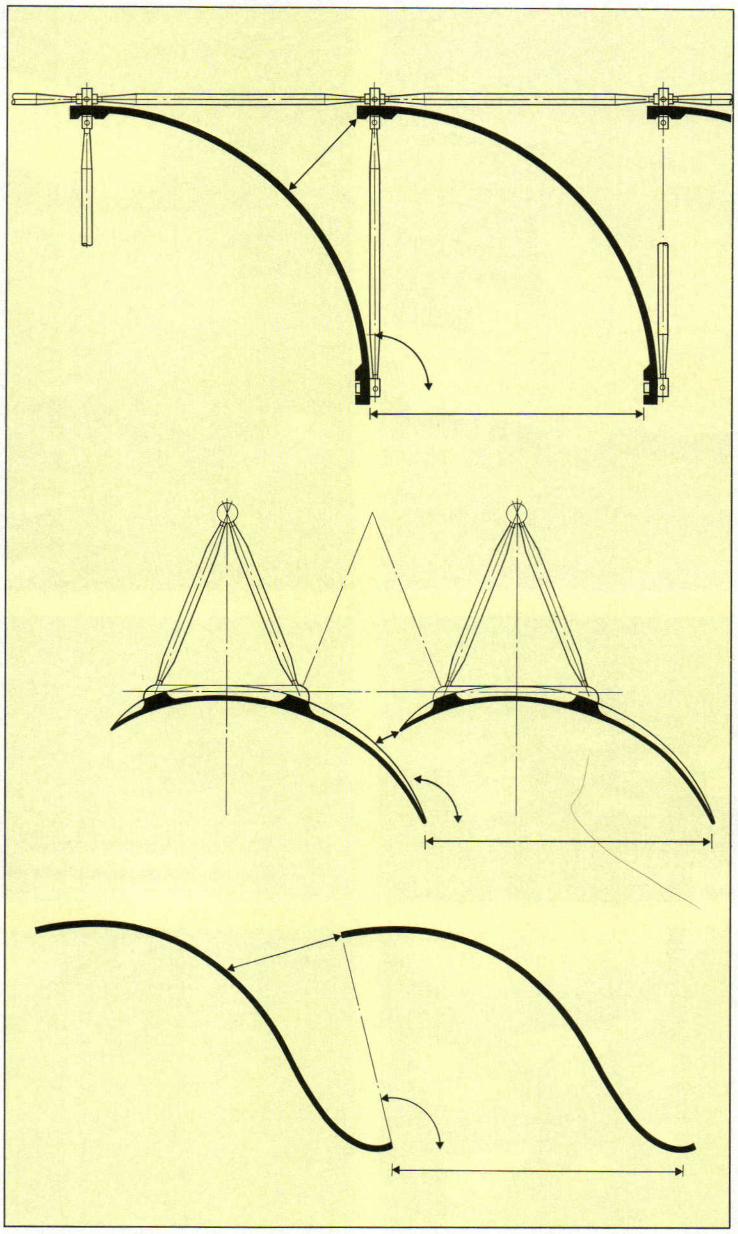
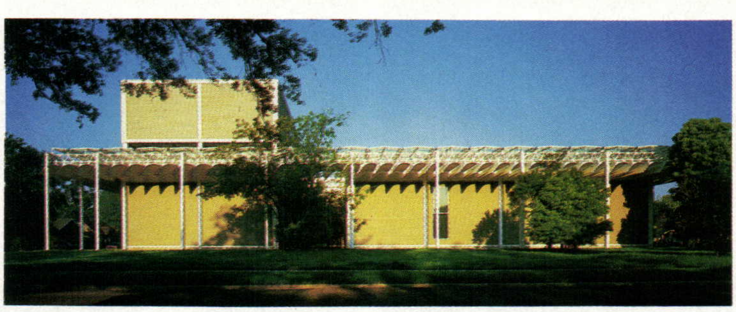
6

The Menil Collection

Renzo Piano's direct involvement with both the design and craft of building technology differentiates him from his high-tech colleagues. Like Jean Prouvé, he is as interested in the industrial production of a building element as its visual effect, a practice that led him to becoming a partner with engineer Peter Rice from 1977-81 following their collaboration on the Centre Georges Pompidou. Though the architect and engineer have since gone their separate ways—Piano to his Genoa building workshop and Rice to his former employer, Ove Arup & Partners—they have maintained a close working relationship. The most recent example of their ongoing collaboration is the Menil Collection, the Houston museum devoted to artwork assembled by Dominique and John de Menil.

The simple form of the 106,304-square-foot building, essentially a clapboard-sided box, is distinguished by an elaborate roof canopy (right). Its combination of louvered trusswork and skylights, which evenly distribute daylight in the galleries, typifies the sophisticated structural design, materials research, and fabrication techniques that Piano and Rice apply to a single building element. Their collaboration on the roof system began with a study of the light angles and structural properties of several geometric configurations through computer modeling and full-scale mock-ups. The louvers originally were designed as quarter circles supported by struts (top), then flattened and suspended from triangulated trusses (middle), and finally developed into sinuously curved "leaves" (bottom). The ductile iron of the trusswork, a type of cast-iron first explored by Rice as a possible material for bracing elements at Pompidou, was chosen for its high resistance to cracking in tension. Less viscous than cast steel, it can be molded into refined sculptural shapes. Since it does not require heat-treating after it is poured, the resulting form is more dimensionally accurate than cast steel. The ferro-cement of the leaves, also a material Rice and Piano had experimented with earlier, was selected as a lightweight alternative to precast concrete and finished through a sand-casting process to diffuse spectral light. Since the thermal movement of ductile iron and ferro-cement are similar, the leaves could be joined to the framework by clamps and an epoxy resin. Remarks Rice of the intensive study required of the design, including a prototype built near the site, "This project took up more of my time relative to its size than any other I've ever engineered."





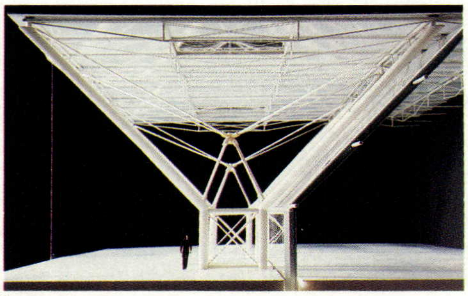
Architects:
Piano & Fitzgerald
Engineers:
Ove Arup & Partners—Peter Rice, Tom Barker, Alastair Guthrie, Neil Noble, John Thornton; Haynes Whaley Associates (associate structural); Galewsky & Johnston, Beaumont (associate mechanical); Lockwood, Andrews & Newman (civil)
General contractor:
E. G. Lowry

Stansted Airport

Norman Foster's terminal for London's third airport in Stansted, due to be completed in 1990, is a welcome relief from the sprawling pods and fingers that characterize the average airport. Inspired by Eero Saarinen's Dulles terminal, it contains all passenger facilities on one level within a discreet volume that conspicuously lacks the exoskeletal gymnastics characteristic of earlier high-tech sheds. According to structural engineer Martin Manning, who directed the Arup team, Foster made a conscious decision to design Stansted so that its expressive structure could be seen from the inside as well as the outside, after he had visited the steel-masted Fleetguard factory in Brittany, designed by his former partner, Richard Rogers. As a result, the roof of the terminal, free of intrusive hvac ducts and mechanical plants, is supported by a 36-meter grid of tubular steel column "trees" that extend outside the glazed concourse to form exterior canopies (6). The mechanical services are relegated to the lower level and fed through the trunks of the column trees (axonometric, opposite), which are hung with lighting and signage on the upper level (4).

Although deceptively simple, the form of the structure was developed over a two-year period, requiring intensive collaboration between parallel teams of engineers and architects. Numerous studies, including wind-tunnel tests, of the steel framework, roof, and cladding systems were conducted to devise a streamlined system that proved cost-effective, easily constructed, and visually elegant. Possible solutions for the column trees included an unbraced, all-bending assembly of continuous trunk and branch members; a fully braced assembly of triangular trussed branches and diagonally braced trunk; and the end result (axonometric), an assembly consisting of four tubular columns fully braced with prestressed ties that support branches four meters above the concourse floor; the branches are angled outward to form a roof bay of 18 meters.

Once the design of the column tree was developed, the project team evaluated methods of simply supporting the roof and their effects on the columns (1,2,3). The chosen solution is a type of skylit, domed shell, constructed from steel latticework and covered in perforated metal paneling that will reflect light directed from fixtures on the columns. Explains Manning of the final result, "We had to design the components so that the trees would not only support the roof, but also *look* like they were supporting the roof."



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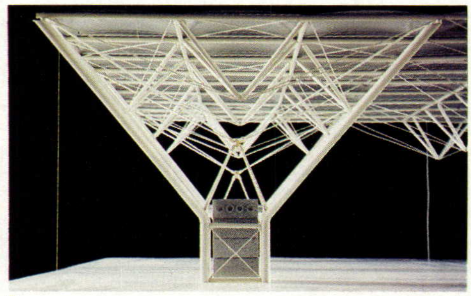

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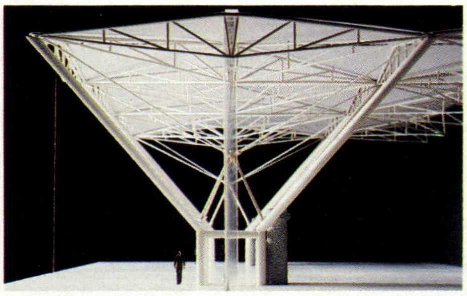

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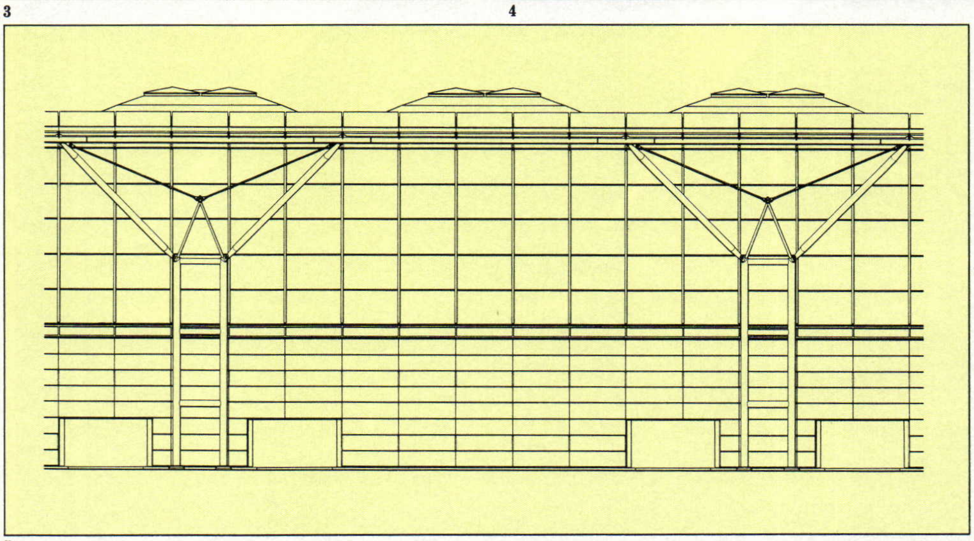

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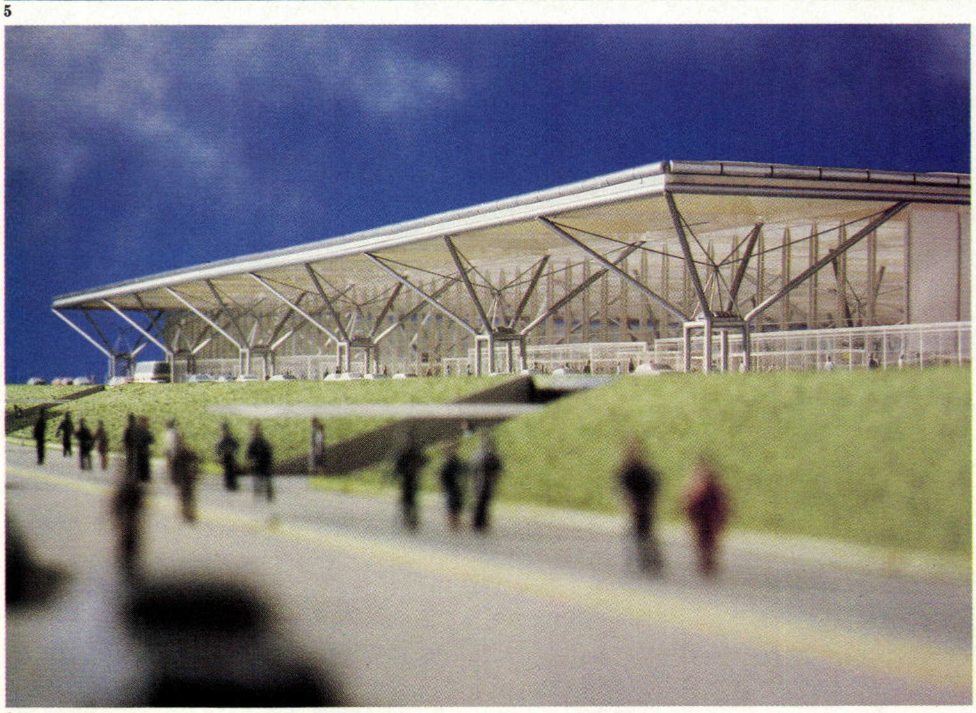
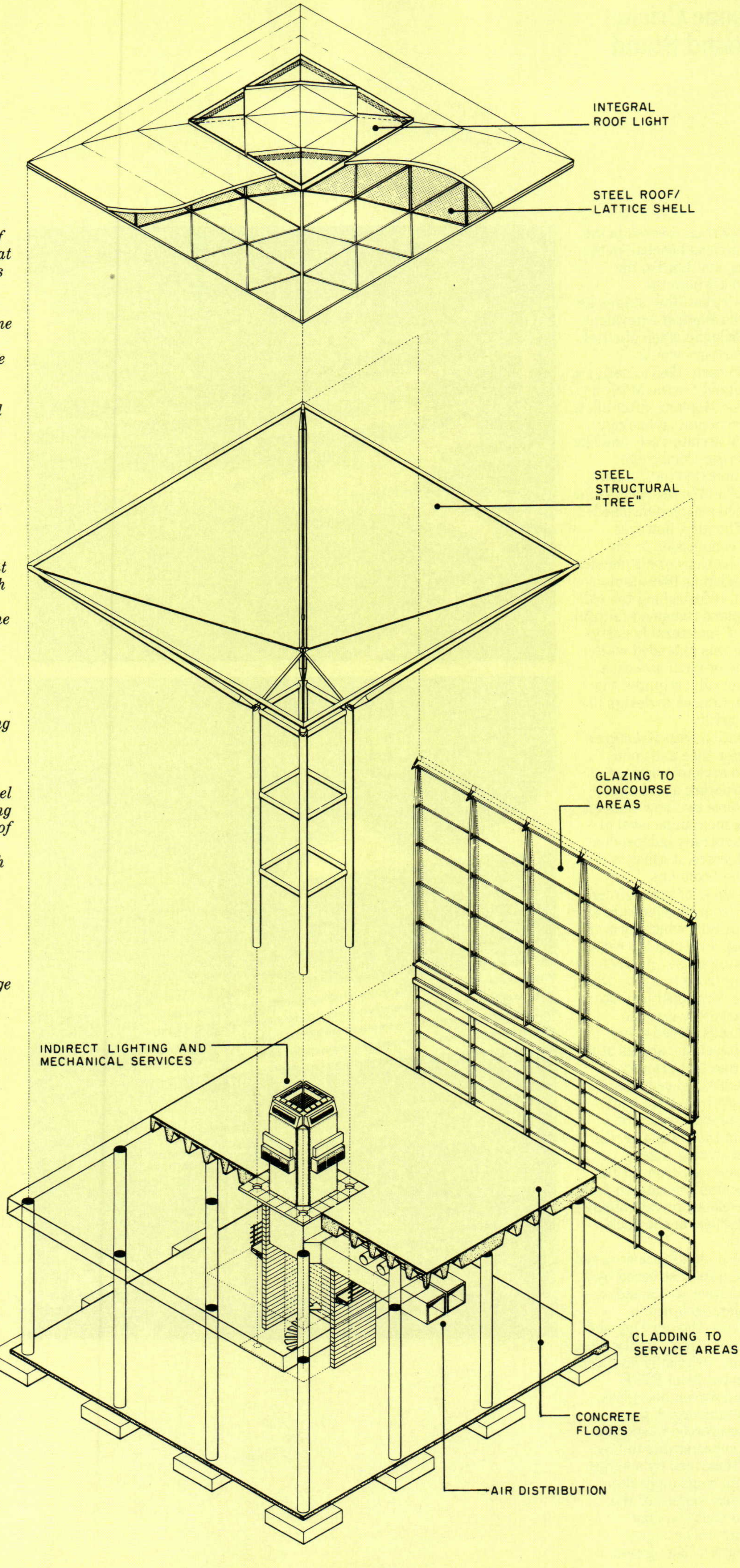


6

Richard Davies photos

1. An early roof design consisting of primary trusses simply supported at 18-meter intervals with infill panels of secondary trusses. Vertical and horizontal loads are carried downward, but provide only in-plane stiffness to the column tree. Uplift forces are resisted by tying down the roof with cables.
2. An alternative means of simply supporting the roof with booms tied to 3-meter-deep inverted pyramids, called tetrapods, and struts, a combination that carries vertical loads down to the column tree. The roof is prestressed to resist wind uplift by tying the bottom points of the tetrapods to the tree columns.
3. A roof scheme consisting of 2-meter-high triangular trusses that span across and diagonally through the column tree. Secondary horizontal beams join the apex of the trusses to support roof decking.
4. Model illustrating ways of suspending signage and lighting from trunk and branches of column trees.
5. Detail of airside elevation showing final design of lattice-shell domed roof and column tree-supported canopy. The translucent glass cladding of the upper concourse level is separated from the metal paneling on the lower service level by a strip of clear glazing.
6. Model photo of roadside approach to terminal showing one-story landside elevation with exposed structure.

Architects:
Foster Associates—Norman Foster, Spencer De Grey, directors-in-charge
Engineers:
Ove Arup & Partners—Martin Manning, director; Chris Jofeh, project director (steelwork); David Kaye, project director (concrete); British Airports Services Ltd. (mechanical/electrical)
General contractor:
Laing Management Contracting

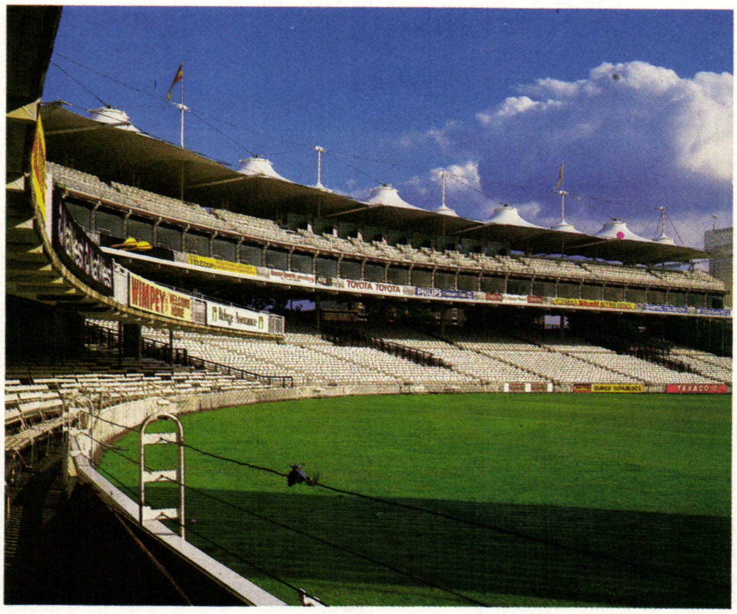


Marylebone Cricket Club Mound Stand

Cricket is a sport as revered in the United Kingdom as baseball in the United States, and Lord's, the historic ground where the Marylebone Cricket Club stages its matches, is the English equivalent of Wrigley Field. So when Michael Hopkins & Partners won a competition in early 1985 to design a new mound stand for the MCC, it was a surprise. Hopkins, after all, is fond of experimental technology, not traditional architecture, and like his Schlumberger Cambridge Research Center (RECORD, April 1986, pages 136-147), the scheme for Lord's included a cable-tensioned fabric roof. The jury, however, awarded the commission to the architect on the basis of his decision to retain an existing 1899 stadium on the site. In refurbishing the old building, Hopkins remained faithful to his credo of structural honesty. Its colonnade was extended with replicas of the original arches, a task that, ironically, required the high-tech practitioner to design in load-bearing brick.

In collaboration with structural engineers Peter Rice and John Thornton, the architect devised a steel superstructure above the stadium to house two new tiers of seating and a mezzanine level of services. Structurally independent of the brick terrace, it consists of six tubular-steel columns supporting a spine of plate girders. Cantilevered from the spine are a series of rib beams, which form the floor of the top level and the ceiling over the viewing boxes. At the back of the building (bottom right), the rib beams are connected by plate girders that transfer loads to vertical steel rods placed every 18 meters between the arches of the colonnade. From this primary structure, steel-rolled sections are suspended by hangers and covered with precast concrete planks to form the lower tier. On this level, the awning-shaded viewing boxes at the front of the building (opposite) are catered from glass-block-enclosed private dining rooms and kitchens at the back (bottom right).

The top tier of seating is crowned by a membrane roof, stressed by a framework of steel struts and catenary cables, designed in conjunction with Alastair Day and Brian Forster of Arup's lightweight structures unit. Originally intended to be constructed from PTFE (*Teflon*)-coated woven fiberglass, similar to Schlumberger, the architects were forced to specify PVC-coated polyester due to fire regulations. Tensioned by a series of steel pick-up rings (opposite), the umbrella-like shapes of the fabric recall a tradition long associated with cricket: tents erected around a village green.



Richard Bryant photos

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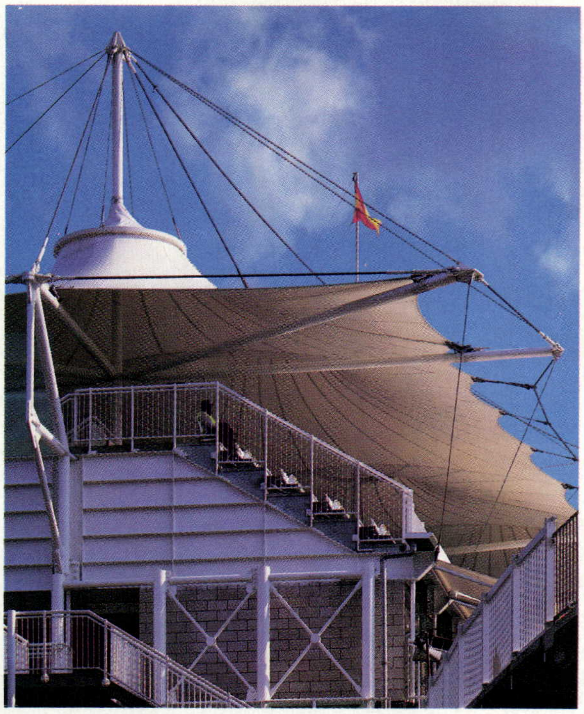
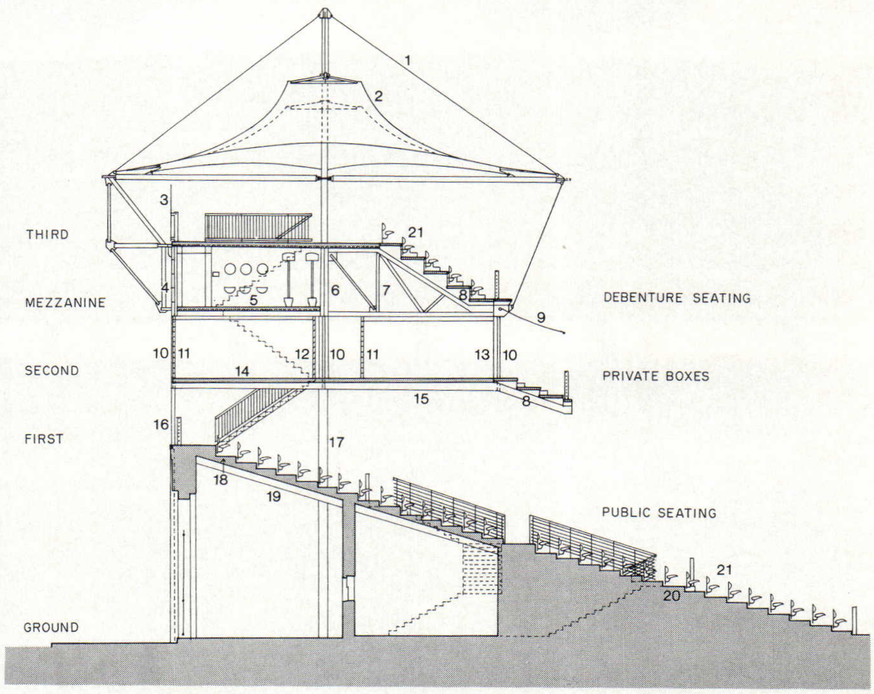
NIXDORF COMPUTER
NIXDORF COMPUTER



The top tier of the new mound stand at Lord's ground designed by Michael Hopkins and Partners is reserved for corporate-sponsored seating and includes amenities required of any cricket match—bar, restaurant, and lavatories. Billowing over its frosted-glass partitions and steel railings is a membrane roof designed in collaboration with Ove Arup & Partners' lightweight-structures unit (opposite). Its PVC-coated polyester fabric was cut according to computer-generated patterns and ultrasonically welded into seven sections that extend between six tubular steel masts. Though continuous ridge-cable configurations were studied, the long span and required stresses of the membrane resulted in a series of steel tension rings, supported by catenary cables stretched between steel masts and booms (left). At the perimeter, the fabric is tensioned by cables that are pin-connected to steel struts. Supported by rib beams (bottom left), the upper tier is braced at the sides (top left) and rear (middle left) by plate girders.

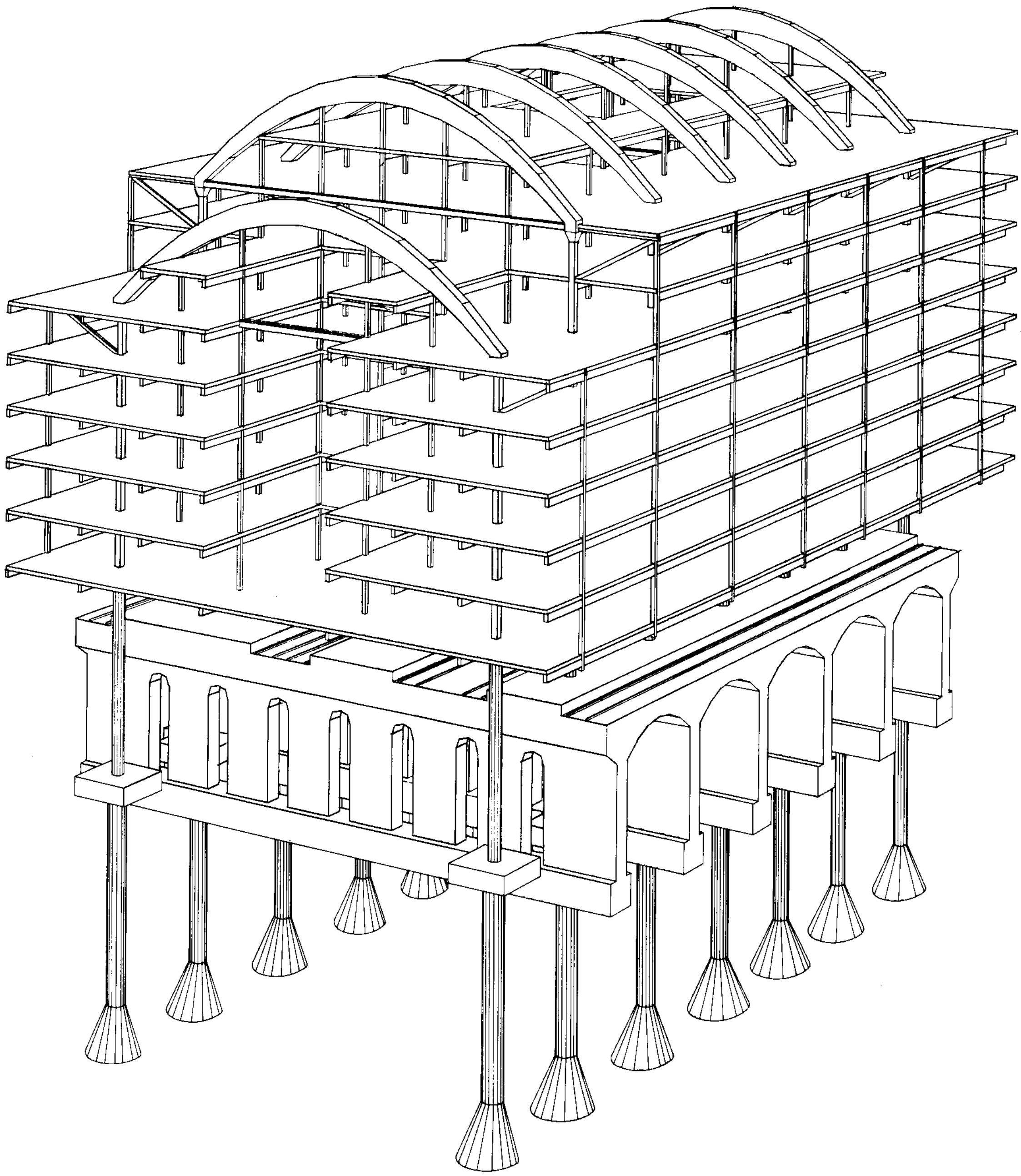


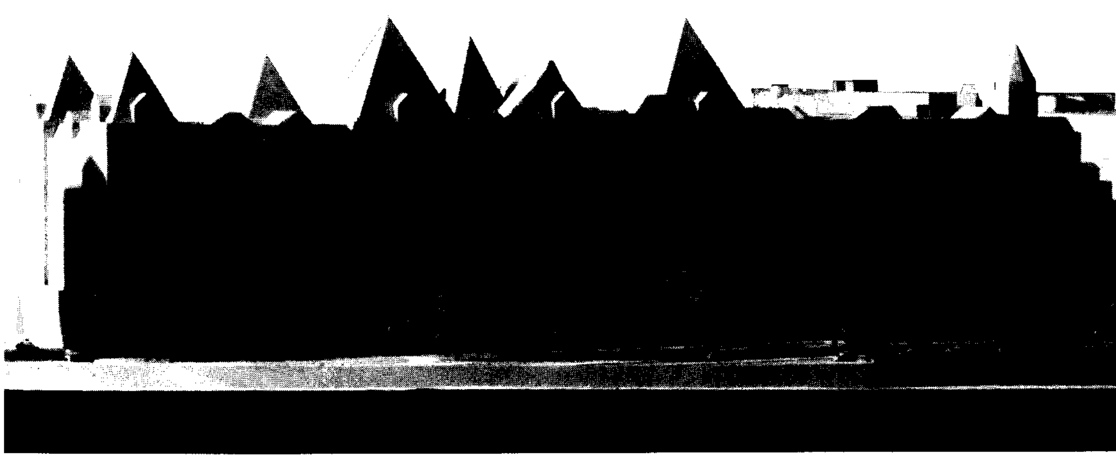
1. *Galvanized steel cables*
2. *PVC-coated membrane roof*
3. *Glass screen*
4. *Plate steel rear girder*
5. *Concrete on metal decking*
6. *Plate steel spine girder*
7. *Rib girders*
8. *Galvanized pressed steel steps*
9. *Retractable fabric canopy*
10. *Solid steel hangers, grout-filled steel sleeve*
11. *Glass block*
12. *Concrete block*
13. *Folding/sliding glass doors*
14. *Precast concrete floor planks over steel beams*
15. *Lower promenade steel beams*
16. *Solid steel tie-downs, grout-filled steel sleeve*
17. *Tubular steel column*
18. *Existing suspended concrete terrace*
19. *Existing steelwork*
20. *Existing lower terrace on fill with new concrete surface*
21. *Polypropylene seats on galvanized steel frames*

Architects:
Michael Hopkins and Partners —Michael Hopkins, John Pringle, project directors; Bill Taylor, project coordinator; David Selby, David Sparrow, Andrew Barnett, Jee Seng Heng, Ernest Fasanya, Simon Herron, Adam Matthews, Martin Hsu, Ka Wooi Yeo, project team
Engineers:
Ove Arup & Partners—Peter Rice, John Thornton, project directors; Rob Kinch, project manager; Amanda Gibney, Dale Brown, Peter O'Riordan, structure; Alistair Day, Brian Forster, membrane roof; Alisdair McGregor, Andrew Sedgwick, services; Brian Lieberman, Peter Everett, public health; Margaret Law, fire; David Richardson, acoustics; Bob Cather, research and development
General contractor:
Higgs and Hill Management Contracting Ltd.

Embankment Place

Currently under construction over Charing Cross Station, Embankment Place is designed as an independent structure that recalls the cast-iron grandeur of Victorian train sheds. As revealed by the computer-generated drawing below, the building's steel columns will rise from deep pile foundations through the station's brick vaults to a series of arches. From this main structure, the office floors will be hung, and the resulting framework will be sheathed in tinted glass and granite as a series of stepped profiles that respond to the surrounding buildings (photo). In addition to Embankment Place, scheduled to be completed in 1989, Farrell has proposed an urban design for the surrounding Thameside area. Improvements include a new footpath over Hungerford Bridge and restoration of Inigo Jones's York Watergate.



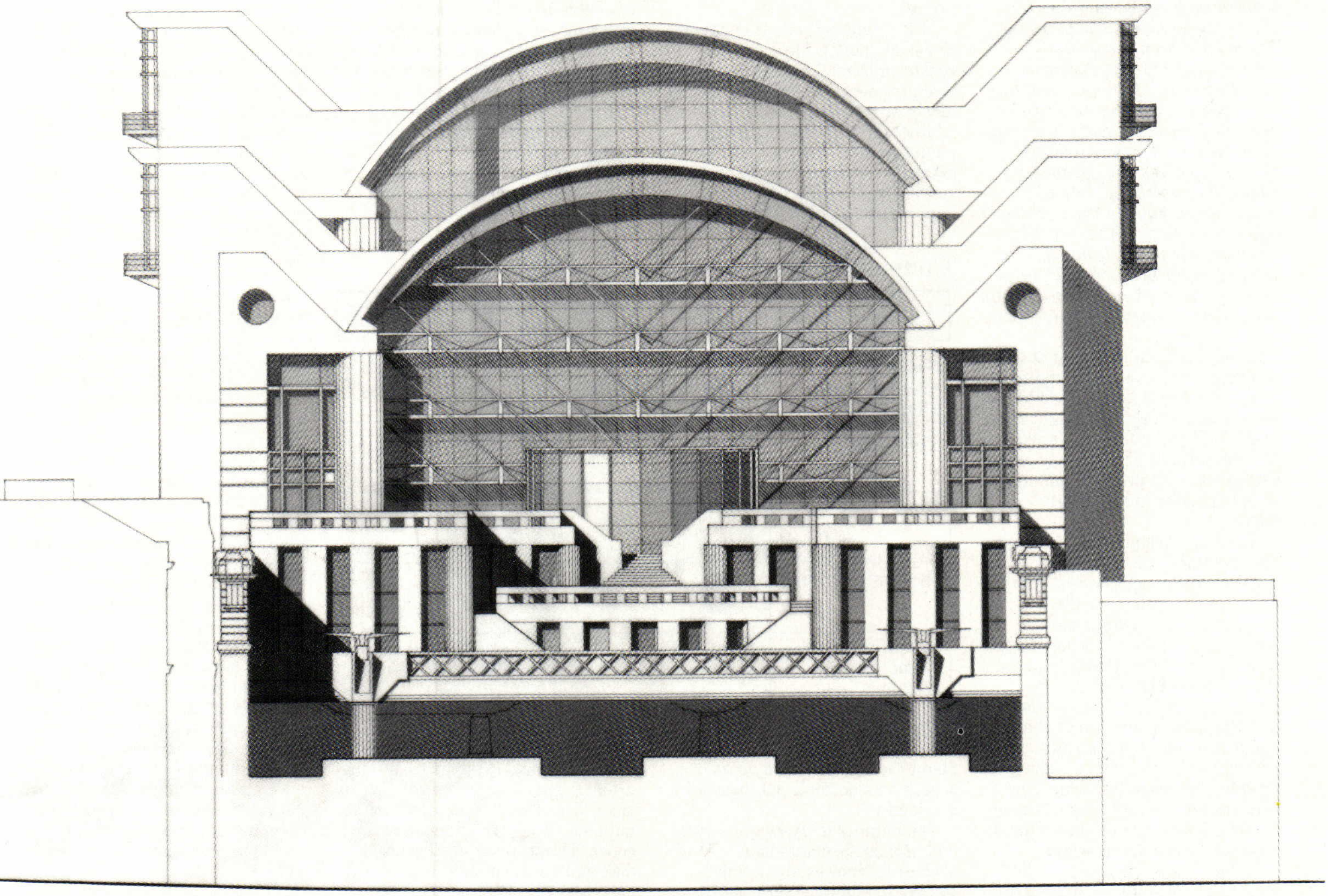


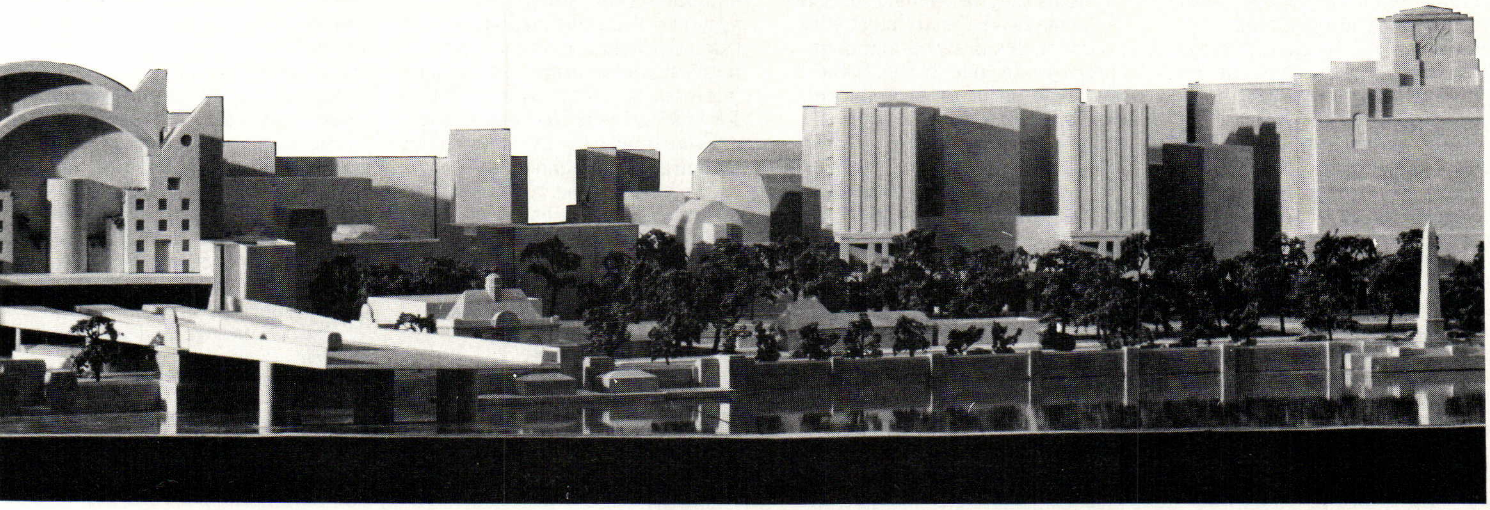
Terry Farrell is often described as an English version of Michael Graves. Like the American architect, he has transformed his style from a Modern idiom, developed with former partner Nicholas Grimshaw, to an eclectic Classicism that he has continued to refine since opening his own office seven years ago. Farrell's proposal for Embankment Place, while clearly inspired by history, reveals that building technology still influences his design.

The 500,000-square-foot office building is currently being constructed over Charing Cross Station as the focus of a comprehensive scheme to upgrade the surrounding streets and a historic park along the River Thames. To avoid disrupting one of the busiest train schedules in Britain, a multidisciplinary team of Arup engineers, led by director Nigel Thompson, devised a method of independently supporting an acoustically-insulated structure over the 1871 station. The primary members of the frame construction consist of 18 steel columns on 30-meter-deep foundation piles that penetrate the centers of the brick vaults supporting the railway tracks and platforms (axonometric drawing). The office floors, constructed from metal decking over steel beams, are suspended from this main structure and serviced by circulation towers placed outside the four corners of the building, an arrangement unintentionally similar to Richard Rogers's Lloyds of London.

At the top of the columns, a series of arches, post-tensioned by clustered steel rods, ties the frame construction together to form a vaulted roof. "Our first solution was a flat truss," notes Farrell of his collaboration with Thompson—a working relationship that has continued to develop since the architect and engineer designed a 1982 competition entry for a new BBC headquarters. The decision to use a more expressive structural member was reinforced by the discovery that Charing Cross Station was originally topped by cast-iron arches, which subsequently collapsed in 1906. In reinstating the station's Victorian profile, Farrell surrounded the central mass of the office addition with stepped "shoulders" to echo the height and light-colored stone of the neighboring Thameside buildings (model photo). Though granite cladding and decorative details will conceal its steel frame, the formal composition of the building directly reflects the underlying structural system. As Farrell explains, "Rigorous engineering leads to balanced, symmetrical solutions."

Architects:
Terry Farrell Partnership—Terry Farrell, John Chatwin, partners-in-charge; Neil Bennett, project architect; Simon Sturgis, Doug Streeter, design architects; David Beynon, project manager; Toby Bridge, project coordinator
Engineers:
Ove Arup & Partners—Nigel Thompson, director; Malcolm Barry, project manager; Derek Pike, Richard Terry, structure; Mark Facer, mechanical; John Haddon, electrical; Bill Grosse, geotechnical; Richard Cowell, Mike Wilford, acoustics; Ian Fowler, transportation
General contractor:
Laing Management Contracting





Using your micro to specify

Computer-aided catalogs are already here, and computer-aided specing is just around the corner for micro users. The author discusses and evaluates several of the systems and tells you what you can look forward to down the road.

By Steven S. Ross

Until recently, the architectural world has been threatening to divide itself into two camps—large firms with big projects, using mainframe computing power to keep track of everything that goes into a building, and smaller firms seemingly doomed to doing the whole job by hand. The problem: There have been reasonably priced, powerful microcomputer-based systems for some time. But only now is software emerging that begins to take full advantage of the machine power available. Several systems use databases—sometimes on cheap optical disks—kept right in the architect's office. And some allow users to connect to a mainframe via telephone for brief periods, after most of the work has been done on the micro, to keep the costs down.

Imagine that you're sitting at the drafting table—or the computer terminal—and that you need to see some choices for doors. Right now, you'd likely turn to Sweet's from McGraw-Hill or (if you know what manufacturer's product you need) to individual manufacturers' catalogs.

You'd spend some time reviewing specifications and making price/performance choices. And you'd spend even more time preparing the drawings and handling the contract documents. Over the next few years, though, the whole process will change a great deal, at least if electronic publishers have anything to say about it. They are promising architects the ability to review more product choices in less time. And, in some cases, the architect will then be able to drop the product's detail right into working drawings.

In fact, for some products, like furniture and windows (page 137), manufacturers are rushing electronic catalogs into architects' hands this fall.

Publishers and suppliers have taken different approaches to the systems they are planning, however. And, despite the range of systems announced this year, no publisher has put enough participating product manufacturers' catalog information into a form that's structured enough, yet, to make any system a complete solution to architects' needs.

Steven S. Ross is past president of CCM, an educational software company in New York City, and now teaches journalism at Columbia University, where he also runs a large computing laboratory for students. He is often consulted on quality-assurance matters; his latest book, Construction Disasters: Design Failures, Causes and Prevention, *was published by McGraw-Hill in 1984.*

Comparing the Micro Spec Systems

	Product Choice	Product Specs	Design & CAD	Contracts
Sweet's (Search; Spec; Details)	●	●	○	○
Superspec	○	○	○	●
Eclat	○		●	
System George	●	●		○
Manufacturers' Computerized Catalogs			●	○

● Major strength ○ Present or eventual capability

All building-product suppliers who participate in the print Sweet's catalog files, for instance, will be included in the electronic version due early in 1989. But Sweet's salespeople are having to carefully explain exactly what information is needed.

"Electronic Sweet's is enhancing the print catalog files, and not replacing them," says Perry Sells, vice president/general manager of McGraw-Hill's Sweet's Division. "Although we've been helping manufacturers produce informative catalogs for more than 80 years, we're now showing them how important it is to fill in all the facts about their products so users can search an electronic database with confidence."

The number of systems—actual and promised—may make architects' choices about which system to embrace more confusing at first. But the initial babble promises enough variety to match the way *you* want to work, if all the suppliers actually deliver the systems they've announced. Some systems favor the architect who starts with a drawing and then prepares documentation. Some favor the spec-first professional. Some are better than others at flagging inconsistencies in oft-changed designs. Most, if the user is careful, allow switching back and forth from drawing to spec.

In fact, the emerging systems reflect the priorities and personalities of the people overseeing their creation. Corbel & Company of Jacksonville, Fla., has made a name for itself writing pension documents and actuaries' contracts. Corbel acquired StandardSpec of Chicago and is turning it into SuperSpec, a database system that will coordinate all items in a project manual. "If the drawing says one thing and the spec says something else," says founder and CEO Lawrence C. Richter, "the spec is the contract. Courts understand text, not drawings."

SuperSpec, parts of which will be available this fall, contains impressive capabilities meant to keep architects out of court. Change a ceiling-joist system, for instance, and SuperSpec will present you with new choices for hangers to attach the air conditioner you've already specified.

System George, from Active English Information Systems in Canton, Ill., is a start at automating manufacturers' catalogs by placing product images and specs on a video laser disk. The disk also references national standards and widely used codes. Through the in-office laser disk and a modem link to a central computer at AEIS, the user can create bidding documents, materials lists, and even printed instructions for manual or on-screen drafting.

Users can also query manufacturers through the system's electronic mailbox—(Sweet'sBuyline allows users to notify manufacturers' reps of their interest). The initial System George fee is $6,500 plus $500 per month.

Eclat Intelligent Systems of San Leandro, Calif., announced ei:Expert this June, to integrate its ei:VersaSpec (an enhanced version of the VersaCAD drafting system) with ei:MicroSpec, a database through which users can create specs, purchase orders, bills-of-materials, and job-costing documents. Eclat gets manufacturers' information into the system in the form of CD-ROM catalogs, one per manufacturer, that cost the user $100 each.

That's a more cumbersome approach than that of System George when you're looking for product data. But if a manufacturer has supplied a CD-ROM catalog, the product details can go straight to a CAD system.

Perhaps the most ambitious specifications database project—and the one that will appear last, in early 1989—is SweetSpec from Sweet's, which has licensed MasterSpec from the AIA and vastly expanded it. The 1989 publication date allows Sweet's to come out with a service comprehensive enough to be useful on most projects. What *can* these systems do now? How do their capabilities fit together? And what might their capabilities be in the next few years?

To understand that, you have to understand why so many companies are demonstrating and announcing systems this year. Because Sweet's product catalog files are so widely used and understood by architects, this article puts all systems into the Sweet's context. Along the way, the article will describe how catalog information must be formatted and added to, if an architect is to computerize the production of text documents and drawings as well.

You also have to understand that the links do not come totally out of the computer, despite the slick presentations being made for these systems at technical meetings. The computer helps, but it must be consciously directed by the design professional. That "direction" is getting easier and easier to provide, but it is emphatically not automatic.

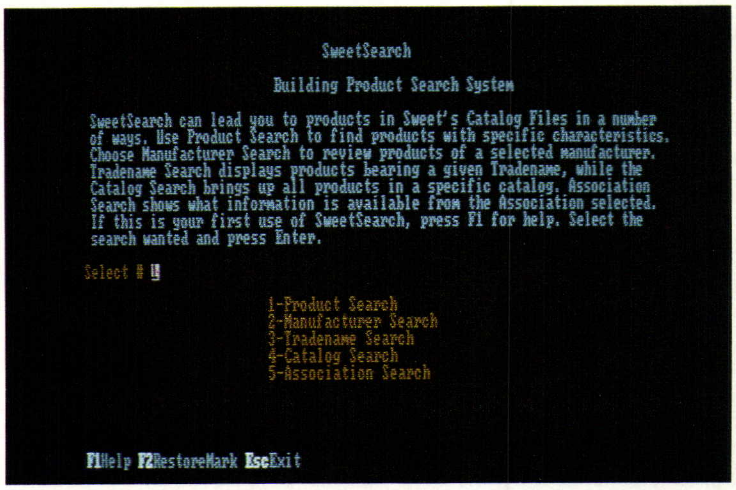
Why all the excitement? Miriam Eldar, who directs the Electronic Sweet's projects, explains the conditions that govern the field now:

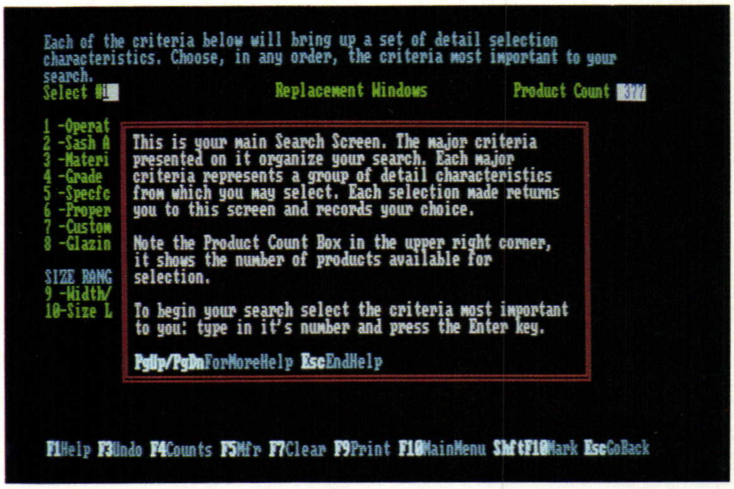
- Enough computers in architects' offices to provide the customer base for a computerized service. That condition has just been met.
- User-friendly databases that can guide professionals through a series of choices and keep track of those choices.
- The ability of computers to store a great deal of information cheaply with the CD-ROM.

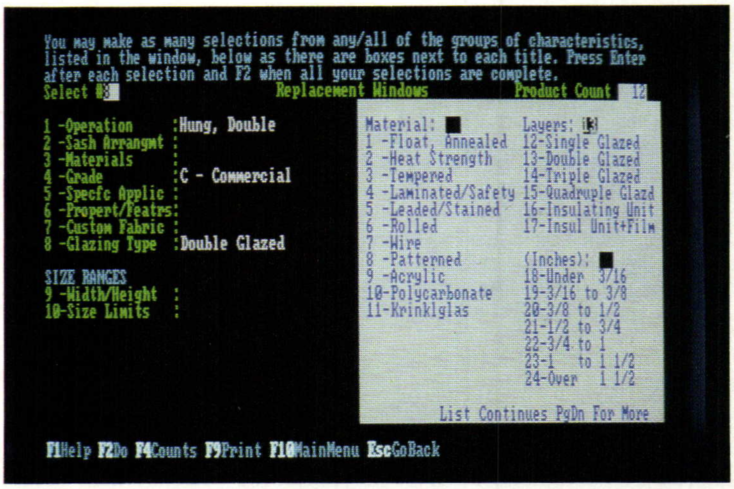
People have been talking about such systems for a long time. Harry Mileaf at Sweet's, in fact, started investigating computer-delivered services many years ago. As vice president for product planning and development at Sweet's, Hugh Sharp guided development. By 1984, Mileaf had decided that the trends favoring computerization were inevitable and designed Electronic Sweet's. "He was the papa, I was the wet nurse," says Eldar.

The project has involved dozens of professionals and an "eight-

(Continued on page 136)







From SweetSearch's initial menu (top), user chooses Product Search option, from which he selects Doors and Windows. He then narrows the search to Replacement Windows, which presents him with major criteria to help organize his search (center). After selecting option #1, Operation, SweetSearch presents user with the opportunity to further define his needs. He can also check on the number of available products that conform to his needs, and receive information on all relevant technical specifications such as performance characteristics. In this case he selected option #8, glazing type (bottom). From there, the search is narrowed even further to manufacturers' products that meet the user's needs and specs. The printed Sweet's catalog is also referenced for user convenience.

The technology and what it costs

You can spend $2,000. You can spend $10,000. Here's a quick run-down. Along the way, we define terms like modem, fixed disk, and CD-ROM.

All of the systems described in this article can be made to run on an IBM XT or compatible computer. They all need a hard, or fixed disk, because they all require two or three megabytes of disk storage space for the system itself. An XT or compatible, with color medium resolution multisynch or EGA monitor, one floppy disk drive, one 20-megabyte fixed disk (about the smallest disk made, these days), and 640 kilobytes of memory, bought from a supplier who will provide service, costs less than $3,000.

In fact, if your office is lucky enough to have access to a computer hobbyist, such a system can be assembled from mail-order suppliers for well under $2,000. If you use the same computer for lots of word processing, you may want to forego color graphics and use a high-resolution monochrome monitor. The most widely accepted monochrome high-resolution standard was originally developed by Hercules. That actually saves you several hundred dollars.

If you have, or are planning to install, personal computer CAD software like AutoCAD or VersaCAD, you'll want an AT-type computer instead (CAD programs run too slowly on an XT, and some won't run at all). That adds $300 to $500 to the cost of the computer.

For CAD, you'll also need a co-processor chip (it makes the software run faster). For the XT, the 8087 co-processor costs about $100; for the AT, the chip is called the 80287.
AT co-processors come in several flavors, however. The 80287 that's meant for the old IBM AT costs only $150. The 80287 chips meant for faster AT compatibles cost up to $300.

Also for CAD, you may want a digitizing tablet; one with an active surface of 11 by 11 inches costs about $500. Some users like a mouse instead, although that makes it difficult to use a CAD system like AutoCAD with its add-on architectural programs. Good ones are only $100.

CAD drawings take a lot of disk space. The so-called Bernoulli technology —cartridges that slip into the disk drive and hold 10 to 20 megabytes of files each—sets you back about $2,000 for the drive and $50 to $100 for each cartridge. If your office only works on one or two projects at a time, though, a 40-megabyte fixed disk and tape backup, for well under $1,000, might be just the ticket.

Most of the systems also require a modem. That's a device that connects the computer to a telephone line. The 2,400 bits-per second models can be had for $200 mail-order, although a top-of-the-line Hayes costs $500 or more. Because you'll need to transfer a lot of data as quickly as possible, it makes little sense to skimp by buying a 1,200 bits-per-second modem for $100. One warning: Some non-Bell in-office telephone systems installed more than two years ago cannot handle a signal from a modem. They require either an add-on box ($300 to $1,000), or that you have the telephone company install one direct outside line for the modem to be connected.

Most suppliers are focusing on the CD-ROM as an easy way to distribute catalogs. The initials stand for Compact Disk-Read Only Memory. In physical form, they are identical to the popular digital audio disks. Because the demand for audio players has pushed the price down to $200 or less, publishers expect that a CD-ROM player that can be attached to your computer will cost only $300 or so by early 1989. The price this summer was $800 to $1,000, though.

System George uses a laser disk—an older, more expensive technology than the CD-ROM. Laser disks can store more information, but the players are more expensive because laser disks never became a widely accepted standard that would have allowed mass manufacturing. In any event, the laser disk player is included in the cost of System George.

Letter-quality printers all produce the same high-quality text. Cheap printers (under $400) do it at one or two minutes per page, while fast printers ($700 and up) do it in as little as 30 seconds. Fast dot-matrix printers for drafts can be purchased for $300 these days.

(Continued from page 134)
figure development budget," says Eldar. She expects database services to represent various aspects of Sweet's, and eventually to go beyond them. Sweet's announced its first database, a product search system, in June 1985 as "Electronic Sweet's." With other Sweet's computer services such as SweetSpec and Sweet'sDetails also in the works, the original database service was renamed Search. The term "Electronic Sweet's" now refers to all the services Sweet's is planning.

When SweetSearch is available in early 1989, product selectors will be able to search the Sweet's catalog electronically for a specific product by answering questions about what the product, a window, for example, must be able to do—its configuration and needed features. The screen will display the brand names and model numbers of windows that can do the job, guiding users to the print files.

"Electronic Sweet's is enhancing the print catalog files, not replacing them."

"It sounds easier than it is to do it right," Eldar says. "There are now about 40,000 products, and each product has, on the average, 150 characteristics." That's 6 million pieces of information. In fact, Sweet's has all the software in place to offer the service now. It is making sure manufacturers are comfortable with characteristics Sweet's will use to describe their products. Product categories have been divided into about 650 separate kinds of templates, each template leading to an on-screen questionnaire from which users narrow their product choices by specifying various sizes, colors, and performance characteristics. Between now and 1989, it will build the database.

"Otherwise, products could be missed by a user doing a search," says Eldar. Users might accept that they'd miss something in a print catalog, but computers are held to a higher standard of expectations.

Sweet's will distribute the database on CD-ROM twice a year. The second disk will correct errors in the first, and include data from catalogs that come in too late for the first disk. The cost to users will be about $115 a year.

Eclat is trying a different approach. It expects to charge about $100 for each CD-ROM "catalog" of a single manufacturer's product specs and details. The CD-ROM's video images won't duplicate the resolution of a printed catalog, but the designs can be rotated, even "stretched" (where the manufacturer produces custom sizes—of windows, for instance).

Eclat's David Currie says users will be "better off looking at paper when they don't know what they want." Users would then go to the Eclat-supplied CD-ROMs once the search has been narrowed to a specific manufacturer's products. Eclat also sells MicroPix, which allows images to be captured from videotape or through a video camera (the required equipment is made by AT&T under the TrueVision label). The captured images can be referenced to Eclat's ei:MicroSpec software for creating contract documents and cost estimates, and linked to symbols within a CAD drawing. The system works with AutoCAD and CADvance, but the most versatile interface is with the company's version of VersaCAD.

Where neither a catalog image nor a manufacturer's CD-ROM is available, Eclat offers a symbol library.

Corbel's SuperSpec is expected out this fall. By August, it had completed sections covering 57 types of building products. That's far short of the 200-plus categories architects can run into in normal work, "but only about 40 sections are used in 90 percent of all construction," says Richter.

Sweet's group is developing SweetSpec, an "almost expert" system that asks users a series of questions, presenting appropriate new questions based on the user's answers until a customized spec is produced.

The level of detail these systems provide should be good enough to use in a contract. But will people want to use them for simple projects, or will they find them too cumbersome?

Sweet's obtained nonexclusive rights to AIA MasterSpec to use as a base for SweetSpec (there are more than 100 organizations licensed to use MasterSpec, by the way), and has been busy enlarging it. "Things that MasterSpec covers, by way of example, we handle now with more detailed paragraphs," says Rob Dean of Heery International in Atlanta. He originally brought the idea to McGraw-Hill, and his firm is handling most of the work needed to expand MasterSpec.

"SweetSpec's database has grown to three times the size of MasterSpec," says Eldar. SweetSpec can be much larger because of the CD-ROM delivery system, which has the space to include in-depth explanations of specs, alternative specs, and listings of products and manufacturers (a totally separate undertaking from SweetSearch, by the way; inclusion in one service does not guarantee inclusion in the other.)

Corbel's SuperSpec contains impressive capabilities meant to keep architects out of court.

Sweet's expects to update the specification database daily, too. "MasterSpec is still the best and most widely accepted in the business," says Eldar. "We want to work with the AIA."

The spec database will be distributed on the same CD-ROM as SweetSearch, and can be used free, apart from any mainframe system. To print out the full spec, users will have to go on-line. That is, they will have to connect their computer to a central computer through a modem and phone line, at a charge. Costs haven't been set, but Sweet's is talking about a flat fee of $20 or so per spec section.

One feature of SweetSpec is that it can be used to print out an audit trail of choices the user made to arrive at the chosen spec. The CD-ROM alone will allow users to get an audit trail of their specification decisions.

Sweet's says it will supplement its services with Sweet'sUpdate, a central computer database that can be searched through a personal computer and modem from the user's office, to check if there is new information that has become available between CD-ROM update disks. The information itself will not be supplied, however. For that, users will call the manufacturers.

Eldar says at least three other services "are more than a good probability": Sweet'sDetails would allow direct addition of graphic design details from manufacturers to drawings. Sweet'sEstimator would help predict building costs. And SweetCode would provide building code information for major jusrisdictions. "We have identified about 40 other services, too," she says.

Eclat's system, while not as sophisticated as Sweet's as far as product selection is concerned, offers a link to the drawing through its ei:Expert Design System and (for the most complete link) ei:VersaSpec (its modification of VersaCAD). For creating bills-of-materials and other paperwork, the files are stored in a form compatible with the widely used Ashton-Tate dBase III database software package. Files from dBase III can even be changed into spreadsheet software Lotus 1-2-3 or Symphony formats, if your office has the knowledge and experience to fiddle.

Perhaps the biggest problem professionals have at this stage on larger projects is keeping track of changes—updating the database as the design evolves. That's been a strength of the expensive mainframe systems large firms have installed. And it has been a serious shortcoming of microcomputer-based systems that smaller practitioners might use. That's changing.

Corbel says it has given that matter a great deal of thought. Drawing upon experience in preparing pension documents (which vary widely from state to state and from pension plan to plan), Corbel's SuperSpec seeks to validate information as the spec is created.

To do that, the system harnesses the power of a central computer. Users prepare specs and drawings on their personal computers, then connect into Corbel's system via phone lines. Because most of the data entry is done before the connection is made, the cost to users can be kept reasonable.

The central database can also spin off job-related documents—bills-of-materials, contracts, and so forth. Simple graphics—the firm's logo, for example—can be treated as text in the documents. They then move automatically as text is added or taken away.

Corbel has mapped out four ways for users to work with the database they create for each job:

1. They can simply have the central computer download text to their microcomputer, and update the text, job-by-job. The updated text is sent back to the central computer after updating. (Corbel also has a high-speed laser printer in its offices. Many firms will find it easier to have text printed there, rather than to be connected for hours over phone lines. But Corbel uses lots of technical tricks to compress text for sending.)

2. Firms that do specific types of projects (clean rooms, blast-resistant construction, and so forth) can add specific, specialized choices to the SuperSpec on-screen menus, and make the special choices available on all its jobs.

3. Firms can add their own contract language, modifying or changing the language of specific clauses in the SuperSpec system. Then, whenever the system spits out a contract for a new job, it will automatically use the firm's language instead of Corbel's.

4. Users can insert entirely new language, covering areas that

SuperSpec doesn't. Users can keep their own clauses proprietary, or share them with other Corbel customers.

Why should a firm share contract language with its competitors? "SuperSpec could be a clearing-house for contract language," says CEO Richter, "so that customers get as much warning as possible if legal problems pop up."

Richter estimates that the cost of running a 300-page spec through the system once would be less than $1,000.

It is tempting to say that, at present, System George and Sweet's initial services are more product-oriented, that Eclat is more drawing- or design-oriented, and that SuperSpec is especially good at keeping track of materials and documentation.

That's a bit of an oversimplification, however. All these suppliers, and others with emerging systems, say they plan to shore up areas in which they are weak. Or they can make their systems more compatible. Eclat has talked about building a natural on-screen bridge from Sweet's, for example.

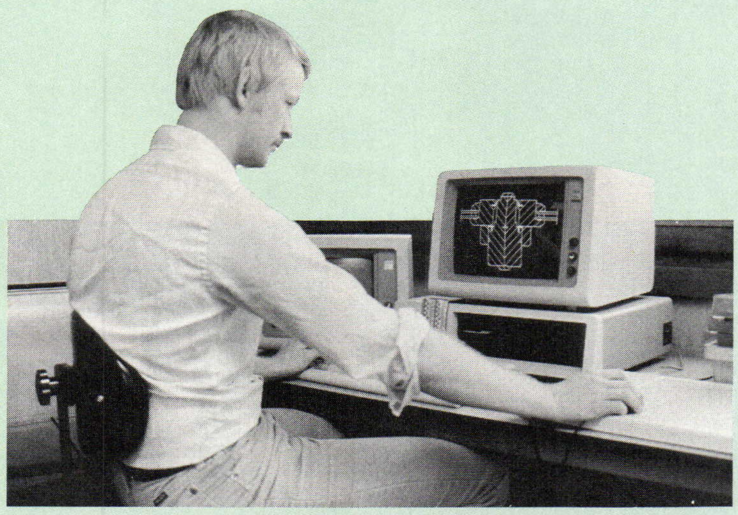
These enhancements aren't automatic, of course, because they cost money. No publisher has unlimited resources, and announced but undelivered systems have littered the computer business for

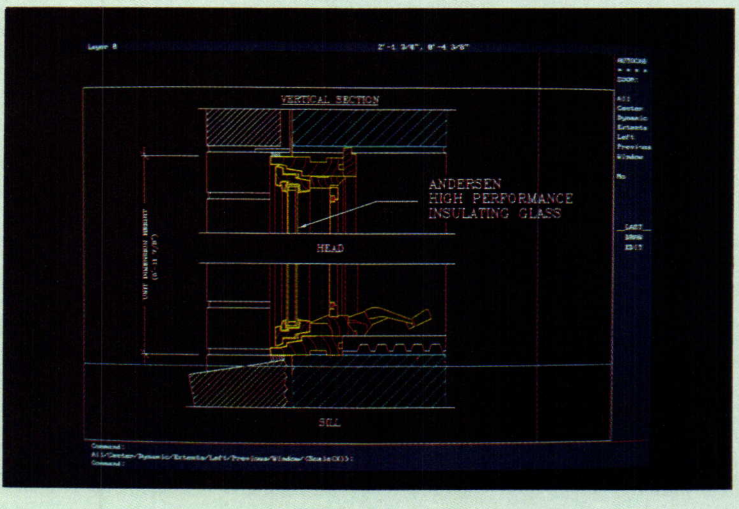
System George places product images and specs on a video laser disk to automate supplier catalogs.

years. But such bridges are getting easier to think about, because the ways of arranging data files inside a microcomputer are becoming more standardized. Aside from dBase, other popular file structures are Lotus and Oracle. Developers of those systems have already created easy ways to transfer data from one to the other. Likewise, CAD file structures are becoming more standard, with just about everybody at least offering a way to get from their system back and forth to AutoCAD. That makes the publishers' job easier and less expensive to contemplate.

There is even a lot of room for these publishers—and smaller suppliers—to market custom interfaces—add-on systems that favor architects working in a specific climate, or on projects of a certain size or type, or on projects for a certain state or the federal government (with all their special contract format requirements).

The automated catalog is here





Dan Myrick, of Marvin Windows, demonstrates the company's software (top), which is scheduled to come out this fall. CADD-1, introduced by Andersen Corp. last spring, is designed to enable user to draw details such as the section shown (bottom). Pella came out with a "library" of symbols in 1985; a more sophisticated version, "Designer," is about to debut.

If you're already using AutoCAD version 2.52 for on-screen designing, window manufacturers have a deal for you: Free software that allows you to electronically browse through their catalogs, then add the window you choose directly to your drawing. The aim, of course, is to make it easier to choose a specific manufacturer's product.

The window manufacturers' give-aways go beyond merely providing a library of symbols or details.

Andersen Corp., Bayport, Minn., got its CADD-I disks to distributors last spring. By summer, 1,400 copies had been handed out. The company described a session with CADD-I this way:

"The computer draws the orange and black Andersen logo, and frames the top and right edges of the computer screen with a thin line. In the upper right corner it draws a slender, rectangular box.

" 'OPTION: drawing type: elev, plan, detail, exit,' the computer screen reads.

" 'Elevation,' the architect responds.

"The dialogue begins. Do you want to label the product you're selecting? What product type do you want? What subtype? Which grille, glass, color, screen, and extension jamb?"

The architect selects a product and tells the computer to insert it into the elevation drawing, "then copy it to form a row of 10 windows, side by side. With minimal effort, the windows are added to the floor plans and working drawings, and a complete window schedule is printed."

Pella Rolscreen Co., Pella, Iowa, came out with a library of symbols in 1985, called Selector. Architects or drafting personnel used the AutoCAD insert command to insert the symbols into drawings. This saves drafting time, obviously, but does not allow the computer to keep track of the products being used. Nor does the computer guide users through acceptable choices. The symbol library now works with all popular CAD software, not just AutoCAD. Kevin Stuart of Pella says, "1,500 of them have been given away."

Pella has now expanded the idea into a full-blown program called Designer, which only works with AutoCAD. It's due out just about now. Designer doesn't cancel AutoCAD (or the popular AEC add-on AutoCAD program for architects). Instead, the Pella menu coexists with the AEC and AutoCAD menus. "Even after you place a window on the drawing, you can auto-stretch" the drawing, says Stuart.

As demonstrated, Designer switches easily between itself and AutoCAD, allowing users to go back and forth between the Designer menu and the normal AutoCAD drawing utilities. The flexibility on the drawing side has its price. Unlike CADD-I, there's no automatic generation of window schedules.

Robert Saxler, a consultant to Andersen, is willing to give up some of that flexibility and to force users to make decisions before the window appears in the drawing because, in his opinion, "the power of CAD lies in the database."

The database also helps keep users out of trouble. By keeping track of the units being used, it can keep users from putting impossible combinations of products into an elevation, calculate wall openings, and so forth.

Marvin Windows, Warroad, Minn., has taken a middle-of-the-road approach. Its system, promised for this fall, allows users to assign some information ahead of time, before adding the window to the drawing, and then allows users to refine their choice. But Marvin, like Pella, is said to work smoothly within AutoCAD.

Despite the flexibility, Dan Myrick of Marvin says the software will keep track of custom changes. "We can stretch the window, and it, too, will interact with the drawing.

"Put down a floor-plan symbol, and the software will calculate the rough wall opening," Myrick says. Using the symbol allows the architect to bypass the menu choices. Once chosen, the details can be tagged with information the database needs to keep track of them.

The on-disk window catalogs don't have prices built in, but users can add them to the specification database through the CAD program.

Pella will be distributing the system on three high-density 1.2 megabyte disks that can only be used with the newer floppy-disk drives (not the older 360-kilobyte drives). One disk contains all the elevations, specs, and accessories. The second disk contains all the window cross-sections, and the third all door cross-sections. Thus, it is fairly easy to run the Pella system from the floppies without actually loading it onto the computer's fixed disk. On the fixed disk, the system takes close to 3 megabytes of space.

CADD-I has to be loaded on the hard disk, but it takes up only 1.5 megabytes. CADD-I saves space by storing only separate components (sills, louvers, and so forth), then combining them inside the CAD program.

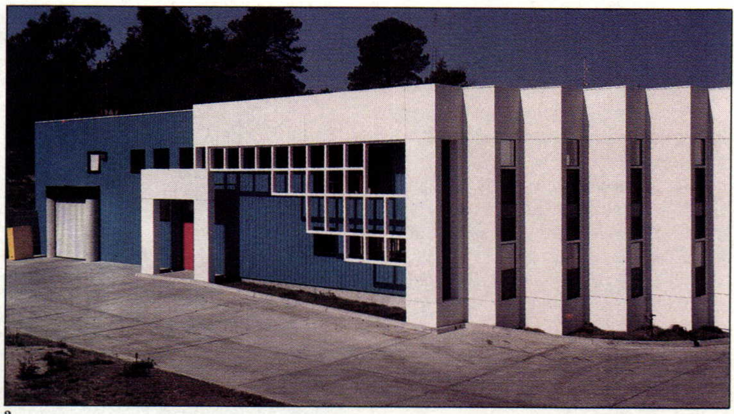
Marvin's system will take up about a megabyte on the fixed disk. It comes on six "standard" 360K floppies—five with the details and one with specs. The specification disk can be used alone, without the details. It is arranged by product line. To use it, you'll need a digitizing tablet (optional with AutoCAD, but required anyway if you have the AEC system option). The Marvin tablet overlay sits on the open area of the AEC overlay.

New products

For more information, circle item numbers on Reader Service Card

1

2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Pre-engineered buildings have been perceived as providing economy and speed of construction at the expense of design flexibility. The buildings shown here—by five different architects with roof, wall, or structural systems from four different manufacturers—meet five different client programs.

The city of Canton, Miss., needed a fire substation in a hurry, as firefighters responding to alarms on the west side of town often were delayed by long freight trains crossing the city. A low-profile, rigid-frame structure provides two high bays for fire trucks and sleeping quarters for eight firemen. The end walls will accommodate eventual expansion. What makes it a firehouse is the distinctive tower and screen, constructed of the same materials, intended by the architect to recall the shapes of the neighboring shotgun-type houses and water tower.

The *Delta Queen* Steamboat Company wanted to convert a badly damaged riverfront coffee warehouse into a passenger terminal and headquarters. After erecting additional steel bracing, a new second floor was created within the original one-story structure, using concealed-fastener steel wall panels, and an 18,000-sq-ft standing-seam roof. The wall system allowed for the insertion of large clerestory windows the length of the building.

A San Diego computer firm, doubling in size each month, needed a large facility quickly. The roof is carried by steel columns set outside of the wall, allowing a serrated setback. The screen on the facade gives scale and definition while providing solar shading. The clear-span interior let the owner build first, then decide how to allocate manufacturing and office areas. The spacing of the structural steel allowed the architect to place windows and doors almost at will. The metal panel walls were factory-finished in a custom blue.

A Missouri architectural firm wanted its three-story office building to have the same character as an adjacent 1940s radio station, a local landmark. The pre-engineered structural system allowed the designers to break the roof line with dormers, and use green clay tile and Carthage stone to blend with the material of the older building. The walls are an exterior insulation and finish system, hung on metal studs fixed to the frame.

The University of New Mexico, Albuquerque, needed an arena to seat 18,000. The 15-ft space between the two-panel roof encloses hvac equipment, lighting, rigging, and maintenance catwalks, and acts as the return-air plenum. The walls are constructed of site-built masonry.

1. Mockbee—Coker—Howorth Architects, Jackson, Miss.
Ruffin Prefab Co., Inc.
Circle 300 on reader service card

2. Broadmoor Design Group, Metairie, La.;
Armco Building Systems.
Circle 301 on reader service card

3. Batter Kay Associates, Inc. Del Mar, Calif.
Butler Manufacturing Co.
Circle 302 on reader service card

4. Pellham—Phillips—Hagerman Architects and Engineers, Inc., Springfield, Mo.
Butler Manufacturing Co.
Circle 303 on reader service card

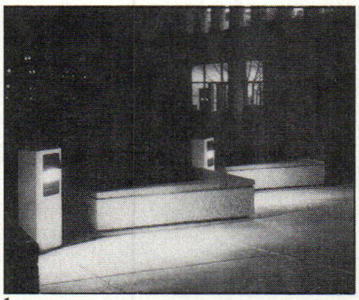
5. The Boehning Partnership, Albuquerque, N. M.
Behlen Mfg. Co.
Circle 304 on reader service card

1. Path lighting
The *Litewalk* landscape fixture has a cast-aluminum housing just under 4-in. deep, with an integral striking edge for recessed mounting into concrete or brick. Its HID light source and sharp cutoff reflector are said to provide superior nighttime illumination at an economical dollar/lumen ratio. The *Litewalk* luminaire is available in surface, recessed, or pedestal-mount configurations. McGraw-Edison, Vicksburg, Miss.
Circle 305 on reader service card

2. Basin set
Imported from France, the *Diplomat Prestige* faucet has a bamboo motif, with brass node rings accented by the reflective silver nickel of the body. Fittings may be ordered in chrome, black chrome, and custom finishes. Kraft Hardware Inc., New York City.
Circle 306 on reader service card

3. Drawing table
The *BF3T* table has a 36- by 48-in. top, set on either architect- (27- to 35-in.) or standard- (39- to 47-in.) height adjustable bases. Construction features include an integrated footrest and height/angle release lever, and an adjustable coil spring counterbalance for one-motion position changes. Charvoz-Carsen Corp., Fairfield, N. J.
Circle 307 on reader service card

4. Architectural coil coating
The sample panels (photo) compare *Commcoat Flurodized* architectural coil on the left to standard anodized aluminum, after the equivalent of two to three years in the Florida sun. The *Flurodized* metal has not faded or developed streaks in the color coating, and has retained its metallic sheen. The coating process ensures that color values are maintained evenly throughout; for example, *DF04 Dark Bronze* will match, whether on soffit, coping, or fascia, this year or next. The metal coils can be formed, even to a 2T bend, without cracking the coating. A spray-applied version is available for extruded pieces and repairs. Commonwealth Aluminum Corp., Bethesda, Md.
Circle 308 on reader service card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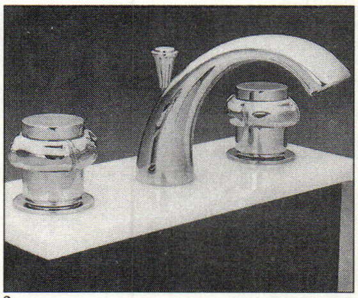
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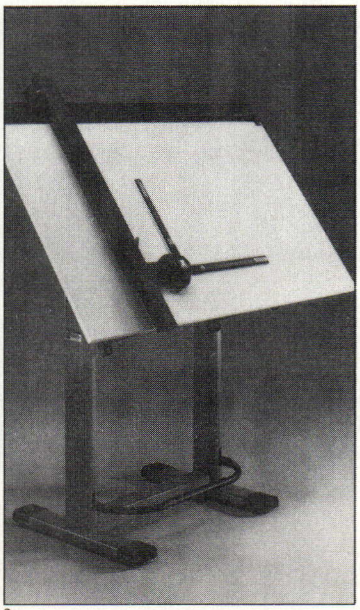
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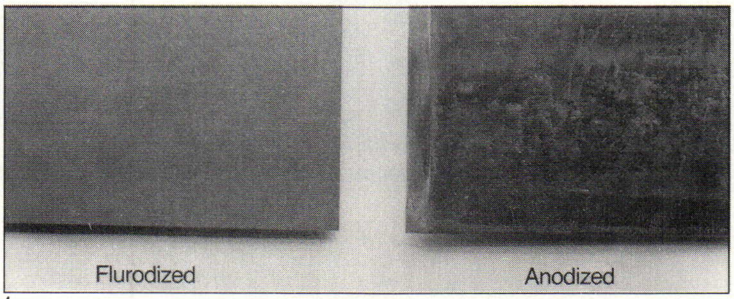

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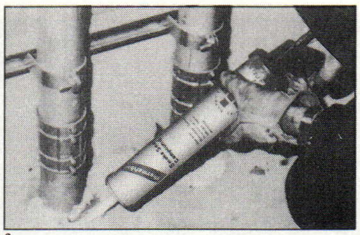
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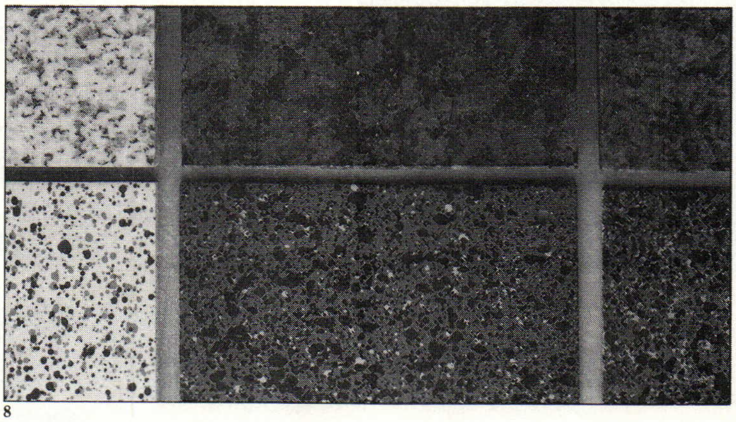
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5. Field-applied metal finish
An air-drying fluoropolymer based on *Kynar ADS* resin, *Duranar* is a sprayed-on system for refinishing metal surfaces, including anodized aluminum, bronze, steel, and cast iron. Various surface preparation techniques required for a successful application may include chemical etching, cold stripping, and priming. *Duranar* comes in a range of colors; the photo shows the 1924 lobby of a Walnut Street office building in Philadelphia, where both the steel mail chute and bronze elevator doors have been restored in *Colonial Bronze*. Pennwalt Corp., Philadelphia.
Circle 309 on reader service card

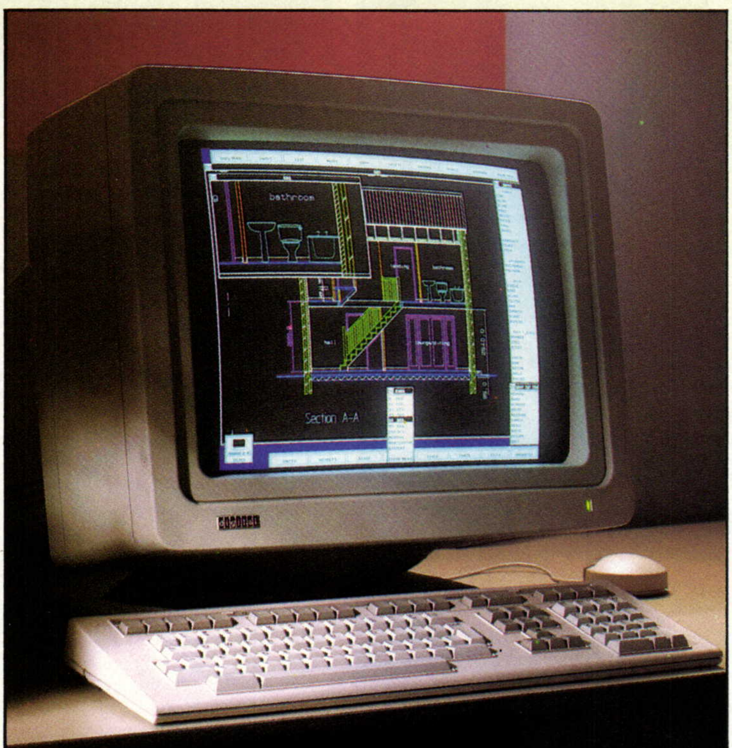
6. Smoke-resistant compound
An extension of the *Thermafiber* smoke- and fire-containment system, *Thermafiber Smoke Seal* is used with these high melt-point (over 2,000 F) barriers to prevent smoke and noxious gases from seeping through floor and wall joints and penetrations. USG Acoustical Products Co., Chicago.
Circle 310 on reader service card

7. Mirror adhesive
A new formulation of this maker's standard mirror adhesive, *Qwikset Mirro-Mastic* facilitates installation of glass and acrylic mirrors. The permanent adhesive will not damage safety backings, and holds the glass in place to prevent injuries if the mirror should break. Palmer Products Corp., Louisville, Ky.
Circle 311 on reader service card

8. Stone-look paint
A spattercoat spray system of up to four different fluorocarbon coatings over a base coat, *Endurastone* is said to give exterior and interior aluminum panels and extrusions the appearance of granite or marble. The coating is factory-applied and oven-cured, and is described as having outstanding resistance to such atmospheric pollutants as acid rain and ultraviolet radiation. *Endurastone* is offered in both red and black granite patterns, as well as custom-matched colors. PPG Industries, Inc., Pittsburgh.
Circle 312 on reader service card
More products on page 153

Only the privileged could afford the best in CAD

...until now



Until now only a few "Blue Chip" users have had the privilege of running one of the leadin architectural & construction CAD systems —GDS, the Graphics Design System.

We can now offer a complete GDS system based on the new VAXstation II/GPX. Capabilities previously associated with system many times its price are now available for under $50,000.

For construction applications, you can't find a more comprehensive system than GDS. It will take you from architectural modelling and engineering design right through to draftin and detailing, from conceptual design to working drawings.

Find out how you can take advantage of the best CAD at the best price. For more information call McDonnell Douglas Manufacturing and Engineering Systems Company 1-800-325-1551.

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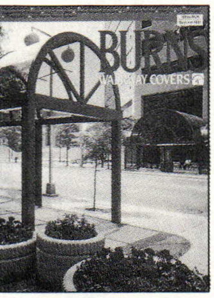
Circle 60 on inquiry card

Product literature

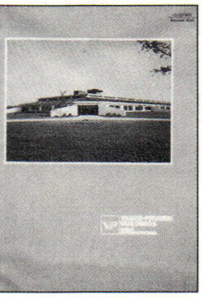
For more information, circle item numbers on Reader Service Card

Building systems
An 8-page folder illustrates building types constructed using *Atlantic* metal components with brick, stone, concrete, wood, and glass. Clear and multiple-span layouts are shown in recreational and airport facilities. Energy-saving insulated roofs and walls are explained in cutaway drawings and detail photos. Atlantic Building Systems, Cincinnati.
Circle 400 on reader service card

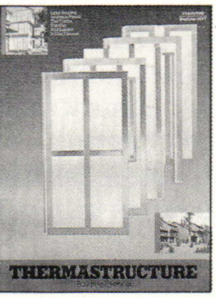
On-site roll-forming
A brochure illustrates the forming of *Cot-R-Cap* metal roofing and siding, said to provide design flexibility and weather-tight seaming. Installations include an Atlanta airport, a Petaluma library, and an Edmonton office. The batten seam roof is now offered in this architectural metal product line. Alumax Inc., Mesquite, Texas.
Circle 401 on reader service card



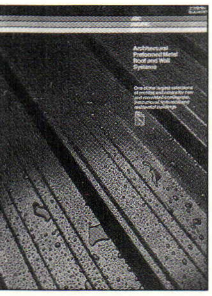
Walkway covers
A full-line catalog illustrates the options available in structural members, finishes, and designs for many types of walkway covers and canopies. Installations pictured include barrel-vault skyroof, street-level walkways, and solariums; standard fascia, deck, and beam profiles are detailed. E. L. Burns Co., Inc., Shreveport, La.
Circle 402 on reader service card



Custom structures
An 8-page color catalog explains the manufacturer's "Custom Concept" of pre-engineered building design, which provides components to meet any dimensional or architectural requirement at no additional cost. Framing, wall, roof assemblies, and accessories such as windows and louvers are included. Varco-Pruden Buildings, Memphis, Tenn.
Circle 403 on reader service card



Structural panels
Thermastructure framing and insulation panels are described in a design guide as a solid composite of expanded polystyrene and 24-gauge steel, which interlock with shiplap joints to form load-bearing exterior walls and roofs with R-values of 22. Panel profiles and connection details are illustrated. Ravda Corp., Radford, Va.
Circle 404 on reader service card



Preformed systems
Architectural steel building products for roofs, exterior and interior walls, mansards, fascias, soffits, and screens are covered in a full-line color catalog. Photos show all products on-site, including copper batten and standing-seam roof installations. ASA Pacific, Inc., West Sacramento, Calif.
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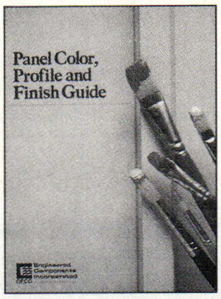
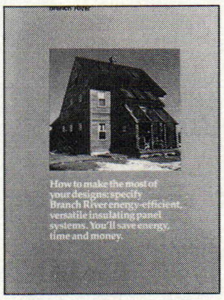
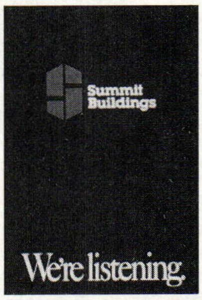


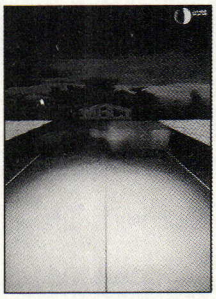
Panel colors
A specification folder contains sample chips of all 25 colors and finish choices offered by this manufacturer of architectural and utility metal panels. A chart cross-references 29 panel profiles with all standard finishes. Engineered Components, Inc., Stafford, Tex.
Circle 406 on reader service card



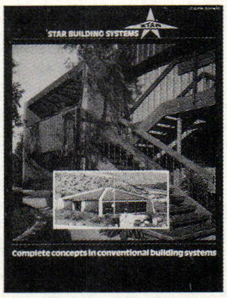
Stress skin panels
Interlocking panels for post-and-beam construction have a UL-classified EPS core laminated to a nailable strand board exterior and an interior surface of 1/2-in. drywall. A brochure gives technical data and photos of homes and offices built with the insulated panel system. Branch River Foam Plastics, Inc., Smithfield, R. I.
Circle 407 on reader service card



Pre-engineered structures
Architectural folder highlights the design and structural capabilities of custom-engineered metal buildings. Applications illustrated include factories, large offices, schools, and health-care facilities. Summit Buildings, Waukesha, Wis.
Circle 408 on reader service card



Architectural panels
A 20-page color catalog gives product description, application, design, and installation data for a complete line of light-gauge structural metal components, including roofs, fascias, screens, curved shapes, and panel siding. MBCI, Inc., Houston.
Circle 409 on reader service card



Systems buildings
Standing-seam, concealed-fastener, and insulated systems are highlighted in a concept brochure. The system's ability to respond to the individual requirements of specific design projects is explained. Star Manufacturing Co., Oklahoma City, Okla.
Circle 410 on reader service card

Modular classrooms
Catalog page illustrates several types of quickly erected school buildings, describing the variety of roof lines, fascias, and finishes possible. Relocatable classrooms are constructed with heavy steel frames and interlocking rib roofs, and can connect to provide for a variety of school functions. Besteel Industries, Inc., Industry, Calif.
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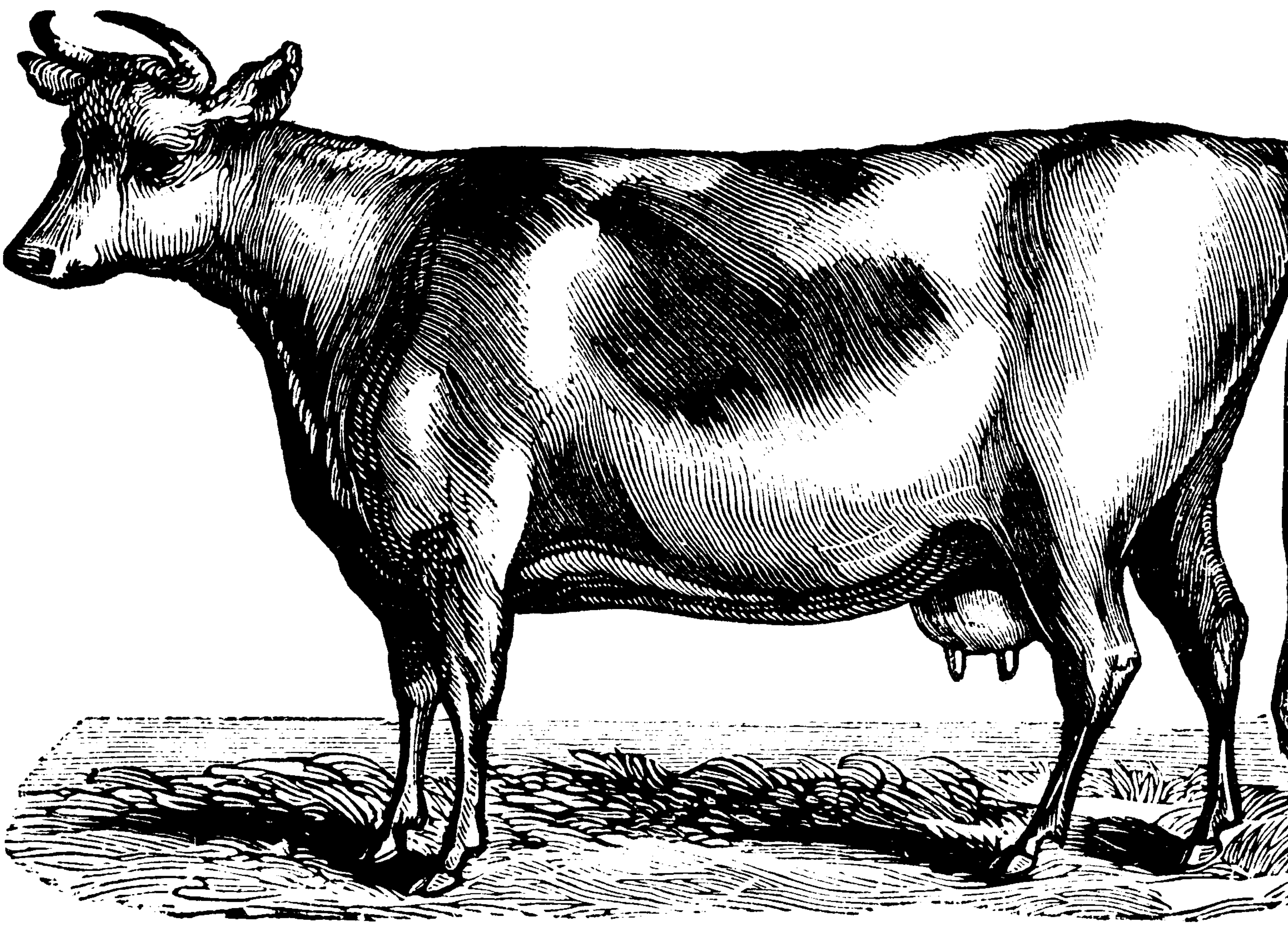
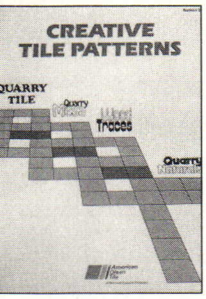
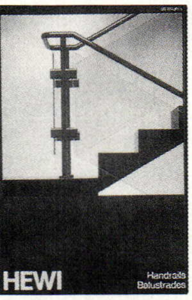




Quarry tile
A 12-page design guide lays out 65 different flooring patterns using various sizes of quarry tile. The percentage of each type of tile required is listed for each design, ranging from classic monochromatic herringbone to elaborate Byzantine borders. American Olean Tile, Lansdale, Pa.
Circle 412 on reader service card

Sound products
Communication equipment for such acoustically difficult areas as schools, stadiums, and institutions is covered in a 16-page catalog. Products include amplifiers, speakers, program sources, and microphones for public address, assembly, paging, and sound masking requirements. Dukane Corp., St. Charles, Ill.
Circle 413 on reader service card



Handrails
Glass and nylon-rail balustrades are shown in an 8-page color brochure from a national installer of *HEWI* railings. End, corner, mounting, and connection details are illustrated in photos and drawings. The steel-reinforced *Ultramid* railing meets BOCA codes, and comes in 13 colors. W & W Glass Products Ltd., Spring Valley, N. Y.
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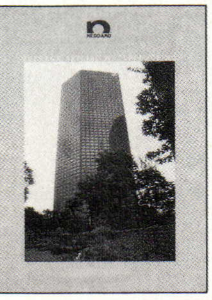

Waterproofing coatings
An 8-page brochure highlights various elastomeric surface-applied coating products for waterproofing pedestrian and vehicular traffic areas, pools, balconies, and interior areas. Project photos illustrate some characteristics of *Neogard* products: nonskid, seamless, waterproof, and chemical-resistant. The Neogard Corp., Dallas.
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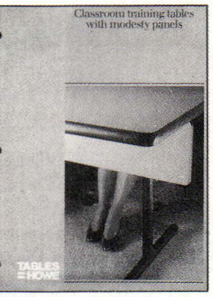
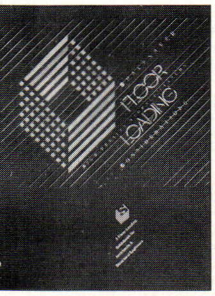


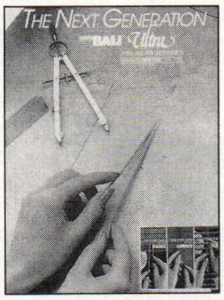
Training tables
Classroom tables designed for office and conference use are featured in a color brochure. Tables come in stationary, folding, and flip-top models, in a range of appearance and material options, for basic skills training to boardroom use. Howe Furniture Corp., Trumbull, Conn.
Circle 416 on reader service card



Mobile storage systems
A 16-page floor-loading guidebook supplies architects and engineers with system configuration and layout alternatives needed to customize high-density mobile storage systems to new or existing building requirements. A case study shows actual design criteria and floor-load analysis. Spacesaver Corp., Ft. Atkinson, Wis.
Circle 417 on reader service card

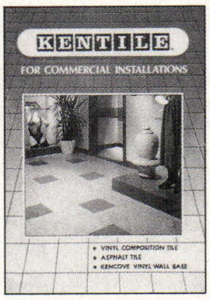
Computer furniture
A 24-page catalog explains how *Humanetics* furniture is designed to alleviate the common complaints of VDT operators: sore necks and backs, strained eyes, and fatigue. Bilevel and adjustable surfaces, seating, clustered workcenters, computer accessories, and security systems are included. TAB Products Co., Palo Alto, Calif.
Circle 418 on reader service card

Residential walls and ceilings
Appearance, acoustic, and fire-resistance improvements in residential and multifamily drywall construction are explained in an 8-page booklet on upgrading walls and ceilings. One system combines 5/8-in. gypsum base and *Diamond* interior veneer plaster, which needs no joint finishing to provide a hard, seamless wall. USG Corp., Chicago.
Circle 419 on reader service card

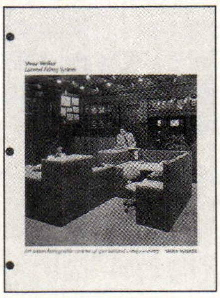


Window treatments
Commercial applications of *Ultra* mini- and micro-blinds are shown in a color brochure. A new product feature is the *All-In-One* control cord, which raises, lowers, and tilts the blind from one point. Energy-efficient and flame-resistant properties of the window blinds are explained. Carey-McFall Corp., Montgomery, Pa.
Circle 420 on reader service card

Flammability testing
A color folder describes the various ASTM and Federal Test Methods used in the flammability testing of building materials, floor coverings, plastics, attic insulation, and other materials, including the new ASTM E-84 Tunnel Test. Other materials evaluation procedures offered are listed. United States Testing Co, Inc., Fairfield, N. J.
Circle 421 on reader service card



Commercial flooring
Samples of vinyl composition tile are supplied in a 12-page installation album. Styles include *Architectural Criterion, Avanti, Marbleized, Hanover Slate,* asphalt tile and *Kencove* wall base. Complete product data and technical information are given. Kentile Floors, Inc., Brooklyn, N. Y.
Circle 422 on reader service card



Lateral files
A six-page folder explains how interchangeable, stackable files provide flexibility and convenience to office layouts. Doors and drawers can open in either direction, for use as space dividers within an open plan. A chart illustrates all standard and custom stacks, drawers, tops, and bases. Shaw-Walker, Muskegon, Mich.
Circle 423 on reader service card

STYROFOAM Brand Insulation Directly on Metal Decks

It is now possible to install STYROFOAM* brand insulation directly onto metal decks by using a new system developed by Dow; no thermal barrier is required.

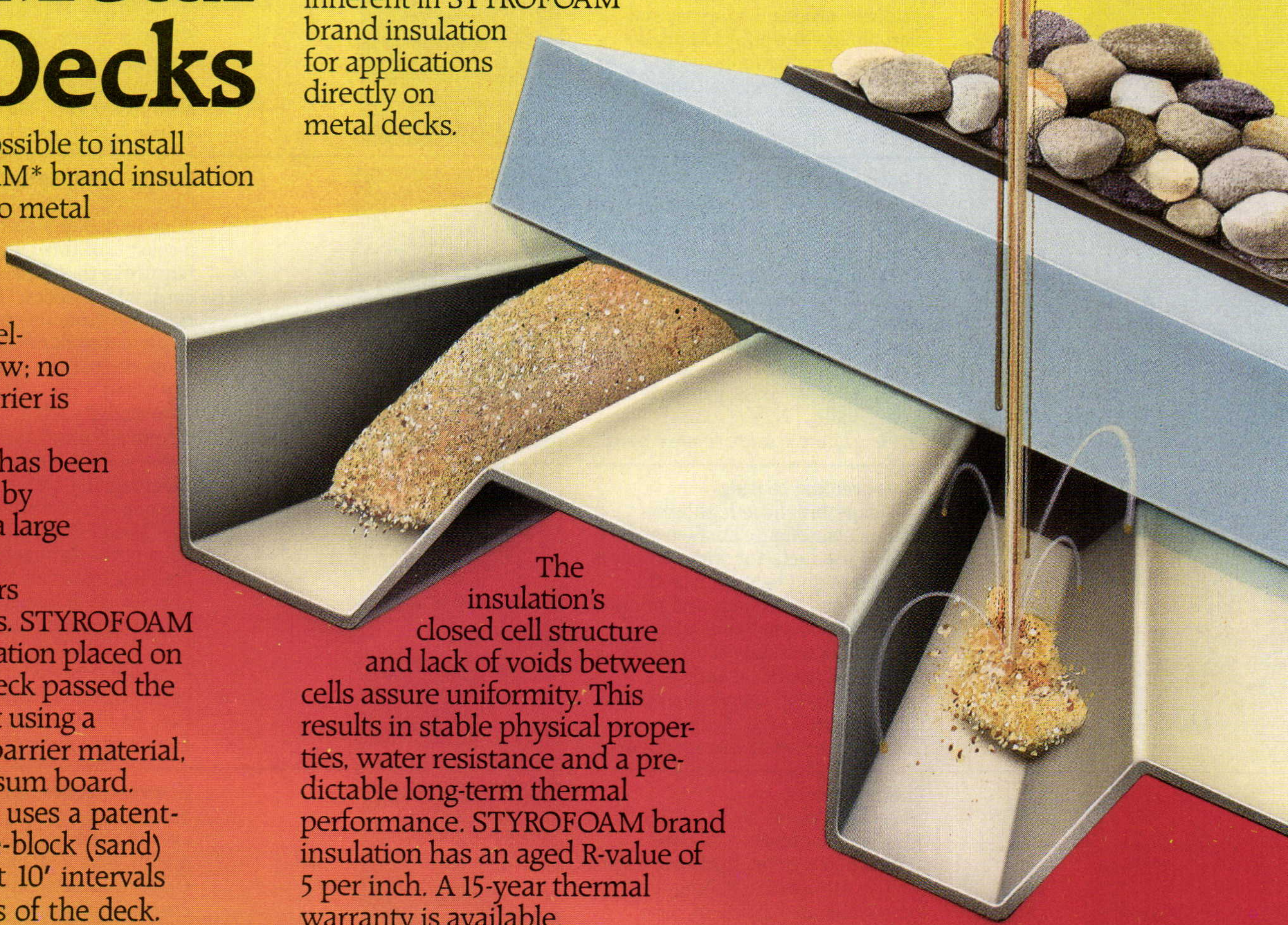
That fact has been established by conducting a large scale test at Underwriters Laboratories. STYROFOAM brand insulation placed on the metal deck passed the test without using a traditional barrier material, such as gypsum board. The system uses a patent-pending fire-block (sand) technique at 10′ intervals in the flutes of the deck.

This U.L.-tested system—STYROFOAM brand insulation, non-bituminous single-ply membrane, ballast and the inorganic fire block – provides time and material savings. Only non-bituminous membranes are appropriate.

This roofing assembly is described in U.L. Construction No. 260. Copies are available from The Dow Chemical Company.

Top-of-the-Line Insulation

Now you can take advantage of the high strength, the moisture resistance and the design R-values inherent in STYROFOAM brand insulation for applications directly on metal decks.



The insulation's closed cell structure and lack of voids between cells assure uniformity. This results in stable physical properties, water resistance and a predictable long-term thermal performance. STYROFOAM brand insulation has an aged R-value of 5 per inch. A 15-year thermal warranty is available.

For a description of U.L. Construction No. 260, plus additional facts on the advantages of using STYROFOAM brand insulation over metal decks, contact The Dow Chemical Company, STYROFOAM Brand Products, P.O. Box 1206, Midland, Michigan 48674.

DOW* Styrofoam BRAND

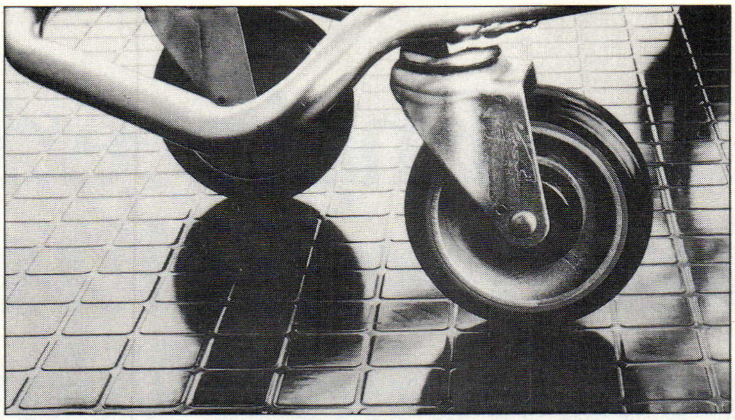
WE BUILD CONFIDEN

Caution: STYROFOAM brand insulation is combustible and should be handled and installed properly according to Dow literature available from your supplier or from Dow.

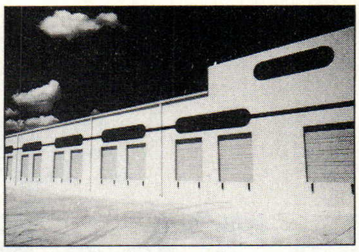
Circle 62 on inquiry card

Continued from page 147

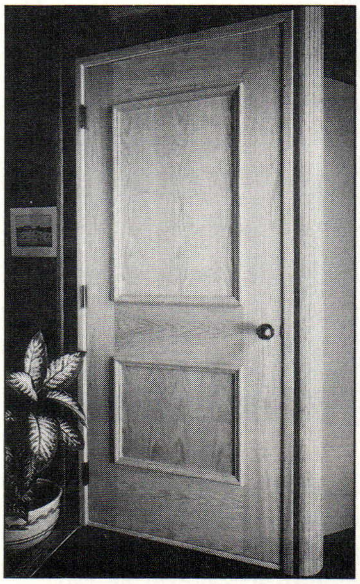
Solar-powered bus shelter
A completely self-contained unit, the *B. I. G.* shelter has a roof-mounted photovoltaic cell that needs only about 3 1/2 hours of sunlight per day to provide 8 hours of nighttime illumination. The solar collector charges an efficient battery; the shelter's power independence contributes to its competitive price. The fascia is specifically designed to conceal the solar collector, which itself is easy to rotate on-site for the due-south orientation required. Shelter components can be designed in a variety of architectural styles. The installation pictured is in California, but the photovoltaic structure can be used at any latitude.
B. I. G. Custom Enterprises, El Monte, Calif.
Circle 313 on reader service card



Rubber flooring
Designed with a new rounded-corner stud profile and a special resilient rubber compound, *Low Vibration Square* commercial flooring is said to reduce the clatter of shopping carts, gurneys, and other wheeled equipment. The floor is highly slip-resistant, and comes in 16 standard and *Beachstone* ceramic-look tones, as well as custom colors. Endura Division of The Biltrite Corp., Waltham, Mass.
Circle 315 on reader service card



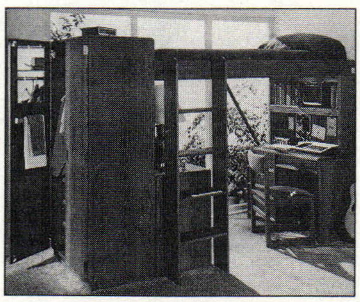
Sectional door
Roll-formed from prepainted 24-gauge galvanized steel and installed with self-lubricating nylon rollers, the *Model 224* upward-acting door is described as competitively priced for the commercial and light-industrial market. The doors have a textured surface, and integral reinforcement ribs along the entire length of each section. Windsor Door, Little Rock, Ark.
Circle 316 on reader service card
Continued on page 157



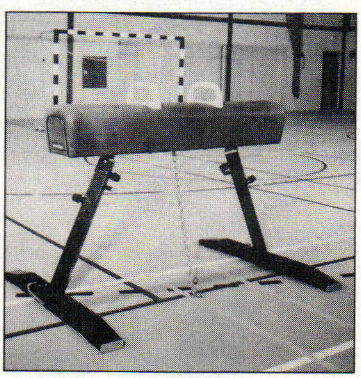
Labeled wood door
Built with five-ply construction of hardwood veneers and crossbands over a selection of interior cores, the *Styled* architectural wood door will provide 90-minute fire performance in commercial, institutional, and residential applications. The door is now available in matched red oak veneer and molding; dimensions are from 2- to 4-ft wide, and up to 10-ft high. Weyerhaeuser Co., Tacoma, Wash.
Circle 314 on reader service card

Continued from page 153

Integrated design
Master Architect software introduced for the *Intergraph 32C* series of workstations allows users to tightly combine graphics and nongraphical data. Changing the drawing of a roofline, automatically updates the required height of intersecting walls. The software can display 2D and 3D views at the same time, with objects programmed to display themselves differently in each view. A plan view might show all the doors open, and the model view can show them closed. A change in window dimensions will trigger changes in wall openings and framing. Intergraph Corp., Huntsville, Ala.
Circle 317 on reader service card

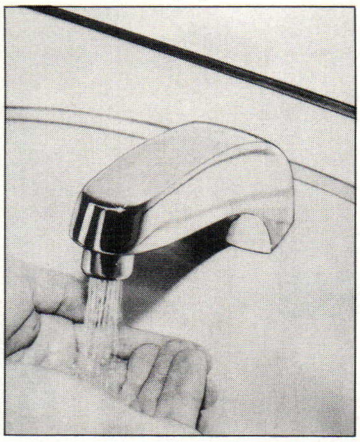


Dorm furniture
Part of this maker's *Mountain Ash* line of contract casework for residence halls and hospitality use, this loft system has laminate surfaces accented with solid oak moldings and pulls. The desk and hutch unit supporting the bed comes with a built-in light and tackboard. EBCO Contract Furniture, Sheboygan, Wis.
Circle 318 on reader service card

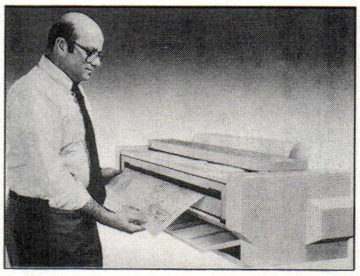


Sports flooring
The *Solvolan* floor comes in several thicknesses for use in schools, health clubs, multipurpose rooms, etc. Rubber mats are adhered to any even, stable subfloor, and covered by layers of polyurethane compounds. *Solvolan* comes in several colors, and can incorporate game markings and floor pits as pictured. Cam-Turf, Dallas.
Circle 319 on reader service card
Continued on page 159

Continued from page 157



Sensor-operated faucet
Water flow from *ETF* series public restroom faucets is controlled by a low-voltage electro-valve, activated when an infrared sensor-beam is broken by a user's hands. The faucets, an addition to the *Optima* electronic product line, need a tempered water supply, Sloan Valve Co., Franklin Park, Ill.
Circle 320 on reader service card



Reprographic media
An expanded line of roll and sheet paper, vellums, and films for xerographic engineering copiers, includes a polyester film that resists the distortion caused by the hot fuser sections of such equipment. This high-strength *S-139-MX4* film also resists aging, while remaining erasable. Fixed-image and image-erasable vellums, as well as hard-copy opaque paper and translucent bond, are offered in a variety of roll and sheet sizes. Dietzgen Corp., Des Plaines, Ill.
Circle 321 on reader service card

Tree chair
Two-hoop chairs are made of kiln-dried hickory saplings. The rustic frame is constructed with fitted, glued, and pinned tenon joints; seats may be natural or vinyl cane, or upholstered. Tables, settees, stools, and other pieces are offered for hospitality, contract, and residential use. Old Hickory Furniture Co., Inc., Shelbyville, Ind.
Circle 322 on reader service card
Continued on page 172

ONE...

TWO...

THREE...

...GO!

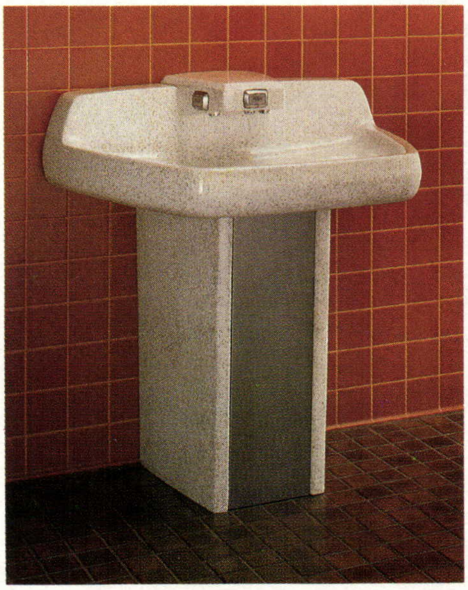
The Tri-Fount™ Washfountain — the best way yet to move traffic through a washroom.

It's as easy as 1, 2, 3.

1. It can wash one *or* two *or* three people at once.
2. It meets all barrier-free codes.
3. It's a real cost saver—saving water and energy with each use, saving time and trouble with minimal maintenance through the years.

Each of the three independent spray nozzles is controlled by its own push button, so each user activates a single metered .5 GPM flow of preblended water. It really cuts down on waste and waiting time.

Leg and toe clearances, and required reach to the push buttons and water streams, are well within existing barrier-free codes as well as ANSI A117.1-1980 standards. Less than five pounds of pressure activates a safe, tempered flow of water which shuts off automatically. Optional backsplash—mounted soap valves are available, too. Concealed spray formers, recessed push buttons, and a rugged access panel provide unsurpassed vandal-resistance.



The Tri-Fount™ Washfountain is also easy to maintain, with front access to all supplies and stops. The unit's metering valve assemblies employ the same basic design as Bradley's field-proven 90-75 metering faucet. Timing can be adjusted from five to twenty seconds by turning a screw—without turning off the water. And if the metering cartridge should ever fail, it can be replaced quickly and easily.

For more information, call your Bradley representative or contact Bradley Corporation, P.O. Box 309, Menomonee Falls, WI 53051. Phone 1 414 251-6000.

Bradley CORPORATION

BRADLEY

We get the job done better.

Circle 71 on inquiry card

SENIOR FACILITY PROJECT MANAGER

herman miller

Herman Miller, Inc., a Fortune 500 company and one of Fortune Magazine's Ten Most Admired Companies in America, is a leading manufacturer of interior systems and furnishings for work place environments, including offices, light industrial and assembly operations, laboratories, and institutions. We have a current need for an experienced Facility Project Manager at our Zeeland, Michigan, location.

If selected, you will manage all activities associated with the programming, design, engineering, budgeting, scheduling, bidding, purchasing, contracting, construction, and installation of major facility projects.

To be considered, you must have these qualifications:

- **Strong design sensitivity.**
- **Strong interpersonal skills.**
- **Bachelor's degree in architecture, facility management, or related field.**
- **Seven years of experience related to technical project management.**

Herman Miller offers an excellent compensation and benefits package and the opportunity to earn bonuses based on increased productivity. Also, we offer employees the opportunity to participate meaningfully in the management of **Herman Miller** and the chance to become an actual owner of the company through our stock-based profit sharing plan. Additionally, we provide a pleasant and healthful work environment for our employees.

To be considered, please write, indicating background and salary history in confidence to:

Eric Heiberg
Senior Facility Project Manager Position
Herman Miller, Inc.
8500 Byron Road
Zeeland, MI 49464

At **Herman Miller**, we are proud of our efforts as an Affirmative Action employer, and we encourage women, minorities, handicapped, and Vietnam-era veterans to apply.

OSITIONS VACANT

rchitect, Golf Course Design — Consult with panese clients to design Japanese golf courses. ssist in designing golf course and interpreting panese architectural standards to U.S. stan- ards in the U.S. design center; interpret Amer- an specifications of architectural nature into panese architectural standards. Train Japanese ationals at U.S. design center the company's nique methods of creating golf courses to in- re compliance with landscape specifications; oordinate U.S.-Japanese technical meetings in- olving engineering personnel and clients; ana- ze data concerning Japanese sites to assist U.S. chitects in unique problems involved in each panese site to insure maximum design impact n small parcels of land. Minimum require- ents: Bachelor's degree in engineering pecializing in architectural studies from Japan, lus 2 years study in a U.S. school of architec- re. Must be fluent in both Japanese and En- ish languages, and must have an excellent un- erstanding of the game of golf. $36,000 per ear. 40 hour week. Apply by resume to Colo- do Division of Employment and Training, 600 rant Street, Suite 900, Denver, CO 80203. Re- r to order # CO 2860453.

osition: Vice President - Interior Architecture epartment. Hours: 40 hours per week, 9:00 m. to 5:00 p.m. Salary: $42,000. per year. Re- uirements: Bachelor of Science in Architec- re; 2 year's experience in the position or 3 ears as a Project Manager - Interior Space Plan- ing; 1 year's experience in "Corporate De- gn". Duties: Plan & design the interior space r commercial and industrial buildings, confer- ng with the client to determine the budget & pe of interior construction desired & the quipment & type of utilities to be installed; for- ulate an environmental plan which will be onducive to the client's business purposes roviding for the practical & esthetic aspects; spect the work of the subcontractors to en- re that it conforms to plans; review the com- eted work with the client to ascertain if modi- cations are required. Send resumes to: Illinois epartment of Employment Security, 401 South ate Street-3 South Chicago, Illinois 60605. At- ntion: Robert S. Felton. Reference # V-IL 24. An Employer Paid Ad.

POSITIONS VACANT

Senior Architectural Positions — An established, growth oriented firm is seeking experienced people interested in working in Hartford. The practice includes Architecture and Interiors, and covers New England and New York State with a current staff of sixty-five. Present openings include Project Management, Design, Contract Documents, Specifications, and Roofing Services — all of which will be additive to present staff. Education and experience requirements commensurate with individual positions. Candidates who are interested in joining a highly motivated, professional team where people are considered the primary asset, are requested to submit cover letter (indicating position being sought), resume, and salary history to: T. F. Dowling, V.P. - Jeter, Cook & Jepson Architects, P.C. - 450 Church Street - Hartford, CT 06103. (All inquiries will be responded to in confidence).

Architects — $25,000-85,000 Group One Search Executive Architectural Recruiters. Key positions nationwide at all levels with Regional & National firms. Experience in research/ development, health care, commercial, criminal justice, educational, institutional, industrial and multi-family projects. Confidential. No Fee. Include salary requirements. 4917 Ehrlich Road, Suite 103, Tampa, FL 33624, (813) 969-0544.

Michael Latas & Associates, Executive Search and Professional Recruiting Consultants, Specialists in the architectural and engineering fields. Operating nationally. Inquiries held in the strictest of confidence. 1311 Lindbergh Plaza Center, St. Louis, Missouri 63132; (314) 993-6500.

Design — A leadership position is available in the Design Group of Gresham, Smith and Partners, a 250 person A/E firm in Nashville, Tennessee. Take advantage of this rare opportunity to contribute to the design of major architectural projects throughout the U.S. Call Pat Bowker at 1-800-251-2150 for more information.

POSITIONS VACANT

ARCHITECT/PROJECT MANAGER

The Design Alliance, a rapidly expanding design oriented firm seeks a highly motivated and technically oriented registered Architect to manage, coordinate and schedule the production of construction documents for all projects and to be responsible for quality control. 15 yrs. exp. will be required. Send resume with cover letter stating salary requirements to: **Barron E. Stallman, The Design Alliance, 75 Market Street, Portland, ME 04101. EOE.**

POSITIONS VACANT

Construction Zone Manager: 40 hrs. per wk.; 10-20 hrs. over-time per wk.; 8:00 A.M. to 5:00 P.M.; $60,000 per year, provides professional services in development and construction of airports facilities and terminals; Monitoring all construction activity, including compliance with construction documents and schedules. Other professional services include: Consultation with clients; Analysis of FAA regulations; Negotiations for FAA and airport authority approvals; Analysis of space requirements and facility requirements to accommodate aircraft; Bid document preparation; Review and approval of warranties and testing certification; Directs activities of workers concerned with construction; Confers with and directs supervisory personnel and subcontractors engaged in planning and executing work procedures, interpreting specifications and coordinating various phases of construction. Must have 8 yrs. of grade school and 4 yrs. of high school and 5 yrs. of college. Must have B.S. in Architecture. Must have 5 yrs. experience in job offered or 5 yrs. experience as Sr. Architect in Airport Construction. Experience must include 5 years in airport design / construction. Applicants should forward resumes: to Illinois Department of Employment Security, 401 So. State Str., 3-South, Chicago, IL 60605, Atten: Marie Ninneman; Ref. 7627-N An Employer Paid Ad.

Architectural — Exciting new projects for an established and growing architectural design firm creates unlimited opportunity. Varied projects require well-qualified Job Captain, Project Manager, and Senior Designer. Must have a desire to excel and advance quickly. Send resume to: Nadler, Philomena and Associate, 103 South Bedford Road, Mt. Kisco, NY 10549, to the attention of Mr. Rene Mueller.

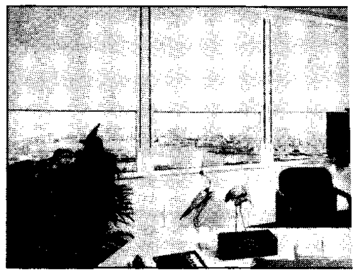
Project Architect — Immediate openings for registered architects with an expanding A/E firm located in the beautiful Finger Lakes Region of Upstate New York. Requires strong project management skills for individual with 8-10+ yrs. progressively responsible experience. Exceptional opportunity for growth and advancement in a progressive atmosphere. Send resume and salary history to: Fred H. Thomas Associates PC, 2560 North Triphammer Road, Ithaca, NY 14850.

Architects — Openings for Designers, Production Architects, Intern and Project Architects with Award Winning Firms in the Northeast. Call/send resume to: Dana Lebo, J. Edward King & Assoc., 5 Independence Way, Princeton, NJ 08540. (609) 452-7168.

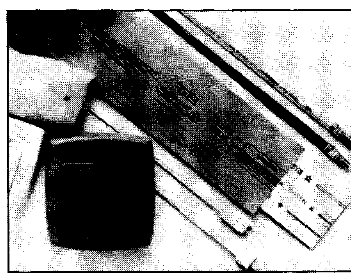
Project Director — We are a 50 person architectural firm based in Philadelphia seeking to add a Project Director experienced in the education market. Responsibilities will include marketing, design and project management. The successful candidate will be a registered architect with demonstrated ability to market design and direct projects in the educational field, primarily colleges and private schools. This position will be tracked to lead to a principal level position. Salary commensurate with experience. Interested candidate should submit resume with salary history to: M-2, P.O. Box 1924, Phila., PA 19105. EOE.

Continued from page 159

Pivot hinges
An expanded line of pivot hinge products includes a reinforced hing especially made for heavy-traffic doorways with overhead stops, suc as in schools and public buildings. All hardware comes in a range of standard sizes, and brass, chrome, and bronze finishes. Stanley Hardware, New Britain, Conn.
Circle 323 on reader service card

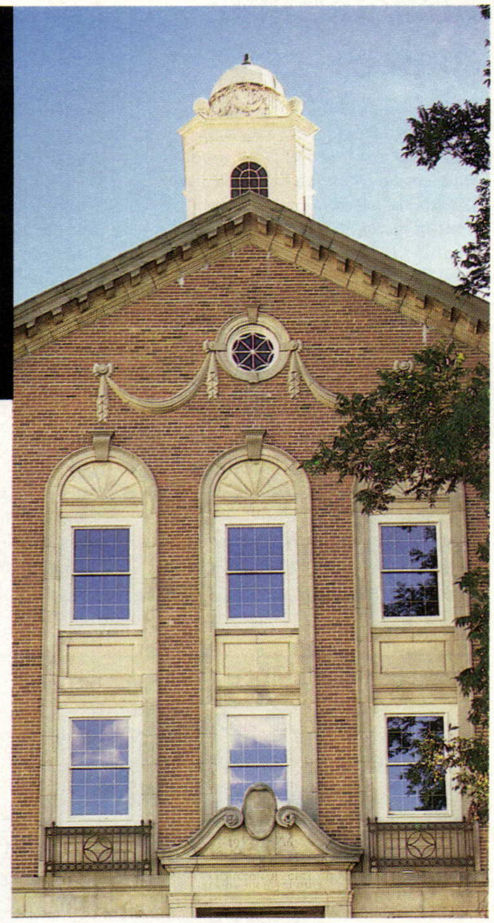


Solar screening
Designed for conference and office spaces where precise control of daylighting and glare are important, the *Window Manager* is a dual-shade interior treatment installed inside the window frame. Two roller screens fit inside an almost flush housing; vertical side tracks hold each screen tautly against the frame. Depending on the glare-reducing or blackout levels required, screen options may include woven *Soft-Vu* material as shown, which controls both glare and overheating, while maintaining an exterior view. Various translucent shades can be combined with an *Approtex* fiberglass-vinyl shade for both blackout capability a insulation. All *Window Manager* materials are fire retardant to meet the most stringent public use codes. Appropriate Technology Corp., Brattleboro, Vt.
Circle 324 on reader service card



Undercarpet cable
New interconnection and cabling systems are said to facilitate the in-field installation and rearrangement of telecommunication and data transmission networks. The kit includes copper and fiber-optic terminations, wallplates, adapters, and patch panels. Test devices are available to ensure correct installation; a software program provides wire tracking for circuit management. Thomas & Betts Corp., Raritan, N. J.
Circle 325 on reader service card

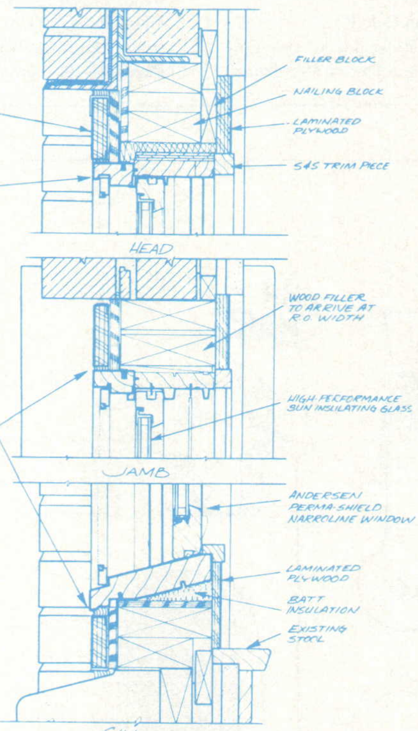
THE SMART WAY TO UPDATE AN OLD SCHOOL AND STILL KEEP IT TRADITIONAL.



This most
pressive structure, located in Fort
orth, Texas, is Arlington Heights
gh School. A local landmark as
uch admired today as when it was
ilt half a century ago.

When it came time to replace the
orn-out original windows, school
strict officials wisely decided to install
ndersen® Perma-Shield® Narroline®
ndows.

A prime concern was to preserve
e historic architectural style of the
ilding. It's plain to see that the
arroline double-hung windows—with



their clean, simple lines—tie in very naturally. Almost as if they had been there all along.

Esthetic values aside, Andersen windows provide very material benefits. Starting with energy efficiency.

In this case, the windows are equipped with our High Performance Sun insulating glass—expressly developed for use in hot-climate areas.

The officials were particularly impressed with the shading coefficient of this revolutionary glass—which in effect helps turn hot Texas sun into cool daylight. Further, the windows easily met government specifications that qualified the project for federal energy credit.

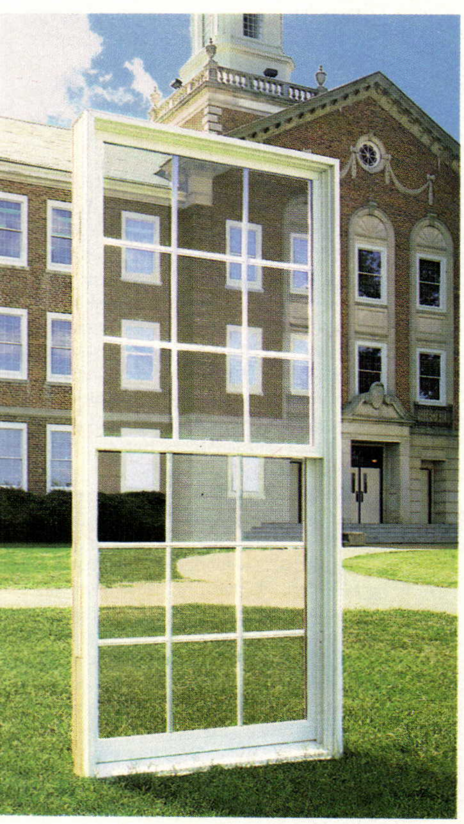
All Andersen windows far exceed industry standards for weathertightness*—which also helps keep energy bills down.

Maintenance costs are minimized, too—because our Perma-Shield® vinyl exteriors never need painting or puttying. The removable, one-piece Perma-Fit grilles also make window cleaning easier.

Whether you lean toward old or new schools of architecture, count on Andersen windows to be totally in keeping with your plans.

For more details, call your Andersen distributor or see Sweet's File 08610/AND. Or write Andersen Corp., Box 12, Bayport, MN 55003.

*NWMA I.S. 2-80



Arlington Heights High School
Fort Worth, Texas

Administration: Fort Worth School District

Project work: School district maintenance and carpenter shop personnel installed all the Narroline windows and trimmed them out with Perma-Shield® casing.

Come home to quality.

Andersen Windows • Patio Doors ™

Andersen

Circle 78 on inquiry card

Manufacturer sources

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

Pages 88-91
Leo Gonzales Cigarroa High School
Joaquin Gonzales Cigarroa Middle School
JONESKELL Architects
Pages 88-90—Clay tile: D'Hanis Mfg. Co. Brick: Elgin Butler Brick Co. Hollow metal doors: Steelcraft.
Page 90—Fabric sunshades: American Awning & Shade. Prefabricated structures (gymnasium, library, cafeteria, vocational education): Star Mfg. Co.
Page 91—Epoxy paint: Martin Senour Paint Co. Diffusers: Titus. Public address system: Rauland. Maple gym flooring: Sports Unlimited. Library furniture: by owner. Door closers and locksets: Russwin. Hinges: Stanley. Carpeting: Stratton (*Madras*). Steel lockers: Medart.

Pages 92-93
The Country Day Secondary School
George Robb
Shingles: Esso Building Products *(Esgard).* Aluminum windows: Guardline Industries, Inc. Infiltration barrier: Tyvek. Paints and intumescent coatings: Glidden. Plastic laminate: Formica. Vinyl flooring: Armstrong World Industies *(Excelon).* Molded plastic seating: Chairtex Mfg. Ltd. Florescent fixtures: Sylvania. Bollards: Prescolite.

Pages 94-97
The Wray School
Anderson Mason Dale P. C.
Pages 94-96—CMU and face brick: Clay-Lite Co. Aluminum-framed storefronts: Kawneer (*Insulcast 450*). Wood-framed windows, blinds: Pella. Exterior stucco: Nu-Wall with Sto finish coat. Sealants: Pecora. Metal roofing, flashings and leaders: Butler Building Products. Exterior lighting: mcPhilben; Daybrite. Hollow metal doors (throughout): W. Ray Crabb Inc.
Pages 96-97—Wood interior doors: Weyerhaeuser. Locksets: Schlage. Hinges: Soss. Closers: Norton. Operators: Door Controls, Inc. Drywall: U. S. Gypsum, Co. Paints (latex and oil): DeVoe. Carpeting: Bigelow. Diffusers: Titus.

Pages 98-101
Julia Kiniski School
Barry Johns Architect Ltd.
Pages 98-99—Face brick, stone trim: I. X. L. Brick Co. Ltd. Aluminum siding: Alcan. Skylights: MAC Plastics; Sentinel. Metal doors: Steldor. Wood-framed clad windows: Robert Hunt Corp.
Pages 100-101—Acoustic ceilings: Canexel *(Whispertone).* Suspension grid: Bailey Metal Products Ltd. Vinyl wallcoverings: Tower Contract Ltd. Paints: Pittsburgh *(Pitt-Glaze* polyester epoxy). Vinyl wall and floor tile: Amtico *(Duravinyl).* Air diffusers: Krueger Mfg. Wall and unit heaters: Trane. Roof ventilators: Broan. Florescent fixtures: York Lighting. Alarm and clock system: Simplex.

Pages 102-111
The Vollum Institute for Advanced Biomedical Research
Zimmer Gunsul Frasca Partnership
Pages 102-107—Brick: Klamath Falls Brick Co. Terra Cotta: Gladding & McBean. Skylights and greenhouse: Architectural Systems Inc. Waterproofing: Neogard. EPDM roofing: Carlisle. Aluminum-framed windows: Mercer. Metal-clad wood windows: Pella. Entrance: Harmon Glazing; Ellison Bronze.
Page 108—Railings: Aluminum & Bronze Fabricators Inc. Flooring: Cold Springs Granite Co. Drywall: Domtar/Angeles Metal Systems. Paints: Miller. Carpeting: Stratton; Interface. Laboratory casework: Perma Lab. Fume hoods: Permalab/Baker. Bio-safety cabinets: Nuaire. Automatic sprinkler: Harder Mechanical.
Page 109—Acoustic ceiling: USG Interiors, Inc.. Pendant fixture and sconces (throughout): custom by architects, fabricated by J. C. Garber Lighting Co. Tables: Peterson. Suspension system: Chicago Metallic.
Page 110—(top) Pendant lighting: Lazin Lighting. Picture spotlights: ERCO. Recessed spotlights: Staff Lighting. Rug: Unika Vaev (*Sanduhir*). Conference table and chairs: Peter Miles (*Scarthin Nick IV*). Fabric: Jack Lenor Larsen (*Heirloom*). Upholstered armchairs: Baker Furniture. Wood doors and paneling (throughout): Algoma Hardwoods. Fireplace: Calmex. Floor: Kentucky Wood Floors.(middle) Auditorium seating: J.G. Furniture (*Ikria*). Upholstery fabric: Unika Vaev (*Laser*). (bottom) Lounge chairs: Busnelli (*Tulsa*). Swing-arm lamps: Nessen. Leather-covered drum tables: Nienkamper. Tables: Peter Miles (*Whitney Pedestal*). Chairs: Peter Miles (*Oxford Conference Chairs*).
Page 111—Conference table: Dux (*Maria*). Chairs: Rudd (*King's Chair*). Custom cabinets: Nelson Pyle. Chalkboard: Claridge.

Pages 112-121
Smithsonian Institution
Shepley Bulfinch Richardson and Abbott
Pages 113-117—Granite: Rock of Ages. Limestone: Bybee Stone. Copper roofing: Revere Copper Products, Inc.. Metal and glass entrances: Glass Systems Inc.; Armour Glass. Aluminum-framed windows: Glass Systems Inc. Glazing: Economy Glass. Replica cast iron lighting standards: Wells Box. Fixture: Western Lighting. Ornamental iron fencing: Construction Systems, Inc. Fountain: custom by architects; mechanical by Roman Fountains.
Page 118—Skylight: Super Sky Products Inc. Ornamental iron railing: Zephyr Metal Craft.
Pages 120-121—Fountain: Baycraft Fiberglass Engineering. Wood doors and custom woodwork: Geyer Industries. Paints: Pittsburgh Paint. Plaster and drywall: National Gypsum Products. Acoustical tile ceiling: Celotex. Decorative lighting fixtures: Edison-Price. Recessed lighting: Wasco; Lightolier. Mirrors: Binswanger Mirror Products. Public address system: Dukane. Sprinkler system: Livingston Fire Protection. Elevators: U. S. Elevator.

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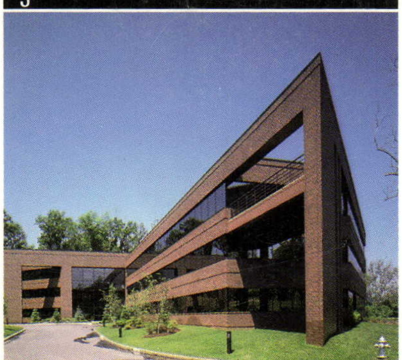

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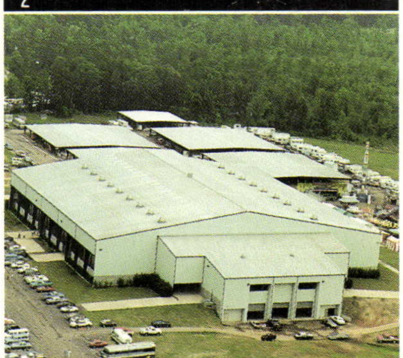

1

Six major reasons to specify Sloan...

the first time.

At first glance, it's difficult to imagine how these six different buildings are related. But if you take a closer look at their histories, you'll find they all share a common theme: the washrooms in all six buildings have been refitted with Sloan flushometers.

True, these buildings don't look old enough to need major plumbing repairs. But the fact is, the original flushometers that were installed just didn't hold up. Even after repeated servicing, they continued to malfunction. They didn't shut off properly. They leaked at the stops. In some cases, they even flooded the washrooms. In short, they weren't Sloan flushometers.

Unlike substitutes, Sloan flushometers offer proven, reliable service. With built-in quality at an affordable price. That's why today more buildings are equipped with Sloan flushometers than with any other brand.

Only Sloan's rugged, tamper-proof design can assure the quiet, dependable operation so critical in buildings like these. Plus, Sloan flushometers are built to last for years with only minimal, routine maintenance—an important consideration for owners who value time and money.

The next time you consider specifying a substitute, think about these six buildings. Then specify and insist on Sloan. The first time.

1. Angelina County Exposition Center, Lufkin, TX **2.** Linpro Company, Berwyn, PA **3.** Northwood Jr. High School, Meade, WA **4.** Barnett Plaza, Orlando, FL **5.** Cow Town Colosseum, Fort Worth, TX **6.** CNA Tower, Orlando FL

SLOAN VALVE COMPANY
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A Tradition of Quality and Pride