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Housing

'An Elegant Assembly of Contextually Polite Parts'
House in North Tampa, Fla.; The Jan Abell Kenneth Garcia Partnership, architect. By Michael J. Crosbie

Disparate Rows Peer Across a Central Path
Riviera Villas, Johannesburg, South Africa; Ian and Lynn Bader, architects. By Lynn Nesmith

Taut, Vaulted House on a Hillside
House in San Francisco; James Shay, AIA, architect and owner. By Allen Freeman

Evaluation: Habitat a Generation Later
Moshe Safdie’s intended housing prototype is a one-off luxury apartment building. By Andrea Oppenheimer Dean

Sleek Structure Made Out of Boat Masts
House near Woodgreen, England; Richard Horden, architect. By Annette LeCuyer

Space and Structure in a Primordial Folkhouse
The strong and sheltering minka dwellings of Japan. By Guntis Plīņsums

Kaleidoscope
Hillside Homes, Bellingham, Wash.; Zervas Group Architects. By John A. Galloway

House in Santa Rosa, Calif.; Roland Miller Associates, architect. By Donald Canty, Hon. AIA

Block Island House; Herman Hassinger, FAIA, architect. By M.J.C.

San Francisco Town House; Charles Pfister Associates, architect. By Carleton Knight III

Russell Park Student Family Housing, Davis, Calif.; Sam Davis, FAIA, Architects and Shen/Glass Architects. By M.J.C.

Phoenix Place, Sacramento, Calif.; Lyndon/Buchanan Associates, architect. By David Littlejohn

The Beach Apartments, Albuquerque; Antoine Predock, FAIA, architect. By D.C.
Technology & Practice

Who's in Charge of Housing Innovation?
Vernacular construction technologies distribute control widely. By Stephen H. Kendall

The Netherlands: Distinguishing 'Support' and 'Infill.' By Stephen H. Kendall

Japan: Selling Houses Like Automobiles. By Hiroshi Watanabe

Sweden: Manufacturers Customize Kit of Parts. By Arnold J. Aho, AIA

United States: Agreements Among Competitors Could Make Houses 'Smart.' By Karen Haas Smith

Home is Where the Art Is
Architects turn owner-homebuilders on to architecture. By Michael J. Crosbie

Design/Build Methods Mature
Release of new AIA documents reflects steady rise in the use of this delivery process. By Christopher Wist

Description:
- The contents include various articles on architectural topics such as housing innovation, vernacular construction, and architectural practices.
- There are sections on who's in charge of housing innovation, design/build methods, and home is where the art is.
- The layout includes a page number and a diagram with a communication module and a sensor.
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EVENTS

Nov. 1-8: Second International Daylighting Conference, Long Beach, Calif. Contact: Marjorie Matthews, Oak Ridge National Laboratory, Building 4508, Room 216, P.O. Box X, Oak Ridge, Tenn. 37831.


Nov. 2-5: Ceramic Tile Distributors Association Convention and Exposition, Reno. Contact: CTDA, 15 Salt Creek Lane, Suite 422, Hinsdale, Ill. 60521.

Nov. 3-6: Automated Manufacturing Conference and Exhibition, Greenville, S.C. Contact: AM 86, P.O. Box 5616, Greenville, S.C. 29606.

Nov. 5-7: Course on Engineering for Extreme Winds—Hurricanes and Tornadoes, Lubbock, Tex. Contact: Martha Hise, Dept. of Continuing Education, Texas Tech University, P.O. Box 4110, Lubbock, Tex. 79409.

Nov. 6-7: Seminar on Design of Off-Peak Cooling Systems, Los Angeles. Contact: Jack L. McClung, Professional and Educational Programs, ASHRAE, 1791 Tullie Circle N.E., Atlanta, Ga. 30329.

Nov. 9-11: Conference on Zoning and Land-Use Control Issues, Orlando, Fla. Contact: Vicki Groat, American Institute of Certified Planners, 1313 East 60th St., Chicago, Ill. 60637.

Nov. 9-12: AIA Housing Conference on High-Tech Housing Design, Toronto. Contact: Ravi Waldon at Institute headquarters, (202) 626-7429.


Nov. 11-12: Conference on Fostering Strategic Innovation, Boston. Contact: Earl Powell, Design Management Institute, 621 Huntington Ave., Boston, Mass. 02115.

Nov. 12-14: Decorative Metalwork in Architecture Conference, Minneapolis. Contact: Jan Becker, University of Minnesota, Dept. of Professional Development and Conference Services, 313 Nolte Center, 315 Pillsbury Drive S.E., Minneapolis, Minn. 55455.


Nov. 13-14: AIA Architects in Education Conference in conjunction with the California Council on Architectural Education, Santa Monica, Calif. Contact: Alan Sandler at Institute headquarters, (202) 626-7573.


Nov. 16-21: Seminar on Computer-Assisted Planning and Operation of Health and Hospital Care Facilities, Tel Aviv, Israel. Contact: Seminar Secretariat, P.O. Box 50006, Tel Aviv 61500, Israel.


LETTERS

Tulane Clarification: I believe that several points of clarification are necessary in regards to my quotation in the article [page 48] on the Tulane school of architecture, which appeared in the August issue.

First, the article did not clearly state that I am a graduate of the bachelor of architecture program at Tulane, not the master of architecture program. Furthermore, my thoughts regarding the status of the graduate program were not expressed completely. The article failed to mention my belief that Tulane can and should make every effort to develop its graduate curriculum in architecture as fully as possible. I feel that the university has sufficient economic and human resources (Tulane's endowment is, in fact, quite a bit higher than the article indicated) to create a highly innovative and effective graduate architecture program. Such a program, if vigorously and enthusiastically supported, would further enhance the school's excellent undergraduate offerings. As I stated, however, in the unfortunate event that the university should fail to pursue a fully developed master's curriculum, the only sound alternative would be to eliminate the graduate program entirely, focusing all resources on the undergraduate level.

The series in ARCHITECTURE on individual architecture schools is a valuable resource for both prospective students and potential employers. I urge you to continue the series and to consider increasing the number of schools covered each year.

Gerald Martin Moeller Jr. Washington, D.C.

Understanding MIT: I enjoyed the Aug. review of schools. As an alumnus, former faculty member, and enthusiast of MIT [see page 54], I felt that Senior Editor Michael J. Crosbie did a particular good job of understanding a complex situation and writing a sensitive piece.

Michael Underhill, AIA House

Fifth-Year Program: The faculty and graduates for our fifth-year program and I appreciate the positive recognition given to our program at the University of North Carolina at Charlotte in your August issue [page 42].

I wish to correct, however, the erroneous statement that I have been asked to develop a similar program at any other school. Among the frequent visiting critics to our program are Susanna Torre Columbus and Jerry Wells of Cornell.

The critical input from these visitors over the past six years has contributed significantly to the development of our program. Conversely, I have been told both, observation of our developing program has served in the development of similar one-year thesis programs at Columbia and Cornell.

Nelson S. Benzing Jr., AIA Director, B. Arch. Degree Program UNC

Competition Advisers: I think it is commendable that your magazine publishes news about recent competition winners e.g., Phoenix, ASU, Mercer Island, and others. You even dutifully report the names of the other finalists, their associates, and the names of the jury members.

However, design competitions also represent the work of a professional advisee in most cases, an architect or planner. I think it would be both appropriate and fair to list the name of the professional adviser responsible for the administration of the competition, along with the names of the sponsor, jury members, and participants.

My interest is admittedly self-serving, was the professional adviser for the Phoenix municipal government center competition and the Mercer Island civic center competition, both of which you reported in your News, Awards and Competitions section.

Edward C. Wundram, AIA
Portland, Or

Letters continued on page

Correction: In our coverage of the 1986 AIA convention (July, page 11), it was incorrectly reported that a resolution to create an additional seat on the AIA board, to be filled by an associate member, was tabled. The resolution was defeated.

In our news report about development of Philadelphia's waterfront (Aug., page 18), the firm of Rector Olson Associates one of the architects for Penn's Landing was misspelled.
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Strategies for Staffing: It was with great annoy that I read the portion of “Charting Our Course” [ARCHITECTURAL TECHNOLOGY, May/June, page 52] that deals with staff recruitment and development. It seems the positive response to employee concerns that pervades most professions is yet to be felt within ours.

Exemplified by the article’s matrix for employees, one finds a litany of archaic attitudes that seems always to have been part of architectural practice: limited security, average or below average salary, minimal benefits, less loyalty to the firm, and so forth. Not one of the six variants of firm strategies contains a wholly positive approach to the architectural employee. It is alarming that, while we’re concerned about saving our own financial resources, we think nothing of shortchanging those who work for us. Apparently, it is only the finances of the “gurus” we are working to improve.

I suggest that we, as architects, account this portion of the article’s recommendations as not being adequate to our profession and work to establish a guideline that can enhance our employees’ livelihoods rather than detract from them. To achieve financial parity with other professions at the expense of our employees does not, in any way, further our professional aims.

Walter S. Marder, AIA
Tallahassee, Fla.

Using Uniformat for Specifications: Jack Varley’s piece in the May/June issue of ARCHITECTURAL TECHNOLOGY [page 64] was welcome reading. I am not sure that many architects, other than estimators, are aware of the existence or uses of the Uniformat system. For those who may not be familiar with Uniformat, the system breaks down project components into twelve “sections:”

1. Foundations
2. Substructures
3. Superstructure
4. Exterior Closure
5. Roofing
6. Interior Construction
7. Conveying
8. Mechanical
9. Electrical
10. General Conditions
11. Special
12. Sitework

In addition to the use of this format for estimates and outline specifications, with some reordering and expansion Uniformat can also be used as a model for construction specifications, a further extension of outline specifications. It may not be accidental that the Uniformat is organized along lines similar to construction drawings, unlike the CSI format, which is best described as a filing system and has little relation to either building systems or construction contracting. Building systems in the Uniformat context could be defined as physical assemblies or processes that have a common design/performance criteria.

Utilizing a similar subject outline throughout the design and documentation of a project has obvious advantages for records management, phase continuity, quality control, and historical reference. We might also see here a more friendly format for the development of “expert” architectural systems.

Here’s how we adapted the Uniformat outline into a specification subject outline for a recent full service project of ours. Our version attempts to span the Uniformat and CSI words:

IDX Index of Specifications
LD List of Drawings

1. Foundations & Substructure
2. Site Improvements, Earthwork, Grading, Paving
3. Site Utilities
4. Poured-in-Place Concrete
5. Superstructure Framing
6. Roofing & Deck Waterproofing
7. Exterior Walls and Enclosures
8. Doors & Finish Hardware
9. Interior Construction and Finishes
10. Field Painting and Coatings
11. Building Equipment & Specialities
12. Elevator

13. HVAC Air Handling Systems

continued on page 11

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The HP DraftPro Plotter: high-quality drafting for only $5,400.
Cutting Edge: I read with interest the feedback to William Herrin's article in the “cutting edge” [ARCHITECTURAL TECHNOLOGY, May/June, page 9]. One reader commented that there is a problem in "giving away the profession" to a lot of persons. In this list, engineers are given the same billing as materials people. A registered engineer who has gone out of his way to help keep architects out of liability suits, I find that comment more than a trifle offensive.

I have often seen architects avoid retaining the services of a firm such as mine and instead go to a local contractor to let the contractor do the design for free. This seems to be a fairly simple violation of ethics. With the materials suppliers selling directly to the building owners, bypassing all registered professionals and flaunting the registration laws, castigating professional engineers is a cheap shot that is not deserved. The design and construction management of a large building project is beyond the training of any single individual; things are just too complicated and specialized. There is a fundamental truth being ignored: Designers don't get sued when the owner is satisfied. In the inter-professional sector, both architects and engineers need to get on the same team to provide satisfied clients; then the litigation will come to a screeching halt. H.Z. Lewis Littleton, Colo.

Curtain Wall Details: Since our firm specializes in diagnosing and prescribing repairs to building exteriors, any article on curtain walls [ARCHITECTURAL TECHNOLOGY, May/June] is read with great interest.

I was distressed to find what I consider a fundamental error in one of the article’s illustrations. The lower detail in Figure 3 on page 35 depicts a steel angle resting on the edge of a concrete slab. The caption indicates that a rubber bushing accommodates horizontal movement. This is incorrect. Relative movement in the horizontal plane would have to be accommodated by slotting the hole in the horizontal leg of the steel angle, which was not done. The bushing does not fit into this hole and so has no effect whatsoever on horizontal movement.

Harwood W. Loomis, AIA Hamden, Conn.

Indoor Air Time-Bomb: My independent study into the subject of indoor air pollution [ARCHITECTURAL TECHNOLOGY, July/August, page 27] revealed that even with the best air conditioning systems, the ability to remove contaminants is limited. Unless the contaminants are removed, the recirculated air will always be contaminated. One method to reduce contaminants is to increase the amount of outside air and fresh air ventilation from five to 30 cubic feet per person.

The solution is not to recirculate chemicals such as styrene, benzene, xylene isomers, vinylidene chloride, formaldehyde, cigarette smoke, etc., but to provide direct exhaust/openable windows as needed to keep the threshold limit value no worse than the outside air. Otherwise architects, contractors, engineers, and owners will face a liability time bomb as technology gets more sophisticated.

Maurice Zorman, AIA, EDRA Beverly Hills, Calif.

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But do it soon. Because all entries must be postmarked by April 1, 1987.
ITE Selected to Redesign Los Angeles' Pershing Square

ITE Projects Inc. of New York City has been selected the winner in an international design competition for the $12.5 million reconstruction of Pershing Square downtown Los Angeles. The site is the oldest park in the nation's second largest city and has a history as checkered as its physical refurbishment as well as emphatically grided winning design. Dedicated in 1866, the five-acre square bore at least five names, and the ITE plan, when built, will mark its sixth physical incarnation. Its most drastic modeling occurred in the 1950s when Pershing Square was removed to make way for a subterranean garage and air-raid shelter whose ramps usurped much of the site area and whose half-heartedly landscaped concrete surface was a pale substitute for the lush old park. Even this proved too luxuriant for downtown powers who felt that the square was harboring dangerous derelicts, and therefore the square was redone in 1960s in a mode that bore an odd resemblance to the deck of an aircraft carrier. This loss of amenity discouraged middle-class patronage even further, leaving the park largely to those whose low income and lack of mobility precluded an alternative.

Pershing Square lies between Los Angeles' two downtowns. On the east is the city's original and architecturally rich financial, entertainment, and retail core, now bustling Latino shopping street adjoined by a National Historic District and an active skid row. To the west is the just-modelled 62-year-old Biltmore Hotel, the Neutra Goodhue-designed Central Library (which sustained $24 million of damage in two arson fires over the summer), and the antiseptic but prosperous new financial district whose instant skyline has become one of the many symbols of Los Angeles.

At present, the square is a forlorn place largely tenanted by members of the city's large homeless population. The Central City Association, a federation of major downtown business interests, has set out to revitalize the space by forming the Pershing Square Management Association to effect its physical refurbishment as well as to program activities in it. A prime goal of the park redesign was to attract office workers and tourists without disturbing its present users.

The design competition has been PSMA's principal effort to date, and proved to be, in comparison with recent downtown public-project competitions in other sunbelt cities, a smooth, publicly visible process yielding a satisfactory outcome. It generated 242 entries from which five were chosen for development in a second design stage. Two of these, by the SWA Group of Suasalito, Calif., and by Frank Welch & Associates of Dallas, were formal, symmetrical public square designs in the tradition of earlier Pershing Square landscaping, and, for that matter, in the tradition of most central-city plazas on this continent and in Europe.

Welch's proposal was appropriately rich, well-scaled, and complex, while the less refined SWA entry was a puzzling choice, since it was outshone by several other traditional designs that were either on the runner-up list or were among the discarded entries.

The three other finalists embodied more avant-garde approaches (assuming, for convenience, that revivalism is not a strongly avant-garde phenomenon). SITE'S entry was based on a bold grid of 13-and-a-half-foot squares, expressing, as did two other schemes, the 27-foot column grid of the parking structures below. Even in the anonymous first stage it was clearly identifiable as a SITE work, in that it took a familiar form (an uninflected grid) and gave it a simple yet contradictory twist by having its surface undulate freely. The Santa Monica, Calif., firm of Phelps/Son Architects presented a Venturi-like essay in cartography and history, replicating the original land survey of the city on one diagonal half of the site, and devoting the other to a thickly planted and sloping replica of nearby Bunker Hill. Bone/Levine Architecture of New York City offered the boldest of all the entries, a dramatically sweeping trellis in the form of an elevated "botanical freeway." The selection of these three schemes demonstrated the jury's willingness to consider non-standard solutions, and its ability to discriminate astutely among such proposals. Additionally, the predominance of out-of-region finalists testified to the effectiveness of program materials in describing the site and its background.

But even though the winning design is one of considerable promise, the second-stage judging left the door open for second-guessing. Thanks to further development and greater depth of presentation, the differences in quality among the schemes became more evident. The Welch and Bone/Levine proposals seemed the strongest, in part due to their clear-cut urbanity, and in part because they had the good sense to maintain the apparent flatness of the site. There is a drop of about two feet across the site, but it is barely perceptible given its 330x600-foot dimension. Welch's plan, richly paved and centered on a large fountain ringed by its present users.

ITE Projects' winning proposal for the revitalization of Pershing Square.
Design from page 15

by sculpted human figures, was composed of spaces within spaces and achieved transparency without sparseness. Its screening of the garage ramps with vine covered pergolas seemed the most effective treatment of these intrusive elements. Kevin Bone’s scheme improved in its second phase by setting up a counterpoint between a regular grid of trees and the freer form of the freeway/trellis, but also lost some ground when that structure lost some of its fluidity in its later version. It was not clear, however, whether this was an abstract flaw of plan graphics or a concrete one that would be sensed in real time and space.) Bone left the garage ramps largely exposed, taming them by making their sinuous forms very much a part of his composition. Puzzlingly, these two schemes were the first to be eliminated by the jury.

The SWA Group’s entry metamorphosed from a public square in phase one to a Beaux-Arts set piece in phase two, which also saw the addition of Robert A. M. Stern, FAIA, to the design team. The result looked like a portion of a larger park transplanted on another site. An extreme change of grade at the north end split the park in two, and, along with the paving and planting patterns, largely thwarted the diagonal circulation that is vital to the square’s actual use. The Phelps/Son scheme, while representing a higher order of accomplishment, was also hurt by a raised north end capped by a lath house that acted as a formidable visual barrier. Its compass-rose fountain cleverly continued the map metaphor, but also seemed oversized. Heeding first-phase jury suggestions, Barton Phelps altered the proportions of paved grid to forested “hillside” from an equal balance to a two-to-one ratio favoring the latter. The effect was more of an arboretum than that of a downtown open space.

SITE’s second phase addition of a large central trellis seemed to weaken its original concept, and it became clear that the plan’s undulations, by raising the edges of the square, divorced the space from its surroundings and created a decided awkward perimeter. Security would be problematic, and entering the park at the center of its long sides under this raised edge would be a dubious esthetic experience.

In SITE’s own words, its design is meant “to compress virtually all of the Los Angeles experience into a metaphorical magic carpet” with the paving grid representing the flatland street system and the rolling edges symbolizing the area’s hills and mountains. (The lines of the grid will be made of translucent material illuminated from below at night, simulating the city from the air.) This is a laudable strategy, but metaphor can be a double-edged sword. By making a uniform and non-hierarchical pattern, the plan seems to symbolize the sprawl and the lack of center that are stereotypically associated, whether fairly or not, with Los Angeles. This lack of formal focus seems a symbolic contradiction to the competition’s first objective to “establish Pershing Square as an important symbol of the center of Los Angeles . . . .”

At the same time it must be remem-

continued on page
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And the cold. And the rain. And snow, indeed, moisture. In addition to its attractive appearance, HYPALON's low maintenance makes it a very attractive roofing solution.
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are available in formula-
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an exceptional combination
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s, corrosive chemicals,
and setting quality standards
the industry and meas-
even the strictest build-
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or adhesives depending upon the
system's supplier recommendation.
In addition, because they're among
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when you're specifying a single-ply
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on a product that's as attractive to
your client as it is to you—Du Pont
HYPALON.

For more information about Du Pont
HYPALON and the companies who
manufacture roofing systems based
on HYPALON, call 1-800-441-7111.
Only Du Pont makes HYPALON.
Specify it by name.

Du Pont manufactures HYPALON, not single-ply roofing membranes or systems.
Your single-ply roofing system is only as effective as the material that goes into it. HYPALON® is Du Pont's registered trademark for its chlorosulfonated polyethylene, a synthetic rubber supplied as a raw polymer to the rubber industry. Rubber manufacturers then compound and process the polymer to produce a variety of end products including single-ply membranes.

It pays to know the polymer that your single-ply roofing system is based on. And it pays to choose HYPALON synthetic rubber by Du Pont.

In comparison to other polymers used in roofing, systems based on Hypalon can be created in a broad range of colors without loss in performance. Since a variety of ultra-violet stable pigments are compatible with a properly compounded membrane of HYPALON, systems will retain their color and performance characteristics despite continual exposure to sunlight. This is significant in that masstones, pastels and even fluorescent color can be used in the manufacture of roofing systems.

HYPALON's unique chemical and physical properties allow for design versatility rarely found in other polymer products. Membranes based on Hypalon can be easily shaped and fitted over various configurations, substrates and hard-to-fit areas of any roof, including sloped or curved designs. Whatever the building, a system based on HYPALON can be tailored to cover it with a snug, long-lasting fit.

A thermoplastic grade of HYPALON is used to make roofing membranes. This provides easy installation and allows the membrane to be seamed using heat, solvents or adhesives, according to the system supplier's recommendations. After installation, cross-linking sites on the HYPALON polymer allow it to cure in place. No other synthetic rubber or thermoplastic offers this feature.

Since it vulcanizes over time, a roofing system based on HYPALON actually becomes stronger with age. And because repair and maintenance is minimal, roofing systems made of HYPALON are among the most economical on the market.

The combined action of ozone, oxygen and sunlight often cause the degradation of many polymer products. HYPALON, however, is both ozone and ultra-violet resistant. In fact, when properly compounded for the roofing application, its resistance to all these elements is actually enhanced.

The toughness of the polymer itself enables HYPALON to remain functional under some of the harshest environmental conditions. Membranes based on HYPALON offer serviceability in temperatures as formidable as -40°C (-40°F) and 93°C (200°F).

Due to the chlorine in its molecular makeup, compounds of HYPALON are resistant to oil and to flame propagation. Additionally, a membrane based on HYPALON is highly resistant to corrosive chemicals, ozone, pollutants, and acid rain—setting quality standards throughout the industry.

For more information about Du Pont HYPALON and the companies that manufacture roofing systems based on HYPALON, call 1-800-441-7111.
Continuing Controversy Over Kent State Memorial Design

A memorial intended to heal the wounds of the tragic events that occurred at Kent State University 16 years ago has instead resulted in a bitter controversy. More than five months after a national juried competition (see June, page 14), the design of the memorial that will be built is still uncertain. The jury’s first choice was disqualified, and the university had planned to build the second place scheme. However, in early September, Ian Taberner, the disqualified first place winner, donated his design to the university.

In April, the competition jury unanimously awarded first place to Taberner, who also credited Michael G. Fahey and 10 University of Michigan students. Shortly after the announcement, Taberner informed university officials that he was a Canadian citizen. (The competition was open only to U.S. citizens.) Taberner was disqualified, and the university designated team member Fahey as the winner. Fahey subsequently refused the $20,000 cash prize and the designation, saying his involvement in the scheme was minimal.

Initially, the university sought to construct Taberner’s memorial without his permission. In an article in the Detroit News on April 17, Kent State President Michael Schwartz was quoted as saying: “The bottom line is that we now own that design—and if nothing can be worked out on a contract with Fahey—then we’ll build it ourselves with our own architects.”

After Taberner threatened legal action if his design was used against his will, the university agreed to negotiate with him for a consulting role. After attempts to reach an agreement failed, the university trustees on July 2 adopted the second place scheme as the winning design.

That new winning scheme, designed by Bruno Ast and Thomas J. Rasmussen of Chicago, calls for a platform area with 13 polished black marble disks set into blue granite pavers, which represents the 13 persons that were killed or wounded.

The latest event in the controversy occurred when Taberner donated his design to the university. In giving his scheme to the school, Taberner stipulated that the memorial be built on the original site and that he serve as architect and receive an appropriate fee for its execution.

At press time Kent State officials had not yet formally responded to the donation. But whatever the reaction, it appears a cloud of controversy will continue to surround the memorial, for the prevailing sentiment, as an editorial in the Kent State student newspaper recently suggested, is: “People have waited 16 years for a long overdue memorial. The new one must be fully supported by the university, the families of the victims, and others who think about the future.”

News continued on page 24
Circle 12 on information card.

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SMART ARCHITECTS CHOOSE HOMASOTE.
First Geodesic Dome Built
In U.S. Donated to MIT

The MIT museum received the first geodesic dome built in the United States as a gift from Zane Yost, AIA, principal of Zane Yost & Associates, Bridgeport, Conn. Yost built the dome when he was a student at MIT in 1951 out of 3½-foot-long spruce 2x2s and plywood circular disks, from Buckminster Fuller's calculations and a paper model.

Yost donated the dome to the museum because, he believes, the structure is representative of Fuller's philosophy of "offering ideas as examples, rather than a complete solution."

The dome found a home for 35 years on Yost's parents' farm in New Hampshire. Conceived originally as a potential solution to the housing crisis, the 24-foot-diameter, 450-square-foot structure served as a guest house for much of that time.

Although the underground plumbing and electric lines caused occasional problems, the structural system has survived intact. The waterproofing of neoprene topped with a fluid-applied elastomeric coating (a revolutionary idea for its time) also held up, even though the skin below (⅛-inch masonite panels built on a shoestring budget and screwed into the frame), proved to be unsalvageable.

Yost reports that he dismantled the 20-sided dome in less than a day—all the galvanized bolts, attached to metal tabs at the ends of the 2x2s, unscrewed and were in good condition. He hauled the entire structure to MIT "in a box that would fit under your desk."

Michael Yeates, assistant director for collections at the museum, indicated that MIT would be willing to lend the structure out as a traveling exhibit.

The address: MIT Museum, 265 Massachusetts Ave., Cambridge, Mass. 02139.

—M. STEPHANIE STUBBS

Losses

Henry Moore: 'The Teacher for His Monumental Sculpture Was Nature'

By the time he died this Aug. 31 at the age of 88, Henry Moore's sculpture was the preferred outdoor embellishment for many of the better known public buildings in America and Europe, and notably their shrines to art itself, including Mies' National Gallery in West Berlin, New York's Lincoln Center, and I. M. Pei's East building of the National Gallery in Washington, D.C.

Though a lifelong denizen of rural England, Moore's pre-eminence was early acknowledged in the U.S. when Alfred Barr included him in a 1936 exhibition of cubism and abstract art, and no other country now owns more of the sculptor's works. While his name is equated with the modern movement—which we associate with squared edges, the triangle, and the grid—Moore's was an art of rounded shapes, many punctuated with huge holes. The teacher for his monumental sculpture was nature as he experienced it on his unprepossessing farm in Hertfordshire, rather than modern, urban, hard-edged images. This explains in part why, as John Russell of the New York Times wrote, Moore's work "was loved by people the world over—and not least by those who had never looked at the work of another sculptor."

Moore's transformation from an unknown avant-garde artist to a figure of public recognition and affection was generated by his powerful and moving drawings of life in London's underground bomb shelters during World War II. In their humanity, these images allowed Moore's art to be described as Moore's own generously empathetic, plain-spoken, unpretentious nature.

One of eight sons of a miner who elevated himself to mining engineer by learning mathematical and technical skills, Moore in turn raised himself to burrow and carve into rock, but as a sculptor. He began as an elementary school teacher. After being gassed in World War I, he used his free tuition as a veteran to enroll first at the then-progressive Leeds School of Art where he was exposed to original art works by Cezanne, Gauguin, Kandinsky, and African "primitives." From there he proceeded to London's Royal College of Art and a hungry sampling of London's art treasures. He wanted, he said, "to learn all about all the sculptures that had ever been made in the world." He also began traveling, first to Paris when he discovered Cezanne in 1923 while studying at the Royal Academy, then to Italy in '25 on a traveling fellowship.

Moore had his first one-man show in London when he was 30. "The vital thing he said around that time, 'is to have a subject that allows you to try out all kinds of formal ideas, just as Cezanne did in his 'Bathers' series. In my case it is the reclining figure that provides those chances.'"

Seattle Opposes Proposed Removal of Moore Sculpture

At the time of Henry Moore's death in late August, one of his most prominent works was making front page headlines in Seattle. "Vertebrae," an eight-ton Moore bronze that has perched for 15 years of the forecourt plaza of Seafirst Bank building across from the public library, had recently been sold to an unnamed Japanese collector for "about a million dollars."

When installed in 1971, "Vertebrae" was the only major Moore sculpture on the West Coast and was seen as comparable to Chicago's Picasso and the Moore at Lincoln Center. In the years since, it has insinuated itself into the public's affections, so it is therefore not surprising that plans to replace it with a planter have met stiff resistance.

Initially, local representatives of JMB Property Management Corporation, current owner of the building, defended the sale, saying they invest in real estate, not art, and claiming no local interest in acquiring Moore's 'Vertebrae' in place at the Seafirst Bank plaza in Seattle.
Remodeled spaces have all the lighting problems of new construction without the benefit of long lead times.

This carefully-designed space is actually the clubhouse of the Minnesota Twins baseball team—a far cry from the bare-concrete and exposed-pipe image we usually associate with a locker room.

Despite its remarkable luxury, this job suffered under the usual remodeling constraints: an existing structure (the Metrodome) and the pressure of time (the opening of baseball season).

The designers wanted the look of linear fixtures and the even lighting that only a high-quality lensed indirect fluorescent system can deliver. Unfortunately, high-quality linear systems need eight to twelve weeks for delivery — acceptable for new construction but too long for time-sensitive remodels.

Here, the answer lay in a newly-developed modular system: FasTrac by Peerless, which promises four-week shipment on any order of up to 1000 feet.

Softshine optics: on the cutting edge

These 6” round linear fluorescent fixtures offer seven of the controlled optical systems that established Peerless as a leader in lighting technology.

Here, note the even ceiling and upper wall illumination, overall shadow-free environment and lack of glare. These two-lamp fixtures, hung 10’ apart, use a wide spread Softshine lens that distributes the light into precisely the right viewing areas.

This diagram, generated by research computers at Peerless, shows how the light strikes each individually-designed lens facet, then fans out over a wide area while the lens retains a comfortable low brightness.

FasTrac design options: impressive

FasTrac’s modular aluminum extrusions come in 4’, 8’ and 12’ standard lengths and twelve standard colors, in one-lamp and two-lamp versions.

A quick-connector system allows the fixtures to rotate, so they can serve either as up lights, down lights or wall washes. Peerless offers seven different Softshine lenses plus the option of white or matching colored baffles.

Through the use of joiner hangers, fixtures can be made into a continuous run of any length, and black neoprene flex connectors allow configurations. All FasTrac options and components are available on the four-week shipping schedule.

FasTrac is part of the Peerless family of Softshine products, designed to solve illumination problems, design problems and human comfort problems no other fixtures in the world can solve.

Peerless invented and patented them. Only Peerless makes them.

They’re the lighting of the future. If you’d like to see what else the future holds, just call.
Control insurance costs with Project Liability Insurance.

More and more architects are finding Project Liability Insurance an effective way to control insurance costs. The concept, developed by CNA Insurance and Victor O. Schinnerer & Company, Inc., provides coverage for a specific project. One policy protects you and all design consultants during the design and construction phases of the specific project. This protection continues up to five years after the construction is completed.

To help control your costs, the premium can be negotiated as a reimbursable item in the construction budget. The cost of your annual policy will be reduced because billings from jobs covered by Project Insurance are not included under your annual policy. Also, any claims under your project policy will not impact the premium charged for your annual policy.

You have come to expect innovative product ideas like Project Liability Insurance from our professional liability program. You can also count on our expertise that comes with nearly 30 continuous years of experience. Contact Schinnerer. We offer you a program worth investigating.
The Plaza Suite is shown in our Blond Whisper Color™ with Lexington™ faucets. For our luxury products brochures, write to American Standard, Department K8B, P.O. Box 2003, New Brunswick, NJ 08903. To see Plaza, visit our Showplaces: Chicago (3 Crossroads of Commerce, Suite 100, Rolling Meadows); Dallas (12344 Inwood Rd.); Los Angeles (116 N. Robertson Blvd.); New York (40 W. 40th St.); Pittsburgh (100 Ross St.). Or call 1-800-821-7700 (ext. 4023) for your local showroom. ©1986 American Standard Inc.
Losses from page 24

A housing bill passed by the U.S. House of Representatives would virtually stop construction of new public housing and instead call for the rehabilitation of existing units. Overall, the Administration's plan to eliminate a number of programs and sharply curtail others was rejected by the House as it extended for another fiscal year all housing and community development programs—including the Community Development Block Grants, the Urban Development Action Grants, and the Farmers Home Administration assisted housing programs. However, in sharp contrast to the past, specific funding levels will be left to the budget and appropriations committees.

The move toward rehabilitation of existing public housing would extend even to $860 million in fiscal year '80 funds that were originally designated for construction of new public housing units. In the future, money could only be spent to complete units already committed, to replace those demolished or sold, or when 90 percent of a public housing authority's units are in good condition.

Few housing authorities can meet that goal, critics of the measure contend, given the "inadequate" levels of rehabilitation funding provided in recent years. And, critics maintain, in many areas of the country new units are now desperately needed as well as the rehabilitation of older ones.

In New York City, where the situation is perhaps the bleakest, 200,000 families are on the waiting list for public housing, a wait that could take 30 years at current vacancy rates. During the Carter Administration, 20,000 new units were built each year; under Reagan 5,000 units have been constructed annually.

Another controversial provision allows public housing to be sold to residents at 75 percent below prevailing market value with a low interest loan from the housing authority. If the housing legislation is passed, property worth $14 billion could "immediately be transferred to public housing residents," says Rep. Jack Kemp (R-N.Y.), who introduced the provision.

Selling public housing to low-income residents is currently being tested in a three-year government experiment that started in fiscal year '80. As of last May only one house had been sold, and critics contend that few low-income families can afford home ownership, even with generous financial aid. The Reagan Administration, however, expects the purchase of an estimated 300 low-income housing units by the end of this year. There are 2,000 units across the country scheduled for sale by 17 public housing agencies.

In other action, the House approved a program under which HUD would designate 100 enterprise zones, one-third of which would be in rural area. It seems highly unlikely, though, that tax incentives considered necessary to make the enterprise zones successful will be included in the federal tax reform package. Therefore, the only money for such a program would have to come from state or local governments.

Three new demonstration programs would be established: an emergency shelter program for the homeless; a program where tenants would be allowed to manage the public housing projects they live in; and the Nehemiah housing opportunity grant program that would create a revolving loan fund for low-income families to purchase new or substantially rehabilitated houses.

In addition, the Federal Housing Administration mortgage insurance program would be reauthorized; families would allowed more flexibility to move within the same Standard Metropolitan Statistical Area without losing their Section 8 housing certificates; and public housing authorities would be able to phase in rent increases resulting from tenant income increases. Among the reauthorized programs would be the Section 302 rehabilitation loan program, the rental rehabilitation and housing development grants programs, Section 202 elderly and handicapped housing, 11-year-term Section 8 certificates, and five-year-term housing vouchers.

Meanwhile, the Senate Banking Committee passed housing legislation similar to the House bill, although it is uncertain at this writing if the full Senate will consider the legislation. If it does, Sen. William Armstrong (R.-Colo.) is expected to attempt to significantly strip down and/or delay action on the legislation through amendments and parliamentary maneuvers. What seems most likely to occur is a comprehensive housing and community development reauthorization bill is not passed by the full Senate is that both the House and Senate will agree on a short-term FHA extension. The rest of the housing and community development programs would most likely be continued through appropriations only.

If a housing bill is passed by Congress, President Reagan has threatened to veto any legislation that preserves housing programs at their current or at higher levels. And given the new budget deficit-reduction law, the trend is clearly for less federal involvement in providing low-income housing.

Such a shift has already started to occur. As economist Kermit Baker wrote in a report for the National Association of Home Builders: "The development of assisted housing has undergone substantial changes over the past four years. Gone are the days when the federal government, a private developer, and a private financial institution could execute a simple agreement to construct low- and moderate-income housing. These three actors are now taking the lead seat to community development corporations, public/private partnerships, state and local governments, and private foundations.

— NORA RICHTER GREE
Brite Vue Tempered Glass Entry Doors do double duty.

Architect Charles Bergstrom AIA had an idea for client Jonathan Edwards Keepsake Diamonds in Seattle. Glazing Contractor Parker Henry Glass Co. turned to Brite Vue for the creative fabrication necessary to convert the idea to reality. Result...a beautiful glass wall of hinged doors and fixed panels when closed. At opening, hinged doors pivot to connect with fixed panels in the rear thus forming five completely enclosed showcases. Security glass is 3/8” laminated to 3/8” with a .090 polyvinyl butyral interlayer. Aluminum fittings are anodized light bronze.

Having no vertical frame members, Brite Vue Tempered Glass Entry Doors and Sidelights provide nearly total vision areas. Architectural design flexibility comes from a selection of fittings...aluminum, extruded architectural bronze, brass clad or stainless steel clad aluminum. Aluminum can be anodized or electrocoat painted in any available color. Hinged or sliding doors are offered. Superbly tempered glass provides enduring strength and safety. Most fittings accept 3/8” and 1/2” glass in clear, gray or bronze and 3/4” glass in clear and bronze.

Put some imagination in your entrances!

Call or write today for complete information.
Initial Assessment of Tax Reform’s Effect on Profession

The Tax Reform Act passed by House and Senate conferees would have a major impact on the construction industry, due to the reduction or elimination of tax incentives that have encouraged building activity.

Incentives retained by House and Senate conferees that were supported by a broad coalition of groups representing the building industry, including AIA, are the tax credits for historic rehabilitation and for removal of architectural barriers to the handicapped and elderly. For historic rehabilitation, the existing three-tier tax credit (15, 20, and 25 percent of rehabilitation costs) would be replaced by a 20 percent credit for certified historic structures and a 10 percent credit for non-historic structures placed in service before 1936. For removal of architectural and transportation barriers, the tax reform bill would allow as deductible up to $35,000 of qualifying expenditures for removing such barriers.

The conferees’ agreement would eliminate several forms of tax credits for low-income rental housing including preferential depreciation, five-year amortization of rehabilitation expenditures, and special treatment of construction period interest and taxes. In their place it proposed a new measure that would provide for credits for new construction and rehabilitation of low-income housing and for certain costs of acquisition of existing housing to serve low-income persons. Owners would have to retain the property as low-income rental housing for a 15-year period to be eligible for the tax credits.

Of concern to AIA was the retention of the cost method of accounting for professions. House and Senate conferees agreed to retain it only for qualified personal service corporations and other entities (other than tax shelters) with an average annual gross receipts of $5 million or less, or farming and timber businesses.

Clearly, what effect these and other tax changes will have on the architecture profession can only be conjectural at this point (this issue went to press before either the House or the Senate acted on the conferees’ proposals). However, AIA president-elect Donald J. Hackl, FAIA, suggested in his first formal statement on the matter: “Under the two-fold assault of tax reform and a projected economic slowdown, investors will be increasingly hard-pressed to justify any undertaking that does not have clarity written into it. Will it be quality that determines not only whether or not a building is built, but how quickly it is rented and for how much a square foot. By ‘quality’ I have in mind such traits as energy efficiency, durability, flexibility, the skillful integration of a structure with the latest technologies, project management, among others. . . . The real winners of the proposed reform will be those who have built a solid reputation for quality and those developers who have a history of settling for nothing but the very best for their clients.”

Practice

BOCA Adopts New Standards For Inclusion in Model Code

The annual meeting of the Building Officials and Code Administrators International, held this summer in St. Louis, resulted in numerous changes to the BOCA model building code that could significantly affect architectural design. The committee considered over 300 changes proposed at a public hearing in January; changes will become effective in the 1987 edition of the BOCA code.

Key issues in the new code include:
- Redefinition of educational occupancies. All buildings used by more than five persons at one time for educational purposes are now defined as educational occupancies. The current code places buildings with under a 50-person occupancy load in the less stringent business occupancy classification.
- Permitted area for open space. Modifications to this section clarify that credit for open space on each side of a building must be either space on the same lot or dedicated to public use (such as a street). In addition, a builder applying for an allowable building area increase cannot take credit for open space available on an adjacent lot if that lot will be available for construction at a future date.
- Extensive revision of structural design loads for snow, wind, and earthquakes. The BOCA code will now parallel the American National Standards Institute’s provisions for determination of these design loads (ANSI Standard A58.1-1982).
- Consolidation of smoke control requirements. All smoke control requirements will appear in Article 17. Technical changes to this section of the code will occur in future editions, following future study. Also appearing in the 1987 edition will be a new section on hazardous production materials use facilities that relate specifically to the semiconductor manufacturing industry, and another section on correction and detention facilities, which adopts many of the provisions of the National Fire Protection Association’s Life Safety Code.

Architects interested in keeping up with the latest model code revisions can receive “Code Call,” a free monthly newsletter, published by Rolf Jensen & Associates, Inc. Call Brenda Pedersen, (312) 948-0700 for details. — M. Stephanie Stubbs

Indoor Air Quality Papers Sought

The American Society of Heating, Refrigerating and Airconditioning Engineers has issued a call for papers for “IAQ 87: Practical Control of Indoor Air Problems,” a conference to be held May 20-22, 1987 in Washington, D.C. ASHRAE held the first interdisciplinary conference to improve understanding of indoor air quality problems this April.

According to ASHRAE, IAQ 87 will present demonstrated solutions to indoor air quality problems, including case histories and papers describing control applications. The majority of accepted papers will cover nonresidential applications, but ASHRAE also will accept a limited number of residential studies.

Abstracts of 300 words or less and requests for registration information may be sent to: J. Richard Wright, Director of Technology, ASHRAE, 1791 Tullie Circle N.E., Atlanta, Ga. 30329. Deadline for receipt of abstracts is Dec. 1. Final manuscripts are due April 15, 1987, for publication in the conference proceedings.

New Standards for Siding

The American Architectural Manufacturers Association recently released its new standard specifications for aluminum siding, soffit, and fascia, completed after five years of research.

The new performance standard combines several previously separate prescriptive specifications. It permits performance-based product design by eliminating the need to meet minimum metal thickness criteria and allows alternative fastening systems that meet the performance criteria. It also differs significantly from the old standards in terms of windload resistance requirements.

The new standard, AAMA 1402-86, is available for $12 prepaid (postage and handling included), from AAMA, 2700 River Road, Suite #118, Des Plaines, Ill. 60018.
Natural beauty, durability and stability make it the natural choice for creative designs that endure. Send for Redwood Architectural Guide.
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"Hands-Off," the "Smart" Water Coolers

Models HWCF81HO, HWCF8-21HO, HWDFS81HO, HWDFS8-21HO and HWCT81HO

These sleek, wall-mounted units each feature a receptor, backplate and grille constructed of heavy-gauge stainless steel with #4 Satin finish. They're also available in Stainless Steel with a Sienna Bronze finish.

Model HCBF71HO

This handsome wall-mounted model is manufactured of heavy-gauge steel and finished in Kenyan Beige Enamel. Optional finishes include: Alabaster Enamel; Expresso Enamel; Metallic Bronze Enamel; Cork Vinyl; Stainless Steel; and Stainless Steel with Autumn Bronze finish.

Circle 19 on information card

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The Arts

Basque Sculptor’s Public Art

Although Eduardo Chillida received ample recognition for his public sculpture in the Basque country in the ’70s when it was created, little has been heard of him since. The silence is being broken this month with a many-pronged attempt to reassess the sculptor’s significance. On Oct. 24, the first major U.S. exhibit of Chillida’s work since a 1980 retrospective at the Guggenheim will open at the Tasende Gallery in La Jolla, Calif. In conjunction with it, the La Jolla Museum of Contemporary Art (with support from publisher Harry N. Abrams) will host a Chillida symposium on Oct. 23, which will be preceded by the showing of a new film on his work by Laurence Boutlin. Also to be promoted at La Jolla is a new book on Chillida by Peter Selz.

Chillida created “comb of the wind” (above, right and left) in collaboration with architect Pena Ganchegui for his home town of San Sebastian. It consists of three steel forms resembling giant claws or pliers anchored to the rocks and grasping the sky, plus a promenade. Before construction of the work, this area of San Sebastian was inaccessible; it is now used as an esplanade for games and performances.

Also designed in collaboration with architect Ganchegui is the 8,000-square-meter plaza (left) for Vitoria-Gasteiz, the capital of the Basque province of Araba. In the Baroque tradition, it is replete with “involutions, mazes, tangles, and surprise,” in the words of a Basque government publication.—Andrea Oppenheimer Dean
What Do These Prestigious Buildings Have In Common?

Lincoln Square of Fordham University
New York, NY
Architect: The Perkins & Will Partnership

Carpenter Center For The Visual Arts
Harvard University
Cambridge, Massachusetts
Architect: Le Corbusier

United Airlines Headquarters
Libertyville, Illinois

To find out about other prestigious buildings that have been sealed for more than 15 years with Morton Thiokol LP® polysulfide base sealant, send for your copy of, "It All Started Here".

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Top: Embassy Plaza, a development of Walden Investment Corporation, Schaumburg, IL
Architect: Shaw and Associates, Chicago, IL
Glazier: MTH, Chicago, IL

Bottom: Sports Specialties-Locker Room, B.C. Enterprises, Schaumburg, IL
Architect: Werner Johnson Architects, Palatine, IL
Glazier: E.J. Hayes Glass and Mirror Co., Skokie, IL
One of the earliest and best decisions about the merger of Architecture and Architectural Technology, which is effective with this issue, was that the merger should mean the thoroughgoing integration of the two magazines and their concerns into a single coherent whole. One magazine would not swallow the other, nor would it carry the other like an insert. Rather the best of both would be blended.

Thus, Architecture's central task remains presentation and analysis of built works at scales ranging from urban design to interiors. Those on the following pages are entirely residential, and they show some of the characteristics that will continue to mark our coverage of buildings.

They are varied in size, style, and location (several being outside of the U.S.). Many are by small and/or young firms (several of the firms being published here for the first time). Most are new, but there is an instructive evaluation of a famous building of a generation ago and an examination of a centuries-old way of building vernacular houses in Japan.

These things represent a continuation of Architecture's constantly evolving approach to the profession and its works. But there are things resulting from the merger that are entirely new.

Largest of these is the Technology and Practice portion of the magazine beginning on page 85, produced by Mitchell Rouda and the former Architectural Technology staff. This month it too is residential, its major element being an unusually comprehensive and penetrating treatment of housing delivery systems here and abroad.

The concerns of Architectural Technology are reflected in the building content as well. Thus, the building chosen for evaluation was the very symbol of industrialized housing in the '60s and '70s; one of the new houses is made of prefabricated boat parts, and the vernacular house type is analyzed from a structural viewpoint.

As time goes on we are certain that the merger will cause us to pay more and more attention to how things are built, in terms of both process and technique, along with what is built and how well. D.C.
Until recently, the houses found in North Tampa around Keystone Lake were simple, unassuming, weekend cottages. But as Tampa grew north, the lake region became a suburb, defunct orange groves sprouted split-level ranches, and property values escalated. Soon large, expensive houses were built right next to tiny cottages, like Gullivers among the Lilliputians.

This house on the lake, designed by the Jan Abell Kenneth Garcia Partnership of Tampa, is big but doesn't appear so. Where they might have used a large version of a cracker-box cottage, Abell and Garcia have wisely related the house to the context in exterior scale, rather than detail or decoration, creating an elegant assembly of contextually polite parts.

The house started as an addition to an undistinguished existing structure on the property, but as the program grew it became evident that it would be best to start from scratch. The old was demolished and the program expanded to 5,000 square feet for a family of four—two physicians and their young children. Both doctors find their careers demanding and wanted the house to be a sanctuary for pursuing different recreational interests: he, collecting model train sets; she, photography and painting.

On approach to the house from the west, the entry court is dominated by two gabled "cottages," representing, explains the architect, the two distinct, adult individuals who live here all though, paradoxically, the gabled elements are identical. These elements—a garage that helps define the court, an angled pool house, and a smaller garage to the south—are sutured together by a dark gray spine that extends north-south. The east side of the house, which faces the lake, is all.

'An Elegant Assembly of Contextually Polite Parts'

House in North Tampa, Fla.; the Jan Abell Kenneth Garcia Partnership, Architect. By Michael J. Crobie
Sculptural elements that are gradients of gray: the lightest shades advancing, the darkest receding. This elevation makes clear how Spartan palette reinforces the idea of the house as a gathering of smaller buildings by subduing their connective tissue.

As a protective sanctuary, the house is well sited. The building stretches out like a wall, separating the visitor from the lake. The entry side is not entirely hospitable. It’s rather flat and tight, bare of windows to rebuff the west sun. One enters through an open-air vestibule into a gallery and is, in plan, at the heart of the house, but not quite yet in. We are standing in a slot of space that runs north-south and is demarcated by the darkest gray outside. This slot is the real threshold because it splits the house (again, in plan) between its public and private realms.

On the west side are storage areas, a guest room, the kitchen, utility spaces. To the east is a study, dining room, breakfast room, greenhouse, and living room. The last is the only two-story space in the house and perhaps its most exciting. It and the spaces that adjoin open their walls to the lake and the view. The living room bows out toward the lake, stopped by a freestanding chimney. Low spaces in the living room are found under two volumes that intrude from the second floor and seem to hang from the ceiling. These are the interior remnants of the two gabled “cottages,” and in the living room their separation, narrowed by facing balconies, seems near resolve as they pucker to kiss.
Above, entry side in the afternoon sun with the house appearing as an enclave of small buildings; below, round anteroom connecting pool to the house, with lake views; across page, sun rakes the floor in a corner of living room; right, two-story space in living room with sitting alcoves above.
Down the spine to the north one finds the pool and its anteroom, a round, domed porch with a tiny oculus—a miniature Pantheon where one can relax with an iced tea and watch a circle of sunlight make its slow journey across the tile floor. The pool house is neither in nor out—basilica-like in proportion with a ceiling vault and apse of metal screening. Together, the pool house and its anteroom might be mistaken as the vestige of some ancient ruin, tilted to align with a particular constellation. But the skewed fragment serves no astrological agenda; angling it was the only way to fit it on the property.

The house is bisected in section as well, the second floor devoted entirely to private, family use. To the north are the children's rooms, which had to be exactly the same size. On the east side is a family room and sitting room (with their balconies) and a bedroom. And to the west, each residing in a gabled "cottage," are a train-collecting room and a studio with darkroom. Across a shared porch that overlooks the entry, these two realms for private pursuits hold hands.
The Riviera Villas in the Kallarney section of Johannesburg, South Africa, is a complex project that maintains a sense of innocence. A husband and wife architect team, Ian and Lynn Bader, created an enclave of 11 town houses that provides both public scale and a sense of privacy. An assemblage of serious and ironic elements, the project manages to make an eloquent architectural statement without screaming for attention.

Johannesburg was established 100 years ago as a mining town on the country's gold reef. The earliest town planning surveys had divided the city into two parts separated by a strip of land that the Baders call the “fault line.” Land on the two sides of the irregular strip followed different plans and patterns of development. Running north-south through the city, the “fault” was slow to be developed and came to be known as “land which has fallen out.”

The Riviera Villas' 6,146-square-meter, slightly wedge-shaped site was part of this “fault” and over the years had been used as an informal pathway linking a residential neighborhood with a synagogue and Hebrew school.

The Baders made this pathway the project's central circulation spine that is set on the skewed orientation of the “fault line.” Just as the “fault” divides the city yet provides a continuity, the spine mediates between two distinct architectural realms.

On one side, the units are elevated above the low wall that serves as the horizon line, while on the other side the units are set directly on the ground. This relationship creates, in the words of the architects, “a kind of schizophrenia.”

The Baders, natives of South Africa who have lived in New York City for the last six years, drew from the vernacular buildings of the N'debele and traditional Cape Dutch architecture. They interpreted the anthropomorphic facades of the simple mud brick houses of the N'debele, which are painted as part of the ritual of habitation, as masks through which one enters. The colors (blues, greens, and earth tones) and the detailing are intended to connect the dwellings with the landscape. For the Riviera Villas, the architects designed a complex series of facades that are different on each elevation and used colors drawn from a similar palette to establish a similar relationship between the earth and sky.

The gable walls and white plaster of the traditional Cape Dutch buildings are repeatedly recalled in the Riviera Villas and similarly reinforce the project's pointed profile against the sky.

The main entrance to Riviera Villas is defined by a cylindrical gatehouse and a cantilevered hinged gate opening onto the skewed central spine. Running along the north-south axis, the spine terminates at a small pavilion that leads to a synagogue.

The 11 housing units, each approximately 220 square meters, are based on two abstracted building types, the basilica and the villa. Along the east side of the main street three basilica-type town houses are set on a stepped ground plane that encircles the central skylit volume. The bedroom ceilings are open in plan but defined by floor surfacing patterns—the ceiling banding in the paving defining the entrances and circulation paths.

On the second floor, the three bedrooms open onto a balcony that encircles the central skylit volume. The bedroom ceilings are painted blue and have recessed pyramidal skylights.

In addition to the variety of forms, the Baders used diverse building materials as well as subtle color differences in the plaster facades of the two house types. The smooth plaster surfaces sharply contrast with the black slate and mirror glass. Along the opposite sides of the street the coloring of the brick varies. The striated walls make reference to geological formations and the gold vein that runs under the site, while the exterior light fixtures projecting from the wall are variations of mining lights.

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opposite page, top, central roadway looking toward the hinged gate; middle, painted facade of traditional N'debele dwelling; bottom, gable wall of Cape Dutch architecture, near left, airbrush drawing of the gate. Above right, basilica unit’s east elevation, which faces the roadway. Right, north elevation of a villa unit.
Top, main living space of the villa-type house is defined by floor treatment and recessed squares in the ceiling with coff light fixtures. Middle, gable ceiling of the villa’s dining room is recalled in the large window that faces the landscaped entrance courtyard. Bottom, second story bedrooms open onto a central double-height, skylit atrium, which serves as the villas’ main cross circulation axis. Right, detail view of large central entrance of the basilica form town house.
James Shay, AIA, says he appropriated the blocky massing, vertical wood siding, minimal use of trim, and high, four-pane windows from a 1951 town house on Pacific Heights by Joseph Esherick, FAIA. The barrel vault roof and crisp detailing reflect Shay's regard for Ando, Isozaki, and Maki. But this house that Shay designed for himself is characterized more than any Esherick or recent Japanese building by its close relationship to its San Francisco location: a narrow site sloping down 30 degrees from a dead-end street, Edgewood Avenue, with a panorama over a lush canyon of downtown skyscrapers and Berkeley.

Edgewood Avenue runs a single block north-south just south of Haight-Ashbury. It is an old, tree-lined street not unlike residential Berkeley; next door is a dark-shingled, 1907 beauty by Julia Morgan. Shay scaled and articulated his house to harmonize.

Excessive ground water compounded the problem of a steep slope. With soils engineer Don Hillebrandt, Shay designed a drain system to stabilize eroding soil; with structural engineer Carl Chan of Shapiro, Okino & Horn he devised a foundation of 15 piers, drilled 30 feet deep, with reinforced concrete grade beams. A steel frame with a 20-foot-wide span (plus five feet on one side for a stair tower) supports four levels, the top two running 47 feet front to back, the lower two progressively smaller following the descent of the hill. The backside rises 49 feet to the tip of the vault. The resulting shape is compact; materials and fenestration make it seem taut.

Dominant on the rear elevation is a wide, centered bay—a glassy, two-story box projecting at the second and third levels. The box encases a third-floor balcony and supports a fourth-floor deck that projects two feet over the outside edge. Underneath, another deck cantilevers on a double-V shaped steel frame at the first level.

A trellis-covered slit down a side elevation contains a pipe chase. Because the pipes are clustered the roof is interrupted only by a single notch at one edge for the plumbing vent. Pre
weathered, eight-inch steel strips over three layers of plywood form the vault, and the tympanums, front and back, are covered in vertical, one-foot, eight-inch strips of the same material. The steel wraps each of the four corners of the top floor and frames a big window that projects above the entrance.

Top, the living room from the rear deck, showing sofa designed by the architect, dining area at right, grille that rises to the vault, and clerestories along the south wall above the stairs. Center, the stair hall from the entry with views up to the fourth floor, through the bedroom on the third, and down into the second-floor studio. Right, the front of the stair hall on the third level. Niche was designed to accommodate sculpture, one of two pieces by Richard Bauer, a friend of the architect. Opposite page, the fourth floor from the kitchen, directly over the entry foyer at southwest corner. Railings are oak, as was the front entry door.
riously the square window is slightly skewed, as if it is looking
passersby down the street (the house is next to last). The
other three front openings are recessed to varying degrees.
The most deeply recessed opening is for the front door. The
use of compression it creates continues into the foyer, another
light space. You can't see into the living spaces until you are
the corner of the house, from which it seems to open like a
mouth. You see from right to left: stairs up to the fourth floor, a
second flight that widens as it descends to the second, and a
hallway angled toward the opposite corner of the third floor.
Because it is a diagonal, the hall increases the apparent depth
of the house, and an interior casement window further opens
the house, front to back. The window also brings afternoon sun
from the stair-hall, which acts as a light collector on the south
elevation, illuminating the third-floor bedroom, the second-floor
radio, and fourth-story living spaces.

The vaulted ceiling, a deck, a skewed bridge from kitchen
to living/dining room, and south-facing clerestories all contrib-
ute to making the top floor seem big and bright. Walls and ceil-
ings are painted a yellow-white—the color of drywall mud, which
Shay discovered he liked during construction—and floors and
handrails are oak, the latter elegantly supported on quarter-inch
steel rods. Varied wall planes, some pulled forward, some
recessed, obviate applied "decoration." Except for two com-
misioned sculpted torsos, the walls are unadorned, although
Shay says he plans to apply the wood siding used on the exter-
ior in some of the recesses.

Like many houses that architects design for themselves, this
one embodies "a few formal ideas that I wanted to try out," as
Shay puts it. Nevertheless, the house was "improvised all the
way through," he insists. Perhaps that is one source of its livel-
ness.
Evaluation: Habitat
A Generation Later

Moshe Safdie's intended housing prototype is a one-off luxury apartment building.
By Andrea Oppenheimer Dean

“It manages to convince as a little scrap of tomorrow,” wrote Australian critic Robin Boyd when Habitat was completed for Expo 67 in Montreal. And, Boyd continued, it was not “a lonely dream. The Habitat idea has convinced the background of the architectural conscience all this century. Its basis is that modern architecture must become more involved in making an appropriate total environment for modern life.”

Habitat was the built expression of Moshe Safdie’s final thesis project at McGill University. When he started its design for Expo in 1964, Safdie was 26, three years out of school, and had designed not even a house. His intention for Habitat was to provide a prototype for middle-income, medium density, prefabricated urban housing that would have the privacy, identity, and open space of a single-family suburban house. Reminiscing recently about his first project, Safdie said, “Today, I probably wouldn’t dare do it at all. I mean, it was technologically way out and unprecedented. With what I know today of the risks, I think I would have been terrified.” Indeed, the controversy that accompanied Habitat reportedly resulted in Safdie being excluded for 10 years from commissions from the Quebec provincial government or other work in Montreal.

In Safdie’s version of it, Utopia was based on a cluster concept comprised of 158 housing units from 600 to 1,700 square feet rising to 12 stories in places. It is made up of concrete boxes (17½x38½x10 feet) prefabricated on site and stacked on top of one another so that each unit has a garden on part of the roof of the unit beneath it. Architectural Forum proclaimed the scheme “spectacular, wonderful,” its implications for future urban living “enormously impressive and largely convincing.”

Located on Cité du Havre, a manmade peninsula in the St. Lawrence River, Habitat is approached from an expressway built in ’67 for Expo. Across a channel is the old harbor of Montreal. On this splendid site, standing quite alone, Habitat comes into focus as a tumble of Lego-like boxes forming an irregular pyramid with great hollows left by absent boxes. Once on the ground, you follow a service road through a grade-level spine over which hover huge girders supporting walkways at the fifth and ninth levels. Even on a sparkling sunny day they shade the narrow drive.

This architecture of concrete—concrete platforms, concrete stairwells, elevator cores, boxes, walkways, and so on—gives the impression of what in the ‘60s was appreciated as “virile architecture.” Habitat’s design is relentlessly square-jawed, rough-hewn muscular; there are no soft or graceful touches. The concrete is scarred and discolored in many places. Exterior platforms are extensive, in shadow much of the time, and vacant, except for a couple of planters and benches (two of each, to be precise). If it were an urban, middle- or lower-income housing complex, Habitat’s vast expanses of concrete—as austere as its shape are extravagant—would invite graffiti and muggers, and its walkways and numerous platforms would be littered with bits of junk and trash. Instead you see maintenance men sweeping, removing trash bags, and generally fixing things up all over the outside of the building. As a janitor remarked, “The building was not made for easy maintenance.”

Habitat is, and for years has been, an exclusive, high-priced apartment building. Its tenants purchased the building last winter from the Canadian government for the paltry sum of $10 million, or $50 a square foot. (The government was eager to unload the building since rents were fixed and maintenance took about $1.5 million a year.) There has long been a waiting list, and turnover in the building has been less than 5 percent. Its popularity is indisputable.

One begins to feel the appeal of the building while climbing...
Looking down on Habitat's complex, varied, and ever-changing patios and its flower-filled patios leading to apartment entrances. The fresh breezes and river views are exhilarating, yet there's a sense of serenity. The only sounds come from wind and water, and though you're not actually climbing at all, it feels as though you're scaling a rock face or steep riverside hill. The unfriendly concrete becomes a background you hardly notice. The scale and architectural elements is more comfortable than below where associations are to megastructures. You realize there's nothing quite like Habitat, nor to compare it to.

From an environmental point of view Safdie was most successful at Habitat, as attested by kudos from residents. Among actions from people who live there were the following: “It's like a huge park.” “It's like a cottage rather than a high rise.” “Often you feel the concrete is terrible, but once you've lived here you don't notice it and don't want to leave. It's unique.” “It's like living in the country but you're five minutes away from town, without the hassles of the city or the nuisance of suburban living—the commute, the lawn mowing, maintenance, and snow shoveling.” (Platforms and walkways are heated in winter.)

Residents' evaluation of the design can be summed up by the fact that they have recalled Safdie to oversee rehabbing of the building—refurbishing lobbies that look raw and frayed, weatherizing, making repairs inside and out, enclosing some patios to create solariums, and breaking through concrete boxes to enlarge some units. Since such expansion may involve structural problems, the residents have also recalled August Kommendant, who was structural engineer for Habitat. Although rooms at Habitat are relatively small and interior plans don't reflect the innovations of the exterior, each unit is oriented and glazed for splendid, ample views, and each has at least one terrace.

Despite enthusiasm for Habitat, *Architectural Forum* in 1967 also said that it was “in some ways, a failure.” In fact, people who do not live in it are critical of the building as a piece of urban design, for its high initial cost, and for being a technological failure.

Habitat is faulted, first of all, for being anti-urban, inward-looking, making no reference to anything outside itself. As Phyllis Lambert, director of the Canadian Center for Architecture, observes, “It has nothing to do with cities; it's a suburban sort of thing.” Toronto architect Jack Diamond further points out that Habitat is completely isolated out in Cité du Havre where there are neither schools nor shops, and that it countermands most of the lessons about urban life taught by Jane Jacobs, Oscar Newman, and others.

Safdie is in agreement, up to a point. “In the final analysis, a huge park.” “It's like a cottage rather than a high rise.” “Often you feel the concrete is terrible, but once you've lived here you don't notice it and don't want to leave. It's unique.” “It's like living in the country but you're five minutes away from town, without the hassles of the city or the nuisance of suburban living—the commute, the lawn mowing, maintenance, and snow shoveling.” (Platforms and walkways are heated in winter.)

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Section shows housing modules, pedestrian 'streets' protected by arching plexiglass canopies, and linear mechanical spaces. Plans at right are a sampling of many. Below, a private patio off the second level of a lower apartment has views and sounds of river rapids. Bottom, a view down into cove-like space from an upper-level 'street.' Opposite, overlooking the river from the same high vantage point.

He says, "this was not an urban site. If I had had an urban site, Habitat would have become an urban form. There is a ship-like quality about it because it's of the harbor and not of the city." He also agrees that the site is too isolated, but points out that when the city recently proposed developing adjacent properties for housing—which would create densities high enough to justify building a school, shops, and other amenities—the tenants lobbied against it. They like their splendid isolation, Safdie explains.

Criticism to the contrary notwithstanding, Habitat's spaces do seem to be "defensible," in Oscar Newman's meaning. As a resident explains, she can see the outdoor decks from her windows and recognize strangers. (Habitat also employs a security force.) Frank Motter, president of the tenants' association, insists Habitat is a place for children. He says about 10 percent of residents, whose average age he gauges at about 40, have young children. Safdie's own boys were raised at Habitat where he lived for 12 years. Conditions may not be optimal, but outdoor patios, says the architect, serve as gardens for children, there's plenty of safe platform space, and at least two nearby schools provide bus service. Money helps, of course. Were Habitat downtown and occupied by low income—even middle-income—families who could not afford costly maintenance, a security force, and other help, it could be a dangerous place.

Another criticism of Habitat is that it is a "radiator building," as Toronto architect Barton Myers, FAIA, puts it. In Canada's fiercely cold climate even Safdie agrees that exposing up to five surfaces of each concrete box is not practical. He says he would design the units more compactly today. But neither he nor Habitat residents agree with the criticism that outdoor living would be uncomfortable.
Work in the Arctic as well as Canada, says Safdie, he learned that northern people appreciate the outdoors far more than people living in temperate climates. In fact, a survey of Habitat residents asking if they wanted walkways and decks enclosed revealed that 80 percent did not.

Habitat's shapes, though, are more reminiscent of Safdie's native Haifa than of any northern architecture, and the Habitat concept has had no direct effect on housing design. The closest offspring are unbuilt projects by Safdie in Puerto Rico and Singapore, plus two projects, one for Singapore, another for Australia, that "await a turn in the market before starting," says Safdie.

Interestingly, Safdie sees a close relationship between Habitat and his building to be constructed at Columbus Circle in New York City. He wrote, "The building culminated in a pyramidal top, 12 stories high, accompanying terraced apartments. I selected that that top was equal in height to Habitat. Here was new scale, perhaps 'The New City.' The constraints were great and the density was enormous, but the ideas that began to evolve Habitat were, in my own mind, clearly alive and well."

One reason Habitat wasn't duplicated was its high cost—$13.5 million excluding land, but including almost a million for a special crane to hoist the 90-ton precast components into place. Inflation in construction costs over the last 19 years has exceeded 10 percent. The cost could, of course, be justified as research and development money had the prototype been subsequently mass produced. Apart from cost, the main reason it wasn't that prefabrication, at least in the form foreseen in the brave new world of the '60s, hasn't proven practical.

The very complexity that makes Habitat's design so intriguing also made it impractical as a prototype. Among other things, it required that lower units support upper ones, though all the modules appear to do the same work. If he had it to do again, Safdie says, he would design Habitat more simply, in a more open-ended way, leaving tenants more options. He says such a building would probably have smaller components, which would be off-the-shelf parts, and he would organize things around mechanical cores.

"In the '60s," says Safdie, "we believed that industrialization could greatly reduce the cost of housing, improve its quality, and speed delivery. The logic seemed clear and drew on the Buckminster Fuller tradition that improving the means of production would reduce costs and make housing available to all segments of society." Unforeseen was that the cost of urban land and interest rates would soar in the '70s and early '80s to the point where construction costs became a far smaller percentage of overall building costs than in the '60s, eliminating an incentive to prefabricate. Also unforeseen was that the 20 years following Habitat would be a time of retrenchment and regression in urban housing, and that industrialization would have a far greater effect on the booming office market.

"The radical rethinking of tall buildings, which I think will come," says Safdie, "has not taken place yet. As an environmental idea Habitat hasn't happened yet."

In the end, says the architect, the technology of Habitat was obsolete before the building was completed. And ultimately, he says, "the technology of Habitat is not an issue; it's not worth talking about, and I'm totally bored with people writing about it. What is worth talking about is space and amenities and hierarchy and scale and variety and repetition within variety, and fresh air and privacy, and so on and so forth."

From the point of view of these "so ons and so forths" of design, Habitat is largely a success.
Sleek Structure
Made of Boat Masts

House near Woodgreen, England; Richard Horden, Architect. By Annette LeCuyer

In Britain—with its vast stock of existing housing—custom-building a house is rare, and self-built houses almost unheard of. Architect Richard Horden has defied the odds with a house designed and built jointly with his client near Woodgreen in the New Forest on England’s south coast. It is sleek and stylish, the product of a simple yet elegant structural concept complemented by sophisticated fixing and jointing details.

Horden describes the house not in terms of style but in terms of materials. In all his work, a central preoccupation is the search for new building components and an original use of familiar ones. The Woodgreen house skillfully explores the gamut—from products from the aerospace industry to yachting ironmongery to common household trellis.

The house is an idealized white box set on the crest of a wooded hill with panoramic views of the Devon countryside. The 5x5-bay structure is based on a 3.6-meter-square, 2.4-meter-high plan module. After construction of the foundations and floor slab by a general contractor, Horden and his client carried out all of the work themselves.

The structural frame is made of oval stove-enameled, lightweight aluminum yacht masts that are maintenance-free and are perforated without risk of corrosion to carry electrical services internally and various building accessories externally. The columns and beams—or spars—are joined by a stainless steel cross that slots into the hollow centers of the members and is fixed with stainless steel bolts. Tension cables provide lateral bracing in the roof plane and vertically in the corner bays to complete the wind frame. Erection of the 25-bay frame on site by five members of the architect’s and client’s families took just over five hours.

Twelve of the 20 bays are enclosed to make the house and garage, while the structural frame remains exposed to define an entrance courtyard to the east and garden terraces to the west. The living spaces occupy the central bays, with bedrooms and a garage to the north and a granny flat to the south.

Because yacht masts are efficient in compression but are not designed to take bending stresses, the columns do more structural work than the spars. The structural frame takes wind loads and distributes services, but all loads from the roof and wall cladding panels must be carried directly to the column heads by secondary structural members. Horden is now developing a series of alternatives for prefabricated floor and roof panels—including battened canopies and options for neoprene gasketed panels in plywood, aluminium, and rigid foam. However, the Woodgreen house takes a low-key approach, using assemblages of familiar building materials. The roof panels, made up of corrugated metal decking and insulation, are framed by steel angles that carry the load to the corners of each module. The outer roof membrane is solar-shield, aluminium-faced bituthene sheeting; spacecraft are cited as the source of the crinkled aluminum look. In the central modules of the house, yacht deck hatches provide water-tight, operable skylights.

Wall panels on the north and south elevations are made of gypsum board and insulation with aluminum cladding. The east and west elevations are fully glazed with sliding patio doors in each module. Internally, the ceiling is finished with white louvers, the blades of which can easily be removed to gain access to services in the roof. Under the deck hatches, alternate louver blades are omitted to allow access to the hatches and for ventilation. Internal partitions are framed panels of guspyum board, glass, or adjustable white translucent spinnaker cloth blinds sewn by a kite maker.

Adjustable louvers are also used externally, mounted in both the horizontal and vertical planes in several of the structural bays defining the garden terraces. Again, to avoid inducing bending stresses in the spars, the louver panels used for roof shading are fixed directly to the diagonal tension cables rather than...
The structure extends, in rudimentary form, one bay beyond the window wall. White trellis defines garden areas; roll-up sail canopies provide shading. Above, entrance elevation provides access through the house to the garden.

Canopies in two shades of bright blue, also fixed to the diagonal bracing. The sails may be opened or furled to suit the weather conditions and/or the occupant's mood. On the west terrace, closure is made by panels of white painted wooden trellis lashed to the spars.

In addition to carrying the building components themselves, the mast columns carry television dishes, a small wind-powered generator, and a solar panel and flagpole, which look very much at home on the masts of the yacht house.

While the exterior is decidedly understated, the quality of space and light produced by the interplay of the slatted, translucent, and transparent planes make this simple house very special indeed. The many possible combinations of panels allow for rich variety unified by the discipline of the module. This, together with the interaction of interior and exterior spaces, recalls the tatami and shoji discipline of traditional Japanese domestic architecture.

In Horden's eyes, the Woodgreen house is not a one-off product but a prototype he is developing. The system is being marketed by Britain's Design Council and will be used at an exhibition in Dallas this autumn. Their light weight allows the structural frame and infill panels to be shipped anywhere, offering a posh British alternative to the Lincoln Log.
Construction sequence above: aluminum tubular columns—3 meters o.c.—rest on a laid slab with pad foundations and support tubular aluminum spars. Steel cables brace the unenclosed front and rear bays. Closed bays incorporate solid, glazed, louvered, and trellised panels. Loads transfer to the column heads so the spars are not subjected to bending. Details show column head connections in plan and section. The headpiece is a stainless steel cross which extends down the centers of each
Space and Structure In a Primordial Folkhouse

The strong and sheltering minka dwellings of Japan. By Guntis Plēsums

The house is an enormous roof, and the roof is akin to a mountain. The broad eaves reach toward the earth. The earth becomes the house; the walls are made of clay, the very stuff of earth. The earthiness of the ever-present earthiness of the ever-present

Cracked in myriad ways and weatherworn, the mud is held together by finely chopped straw. Grass and moss grow on the reed roof. Grass is seeded on the ridge by the farmer to keep the roof in place. Birds and wind complete his job. Abandoned, the house returns to the earth, and a mound is added to the mountains.

minka (no English word quite represents this Japanese folkhouse type) have returned to the earth. Heavy timbers and a bit of protective care have preserved houses that retain elements of ancient pit dwellings and the flavor of ages past. To much of the world minka may well represent the archetypal shelter, the instinctively accepted prototype of house stored in the subconscious.

There is much in minka that defies the eyes, that is sensed through the bones and the nose. The earthiness of the ever-present structure gives comfort to our need for safety and endurance. No force could possibly shake such a building down—or so one feels. The wood retains the smoke from centuries past, 17th through the 20th, even the 16th. The smoke has given a patina to the heavy timber structure and the laced bamboo framing, helping to preserve the wood from insects.

The earthen floor, the dark wood boards, the open hearth, the heavy structure, and semidarkness immerse the traveler in another age. A gentle rain descends as a welcome curtain between this world and the intruding outside reality.

Minka is characterized by its anonymous initial point of origin, a unique structural system, transformations over time, and local differences in plan and style. Unlike Buddhist temples and the mansions of the nobility, minka employ a native Japanese structural system and planning process that were not influenced by Chinese or other continental architecture. Due to isolation and the use of local craftsmen and materials, there is great variation in style and construction. Response to climatic forces and topography, use of locally available materials and resources, spatial arrangement suited for regionally prevailing means of livelihood, and social patterns are particularly significant factors in this differentiation. Symbols of social status, prescriptive rules, and ways of circumventing them, and the fashions at the time also contribute to the remarkable variety and beauty of minka.

Japanese structural and construction systems are hierarchical in character, and this is particularly clear in minka. Jikugumi, the primary structural system or framework, carries the structural loads and defines the space. A secondary structural system facilitates the building of function-defining infill elements. This subordinate structure is an intermediary between the primary structure and all other construction. All of the remaining architectural elements are called zōsaku, and the walls, floors, ceilings, and partitions are literally equated with furnishings.

The position of posts is most important to the minka system.
The posts have particular significance due to a unique differentiation of their role. There are two types of posts: primary and secondary. Primary posts and beams comprise the general framework and transmit the structural forces. This is the basic structure that supports the enormous roof. The secondary posts are placed according to functional requirements. The secondary posts may assist in load transmission, but the safety of the structure is not affected by their removal. Because of the extreme structural consequences, operations rarely called for relocating primary posts. There are some primary posts that could be removed without resulting in an immediate collapse, but the remedy is too troublesome, and the whole process is just not worth the effort. Some of the secondary structure is built at the outset, and it may alter or substitute for some part of the primary structure. Generally, however, the primary posts are part of the structural framework, and the secondary posts brace the walls and frame the openings. Walls are placed only above the lintels to provide lateral stability against earthquakes. There are no lower walls or partitions in this framework, and the partitions may not necessarily follow the pattern established by the columns. With the addition of the secondary structure, the building skeleton becomes more complex. Once the house is completed, it is often impossible to identify many of the secondary columns from the primary. Contrary to common framing practices in the West, the columns, beams, and lintels serve as structural and finishing members. This accounts for the great care that is taken in finishing and protecting the wood during construction. Posts, smooth as pin or weatherworn, invite caress and contribute to communication with the structure. Trim, the surface covering over a hidden material, separates construction into rough and finished, permitting or perhaps inviting expedient practices. One could argue at length over the merits of each approach. Trim, however, tends to isolate us from the construction of a dwelling. Consequently, the hidden structure gets eliminated from our consciousness. No longer does it contribute to the sense of wellbeing and the feeling of security that comes with the presence of structure.

It does not follow that structure is always exposed in Japanese architecture. Structure separated by interior surfaces, such as ceilings and floors, is left in its rough-cut state as in the West. Columns are exposed on both sides of the wall except in storehouses where the outside is protected with clay. The secondary posts, the clay walls, lintels, and minor structural elements contribute to the stiffening of the structure and the overall stability. But there is an important difference that has contributed to the longevity of these buildings. The clay walls are infill just like all the other secondary structural elements. The owner can easily knock out the wall and alter the floor plan without affecting the safety of the structure. Small wonder that the posts take on great significance.

The structure of Japanese folkhouses represents an attitude characteristic of Japanese architecture and gardens, as well as all other arts. This attitude is the Zen influence that permeates all aspects of Japanese culture. We are well aware of the fact that structure is always exposed in Japanese architecture. Structure separated by interior surfaces, such as ceilings and floors, is left in its rough-cut state as in the West. Columns are exposed on both sides of the wall except in storehouses where the outside is protected with clay. The secondary posts, the clay walls, lintels, and minor structural elements contribute to the stiffening of the structure and the overall stability. But there is an important difference that has contributed to the longevity of these buildings. The clay walls are infill just like all the other secondary structural elements. The owner can easily knock out the wall and alter the floor plan without affecting the safety of the structure. Small wonder that the posts take on great significance.

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that Japanese gardens represent nature transformed, intensified, and perfected to make man aware of the essence of nature. We can also recognize the Zen in the use of structure. **Jikugumi** expresses the "structuralness" of structure, the quality and state of being structure in all its myriad ways, while fulfilling its more prosaic role of holding up the roof. Dressed by hand, the heavy timbers may be squared off or purposefully left in their natural state with bark on or with some natural deformity emphasized. The overbearing presence of structure is even more pronounced by the more modestly sized secondary posts. It is important to note that the roof structure is oversized only according to our standards. The weight and size is needed for stability and the intricate joinery. Straight timbers were difficult to obtain, but this shortage was transformed into poetic basket weave of beams. The unenviable economic state once again is the very source of esthetic expression rather than a lamentable condition of poverty. Crooked timbers become favored and highly prized; imperfection discloses the true nature of handcrafted wood structure. **Beauty** is recognized in the simplest and most common, and the Zen philosophy ritualized in the tea ceremony re-emerges in the use and preference in structure.

And so it is that structure, often the humble servant of architecture, takes on a range of subtle meaning. There is unity in Japanese culture and architecture that affects all material things. Precious, life-fulfilling attitudes are not the exclusive possession of the rich or the enlightened. Esthetic tastes were cultivated by noblemen, samurai warriors, merchants, and the lower classes of artisans, farmers, and fishermen.

The great richness and regional variations of **minka** are due to the number of primary frameworks used. Teiji Itoh, in his book, *Traditional Japanese Architecture*, identifies eight primary framework types, although there are many modifications and adaptations, and it is difficult to find pure examples in practice. The distance between the members of the framework differs considerably, and there are many variations in details. Seven of the more common primary frameworks are listed here and shown above:

**The inverted U**. A beam spanning between two posts defines the inverted U-frame, and girders on each side connect the parallel U-frames. The beams are placed on top of the posts and the girders, in turn, on top of the beams. The posts are usually spaced at one ken (approximately six feet) intervals. This is the most widely used system as well as the oldest. Its origins date from antiquity, and the oldest remaining minka employed this system, yet it is still in use today. The inverted U is also used for L- or U-shaped and hollow-square house plans. There is also a long-beam variant.

**The ladder**. A base plate, set of posts, and girders or top plate make up the ladder-like sides. These, in turn, are connected by beams. This system was used in the urban houses of the Edo period (1615-1868) and is common today as well. Apparently it was easier to use this framework in the tightly packed urban situation where houses nestled next to each other. Although it looks similar to the inverted U-frame, outside walls were erected first, and beam placement may be independent of post location. The ladder also allows irregular post placement, thus permitting more flexibility in design.

Above, seven common frameworks used in minka construction (1) inverted U; (2) ladder; (3) umbrella; (4) cross; (5) parallel crosses; (6) box; (7) jungle gym. The frameworks can be combined in a variety of ways for different spatial effects.
The umbrella. In this system a tall central post is connected sloping beams to four posts placed in the middle of the sides of a square. Secondary posts are subsequently placed in the corners of the square to accommodate walls. This system was dominantly used in the Shiga prefecture.

The cross. Two criss-cross beams of equal length are joined in the middle. As in the umbrella system, posts at the end of each beam fall in the middle of the sides of a square. Likewise, secondary posts are placed in the four corners. Some small farmhouses use this system for column-free space. It is also used over the earthen-floor area of large minka in combination with other frameworks for the raised floor areas. The cross structure is common in Shiga and Fukui prefectures.

The parallel crosses. This is a variation of the cross system that consists of double beams joined together and eight posts. The parallel crosses are found in the Ikawa district of Shizuoka prefecture and are used to cover the area over a central sunken earth.

The box. Four corner posts are connected by mortised beams, braces, lintels, and floor beams, resulting in a rigid framework. The approximately 18 shaku square is used either over the earthen or in front of the house or in the house proper. The box is subdivided by a secondary structure. The box was developed during the Edo period, and it is found in Toyama and Ishikawa prefectures.

The jungle gym. This is an aggregation of the box elements resulting in a space frame of posts connected by beams, braces, lintels, and floor beams. The jungle gym is a rigid structure, and lintels, normally secondary structural elements, play a primary role in bracing the structure. Posts may be removed if necessary and longer beams substituted for the increased spans. This system was used in the Kyoto and Osaka area.

It is through the dimension of time that hierarchic space-structuring principles in minka take on their significance. Hierarchy in Western architecture is generally associated with primacy of certain buildings and spaces over subordinate urban fabric, forms, or service spaces. Japanese towns and buildings also employ these universal planning principles, but Japanese buildings extend these principles to the most minute building elements, details, and materials.

Originally, the interior of minka was one large, open space, but over centuries rooms were divided off. Even when subdivided, these rooms remained general purpose spaces. A ceiling is stalled over the more finished rooms, but much of the roof structure remains exposed to the interior space. The floor of living spaces is usually wood and raised above the earthen floor the cooking, entrance, and work areas. Use of mats varies with region, age of the dwelling, and wealth of the owner.

Design and construction are intimately associated with use, replacement, renewal, and transformation. As life proceeds from birth to inevitable death and the cycle is repeated through subsequent generations, the house likewise undergoes change and renewal. This renewal has been institutionalized in the 20-year building cycle of the sacred Shinto shrines at Ise—the dwelling place of the nation's divinities. The humblest peasant house requires some repairs and replacement of parts.

Simple materials and the prevailing state of poverty demanded the prudent use of resources. Consequently, some parts of minka, such as the primary framework, are built to last over centuries. The infill, particularly the heavy wood board walls, may last as long, but the course of living with its unpredictable demands may necessitate their replacement with something more usable. The old is valued and cherished, and there is much emotional attachment to the worn and imperfect. A whole esthetic theory, well known to the students of Japanese arts, transformed the ordinary and the imperfect into cherished, refined imperfection.

Much in zōsaku is vulnerable and fragile. Wooden tracks and raw mats wear out, paper walls require patching and replacement. Japanese house construction anticipates renewal and transformation without the messy and destructive processes that accompany Western demolition. Usable parts are carefully replaced in houses and temples alike; old and new coexist in a restored or new equilibrium.

Through the existence of the primary and secondary structure, minka provide for change in a time frame that follows the course of life over generations. It allows for individual expression, adjustments, and renewal, yet assures continuity and prudent use of limited resources. The very existence of the primary and secondary systems in minka turns the folkhouse into a sort of self-regulating "organism," thereby keeping the buildings useful for centuries. Consequently, reverence for what is old does not inhibit the need for change, but change is restrained by the limits inherent in the system. The liberating, two-tier structural system is far superior to the dominant traditional sukia-style house and the Western modern "functional" dwelling, which subordinates the structure to the floor plan, thus losing flexibility and adaptability.

Rich in meaning, the physical systems of minka are accompanied by a mythological realm that is deeply ingrained in Japanese culture. Buddhist teachings hold that man is but a part of the animate and inanimate world, like a pebble in the great cosmic cycle. These teachings are compatible with the native Shinto beliefs that all nature is full of kami, spirits, and that all trees and rocks have a kami. The carpenter too works on wood respectful of the spirit within. The love and care that go into building are born out of such Shinto and Buddhist roots. The house that he builds is not only a stage for living but a dwelling of kami. It deserves the best.
Public Housing Designed as a Jaunty Village

In this era of dearth in public housing nationwide, Zervas Group architects (formerly Johnson, Erlewine & Christensen) has signed for the Bellingham, Wash., housing authority a village jaunty, tight, simply made houses. The brief for the 24 units included a HUD fixed budget of $33 per square foot, energy saving measures, and solar design. In addition, the project didn’t “look like public housing.”

Hillside Homes’ site plan achieves high density on a narrow, 1.4-acre tract. Two single-family houses, one for the disabled, are located near the project entrance, and 11 duplexes are staggered along the crescent drive with sidewalks on both sides. The drive terminates at the laundry, behind which is tucked the play area.

Employing traditional wood frame forms, asymmetrical plans, stucco exteriors with simple painted trim, tiny gabled entry arches, and rough-board fences, Zervas Group effectively evoked an “everyman’s house” image in duplexes that look like single dwellings. Each duplex comprises a 1,000-square-foot two-bedroom unit and a 1,200-square-foot three-bedroom unit.

All employ passive and active solar features. South-facing, direct-gain windows are glazed with diffusing translucent panels that have higher insulation values than glass. Minimum insulation and weatherization standards are exceeded throughout, including fully insulated ground slabs. Domestic hot water is heated by a roof-mounted active system, and all units are aligned for optimum solar exposure. Back-up space and water heating is electric. Other energy strategies include night insulation, air-to-air heat exchangers, exterior shading of south-facing glazing, minimal north-facing windows, and an “operator’s manual” to assist tenants in the most efficient use of these systems.

Judging by the number of inquiries from people wanting to “buy one of the condos,” the housing authority has avoided the stigma of subsidized public housing and gotten low budget, low profile, low energy houses. —JOHN A. GALLOWAY

Mr. Galloway is an architect and freelance writer in Seattle.
Cheerful ‘Monopoly House’
On a Heavily Wooded Slope

Santa Rosa, Calif., capital of the so-called “redwood empire” north of San Francisco, is such a fresh-faced, all-American place that it was chosen nearly a half-century ago as location for the motion picture version of Thornton Wilder’s “Our Town.” The intervening years have brought growth and change, not all of it for the better, but vestiges of the “Our Town” character persist, as do the benignly moderate climate and lovely, wooded surrounding landscape.

This moderate-sized house (2,400 square feet) was inserted into that landscape in a Santa Rosa suburb with great care. The clients wanted as much sunlight as possible but didn’t want to lose a lot of trees. So architect Roland Miller Associates made it what they call a “Monopoly house” with a small footprint.

A basic client request, in the architect’s words, was that “the house should be simple and look like a house with a front and back porch and preferably a gabled roof. It should have a personality that makes it special.” Personality it has, and a sufficiently sunny one.

This derives in part from the use of color. On the outside, 4x8-foot plywood panels are painted cocoa (with cream) and criss-crossed by teal green 2x2-inch battens. A brighter green lattice masks the porch apron and garage glazing. Real copper metallic paint was sprayed on exposed metal in an auto body shop “to add a little flash.”

Inside, exposed rafters were painted pale yellow. Other interior colors are warm white and pale apricot, and cabinets are light oak. The overall effect is a pleasant glow, making the most of the light that filters through the surrounding trees.

The same end is achieved by use of skylights and by a tall window at the end of the living area where the volume was taken to the roof rafters. This window is pointed squarely at the two best firs on the site, a view shared by the second-story den, peering through the upper reaches of the living area.

In plan the house has a continuous living and dining area on the first floor with the kitchen opening onto it. The master bedroom also is on this level. Upstairs, in addition to the den, are bedrooms for the clients’ two children, their study, and a dark room. In all, it is a livable, friendly house, built on a budget as constricted as the cleared area on the sloping site.

—DONALD CANTY, HON. AIA
The first settlers of Block Island, off the coast of Rhode Island, went there in the early 1700s to get away from the Indians. Today, the island's refugees flee contemporary irritants—traffic jams, phone calls, fast food, bills—if only for a week or two.

Located on a windswept hill overlooking an inlet, this Block Island house by Herman Hassinger, FAIA, for the architect and his family is a perfect get-away that is right at home both in its materials and sensible, comfortable interiors. While faithful to the island's weathered, cedar-shingle-clad and white-trimmed buildings, it makes no pedantic display of some architectonic profundity. Like its inhabitants and house guests, this architecture is on vacation.

The house is T-shaped in plan and a story-and-a-half in section, like many other island houses. At the base of the T rises an observation tower, growing gracefully from the shingled hip.
Hassinger says that the T-shape and the tower came early in the design. Working with these two elements, he refined the proportions and profile, simplifying the form. He showed a few sketches to an island neighbor who immediately recognized in the design an old lifesaving station that had once stood within view of Hassinger's site. An old postcard of the station reveals it as T-shaped, a story-and-a-half, with a combination gable and roof punctuated by a squat tower. Hassinger's tower was taller, and it lacked the gentle taper of the old one—a detail he added during construction.

Central to the house is a utility core from which grow the encumbered living spaces on the first floor. The best views on the hill are to the west and south, and the house opens to these two sides, where one finds the living and dining areas, capped with exterior decks that have windbreaks on the northwest and southwest corners. To the north and east are more private spaces: two guest bedrooms, a studio, and family room.

The character of the living areas is warm and comfortable, the views always commanding attention. The exposed timber construction is a good, rustic background for the artwork displayed throughout the house, most of it with a nautical or island theme, including Hassinger's extensive collection of mermaids (not real ones). The architect's fascination with these creatures can be found in the decorative fin stenciling in the dining area (above) and on the deck's columns (top), which sport finned capitals. "A little-known mermaidic order," Hassinger points out.

The second floor, totally devoted to bedrooms, is as tight and efficiently designed as a ship, no doubt nostalgic to Hassinger, who served in the U.S. Coast Guard. At the top of the second flight of stairs is a ladder that leads to the tower. One climbs straight up into this eight-foot-square perch through a hatch that, when closed, becomes the seat of a built-in bench. Close the hatch, replace the pillows, and you're in splendid isolation with the island spread out before you. —MICHAEL J. CROSBIE
Elegant Town House with the Plan of a Mini-Skyscraper

The extensive programmatic demands for this residence on the north side of San Francisco's Nob Hill led its designers, Charles Pfister Associates, to an unusual model for the firm's first venture away from interior design and into architecture. Although the lot on Pleasant Street near Jones was substandard—only 22 feet wide—owner John McInerney's specific requirements for his family included three bedrooms plus maid's quarters, a one-bedroom rental unit, as well as a roof deck. The client also wanted spacious rooms, and by collecting the service functions—stairs, elevator, and bathrooms—in a tight central core, the designers were able to leave large spaces front and rear for the other functions. The town house grew to six levels, and architect Richard Brayton, AIA, of the Pfister office says matter-of-factly, "We treated it as a mini high rise."

While the plan made sense easily and early, the designers struggled with the facade. After the high rise concept became apparent, however, everything came together felicitously. Brayton remembers thinking with Pfister and James Leal, "It's a high rise. Why not a glass curtain wall?" For his part, Pfister, noting, "San Francisco is facade architecture," says he saw the design as "a wonderful opportunity to create a new architectural facade in the classic mode."

The large central window—the facade's strongest visual element—derives from the context. "San Francisco is a big bay window town," says Brayton, "but this is a reverse of the usual bay. It is an increasing projection of the skin, which makes sense programmatically." He explains that as the building rises, and the concomitant vistas improve, the window reaches out to the view. Describing it as a slightly "tongue-in-cheek symbol or icon of a bay window," Brayton adds that, accentuated by a deep reveal, it also acts as a sort of keystone to the facade, which is constructed of painted wood in a mock quoin pattern.

Toward the end of the design process, the designers realized that the facade needed a little extra punctuation. The lower level round window, inspired by similar designs in older Bay Area houses, provided the answer. "It makes an exclamation point on the front," says Brayton, who notes that all the windows except the circular one pivot horizontally (it turns vertically), thus adding liveliness to the facade.

Pfister Associates had found that while there was a 65-foot height limit to new buildings, roof structures such as greenhouses were permissible. Extending the top floor barrel vault, a form selected for its visual appeal, also created a voluminous interior space that allows the greenhouse to overlook the living room through a semicircular, glazed arch. By opening the stairway inside, the effect is that of a glass house on top.

Brayton describes the view from the backside of the 4,500-square-foot residence as a "site bonus." French doors in the dining room center on the rose window of nearby Grace Cathedral. The stained glass, lighted from inside during the evening, provides a delightful backdrop for dining. The opposite view, from the living room, of San Francisco Bay and Coit Tower is no less enchanting, day or night.—CARLETON KNIGHT III

Photos right, top, and middle, greenhouse structure on roof of town house on San Francisco's Nob Hill permits extra long views and, bottom, gives spaciousness to living room. Across page, glazed and glowing central core determined skyscraper-like appearance of residence.
Russell Park student family housing at the University of California, Davis, is a suburban scaled development that gives primacy to the pedestrian. Designed by Sam Davis, FAIA, Architects and Shen/Glass Architects, both of Berkeley, it comprises 200 units on 10 acres. There is also a community center (symbolically and literally at the heart of the project), laundry facilities, and an ingenious rental storage building in the form of a wall that stretches along a major artery on the site's north boundary, serving as a traffic screen and gateway to the complex.

The 200 units are broken down into five clusters, each cluster containing five buildings, and each building eight units. There is a range of one-, two-, and three-bedroom units, varying in size from 670 to 1,130 square feet. Each unit has some basic amenities such as a foyer, counter dining area, and private patios. Every building has a combination of one-, two-, and three-bedroom units, which are entered through a shared courtyard on the north side, protected by privacy walls.

The five buildings that make up each cluster are arranged in a staggered pattern. To the north and south, two clusters are butted together creating large and welcoming communal open spaces with play structures at their center. The fifth cluster is in the middle of the site, jogged just east of center, framing an

Walkways were given careful consideration. Parking for 220 cars is confined to the periphery of the site so pedestrians, both large and small, have carefree run of its interior. The staggered arrangement of buildings and clusters makes for constantly shifting and interesting views of the buildings, whose every side has a gabled profile. This gives the entire project the feel of a small, contained community where one can wander down paths between clusters and buildings without infringing upon the privacy of the units.

The community center on the west side of the site provides an informal link with an older student housing project (dating from the 1960s) across the street, which shares its use. At 3,600 square feet, the center, with its long, colorful spine, comfortably accommodates administration offices, meeting rooms, and child care. The latter is found on the building's sunny south side with ample exterior play areas. As the center faces the housing, it becomes a backdrop for a stage area that is used for local theatrical events. —M.J.C.
Top. Russell Park community center is distinguished from nearby buildings by its white and gray colors, while it serves as a stage set for amphitheater; above, center's colorful and light-filled interior, with view into glazed child-care room.
one of many long, suburban avenues in the flatlands north
Sacramento, a high, peak-roofed entry pavilion—like a stage-
barn designed by Palladio—leads to Phoenix Place, a would-be
datait of luxury houses whose four models were designed by
Buchanan Associates of Berkeley in conjunction with
developer-builder Larry Lowder and landscape architect Ed Haag.

Lyndon's 1974 book (a collaboration with Charles Moore, FAIA,
and Gerald Allen, AIA), The Place of Houses, was intended
as a kind of pattern-book for contemporary house builders.

Included were four ways of relating a house to its setting:
merging (Taliesin), claiming (Monticello), enfronting (Mount
Vernon), and surrounding (a Southwestern patio house). At Phoe-
nix Place four types are identified by familiar house elements—
roof, tower, court, and terrace—that serve as organizing principles.

The terrace house is oriented so that the 43-foot-long rear
terrace that defines the house—redwood-decked and trellis-
roofed—faces directly south. The living room/library, dining room,
and family room open onto this terrace through a handsomely
detailed series of four double French doors. The house is sliced
through midway by a narrow, two-story skylit open space, partly
to accommodate the stairway (which pauses at the landing for
a projecting, sunlit window seat), partly to provide a "slot of
light" that is meant to serve as an organizing and orienting device
on the interior. The hip roof is cut back along its long south
edge, where that wall rises higher than the north wall. Here is
located, upstairs over the terrace, the large master bedroom with
a private balcony. Two of three other private rooms upstairs,
their ceilings partly shaped by the rooflines, also face south.

Part of the "missing" piece of roof is pulled out to form a dra-
matic sunshade, on Maybeck-like props, for the high range of
windows that provide light and views for these rooms (and the
open sun-slit), four of them symmetrically disposed over the four
French doors below.

Less successful conceptually is the court house, if only because
the tiled courtyard itself loses some of its centrality and signifi-
cance in so large and so spreading a California house. This house
is essentially two buildings, an L-shaped social wing embracing
the entry hall and court, with eaveless roofs sloping dramati-
cally up from the perimeter, and a two-story rectangular bed-
room and garage wing with a low-sloping hip roof, broad shading
caves, and a magnificently proportioned and detailed bedroom-
balcony under one projecting gable end. Other than this bal-
cony, a lovely place echoed by an adjacent entry pergola, the
best design features of the court house are a wondrous series
of natural light effects, achieved by a sensitive placing of large
high windows, French doors, skylights, punctured walls, and two-
story spaces.
The roof house has a central design concept—one vast hip roof shaping and defining a 2,800-square-foot house. The gently sloped roof itself is quite beautiful. Its long horizontals are enforced by the lines of broad steps, low porch walls, and trellises. The horizontal wood siding, which elsewhere sets up mildly jarring counter-vertical rhythms, is here part of a unified whole. A rare hint of the old MLTW days comes in two small rectangular bites taken out of the roof edges: one of them (across a ridge line) pulls light and sky into a handsome corner porch off the living and dining rooms; the other dramatizes a secret garden that cuts into the master bath. The “core” about which most of the social half of the house is built—the finest interior space in the collection—was created by popping a long gallery of clerestory windows out above the central roof ridge, from which light pours into a high central space that flows between entry hall, stairwell, library niche, living room, and dining room. Inside, this is ringed with provocatively sculpted wood columns, which support more of those red-stained and light-filtering teak grids. On the outside, this long, high light monitor further emphasizes the Wright-like lines of the house—particularly thanks to the ingenious addition of a small upstairs study (the only second floor room) tucked into a cross gable, which creates a wonderful Robie-house effect. It’s the least expensive of the models.

The tower house at Phoenix Place is arguably the most interesting. From the corner tower pavilions, at or above the tops of the oaks, one has a view of treetops and rooftops, the nearby river, the green valley south, and, on clear days, the distant Sierra Nevada. The roofs of these essentially square, tight-footprint houses slope up steeply into two directions to meet the corner tower, which encloses the main stairway below, revealed on the exterior by stepped windows. These roofs are sheared close to the wall on the two public sides of the house, and expand out (along with lower roofs) to shade windows, balconies, and porches on the two other sides. The entry hall shares the height and light of the corner stairs and leads to a central hall from which radiate indoor and outdoor social spaces. As in every house at Phoenix Place, there is an open view straight from the entry to the rear windows or terrace, modulated by various ceiling heights and falls of light.

The four houses were originally only about 85 percent designed. When prospective owners come to choose a plan, they find the ground space and orientation already fixed; along with exterior materials and the general disposition of interior spaces. But they can have the architects enlarge or erase a family room, extend a deck, add a gazebo, close in a tower. Lyndon says he wants the buildings to contain things buyers would think of as “house-size” amenities: a master suite with a private deck or patio, and a vast tiled or marble bathroom, like a Beverly hillbilly’s dream of Caracalla—sunken round or oval tub, preferably with Jacuzzi; separate tiled shower room, separate chambers for WC and bidet; double basins sunk in a travertine slab; skylights; ferns; walls full of mirrors. The master bedroom no longer suffices. House salesmen insist on master suites (sometimes two per house), each with a fireplace at the foot of a private deck or patio, and a vast tiled or marble bathroom, like a Beverly hillbilly’s dream of Caracalla—sunken round or oval tub, preferably with Jacuzzi; separate tiled shower room, separate chambers for WC and bidet; double basins sunk in a travertine slab; skylights; ferns; walls full of mirrors. The master bedroom should be canopied or raised on a podium, or at the very least in a room with a coved or “cathedral” ceiling.

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Formal living rooms (preferably sunken) and dining rooms are still essential, even if all your nonintimate living is done in the family room—which should have its own fireplace and wet bar, separate from those in the living room and master suite. A cozy library or study adds chic (and resale value), even if no one in the household ever reads or studies. The children’s suite or wing should have a separate playroom, which can gracefully age into a guest sitting room. Wall-to-wall carpet, or (on top of) hardwood flooring, is indispensable.

What led me to dig out Langdon’s article was that virtually every amenity he had listed has been built in to the designs for model homes for Phoenix Place. They form a major part of what has been called the American housing market; Any spec-built house with a separate family room, a master suite, a guest sitting room, and a garage is going to be regarded as inferior. The developed first task is to innovate and then to disguise the innovations with an atmosphere of pleasant familiarity. Many of the innovations described—sheltering roofs, old-timey latticework, grandiose Victorian front doors, surplus overhead space—had been incorporated into the houses of Phoenix Place.

In a provocative, wide-ranging survey on “The American House” published in The Atlantic Monthly two years ago, Philip Langdon analyzed the need American house buyers feel for reassuringly familiar associations.” Anything that looks unconventionally, he wrote, after talking to dozens of people in the house-building trade, “will be regarded as inferior. . . . The developer’s first task is to innovate and then to disguise the innovations with an atmosphere of pleasant familiarity.” Many of the “disguises” he described—sheltering roofs, old-timey latticework, grandiose Victorian front doors, surplus overhead space—had been incorporated into the houses of Phoenix Place.
the resistance of the builder to anything too outre—it is remark-
able that the architects were able to shape the basic spaces as
well as they did. But for all their noble efforts, I came away
from a tour of the models remembering not so much architec-
ture as bland, oversized, cushy-carpeted rooms, a surfeit of mahog-
any and marble, faux-plaster walls, more fireplaces and wet bars
than I could imagine most families ever using, and bathrooms
big enough for small wedding receptions.

("A prime amenity is space itself," wrote Langdon, reporting
on American realtors and developers. "I think they got too big,"
says Lyndon of his houses at Phoenix Place.)

What I am describing is a compromise between sensitive,
imaginative design and the realities of the marketplace. Phoe-
nix Place may be one of the first American attempts to sell some
of the best current architectural thinking to an anonymous audi-
ence of unsophisticated nouveaux-riches. (The characteriza-
tion of the clientele is not mine, but it may be apt.) It may work—
six houses are now finished and two more under way—if the
gods are favorable and interest rates hold. The American upper-
middle class ("We've got the top 2 percent of the market," a
salesman told me) may yet be weaned away from mini-baronial
manors hedged off from their neighbors, with windows in all
the wrong places.

But the price architects will have to pay to bring this about
may be what Lowder's marketing expert called "more sex and
sizzle": the "Dallas" and "Dynasty" image, the sunken oval tubs
and marble hearths and wall-to-wall fuzz and Honduran mahog-
any cabinet doors. ("It's the cream, but still they want oak,
because they've been told oak is better!" complained a sales-
man.) The result—outside, in the oak-shaded interstices, on the
balconies, on the vine-shaded terraces, on the stair landings, under
the great windows—may, one day, be a model of its kind. But
in most of the rooms, American taste, and American market-
ing realities, will still rule.—David Littlejohn

Mr. Littlejohn, author of Architect: The Life and Work of Charles
W. Moore, is a professor of journalism at the University of Cal-
ifornia, Berkeley.
Colorful Regional ‘Landscape’ Celebrates Route 66

It is not at all surprising that the Beach, a 74-unit Albuquerque apartment building by Antoine Predock, FAIA, is an act of regionalism, nor that its massing and materials recall the pueblos of northern New Mexico. But there are other kinds of regionalism at work here too. The massing also recalls land forms of the Southwest: square-shouldered mountains rising from plains and desert (here parking courts), steeply rising pinnacles. Here the pinnacles are penthouses.

And the facade facing Route 66 is colored in a pattern reminiscent of Navajo blankets, going, in Predock’s words, “from a base of Rio Grande Valley olive greens through the sunset colors of the mesas and mountains to the sky blue penthouse terraces.”

Finally there is allusion to the roadside regionalism of the modern-day West in streaks of neon tubes. These recall the site’s former occupant, for which the project is named, a motel with an especially spectacular display of neon. The neon and colors reflect a certain Venturisesque intrigue in Predock with what he calls “Highway 66 iconography.” They also etch and reinforce the terraced, highly sculptural form.

While the highway side celebrates interstate cacophony and welcomes the automobile into its forecourt, the back side is monochromatic and quiet, facing on a golf course, a park, and, glancingly, the Rio Grande River. Most units have views over this tranquil greenery to distant, dramatic mountains and mesas.

As Predock puts it, “the site straddles a cultural fault line, the habitat of the West Central Avenue, Route 66 custom cruiser meeting the white belts and white shoes of the Albuquerque Country Club.”

The building contains a few offices and a wide variety of apartments, from tiny efficiencies to the generous penthouses. It also serves a variety of income groups. The city, hoping the Beach would stimulate an upgrading of the shabby strip of which the site is part, provided bond financing in return for which the developer set aside a fifth of the units for moderate-income rentals. —D.C.

Right, the Beach as seen from the highway entering Albuquerque across the Rio Grande. Predock calls it the biggest violation ever of the city’s sign ordinance. Below, upper level terraces.
Right, neon tracings on the building's jagged outline. Below, representative interior. Bottom, monochrome rear elevation faces golf course and distant mountains.
HOW TO COPE WITH EXTREME STRESS.

When the rumbling subsided on May 2, 1983, much of downtown Coalinga lay in ruins. It was the fourth largest quake to hit California during this century, jolting the Richter scale at 6.5.

Amidst the rubble of brick and concrete block, however, newer “stick-built” structures remained intact. So much, in fact, that many escaped visible signs of damage.

A fluke? Hardly. Since typical wood-frame construction employs sheathing nailed to studs and joists, these stress-path assemblies are ideally suited to carrying shear. Walls, floors and roofing components work together as diaphragms to dissipate short-term, lateral loads.

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Both the forms and methods of construction used in American housing have changed little in the last few decades. The way housing is brought to market, however, is changing in profound ways. Of most importance, housing has become more market- and price-driven than ever before. This has encouraged innovation in two complementary areas—standardization, to keep price down, and customization, to keep consumer satisfaction up.

How these two seemingly opposing objectives can be reconciled is the focus of this month's Technology and Practice section. The opening essay explains how certain technologies and materials affect cost efficiency and the ability of many parties to participate in the design, construction, and alteration of houses—a key consideration in making housing that is appropriate to all types of consumers. Following this is a series of articles on aspects of the housing market in the Netherlands, Sweden, Japan, and the United States. These case studies reinforce the message that technologies that enable broad participation in the creation of housing offer the most promise for achieving the dual goals of efficiency and diversity.

This material was originally conceived for presentation in Architectural Technology, which this month merges with Architecture magazine. When the Technology staff first composed the package, we envisioned a presentation style quite apart from our usual reliance on architectural detail for illustration. Moving this material into our new format has made this departure easier than we imagined, since we now have the freedom to use photography when it is appropriate. None of this implies a change of focus from the original framework of Architectural Technology, and in the future you'll see a return to detail drawings as our primary means of graphic communication.

One change that has resulted from the merger of Architectural Technology and Architecture is especially worthy of note: an expanded products section (which begins on page 141). Developed by the editors of Architectural Technology, the section is divided into two parts. The first introduces a variety of new and notable offerings; the second presents products related to the subject matter of the Technology and Practice section. This month, that segment of the products section (page 148) introduces nearly two dozen sophisticated electronics and control systems for housing.—Mitchell B. Rouda
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Who's in Charge of Housing Innovation?

vernacular construction technologies distribute control widely
by Stephen H. Kendall

Every 15 years or so, a new round of hand-wringing takes place regarding what is supposedly the desultory state of American housing technology. Along with criticisms that the housing industry spends too little on R&D and that too few builders employ technically advanced approaches to construction, architects add the familiar lament that they are too removed from the production of housing.

It’s been more than a decade since the last Operation Breakthrough projects were built, and the clamor for dramatic advances in housing technology is starting again. Examples of manufactured and industrialized housing from Japan, Sweden, and elsewhere are being called technically superior, of higher quality, and more efficiently constructed than stick-built or manufactured houses produced in the United States. The popular press, consultants, agencies, associations, and individuals fighting at industry roundtables (and in the halls of Congress) voice concerns of an intrusion of foreign housing and housing product claims of foreign technological superiority cause furor, excitement, or apathy? For that matter, is there a way to discern when any technology might materially change the way houses are built? When architects add the familiar lament that they are too removed from the production of housing, what is supposed to cause furor, excitement, or apathy? For that matter, is there a way to discern when any technology might materially change the way houses are built? The answer to both questions, it seems, is that technological innovations, already, may never yield significant improvements in housing quality or reductions in cost.

More often, dramatic shifts in housing result from innovations that are not strictly technical, but also involve changes in design and production methods. To put it another way, enduring advancements in housing technology may be governed not merely by issues of technical performance but also by the issue who controls the various stages of designing, deploying, and modifying housing (and the subassemblies that are used to make housing). Control, in this context, refers to the exclusive ability of a person or group to change a building element or assembly (of any scale or kind) over some period of time.

Every technology can be described in terms of the initiatives different players take in controlling the technical bits and pieces of that technology. For example, to make a piece of plywood, a pipe, or even a window assembly, a company decides to take control of certain elements to make something. In these cases, the controlling party has industrially produced the element or assembly before any house design was known to the producer.

Prefabrication is a different kind of initiative that takes these industrially produced elements and puts them together for a particular place, design, or type of construction. The prefabricator takes control of a design and then manufactures component assemblies—for example a truss, a wall panel, or a semi-finished house module—made up of both rudimentary industrially produced elements and other prefabricated assemblies. These prefabricated assemblies can only be made after a specific design has been established in which the assembly will be placed.

Much of the widely publicized work of Japanese housing manufacturers involves sophisticated prefabrication, not industrialization. Such prefabrication of modules, panels, and various other assemblies is clearly useful and has been applied increasingly for centuries. But in itself prefabrication is less interesting than the industrialization of fundamental elements. Basic industrial production supplies a system with elements that can be employed for a wide variety of construction methods and can be used easily by many independent players. Because the elements are smaller, cheaper, and more general, they are within the economic grasp of many, including end users. Hence control of the system can be distributed widely, and efficiencies can be achieved that have broad benefit.

No housing company anywhere in the world has yet achieved, at the level of whole houses, the mass-production efficiencies we associate with the industrialization of rudimentary elements. When corporations try to expand industrialization from the realm of rudimentary elements to the realm of more complex assemblies, they require standardization at such a high level that it tends to make variation less likely—simply because it is more difficult to do.

In order to see the relationship between particular technologies and patterns of control, it is necessary to identify a series of levels in the decision-making process. In housing, for example, a site plan, a house type, the configuration of interior spaces, and the materials, furnishings, and finishes can each be said to represent levels in the development process. Decisions at different levels must be coordinated, but do not necessarily have to be made simultaneously or by the same party.

For example, to make a site plan, it is not necessary to deter-
mine how the interior spaces will be configured, but it is necessary to set some constraints about where the footprint of a structure could be. Similarly, to size the main fuse box in a house, it is not necessary to know where each circuit will run, or precisely which appliances will be attached to each circuit. But it is essential to select a box with the capacity to accommodate a range of circuits, and it is essential that the circuits be wired to accommodate an appropriate number of appliances. What is considered appropriate at each level is, of course, a decision made by the party controlling the design of that level. Hopefully, that determination reflects the influence of those controlling the next lower level of decisions.

Decisions at different levels can be made by different parties at different times without disrupting design and production processes, so long as the decisions made at higher levels leave room for a fair number of options at the lower levels. Not only may the controlling parties be different for each level, but they may change hands as the life continuum of a house passes from design and construction to occupancy and change.

2x4 construction: a vernacular technology

For a system to have the capability to distribute some form of control to all parties, it must be widely shared. We call such widely shared systems vernacular. John Habraken, in his recent book Transformations of the Site, explains the advantages of vernacular construction technologies this way: “To the extent that [a system] is successful [in distributing control], it will become a shared property in the minds of the people and it will stay alive, growing and changing towards ever richer and more effective manifestations.”

The way certain building technologies can allow control to be widely distributed, and distributed differently at various levels and stages of construction, is particularly visible in the 2x4 wooden housebuilding system, still the dominant method for housing construction in North America. This system, including platform framing and all that goes with it, has been so successful in part because the technical systems in it and the many levels of control exercised on it can operate so independently, with wide interpretation, while sharing a changing repertory of highly industrialized general elements.

Writes Habraken: “In the North American stick-built system we find the same mutual benefit between formal and informal production as we find in [another system, more commonly recognized as vernacular] the examples of the squatters in developing countries using concrete technology. On the one hand there is the world of sheet rock, the steel profiles, the aluminum foil, the siding, the insulation, the pipes, and wiring while on the other hand, the system allows the homeowner to repair his house on weekends, to discuss change with the contractor, to build indeed his own house should he find it to his advantage to do so.”

In this sense, our 2x4 system is arguably the most advanced and complex industrially produced system for building houses in the world. It was not invented in a private industry R&D effort or proposed as a result of a government-supported program. Yet it has had the power to accommodate a diverse set of participants and a rapidly growing and changing market, and it has allowed technical innovation from independent sources to be brought into it. Innovations have been developed by different parties, with a minimum of explicit coordination, and many of these innovations (laminated veneer lumber and faced rigid insulation board, for instance) quickly gained widespread acceptance, since they accorded with an extremely pervasive and well-understood technology.

Despite architects’ fascination with innovative construction technologies, few new construction methods seem capable of generating this kind of broad application, nor are many building strategies able to accommodate participation by as many independent parties. To wit, in Japan, where so much attention has been focused on developing new approaches to housing construction (usually controlled by a single company), there is a growing corporate and government interest in 2x4 technology (although, typical to Japanese industrial traditions, the technology is largely controlled by corporate conglomerates and may never be widely available and broadly distributed in the sense that it is in North America).

Because 2x4 construction (at least as it is used in the United States and Canada) is a vernacular technology that can’t be dominated by professional interests, the technology has been especially capable of accommodating significant changes without requiring systemic change to the construction methodology. For 150 years we have seen the prefabrication—using elements of the 2x4 system—of whole houses, panels, packages of pre-cut framing members, and other assemblies. Mobile dwelling units constructed within the bounds of 2x4 technology have been shipped to remote settlements around the world. Whole specialized industries making general industrially produced elements and assemblies, based on the 2x4 system, have risen and declined. So too have a variety of supply networks and trades. Perhaps of most importance, the system has allowed laypersons to become familiar with it and use it independently.

The apparent lack of systemic change in 2x4 technology is in fact a sign of a living technology that has served a multifaceted set of needs and a diverse group of users very well. It indicates a resilient and dynamic interaction between the fundamental technology and producers, builders, designers, and a market of millions of households, all of whom, in one way or another, exercise control of assemblies at different stages in a house’s life cycle.

While this building strategy has been efficient, easily interpreted into many different design styles, and widely applied, it sometimes appears that 2x4 technology has reached a developmental limit as a vernacular technology, with most of the juice already squeezed from it. This may be because our building culture has taken 2x4 technology for granted and has developed such a tacit understanding of the system that it is hard to see how to leverage improvements in it that make a difference. Instead of building on its strengths, which we barely understand how to leverage improvements in it that make a difference.

Architects’ attraction to radical advancements in building technology, fostered in part by an education that so often awards high marks for self-expression, has usually resulted in advocacy of “integrated systems” of one kind or another that reduce decision-making levels in favor of “professional expertise.” Looking back into the writings of our foremost architects (Gropius, Wachsmann, Wright, Christopher Alexander, and others), whose work so often serves as ideological benchmarks for new architectural developments, we notice a distinctly different approach of amalgamating divergent systems into a more unified whole.
Design professionals have not only claimed to know best how people should and/or will live but have asserted that dramatic failures in ways of building offer great promise for quality and efficiency. The problem is that in housing, unlike subma-

This early example of industrialized wooden construction comes from an advertisement that appeared in the South Australian Record in 1837. The “portable cottage” was touted not only for its quality, but also for “the facility with which it may be taken down, removed, and refixed by the most inexperienced.”
A series of housing projects in the Netherlands (some just completed and others on the boards) allows households to customize the layout, equipment, and interior finishes of their apartments in a way that is equally efficient for occupants, building owners, product manufacturers, and contractors. The projects—all multifamily—introduce a new logistical distinction in housing delivery, between support and infill.

Supports provide the basic building shell (including structure, exterior walls, general circulation patterns, building plumbing, and electrical systems). Designed for specific sites, supports include those elements and assemblies that are long lasting and can't be changed by occupants acting individually. Infill packages (including some partition walls, the plumbing fixtures and some piping, electrical equipment specific to each dwelling, cabinets, and finishes) are used to make dwellings within the support. Infill packages consist of those elements that each household can control without affecting other households. These elements, classified as consumer goods, change more rapidly than the support, as a result of market trends, tenant needs, maintenance, and regulatory requirements.

The support/infill concept emerged from the work of John Habraken, a Dutch architect now teaching at MIT. (Habraken was the head of MIT's school of architecture from 1975-1981.) Habraken's research, which began in the Netherlands more than 25 years ago, concentrates on how architects can participate more effectively in the design and transformation of dwellings.

Habraken's design methods and theories stress that housing always reflects the interaction between two spheres of control—the individual household and the community. Different economies, cultures, times, and individual participants have drawn the line between these two spheres differently; and, it seems, various patterns of control can all work effectively, even while people share the same form, technologies, and typologies. But regardless of where the lines are drawn, Habraken says, professionals cannot effectively contribute to the development of healthy dwelling environments without recognizing and balancing this interaction in some way. To this end, Habraken says, has been aimed at the development of methods that allow various participants in housing production to negotiate which decisions are to be made by each player.

One of Habraken's key conclusions is that the ability of manufacturers, architects, developers, households, and others to be effective in controlling their "territory" in housing production and change relates directly to the form of technical elements and their manner of assembly. By separating support and infill elements, consumers can control all of the decisions rightfully made by them without affecting decisions rightfully made at the community level.

Economic and public policy forces in Dutch society as well as changes in the construction industry and in the architecture profession are helping to bring this concept into reality. The Netherlands has always been a place of experimentation in housing design. It also has a long tradition of democratic government, commitment to the rights of individuals, and community cohesion (public infrastructure to keep out the ocean is a dramatic expression of this unity). And unlike the United States, the Netherlands has consistently had deep public sector involvement in the production and ownership of housing.

In recent years, however, public sector support of the housing industry has declined, with significant consequences. Many architects have no work, and the housing industry finds itself with excess capacity, since the country is for the most part "already built."

In the face of these changes, some housing industry participants (architects, contractors, product manufacturers, housing associations, and government ministries) have formed a new organization, called the Open Building Foundation, with joint public/private funding. The organization is dedicated to rethinking the way supply and demand in the housing industry can be balanced. It serves as a focal point for R&D and the implementation of open building concepts that are explicitly realized in the support/infill approach to housing production.
Top photos, construction of the concrete support of Lunetten; racks of prefabricated wall panels; finished dwellings. Bottom photos, panel colors and position of doors and windows are selected by households; infill partitions use industrialized stud assembly; some partitions are preassembled in modular sizes (note HVAC duct, which is part of support). Plans at left show different layouts.
new town in Lunetten

The most extensive support/infill project has been built in Lunetten, a new mini town south of Utrecht. Under a design/build contract, the architect for the project was Frans van der Kerk, a principal of Workgroup Kokon in Rotterdam. The project uses conventional Dutch housing patterns in its ban streetscape and courtyard form. But unlike conventional Dutch public-sector housing, this project untangles support and fill and uses recently enacted modular coordination standards to allow a more efficient articulation of the design and construction process. The goal was to produce a project, with the cooperation of contractors, that could be built more quickly than through conventional strategies, save in construction financing, overhead, and other costs; enable each apartment (and these are rentals) to be custom-designed with the tenant’s participation; make it easy to defer the design of plans and interior assemblies to a late stage of construction; enable changes in layouts during construction and in later years with minimum difficulty.

These goals were met by the design of a concrete structure, with a single repetitive span and carefully positioned openings and cross walls, that has the capacity to accommodate dwelling unit plans that vary in shape, size, and layout. Tenants used full-scale mockup to determine their own floor plans, equipment, and finish schedules within certain assigned territories. Infill packages were provided for each dwelling. These packages were assembled from industrialized elements available to the general market.

The design process started with a space plan, which represented a stage between conventional schematics and design development. This plan, dealing with both supports and infill, established the position of walls, floors, stairs, mechanical systems, and equipment. It used a grid with alternating 10- and 0-centimeter bands for the purpose of coordinating this work. The space plan, which left open the exact specifications of materials and dimensions, allowed the contractor (already involved in the project) to establish preliminary budgets. The plan also provided a basis for financial negotiations with the ministry of housing (which provided typical subsidies along with typical space standards) and, with a set of performance specifications, enabled infill packages to be developed for the different apartment layouts.

The space plan was used, together with a computer program, to enable the layouts within the support to be drawn up, estimated, and translated into rent figures, so tenants could receive immediate feedback on the financial consequences of their choices. The support was already under construction when detailed material and dimensioning plans were developed for the infill. Because of the distinction between support and infill, these final plans could be different from the “standard” plans used earlier to test the capacity of the support.

Supports and infill were bid and contracted separately. The infill was installed by a number of teams, each completing one dwelling and moving to the next at the rate of one per week.

Renovation in Riebeck

Riebeck is a district in Rotterdam built in the late 19th century. Last year, a feasibility study was undertaken by the in-house architecture staff of Tuinstad Zuidwijk, a large housing corporation, to rehabilitate a portion of the area using the support/infill concept. The company owns 4,000 units in Riebeck and wished to establish a flexible housing stock within the existing historic fabric. The problem was to minimize loss of rent during renovation while reconfiguring the buildings in such a way that current and future household mixes could be accommodated. Although the first phase of the project has since been built with conventional construction methods, Tuinstad Zuidwijk intends to renovate other portions of its housing stock following the study’s proposals.

The renovation process, as outlined in the study, requires careful capacity analysis of the existing structure to see which alternative floor plans and equipment layouts are possible, given the constraints of structure, circulation, anticipated household composition, financing, construction procedures, and so on. This analysis would determine where openings in the existing masonry walls between units could be made to enable a wide variety of floor plans (even unanticipated ones) within the regular party wall pattern. At the same time, the design shows a new configuration for vertical access, provides new horizontal access corridors, adjust ceilings so that floor heights are uniform.

Plan at far left shows repetitive floor configurations typical of nineteenth century Rotterdam. A project proposed for the Riebeck district shows how varied plans can be achieved within this housing stock. In the renovated plans, right, structural bays and facade openings have been retained. By punching penetrations through the walls (a process known as ‘party wall editing’) adjacent bays can be combined. Levels can be configured independently, within limitations imposed by public stairs. Infill partitions line bearing walls, create interior walls, and when doubled provide fire barriers. Note bedrooms do not have closets, which are purchased as furniture.
throughout, and calls for the replacement of mechanical and electrical systems.

The study presented a plan that could provide 1,700 different dwelling units within a support that was uniform in principle. This consistency would simplify reconstruction of the old buildings into supports, even though the facades of the various buildings to be converted and integrated are quite varied, having been built by different owners at different times.

Plans called for the infill to be constructed from conventional materials and assemblies and packaged on the basis of dwelling unit "territories." The infill packages would be let to a single contractor. This arrangement would allow the exact decisions on unit plans, mix, and distribution to be deferred until well into the construction process. Single-source contracting of infill packages also reduces the need for on-site storage and reduces the time needed to finish a dwelling to approximately one week, by a work crew of five.

When the project is realized, few apartments will have the same plan, equipment, or finish specifications. The support/infill approach will have saved time as well, enabling the owner to recapture rent that would have been lost using traditional construction methods.

Japan:
Selling Houses Like Automobiles

By Hiroshi Watanabe

In the downtown showroom of a "dealer," one of a nationwide network of franchises that market and deliver industrialized houses in Japan under a certain brand name, the "home engineer," as the salesman calls himself, punches a few computer keys after consultation with the customer. In moments half a dozen floor plans have been retrieved from the tens of thousands of plans stored. With a little adjustment one of them ought to do nicely. Nearby, the prospective homeowner is perusing a laser-disk catalog and, with a word of advice from an interior decorator, is selecting kitchen appliances.

The week before, the customer visited a show house park nearby and looked over houses by different manufacturers. The houses included a cottage touted as "Tudor," a flat-roofed, pristinely white throwback to the days of doctrinaire functionalism, and a dwelling in Japanese farmhouse vernacular that suggested all the joys and entailed none of the backbreaking labor of working close to the earth.

He finally settled on what was, unknown to him, a vaguely Wrightian structure, with features usurped from the Usonian house. The brand name is one with which he is quite familiar. He is confident of getting a reliable product and is further reassured by the manufacturer's 10-year guarantee, 20-year maintenance service available for 365 itemized building parts, and 24-hour emergency service system. And not least, he is pleased by the cost, which represents savings over a comparably finished, "custom-designed" house.

In a couple of hours the design of the house is a quarter of the way toward being finished, and the remaining three-quarters will be left to someone in the back office who will spend half a day throwing together a set of standardized details and doing the necessary contract drawings.

With the contract signed and the building permit obtained, (and financing arranged, in part through an agency associated with the housing dealer) orders for house components are placed with affiliated plants.

A final pre-construction meeting to check drawings and to make last-minute revisions is held by the client, the salesman, the construction supervisor (likewise from the dealership), and a local subcontractor who will carry out the on-site work. About two weeks later, on the morning of day one of construction, five trucks bearing two modules each arrive at the site. Each module consists of lightweight, ceramic-like panels hung on a rigid steel box frame and comes with doors, windows, interior finishings, and services. The modules have been erected on a poured-in-place concrete footing before lunch time. Two weeks later, after wiring and plumbing have been connected and some finish work has been done, the new house is ready for occupation.

U.S. implications

As in the Netherlands, margins of profit are being squeezed out of the design and construction process of housing in the United States. Though our experience is to some extent different—in the Netherlands the government's role as a provider of housing has recently been reduced, and in the United States, that role was never large and what there was of it has long since been withdrawn—we nevertheless find similar demands placed on housing and our methods for producing it: efficiency, quality, equity, and affordability.

The normal strategy for increasing efficiency and reducing costs is to reduce variety and reduce the number of decisions made by independent parties. But our housing market is high disaggregated, and rightfully so, given the way our political economy operates. Our housing market expects a huge range of choices.

The lesson for U.S. architects and housing producers in the Dutch experience is that both variety and efficiency are possible, if we learn how to untangle yet still coordinate technical systems—not solely on the basis of technical performance, but also according to levels of control.
At its most streamlined, that is the process by which an indus-
ialized house by one producer called Misawa Homes can get
it in Japan.

Industrialized housing is big business in Japan and getting big-
er. To get an idea of its scale, one need only consult figures
released in July by the Japan Prefabricated Construction Sup-
pliers and Manufacturers Association, the industry organization.

It year 199,702 prefab houses (which is what industrialized
uses are called in Japan) were sold in that country, the highest
ure recorded since 1973 at the peak of a housing boom that
is subsequently dented by the energy crisis. In 1985 industri-
ized houses represented 16 percent of the total number of
using starts, the highest percentage on record.

The '60s and early '70s saw hundreds of companies enter the
fab housing industry in Japan. In recent years, the field has
nmed considerably. In 1985, the top five companies sold 80
cent of all prefab, single-family houses.

Despite their now-stable positions and the sheer size of their
nesses—in volume of sales the top three or four are in the
ne league as the major Japanese construction companies—the
fab housing companies remain, whether out of choice or
cessity, something of outsiders. They do not belong to the
iding Contractors Society to which giant, established construc-
ton enterprises like Kajima and Takenaka belong, and they take
part in activities sponsored by architectural academic circles.

Even a band of outsiders can have the odd man out. Misawa
omes is nearly alone among successful prefab housing com-
ies in being based in the Kanto area, the area situated around
kyo; the others are based in the Kansai region, centered on
aka. Misawa is also the sole prefab housing producer among
he top five that is concentrated in the housing industry; the
ners are affiliates of large industrial organizations or of a general
struction company. This commitment to housing as the pri-
mary focus of the corporation is coupled with Misawa's unique
reputation for technological innovation and shrewd marketing
techniques.

Misawa Homes is the largest producer of prefabricated, single-
family houses in Japan, and these days that means in the world.
In 1985 it sold nearly 22,000 prefabricated, single-family houses
—a figure that represents more than a quarter of the market.

Independent companies share technologies

Misawa Homes is at the center of a network of independent
companies. Misawa provides overall management, formulates
general marketing strategies, trains personnel, and, through its
subsidiary, the Misawa Homes Institute, undertakes research
and develops new products. The factories that fabricate build-
ing components and the franchises that deliver the houses to
consumers at the local or district level are independent enti-
ties, although Misawa Homes may have capital invested in them.

In that sense, little of what Misawa sells can really be called
proprietary—the basic construction technologies it employs are
shared throughout the industry.

Misawa Homes developed from a family lumber-supply
business in Matsumoto. In the '60s, under its founder, Chiyoji
Misawa, it began to market houses made of stressed-skin
wooden panels. Yositaka Utida, professor emeritus of the Uni-
iversity of Tokyo and perhaps the leading expert on building
systems in Japan, recalls the furor that these paneled houses
caused: "When Misawa began, it appeared to the architectural
world as a shocking venture business. Most shocking of all was
that Misawa proposed to build using glue, something experi-
enced Japanese architects, engineers, and academics had never
thought of doing. Why did Misawa? [Probably because] when

Salespersons at Misawa dealer show-
rooms, left, help customers adjust
standard plans for local regulations and
particular locations. The Misawa Expert
System simplifies the process of retriev-
ing plans and materials, in turn reducing
the experience required on the part of
sales staff. Factory, above, produces
PALC panels for use in Misawa homes.
Above, conventional poured-in-place concrete footings support prefabricated volumes, which are transported to the site on trucks. Right, local subcontractors, affiliated with Misawa, hoist volumes from truck using a separate crane. Most houses are comprised of seven to ten volumes. The size of each volume is limited by road transportation restrictions.

it began, the average age of the people at Misawa must have been under 25. They were full of youthful energy and knew nothing about the world. They had a daring born of ignorance. That was one of the strengths that contributed to its success.”

According to Utida, stressed-skin technology wasn’t anything innovative in itself. “The glue for making plywood was already on the market, though it hadn’t been used for building houses. In Japan there is a Building Standard Law determining, among other things, the way structural calculations ought to be made. What Misawa did was to ignore such things.” By bending the rules slightly, Misawa was able to produce units that were particularly cheap and easy to construct—and they sold well as a result.

Today Misawa uses panels for exterior walls, floors, partitions, and roofing and classifies them according to structure, sheathing, connection, insulation, size, and configuration.

Changes at Misawa’s largest panel plant, in Matsumoto, indicate trends in the prefab industry. At first, it was producing small panels but gradually shifted to large panels (up to 3 x 4 meters) to reduce on-site labor. More recently the plant has converted to the production of a range of panel sizes, in sequence and in small runs, to provide “free size” options and reduce inventories. Currently, there are three basic housing models with up to 300 options, requiring up to 400 panel sizes per model.

Misawa’s most significant innovation has been the introduction of a noncombustible alternative to its wood panel system. Wood is cheap, but Japan has a long history of major urban fires. In April 1981 Misawa began production of what it called a “new ceramic” product—precast, autoclaved, lightweight ceramic (PALC), made of silica, limestone, water, and additives. These ingredients are mixed into a slurry that is then aerated, poured into molds and, after hardening, autoclaved at high temperature and pressure (180 degrees centigrade and 10 atmospheres). PALC is fire- and corrosion-resistant and has great compressive strength. It can be molded into differently sized and patterned panels and, because it acquires its shape very quickly, makes production efficient. Although PALC can be used in a variety of structures, it is most economically and most often used as wall panels hung on a rigid steel box frame. Japanese road regulations determine the size of this module, which is 14.8 x 9 x 7.5 feet.

Presently there is one factory in Nagoya producing PALC panels, and PALC houses account for about 10 percent of Misawa houses sold now in Japan. Misawa sees this expanding to 25 percent in four years.

In contrast to the stressed skin panels, PALC was a true technological innovation on Misawa’s part, earning the company new respectability. That Misawa spent 13 years and $35 million (of which only $6.6 million came from the Japanese government) indicates the urgency of the company’s search for an alternative to wood.

The real innovations are in marketing

James McKellar, director of the Center for Real Estate Development at MIT, notes that any assessment of the Japanese prefab industry must deal with its marketing strategies as well as its innovative technology. Marketing “is every bit as sophisticated, if not more so, as the automated production lines, CAD/CAM systems, and robotic assemblies seen within the Japanese factories,” he says.

Of particular interest is Misawa’s system of franchises. (National, a competitor, has a limited franchise network, but that is another story.)
OVE, workers set volume—complete with doors, windows, interior finishes, and services—into place. All of the volumes of a house can be positioned in less than a day. Two more weeks of construction are required (for wiring, plumbing, and finish work) before a house is ready for occupancy, right.

Dealers on dealers in the automobile industry—"customize" uses to meet the needs of individual consumers and consequently assume some of the responsibilities of architects. The dealers rely on several different methods to attract customers. One is the show house park, in which a number of model houses are built cheek by jowl, often on expensive downtown sites. In the past, up to 80 percent of sales was generated in these parks, but this figure has steadily declined; today the parks account for 30 to 40 percent of sales.

Introductions provided by past customers, contractors, and associated enterprises have become more important as a means of generating business, and today account for about as many sales as the show house parks.

Show house parks and introductions are passive approaches that the dealers wait for customers. That sufficed in the '60s and early '70s (the "first golden age" of prefab housing) but today dealers need to be more aggressive. One approach they are taking is called the "roller strategy." Instead of building show house parks, the dealers use occupied houses in advertising campaigns. Before the construction of a house with low potential, the dealer reaches an understanding with the customer: In return for certain discounts, the customer allows the dealer to bring possible clients around to the house in the future. The dealer may install extra features that will make the house more attractive. This roller strategy enables the dealer to introduce products to a wider audience and to "localize" his approach, and generated nearly 36 percent of sales in the Tokyo area last year.

The salespersons at Misawa Homes go through specialized training, and among the courses they take is one in simple planning techniques. After this, any training in design they receive on the job. In dealing with clients, Misawa's salespersons are expected to be able to draw simple plans, but any presentation of an elaborate nature is done by the design section of the dealership.

One marketing strategy that Japanese prefab makers, though not Misawa, are initiating involves the use of name architects. Sekisui House, Misawa Homes' main rival in the field of prefab housing, will be launching at the end of August a campaign to sell houses designed by a number of young, "avant-garde" architects, including Itsuko Hasegawa, Kunihiko Hayakawa, and Toyou Ito. These architects have designed "general solutions" that have been described as pret-a-porter (i.e., high-class, ready-to-wear) houses, and every time one of his or her designs is used, the architect will receive a "royalty." In addition, the architects have adapted their designs to five adjacent sites in Kamakura for specific clients. (Bringing together well-known architects to do buildings on adjacent sites has been attempted several times before by real-estate developers in Japan but never by prefab housing manufacturers.) Kobori Juken, another maker, has commissioned architect Kan Izue to do a "limited edition" of houses.

Many architects welcome the chance to do prefab design. Hayakawa, for instance, sees this as an opportunity to bridge the gap between architects and the general public.

But Chiyoji Misawa, himself a former architect, takes a generally dim view of name Japanese architects. "Nothing more can be learned from them. We'd like to teach them a thing or two." Misawa is willing to concede, however, that there may be things still to be learned from Western architects, and indeed Adele Santos of the Department of Architecture at the University of Pennsylvania has been a consultant for Misawa for three years. Even so, architects play only a small role (as interior designers) in Misawa's vision of the future. The house will be designed by a team of specialists including engineers, sociologists, and medical experts.

According to Misawa, studies show that children who live in
rooms on lower floors are socially more adept—because they can more readily go out and mix with friends—and presumably such findings will be reflected in designs. It is also hoped that eliminating house-related causes of diseases such as respiratory ailments will enable Misawa to boast that “those who live in a Misawa house live longer.” Such concerns, which might be characterized as social engineering, motivate Misawa, not avant-garde esthetics.

What role does Misawa hope to play internationally? At the moment, there are various impediments to outright expansion. To correct an egregious imbalance in international trade, Japan is being urged to stimulate its domestic economy and to rely less on exports. Moreover, a strong yen is making Japanese products more expensive abroad. Nevertheless, interest is being shown by numerous parties eager to tap Misawa’s know-how. A PALC factory in South Korea will eventually produce panels not only for the Korean market but for franchises in the South Pacific, thereby circumventing the effect of the strong yen. Third-world franchises may conceivably supply Japan in the future. In China, Misawa is building an international foreign community in Beijing, the so-called Guan Ming Fresh Town; everything, including PALC panels, will be imported from Japan. There is talk too of a hotel in Kunming and facilities in Tianjin.

As for the United States, many possibilities are being mulled, including licensing, extending franchises, and building factories. Misawa is aware of the differences that exist in the two countries in everything from demography to unions, and is understandably cautious. Tohru Konishi, general manager of the international development division of Misawa, is quick to emphasize that local people understand best local demands, regulations, and culture. Reputable and capable local people, he insists, should be at the center of any cooperative venture with Misawa.

Internationalization is a word in frequent use in Japan to describe the country’s more activist stance on the world stage. However, that is only one of a whole set of changing conditions that is affecting Japan and Misawa. Of greater immediate concern is the question of how an industry that was originally geared to produce low-priced houses through mass production can remain competitive as it adapts to a diversifying demand for better quality homes. Misawa’s answer is to innovate both its technology and its marketing techniques, and in this it is living up to its reputation.

Misawa appears eager to meet the challenges of these transitional times. In Chiyoji Misawa’s view, the last time the Japanese introduced significant changes in the way they build their houses was 400 years ago. Speaking with more than a touch of impatience, quite as if he had personally been kept waiting all those centuries, he says it’s about time for a change.

Sweden:
Manufacturers Customize Kits of Parts

By Arnold J. Aho, AIA

The roots of Scandinavia’s housing industry lie with the Vikings, who carried cargoes of essential wood and pre-cut timbers in their migrations westward to settle the treeless islands of the Faroes, Iceland, and Greenland. By the middle of the 19th century, Swedish factories were prefabricating log houses that were shipped in pieces to distant construction sites. Today, more than 96 percent of all houses built in Sweden are of wood, and 80 percent of these are produced industrially.

The modern manufactured housing industry in Sweden blossomed in the 30 years following World War II, when the population in Scandinavia—and consequently the demand for housing—increased dramatically. Shifts in population centers due to war reparations and migrations due to change from an agrarian to an industrial economy added to housing shortages. As late as the 1970s, the Swedish government established the goal of building one million housing units within 10 years. Long winters and limited daylight hours make the construction season in Scandinavia very short. Given the number of housing starts, methods to quicken construction became essential. Additionally, a high standard of living, high wage rates, and strong trade unions necessitated efficient labor methods and the elimination of nonproductive time caused by weather, material and supply delays, and construction scheduling.

It was not merely the need to build more units that sparked the development of the Swedish manufactured housing industry, but also the need to improve housing quality. For instance, when the energy crisis of the early 1970s underscored the petroleum dependency of this part of the world, Scandinavian began to demand greater energy efficiency in their dwellings. Energy consumption in Swedish homes was reduced by 29 percent within a 10-year period, in part because of stricter codes based on government-sponsored energy-research programs. Factory-manufactured housing offered the means to achieve quality control of components, manufacturing, and construction methods, not only from an energy-conservation standpoint but also in terms of dimensional tolerances and the quality of

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An organized team approach

Partly encouraged by the service-oriented nature of Swedish society, with its concerns for safety, pollution control, and workplace quality, innovations in industrial equipment and processes became available to the manufactured housing industry. The most significant breakthrough made in recent years by Swedish housing producers, however, was not in hardware fabrication systems, but rather in their recognition of the multi-disciplinary nature of the housing industry.

The Scandinavians have evolved a procedural system for the design of manufactured housing that accommodates equally all the parties involved in the building process: architects, researchers, manufacturers, building contractors, financiers, code authorities, and, of course, consumers. In the last 20 years, this joint participation has made new-house ownership easy and attractive for the consumer. Initial unit costs have been lowered and made more predictable by reducing the amount of labor and cutting construction time. Manufactured houses in Sweden cost 25- to 40- percent less to build than their site-built contemporaries. Moreover, most systems available today can be built in less than one month, one-fourth the time required for traditional construction. A single house can be fully enclosed one day, with occupancy within two weeks.

Manufactured houses have also demonstrably exceeded the quality found in comparable site-built houses by using higher quality materials and employing careful control, and consumers are assured of this by full guarantees. Financing packages to make home-buying easier, including a government-sponsored mortgage loan guarantee program, have been integrated into the home purchase. Finally, code inspections at the factory simplify building-code compliance for the set of standardized building components.

Under this systemized approach, Swedish houses come as a complete package of components, including all exterior and interior finishes, equipment, fixtures, appliances, and built-in furnishings. Because the houses are seen as industrial products, a name and a reputation become affixed to them by brand. In both Finland and Sweden, the general public is as familiar with the brand names of manufactured houses as Americans are with Detroit’s cars.

Unlike most industrial products, however, the manufactured house accommodates considerable design flexibility to satisfy individual consumer’s requirements, site-specific restrictions, and municipal concerns. The design phase for Scandinavian systems allows the customer to actively participate in developing an individualized house.

Panels, complete with interior and exterior finishes, can be pre-fabricated for virtually any style of house. When construction is complete, there is no visible difference between panelized and conventionally constructed houses. Shown is a demonstration model.
vidualized program and design. Thus, the factory produces what is essentially a custom house for a particular buyer using standardized elements and details.

Houses need not be purchased as complete, finished units. For example, the owner might purchase only the exterior shell with the intention of finishing the interior on his own. The manufactured house also allows for future replacement or upgrading of the individual subsystem components or equipment, although some limits are imposed. Small components from different sources may be interchangeable, but most large building components must be obtained from the same manufacturer.

The unit design and building process

A family interested in building a house goes to a storefront sales office featuring a particular brand name. The offices are found in nearly every moderately sized city. The family brings its own thumbnail sketch of a plan, or peruses a standard design catalog, then selects a plan that most closely approximates its needs. At the many offices equipped with CADD, it can call up the plan on a monitor. Any desired changes, such as adding a room, are plugged in, and the family sees the plan change instantly.

Design changes are welcomed and easily accommodated. Approximately 90 percent of the manufactured housing produced is customized to suit a particular family's needs, and architects often figure significantly at this stage. Many of the larger manufacturers' offices retain staff architects and engineers who help customize the house design as part of the sales package. Alternatively, the family may hire a private architect to accompany them to the sales office and act as a design adviser.

Of course, architects also participate in designing the basic plans developed by the manufacturers' offices. It is becoming common practice for architects to form partnerships with manufacturers and financiers as joint owners of manufactured housing shops.

Once the basic plan design is resolved, the computer (or a salesperson) prompts the family through a broad range of choices for the various finishes, fixtures, colors, etc. As these decisions are made, computer screens display the updated cost of the house. Then the computer draws a perspective line drawing of the house; some manufacturers even produce a computer-drawn, full-color perspective rendering.

Thus, the family leaves the sales office with completely tailored plans, knowing exactly what the house will cost. The purchasers also have all the documents necessary to secure mortgage approvals, because the lender knows that the manufactured house meets all code and specification requirements based on prior approval of components.

There are three basic types of housing systems used extensively in Scandinavian countries.

The modular volume system consists of a room, or series of rooms, completely fabricated at the factory and shipped to the construction site. The only on-site work consists of providing foundation (often quite minimal) and connecting the utility services. Modular volumes make the most sense on remote sites or in areas where skilled trades are not readily available.

The major drawbacks to the volume system are the dimensional restrictions for transporting the units and the need for a high-capacity crane to hoist them onto their foundations. The size of the units makes long-distance shipping (such as for export) impractical.

The large panel system, currently the most popular system Site erection is usually performed by a factory-licensed contractor, although a number of manufacturers offer their own erection crews. The house is delivered to the site in one or two crane-trucks, with the driver/crane operator unloading the sequential packages and positioning the panel elements.
Scandinavia, consists of entire wall or partition-sized panels, as well as composite floor and roof panels or trusses. The wall panels are full-wall height and usually exceed four feet in length. The panels include windows and doors already installed and exterior and interior finishes.

Polyethylene film protects the interior finishes on the walls during transportation and placing. The film is then pulled up from the bottom and secured to form the vapor barrier on the ceilings. Plastic electrical conduits and plumbing lines run forward through the panels; they are usually connected in the attic space. Bolts structurally integrate all the panels.

Construction of the panels is very similar to standard wood stud construction, except that the studs are equivalent to two-by-sixes in size. With the addition of 2x2 horizontal furring on the outside of the studs, the exterior wall panels can accommodate eight inches of insulation, with very little through-wall void to serve as a thermal short-circuit.

Though wood stud construction is the most frequently employed for panel fabrication, several Scandinavian manufacturers are now working with urethane foam-core panels or other composite-material sandwich panels.

The advantages of the large panel system include the high tolerances and precise fitting of all system components. Joints are kept to a minimum. The major drawback is the need for a long-reach, fine-control crane. Most large-panel manufacturers deliver the house to the site on trucks equipped with this type of crane. The driver, who is also an experienced crane operator, then stays on the site to place the panels. The entire weather-tight shell is erected in one or two days, and the remaining work can be completed within approximately 11 days. Most houses exported from Scandinavia today employ the large-panel system.

The third type of system in use is the small panel system, consisting of modular panels approximately four feet by eight feet in size. The interchangeability of solid wall panels, window panels, door panels, and other stock units permits some modifications during construction. The panels can be erected with no specialized equipment by three people, typically a carpenter, a plumber, and an electrician. From the foundations up, the entire process can take as little as 11 days to occupancy. This system, in which the panels can be delivered painted, papered, and fully finished, clearly has potential to be owner-built. Panels are usually of wood stud construction with various sheet materials, such as plywood, laminated to the exterior and/or interior.

Similarities between Scandinavia and the United States, in terms of climate, population density, and, most importantly, the need to produce lower-cost and higher quality housing, make this country fertile ground for the seeds of a manufactured housing industry. Whether Swedish companies develop a viable market in the United States or American companies emerge to fill this need remains to be seen. But there is little reason to believe that, in one form or another, Scandinavian technologies will stay out of the United States for long.

Manufacturers say they are capable of precise methods of joinery and fabrication not attainable in the field and claim to waste less than four-tenths of 1 percent of raw material.
Change comes slowly to the U.S. housing market. Like television programming, most housing is designed around some market researcher's idea of what people like. The basic product hardly ever changes—few builders are willing to compound the inherent risk in the housing market by offering a truly innovative product. Instead, they offer competitive amenities: the icing on the cake. One year it's hot tubs; the next year it's decks and greenhouses.

If the National Association of Home Builders' Research Foundation has its way, within five years new American homes will feature a more fundamental improvement: a 'smart house' wiring system that provides integrated control and communication between various home appliances and equipment. To that end, NAHB/RF is encouraging American manufacturers to pool R&D efforts to establish a new standard wiring interconnection method and data communications protocol that will enable the manufacturers to create products that work together in a modularized electrical/electronic network. The concept offers the potential for coordinating the technical developments necessary for real improvement of residential wiring systems, without undermining the incentive offered by the open marketplace.

Builders think the 'smart house' is a great marketing idea. Smart-house gadgets would be available only in houses specially wired for them, creating an incentive for purchase of newly constructed houses. Of course, the consumer will be captivated by the new gadgets; but more importantly, the smart house actually represents a significant improvement in home wiring—safer, more advanced, and less expensive home electrical, electronic, and communication systems. Despite the potential, however, it's not yet clear how many manufacturers will be willing to take the plunge and sign licensing and royalty agreements.

The heart of the smart house is integrated wiring, which is not a new idea. Readers may be familiar with Brand Rex Cable, which is also known by the tradename of "Tri-Con." Tri-Con is an integrated wiring product manufactured by Brintec Corporation; it combines one wire for power, a twisted pair for communications (one for digital and one for analog), and a coaxial cable for audio-visual signals into a single bundle. The benefits are a reduction in wiring clutter and labor expense—you drill one hole and string one cable. The smart-house system would use a similar integrated cable. Brintec has signed up to manufacture it.

David McFadyen, president of NAHB/RF and the inspiration behind the foundation's smart-house project, aims to take integrated wiring a step further, producing a system that connects every electrical and electronic device in the house to a local area communications network. In the smart house, the electrical outlets in each room will have both power prongs and con-

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For communications. Separate gas appliance outlets will be provided so that gas equipment can also be hooked into the smart-house communications network.

A centralized controller will distribute electrical current as needed—to monitor energy use, control each device according to preprogrammed instructions, and alert the homeowner to functions (see “How the Smart House System Works,” page 1).

The possible uses of this integrated electrical/electronic/communications network are endless. In the morning, the heating or air-conditioning and hot water could be programmed to turn on automatically a half-hour before the wake-up alarm is off. Coffee would start perking, and a favorite radio or television program would turn on. The homeowner could program the clothes washer to send a message across the television screen when it finishes a cycle. He or she could call home from the office and tell the oven to begin cooking the roast. The oven could program the house to “act alive” while they are away on vacation and to notify someone if something goes wrong. And so on.

Of course it is already possible to custom design an integrated wiring and control system to regulate the electrical and electronic devices in a home. Such systems can turn devices on and off at preprogrammed hours. The smart-house system would differ in two important ways: First, the wiring and the interconnections would be standardized and modularized, eliminating the need for custom design and enabling the homeowner to add new devices to the system as needed. But the really revolutionary difference is that the devices manufactured for the smart-house system will be able to “talk back” to the controller. For example, a smart oven will tell the controller its temperature and which stove-top burners are lit—not just whether it is turned on or off.

Silicon chips in the appliances and home equipment would be linked to programmable switching devices in the controller. Initially, NAHB/RF says, the switching devices may be electromagnetic, but as soon as less expensive semiconductors are available, they will be used.) All of the components would be able to interact, since all would function with a uniform communications “protocol” (computer language).

Will the smart-house concept really fly?

NAHB/RF plans to have smart-house products commercially available by late 1988 so that architects can begin specifying the products in houses that are on the drawing boards early that year. But even if the smart-house project doesn’t fly—or doesn’t fly that fast—all the concepts are based on existing technology. Clever designers can integrate the functioning of many electrical and electronic systems in the house right now. You can’t yet specify kitchen appliances that “communicate,” but you can integrate a variety of sensors, timers, and programming devices with existing HVAC equipment, security systems, and various appliances.

Energy efficiency is one of the potential benefits of smart-house technology. Setting back thermostats for nighttime and letting the house unoccupied is an obvious way to save energy. Programmable HVAC and lighting systems combined with occupied timer. By controlling the amount and type of current flowing to the appliance and programming timing operations, the central controller would replace the functions of many components.

But how much would the smart house cost? NAHB/RF estimates the wiring systems and controllers would add 30 percent to the $2,000 to $5,000 cost of installing conventional wiring in a new house. That’s not a prohibitive price for a technology offering appealing amenities, with the chance to save lots of money on heating, cooling, hot water, and electricity bills. The vastly improved quality of the wiring also helps minimize lightning and shock hazards, and the controllers provide a more even supply of electrical current to sensitive electronic equipment such as home computers.

What family would want to get rid of all their existing appliances just because they’ve bought a new house? Again, good news. Adapters would be available for conventional devices so they could be operated on the smart-house wiring system. They would operate just as they do in a conventional house but could not link into the communications system. They would not have the all-important silicon chip.

A new kind of plug is the key to NAHB/RF’s smart-house project. The integrated wiring system will accommodate power, interactive communications, and audiovisual signals.
Smart houses will use a closed loop power distribution system. Outlets will not be energized until an appliance is plugged in and "requests" power from the controller (this feature not only saves energy but helps reduce the risk of electrical shock). Using a low (12 volt) signal, the "smart" device will tell the controller how much power is needed, specifying a minimum and a maximum rate of flow of electric current or gas (for example, 120 volts AC at 5 amperes). Conventional appliances will be equipped with adapters that request the usual amount of energy. The power will shut off automatically if the flow falls outside the nominal ranges.

Electricity entering a smart house will flow first to a power-conditioning module that will even out the voltage flow. Power will then be distributed as requested in the following forms:

- **120/240-volt alternating current (VAC).** This is conventional electrical power, except that the current flow is monitored by the closed-loop circuitry. The use of 240 VAC is limited to selected fixed appliances connected to dedicated circuitry.

- **48-volt direct current (VDC or "utility power").** DC motors are becoming more popular in appliances because of their greater efficiency, resulting smaller size, greater versatility in speed control, and reduced noise. Most electronic equipment functions on DC power, which is safer at this voltage than conventional 120 VAC.

- **12-volt direct current.** This supply will be used primarily to power smart-house control electronics and sensors. It will be delivered from an uninterruptible power source.

- **Phase-fired 120-volt alternating current.** This is available primarily for controlling lighting levels.

The controller will also be able to handle signals from sensors that detect specific odors, smoke, heat, sound, light, or motion. Those applications become particularly significant when combined with the smart houses' ability to handle audio and video signals. These signals include telephone voice and data communications, sound and image distribution, as well as interactive cable TV.

Eventually, smart-house systems would include speech generation — so the house can talk. Although that sounds silly, it's a feature that can be of real benefit to the elderly and disabled. For example, if motion detectors sense no movements for a specified period of time, speakers could ask the occupant if he/she is all right. If there were no response, the system could call for help.

Though participants have agreed on this overall system design, the component details have not yet been worked out, according to Tim Ballard, an architect and engineer working on the NAHB/RH staff. For example, the controller hasn't been designed: the decision whether to use electromechanical relays or semiconductors is yet to be made. "A lot of people are going to have to spend a lot of time hashing out the details of the interconnections," Ballard says. "Coordinating the designs of products from a lot of different companies is difficult."

Everyone agrees that it's imperative that the programming devices be "user friendly," so that even the computer-shy will feel comfortable using the smart system.
Fuzzy sensors make zoned heating and cooling an attractive option. Space conditioning would be provided only to the areas where it is needed, and only when needed. Photocells and variable-ballast systems would make it possible to reduce lighting levels in occupied rooms to the exact levels needed to supplement natural daylight. Combining other energy-saving technologies such as passive-solar design with automatically controlled central HVAC back-up would further increase energy savings.

Business, not technology, is the major practical barrier to development of NAHB/RF's smart house. One major hurdle was overcome in October 1984 when the National Cooperative Research Act was passed, eliminating possible antitrust barriers to the cooperative development efforts necessary to bring the smart house to life.

Another big problem was solved in December 1985 with the passage of changes in the National Electrical Code (NEC). The 1984 NEC doesn't fly it will be because there were too many lawyers involved in the form of the licensing documents—Some big companies are seriously considering signing on, but the decision would depend not only on the results of market research currently under way. "We can't tell whether there is a market for this, or for which products, until the research is completed," Sizer says. Whirlpool's president John W. Norris Jr. says, "We envision the smart house to be the ultimate in house comfort but also in energy management. They will require less maintenance, offer remote control, and overall system design and coordination by NAHB/RF. The goal is to have the system components available by late 1988.

At this writing, only two companies have signed up: Lennox, which will manufacture gas and electric furnaces and electric heat pumps; and Brinetc, the integrated-cable manufacturer. Lennox president John W. Norris Jr. says, "We envision the availability of smart-house heating and cooling systems providing not only the ultimate in house comfort but also in energy management. They will require less maintenance, offer remote control, and automatic diagnostic capabilities, and will accommodate multiple-zone installations easily and affordably."

But a more typical viewpoint is expressed by Whirlpool spokesman Carol Sizer, who said the appliance manufacturer was seriously considering signing on, but the decision would depend on the results of market research currently under way. "We can't tell whether there is a market for this, or for which products, until the research is completed," Sizer says. Whirlpool's results are not expected until early 1987.

"There is a lot of opposition to this," admits George Graeber, president of the Electronic and Industrial Cable Group at the Brand Rex Cable Division of Brintec. "The opposition is related to the form of the licensing documents—Some big companies have policies against technology licensing and royalties. If this doesn't fly it will be because there were too many lawyers involved—not because it wasn't a good idea." ❄️

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Design/Build Methods Mature

Release of new AIA documents reflects steady rise in the use of this delivery process

Christopher Wist

Despite its increasing acceptance in recent years, design/build still sparks heated debate among architects. Advocates claim that it helps control costs, increases efficiency, and promotes accountability within the construction industry. Contractors maintain that it raises serious and as yet unresolved legal and ethical problems. Both sides agree, however, that sign/build as a project delivery method represents a significant departure from the way in which American architects, owners, and contractors have structured their legal relationships most of this century.

In the conventional project delivery method, an owner enters into two separate contracts: a design contract with the architect and a construction contract with the contractor. For owners, the alternative concept of “single-point responsibility,” hiring one entity to be responsible for both design and construction—holds great appeal in terms of perceived economies, speed, and flexibility.

From the architect’s standpoint, the design/build debate revolves around the question of whether anyone with a financial stake in the construction of a project can serve the best interest of the owner above his or her own. The roots of this discussion predate the founding of AIA when, in the early 19th century, architects were engaged in fierce competition for contracts with design/builders who called themselves “package dealers.” Like their modern-day counterparts, package dealers provided both design and construction services to owners.

To create a legitimate distinction between themselves and package dealers, architects adopted a system of professional ethical principles that, among other things, placed the client’s interests above those of the architect. Not surprisingly, the standards also prohibited architects from acting or holding themselves out as design/builders. This prohibition was carried forward into AIA’s mandatory code of ethics and was not seriously questioned for more than a century thereafter.

By the 1970s, however, dissenting voices from both inside and outside the profession began to argue that the ethical prohibition against design/build was an anachronism. AIA in 1978 authorized a three-year trial period during which members could be permitted to engage in design/build work. Before the experiment was completed, however, antitrust questions encouraged AIA to drop its mandatory code of ethics (including its prohibition of design/build) in favor of a purely voluntary statement of ethical principles. In 1986, the AIA again adopted a mandatory code of ethics. The new code does not prohibit design/build, but nonetheless targets it as a potential conflict of interest. Many insist design/build violates professional ethics.

“We think that [design/build] is bad for [AIA] and for the public,” says Barbara Rodriguez, executive director for the New York State Association of Architects. “I just read an editorial in the New York Times expressing concern over the fact that so many physicians in America are now employees of health-care organizations rather than independent professionals. The author was worried that these doctors might put their employers’ interests above those of their patients. Substitute the word ‘architect’ for ‘doctor’ and ‘client’ for ‘patient,’ and you have the principal argument against design/build in a nutshell.”

Norman Coplan, legal counsel to the New York State Association of Architects, agrees. “Design/build is conducive to a diminution of the architect’s obligation to the public,” he says. “Architects can no longer exercise their unfettered judgment to promote the public’s safety, but must keep within the economic confines imposed by their employers.”

Design/build’s proponents, on the other hand, deny this charge. “The quality of materials specified depends on whether or not it’s a ‘high-image’ building,” says Thomas W. McInerney, chief of architectural productions for the Mt. Pleasant, Ill., office of the Opus Corporation, an 800-person design/build firm headquartered in Minneapolis with $200,000,000 worth of construction to its credit in 1985. “The owner is given a range of choices that fit within his budget, and he will often make the final decision.” McInerney adds, “Design/build has opened up new opportunities for architects [and] added a different dimension to my career growth. I’ve really been enjoying myself.”

Perhaps the most attractive (and most controversial) claim made about design/build is that it is a less expensive process than the conventional project delivery method. According to Richard Wilberg, marketing director for Opus, a given project can almost always be built at a lower cost using design/build.

Even some of design/build’s detractors, such as Rodriguez, concede that design/build “may possibly” offer some savings in cost. Other critics, however, are not as charitable. In testimony before an Indiana state construction committee, Jesse Jones, president of Glenroy Construction, a 400-person company based in Indianapolis, stated that design/build is not less expensive than the conventional approach to construction.

According to Jones, “There’s no free lunch, and if you’ve got five [architects] out there doing designs, sooner or later, they’re going to get paid for it, or they’re not going to participate.”

As to the question of time savings, however, few will deny that the streamlined, single-point-of-responsibility organizational structure of design/build gives the design/builders far greater control over the entire design and construction process, therefore increasing the potential for completing the project in less time than the conventional approach.

Christopher Wist is director of legal research for AIA’s documents program.
Contracts define the architect’s role

As far as owners are concerned, ultimate responsibility for all aspects of a design/build project rest with only one entity. However, within the design/build team, players may divide responsibility in a number of ways. Different contract agreements define the role that architects play in the process. Many variations within the basic framework are possible, for example:

- The design/builder may be an individual or corporation that obtains design and construction services from architects and contractors who are in its direct employ;
- Design/build arrangements may take the form of partnerships or joint ventures, such as between an architect and a builder;
- The design/builder may be an autonomous entity that parcels out the tasks of design and construction to independent architects and contractors, much as an owner does under the traditional project delivery method;
- Architects or contractors may act as the design/builders, and obtain from other sources those services they cannot personally provide.

A variation on the basic design/build process is called design/build/bid. Design/build/bid involves several design/builders competing for the contract to build a single project. Competitors typically prepare proposals based on a set of preliminary criteria prepared by the owner, who normally employs a separate architect to develop scope drawings and outline specifications. Insofar as several design/builders are in direct bid competition, design/build/bid closely resembles the conventional method of project delivery.

To help architects structure these various agreements, regardless of the form, AIA in 1978 initiated an intensive effort to develop standard contract forms for design/build. This effort culminated in the publication of AIA’s family of design/build documents (AIA documents A191, A491, and B901) in 1985.

The basic AIA design/build document, A191, is intended for use between the owner and the design/builder. The other two documents are intended for use by the design/builder and third parties: A491 is for construction services, and B901 is for architectural services.

Robert Paul Dean, AIA, a member of the Institute’s documents committee who helped write the trio of documents, explains: “Each of the three design/build documents comprises two agreements, intended for sequential execution. The part one agreement in each case roughly encompasses the traditional phases of programming, schematic design, and design development. The part two agreement generally parallels the traditional phases of construction document preparation and actual construction. The two agreements acknowledge that preliminary services might result in a decision not to proceed. In that event, the parties might conclude their contractual relationship without executing Part Two. In other circumstances, the parties might use Part Two without ever having entered into Part One.”

A key feature of AIA’s design/build documents is that they do not create any professional relationship between the owner and architect, unless the architect is a principal of the design/build organization. Both documents A191 and B901 provide that: “Nothing contained in the design/build contract documents shall create a professional obligation or contractual relationship between the owner and any third party.”

Stephan Bricker, AIA, vice president of the design/build firm Arbor Health Care Inc., states that “the relationship between architect and client is, if anything, closer in design/build than in a traditional practice. You’re more involved with the client in all aspects of the project, from site preparation to providing furnishings.”

Others believe that owners involved in design/build projects are less interested in specifics than those working with conventional project delivery methods. According to Richard Wilberg, owners in simpler design/build projects often play a minimal role in the process, at least after the construction has begun. In other circumstances, design/build owners are primarily interested in purchasing a usable “finished product” and is not particularly concerned with the interim steps needed to create it.

Will design/build work for you?

In the final analysis, the question of whether design/build is the right approach for a given firm or project depends upon a multiplicity of factors. In addition to choosing among the various contractual agreements that a design/build project may take, individual architects and firms should consider the following:

- **Insurance:** Ten years ago there was a serious question about whether the insurance industry would be able to underwrite policies for architects practicing design/build. In part, these fears have proved to be unfounded. Professional liability coverage is generally available for architects who work on design/build projects. This insurance, however, is typically limited by exclusionary language stating that coverage does not extend to an “equity interest” that the architect may have in the design/build entity. Thus, all things being equal, an independent architect who is hired by a design/builder as a consultant (but not as an employee) should have no more trouble obtaining insurance than an architect practicing in the traditional manner. An architect who enters into a design/build contract in a role other than consultant, however, faces the potential loss of any investment made in the design/build entity, even though he or she will still be insured for professional liability. Architects contemplating entry into the design/build field should first consult with a reputable insurance counselor.
- **Internal Practice Management:** Some architects involved in design/build have noted that a “natural division” exists between the design and construction departments of their firms. Often, such departments will keep their own separate books and records. In some cases, it has even been found desirable to maintain separate payrolls within the same firm. Some architects in design/build firms have experienced difficulty in working with a partner who is not a design professional and who does not fully appreciate the intricacies and demands of the design function.
rilders from using certain business arrangements, although the
prohibition is not usually phrased in explicit terms. For exam-
ple, certain states bar some forms of corporations from prac-
ticing architecture. In those states, a design/build corporation
must hire an independent architect-consultant to provide design
services, even if it has several registered architects on its pay-
roll. Other considerations, such as partnership liability, may also
fluence the choice of business format.

Licensing: Design services under a design/build contract
would be provided by a registered design professional licensed
to the state of the project. Moreover, some states, including
New York, prohibit architects from rendering services to an
owner through an intermediary. (Of course, when the architect
is a principal of the design/build entity, there is no intermedi-
acy between the architect and the owner.) On the other hand,
because of business and insurance reasons, architects may want
to shield their practice by creating a separate design/build
organization.

Warranties: The design/builder usually makes warranty-like
presentations concerning the overall quality of the completed
building. Generally, such warranties are not made by archi-
tects or contractors in the traditional project delivery method;
the owner is responsible for the sufficiency of the drawings and
design to suit his or her particular purposes. In design/build,
however, the owner will often provide the design/builder with
little more than a basic program, and then will rely upon the
design/build firm to come up with a project that meets it.
In effect, as a design/builder an architect sells a “finished
product”—and a promise that the product will meet the owner’s
stated purposes.

In the end, design/build, responsibly performed, offers three
major benefits to architects: greater control of the execution
of the design; fewer cash flow fluctuation problems; and, accord-
ing to Bricker, a greater incidence of repeat customers. Two
major disadvantages are greater liability as the result of greater
control and a greater amount of up-front capital needed to
acquire heavy construction equipment and to sustain a work
force, unless a design/build firm is formed by an architecture
firm and a contractor joining forces.

Only time will tell if design/build is just a passing phenom-
enon or a permanent addition to the American construction
industry scene. What is certain, however, is that design/build
is finally attracting the interest that its proponents have long
argued it deserves. Its future development merits the contin-
ued attention of individuals with a serious interest in the evolu-
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In 1985, according to the U.S. Census Bureau, approximately 168,000 single-family houses were built by their owners—enough dwellings to house the population of Pittsburgh. Each year, owner-builders produce between 15 and 20 percent of all the single-family houses built. Economy motivates most owner-builders, who can save as much as a fifth of the cost of a new house by purchasing materials and coordinating construction. Those who swing their own hammers can save even more.

Whether they personally build or act as contractor, most owner-builders want to design their own houses. In comparison to the information available for learning how to build a house (which can be found in books, magazines, and on television), information on designing a house is scant and most owner-builders resort to stock plans. Owner-builders thus represent a segment of housing producers who could benefit from the services of architects, and through which architects could have a greater impact on housing design. Fees for conventional design services, however, are beyond the economic reach of owner-builders who are looking to cut housing costs.

A unique and illuminating resource for owner-builders hoping for a more personalized design than a stock plan, and an design of houses for middle America, is the Yestermorrow design/build school in Warren, Vt. The school, which was started by John Connell, a practicing architect interested in building, began instruction in 1980. Currently there are about 40 owner-builder schools around the country where people can learn hands-on building and construction. Connell explains that most schools concentrate on a specific construction method—such as platform framing or post-and-beam—with little or no emphasis on the design of the house. In contrast, Yestermorrow's instruction, in the form of a two-week course, focuses on design, guiding the student in producing a workable floor plan that responds to his or her life style. Concurrent with design studio instruction is hands-on experience with building, so that students can begin to make some connections between how the design of a house affects its construction and the quality of its finishes.

Typically, there are 15 students in a class, which is taught by a licensed architect. The students are from a variety of backgrounds and age groups. Many are initially drawn to the school to learn about building rather than design. “I wasn’t anticipating a strong emphasis on design,” says Byrne DeGrandpre, a college instructor from Plattsburgh, N.Y., who took the course this summer. “Design and architecture were pretty much outside my realm of experience, and I didn’t know what the point of it was.” DeGrandpre came to the school with a stock plan, which he proceeded to redesign during studio. “I learned about designing a house as a way of self expression. The course prompted us to think more about the way we want to live and how we use space, and less about how other people think spaces in houses should be used.”

With an understanding of the importance of design generally comes an awareness that, through design, a house and one’s way of living can dovetail. Says Kathy Meyer, an architect who has taught at the school for six years, “Most people don’t realize that they can have control over the quality of the spaces they live in. They don’t know their options. I’m there to give them an idea of what their options might be.” Connell points out that “for a lot of people it’s a luxury to ask, ‘How do I want...
next question that pops up is ‘Who am I?’ You begin to realize how you are through the design of your house.”

Although each course (there were five offered last summer) varies according to the instructor, usually there are introductory exercises on visualizing spaces, how to represent and explore design ideas in models and drawings, and how plans, sections, and elevations interrelate. “Drawing and model making was definitely scary,” explains DeGrandpré. “As with any new piece of information you feel uncomfortable with because it’s new.” Sylvia Smith, a New York City architect who has taught the course for two years, says that a lot of time devoted to helping students become familiar with the representational tools of architecture. “They all come in and say they can’t draw,” comments Smith, “and they’re trying to draw with ball-point pen on rough paper. You have to put soft pencils on their hands and some tracing paper and tell them to take risks and have fun with it. We give them a set of skills that they can use and reuse and try to get them over their fear of making mistakes.” For some student models are the best tools for visualizing the spaces they are designing. Martin Gehner, associate professor of architecture at Yale who has taught a class for two years, says that “the most important thing is that a student starts building a model. In some cases models are faster than drawings because they can show a lot of things that it would take many sketches to reveal.”

Another hurdle for both the architecture and the importance of design, the course has occasionally proven a stimulus for a change in profession. “I think the course has a powerful effect as a career discovery program,” says Gehner. “Last year a student decided to start his own construction business.” Others have been awakened to architecture. “I would seriously consider architecture instead of engineering,” says student Bunce, “because I think it would be more fun and enjoyable, challenging you to be creative.”

For the architects, the course offers an alternative pattern of practice and a chance to be more directly involved in the design of houses for the not-so-wealthy. “Teaching the course keeps me thinking,” explains Kathy Meyer. “Looking over a student’s shoulder gives me more ideas. I get the satisfaction of knowing that they’ve got the design they want, but it works better.” Sylvia Smith adds that in refining their designs, the students develop “a positive attitude about what an architect does. We’re helping them to make their dreams come true.”
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Sidney Freedman, director of architectural precast concrete services for the Prestressed Concrete Institute, supplied the following information and details for precast-concrete panels to supplement the "Curtain-Wall Connections" article that appeared in the May/June 1986 issue of Architectural Technology.

Connection details for precast-concrete panels include a wide range of hardware combinations, including reinforcing bars, studs, coil inserts, structural steel shapes, bolts, and threaded rods. Load transfer from the concrete panels occurs either through anchorage of the hardware to the concrete by bond, or through hardware connected through the concrete (to prevent shear cone-type failure). When possible, it is preferable to have steel failure govern the connection strength because steel is more ductile than concrete and its failures are more predictable.

Selection of the proper details requires considering the size and shape of the panel, as well as the production and construction sequence. Types of connection details for attachment of precast panels to structural steel frames do not differ greatly from connections for attachment to concrete frames. However, when the connection is to steel, bearing points should be closer to the center line of the steel beams in order to minimize torsional forces. Alternatively, supporting steel beams may be gusseted or stiffened to increase their torsional capacity and avoid undesirable rotation.

Details illustrated are not "standard;" they show a range of possible hardware combinations.

Selection criteria

The most common problems encountered with panel connections are improper protection from the elements and inadequate allowance for movement. However, precast-concrete panel connections must be selected on a project-by-project basis—different criteria are important in different jobs. Among the criteria that may apply to a particular job are:

- Direct bearing connections may utilize anchor bolts projecting from the supporting member (1a), welded connections (1b), or drilled-in expansion anchors (1c).
- Haunch bearing connections fasten to concrete or to a supporting tee (2a). Angle steel...

Preparation to resist anticipated forces, such as accommodating volume change restraint (the stress in the connection in the panel undergoes creep, shrinkage, and strain due to temperature), as well as the strength required to maintain durability.

Ductility to accommodate relatively large deformations without failure. Ductility is achieved when the steel devices yield before the concrete fails.

Volume change accommodation to slow movement, thus relieving the effects of creep, shrinkage, and temperature change strains on the precast panel and their supports.

Durability requirements, which depend on the amount of exposure the connection will receive. Fully exposed connections subject to regular inspection and maintenance need only protective paint, as do most other connections. Guarding against condensation, from humidity in the interior of the building or from thermal bridges, may require additional corrosion protection. The architect may wish to consider the following methods, presented in order of increasing cost: paint with shop primer, painting with zinc-rich paint, zinc metalizing, cadmium plating, hot-dip galvanizing, and use of stainless steel.

Fire resistance, required in those connections where weakening by fire would jeopardize the structure's stability. The time of fire protection should equal the code required for the members that are connected. For example, if the steel frame of the building has a two-hour fire rating, so should the connections.

Constructability, which refers to the ease of both construction and maintenance. This concern covers a gamut of topics, including standardized products, enough clearance to allow the workers to provide reasonable tolerances, accessibility of connections, and provision for field adjustment.

Precast cladding panels normally require bearing connections and tie-back (tension or compression) connections. Alignment connections are used to align two panels in relation to each other.

**Bearing connections**

Bearing connections usually transfer the load from the panels to the support system either directly (via panel edge, corbel, or cast-in structural sections) or indirectly (with bolted or welded clasp connections, plates, or other sections). The designer may include plumbing or leveling devices with bearing connections for alignment.

Direct bearing connections accomplish the actual load transfer through shims; the joint is then caulked or dry-packed. The various connections include anchor bolts projecting from the supporting member (figure 1a), welded connections (figure 1b), and drilled-in expansion anchors (figure 1c). The use of expansion-type inserts for stress-reversal load conditions should be considered, especially in seismic zones or other situations where misalignment is likely to occur.

Haunch bearing connections use a projecting haunch for support. A haunch bearing connection is typically a concrete corbel cast with a cladding panel, but it may also be a rolled steel section such as...
**Technical Tips from page 117**

a tube, an angle, wide-flange, a solid bar, or a structural tee (figure 2a). "Back-up" bars may be welded to the haunch to maintain alignment.

Angle seat bearing connections are constructed of steel angles, the type of hardware most commonly used to support precast panels. This type of connection (figure 2b) is often accompanied by confinement reinforcement, placed around the embedded studs, to add ductility to the connection. This practice is highly recommended in earthquake-prone areas, where ductility of the connections can significantly reduce the chance of building failure due to seismic movement.

**Tie-back connections**

Nearly every precast panel requires tie-back connections in addition to bearing connections. Tie-back connections are tension or compression connections. They are designed to resist forces normal (perpendicular) to the panel and are flexible or movable in other directions. Like bearing connections, tie-back connections are often combined with leveling or plumbing devices.

The simplest form of tie-back connection uses a welded plate or flat bar (figure 4a). Some connections may require angles instead of plates. Other types of tie-backs employ a bolt or a threaded rod placed in an insert. This practice is common when connection is in a location where welding would be difficult, or if a greater amount of adjustment is needed (figure 4b).

Combinations of welding and bolting often supply tie-back support (figure 4c). When bolts are used, slots or oversized holes should be provided to permit adjustments and allow movement. A minimum thickness of clip angle or a long threaded rod are other ways of allowing movement by reducing flexural rigidity.

**Alignment connections**

Alignment connections fasten panel to panel (figures 3a and 3b), and may be either welded or bolted. As with other types of connections, slotted holes should be used in conjunction with bolts to permit adjustment during erection and to allow panel movement after the building is in place.

**Further information**

The Prestressed Concrete Institute produces a number of useful publications showing details for many more precast-concrete panel connections. These can be obtained from Sidney Freedman, Prestressed Concrete Institute, 201 North Wells Street, Chicago, Ill. 60606. Freedman's telephone number is 312-644-1081.
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The Decorative Designs of the Adam Family

Robert and James Adam: Birth of a Style. Joseph and Anne Rykwert. (Rizzoli, $25.)

Surely the height of architectural compliment is for an architect to become so closely identified with a style that his name becomes that of the style. This the brothers—James, John, William, and particularly Robert Adam—saw during their lifetimes as the Adam, or Adamesque style became the reigning idiom in England during the later 18th century. In the succeeding 200 years their style has been imitated and copied: It survived as interior decoration in furniture design through the “babel of styles” of the 19th century, and then it was revived in the 20th century, again a sign of supreme homage. Wherever the British flag flew or British influence was strong, the impact of the Adams can be found. Yet so well known has become the Adam style that sometimes one has to ask why all the fuss.

Certainly on one level the Adam style seems to lack much relevance, a sort of over-wrought, over-refined classicism appropriate for decorator show houses. The recently reopened Lansdowne House drawing room (originally designed and built as part of a London house from the 1760s)

Above, Robert Adam’s Lansdowne House drawing room, now at the Philadelphia Museum of Art; right, ceiling detail.

located in the Philadelphia Museum of Art with its violent purples and blues has raised cries of “Porno” or “Miami Vice,” though the research going into the repainting seems impeccably accurate. And recent on-site investigations in England indicate that the brothers Adam did use such explosive color schemes. Color, though, is not all. The appliqued decorative moldings help to create a spatial structure and give coherence. The nobility of the room comes not through mere size—it is big—but through design.

The Adam style was particularly the creation of Robert Adam (1728-1792), though he was assisted by his brothers—principally James, but also John and William, his father William (also an architect), and a number of sisters. Beginning in Edinburgh in the 1740s, Robert spent some time in Italy in the 1750s—became friendly with, and was influenced by Piranesi—and returned to London to become the leading English architect by the 1760s.

What Robert and his London partner James accomplished has both obvious and hidden dimensions. On one level they became totally concerned with the design, not just a plan and shell as did most of their contemporaries, but with all the interior fittings and furniture. With the exception of their predecessor, William Kent, such involvement was unknown in English architecture. They set up a building company for the London work and rigorously controlled the production of all their furniture, moldings, paintings, and other accessories. On another level, they brought to England a discipline of geometry, but then invested it with a lightness and transparency of parts that was altogether foreign to the ponderous mathematical mind.

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On yet a different level, the studies of Robert, and later James, in Italy provided them with a fertility of sources, from Pompeii to Spalato, and actually widened the architectural palette of the age. They were not looking for the "true source" or to correct Serlio or Palladio, as much as to stimulate and refine. Alistair Rowan writes: "Adam lived in an age that had brought to perfection qualities of refinement and variation as cornerstones in the creative arts." But Rowan and also the Rykwerts note the tremendous interest the Adams had in Gothic and castle architecture, and the role landscape began to play in the selection of building styles.

Yet the accomplishment of the Adams goes beyond any enumeration of specific qualities to a totality. An Adam building was a unity, but a unity different from what we think of today. It is instructive that in the preface to their Works in Architecture (three volumes, 1773-1822) Robert and James Adam list as the individuality and novelty of their accomplishment: "A great diversity of ceilings, friezes, and decorated pilasters," to which they had "added grace and beauty by a mixture or grotesque, stucco, and painted ornaments, together with flowing rainceau, with its fanciful figure and winding foliage."

In the 20th century there has been invented the concept of "architectural space"; most of us have been taught that space is the essence or first principle of architecture. Color and decorated surfaces are subsidiary to the space. The Adams did create spaces exciting in themselves. At Kenwood, Hampstead, the library with its barrel vault, apsial ends, and colonnade screens is brilliant, and at Kedleston, Derbyshire, the spatial sequence from the great rectangular marble hall to the cylindrical saloon is exciting. In some Adam buildings it appears as if no two adjoining spaces should be a similar shape. But the spaces become rooms only with the introduction of the Adam decorative treatment, and only with that decoration do they become truly memorable. At Wellesley, Berwickshire, the spatial sequence is from one rectangular room to another, and yet the view between them with the different pediments, moldings, and colors is exciting. Essentially the Adams saw space creation as but one aspect of architecture, and the complete room would be not only the moldings, color, furniture, floor, and walls, but the ceiling as well. No two rooms are the same in any Adam building. The drama and interest is not just shape, but the complete fittings. A well-handled ceiling could provide more interest than a complex shape.

Of great importance in understanding the Adams' accomplishment is that they essentially worked from an esthetic point of view. While appreciation of their architecture can be enhanced by an understanding of its context, the patron, and the allegories and references in the various decorative schemes, these are ultimately subsidiary to the actual creation of beauty and harmony. They appear not to have been hampered by the associative myths that would grow to dominate the space is the essence or first principle of architecture. Color and decorated surfaces are subsidiary to the space. The Adams did create spaces exciting in themselves. At Kenwood, Hampstead, the library with its barrel vault, apsial ends, and colonnade screens is brilliant, and at Kedleston, Derbyshire, the spatial sequence from the great rectangular marble hall to the cylindrical saloon is exciting. In some Adam buildings it appears as if no two adjoining spaces should be a similar shape. But the spaces become rooms only with the introduction of the Adam decorative treatment, and only with that decoration do they become truly memorable. At Wellesley, Berwickshire, the spatial sequence is from one rectangular room to another, and yet the view between them with the different pediments, moldings, and colors is exciting. Essentially the Adams saw space creation as but one aspect of architecture, and the complete room would be not only the moldings, color, furniture, floor, and walls, but the ceiling as well. No two rooms are the same in any Adam building. The drama and interest is not just shape, but the complete fittings. A well-handled ceiling could provide more interest than a complex shape.

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Interest in the work of the Adams may seem somewhat obscure and lacking in pressing immediacy, but the renewal of interest in ornament, decoration, and the styles should call them back to center stage. They illustrate the possibility of refinement and of totality of design that one can only hunger after. If they could have just a small impact—200 years later—upon our dismal ceilings, architecture would be considerably improved.

—RICHARD GUY WILSON

Victorious Victorians: A Guide to the Major Architectural Styles. Text by Peg B. Sinclair; photographs by Taylor B. Lewis. (Holt, Rinehart & Winston, $15.95.) This paperback is largely a handsome picture book, portraying the major American Victorian cottage styles—Gothic revival, Italianate, second empire, octagon, exotic revival, stick, Queen Anne, and shingle. The brief text presents identifying features of each style and tells in what part of the country examples are most likely to be found. The illustrations, all in the glorious colors beloved by the Victorians, show exteriors and interiors and such fanciful details as turrets and balconies, cupolas, friezes, trim work, and ornate embellishments. Shown above, like a receiving line of gracious grande dames, is a row of restored Victorian vacation houses in Ocean Grove, N.J.
Sometimes the reader is too, about why one house might appear more spacious than another of the exact same square footage. Prowler examines the history of small house design, such as "trinity" row houses in Philadelphia (so named because each of their three stories contains a single room), traditional Japanese houses, igloos, courtyard houses, Charleston single houses, and mobile homes.

The core of the book covers small house design and construction, including issues such as lighting, storage, heating and cooling, and furnishings. There is also a section on modest additions and improvements. As examples of many of these principles in use, the last part of the book presents 10 modest mansions (a mixture of primary and vacation houses, none over 3,000 square feet) by architects such as Peter Bohlin, Turner Brooks, and Robert Venturi. The plans for these houses are drawn at the same scale so they can easily be compared.

Dickinson points out, as does Prowler, the obvious advantages of building small and sets down his philosophy of the small house: It shouldn't appear or feel small; "working parts" should have maximum efficiency to liberate its "living parts"; manipulation of scale is essential. The presentations of 30 house designs that make up the bulk of the book are to show "the state of the art in small-house design."

Dickinson defines "small" as fewer than 2,000 square feet for one- and two-bedroom houses, 2,500 for three and four-bedroom homes, and 3,500 for five or more. These are pretty good sized houses, considering that the average American house

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since 1963 has never been more than 2,000 square feet, and is getting smaller.

The author has also constructed an elaborate system for determining “perceived space” in comparison to actual square footage. It's based on reading the volume of double-height spaces and that beyond glazed walls. Perceived space lies somewhere between volume and area.

But Dickinson does not discuss what he means by “affordable.” Of the 30 primary and vacation homes presented, ranging in size from 570 to 3,500 square feet, less than half have cost data. Those mentioned run from $40,000 to $242,000, but these costs are not given in constant dollars and cannot be compared.

Nonetheless both of these books, especially Prowler’s, are valuable resources for information about getting more from less.—MICHAEL J. CROSBIE


This volume accompanies an exhibition of Richard Morris Hunt’s drawings, (which opened at the Octagon last month) but it is far more than we expect of the best of exhibition catalogs. While heralded by Paul R. Baker’s 1980 biography of Hunt (and his introductory essay is one of the best in this volume) it really can be said to have begun in 1926 when Hunt’s son responding to their mother’s wish for an earlier suggestion by AIA Secretary Glenn Brown, gave to the Institute “soft 8,000 original drawings, 15,000 collect photographs, and over 700 architectural books.” This magnificent gift remained undisturbed (much of it in the very office furniture where Hunt had stored it) until 1978 when cataloging began. Buoyed by rising interest in architectural drawing in the École des Beaux-Arts, eclecticism, and<br>
more recent periods of architectural history, the AIA Foundation saw that the time was ripe for the present effort, undertaken in association with the Metropolitan Museum of Art (Hunt’s design for which is shown above).

Even after the efforts of the superb team that Susan Stein has assembled here you will still find it difficult to make up your mind about Hunt, one of the four living fathers of AIA and an undeniably illustrious figure in the pantheon of our national architecture. Born in 1827 in Baltimore, Md., Hunt spent his youth in New England and Washington, D.C. At 16 he moved with his family to Europe. In 188 he became the first American architect to be admitted to the École des Beaux-Arts, never thereafter losing the French connection. When he returned to the U.S.—a confirmed Francophile—it was to practice in New York City. His clients were the Vanderbilts and other new rich for whom he built Fifth Avenue chateaus and Newport “cottages”—the most celebrated of which was Baltimore, not in Rhode Island but North Carolina. His architectural hallmark was the florid, overdecorated style in Francois Premier. He was AIA’s third president, a founder of New York’s Municipal Art Society, and an outstanding exponent of the “city beautiful” movement.

From the penetrating essays included in this volume on well chosen aspects of Hunt’s career, we can see how his early achievements stopped as a dead end and did not lead on to the later work. It becomes clear that Hunt’s interest in sculpture and promotion of the arts was an inevitable and necessary accompaniment to his Beaux-Arts stylistic orientation.
essionalism, including his philosophy of architectural education, to which he made such significant contributions, was part and parcel of the same outlook and experience.

Apart from a generalized belief in the discipline associated with the École and its competition system, and an ultimate appeal to "good taste," Hunt's philosophy of architecture was rooted in the conviction of its importance to the developing U.S. While his career was characterized more by large private residences than public buildings, he believed the ultimate destiny of the former—as with European palaces—would be as some form of public use. He was firmly convinced of the importance of the architectural past, the ultimate source of inspiration and guidance. He thought architecture should be characterized by harmony, dignity, and repose. —FREDERICK GUTHEIM, HON. AIA

Mr. Gutheim is a Washington, D.C., author, critic, and educator.


This two-volume tome is encyclopedic and scholarly, tracing the evolution of the American house and its allied farm structures from the first colonists' imported styles and the pioneers' survivalist forms through decades of borrowing, mixing, and invention to the edges of the turbulence that became World War II. Scholars may find gaps in the scholarship, as scholars are destined to do, but the study is a heroic effort worthy of space in every academic and public library in America.

The author, who is a professor of geography at the University of Akron, has directed his work to folklorists and historians as well as architects and geographers. He writes in language that is direct and refreshing, although not free of the jargon of his own profession.

Great attention is paid to the social, economic, ethnic, cultural, and environmental factors that resulted in architectural forms, including the polarities of "status" and "defense." The broad and humanistic view is coupled with coverage of the materials, connections, and building techniques that made the architecture possible. There are encounters with curious construction terms such as "tabby," "jacal," "bousillage," and "nogging," confirming the depth of the author's investigations. Any study that traces material usage from hewn logs and mud to plastic sheets and used rubber tires should fascinate even the most pragmatic practitioner.

The first volume on houses is a detailed journey along the decades of American house design. Although "North America" certainly does include Canada and Mexico, continued on page 127

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Most of the coverage is centered in the U.S., inevitably beginning in the Northern region, then gradually drifting to the Midwest and South, and finally ending tidbits of Western development for desert. English, French, Dutch, German, and Spanish cultural influences are reviewed with enthusiasm, and Fenno-Celtic, Haitian, and other contributions are mentioned.

Early dwellings in Western America are presented out of chronological order, including those of the native Americans whose stewardship of the land preceded theirs. The Plains Indian tipi, the Navajo Hogan, and the Indian Pueblo are among those included, but the lowland middle American house does not appear, the Seminole house warrants one sentence, and the Mandan house isn't mentioned, even in an enchanting review of the Midwestern soddy, that ancestor of the earth-sheltered architecture of today.

Considerable attention is given to the evolution of the plans of the houses that had European derivation and to their morphosis under the pressures of social, economic, and environmental influences. The names of some of the house forms are a feast for the imagination: the catslide cottage, the shotgun house, the dog-trot house, and the cornbelt cube. Postmodernists whose reservoirs are running low will find more than sufficient stimulus here to sustain them into the next fashion.

Even then, says Noble, styles were "artificially created and fated to last only a few decades, to be succeeded by some new fashion." He comments that "one of the psychological characteristics most often noticed by foreign observers of the North American personality is the tendency to ignore whatever is not current or modern, to prefer the new and progressive," perhaps helping explain our profession's relentless search for invention, sometimes in spite of the determinants of the task at hand. The author's walking of styles ends with the Wrightian prairie style and the bungalow. It would have been interesting had he pressed on to the present, but we can understand that he might shrink from analysis of our current omnidirectional frolics in the urban and suburban environmental maelstroms.

Volume two, on barns and farm structures, proves to be just as scholarly but is considerably more entertaining. Here forms evolve from the demands of function and the characteristics of the environment, executed with economy in the materials of the region. "Styles" appear only in response to changes in those factors, and fashion seldom seems. Farm buildings of increasing complexity remain honest and forthright, always seeming to rest comfortably in their particular landscapes. Borrowing the words of another, the author observes that "the architectural qualities of cathedral-like barns and elegant granaries are often superior to those of the farmhouses continued on page 129.
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The barns and other farm buildings also are related to their cultural arths and ethnic origins, and here the non-Northeastern regions of North America get their recognition. In addition to those already mentioned, the Belgian, Ukrainian, Norwegian, Amish, Mennonite, and Mormon contributions are recorded.

The most interesting forms may be the tobacco barns of the Southeast, the silos of the Midwest, and the windmills, hay berricks, fences, and other minor utilitarian forms that gave character to the farmland and filled the rural landscape with their lean functionalism. The barns, of course, were the masterpieces of passive environmental control: designed to conserve the heat generated by the animals during winter nights, to ventilate through steamy summers, and to provide natural light where needed.

Several visual deficiencies must be reported, for they affect the communication of concepts so elegantly stated in the text. All too many of the 560 floor plans, drawings, and photographs are disappointing. The photographs are presumed to be Noble's own work, and what architect wouldn't envy his odyssey across America, a pilgrimage that took nearly two decades, according to the picture captions. Sadly, the reproductions of the photographs picture a gray continent. Whether taken in crisp frozen winter or sunny summer, too many of these handsome architectural artifacts seem to have been viewed through smoked glass and are rarely recorded in the full sweep of their landscape context. And, in the fashion of some of our stylish architectural journals, the houses and farms appear to be uninhabited stage sets, with lively exceptions.

It is the original sketches that nearly undermine the work. They are amateurish, often flat, and certainly not equal to the quality of Noble's research and writing. The author, and all architects, are directed to Lester Walker's American Shelter (Overlook Press, 1981), which is the model for enchanting drawings that illustrate the story of the American house.

In compensation, a special treasure of selfish professorial statesmanship is found in the last chapter of the second volume. Noble lists 23 "unanswered questions" and a 45-item "research agenda for the future." This gift, at a minimum, provides any serious investigator with a broad choice of topics for a doctoral thesis and the prospect of several lifetimes of adventure in researching the unexpected aspects of North America's settlement landscape. This is but the last of many reasons to thank the author for his significant contribution to our understanding of this continent's architectural heritage.

— ROBERT E. McCONNELL, FAIA

McConnell is professor of architecture and former dean of the college of architecture, University of Arizona.
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HOME DESIGNS FOR THE 1990'S

BRIEFS

Historic Building Course and Workshop
The New York Landmarks Conservancy and the Friends of Terra Cotta/New York State are sponsoring a workshop, "Historic Facades: Restoration and Local Law 10," to be held on Nov. 1. The workshop will focus on the significance of the facade as a valuable part of the building: historic, aesthetic, and functional. For further information, contact Jane Seymour, New York Landmarks Conservancy, 330 W. 42nd St., New York, N.Y. 10036.

Remodeling Awards Program
Nominations are being accepted for the Remodeling Awards Program. The awards will be presented on Jan. 28. Nominations may be made by anyone, and the nominee may or may not be a member of NARI. For more information, contact NARI, 1901 N. Moore St., Suite 808, Arlington, VA 22209. Attention: Awards Program. The award will be given in late February.

Richard Morris Hunt Exhibition
An exhibition of original drawings, watercolors, and 19th century photographs of Richard Morris Hunt will be exhibited until Dec. 28 at the Octagon Museum. Hunt's original model of the Biltmore is on display in the AIA headquarters lobby. Hours are 8:30 A.M. to 5 P.M. Monday-Friday, and 1 to 4 P.M. weekends.

Design Competition Winner
Schwartz-Kinnard Architects, Princeton, N.J., received the $20,000 first prize in the Coldspring/Cylburn Arboretum design competition. The winning design represented an innovative approach to the development of undeveloped, residential acreage in the Coldspring New Town community in Baltimore.

CREDITS

House in North Tampa, Fla. (page 38).

Shay Residence, San Francisco (page 48).


Hillside Homes, Bellingham, Wash. (page 64).

Bodenhamer House, Santa Rosa, Calif. (page 66).

Block Island House, Block Island, R.I. (page 68).

McInerney Residence, San Francisco (page 70).

Russell Park Student Housing, Davis, Calif. (page 72).

Phoenix Place, Sacramento, Calif. (page 75).

The Beach Apartments, Albuquerqu, N.M. (page 78).
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AIA members deserve National attention® And all the special services that includes. See for yourself. When you compare the cars, the rates and the conveniences, National Car Rental is a great travel value. Special low unlimited-mileage rates. Just show your AIA Executive Card at the time of rental at most major locations to receive the special low rates for which you qualify. You pay for the gas you use and return the car to the renting location. "No strings" One-way rentals. National has designated a portion of its fleet for one-way travel. That allows us to give you a one-way rate that's just $15.00 a day more than our regular low rental rates. And there's no drop-charge at participating locations. Top-condition cars. National's cars were named "best in overall condition" by the United States Auto Club in studies they conducted on the major car rental companies. That says a lot about our priorities and the level of comfort you can expect. And, you can select just the size and popular model to fit your driving style. 24-hour Peace of Mind. Considering the great condition of our fleet, you'll probably never need this service. But it's nice to know that National provides 24-hour emergency road service, backed by Amoco Motor Club all across the U.S. Assistance can be a toll-free call away, anytime of night or day. Guaranteed Reservations. At National, you can call just 24 hours ahead to request a Guaranteed Reservation using most major credit cards. Available at participating locations, this service gives you leeway to allow for the unpredictable. If a meeting lasts longer than expected, you can rest assured your National car will be waiting—even if you arrive up to 12 business hours later than scheduled. At National, we've got a plan for your comfort and convenience. It's called National attention.

For reservations and information, call 800-CAR-RENT™ or your travel consultant.

We feature GM cars like this Cadillac Sedan de Ville.
In heart of downtown Quincy, Mass., is the headquarters of the South Shore Bank, an opulent art deco treasure that was severely tarnished by the early '80s. Now through its renovation by the Newton Center, Mass., architecture firm Pierce Lamb Associates the splendor has returned. In addition, new offices have been created in a delightful reinterruption of the deco style.

The most resplendent portions of the building were renovated as close to the original as possible, with the help of local craftsmen: for example, in the great hall (above), the barrel vaulted stained glass skylight; limestone arches on side walls; two rows of brass and opalescent glass chandeliers; nine carved wood teller stations with brass and stained glass accents (far left); colored marble inlays in a travertine floor; and ornate brass and marble check writing desks with florid lamps. Office spaces next to, but previously inaccessible to, the great hall were connected to the hall by new deco-inspired archways (left). — Nora Richter Greer
Willy Wonka's chocolate factory has turned chic! The Chocolate Dipper in Marketplace Center in Boston was designed to visually celebrate the production as well as the marketing of chocolate candy in a space of 850 square feet. The image of the production area is high-tech efficiency; that of the sales space is sophisticated elegance.

Stephen L. Faulk & Associates of Boston began by splitting the rectangular shop lengthwise. At the front of the production half is a marble slab cradled in a projecting bay window where solid sheet chocolate is made. Candy centers move down the enrobing line, into a 12-foot cooling tunnel, and then are packaged. Materials are gray plastic laminate, painted metal ceiling, three colors of floor tiles. On the exterior is a projecting steel framed window, metal panels, and black tile walls.

The marketing portion of the shop is as rich as the chocolate itself; polished marble and granite floor, mahogany veneered casework, vaulted ceilings. The center is meant as a "shrine," says the architect, alluding to "the almost religious attraction people have toward chocolates." The exterior is marked by mahogany, stainless steel, and etched glass. —N.R.G.
The Michael G. Abrams Co. in New York City designs and manufactures women's shoe lines—Palizzio, Proxy, Perry Ellis, and Perry Ellis Portfolio. It seems appropriate, then, that its showroom consists of discrete spaces for each line, but like the company there are common elements binding the spaces together.

The design by Janusz Gottwald & Associates of New York City (Janusz Gottwald with David Hoggatt, Laura Gottwald, and Mary Meuer) places a long arcade down the center of the showroom (bottom). On this arcade are "storefronts"—some pushed back, others forward to create a gentle rhythm to the space. Each brand name is a suite of small offices (located behind the protruding facades) and a larger executive office (behind the pushed back facades) that doubles as a showroom during design week. It is during that week that the arcade scheme seems most effective—when hundreds of people pass through. There is a kitchen/dining room that can be closed off by folding doors or can be totally opened up (right). It is located directly across from the reception desk, a protruding element with a large window cut into it (right). —N.R.G.
Often discount stores are virtually undecorated warehouses crammed with merchandise. One exception to the rule is the prototype design for Gemco by the New York City firm of Walker Group/CNI, where clearly designed circulation paths draw the customers through a dazzling display of objects ranging from fine jewelry and family apparel to supermarket items.

Located in Rowland Heights, Calif., the square-shaped store is entered at one corner that is cut away. From there, the widest aisle leads diagonally toward the back of the store, past non-food items to the supermarket. Narrower paths veer off this central aisle encouraging the shopper to stop and browse. All paths lead to the produce section, which is marked by supergraphic images hung overhead (above).

Throughout, graphics and merchandise are intermingled to create a crisp, clean, and orderly environment. Sometimes the images can be more enticing than the products being sold, as in the case with an aisle of beverages. Other times the store's furniture itself creates an intriguing visual image, as the row of 26 checkout stands, with three-dimensional "V" signs number...
The Roanoke Market is the centerpiece in that Virginia city's revitalization plan for downtown (see Nov. '84, page 54). For much of the past decade, the neo-Georgian brick building was either abandoned or marginally occupied. Today it pulsates with new life, its interior aglow with breathtaking neon and cool colors.

"The market building has symbolic value as the heart of downtown, so we wanted it to be a beehive of activity, with a sense of excitement," explains Chad Floyd, AIA, of Centerbrook, Essex, Conn., who designed the renovation with graphic designer Brenda Huffman of Ivoryton, Conn., Timm Jamieson, AIA, of Roanoke's Hayes, Seay, Mattern, & Mattern, and Mills, Oliver & Webb of Blacksburg, Va.

In plan, the building is a long promenade with a crossing at its center. Its interior is rendered in dark hues of blue, providing a subdued background for illuminated signs, neon, and shops. Food stalls with earth tone interiors are found on the ground floor, while the mezzanine holds clothing, antique, and gift shops. The sign for each shop is a simple graphic image, alternating with countrified stars—the symbol of Roanoke.

Dark blue neon zips along the edge of the mezzanine, racing toward the market's center where it explodes in a display of frozen fireworks. Here a suspended, stylized star of blue, green, and orange neon floats like a holographic dome over the crossing. —Michael J. Crosbie
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his standing seam roof by Sonoco buildings (above), works over existing pitched or flat built-up roofs. The Sonoco seam eliminates rib-closures by lining up with the eave. The one-piece rib panel comes in any length; and machine-embossed ribs produce a single continuous membrane.

A sliding clip designed for one thickness of spacer block allows the roof to expand and contract with temperature fluctuations. Back-up plates, used at all standing seam endlaps, act as a positive fastening surface and help assure a flat endlap connection. The 24-gauge roof panel comes in white or bronze aluminized steel or galvanized painted color finishes. Circle 202 on information card.

The European-designed “High Roller” chair (right), available from Benton Brothers Systems, adjusts to any position by interlocking the frame position to fit body contours. The chair comes in one- or two-person widths, with the upholstered fabric foam rollers in red, yellow, medium gray, black, or the customer’s own material. Coordinating anodized aluminum frames come in red, medium gray, and black. Circle 203 on information card.

Wilsonart has introduced an expanded line of interior-use Solicor colorthrough laminates (left) that can be fabricated to create surfacing seams without the “dark line” normally apparent with regular laminates. Because color extends through the core, nicks and heavy scratches on the surface don’t show as readily. Solicor, designed to handle and fabricate easier than earlier versions of this product type, bends to a professionally postformed, 9/16-inch radius.

Solicor’s flexibility allows it to be stacked in multi-color layers, wrapped in tight curves, routed, beveled, radiused or engraved. Specially ordered edge banding strips measure 2½-inches x 10 feet. Circle 204 on information card.

—Amy Light
NEW AND NOTEWORTHY

Computerized Fee Calculator
An easily modifiable fee calculator/project manager program ensures data entry of all the necessary information needed to prepare complete fee proposals.

The user calculates fee proposals, budgets billable hours, estimates construction costs, edits projects from an archival library, manages project progress, and produces presentation reports guided by the program's menus, reminder prompts, and fill-in-the-blank screens.

Each of the major architectural service areas—predesign, schematic design, design development, construction documents, negotiation/bidding, construction administration, and supplemental services—contains a list of 16 tasks. The user can modify a Means database to generate construction costs for percentage fee calculations. Once the data is entered, the user chooses either summary fee proposal reports or a full report with comprehensive detail for each project phase.

Designers Research
Circle 223 on information card

Upgraded Thermal Windows
A new line of thermal windows designed and engineered to meet AAMA performance specifications and energy efficiency requirements features a redesigned thermal break with an indented thermal cavity for higher thermal and improved structural performance.

Sealair offers systems for vertically and horizontally pivoted windows; out-swing and in-swing casements; and projected, top-hinged, and fixed windows.

An upgraded version of window hardware includes locking hardware, roto operators, and hinges and pivots; standard hardware is white bronze available with a variety of frame finishes to match window selection.

Kawneer
Circle 225 on information card

Micro Workstation Table
A 30-inch split surface, adjustable micro workstation table holds a CRT, keyboard, CPU/disc drive and printer on one foot-print. The table comprises a sliding VDT surface, a sliding front surface for the keyboard, wire management, and a swiveling side surface on a heavy-duty arm to hold a printer. An accessory CPU holder attaches to the outside of the leg frame.

The user may select the base table in tan, brown, white, black, or gray; and the table top in light or dark oak, beach, tan, or gray.

Human Factor Technologies
Circle 226 on information card

Bronze Sun Control Film
3M claims RE35BRARL Scotchtint Sun Control window film with increased abrasion resistance cuts ultraviolet light by 98 percent, glare by 90 percent and heat gain by 40 percent on ⅛-inch clear glass while remaining transparent.

Guaranteed for five years against cracking, crazing, or peeling, a warranty protects against thermal glass fracture for one year after installation.

3M
Circle 227 on information card

Custom Transfers
I.N.T. Custom transfers allow designers to rub down dry transfers of their own construction details, title blocks, and logos as needed—the transfers don't ghost and are erasable.

Mylar, vellum, or CAD/CAM output original drawings are used to create the ink-quality transfers, which are available in a variety of sizes and in black, white, and selected colors. Designers make up sheets in-house or order them from a Letraset Color Imaging Center.

Letteaset USA, division of Essette Pendaflex
Circle 228 on information card

Drafting/Graphics Catalog
Products for drawing, drafting and planning, as well as a complete selection of plotter points and accessories for CAD and automated plotting systems, are listed in the 52-page Fall/Winter Saga catalog.

Drafting film, drafting machines, furniture, lamps, design grids and other products.

Saga, division of Dade, Inc.
Circle 229 on information card

Low-Profile Solar System
The Sunbank thermosyphon solar hot water system deploys a black chrome absorber with ½-inch risers and ½-inch manifolds to provide quick heat recovery. A 40-gallon tank, insulated with polyurethane insulation, provides low heat cost efficiency and superior tank stratification. Flexible connectors between the tank and the collector make installation easy and quick. Sunbank comes with a full five-year warranty.

The Amcor Group, Ltd.
Circle 230 on information card

Blueprint Machine
A low cost, compact blueprint machine is so versatile the user can place it on a 24 x 36-inch flat file or a 12-inch deep bookshelf, hang it on a wall, or transport it to a job site—ready to operate from the back of a station wagon or truck.

The Dart Diazit XL 80 has the capacity to produce the total reproduction requirements of a small manufacturing plant.

The Dart Diazit XL 80 produces sepia or polyester film intermediates as well as blue and black line professional quality prints, up to 30 x 42 inches. To operate, the machine, with a one gallon bottle of reproduction ammonia attached, connects to a standard 110 volt electrical power supply. The user can choose from a complete line of accessories for the Dart XL 80, including a Diazit Ammonia Arrestor System that is said to reduce ammonia odor up to 90 percent, or the Econo-Arrestor System for low-volume ammonia odor reduction.

Diazit
Circle 231 on information card

Roofing Manual
A new manual on roofing applications and installation specifications features a two-page artist's rendering illustrating how and where four flexible connection products can be placed on commercial buildings to seal against leaks at roof perimeters, roof splits, and roof penetrations. The seven-page, full-color catalog Expansion Joint Cover and Flexible Connections, also graphically depicts vertical wall joint closure details, abutment and exterior facade closures, factory-fabricated vertical to horizontal transitions, and perimeter flashing details.

Manville
Circle 232 on information card

Masterkey Cabinet Locks
The Best Lock 5P cabinet lock masterkeys into any existing or new Best lock system so that one customized key operates office doors, desk, equipment, file
A. A. T. 432 Sure-Seal lightweight adhe-

New Grout Admix

Free Structural Glazing Brochure

Air Conditioning Brochure

Products from page 142

Thermostat Measures Conditions

Inside and Out

Ceiling Panels

Multi-Use Door Sills

Roofing System

Cabinets, and other locks. Four mount-

ing types make the SP adaptable for all

standard file cabinets.

Best Lock machines their Lock hous-

ings and key plugs in solid brass and

finishes them in satin chrome. Precision-
machined internal working parts provide

maximum security and long service life.

Best Lock

Circle 234 on information card

Circle 237 on information card

Circle 236 on information card

Circle 240 on information card

Circle 199 on information card

Circle 198 on information card

Circle 200 on information card

Circle 239 on information card

Circle 235 on information card

Circle 239 on information card

Circle 200 on information card

Circle 200 on information card

Circle 200 on information card

1. A comprehensive, full-color brochure
describing the "Pilkington Wall" all-glass
structural glazing system provides pic-
tures of projects installed throughout the
world and also contains information on
Patch Plate assemblies and the new
Planar assembly, which may incorporate
reflective and insulating glass.

Pilkington Sales (North America) Ltd.

Circle 236 on information card

New Grout Admix

Laticrete Grout Admix Plus was formu-
lated to allow fast, easy-to-clean addition
of grout admixtures without damaging or
affecting grout color. The admix resists
staining, locks in grout color, and pre-
vents cracking, powdering, and color fad-
ing of joints. It produces frost- shock-
and chemical-resistant grouts and joint
fillers, which can be used for both in-
terior and exterior applications of ceramic
tile, pavers, brick, marble, and natural
stone. The Admix forms part of a com-
plete grout system that includes sanded
and unsanded grout powders.

Laticrete International

Circle 238 on information card

Ceiling Panels

An aluminum ceiling panel system for use
in both new construction or renovation
projects features smooth-surfaced or
smooth-finished surfaces. Projected
features smooth-surfaced or
uses a bonding adhesive that is applied
dates a number of common jamb depths
standard file cabinets.

An aluminum ceiling panel system for use
in both new construction or renovation
projects features smooth-surfaced or
smooth-finished surfaces. Projected
features smooth-surfaced or
uses a bonding adhesive that is applied
dates a number of common jamb depths
standard file cabinets.

Free Structural Glazing Brochure

A comprehensive, full-color brochure
describing the "Pilkington Wall" all-glass
structural glazing system provides pic-
tures of projects installed throughout the
world and also contains information on
Patch Plate assemblies and the new
Planar assembly, which may incorporate
reflective and insulating glass.

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standard file cabinets.

A. A. T. 432 Sure-Seal lightweight, adhered
roofing system works for both new con-
struction and renovations. The system
uses a bonding adhesive that is applied
conditions. The adjustable and non-
adjustable sills, both with effective ther-
mal breaks, feature a nailable polystyrene
base designed to reduce door unit assem-
ably time by allowing quick alignment and
fastening with either nails or staples.

Perma-Door

Circle 199 on information card

Spray Adhesive

Type 07 spray adhesive, used specifically
for wallcoverings, also covers switch-
plates, outlet covers, and A/C vents. The
user can apply wallcovering to metal or
plastic fixtures by simply spraying the
object, adhering the wallcovering directly
to it, and trimming off the excess.

Custom Building Products

Circle 200 on information card

Drawing Table

"Stratasteel" drafting table comprises a
acellular core sandwiched between two
layers of hardboard and two layers of
steel sheet within a kiln-dried hardwood
frame. A light green resilient vinyl with
recessed aluminum edge banding covers
the top surface. A reversible plastic edge
guard on the anodized full-length pencil
trough serves as a retainer for drawing
tools and can be set flush with the draw-
ing surface to accommodate a drafting
machine. The user can recover the table
with replacement vinyl surfaces, availa-
bale with pre-applied adhesives.

Hamilton Industries

Circle 198 on information card

Ceiling Panels

Ceiling panels of woven color fabrics with
either square or routed reveal edge detail
fit a number of different ceiling plans.

Capaul

Circle 197 on information card

Roofing System

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People Protecting People

Circle 48 on information card
Products from page 144
to the substrate and requires no ballast. The talc-free undersurface is designed to adhere quickly and easily; talc on the upper surface acts as a lubricant to enable the membrane to slide into place. The roofer uses splice tape to make permanent field seams, pressing the membrane edge into place and rolling it with a two-inch steel roller.

Carlisle SynTec Systems
Circle 196 on information card

Insulation Panels
The thermastructure building system uses interlocking load-bearing insulation panels made of a solid composite of expanded polystyrene and galvanized steel. Each standard 4 x 8-foot panel weighs approximately 45 pounds and is assembled with ship lap joints and self-tapping metal screws. The manufacturer presizes the moisture- and mildew-resistant panels. The user can specify most standard siding, roofing, or interior finishes to finish the panels.

RADVA
Circle 194 on information card

Mobile Terminal Stand
AnthroCart deluxe modular computer stand comes equipped with two shelves, three legs, a tubular base with four casters, document holder, six outlet surge protectors, and three cord management clips. Carts measure 30 or 36 inches in depth, and holes in one-inch increments along the legs allow shelves to be adjusted. Optional components include paper feed and catch, printer basket, sidecar, and rover. The cart is available in gray or tan.

Anthro
Circle 195 on information card

Door Controls
Sentronic closers/holders for fire and smoke barrier doors automatically close designated doors when smoke is sensed by a built-in or remote detector. The SED model contains an adjustable single point control and a low friction track and roller. Single lever arm adjusts to locate hold open positions at points from 85 to 110 degrees in three degree increments. The unit works for either push or pull operation.

LCN
Circle 193 on information card

Roof Window System
Sunrise roof window system consists of a ½-inch dual panel insulating glass with a low “E” tempered glass coating assembled in a lightweight extruded aluminum frame.

A baked acrylic polymer coating on the exterior and a white vinyl finish on the interior make up the aluminum frame profile. “Silglaze N” silicone sealant triple-seals the insulated glass. The unit operates by hand-cranked, pole-cranked or motorized control.

Roto Frank of America
Circle 192 on information card

Work Table
Rectangular work table has 1½-inch tubular steel legs and a ¾-inch thick table top with a composite wood core and a surface of veneer or plastic laminate. Solid beech forms the edge. The buyers can choose legs with an epoxy coating in maroon, black, white, or gray, and the top can be finished with a fine line or textured finish.

continued on page 1
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Outdoor Light Detector
LightWatch II, an outdoor automatic light control, uses a sensor to turn lights on whenever it is dark and a person or vehicle enters its 40-feet detection area. The lights remain on as long as activity is detected within this radius. When the activity stops, the control waits for a preset, adjustable delay and then turns lights off. The LightWatch II’s light sensor disables the control during daylight hours.

External adjustable adjustments include a sensitivity adjustment to vary the detection area and a delay adjustment to vary the reset (turn off) delay.

The LightWatch II can be purchased as a 120 VAC or a 220 VAC model. Either is sold as a control alone (to use with existing lighting), or with one or two preassembled 150-watt lamp holders.

Linear
Circle 205 on information card

Presence-Sensing Light Switch
The new Ultralight 800 presence-sensing automatic light switch turns on lights automatically when a person enters the room and switches them off if no presence is detected for a pre-programmed period of time ranging from five to 25 minutes.

Ultralight 800 controls up to 800 watts (incandescent or fluorescent) and operates on any voltage from 125-277 VAC. The control directly replaces a standard light switch, or can be installed in single- or double-gang boxes. The unit features a switch enabling the user to turn lights off manually.

International Conservation Systems
Circle 208 on information card

Programmable Home Control System
Household “basics” such as lighting, the HVAC system, appliances, waterflow and security are the objects of control by the TomorrowHouse control system. Designed to accommodate the user’s preferred groupings of instructions with respect to time of day, date, temperature, light level, moisture level, smoke motion, pressure, and sound, TomorrowHouse adjusts appliances to the constantly changing home environment. The modular system can control up to eight HVAC systems simultaneously.

The TomorrowHouse system is designed for the non-technical user with optional user-specific programming. The menu-oriented program contains help screens to assist in its setup and use. The IBM version offers the use of color graphics.

CompuHome Systems International
Circle 209 on information card

Digital Control Home Security System
The Magnum Alert-850 (MA-850) allows eight individual zones to be programmed as burglary zones with entry/exit delays, motion detection and security are the objects of control by the TomorrowHouse control system.

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CompuHome Systems International
Circle 209 on information card

Digital Control Home Security System
The Magnum Alert-850 (MA-850) allows eight individual zones to be programmed as burglary zones with entry/exit delays, and also as fire zones. The control panel enables these zones to be shunted in a variety of ways. The control panel also provides a built-in “priority with bypass” as well as a “fault-find” feature for trouble shooting.

The digital display keypad identifies zones in alarm, alarm memory, trouble, or shunted condition. The keys have a second (hold down) function to permit siren test, cancel entry delay, display shunted zones, program user codes, display alarm history, chime mode, as well as panic and ambush and AC power failure indicators.

The MA-850’s integral communicator is compatible with all major receivers. It can transmit door openings and closing with user identification, has outputs for long-range radio transmitters, and offers a confidence test to check phone lines.

The system, housed in a large cabinet comes with a built-in dual-tone siren driver and rechargeable battery.

Napco Security Systems
Circle 210 on information card

Comprehensive Management System
The Home Manager’s 14-inch, wall-mounted touchscreen displays the house floor plan and step-by-step commands, enabling the user to manage security, heating and cooling, appliances, lighting and outdoor equipment.

The system’s comprehensive energy management component regulates heating and cooling in up to 20 zones. Each zone can be maintained at a different temperature, and each can change up to six times daily. The homeowner can preset varied schedules for weekdays, weekends and vacations, or other special conditions.

The system accepts all types of standard security input devices and can monitor up to 24 zones. The system also detects smoke and fire and can provide alarm service with a relay output, as well as a sire driver attached to a speaker. Authorized people can gain access to specified zones at particular times with passcodes.

The Home Manager also controls appliances and heating and cooling systems. The assigned command is processed by a computer which sends the proper control commands to the appropriate devices.

Napco Security Systems
Circle 210 on information card
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Kroin

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Moldi is part of a series of Park and Garden Furniture-manufactured seat modules available exclusively from Kroin.

Anchors and ground clamps insure seating is secure. As a result, the three modules may be grouped together in any sequence. 

Moldi is designed to fit between the three modules to provide a seamless transition between seating. Simultaneous seating is possible through the use of 2-1/2" bolts andGrade 10.9 anchor bars.

The components featured in this system are produced by Kroin. They are also noted for their durability and resistance to weather. 

For more information, please contact Kroin at 800-555-1234.

Circle 80 on information card

The system contains a number of seating options that can be used individually or in combination with one another. 

For more information, please visit our website at www.kroin.com or contact us at 800-555-1234.
Products from page 151

The intercom's single coaxial cable between stations handles sound, video, and power.

Aiphone
Circle 215 on information card

Autofill Bath System

The Autofill bath system, available on five foot and six-foot Infinity Bath Whirlpool bathtubs, features an advanced, time-based microprocessor control with two operating modes—"on command" or "programmed." The user determines the time, water level, and temperature of the bath.

Using the "on command" control at a touch of a button, the bath fills to the previously determined water depth and temperature. The "programmed" mode fills the bath automatically to specifications set up to 24 hours in advance.

The bath drain closes automatically, and a level sensor prevents over-the-rim filling. The wall-mounted system control module encases a digital clock. A battery backup system supplements the low-voltage power systems to maintain settings in the event of a power failure.

The Autofill Bath System also permits manual filling using a conventional two-valve system and integral fill. The Infinity bathtub features a body-contoured design, integral fill and overflow with no protruding spout, a master console to group controls together, and fully adjustable brass whirlpool jets.

Kohler
Circle 216 on information card

Off-the-shelf Plumbing System

Ultraflow plumbing system replaces the traditional system of hot and cold water faucets and regulates water flow and temperature at a central unit through the use of remote control buttons. In other applications it can serve as toilet fill tubes and timed urinal flushes.

Pushbuttons located at each water flow outlet provide automatic preset temperature control and pressure selection. Blending of hot and cold water can be preset at eight different temperatures and delivered automatically to the user without prolonged running of water. The system, designed to be both water and energy-efficient, provides equalized pressures and a controlled flow of water, operating at 12 volts or less. Control switches are insulated and waterproofed.

The flexible copper and plastic lines fit from the remote valve unit directly without elbows, T's and other fittings. The system is approved by the three model codes and is listed by Underwriters Laboratories for electrical safety.

Ultraflow
Circle 217 on information card

Remote Controlled Home Security

Ampard II, a six-zone, wireless, remote controlled home security system comes equipped with a programmable feature allowing users to customize the installation.

Standard features include: electronic monitoring of door and window transmitters; a portable keyboard to control system functions within 100 feet of the console; a personal security code; and household lighting control that automatically turns on lights if the alarm is triggered or operates the lights by remote control without sounding an alarm. An optional dialer and monitoring center program communicates with a monitoring station in case of burglary, fire, medical

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Liquid Crystal Display Faucet
The Ceramix Electronix line of bath and kitchen faucets now offers a built-in sensor to measure water temperature in degrees Fahrenheit and gives a continuous solar-powered digital readout on the handle. One handle controls both volume and temperature. The unit automatically compensates for water pressure changes to maintain constant water pressure. A long-life lithium battery provides auxiliary power to compensate for low light conditions. Special circuitry preserves the battery by shutting off the display when the room is completely dark. Faucets for both four-inch center and single hole lavatories, one hole over-rim bidets, and wall-mounted showers complete the Ceramix Electronix line. Finishes include chrome, brass, bone, white, gold, and white with gold trim.

Computerized Irrigation Controller
A 12-station micro-computer irrigation controller from Weathermatic features a high-intensity LED display for improved daytime visibility and a program display showing current time and program values. Options include dual watering programs to provide two separate watering schedules with four daily start times, as well as a six- or seven-day calendar to indicate the days selected by LED display. Several troubleshooting features come into play when a problem occurs. A start-up/back-up program provides 10 minutes of daily watering on each station when the controller has been without power for an extended period of time, and a self-charging battery back-up retains program schedules and the time if a power failure occurs. A "short sensor" detects shorted valves and skips watering on that station until the problem is fixed. All Mark Series controllers are available in UL-listed rainproof aluminum, plastic, or heavy-gauge, industrial-grade steel.

Electronic Thermostat
Five different preset programs in memory and an override switch providing constant control or setback are features of the Tybox thermostat. Preset programs include providing minimum heating, lowering of night temperature and reducing temperature day and night except during pre-scheduled breakfast and dinner times.

The Tybox features a 24-hour digital clock, an economy setback selector, a program selector for one of the five preset programs, and a baseplate that replaces existing thermostats and connects the central heating system using the same wires. The thermostat operates for over a year on three penlight batteries.

Lighting Control Systems
A control system specifically designed for custom residential and commercial application utilizes low-voltage signals to control lights from different locations. LiteTouch switches lights on and off, and offers full range and preset memory dimming. Its remote control interfaces with other, larger capacity dimmers. Decorator switch stations come in a wide variety of finishes, including chrome, brass, bronze, copper, and pearl coat (to allow the user to paint or wallpaper the switch plates.) A single LiteTouch wall station replaces up to nine conventional wall switch plates. Individual LEDs enable the switches to glow when the corresponding light fixture is on.

Technologically Oriented Bathrooms
Using Ambience multi-function electronic computer controls and a Sensorium whirlpool tub, a user programs the tub to fill to the desired depth and temperature up to 24 hours in advance. A code enables the user to program the whirlpool from a touch phone. Remote control permits lights to be dimmed or turned on and off, music to be turned on or off and volume-adjusted, and locked doors to be monitored and opened.

The wall-mounted Ambience computer and a waterproof, portable remote control allow users to operate the tub from across the room or from another part of the house. Ambience controls up to five appliances throughout the house. In addition, the Ambience package contains a remote-controlled stereo system, as well as a compact disc player, radio, tape player and record player. An optional television controller allows the user to change channels, adjust volume, and turn equipment on and off.

The Sensorium bathtub has six water jets that operate at high and low speeds. A champagne air pump blows extra air through the jets, creating frothiness. The bathwater is maintained at a constant temperature, and a pool light illuminates the bath water.
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