

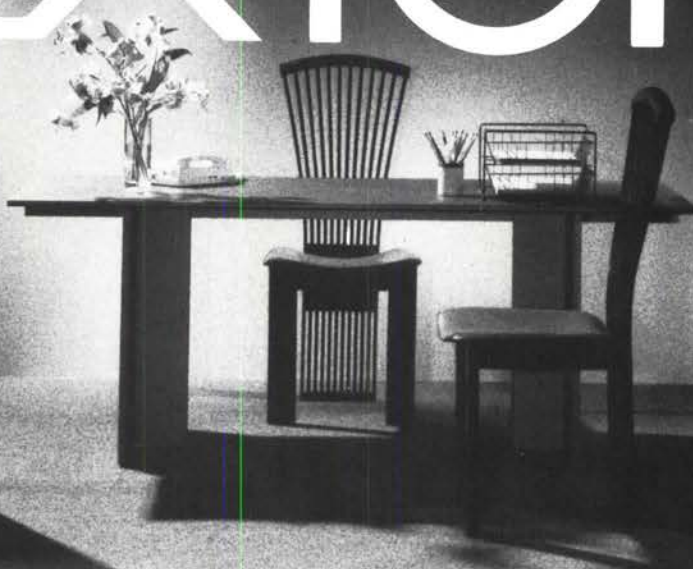
ARCHITECTURE

Incorporating Architectural Technology October 1986 Five Dollars



TEXTONE[®]

vinyl-
faced
gypsum
panels



Superior
interiors...
*yours to create with our
practical magic colors
and textures.*

TEXTONE[®] panels offer unique creative options. Refined low profile patterns. Stylish rough textile looks. Realistic suede, cork and wood effects. All high fashion wall appeal in tough, heavy-duty vinyl. And all backed with SHEETROCK[®] Brand Gypsum Panels—the original fire-resistant gypsum walls for solid life safety protection. Check into the many advantages of TEXTONE vinyl-faced gypsum panels. None of the expense and general messiness of field-applied wall coverings. No costly scheduling delays. Expedites early occupancy. No major decorating concerns. In fact, savings start with delivery to the job site.

■ Call our representative. See Sweet's General Building File, Sec. 9.12. Or write to us for our NEW COLOR COORDINATOR at 101 S. Wacker Dr., Chicago, IL 60606-4385, Dept. A1086

UNITED STATES GYPSUM COMPANY
BUILDING AMERICA

© 1986, U.S. Gypsum Co.

USG® STEEL FRAMING



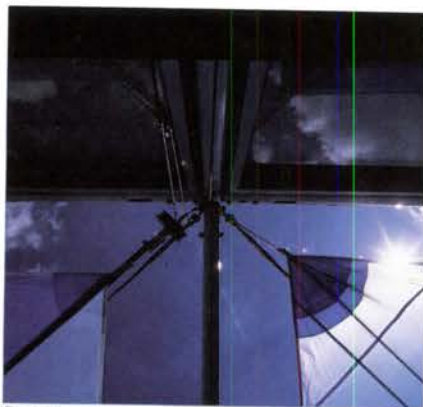
All the design flexibility of wood with the superiority of steel!

Design with confidence. We give you more support in your design options. In systems expertise. In detailed recommendations. And only U.S. Gypsum offers computer sizing of framing components from a *total job perspective*. Lightweight USG® Steel Framing Systems give you the creative leeway of designing with a wide range of materials. In a variety of applications from interior wall and ceiling assemblies to high rise curtain walls. With greater cost-effectiveness. And faster completions. Let us help your planning with state-of-the-art systems and service. Phone now. Or write to us at 101 S. Wacker Dr., Chicago, IL 60606-4385, Dept. A1086

- Atlanta 404-393-0770
- Dallas 214-357-6271
- Chicago Area 312-456-1086
- Los Angeles Area 213-320-4062
- New York Area 201-263-4635



Page 52



Page 56



Page 48



Page 64

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 Plēsums

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.

Donald Canty, Hon. AIA, *Editor in Chief*

Carole J. Palmer *Executive Art Director* Andrea Oppenheimer Dean *Executive Editor, Architecture and Design* Mitchell B. Rouda *Executive Editor, Technology and Practice*

Allen Freeman, *Managing Editor*

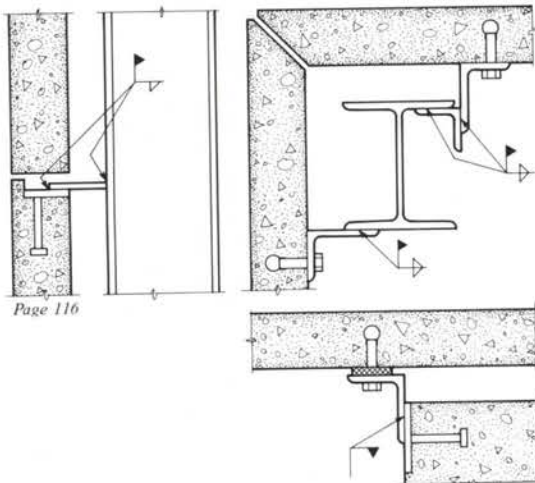
Nora Richter Greer, Michael J. Crosbie, *Senior Editors*; Lynn Nesmith, Douglas E. Gordon, *Associate Editors*; Karen Collins, Amy Gray Light, *Assistant Editors*; Andrea Schamis, *Associate Art Director*; Kathleen Vetter, *Design Assistant*; Timothy B. McDonald, Ronald J. Tomasso, *Technical Illustrators*

Robert Campbell, AIA, David Dillon, Robert A. Ivy Jr., AIA, Carleton Knight III, John Pastier, Stephanie Stubbs, Marguerite Villecco, Forrest Wilson, Oliver R. Witte, *Contributing Editors*

Bernard F. Kroeger, *Circulation Manager*; Brenda L. Owens, *Assistant Circulation Manager*; Jesse Sims, *Production Manager*; Christi L. Wilkins, *Business Manager*; Nancy Perri, *Assistant to the Publisher*; Bob Kliesch, *Publisher*

ARCHITECTURE, publication number ISSN0746-0554, official magazine of The American Institute of Architects, is published monthly by the AIA Service Corporation at 1735 New York Ave. N.W., Washington, D.C. 20006. **Individual subscription** U.S. and its possessions: \$30 for one year, \$48 for two years, \$65 for three years. Canada: \$36 for one year, \$56 for two years, \$75 for three years. Foreign: \$54 for one year, \$96 for two years, \$138 for three years. Single copies, \$5 each (except for May and September issues, which are \$10). Publisher reserves the right to refuse unqualified subscriptions. For subscriptions: write circulation department, ARCHITECTURE, 1735 New York Ave. N.W., Washington, D.C. 20006; allow eight weeks. Quotations on reprints of articles available. Microfilm copies available from University Microfilms, 300 N. Zeeb Road, Ann Arbor, Mich. 48106. Referenced in The Architectural Index, Architectural Periodicals Index, Art Index, Avery Index to Architectural Periodicals. Second class postage paid at Washington, D.C., and additional mailing offices. © 1987 by The American Institute of Architects. Opinions expressed by the editors and contributors are not necessarily those of AIA. The drawings, tables, data and other information in ARCHITECTURE have been obtained from many sources, including government organizations, trade associations, suppliers of building materials, and professional architects or architectural firms. The American Institute of Architects Service Corporation has made every reasonable effort to provide accurate and authoritative information, but does not warrant, and assumes no liability for, the accuracy or completeness of the text or its fitness for any particular purpose. VOL. 75, NO. 10,

CONTENTS



Page 116

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

Design/Build Methods Mature

Release of new AIA documents reflects steady rise in the use of this delivery process. By Christopher Wist

Home is Where the Art Is

Architects turn owner-homebuilders on to architecture. By Michael J. Crosbie

ver
photograph by Loena Kotze of the Riviera
as, designed by Ian and Lynn Bader
located in Johannesburg (see page 42).

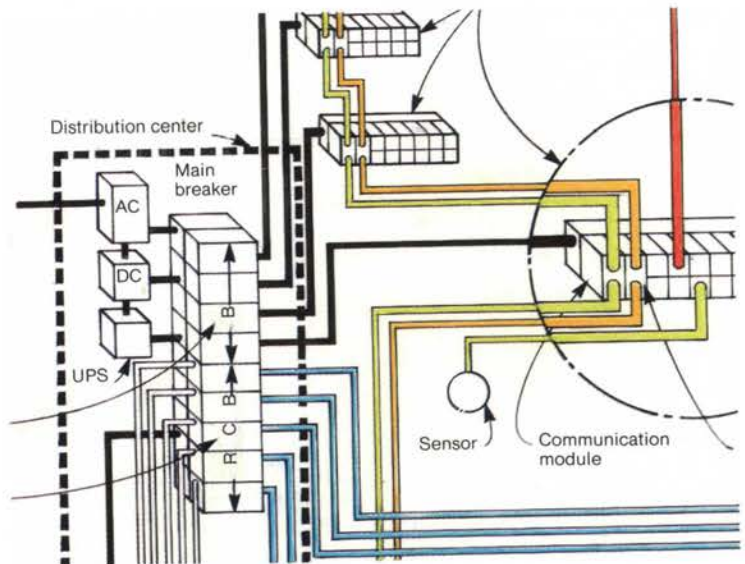
WS		
A's Pershing Square redesign	15	
nce Charles visits Harvard	21	
nt State memorial controversy	21	
tribute to Henry Moore	24	
ministration's housing proposals	28	
x reform effects on profession	30	
OCA amends its model code	30	
uardo Chillida's public sculpture	33	

ents	6	Credits	132
tters	6	Interiors	135
chnical Tips	116	Products	141
ooks	121	Advertisers	156
iefs	132		

The American Institute of Architects

Officers John A. Busby Jr., FAIA, President; Donald J. Hackl, FAIA, First Vice President; A. Nottley Alford, FAIA, Vice President; Benjamin E. Brewer Jr., FAIA, Vice President; David E. Lawson, FAIA, Vice President; Philip W. Dinsmore, FAIA, Secretary; Harry C. Hallenbeck, FAIA, Treasurer; Louis L. Marines, Executive Vice President; James P. Cramer, Senior Vice President;

Directors (Year indicates expiration of term), Frederic P. Lyman, AIA ('87), California; Paul R. Neel, FAIA ('86), California; Robert A. Odermatt, FAIA ('86), California; Harry Jacobs, FAIA ('88), California; Gregory S. Palermo, AIA ('88), Central States; Kennard Bussard, AIA ('87), Central States; Lawrence J. Leis, AIA ('88), East Central States; Mark T. Jaroszewicz, FAIA ('88), Florida/Caribbean; Glenn Allen ff, FAIA ('87), Florida/Caribbean; William W. Herrin, AIA ('86), Gulf States; Norman Koonce, AIA ('87), Gulf States; T. Graham Bradley, FAIA ('87), Illinois; Norman J. Durkee, FAIA ('86), Michigan; Leon Bridges, FAIA ('86), Middle Atlantic; Robert Calhoun Smith, FAIA ('87), Middle Atlantic; C. James Lawler, AIA ('88), New England; G. W. Terry Rankine, FAIA ('86), New England; Kenneth D. Wheeler, FAIA ('86), New Jersey; John M. Laping, AIA ('87), New York; Laurie Maurer, FAIA ('88), New York; Thomas Van Housen, AIA ('88), North Central; Raymond Crowder Jr., AIA ('86), Northwest; Christopher J. Smith, AIA ('87), Northwest; Gerald S. Hammond, AIA ('88), Ohio; Sylvester Damianos, FAIA ('87), Pennsylvania; James Lee Thomas, AIA ('88), South Atlantic; Raymond F. Stainback, FAIA ('86), South Atlan-



Page 102

tic; James D. Tittle, FAIA ('88), Texas; Velpeau E. Hawes Jr., FAIA ('87), Texas; Allen McCree, AIA ('86), Texas; David A. Daileida, AIA ('87), Western Mountain; Gregory Franta, AIA ('88), Western Mountain; Scott Norberg, ex officio, President AIAS; Brent L. Davis, ex officio, Chairman, CACE

Headquarters

The American Institute of Architects: Louis L. Marines, Executive Vice President/Chief Executive Officer; James P. Cramer, CAE, Senior Vice President and AIA Foundation President; Gordon J. Alt, Public Outreach; Suzanne Beauchesne, Administrative Services; Francis X. Brown, Hon. AIA, Conventions; Stephanie C. Byrnes, Information Center/Library; Daniel J. Cohan, Institute Resources; Fred R. DeLuca, Chief Financial Officer/Assistant Treasurer; Deborah A. Diffendal, Management Information Services; Sandy G. Dresser, Human Resources; Kathy L. Dwyer, Program Development, The Octagon Museum; James E. Ellison, AIA, Education Services; Steven A. Etkin, Corporate Vice President; James R. Franklin, AIA, Group Executive, Professional Services; Timothy Hargrove, Controller; Susan Allen Hecht, Membership Services; William D. Hooper Jr., AIA, Professional Systems; Bob G. Kliesch, Publisher, Magazine Group; Paul T. Knapp, CAE, Communications; John E. Lynn, Government Affairs; Ronald J. Panciera, Hon. AIA, Accounting; Ann L. Parenteau, Marketing; James A. Scheeler, FAIA, Group Executive, Liaison and Special Programs; John H. Schruben, FAIA, Real Estate; James Vincent Siena, General Counsel, Group Executive/Government Affairs

KOPPERS
RTMX insulating sheathing
Most "R" per inch

R-Value* 1" = 6.3 3/4" = 5.2
3/4" = 6.3 1/2" = 4.2

KOPPERS COMPANY, INC. • KOPPERS BUILDING • PITTSBURGH, PA 15219

KOPPERS
RTMX insulating sheathing
Most "R" per inch

R-Value* 1" = 6.3 3/4" = 5.2
3/4" = 6.3 1/2" = 4.2

KOPPERS COMPANY, INC. • KOPPERS BUILDING • PITTSBURGH, PA 15219

KOPPERS
RTMX insulating sheathing
Most "R"

R-Value* 1" = 6.3 3/4" = 5.2
3/4" = 6.3 1/2" = 4.2

*Based on 15°F; R value increases proportionally to heat flow.
The higher the R value, the greater the insulating power.

Koppers Rx[®] Insulation will retain its "R" value into the next century. We guarantee it.

the first time ever, a foam
insulation is guaranteed to
retain its "R" value for 20 years.
8.3 "aged" "R" value per inch
the best in the industry.

Koppers Rx Insulation will not lose "R" value
over time. Koppers Rx is a rigid, thermally effi-
cient phenolic foam board insulation, providing
superior long-lasting energy efficiency.

Koppers Rx Insulation is the best value in roofing, wall,
ceiling insulation today. . . tomorrow. . . and
into the 21st century. Koppers Guarantees it!

The Koppers Guarantee

If the "R" value of Koppers Rx Insulation fails to
meet our published specifications — anytime
within 20 years of installation — Koppers will pay
the resulting difference in heating and cooling
costs! See warranty for conditions and details.

Are you getting the long-term "R"
value you specified?

The standards of the Roof Insulation Committee
and the Thermal Insulation Manufacturers Associ-
ation (RIC/TIMA) require an evaluation period of
6 months for determination of "aged" "R" values
for foam plastic insulations. The Midwest Roofing
Contractors Association has sponsored recent
studies which conclude that "the RIC/TIMA 6-
month room temperature 'aged' 'R' values
tests . . . are not realistic to use as the basis for
design of 10 to 20-year roof life." (See RSI
magazine article, July 1986, p.38.)

Koppers Rx goes much further than the standard
6-month "aged" "R" value rating, guaranteeing
high in-service "R" value into the 21st century.

Other Rx Advantages

Specifying Koppers Rx will provide you with
much more than superior, long-lasting energy
efficiency. For instance:

Koppers Rx Insulation is the only plastic foam insulation

product on the market which passed one, one-
and-a-half and two-hour UL fire resistive tests
when the insulation was directly applied over
a protected metal deck. Also, Rx has low smoke-
developed and flame-spread ratings.

- Rx Insulation is non-corrosive.
- Rx Insulation is dimensionally stable and
exceeds the industry standards.

Value-added "R" value

Koppers stands behind the best insulation value
with the best guarantee in the industry. Rx
Insulation is a truly "value-added" material. It
adds value in terms of most "R" per inch and long-
term energy savings. . . so why settle for less.



To learn more about Koppers unprecedented
20-year guarantee, call 800-558-2706 or write:

Koppers Company, Inc.
Dept. #77H-6
Pittsburgh, PA 15219

KOPPERS

Rx[®] . . . The 21st century insulation

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. 2-4: AIA Design Conference entitled "No Earth Tones: Fantasy Architecture of Miami," Miami. Contact: Ravi Waldon at Institute headquarters, (202) 626-7429.

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. 9-13: ArabBuild 86—Arabian Construction Exhibition, Bahrain. Contact: Alison Smith, Overseas Exhibition Services Ltd., 11 Manchester Square, London W1M 5AB England.

Nov. 9-14: Institute of Business Designers Rapids Rally, Grand Rapids, Mich. Contact: Cath McGlynn-Swain, 50 Monroe Place, Grand Rapids, Mich. 49503.

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, 131 Nolte Center, 315 Pillsbury Drive S.E., Minneapolis, Minn. 55455.

Nov. 12-16: International Innovative Housing and Components Exhibition, Toronto. Contact: IHC '86, Manumod Exhibitions, Inc., 209-77 Mowat Ave., Toronto, Ontario M6K 3E3 Canada.

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. 13-14: AIA Corporate Architects Con-

ference entitled "A/E and the Corporation: Is It Good Business?" Annapolis, Md. Contact: Charlotte Yowell at Institute headquarters, (202) 626-7410.

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.

Nov. 17-18: Course on Design and Construction of Reinforced Masonry Structures, Washington, D.C. Contact: Cliff Hopkins, George Washington University, Washington, D.C. 20052.

Nov. 18-19: Conference on Cogeneration—Making the Right Decisions, Cambridge, Mass. Contact: Larry Sherwood, Northeast Solar Energy Association, P.O. Box 541, Brattleboro, Vt. 05301.

Nov. 18-19: Northern Interior Design Exhibition, Middlesex, England. Contact: Hazel Halsey, AGB Exhibitions Ltd., Audit House, Field End Road, Eastcote, Middlesex HA4 9XE England.

Nov. 24-25: Course on Single Ply Roofing Systems, Denver. Contact: The Roofing Industry Educational Institute, 6851 S. Holly Circle, Englewood, Colo. 80112.

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 August 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
Hous-

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 of Columbia 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 that 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 adviser 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 name of the sponsor, jury members, and participants.

My interest is admittedly self-serving. I 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, Ore.
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.

FORMS+SURFACES

ator Surfaces

+ Surfaces offers a range of materials for elevator doors and interiors. Some are durable, these meet most demanding requirements for appearance and long life. Others respect typical budget limitations. Contact our Elevator Surfaces Group for details on standard and made-to-order products.

ed Metal

ossed Metal

ed Bronze

arium

ardwood Veneers

our Panels

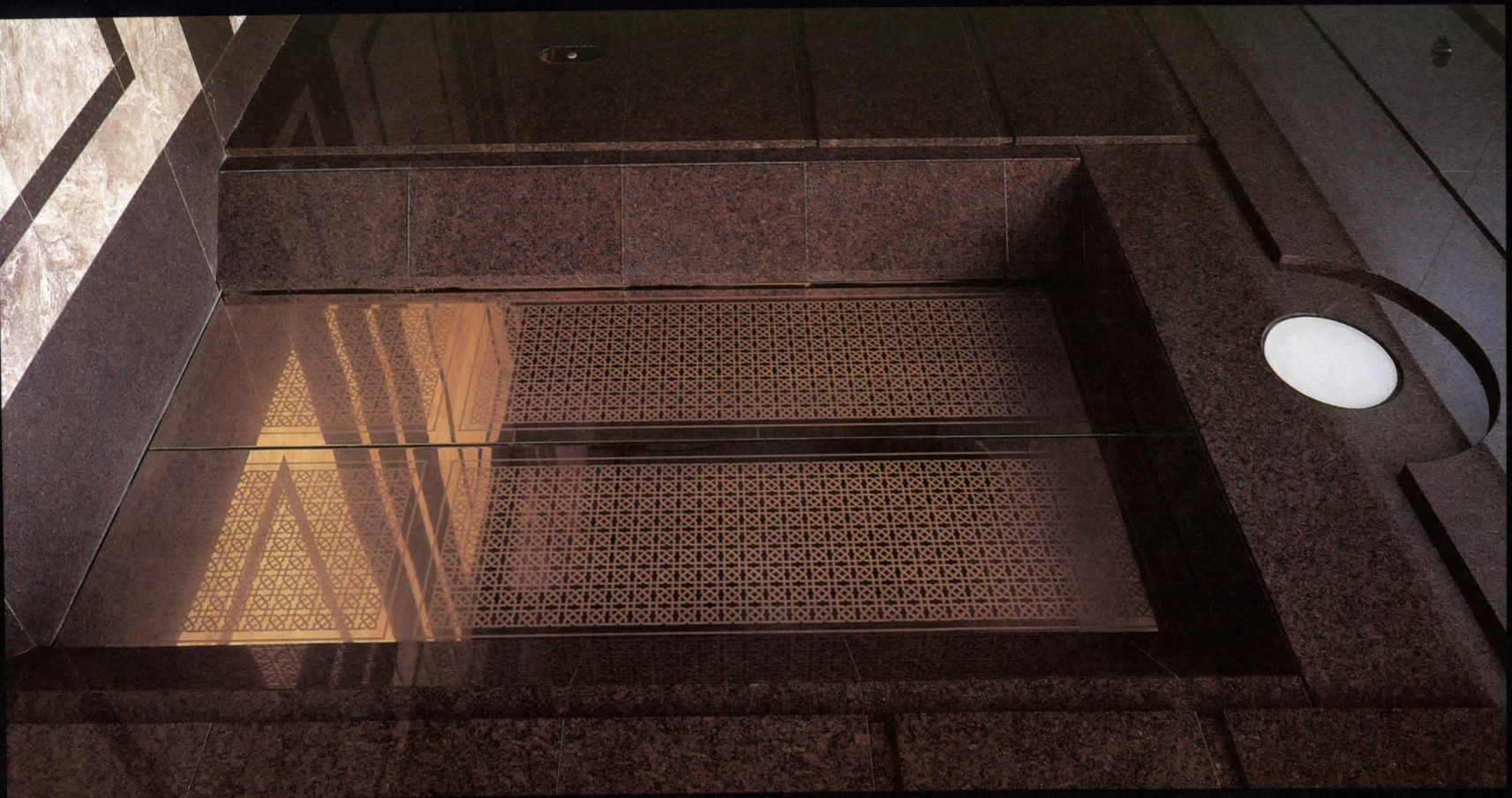
ng Systems

details

+S

ms + Surfaces Elevator Surfaces Group
5215 Santa Barbara, CA 93150 (805) 969-7721

3 No. 4 on information card



Project: One Financial Place, Chicago Architect: Skidmore Owings & Merrill Elevator Manufacturer: Dover Elevator Systems, Inc., Entrance Tyler Elevator Products Inc.

THIS IS SHAKERTOWN SIDING'S MOST BEAUTIFUL SIDE

When most people see Shakertown, they ooh and ahh over the natural beauty of our genuine Western red cedar shingles.

While we're flattered, we've got a lot more to offer than just a pretty face.

But for the other side of the story, you need to look at the other side of our siding.

Right off, you'll notice something you haven't seen before on siding: Plywood.

It's there so you can nail Shakertown right to the studs. With no extra sheathing. And no extra labor.

Then, across the bottom, we've added an ingenious self-aligning groove that makes

chalk lines, story poles and other time-wasters strictly passé.

Now observe how every 8' length of Shakertown Siding is cut precisely to fit stud spacing. The reason? Because no waste makes sense.

So the long and short of Shakertown is that our back is as beautiful as our front.

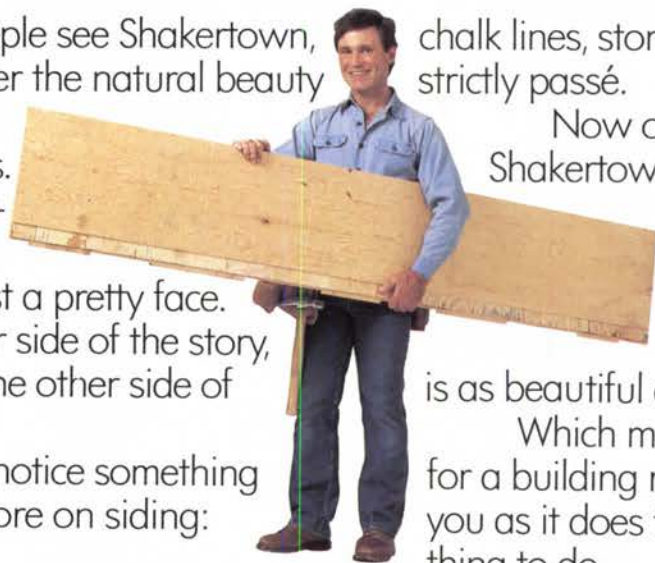
Which means when you're searching for a building material that looks as good to you as it does to a buyer, there's only one thing to do.

Get Shakertown on your side.

SHAKERTOWN[®] SIDING

For free catalog, call toll-free 1-800-426-8970.
In Washington state, 206-785-3501.
Or write P.O. Box 400-AP10, Winlock, WA 98862.

Architect: Richardson, Nagy, Martin; Builder/Developer: The Ranch Development Company



the following letters refer to articles in past issues of ARCHITECTURAL TECHNOLOGY, now merged with ARCHITECTURE.—Ed.

Strategies for Staffing: It was with great dismay 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.

In examining 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 staff, 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 skins, 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, discount 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 Fartray's piece in the May/June issue of ARCHITECTURAL TECHNOLOGY [page 44] 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 these 12 "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 development 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

IBC Instructions to Bidders
PRC Proposal
GCA General Conditions, Forms
02400 Foundations & Substructure
02500 Site Improvements, Earthwork, Grading, Paving
02600 Site Utilities
02800 Landscaping
03100 Poured-in-Place Concrete
05100 Superstructure Framing
07200 Roofing & Deck Waterproofing
08300 Exterior Walls and Enclosures
08500 Doors & Finish Hardware
09100 Interior Construction and Finishes
09500 Field Painting and Coatings
11100 Building Equipment & Specialities
14100 Elevator
15100 HVAC Air Handling Systems

continued on page 11

INTRODUCING
THE NEW
PLAN HOLD



Striplite



396SL Striplite

Edge-to-edge
task lighting

See what you're drawing instead of working in shadows. Striplite's positive positioning directs ideal light for any board angle. And,



it attaches to any drafting table, can be used with all drafting equipment. See the best today... see the Plan Hold Striplite.

Catalog on request.


PLAN HOLD
 17421 Von Karman Avenue • Irvine, California 92714-6293
A TIMES MIRROR COMPANY

Dealers in All Major U.S. Cities and Canada

What if...

**YOU COULD PULL OFF
A PERFECT DRAWING
FOR ONLY \$5,400?**

Ah, the big idea. Everyone has one. But not everyone can afford a plotter to plot one on. Which got us thinking. What if there was an HP quality plotter so reasonably priced you could afford to hook one up to every PC CAD workstation in the office?

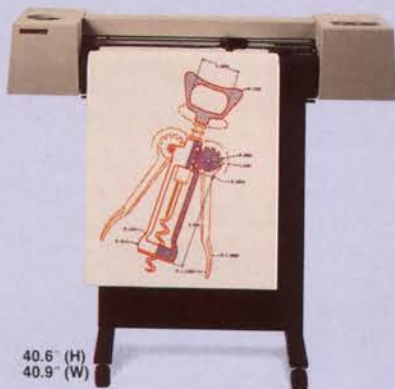
Introducing the HP DraftPro Plotter. Now for only \$5,400 any architect, engineer or designer can create perfect plots time after time. Consider what the DraftPro can do:

It can draw straight lines, smooth arcs and perfectly-formed characters. All on C and D-size drafting film, paper or vellum, using eight different pen colors.

Furthermore, it works with just about any PC, like the HP Vectra PC and IBM PC's. As well as popular PC CAD programs like VersaCAD and AutoCAD.

If the idea of having HP reliability with a low price tag makes sense to you, call us now. For a brochure and sample plot, call 1 800 367-4772, Dept. 623A.

The HP DraftPro Plotter: high-quality drafting for only \$5,400.*

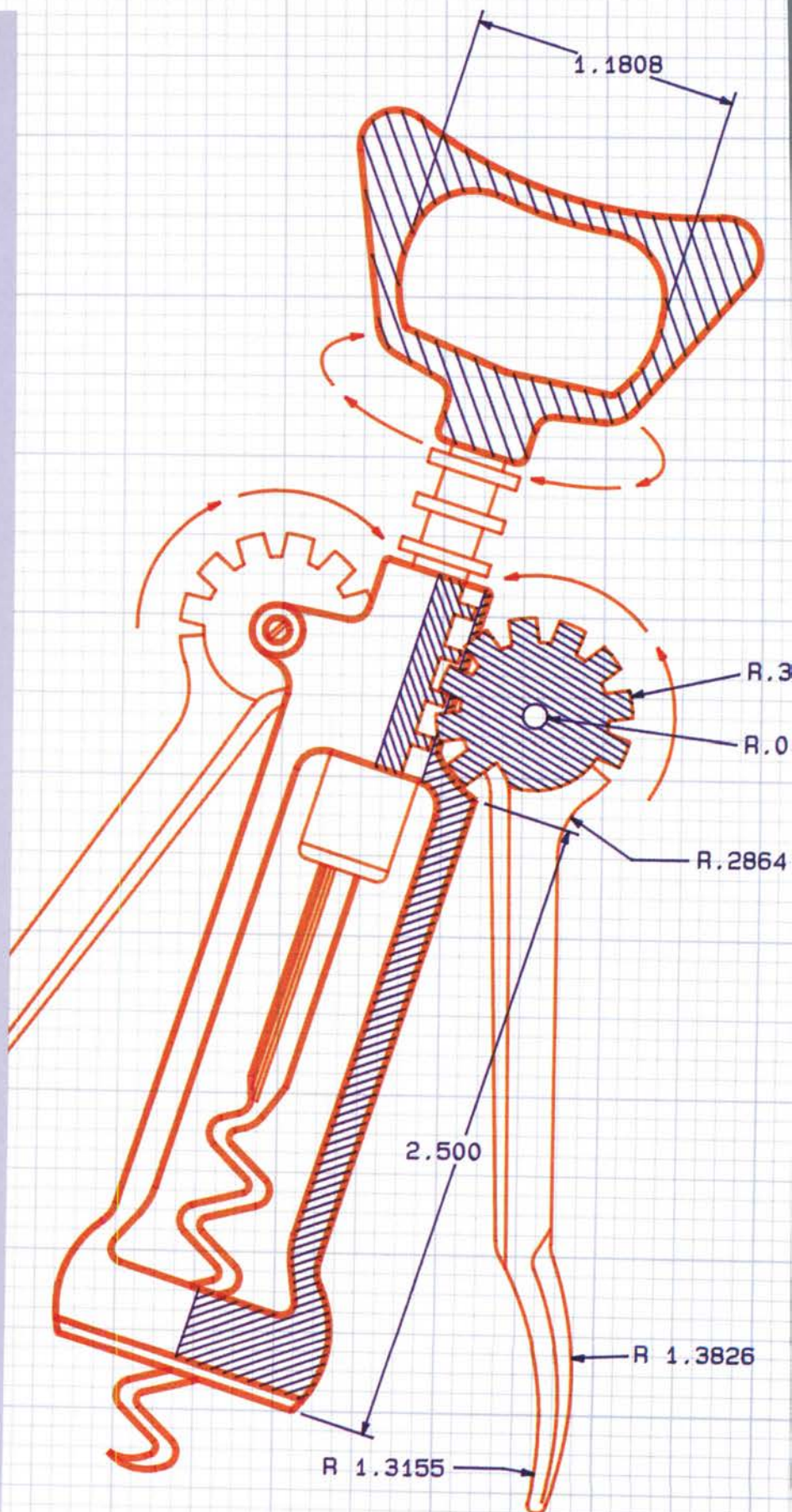


40.6" (H)
40.9" (W)

This diagram is an unretouched reproduction of a drawing produced on the HP DraftPro with VersaCAD software.



**HEWLETT
PACKARD**



*Suggested U.S. list price.

HP Vectra PC is a trademark of Hewlett-Packard. IBM PC is a registered trademark of International Business Machines. VersaCAD is a registered trademark of T & W systems. AutoCAD is a registered trademark of Autodesk, Inc. © 1986 Hewlett-Packard Co.

PG604AM0

ters from page 9

200 HVAC Heating
& Refrigeration Systems
300 Plumbing Systems
400 Fire Protection Systems
500 HVAC Controls
& Instrumentation
100 Electrical Power
& Lighting Systems
200 Communication
& Control Systems

Baron V.C. Wateley, AIA, CSI
Chicago, Ill.

Cutting Edge: I read with interest the feedback to William Herrin's article 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. I am 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 obtaining 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 vendors 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.

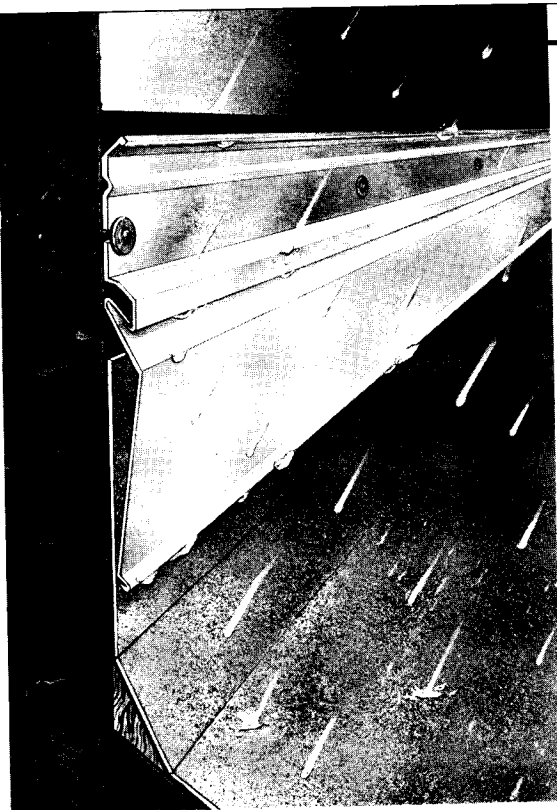
As drawn, the bushing would allow the angle to move upward relative to the slab, placing the bushing in compression. Since there is no resilient pad, the angle could not move downward. The connection drawn therefore allows movement only partially in the vertical axis, and not at all horizontally, as stated in the caption.

*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 airconditioning 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.*



Fry's Springlok Flashing Systems Like Water Off A Duck's Back

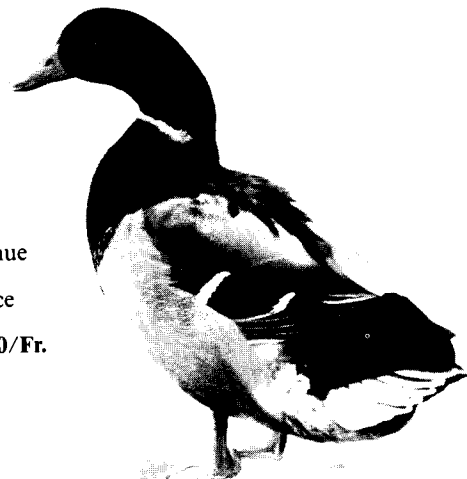
39 years ago Fry Reglet applied a lap-joint feature to our springlok flashing systems. Similar to the overlapping feathers of a bird, water rolls off our flashing and onto the roof, without any possibility of penetration. Our system even moults — the flashing is removable for re-roofing and can be snapped back into place when the job is done.

- easy installation
- cost effective
- nationwide distribution

**Fry Reglet: overlapping ideas
with mother nature.**

(818) 289-4744 625 So. Palm Avenue
Alhambra, California 91803
(404) 441-2337 2777 Peterson Place
Norcross, Georgia 30071
Look for us in Sweets Catalog 7.10/Fr.

FRY REGLET



Don't play with fire.

Use the modified bitumen roofing system that's UL Class A rated.
DynaKap® FR from Manville.

DynaKap FR is the key part of Manville's UL Class A modified bitumen roofing system. It's a sophisticated, engineered product that meets above-deck fire safety requirements without special coatings or extra gravel.

For added safety, both DynaKap FR and the original DynaKap are hot mopped, not torch applied.

DynaKap FR is an elastomeric asphaltic blend cap sheet made with SBS synthetic rubber and fire-resistant additives to achieve the UL Class A ratings. It's reinforced with both a fiber glass mat and a tough polyester mat to resist roof movement and stress.



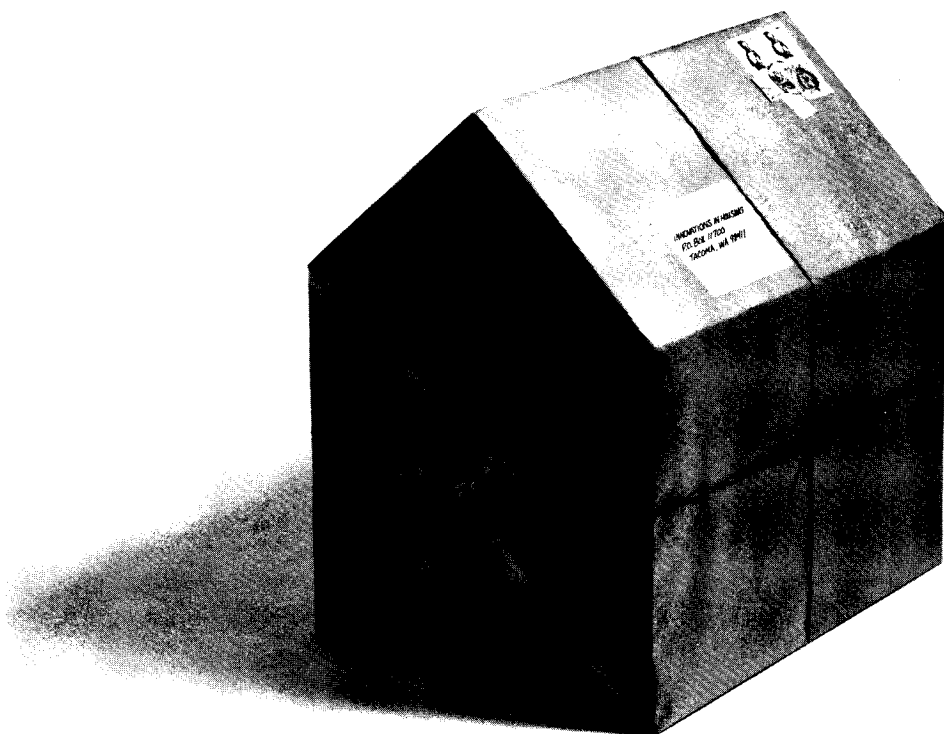
DynaKap FR is compatible with all Manville roof insulations to form total modified bitumen systems that are covered by the Manville Signature Series Guarantees.

For details on DynaKap FR, the state-of-the-art modified bitumen with built-in fire resistance, contact your Manville Sales Representative or the Manville Product Information Center P.O. Box 5108, Denver, Colorado 80217. (303) 978-4900.

For export, telex 454404 JOHNMANVL DVR.

**21,000 people with one goal:
To be your best supplier.**

Manville



**Send us your best house design.
If it wins, we'll build it.**

If you're an architect, engineer, designer, builder or student, you're eligible to enter our design contest.

Object: to recognize innovations in housing.

First prize is \$5,000 and the chance to see your ideas constructed and featured in *Better Homes and Gardens*, *Builder* and *Progressive Architecture*. Up to five \$1000 Citations of Merit will also be awarded.

We're looking for single-family home designs that are appealing and economical to build. They must also demonstrate noteworthy aesthetic and structural uses of wood products.

You can get rules and entry forms three ways. Send in the coupon. Call (206) 565-6600. Or write Innovations in Housing, Dept. PA-1084, P.O. Box 11700, Tacoma, WA 98411.

But do it soon. Because all entries must be postmarked by April 1, 1987.


**INNOVATIONS
IN HOUSING**

**Innovations in Housing
Dept. A-1086
P.O. Box 11700
Tacoma, WA 98411**

Please send me _____ entry forms.

Name _____

Address _____

City _____

State _____

Zip _____

A-1086

Circle 10 on information card

White Cement Imagination in Architecture

From a pristine canvas of brilliant white through a palette of delicate pastels to the warmth of ruddy reds and the icy coolness of crystalline quartz, concrete and terrazzo made with architectural white cement provide an almost limitless spectrum of colors and techniques for harmonizing and contrasting design elements. When used as the concrete or terrazzo matrix binding decorative aggregates such as quartz, marble, granite, limestone, or gravel, its uniform whiteness and physical properties enhance their color and beauty. When used with coloring pigments, it assures precise reproduction of the desired shade or tint.

Send for our new Architect's Reference Guide to White Cement in Design and create materials as colorful as your imagination.



FREEBOOK INDESIGN COLOR

LEHIGH

ALLS BROS
WHITE CEMENT

Lehigh Portland Cement Company
718 Hamilton Mall, Allentown, PA 18105
215-776-2600

Design SITE Selected to Redesign Los Angeles' Pershing Square

TE Projects Inc. of New York City has selected the winner in an international design competition for the \$12.5 million reconstruction of Pershing Square in downtown Los Angeles. The site is the best park in the nation's second largest city and has a history as checkered as the square's design. Dedicated in 1866, the five-acre square has borne at least five names, and the winning SITE plan, when built, will mark its sixth physical incarnation. Its most drastic remodeling occurred in the 1950s when the 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 plaza 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 the 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 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 a busy Latino shopping street adjoined by a National Historic District and an active skid row. To the west is the just-remodelled 62-year-old Biltmore Hotel, the tram 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 displacing its present users.

TE Projects' winning proposal for the revitalization of Pershing Square.

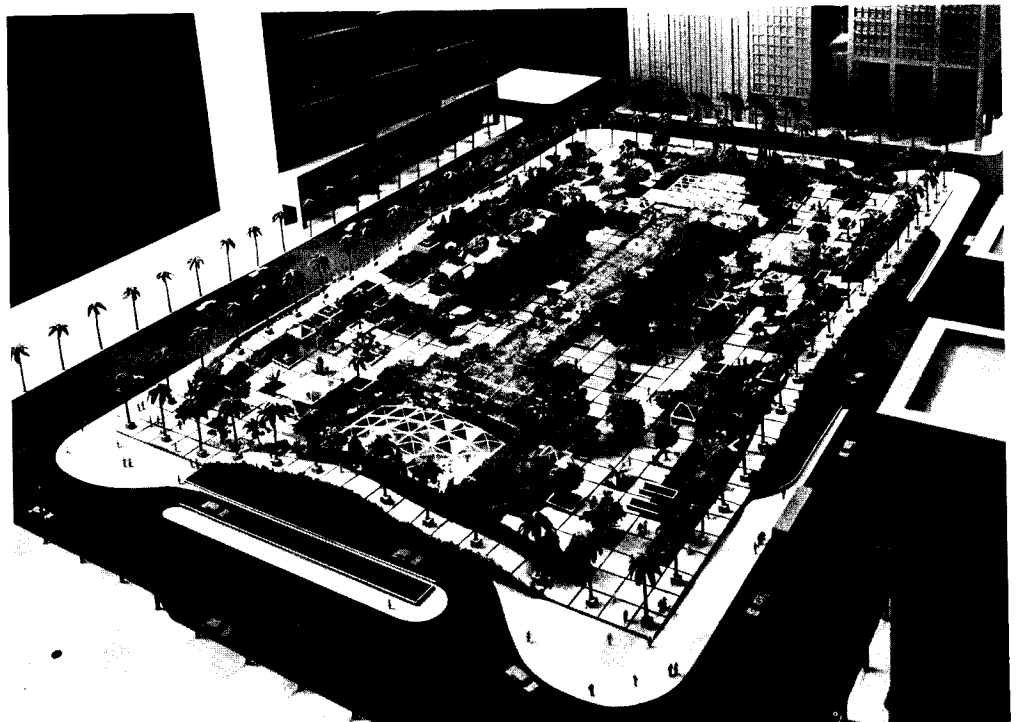
The design competition has been PSMA's principal effort to date, and proved to be, in comparison with recent downtown public-project competitions in other sunbelt cities, a smooth, publicly visible process yielding a satisfactory outcome. It generated 242 entries from which five were chosen for development 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 iden-

tifiable 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

continued on page 16



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 overscaled. 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

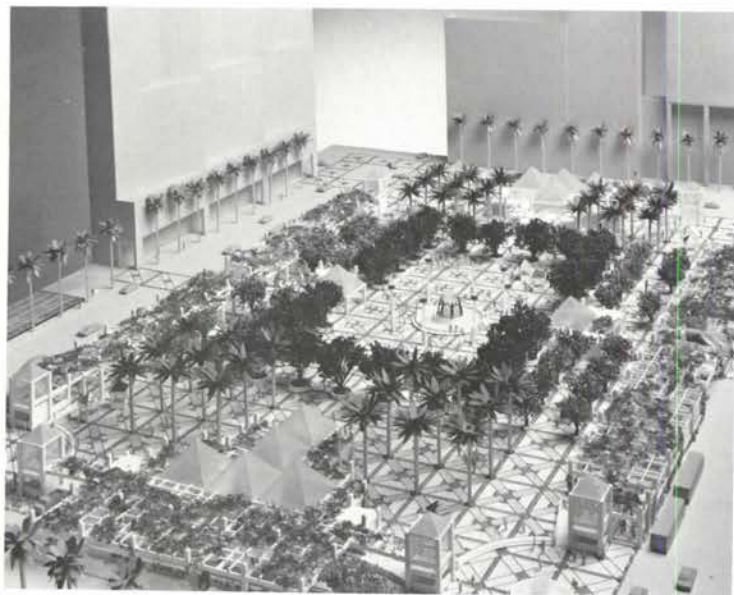
its surroundings and created a decidedly awkward perimeter. Security would be problematic, and entering the park at the center of its long sides under this raised edge would be a dubious esthetic experience.

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 remembered that the design was a response to the

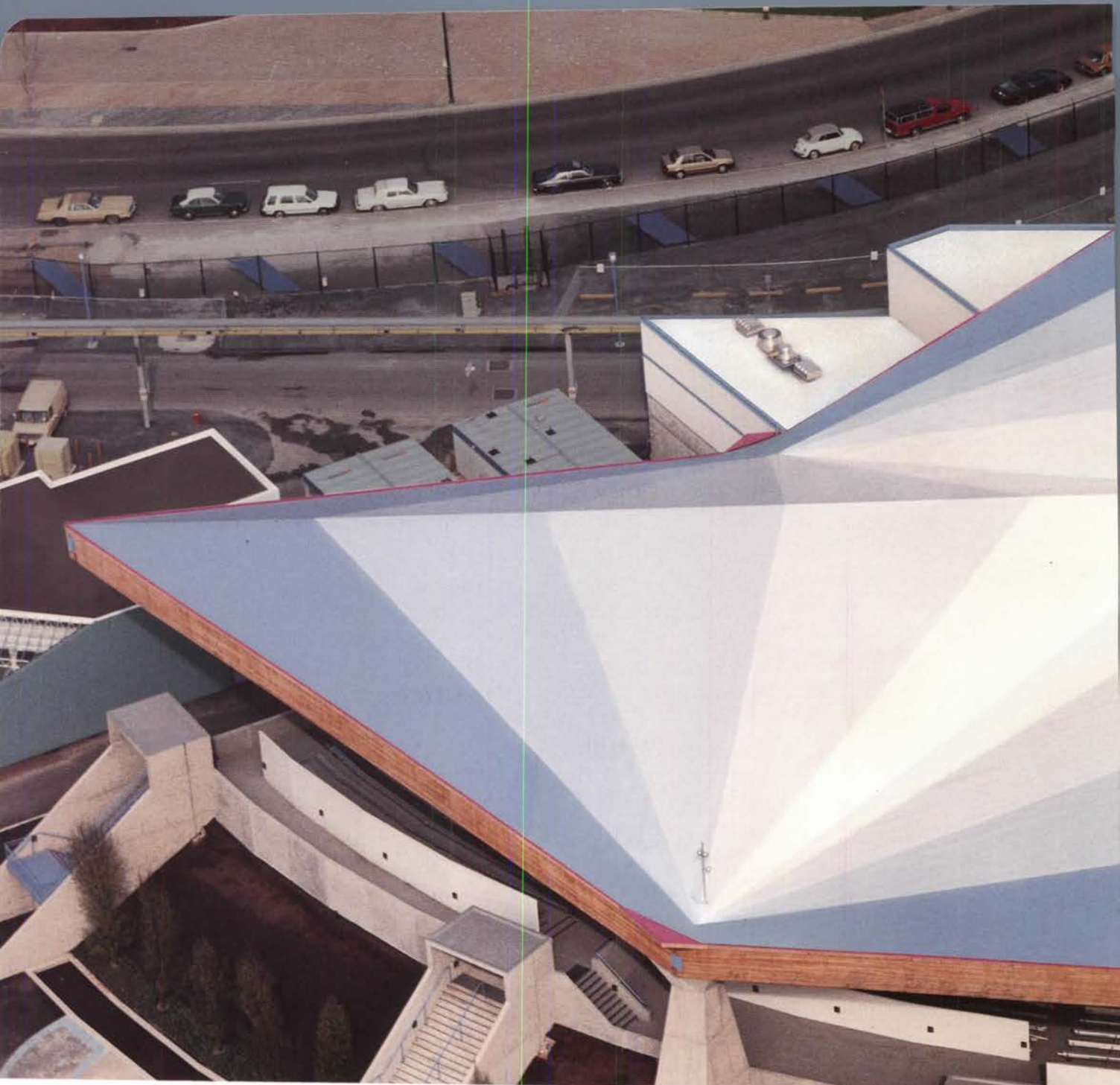
continued on page 16

The four other finalists for the redesign of Pershing Square, clockwise from top left, Frank Welch & Associates, Phelps/Son Architects, The SWA Group, and Bone Levine Architecture.



From Du Pont:

A MATTER OF
TOP
SECURITY!



Building: Expo 86 Theater, Vancouver, Canada Architects: Aitken Smith Carter Partners; The Wade Williams

Feel secure in your c

Your imagination shouldn't be limited by the type of roofing materials available to you. Because there's one single-ply roofing membrane that finally gives form and function equal billing—a membrane based on Du Pont HYPALON synthetic rubber.

A tailored fit.

HYPALON's unique chemical and physical properties allow for design flexibility and performance not found in other single-ply membranes. Membranes based on HYPALON are easily fitted—providing a tight seal over the various shapes and hard-to-fit areas of any roof. Whether in new construction or building restora-

tion, if you can conceive of it, a membrane based on HYPALON can be tailored to cover it.

Looks good, acts tough.

Membranes based on HYPALON can be made in a variety of brilliant colors. Unlike most single-ply materials, membranes based on HYPALON are unique in that different colors can be achieved without loss of physical properties or weatherability. The most popular choice, however, is still reflective white—noted for its remarkable energy-saving capabilities.

But you get more than just a pretty roof with HYPALON. Because no

other single-ply membrane can match the combination of properties and proven performance of HYPALON. For example, a roof made with HYPALON actually becomes stronger with time as it cures. Unlike other synthetic rubber or thermoplastic-based membranes, HYPALON is in place to create a more durable membrane that your client can count on for years. In fact, roofing systems based on HYPALON are among the most economical on the market today.

HYPALON takes the heat.

And the cold. And the rain. A snow. Indeed, membranes based



For More-Ply Roofing Roofing Manufacturer: Dunlop Construction Products, Inc., Mississauga, Ontario, Canada; Dunseal Hypalon® H301 System

ivity with HYPALON.®

N synthetic rubber remain through some of the harsh- ions Mother Nature has

membranes made with N are available in formula- remain flexible at tempera- w as -40°F (-40°C). They an exceptional combination ies—resistance to flame on, corrosive chemicals, s, pollutants, acid rain and c—setting quality standards ut the industry and measur- even the strictest build-

brane based on HYPALON amed with heat, solvents

or adhesives depending upon the system's supplier recommendation. In addition, because they're among the easiest to install, roofing systems based on HYPALON are much less likely to cause problems in the long run. And any necessary repairs can be done quickly and easily.

The sky's the limit.

Let your imagination run wild, not your costs. Most roofing systems based on HYPALON are as cost-effective as they are versatile. So when you're specifying a single-ply roofing system, make sure it's based 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.



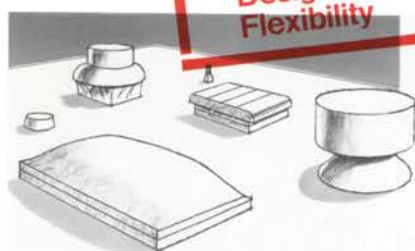
HYPALON®



Polymer Intelligence

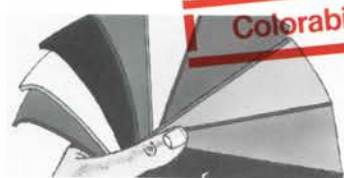
Your single-ply roofing system is only as effective as the material that goes into it. HYPALON® is Du Pont's registered trademark for its chlorosulfonated polyethylene, a synthetic rubber supplied as a raw polymer to the rubber industry. Rubber manufacturers then compound and process the polymer to produce 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.



Design Flexibility

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.



Colorability

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.



Durability

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.



Weatherability

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).

Environmental Resistance

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.



REG. U.S. PAT. & TM. OFF.

gn from page 16

and that, of all the final schemes, SITE's was the most conceptual and the least specific, and thus capable of evolution. Chairman Charles Moore, FAIA, said that "we liked SITE's plan because it didn't seem to complete the whole business of making a park but rather started to work that we can't really imagine the end of. . . . This scheme, like the 'silent cities,' allows each person who uses this site to make possible their own script to evolve—as opposed to the 'talkies' where the script and thus the imagination is already done for you." This unfinished city goes beyond Moore's remarks; it is still quite a bit of specific designing to be done.

SITE principal James Wines acknowledged this in his presentation to the jury, understanding the importance of detail in so far as a generalized scheme. Pershing Park is of considerably greater magnitude and programmatic complexity than any of SITE's executed work, and this provides an opportunity to expand upon one-dimensional brilliance that has characterized that work to date. The grid is largely a *tabula rasa* that will be filled during the balance of the design period. SITE's goal is to "generate mini-environments" reflecting the city's history, ethnicity, and specific culture as well as diverse vegetative domains and landscaping traditions.

SITE will be aided in the latter tasks by landscape architects EDAW, Inc., and Patton & Spitz. Charles Kober Associates will be the local associated architect for the project.

Six million dollars of the \$12.5 million construction cost will be supplied by the Los Angeles Community Redevelopment Agency, with private contributions making up the balance. The competition was funded in part by a grant from the design arts program of the National Endowment for the Arts. William Liskamm, FAIA, of San Rafael, Calif., was the competition adviser. —JOHN PASTIER

Prince Charles in Limelight at Harvard GSD's Anniversary

The 50th anniversary of the Harvard graduate school of design was celebrated in September, coinciding with the 350th anniversary of Harvard University. It was the larger, larger celebration that attracted the presence of Prince Charles, the Prince of Wales, who was the main speaker at its opening convocation.

Wherever the prince went, he traveled along U.S. government security agents who all wore gray suits, red ties, and Gordon Liddy moustaches, as if deliberately to provide a foil for the prince's rosy cheeks, amazing tailoring, and the golden academic robe from the University of Wales in which he rose like the sun over a cloudy Harvard Yard to deliver his

address. Later in the same day the prince appeared at the design school at a symposium called "The Future of the City"—the only one of Harvard's zillion anniversary symposia he attended—and stole the show from the academics with unpretentious and obviously heartfelt comments about the city of Liverpool, its devastation through loss of jobs, and people's need to live in village-like neighborhoods, whether urban or rural, the designs of which express their own style and interests.

Dean Gerald M. McCue, FAIA, took the occasion to announce a new Prince of Wales prize in urban design, funded by an anonymous donor, which will provide an award of \$25,000 periodically to the designer of a completed work, anywhere in the world, that "advances traditions of humanism in urban settings."

The graduate school of design came into existence in 1936 when Dean Joseph Hudnut merged the earlier Harvard schools of architecture (1895), landscape architecture (1900), and city planning (1929). Hudnut's ideal of collaboration among the design disciplines was much debated by various symposia during the three-day celebration. Among those who spoke was Vermont landscape architect Dan Kiley, a student at the time of the 1936 merger, who argued that different disciplines shouldn't collaborate because ideally there shouldn't be different disciplines. "We should abolish all the professions," he said. "Make it all one field. The best landscape architects today are architects anyway. The GSD is like the Army, Air Force, Navy, and Marines. I hate the scrambling for turf." Boston architect Joan Goody, AIA, said that an architect can't accomplish anything without collaboration and decried the "image of the lonely designer, the lonely genius." She felt that both students and the general public were deceived by a few well-known architects who "use such an image to promote hidden well-run businesses."

Among speakers on other topics, historian William McNeill talked about cities and claimed they came into existence not for commerce but chiefly for ritual activity. He argued that people still yearn for ritual and wondered about the effect of "the audiovisual world of the future that offers vicarious participation—participation in private—depriving life of its force and effect. The effect of crowds is missing; people still want to congregate." Planner Martin Meyerson worried about the same problem, saying he thought the urban challenge to designers was "to keep the concentration of people and their face-to-face contact, not to let TV become a substitute." But he said he thought cities were getting better and praised "a new civility" and renewed confidence in leadership. Critic Ada Louise Huxtable, Hon. AIA, challenged him and questioned whether society now possesses any vision, any ideal—good or bad—about cities or about life. —ROBERT CAMPBELL

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 realization.

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

MORE

LEVERAGE

Contemporary styling rounds the bend with Falcon's sleek new Sutoro Lever. And Sutoro's sweeping lever line features a return that satisfies even the toughest handicap codes.

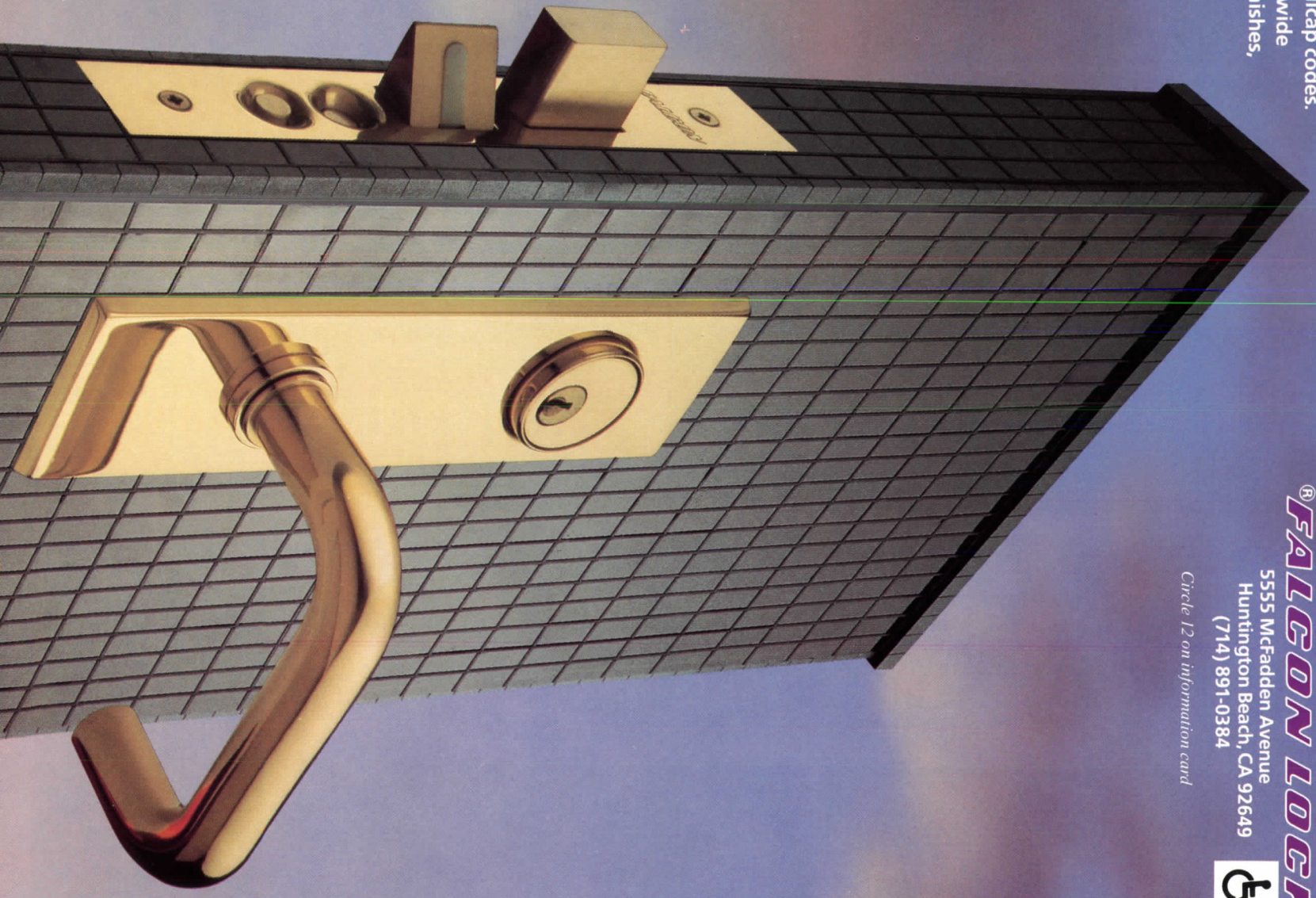
including Polished and Satin Stainless Steel. Falcon's Sutoro: more of the kind of leverage that makes any job easier.

FALCON LOCK

5555 McFadden Avenue
Huntington Beach, CA 92649
(714) 891-0384



Circle 12 on information card



Made in U.S.A.

UNDERLYING GENIUS.

Uncover the ingenious reasons why environmentally safe 440 Carpetboard is your smartest choice in carpeting underlayment.

At first glance, the reasons why smart architects choose 440 Carpetboard are obvious.

It combines environmentally safe insulation, sound deadening and cushioning qualities in one carpeting underlayment for use over concrete or wood.

But they also prefer it for an underlying reason. What it does not provide.

440 Carpetboard contains no asbestos or urea formaldehyde additives. It's environmentally safe.

It also adds a number of selling points with no additional installation time. For example, it has twice the R-value of wood underlayment, deadens noise and adds resilience to any carpet installation. All good selling points for any home or office buyer.

Most ingenious of all, you get all these advantages in a quick, cost-saving *one-step application*.

That's not just smart. It's genius.

Join the smart architects who choose 440 Carpetboard.



Environmentally safe carpet underlayment, insulation, resilience and acoustic control in a one-step installation? That's genius! That's 440 Carpetboard.

SIZES		Wt.
Thick.	Sizes	lbs./sq. ft.
1/2"	4'x4', 4'x8'	1.2
5/8"		1.5

ACOUSTICAL TEST DATA*:

STC 49 IIC 70 (INR+19) STC 48 IIC 65 (INR+14)

*Kodaras Acoustical Lab. Test Report L188-1-64; 790-6-69.

And add underlying genius to your next job.

For full details, and a free sample, call (609) 883-3300. Or write:

homasote

C O M P A N Y

P.O. Box 7240, West Trenton, New Jersey 08628-0240

SMART ARCHITECTS CHOOSE HOMASOTE.

5664

Circle 13 on information card

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.

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 they reflected a belief in

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 (¼-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

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 where he discovered Cezanne in 1923 while 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 on 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 it.

continued on page 1

Moore's 'Vertebrae' in place at the Seafirst Bank plaza in Seattle.



Project: Minnesota Twins Clubhouse, Hubert Humphrey Metrodome, Minneapolis
Architect: Shea Architects, Inc., Minneapolis
Construction: Lund-Martin Construction, Inc., Minneapolis
Electrical Contractor: Sterling Electric Construction Company, Minneapolis



New modular fixtures answer multiple remodeling needs: advanced optics mean better lighting, wide range of options gives design flexibility, four-week shipment keeps projects on schedule.

Lighting the Remodeled Space

You can insist on the look and quality of the best linear lighting—even if you're up against a tight completion deadline.

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.



A selection of specially-designed lenses distributes light facet by facet. This up light combines wide spread with low lens brightness.

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.



PEERLESS

PEERLESS LIGHTING CORPORATION, BOX 2556, BERKELEY, CA 94702-0552 • (415) 845-2760
"PEERLESS," "SOFTSHINE," AND "FASTTRAC" ARE TRADEMARKS OF PEERLESS LIGHTING CORPORATION

PRACTICE POINTERS: INVESTIGATE YOUR OPTIONS

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 con-

struction 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.

Victor O.

Schinnerer
& Company, Inc.

Underwriting Manager
5028 Wisconsin Avenue, NW
Washington, DC 20016 (202) 885-9500

Coverage is underwritten by
Continental Casualty Company, one of the CNA Insurance Companies.

CNA

For All the Commitments You Make®

The Plaza™ Suite is shown in our Bland Whisper Color™ with Lexington™ faucets.

For our luxury products brochures, write to American Standard KBB, 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.

The Plaza Suite. For those who don't understand the meaning of compromise.

**AMERICAN
STANDARD**
Pure luxury

Circle 16 on information card

Losses from page 24

sition of the work. Seattle area private collectors and the Seattle Art Museum denied this.

In late August, as workers prepared to remove the sculpture, the city department of construction and land use posted a stop-work order because the owners had failed to secure a demolition permit. Matters were then further complicated by the prospect that the sculpture may have allowed the bank, under a "bonusing regulation," to obtain additional street level retail space, which would require replacement of the Moore with another work of art.

As the local art community scrambled to contain this tempest, intrigue was thrown into the brew when JMB officials reversed themselves and denied that they were the sellers, claiming that the sculpture was still owned by the bank. At this point the bank's representative, Boston art consultant Wayne Anderson, confirmed that he had sold the sculpture as part of

an effort to shift the corporation's collection from an international to a Northwest focus, but claimed that JMB did own the work during the sale.

Bank officials then rather sheepishly explained that they had had obligations to sell *Vertebrae* to two buyers at the same time—JMB and an East Coast buyer. The double sale resulted from a right of first refusal clause in an agreement between the bank and JMB. The sale by Anderson triggered the clause, giving JMB the option to buy. JMB exercised its option but immediately assigned those rights to Anderson's buyer, an East Coast art dealer, who in turn sold the piece to a Japanese dealer. The dealer has reportedly already resold the work.

Now, as lawyers for the various principals attempt to unravel the events, *Vertebrae* will stay put—for a while.

—JOHN A. GALLOWAY

Mr. Galloway is an architect and freelance writer in Seattle.

Government

Housing Bill Proposes Rehab Rather than New Construction

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 most bleak, 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 be 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 program 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-reducing 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 back seat to community development corporations, public/private partnerships, state and local governments, and private foundations."

—NORA RICHTER GREEN



Are
they
doors?

Are
they
show
cases?

Yes

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

**BRITE
VUE**

Glass Systems, Inc.

1021 Walnut Ave., Pomona, CA 91766 (714) 628-5557
So. Calif. (800) 344-4554 No. Calif. (800) 445-5525
Outside Calif. (800) 423-1885 Telex 757808

Circle 17 on information card

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 the removal of architectural barriers to the handicapped and elderly. For historic rehabilitation, the existing three-tier tax credit (15, 20, and 25 percents 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 hous-

ing 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 quality written into it. It will 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."

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 will also 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. Full manuscripts are due April 15, 1987, for publication in the conference proceedings.

New Standards for Sidings

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.

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.

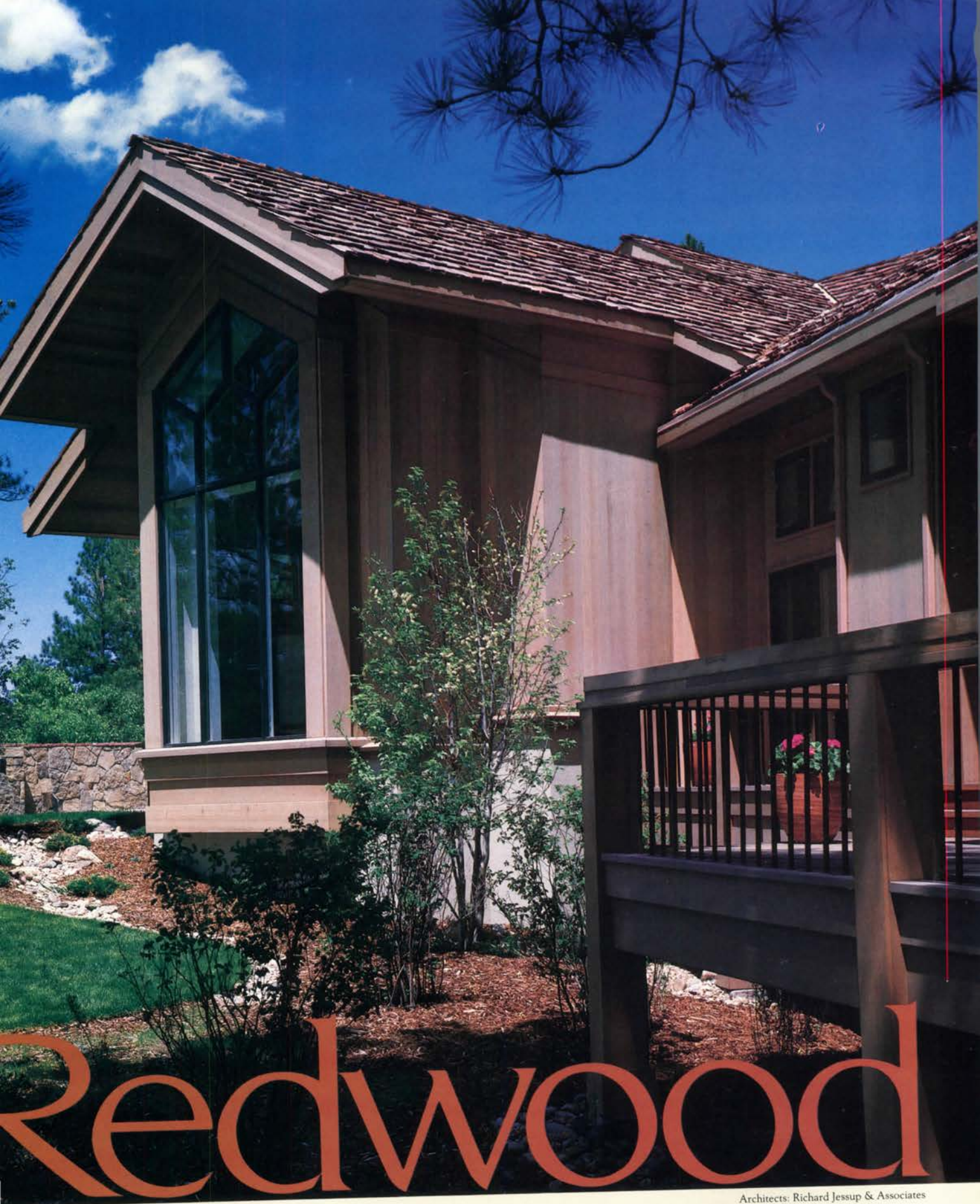
Key issues in the new code include:

- Major reorganization of the code format. Several existing code articles will be subdivided to create new, separate articles pertaining to specific materials.
- Redefinition of assembly occupancies. Assembly occupancy A-1-A (theaters used for theatrical or operatic performances) and assembly occupancy A-1-B (motion picture theaters) are combined into one use group, meaning theaters of all types will now be required to meet the same code requirements.

- 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 determining these design



Architects: Richard Jessup & Associates

Natural beauty, durability and stability make it the natural choice for creative designs that endure. Send for Redwood Architectural Guide.

CALIFORNIA REDWOOD ASSOCIATION 591 Redwood Highway • Mill Valley CA 94941 • (415) 381-1304
GEORGIA-PACIFIC CORPORATION • MILLER REDWOOD COMPANY • THE PACIFIC LUMBER COMPANY • SIMPSON TIMBER COMPANY • TIMBER REALIZATION COMPANY

Sensor Operated **Another first from Haws.**



The First Water Coolers To Offer TOUCH-FREE Operation

Introducing "Hands-Off" water coolers from Haws. "Hands-Off" coolers feature a patented electronic sensor that activates the water stream as soon as a user comes within range. A built-in timer stops the water flow automatically if the sensor is blocked for more than 30 seconds, thus discouraging tampering and preventing damage to the sensor itself. Another protective feature—a time-delay mechanism—prevents accidental activation by passers-by. Now health care facilities, office complexes and all indoor public areas can be designed with the ultimate in barrier-free convenience.

"Hands-Off," the "Smart" Water Coolers

Models HWC88HO, HWC88-2HO, HWDFS8HO, HWDFS8-2HO and HWCT8HO
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 HCBF7HO

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

Circle 19 on information card

Envision the possibilities!



Haws Drinking Faucet Company
P.O. Box 1999, Berkeley, CA 94701
(415) 525-5801 Telex: 33-6358

Haws AG
Kirchberg/Bern Switzerland

For more information on Haws' new "Hands-Off" water coolers, contact your local Haws representative, see Sweets section 15.7C, or phone the Sweets Buyline.



HWDFS8HO

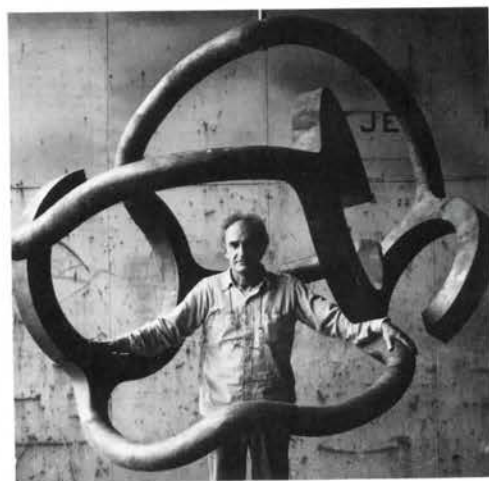


HCBF7HO
Kenyan Beige



The Arts

Basque Sculptor's Public Art



Courtesy of Tasende Gallery/Claude Gaspari



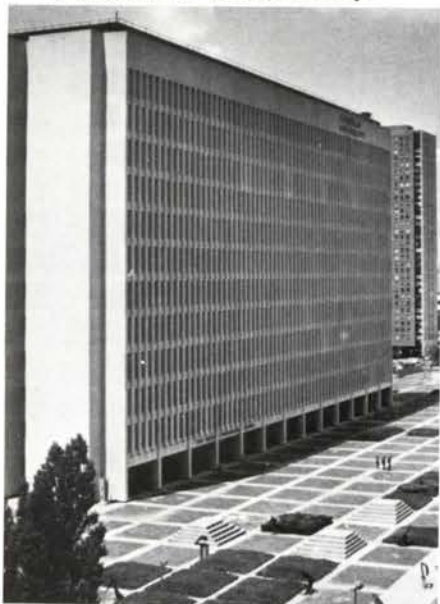
Although Eduardo Chillida received ample recognition for his public sculpture in the Basque country in the '70s when it was created, little has been heard of him since. The silence is being broken this month with a many-pronged attempt to reassess the sculptor's significance. On Oct. 24, the first major 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?

FORDHAM UNIVERSITY



SEALED WITH POLYSULFIDE 1965

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

CARPENTER CENTER, HARVARD UNIV.



SEALED WITH POLYSULFIDE 1963

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

UNITED AIRLINES HEADQUARTERS



SEALED WITH POLYSULFIDE 1966

United Airlines Headquarters
Libertyville, Illinois

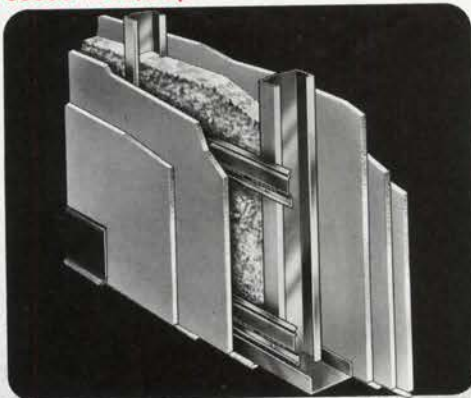


To find out about other prestigious buildings that have been sealed for more than 15 years with Morton Thiokol LP® polysulfide base sealant, send for your copy of, "It All Started Here".

Morton Thiokol, Inc.
Morton Chemical Division
Mkt. Comm. Dept AIA
333 W. Wacker Dr.
Chicago, IL 60606

Now, our innovative USG® SJ Stud/RC-1™ Resilient Channel System

isolates all types of sound problem areas—including tall walls in mechanical rooms and theatres. This exclusive MTC* drywall partition (Music, Mechanical Equipment Transmission Class) is especially effective in handling even such pervasive low frequency sounds as *blower motors, machinery and the bass tone in music*. Our high performance partition systems employ SJ Studs and RC-1™ Resilient channels—offer superior STC/MTC sound ratings plus fire ratings up to 3 hrs. (UL Design U451-U455). And our new computer-aided design service utilizes hundreds of new combinations of materials to customize sound control performance for virtually any requirement. Get specifics. Write to us at 101 S. Wacker Dr., Chicago, IL 60606-4385, Dept.



NOTE: USG Acoustical Sealant should completely fill gap under panels.
*MTC is a single number rating, resulting from a methodology developed and copyrighted by U.S. Gypsum as an index of partition performance in low-frequency sound isolation such as music, motors and some other types of mechanical equipment.

or call us now at:

Eastern Construction Products Division

(914) 332-0800

Southern Construction Products Division

(404) 393-0770

Central Construction Products Division

(312) 321-4128

Western Construction Products Division

(818) 956-1882

UNITED STATES GYPSUM COMPANY

Circle 20 on information card

©1986, U.S. Gypsum



ARM-R-CLAD® ENTRANCE SYSTEMS™

OUR NAME SAYS IT ALL

Whether the need is for standard or tailored sizes, HORDIS creates entrance systems that conform beautifully to your architectural vision... in shape... in adapt... and, best of all, in a hurry. In other words, an entrance system you can propose confidently for exteriors and interiors... and receive fast, thanks to manufacturing centers located nationwide. With the addition of ARM-R-CLAD® ENTRANCE SYSTEMS™, HORDIS, already recognized for quality, now offers a complete range of architectural glass products. ARM-R-CLAD ENTRANCE SYSTEMS come in clear, gray, or bronze glass... and boast a perfect complement of rails and hardware to extend design possibilities. So specifying a glass entrance system go for the single source for all architectural glass products, that matches durability with good looks and delivers both on time for ARM-R-CLAD, from HORDIS.

For more information, contact your local HORDIS sales office and ask for the Door Coordinator, or Hordis Brothers, Inc., 825 Hylton Road, Pennsauken, NJ 08110
Attn: Door Product Manager
(609) 662-0400 TWX 710-892

ARM-R-CLAD is a registered trademark of Hordis Brothers, Inc.



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: Warren Johnson Architects, Palatine, IL
Glazier: E.J. Hayes Glass and Mirror Co., Skokie, IL

Interior: Touche Ross, Embassy Plaza, Schaumburg, IL
Architect: EDI Interior Architecture Ltd., Schaumburg, IL
Glazier: Dymond Glass and Energy Co., Mundelein, IL

HORDIS
BROTHERS, INC.

ARCHITECTURE

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.

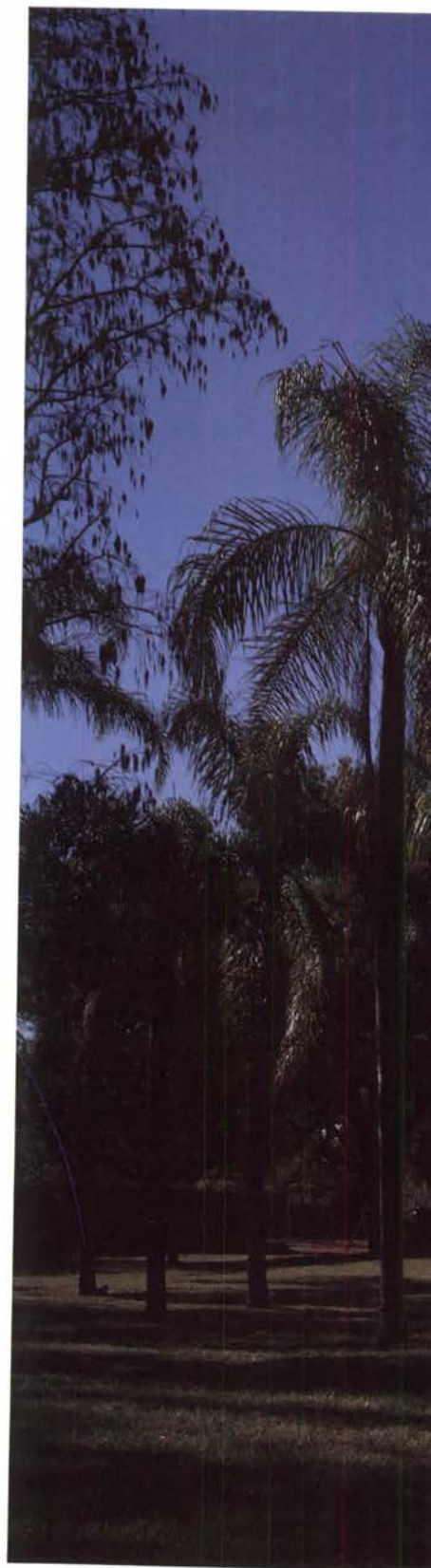
The concerns of ARCHITECTURAL TECHNOLOGY are reflected in the building content as well. Thus, the building chosen for evaluation was the very symbol of industrialized housing in the '60s and '70s; one of the new houses is made of prefabricated boat parts, and the vernacular house type is analyzed from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



'An Elegant Assembly of Contextually Polite Parts'

House in North Tampa, Fla.; the Jan Abell Kenneth Garcia Partnership, Architect. By Michael J. Crosbie



Until recently, the houses found in North Tampa around Key-stone 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 although, 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 a collection of



cross page top, axonometric of house from its west, entry side. Above and left, alternate views of the sculptural east elevation it faces the lake through a screen of palm trees.

sculptural elements that are gradients of gray: the lightest shades advancing, the darkest receding. This elevation makes clear how this 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

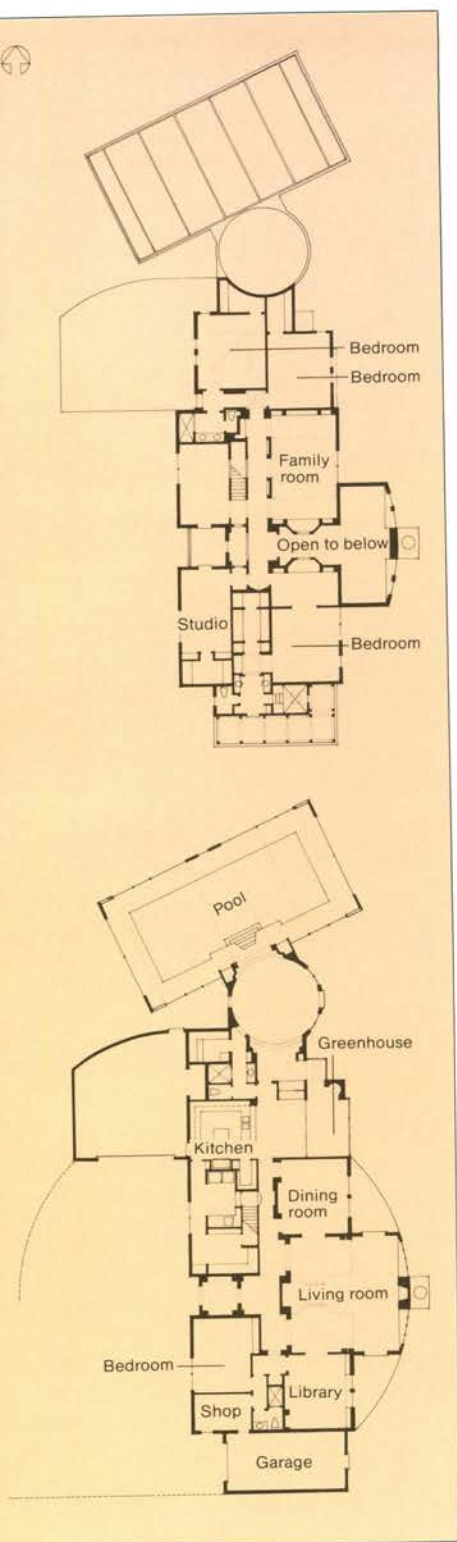
space that runs north-south and is demarcated by the darkest gray outside. This slot is the real threshold because it splits the house (again, in plan) between its public and private realms.

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.





Photographs © Walter Smalling Jr.

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 dark-room. Across a shared porch that overlooks the entry, these two realms for private pursuits hold hands. □

Disparate Rows Peer Across a Path

Riviera Villas, Johannesburg; Ian and Lynn Bader, Architects. By Lynn Nesmith

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.

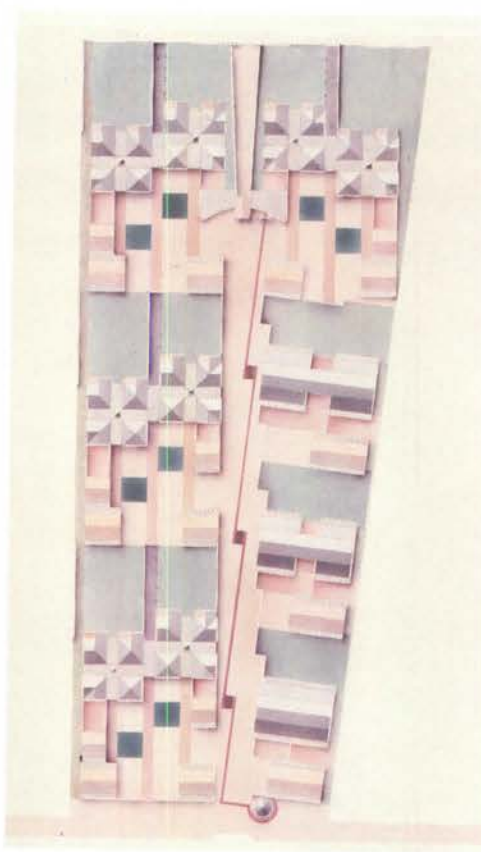
On one side, the units are elevated above the low wall that serves as the horizon line, while on the other side the units are set directly on the ground. This relationship creates, in the words of the architects, "a kind of schizophrenia."

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 seem firmly grounded with broad, low



large central entrances with tall central bays flanked by smaller side entrances and framed with brick walls. Their stepped back facades and recessed bays create a zig-zag pattern that is repeated in the contrasting brick pavings of the roadway.

The remaining eight units have a square plan and cruciform circulation pattern with four corner rooms. Grouped in pairs facing courtyards, these villa-like units have more complex facades that change with each elevation, like a series of distinctive masks. Along the striated brick wall of the central street, the villas are perched in pairs like identical twins, each centered on a break in the wall where the upper facade extends like a leg to touch the ground, while the northern facades bear recessed balconies. Landscaped courtyards repeat the geometrical theme of the villas in small square gardens with four conifer trees and banding in the paving defining the entrances and circulation paths.

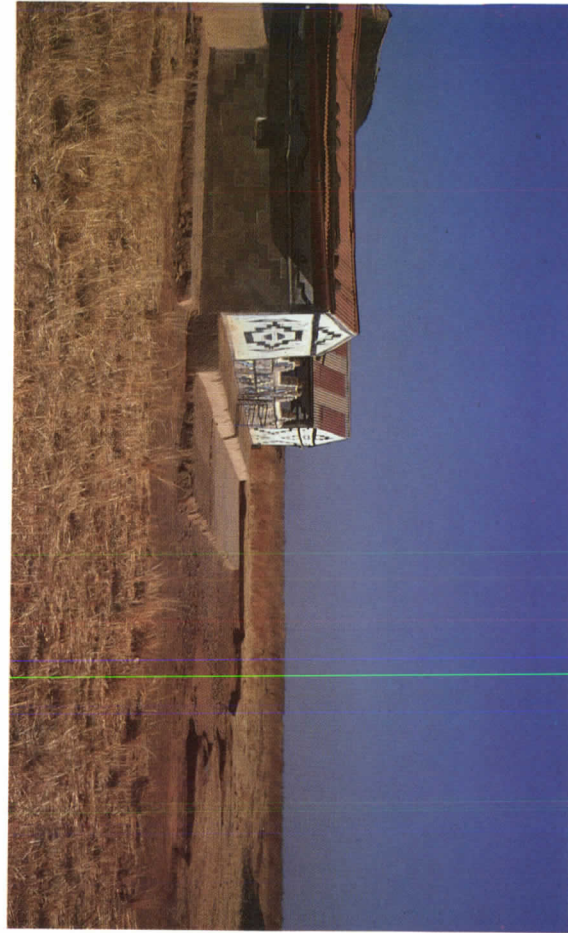
The exterior forms of each of the house types are recalled in the interior spaces. In the basilica town houses, the entrance is a linear central space with a pitched ceiling and a balcony. At the end of this main circulation axis is a stairway sheathed in gray marble and naturally illuminated by glass sliding doors on either side. The first floor living spaces are open in plan but defined by floor surfacing patterns—the rooms are carpeted and circulation paths are travertine. Ceiling forms based on the roofs further accentuate these rooms, which open onto gardens and patios on either side of the house. Clerestory windows running the length of the house provide natural light for the family room and an upper-story bedroom.

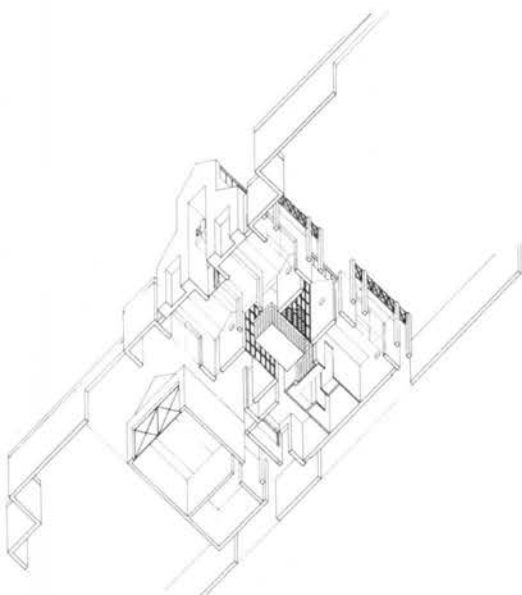
In translating the square theme to the interior of the villa houses, the architects emphasized the central cross axis with a skylit, two-story volume. On the main floor, the living room fills the two squares that face the gardens to the north. The dining room has a gabled ceiling with a large window facing the entrance courtyard. Floor surfacings and ceiling patterns are again used to define the rooms and accentuate the overall grid of the project. 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.

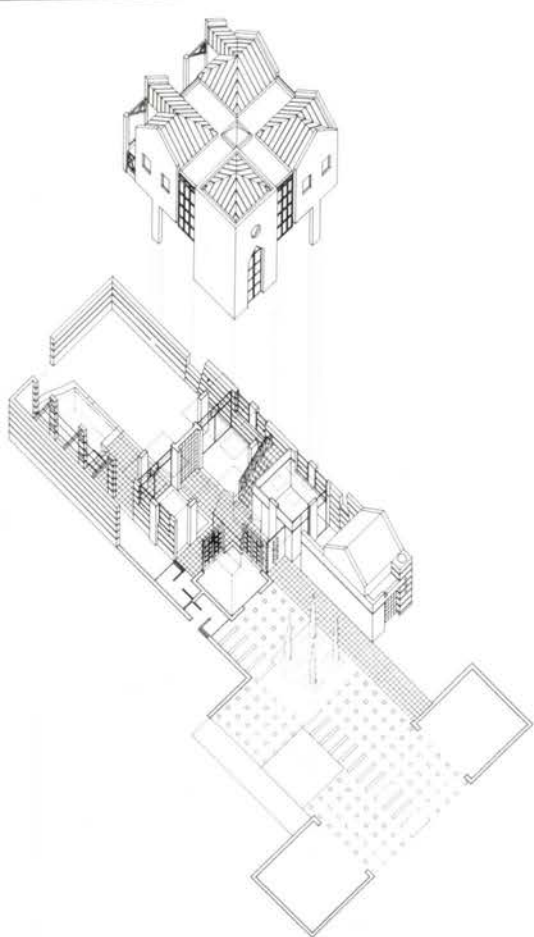
Right, view from south shows roof forms and fenestration and the hinged gate in foreground. The three basilica units are set on the skewed orientation of the road, while the villa units have







Loena Kotze



Loena Kotze

opposite page, top, central roadway looking
ward 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
west elevation, which faces the roadway. Right,
north elevation of a villa unit.

Alex Daligand



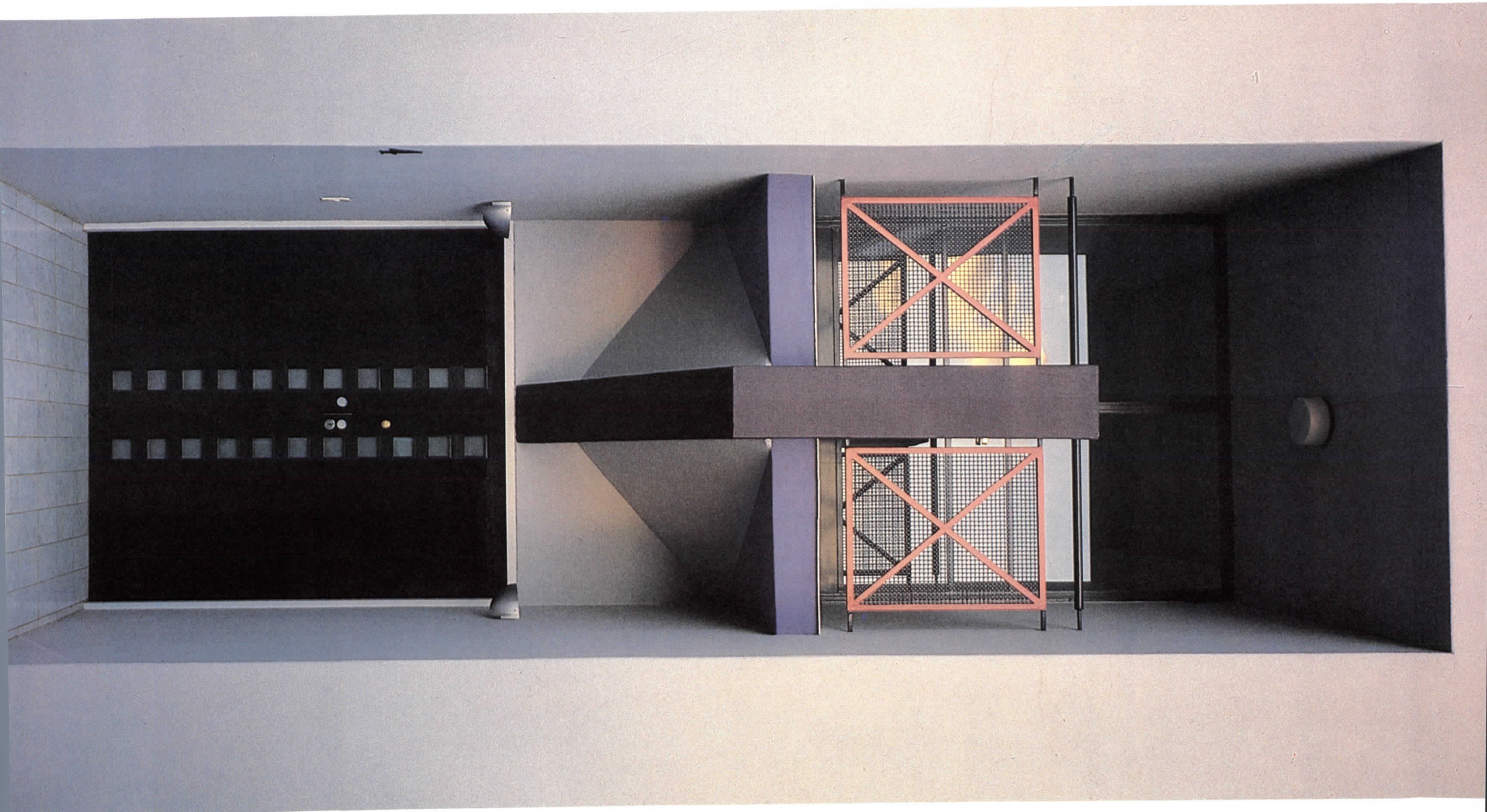
Alex Daligand



Top, main living space of the villa-type house is defined by floor treatment and recessed squares in the ceiling with coffee 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. □

Alex Daligand





Taut, Vaulted House on a Hillside

House in San Francisco; James Shay, AIA, architect and owner. By Allen Freeman

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.

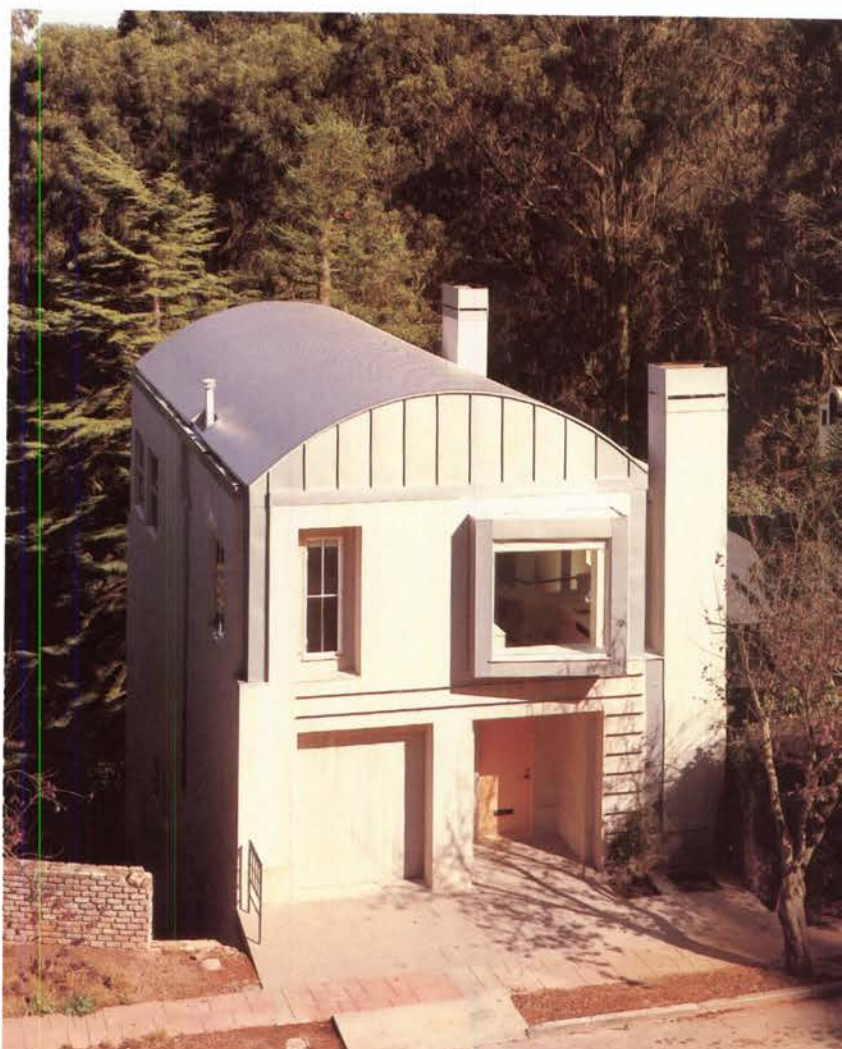
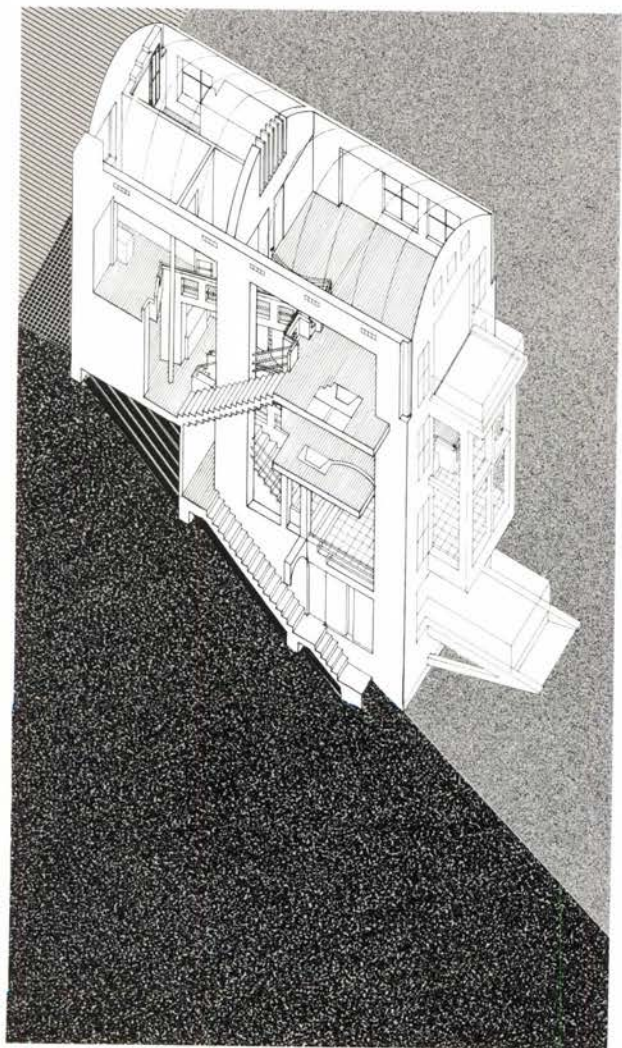
Excessive ground water compounded the problem of a steep slope. With soils engineer Don Hillebrandt, Shay designed a drain system to stabilize eroding soil; with structural engineer Carl Chan of Shapiro, Okino & Hom he devised a foundation of 15 piers, drilled 30 feet deep, with reinforced concrete grade 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.

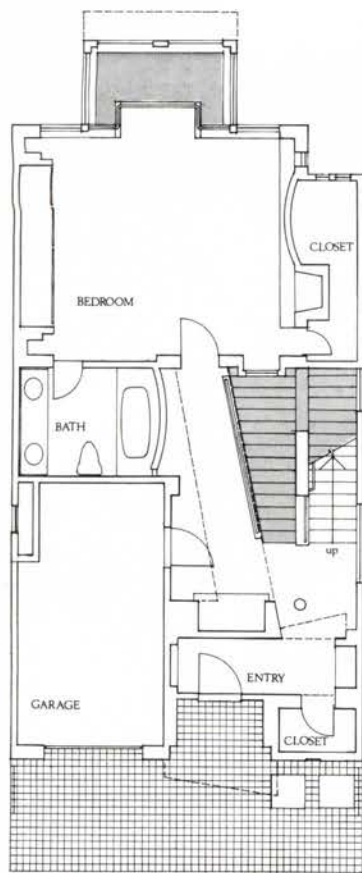
Dominant on the rear elevation is a wide, centered bay—a glassy, two-story box projecting at the second and third levels. The box encases a third-floor balcony and supports a fourth-floor deck that projects two feet over the outside edge. Underneath, another deck cantilevers on a double-V shaped steel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

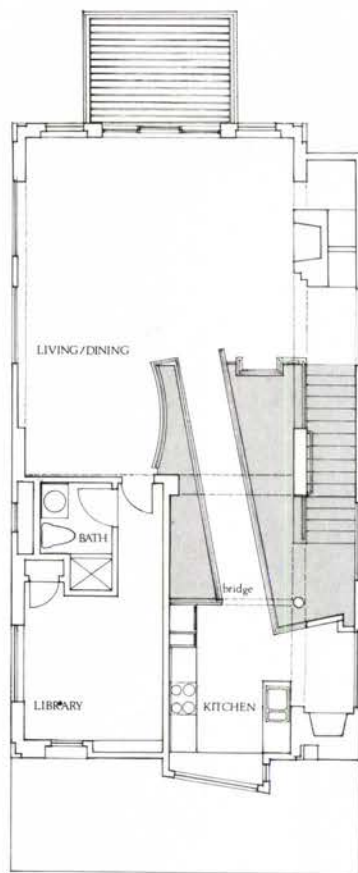
Below, the west-facing front elevation. Large kitchen window over door protrudes and turns slightly; smaller window with four panes is a casement. The siding is vertically applied cedar, finished to weather to a silver patina matching the steel roof. The two chimneys on south elevation service fourth-floor fireplace. Right, the backside extends toward the canyon in a double-height bay sandwiched by decks at the fourth and first levels.



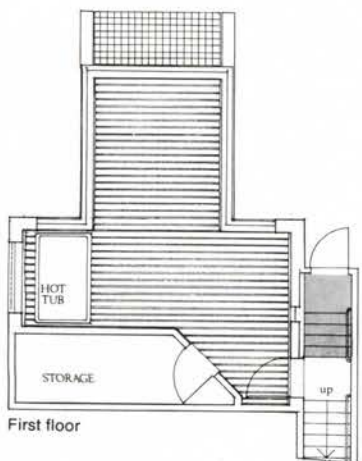




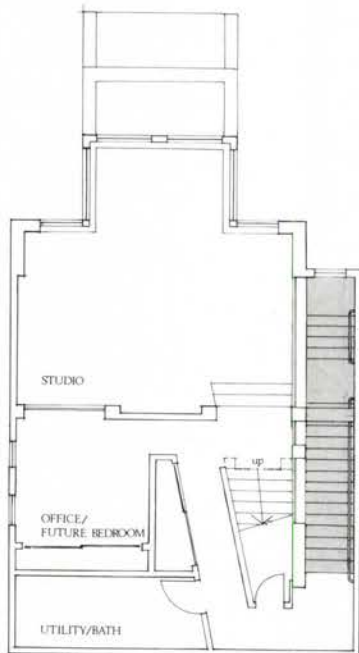
Third floor



Fourth floor



First floor



Second floor

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 are floors.

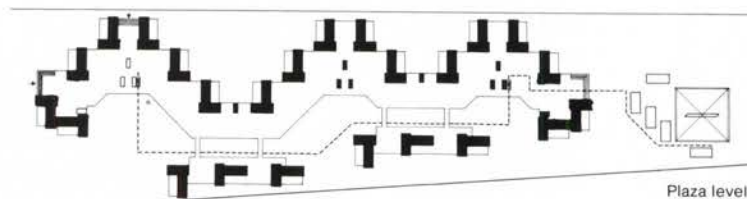




viously the square window is slightly skewed, as if it is looking
passersby down the street (the house is next to last). The
er three front openings are recessed to varying degrees.
The most deeply recessed opening is for the front door. The
use of compression it creates continues into the foyer, another
ht 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
. You see from right to left: stairs up to the fourth floor, a
cond flight that widens as it descends to the second, and a
llway angled toward the opposite corner of the third floor.
cause it is a diagonal, the hall increases the apparent depth
the house, and an interior casement window further opens
e house, front to back. The window also brings afternoon sun
m the stair-hall, which acts as a light collector on the south
vation, illuminating the third-floor bedroom, the second-floor
dio, 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-
missioned 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 liveli-
ness. □



Evaluation: Habitat A Generation Later

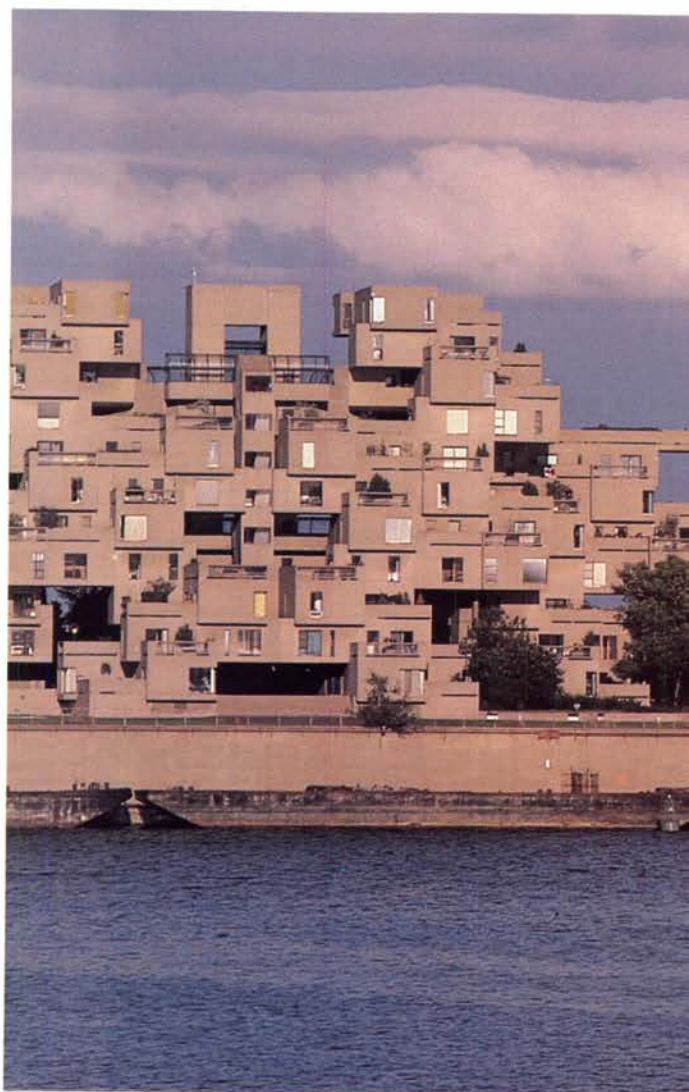
Moshe Safdie's intended housing prototype is a one-off luxury apartment building.
By Andrea Oppenheimer Dean

"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 hovered in 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 for 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 Mon-



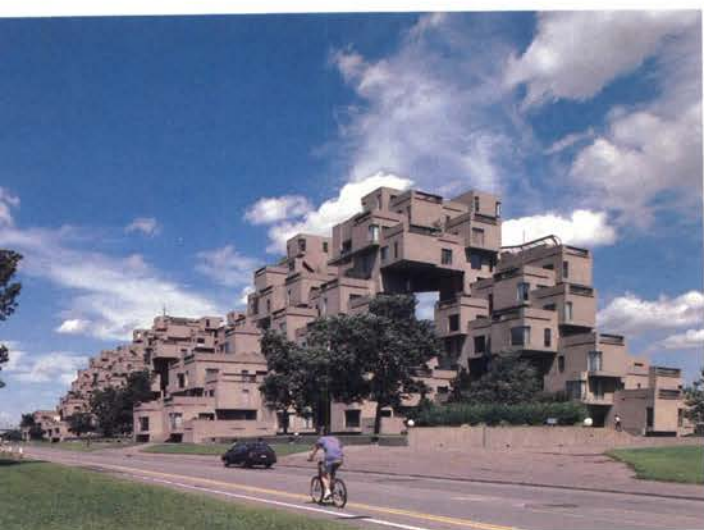
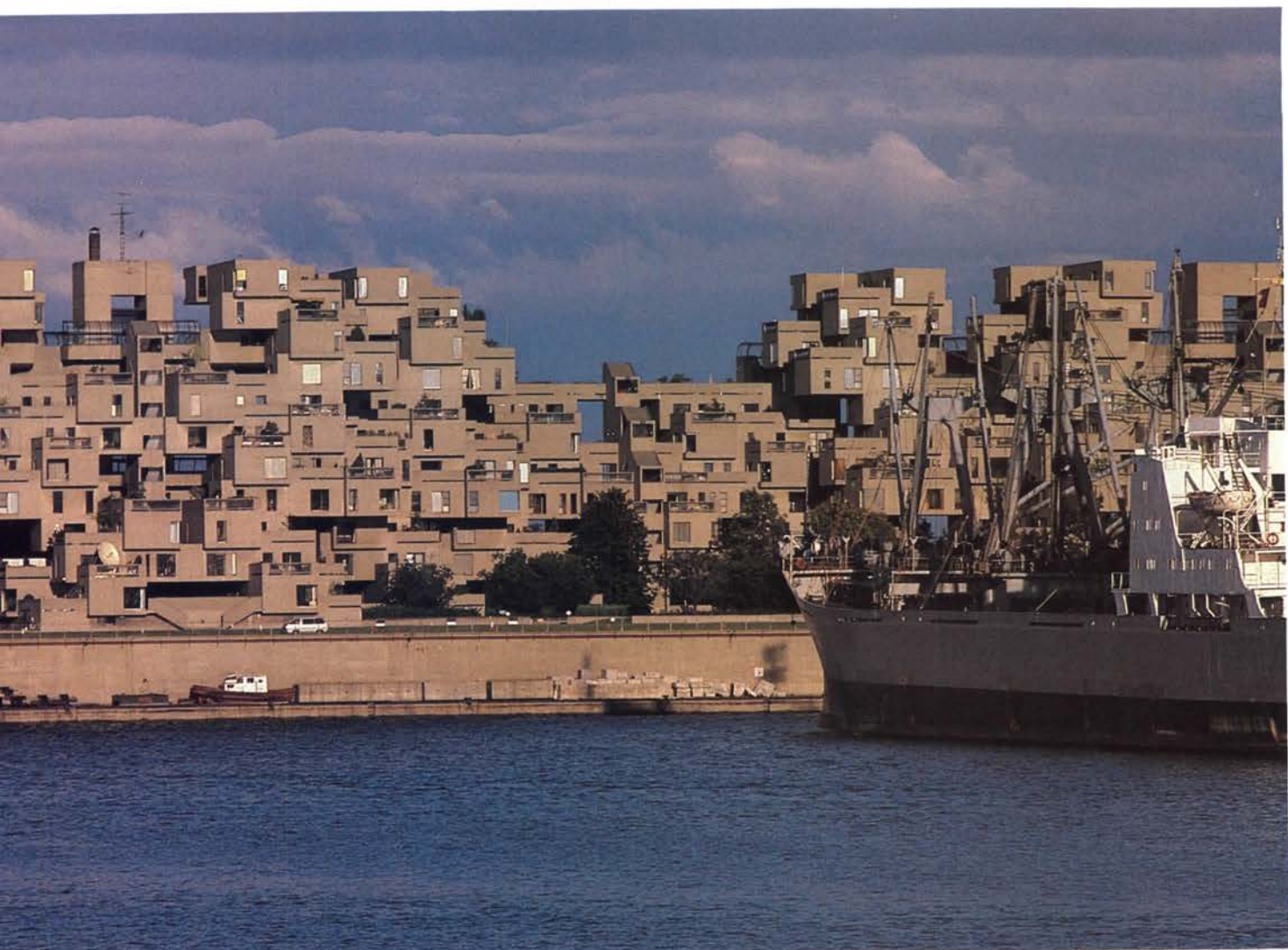
On this splendid site, standing quite alone, Habitat comes in focus as a tumble of Lego-like boxes forming an irregular pyramid with great hollows left by absent boxes. Once on the ground you follow a service road through a grade-level spine over which hover huge girders supporting walkways at the fifth 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 shapes 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 clamber-



Looking down on Habitat's complex, varied, and ever-changing shapes 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 of the architectural elements is more comfortable than below where associations are to megastructures. You realize there's nothing else 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 reactions from people who live there were the following: "It's only outside, but there is the river, the gardens; it's like being in

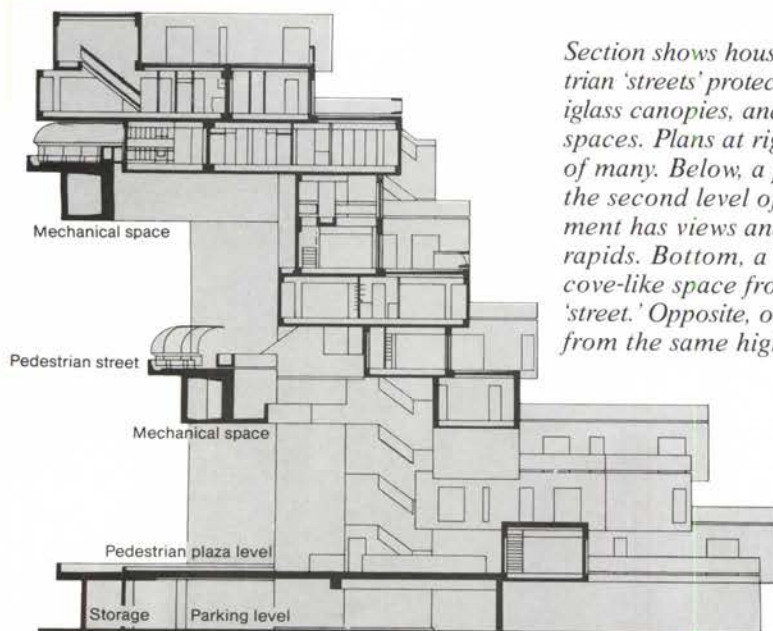
a huge park." "It's like a cottage rather than a high rise." "Often you feel the concrete is terrible, but once you've lived here you don't notice it and don't want to leave. It's unique." "It's like living in the country but you're five minutes away from town, without the hassles of the city or the 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.

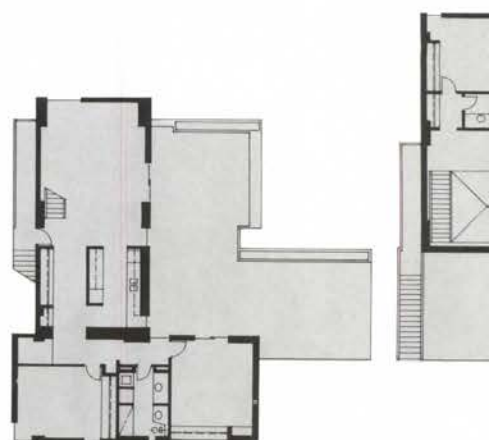
Despite enthusiasm for Habitat, *Architectural Forum* in 1967 also said that it was "in some ways, a failure." In fact, people who do not live in it are critical of the building as a piece of urban design, for its high initial cost, and for being a technological failure.

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.

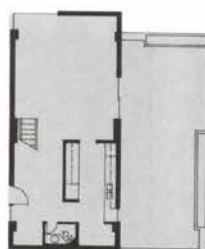
Safdie is in agreement, up to a point. "In the final analysis,"



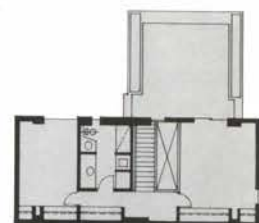
Section shows housing modules, pedestrian 'streets' protected by arching plexiglass canopies, and linear mechanical spaces. Plans at right are a sampling of many. Below, a private patio off the second level of a lower apartment has views and sounds of river rapids. Bottom, a view down into cove-like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



Three-bedroom unit with balcony overlooking dining area



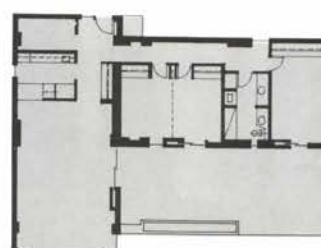
Two-bedroom unit



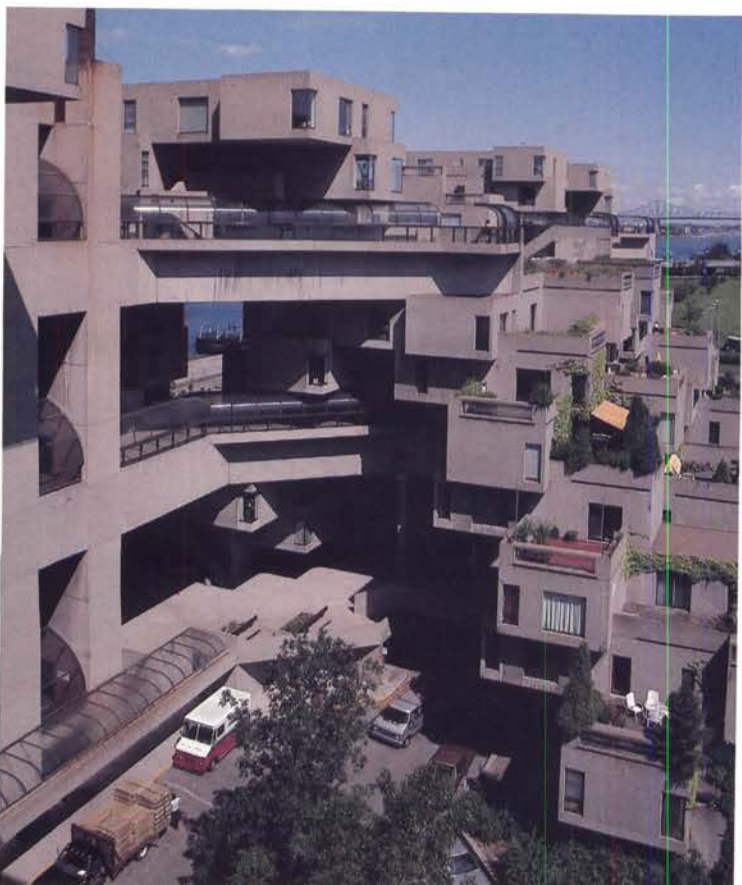
Simplest one-bedroom



Two-bedroom unit on one floor



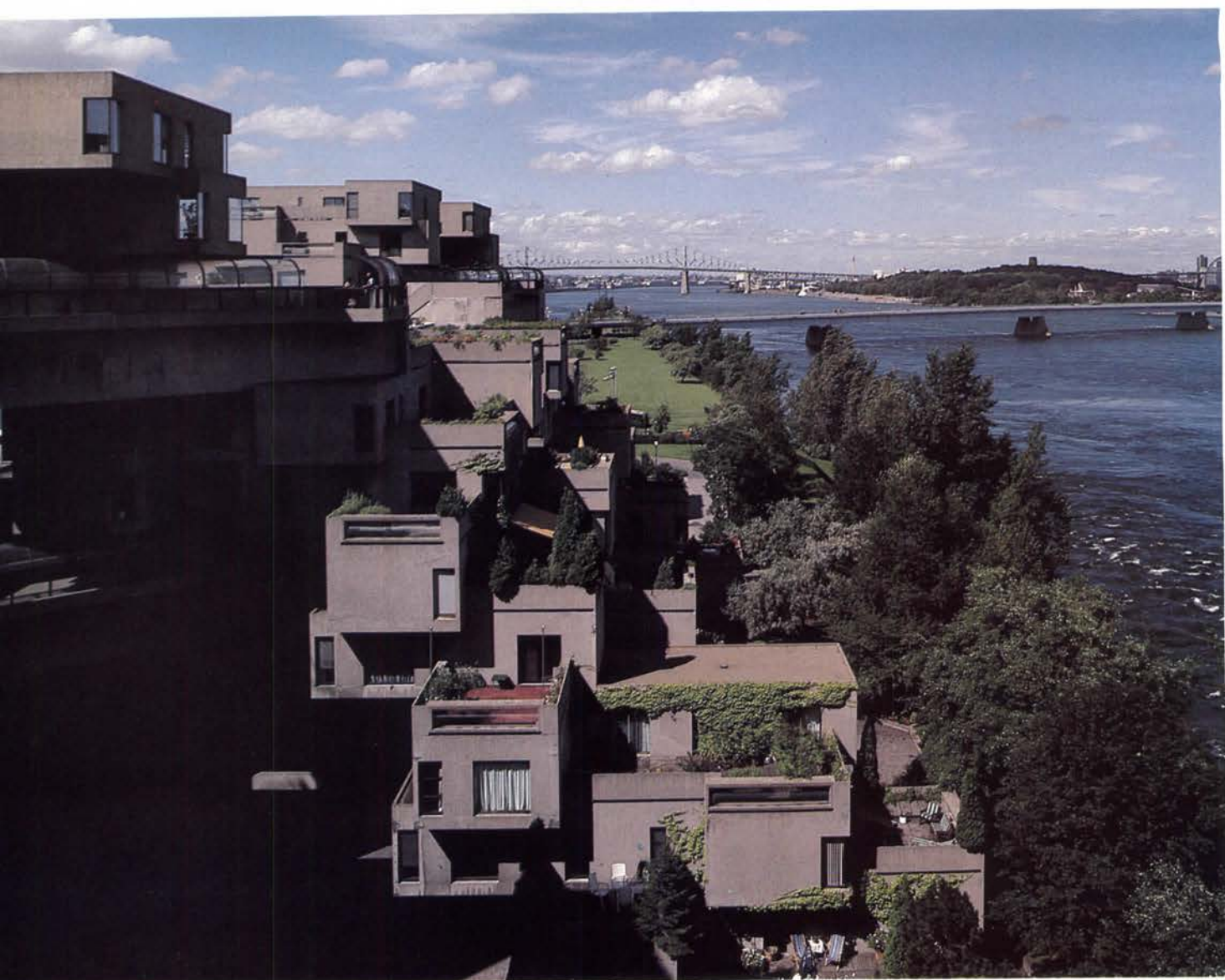
Two- or Three-bedroom unit on one floor



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 one 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 that Habitat is a place for children. He says about 10 percent of the 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 patios and balconies are not practical.



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 in 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 a new scale, perhaps 'The New City.' The constraints were great and the density was enormous, but the ideas that began to evolve at 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 is 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 on 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.

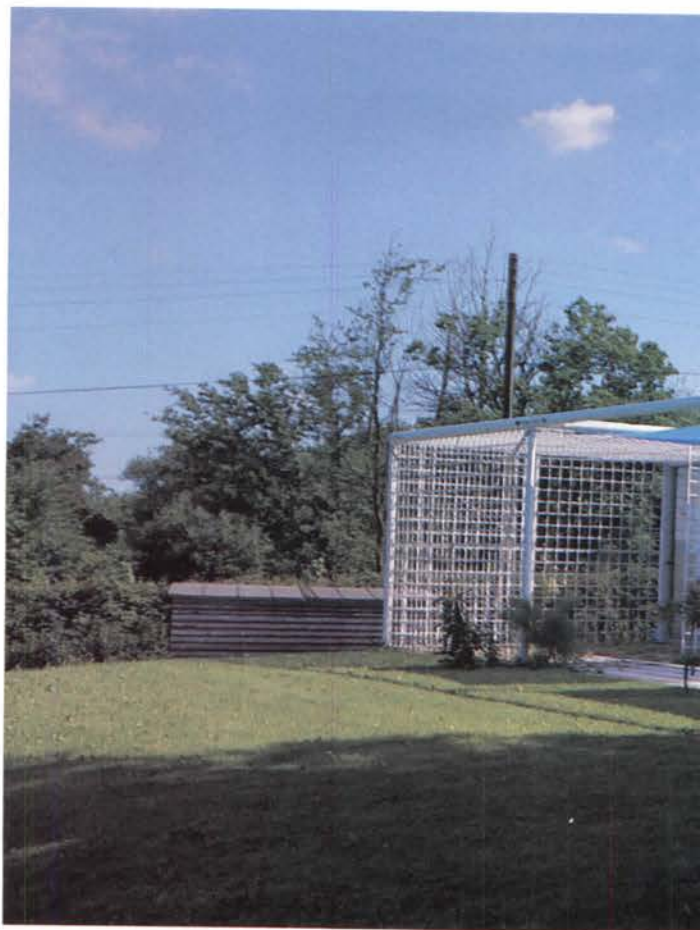
The house is an idealized white box set on the crest of a wooded hill with panoramic views of the Devon countryside. The 5x5-bay structure is based on a 3.6-meter-square, 2.4-meter-high plan module. After construction of the foundations and floor slab by a general contractor, Horden and his client carried 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 bithuthene sheeting; spacecraft are cited as the source of the crinkled aluminium 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 gypsum 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



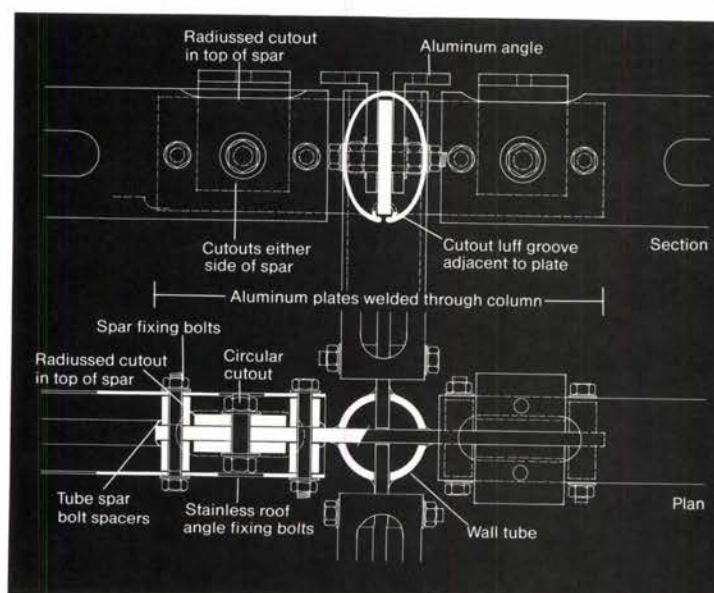
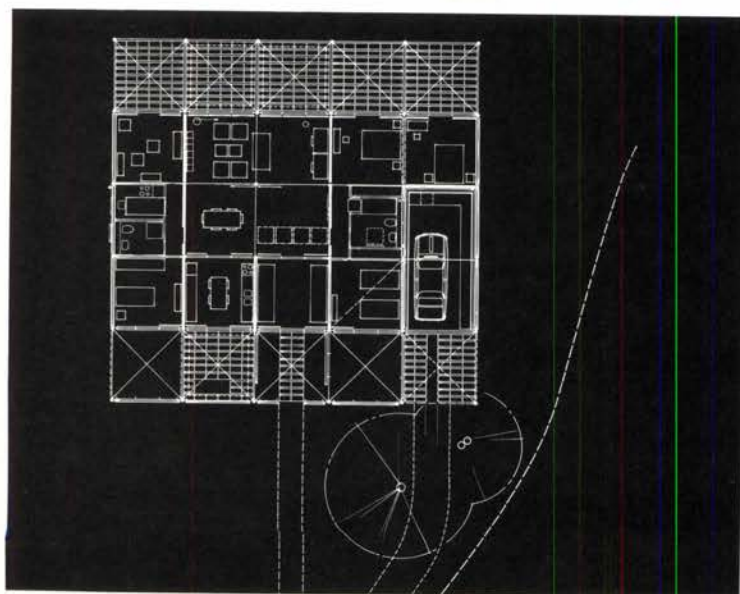
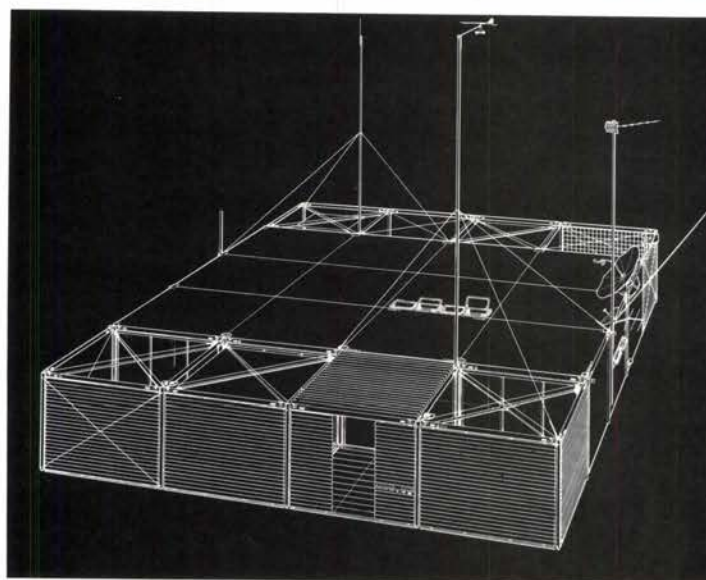
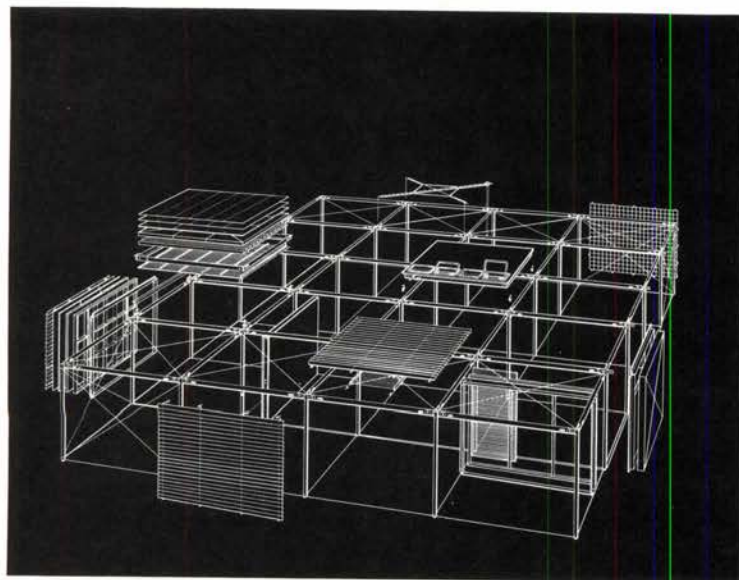
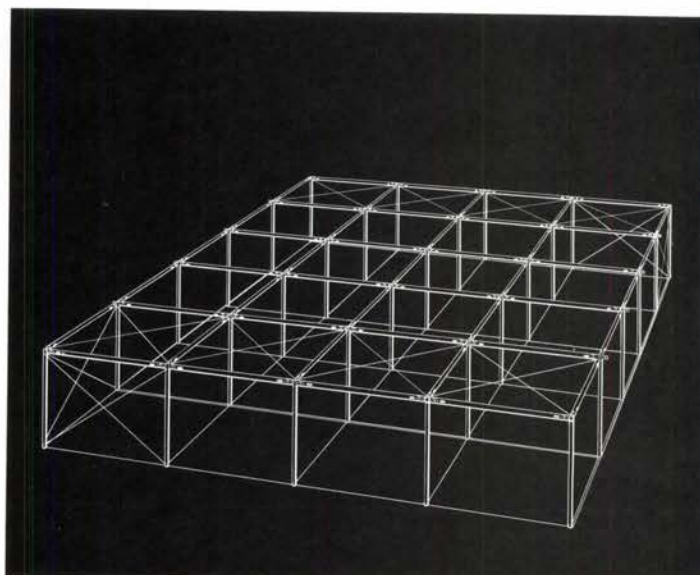
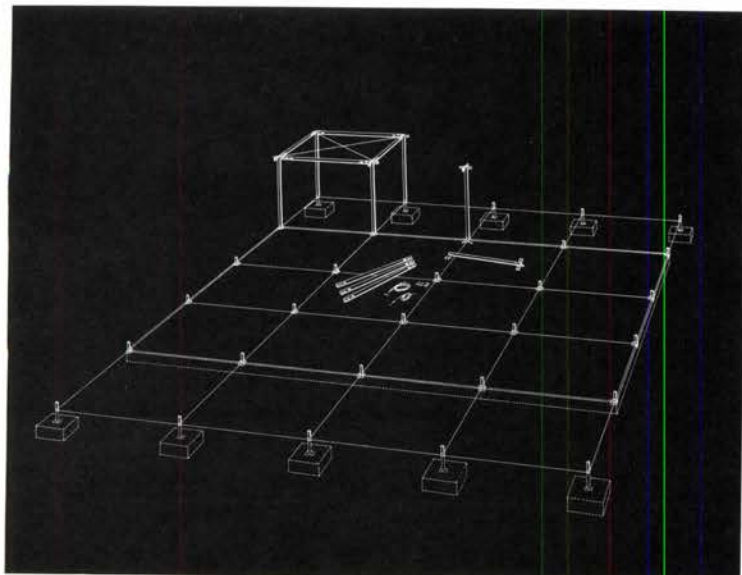
...p, structure extends, in rudimentary form, one bay beyond
...r window wall. White trellis defines garden areas; roll-up sail
...opies provide shading. Above, entrance elevation provides
...w through the house to the garden.

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

In addition to carrying the building components themselves,
e mast columns carry television dishes, a small wind-powered
nerator, and a solar panel and flagpole, which look very much
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 prod-
uct 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, offer-
ing 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. Cracked in myriad ways and weatherworn, the mud is held together by finely chopped straw. Grass and moss grow on the miscanthus 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.

Not all *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.

Much in *minka* may match the esthetics of tea houses or the refined tastes of aristocratic villas and *sukiya*-style dwellings (the dominant traditional dwellings), but these aspects of high culture are generally absorbed into a more primitive and simple construction. This simplicity exhumes an earthy vitality; most *minka* represent the labors of extremely poor people. The choicest houses are well documented and recognized as important

cultural properties, but countless others are still lived in and lovingly maintained or neglected due to the economic burden of their repair. These picturesque and rustic symbols of a simpler life entice family visits on Sunday outings, but the inhabitants of folkhouses may aspire to something other than the demanding upkeep of such museum pieces. The houses do not take gracefully to the necessities and conveniences of modern life. It would be all too easy to dismiss *minka* as anachronistic remnants of another age; spaces rooted in the obscure past with little resemblance to our rooms.

The quality of materials, surfaces, and workmanship overwhelms our senses and diverts our attention. It takes much work to understand the spatial organization of these buildings. The *minka* space-structuring principles may well be more sophisticated than any of the modern structural orders currently employed. Herein lie the secrets to the survival of *minka* over many centuries. The principles are highly advanced despite the misleadingly simple materials and, by our standards, oversized and handcrafted structure. These principles differ markedly from the well-researched prevailing Japanese house.

Minka is a direct descendant of *tate-ana*, the pit dwelling. The one-room neolithic shelters were better suited to resist the rigors of Japan's winters than *taka-yuka*, the pile dwelling. *Taka-yuka* with its story-high elevated floor, was climatically attuned to heat, rain, and humidity. Southeast Asian in origin, it developed from a granary into the prototype for Shinto shrines and the palaces of the aristocracy. The continental semi-nomadic pit dwelling and the high pile structure, both products of early migrations, are the two primary influences on Japanese houses. *Tate-ana* developed into the rural house of common people, and *taka-yuka* became the model for the dwellings of the ruling classes.

Picture scrolls and various documents present the only evidence of the houses of common people between the 7th and 14th centuries, as no dwellings survive from this period. Almost all of the extant *minka* designated as important cultural properties have been built between 1639 and 1853, but there are a few survivors from an earlier age. Some refined houses, in no way different from the feudal period *minka*, were built in the early 20th century.

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*.

The *minka* design method begins with the construction of a general framework—the skeleton of space. The overall form and the character of the building is, to a large extent, defined by this framework, but the space thus delineated has no definite assigned functional purpose. The posts support the roof structure. At this time there are no walls, floors, or partitions. The framework retains a number of possible plans limited only by the established framework.

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* space

etermined by their placement. 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, renovations 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 quite 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 when new or weatherworn, invite caress and contribute to communion with the structure. Trim, the surface covering over a hid-

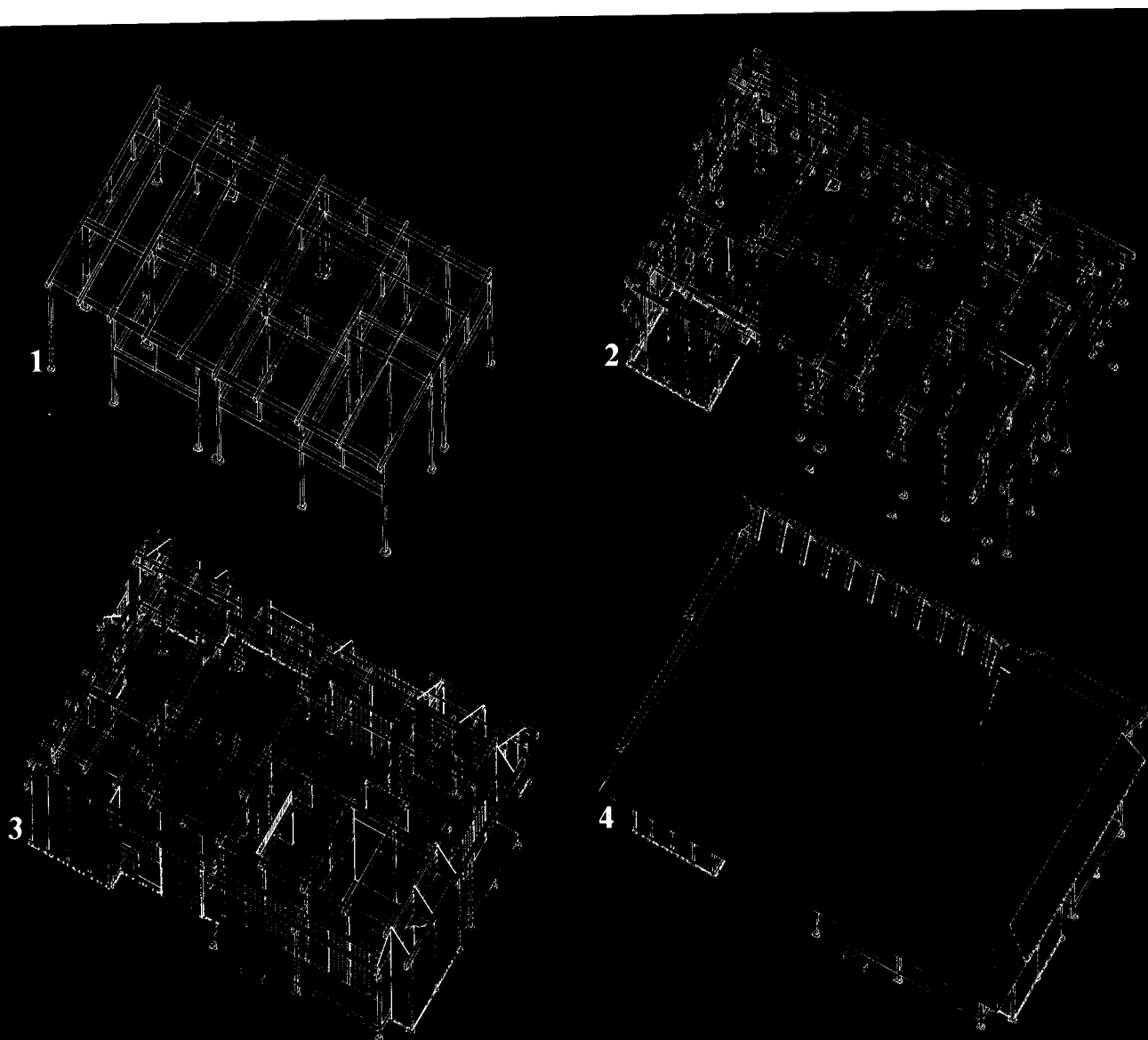
den material, separates construction into rough and finished, permitting or perhaps inviting expedient practices. One could argue at length over the merits of each approach. Trim, however, tends to isolate us from the construction of a dwelling. Consequently, the hidden structure gets eliminated from our consciousness. No longer does it contribute to the sense of well being and the feeling of security that comes with the presence of structure.

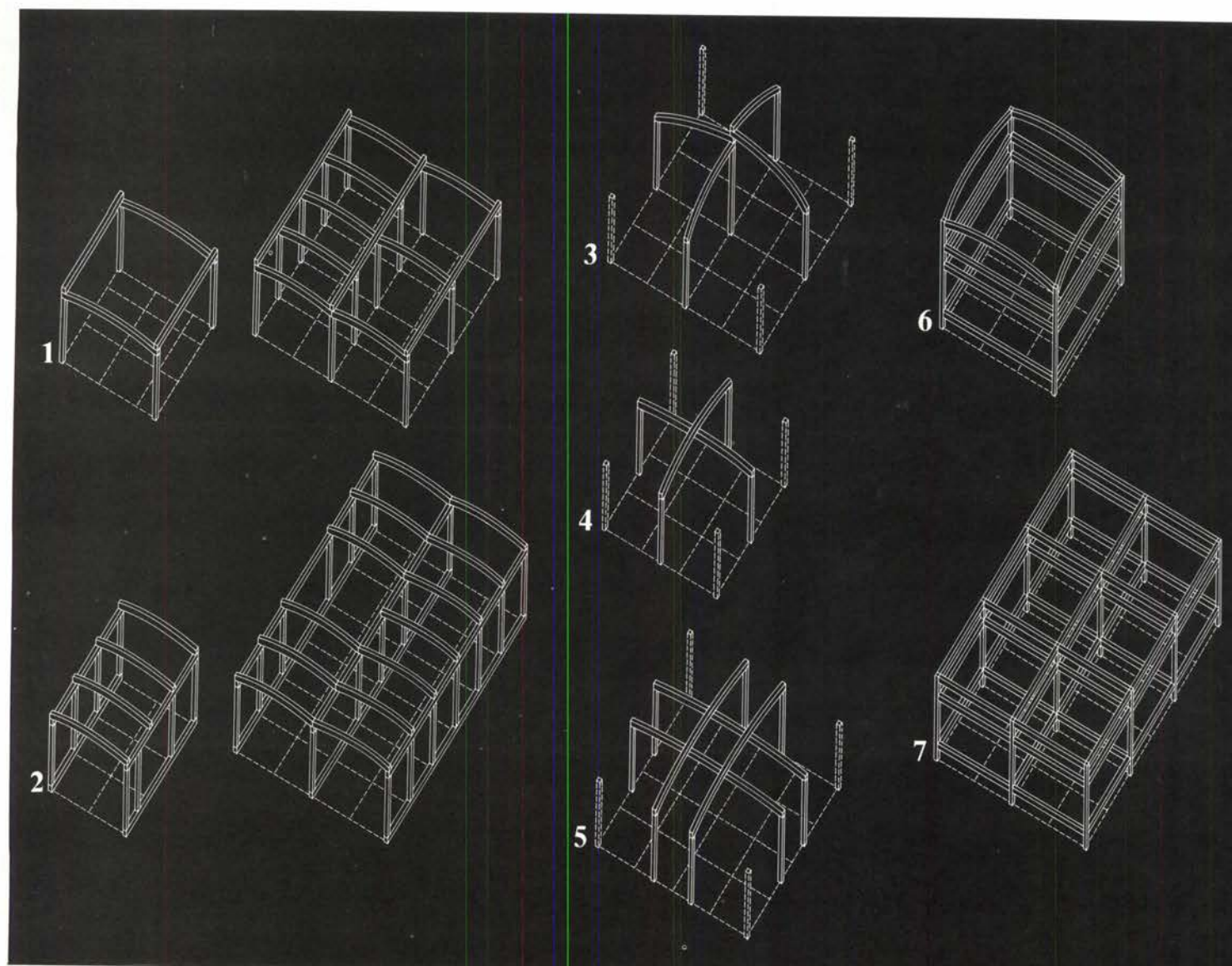
It does not follow that structure is always exposed in Japanese architecture. Structure separated by interior surfaces, such as ceilings and floors, is left in its rough-cut state as in the West. Columns are exposed on both sides of the wall except in storehouses where the outside is protected with clay.

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

Across page, 18th century minka in Kazuma, Tokyo prefecture; below, construction stages of Sasaoka's house in Fujii, Nara prefecture: (1) jikugumi, primary structure; (2) primary and secondary structure; (3) zōsaku, infill elements; (4) roof and house exterior.





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 Domestic Architecture of Japan*, lists

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.

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 per-

The umbrella. In this system a tall central post is connected to 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 hearth.

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 floor 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.

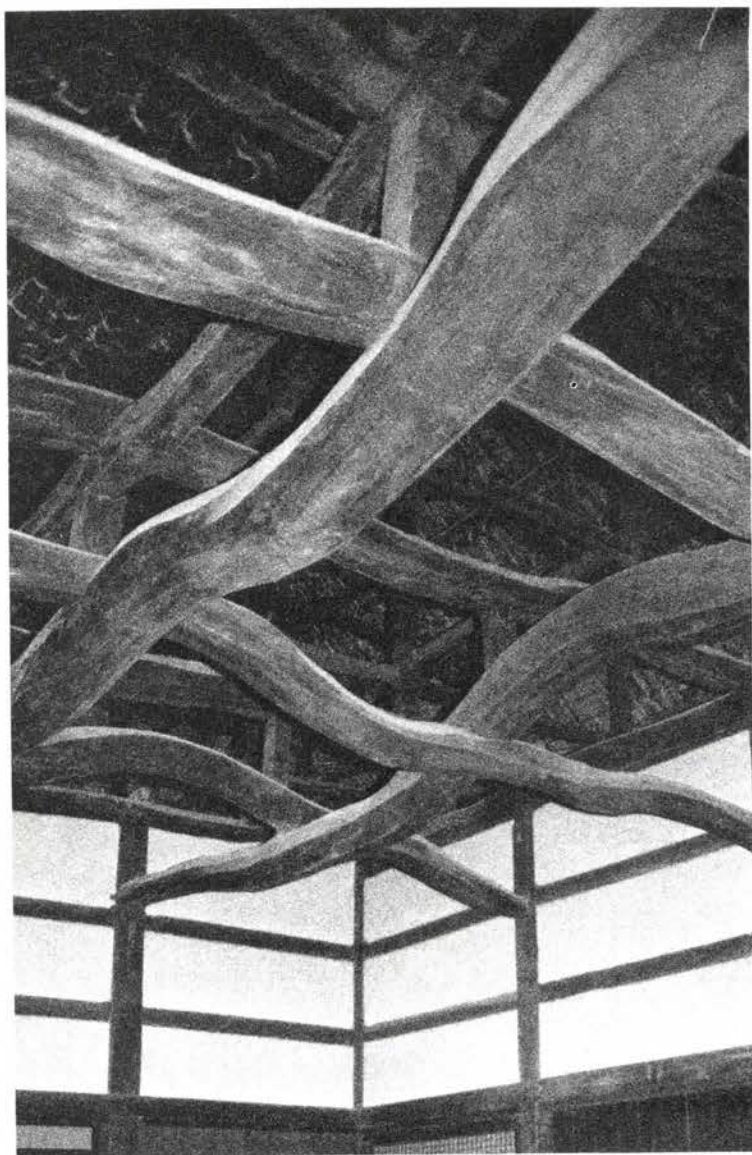
It is through the dimension of time that hierarchic space-structuring principles in *minka* take on their significance. Hierarchy in Western architecture is generally associated with primacy of certain buildings and spaces over subordinate urban fabric, rooms, or service spaces. Japanese towns and buildings 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 installed 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 for 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, placement, 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 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 straw 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



Guntis Plēsums

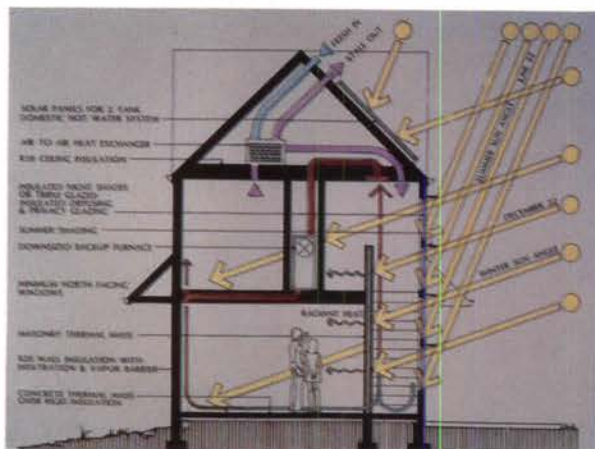
Above, timbers weave together to form *minka* structure in a house originally located in a Chiba prefecture village, now reconstructed in *minka* museum in Kawasaki, Kanagawa prefecture.

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 *sukiya*-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. □

Kaleidoscope





Public Housing Designed as a Jaunty Village

In this era of dearth in public housing nationwide, Zervas Group Architects (formerly Johnson, Erlewine & Christensen) has designed for the Bellingham, Wash., housing authority a village of 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 couldn't "look like public housing."

Hillside Homes' site plan achieves high density on a narrow, two-acre tract. Two single-family houses, one for the disabled, are located near the project entrance, and 11 duplexes are straggled 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, angled exteriors with simple painted trim, tiny gabled entry porches, 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.

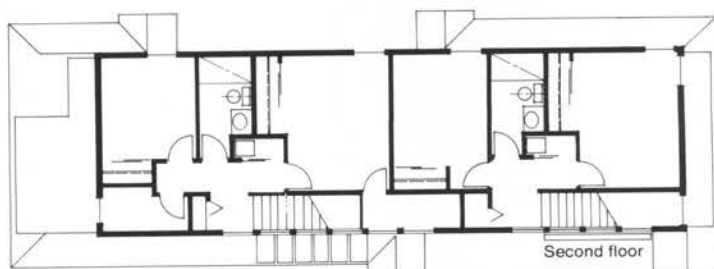
All employ passive and active solar features. South-facing, direct-gain windows are glazed with diffusing translucent panels that have higher insulation values than glass. Minimum insulation and weatherization standards are exceeded throughout, including fully insulated ground slabs. Domestic hot water 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.



Typical townhouse duplex



Second floor

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 suitably sunny one.

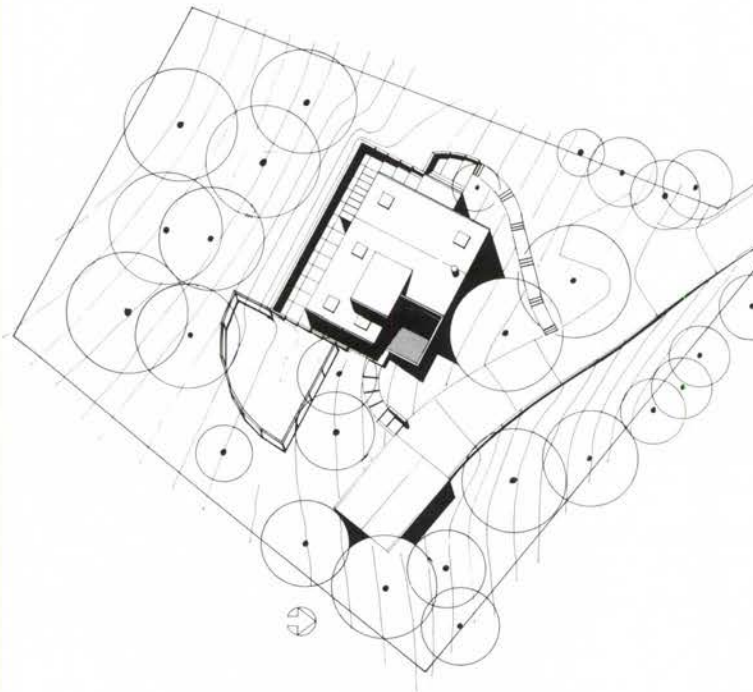
This derives in part from the use of color. On the outside 4x8-foot plywood panels are painted cocoa (with cream) and criss-crossed by teal green 2x2-inch battens. A brighter green lattice masks the porch apron and garage glazing. Real copper metallic paint was sprayed on exposed metal in an auto body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





'Architecture on Vacation' In an Architect's Island House



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.

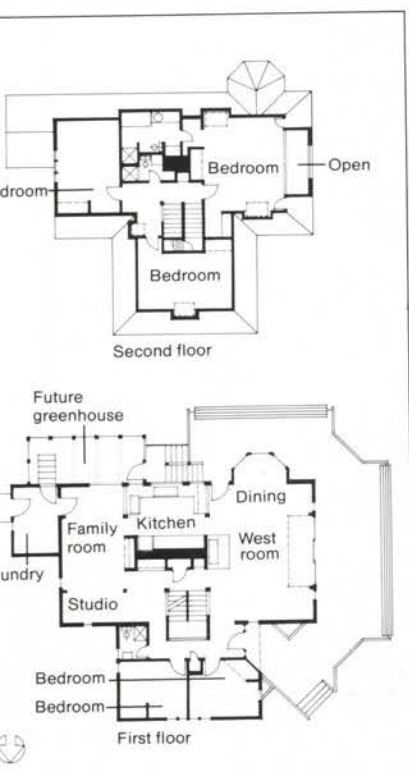
Located on a windswept hill overlooking an inlet, this Block Island house by Herman Hassinger, FAIA, for the architect and his family is a perfect get-away that is right at home both in its materials and sensible, comfortable interiors. While faithful to the island's weathered, cedar-shingle-clad and 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

Left, turn of the century life-saving station, built about 1880.



Michael J. Crosbie



Lawrence S. Williams, Inc.

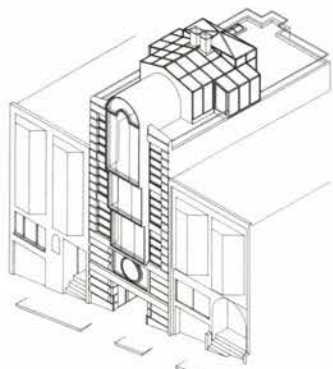
of. Hassinger says that the T-shape and the tower came early in the design. Working with these two elements, he refined the proportions and profile, simplifying the form. He showed a few sketches to an island neighbor who immediately recognized in the design an old lifesaving station that had once stood within view of Hassinger's site. An old post card of the station reveals it was T-shaped, a story-and-a-half, with a combination gable and a roof punctuated by a squat tower. Hassinger's tower was smaller, and it lacked the gentle taper of the old one—a detail that 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 from the hill are to the west and south, and the house opens up on 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 mermaid 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.

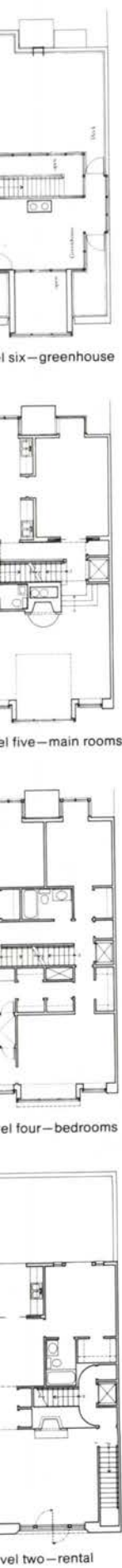
Toward the end of the design process, the designers realized that the facade needed a little extra punctuation. The lower level round window, inspired by similar designs in older Bay Area houses, provided the answer. "It makes an exclamation point on the front," says Brayton, who notes that all the windows 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

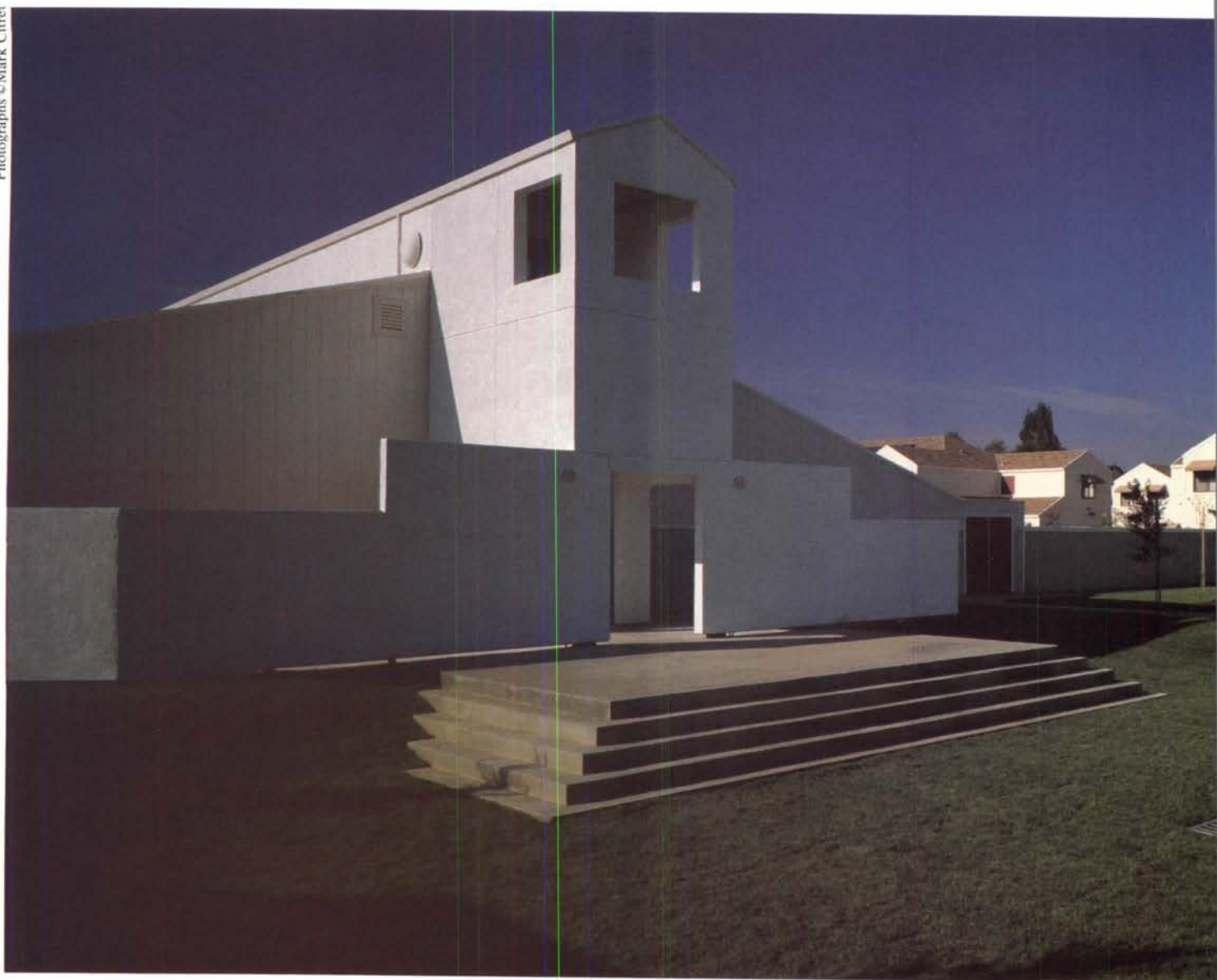


Photos right, top, and middle, greenhouse structure on roof of town house on San Francisco's Nob Hill permits extra long views and, bottom, gives spaciousness to living room. Across page, glazed and glowing central core determined skyscraper-



College Housing with the Feel Of a Self-Contained Community

Photographs © Mark Citret



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.

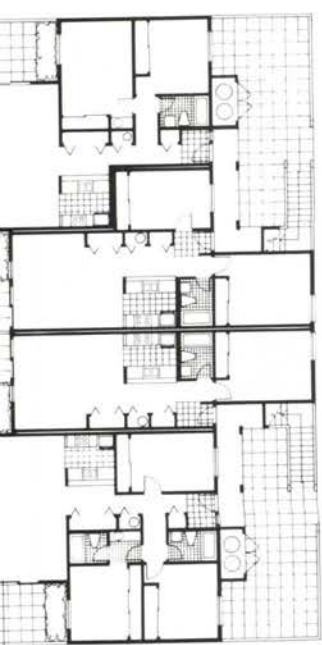
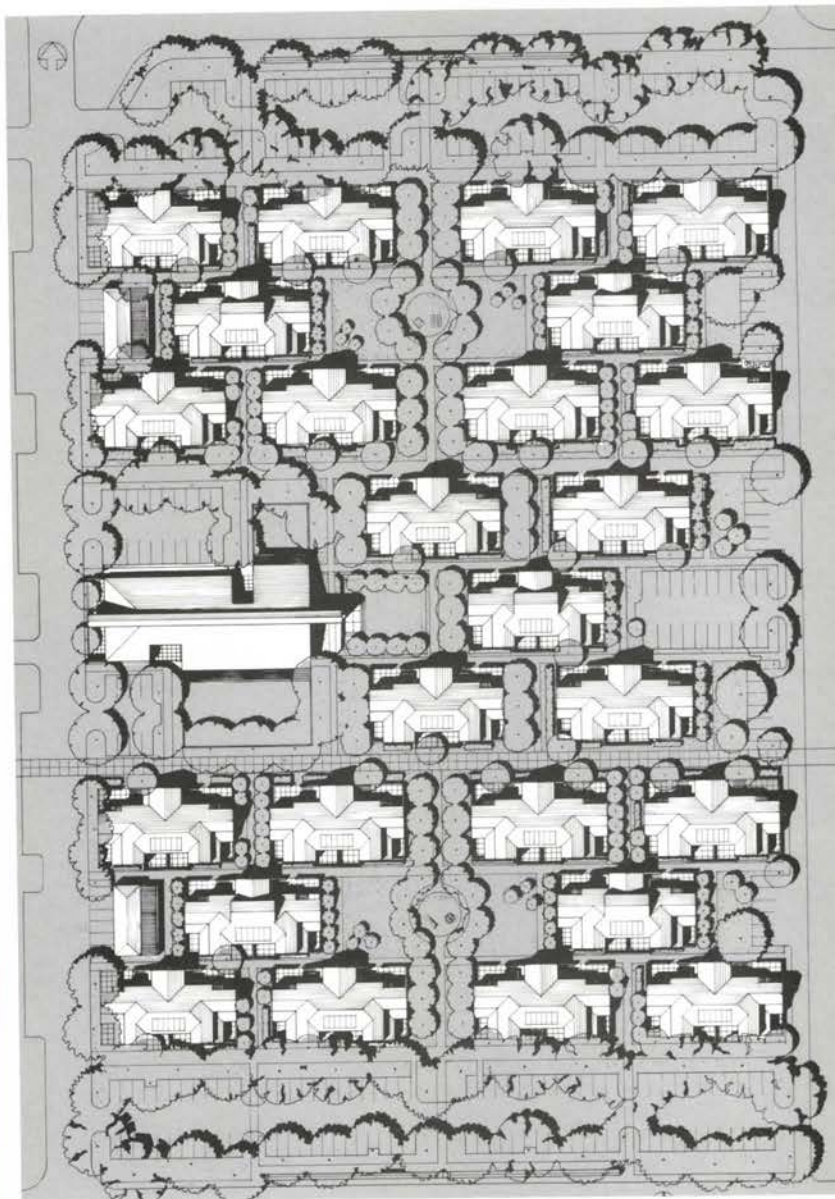
The 200 units are broken down into five clusters, each cluster containing five buildings, and each building eight units. There is a range of one-, two-, and three-bedroom units, varying in size from 670 to 1,130 square feet. Each unit has some basic amenities such as a foyer, counter dining area, and 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.

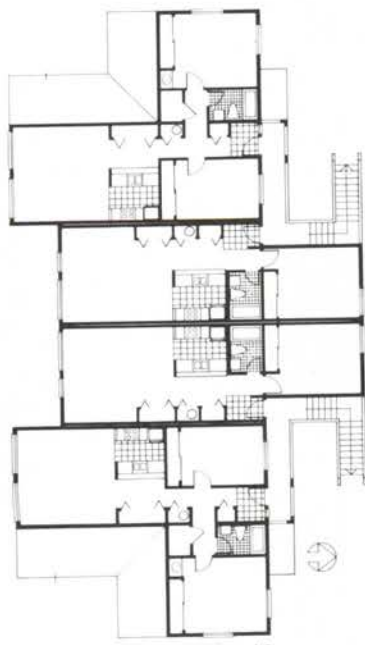
The community center on the west side of the site provides an informal link with an older student housing project (dating from the 1960s) across the street, which shares its use. At 3,600 square feet, the center, with its long, colorful spine, comfortably accommodates administration offices, meeting 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, storage wall/gateway into complex; above and right, units as they face community center and its amphitheater. Units are pale green, blue, and beige, with active solar panel systems com-



cal building plan

Level 1



Level 2





©Mark Citret



©Mark Citret

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 rooms.

Four Paradigms in Four Model Houses in California



One of many long, suburban avenues in the flatlands north of Sacramento to a high, peak-roofed entry pavilion—like a stage-barn designed by Palladio—leads to Phoenix Place, a would-be tract of luxury houses whose four models were designed by Lyndon/Buchanan Associates of Berkeley in conjunction with developer-builder Larry Lowder and landscape architect Ed Haag. Their hope was to demonstrate how civilized and sensitive a high-cost housing development could be. In the process, the architects incorporated ideas that they have been evolving for more than 25 years.

The 11.7 acres are bounded on the south by bluffs over the American River, on the east by a California state park, and on the west by an ecological preserve of ponds and swamps. On the property were 180 blue oaks, middling-sized, occasionally awnynatives offering shade and a semirural sense of place. Lowder and Haag devised a road that curves to leave the west edge of the property essentially native then positioned short side roads and housing plots so that they avoided all but four or five of the trees. Zoning constraints pretty well determined their density and land costs their market; the price range is \$315,000 to \$550,000. They reserved three acres—mostly the rough western edge of the thicker groves of trees—as common land.

For a far longer period of time than at first anticipated, the models remained unreplicated. These four have in common archetypal elements (towers, courtyards, porches, aedicules) as well as uses of design; “ceremonial” front doors; variable floor plans and ceiling shapes, and the roofs that create them; natural light—filtered, layered, changing, arriving through a great variety of openings in unexpected places; design elements that reveal the human shape or presence, such as vertical windows in doorways, proportions, visible ledges and steps for sitting on, cosy porches, balconies, and bays, windows that climb alongside stairs, details that remain on view as evidence of the builder’s work. Other common design features may surprise those familiar with the work of Donlyn Lyndon, FAIA. Without looking distinctly “traditional” or even “Californian” in any easily recognized way, all these houses look more comfortably conservative than, say, his own Collins, Champy, Ottosen, or Mackey houses, in four different states—or anything he worked on while a partner in Moore Lyndon Turnbull & Whitaker. There are here no 45-degree angles, no freestanding arcades or floating interior galleries, no bizarre wall cuts or exotically choreographed stairs. Outside framing members are hidden. All rooms are rectangular. Most ceilings are flat. There are, on the other hand, trellised breezeways, redwood decks for barbecuing, and wide, shingle-

roof overhangs that recall *Sunset* magazine ranch house designs of the 1950s—or even something older.

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 arranging rooms (you could link them, bunch them, set them around a core, or have them “enfront” something outside) and four ways of relating a house to its setting: merging (Taliesin), claiming (Monticello), enfronting (Mount Vernon), and surrounding (a Southwestern patio house). At Phoenix 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 dramatic sunshade, on Maybeck-like props, for the high range of windows that provide light and views for these rooms (and the open sun-slot), 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 significance 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 dramatically up from the perimeter, and a two-story rectangular bedroom and garage wing with a low-sloping hip roof, broad shading eaves, and a magnificently proportioned and detailed bedroom-balcony under one projecting gable end. Other than this balcony, 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 Nevadas. 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.” In fact, in this speculative, expensive market, he and his partner Marvin Buchanan, AIA, had little choice. Lowder had to try to build and sell 33 similar-looking, not really traditional houses at \$300,000-plus each, in a relatively unadventurous market.

He didn't. Due to soaring interest rates and a lack of construction financing, the project came to a halt after the models were built. Sammy Cemo, who assumed control early this year, has engaged a second firm to draft a second set of plans with bigger family rooms and more “Sacramento-oriented” kitchens for buyers resistant to what he calls “that San Francisco look.”

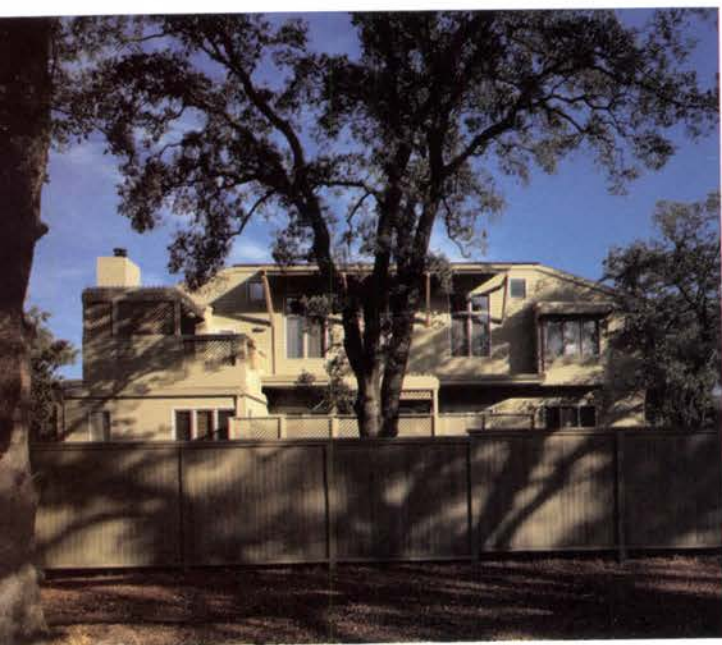
In a provocative, wide-ranging survey on “The American House” published in *The Atlantic Monthly* two years ago, Philip Langdon analyzed the need American house buyers feel for “reassuringly familiar associations.” Anything that looks unconventional,” he wrote, after talking to dozens of people in the 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 lattice grandiose Victorian front doors, surplus overhead space—have been incorporated into the houses of Phoenix Place.

But he went on to cite another point of essentially unanimous accord among developers, builders, and real estate people familiar with the American housing market: Any spec-built house can even dream of selling above the bottom of the range must be crammed with what people in the trade call “amenities.”

“Amenities” are mostly, but not exclusively, machines. They have nothing to do with good architecture, little to do with good craftsmanship, and often not a great deal to do with appropriate materials, or comfort, or convenience, or genuine needs—except insofar as people “need” currently fashionable displays of their (presumed) social status and wealth.

Amenities essentially mandatory nowadays in higher priced housing, according to Langdon, include security alarm and intercom systems, and, if possible, 24-hour guards. Kitchens should have dishwashers and disposals, of course, but also trash compactors, icemakers, combination microwave and conventional ovens, solid (not hollow) oak cabinet doors, “luminous ceilings,” skylights, greenhouse windows, and butcher block islands. A master bedroom no longer suffices. House salesmen insist on master suites (sometimes two per house), each with a fireplace and television in the carpeted sitting room, a walk-in dressing room, 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 bed should be canopied or raised on a podium, or at the very least in a room with a coved or “cathedral” ceiling. 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 and model homes for Phoenix Place. They form a major part of the



Opposite, the entry pavilion. This page, from bottom to top: the terrace house with truncated hip roof; court house with bedroom-balcony under gable end; roof house with rectilinear bite out of the roof; and (above) tower house.

the resistance of the builder to anything too outré—it is remarkable 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 *architecture* as bland, oversized, cushy-carpeted rooms, a surfeit of mahogany 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. Phoenix Place may be one of the first American attempts to sell some of the best current architectural thinking to an anonymous audience of unsophisticated *nouveaux-riches*. (The characterization 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 mahogany cabinet doors. ("It's the *cream*, but still they want oak, because they've been told oak is better!" complained a salesman.) 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 marketing 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 California, 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."

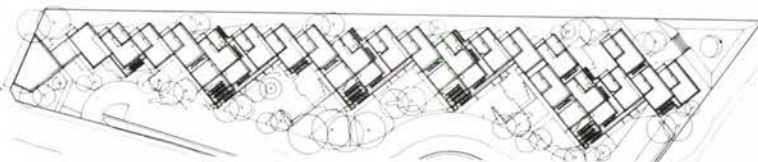
Finally there is allusion to the roadside regionalism of the modern-day West in streaks of neon tubes. These recall the site's former occupant, for which the project is named, a motel with an especially spectacular display of neon. The neon and colors reflect a certain Venturiesque intrigue in Predock 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.

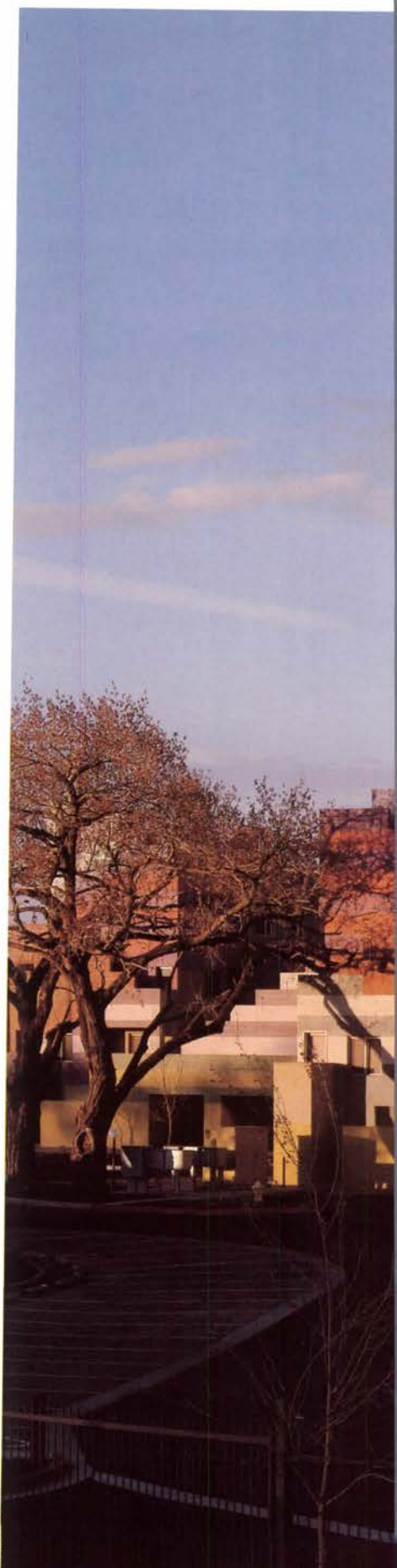
Right, the Beach as seen from the highway entering Albuquerque across the Rio Grande. Predock calls it the biggest violation ever of the city's sign ordinance. Below, upper level terraces.



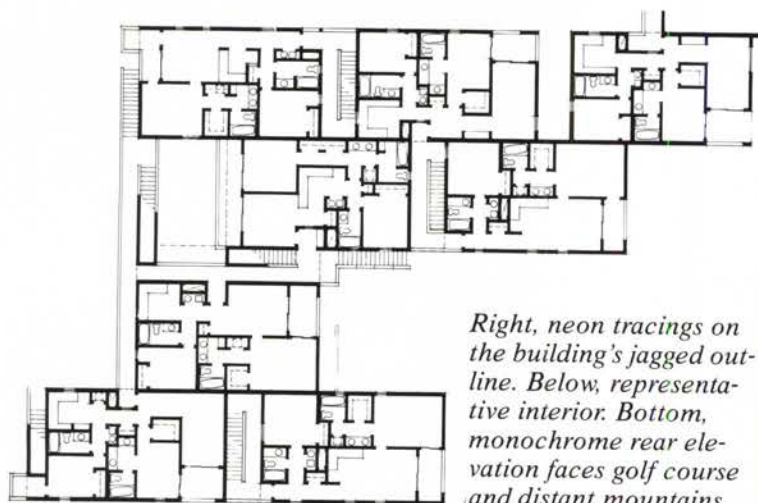
Timothy Hursley/The Arkansas Office



Robert Reck







Unit plans

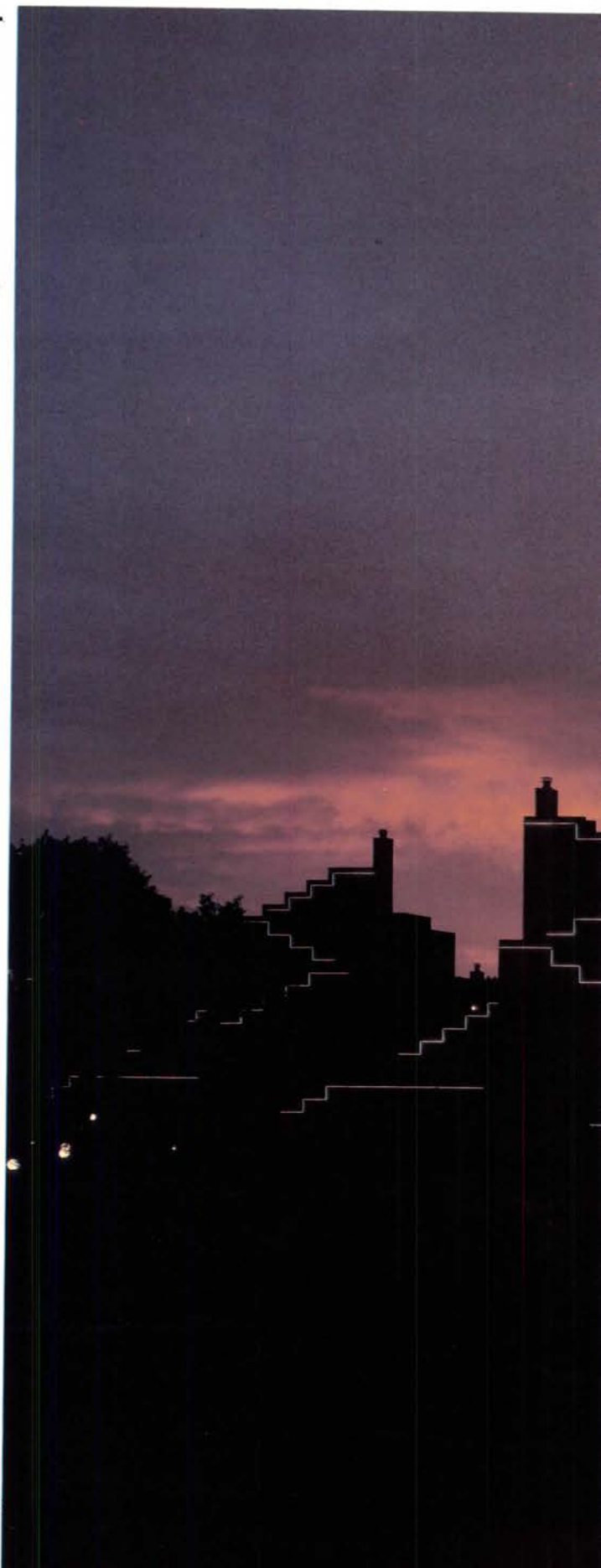
Right, neon tracings on the building's jagged outline. Below, representative interior. Bottom, monochrome rear elevation faces golf course and distant mountains.



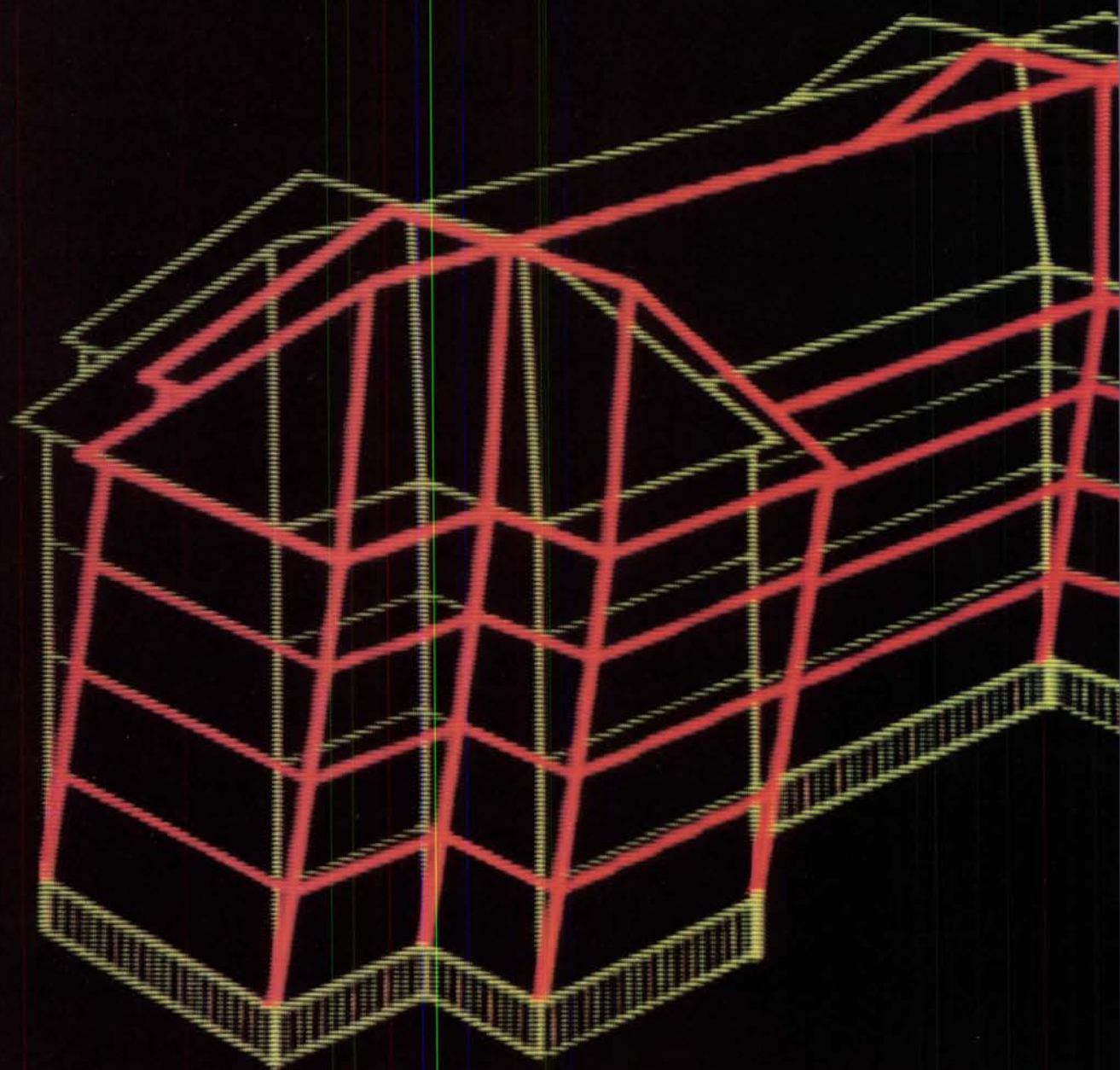
Timothy Hursley/The Arkansas Office



© Robert Reck







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.

In addition to shear strengths up to 820 pounds per linear foot, laminated diaphragms provide superior thermal and sound insulation, and fire resistance.

By using two layers of gypsum board

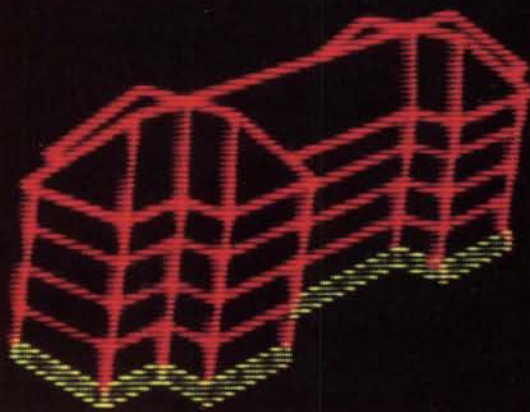
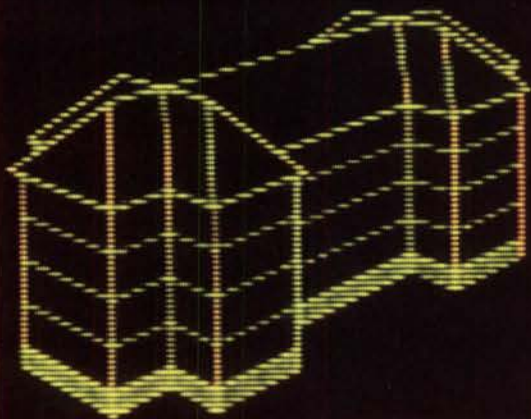
over 2-inch studs, for example, one- and two-hour fire ratings are possible in institutional buildings.

To its credit, timber construction also proven surprisingly worthy under

In a fire-endurance test conform



Shear forces generated by seismic ground motion, wind, and snow load are especially devastating to rigid structures. Because wood frame design is more elastic, it dissipates these stresses by yielding, which increases its ability to resist future loads.



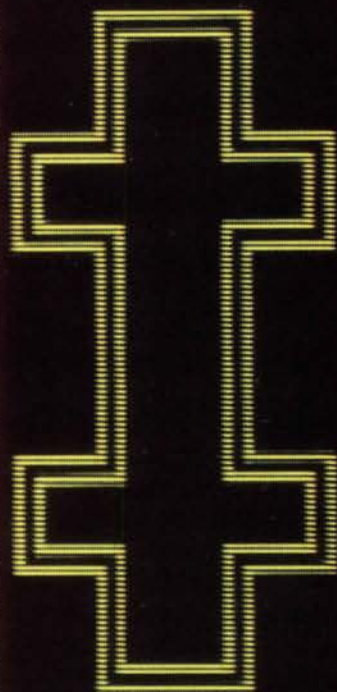
STRESS PLOT ANALYSIS

**BUILDING TYPE:
WOOD FRAME**

**MODEL CODE:
STATIC/DYNAMIC**

**INPUT: LATERAL
LOAD/SEISMIC**

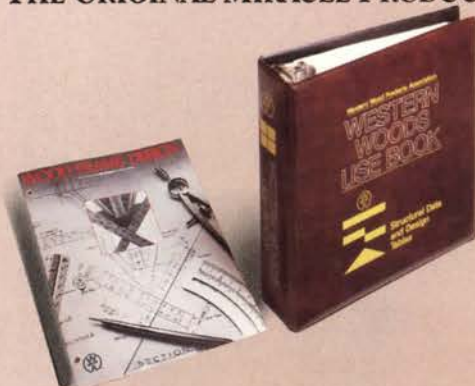
**OUTPUT: FLEXURAL/
SHEAR DEFORMATION**



standards, a heavy timber beam
and full design load after a compar-
el beam collapsed. Following 30
of fire exposure at more than
over 75 percent of the original
section remained undamaged.
earn more about the reserve
of wood-frame construction,
0 for a copy of our Western Woods
book. It covers everything in struc-
analysis—from allowable loads for
beams to 1-inch nails. At no
we'll also provide a technical de-
nual for multi-story construction.
study the nuts and bolts, then
vantage of wood-frame design.

Because a building that stands up under
pressure stands to protect its occupants.
Not to mention your peace of mind.

WESTERN WOOD.
THE ORIGINAL MIRACLE PRODUCT.



Dear WWPA:

Show me how I can improve the behavior of a
structure under stress with Western Wood. Send
me the technical publications checked below.

- ☐ Enclosed is my check for \$30 for the Western
Woods Use Book.
☐ FREE. Wood Frame Design For Commercial/
Multifamily Construction.

NAME

TITLE

FIRM

ADDRESS

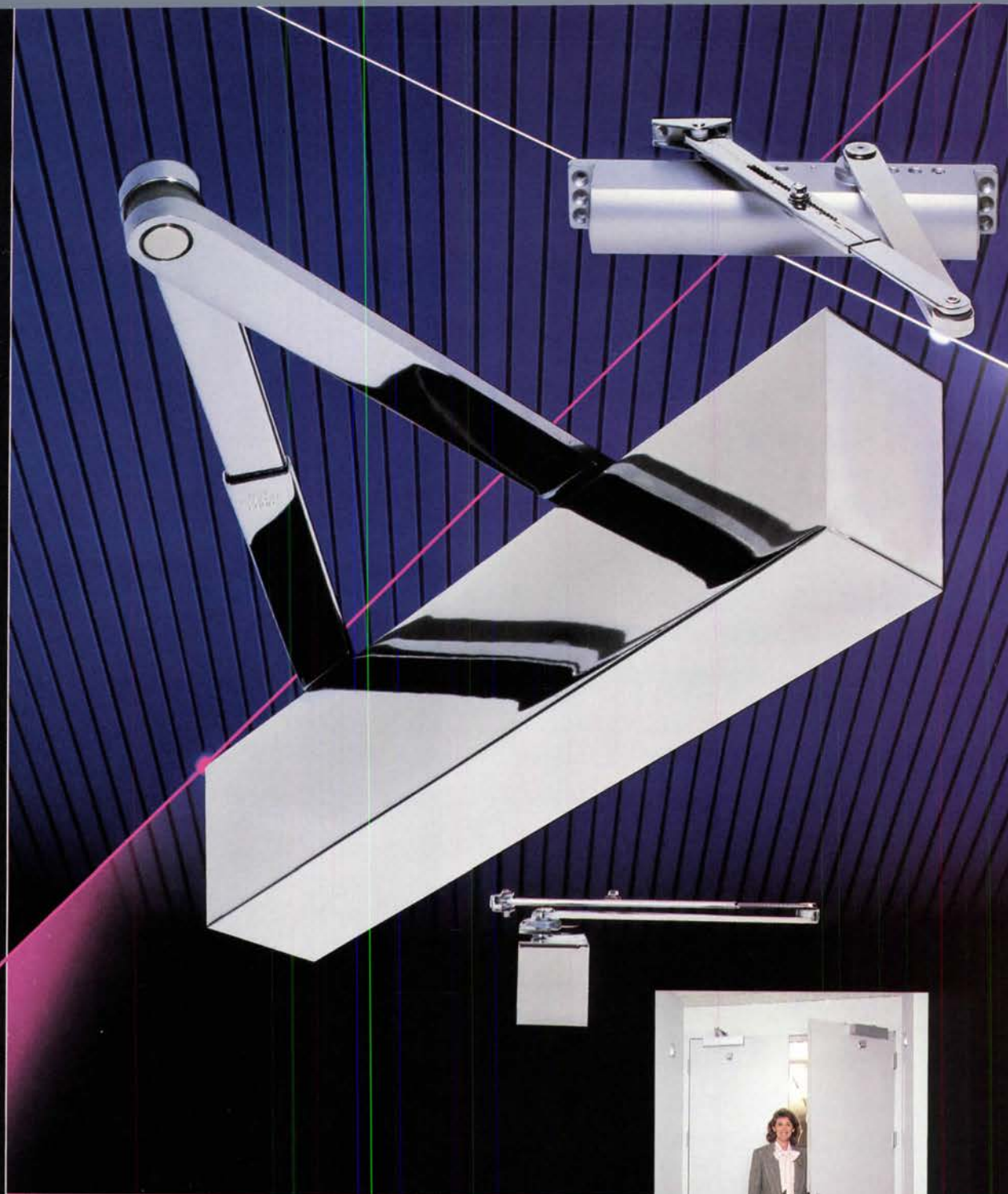
CITY

STATE

ZIP

PHONE

WESTERN WOOD PRODUCTS ASSOCIATION
Dept. A10/86 Yeon Building, Portland, OR 97204



Built to Perform—Beautifully

Built to perform and backed by Rixson quality, compact 2100 and 2200 Series closers reliably and efficiently control doors in even the busiest traffic locations.

Circle 23 on information card

Clean, contemporary styling, attractive finishes and precision-machined parts ensure that these fully adjustable closers meet most door control needs and

complement architectural designs.

Rely on Rixson quality. Because no one knows more about door control.

RIXSON-FIREMARK
9100 West Belmont Ave.
Franklin Park, IL 60131
312/671-5670
(Can.) Ltd. 43 Racine Rd.
Rexdale, Ontario M9W 2Z4
416/743-6216

A DIVISION OF
CONRAC
CORPORATION



Technology & Practice

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

Every
now and then
something better
comes along.



Solutions from Sigma Design... all
the features of high-end CAD on an IBM® PC-AT.

*Productive Drafting Tools, Extensive
Architectural Applications, Spectacular 3D Modeling,
HVAC Design and Drafting, Structural Design and
Drafting, Space Planning and Facilities Management.*

Solutions... the innovative software
you have come to expect from Sigma Design, now at
PC prices. Something better really has come along.

*Sigma Design, Inc.
61 Inverness Drive East
Englewood, Colorado 80112
800-525-7050*

CAD
SOLUTIONS
SIGMA DESIGN

Who's in Charge of Housing Innovation?

Pharmaceutical 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 many 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 non-manufactured houses produced in the United States. The popular press, consultants, agencies, associations, and individuals speaking at industry roundtables (and in the halls of Congress) voice concerns of an intrusion of foreign housing and housing products.

Should claims of foreign technological superiority cause alarm, 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, alone, may never yield significant improvements in housing quality or reductions in cost. After all, such advancements as robotics and microcomputers have been applied in other industries for years, but have yet to be harnessed in ways useful to the full-scale production of whole houses (although some have been applied to the manufacture of assemblies used in building housing).

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 of 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-

Stephen H. Kendall is on leave from the faculty of the College of Environmental Design at the University of Colorado, Boulder. He is currently a Ph.D. candidate in the MIT department of architecture, where he is studying with John Habraken, whose ideas are reflected in this article.

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 many

different parties, with a minimum of explicit coordination, and many of these innovations (laminated veneer lumber and foil-faced rigid insulation board, for instance) quickly gained wide 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 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, there is a tendency to look to proprietary technologies that either subvert the power of this widely shared system or, at best, can't find a place in it.

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 architect (Gropius, Wachsmann, Wright, Christopher Alexander, and others), whose work so often serves as ideological benchmarks

aspects of housing production.

Design professionals have not only claimed to know best how people should and/or will live but have asserted that dramatic departures in ways of building offer great promise for quality and efficiency. The problem is that in housing, unlike submarines, space shuttles, and automobiles (although those comparisons are often drawn), the withdrawal of decision points into the professional domain usually means the elimination of the most important impulses of habitation that make living environments healthy, that is, the ability of local communities and households to control their dwellings over time.

The most notable attempts by architects to revise housing technology (the General Panel System, Lustron House, some Generation Breakthrough proposals, etc.) referenced inappropriate models of industrialization. They invariably linked the technology of housing production to a particular esthetic. Neither the technology nor the esthetic could change or be interpreted independently. And neither was free to be controlled, changed, or interpreted by those outside the design professions. The proprietary nature of their control patterns undoubtedly contributed to the lack of success of these proposals.

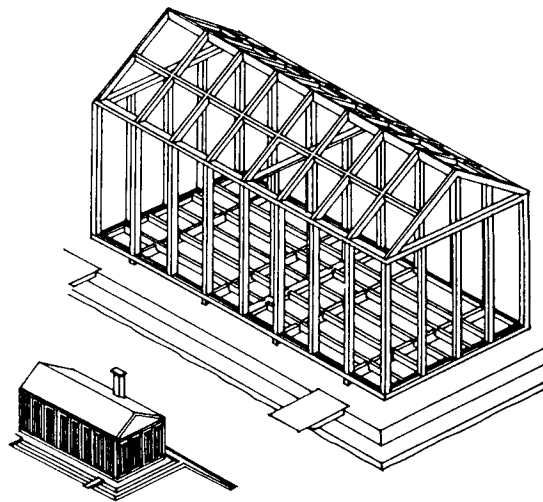
What do these failures teach architects about technical innovations in housing? They tell us two things. First, that we should develop working methods that acknowledge we do not have, and (for the sake of efficiency if nothing else) should not have complete control of all the decisions and assemblies of housing, nor over how these assemblies will be made into complete dwellings or altered over time. The other lesson is that while 4 technology may leave room for improvement in terms of more efficient methods for design and construction, no improvements will be as successful as what we have now unless they will allow a high degree of interpretation and permit deployment by many independent parties.

Guidelines for architectural innovation

Given the importance of distributed control in housing, what can architects do to help? Most fundamentally, we could interpret our design responsibility as one of understanding and controlling change, and of enabling the distribution of authority for making change to those who act on the built environment after our work is completed. We all know that houses change, and that they do so under the control of parties other than those who designed and built them. As simple as this may seem, we often resist this idea, hoping that the houses we design will stay as we left them.

What if we were to think of the design of housing as the process of making plans in such a way that other people can build, use, and change the houses that result from our plans? What if we were to make that explicit? What if we were to think of design as taking place in a continuum, in which we respond to technical and regulatory conditions established by others acting before us, and create a set of conditions that constrain the decisions of those following us at the next lower level?

It is typical to begin the design process by examining how well various technical assemblies respond to functional performance requirements. We want to know, for example, if a certain wall will perform in a certain thermal environment, or whether a particular beam will support anticipated loads. Those are necessary questions, but are not sufficient. To design houses with



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."

an acknowledgement of control by other parties, it is necessary to supplement these concerns with an analysis of capacity.

The idea of capacity is really quite familiar. How many times do we study a space to see if furniture can be arranged (by us or someone else) in a sufficient number of different ways? How often have we studied the position of electrical outlets, trying to anticipate how their positions will affect access to power and data? How many times have we worked on a house "model" for a developer, trying to standardize the framing and the stair openings, the main plumbing, vent lines, and so on, so that as much as possible of the materials purchasing and construction can be standardized—even panelized—while enabling several plan variants to be marketed?

A capacity analysis at the level of a whole house leads to fixing certain design elements and then systematically examining the degree of freedom that remains to make various finished plans. A full capacity study entails complex issues such as technical subsystems, market forces, financing, regulatory constraints, construction processes, and so on.

Obviously, this is a design process that becomes very complex very fast. But it is one of the most critical processes in which architects can participate. Given the complex and distributed patterns of control that exist in the housing industry, and the fast moving pace of change, the process requires better concepts and methods than we now have at our disposal, including those now available with computers.

Designing in terms of both capacities and the functional performance of technical assemblies are not at odds. They are and should be complementary. Good designers move rapidly between these two ways of seeing their designs.

To make it concrete, designing for a large and changing market, where the first-time household is often unknown, requires having a clear strategy for standardizing some elements and assemblies while leaving others variable. Since technically speaking many systems interact to make houses, and many different parties take turns at control, deciding what to fix and what not to is difficult, especially if we move outside the con-

finances of particular patterns of corporate or professional control.

Precedents exist, however, most notably in the techniques for designing, constructing, and transforming speculative office buildings. It would be very useful to systematically transfer some of what we've learned regarding change and distributed control from office building design to the production of housing.

The concept of distributed control of technical assemblies and the concept of capacity help to explain what's important about particular changes in housing production. These concepts lead us to ask, as we look at innovations, who does what and when, and what do their actions mean for the freedom of the actors following.

The Netherlands: Distinguishing 'Support' and 'Infill'

By Stephen H. Kendall

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's work

A few examples of alternative methods for producing housing are presented in the articles that follow; they describe some of the market trends in the Netherlands, Japan, Sweden, and the United States. These case studies represent a wide variety of initiatives in marketing, in the development of national production "standards," and in movements among participants to redistribute responsibilities and improve the efficiency and responsiveness of housing design and construction.

Each experience represents a different approach to housing (and housing component) delivery. All illustrate new balances between the decisions made by individuals and those made at a collective level.

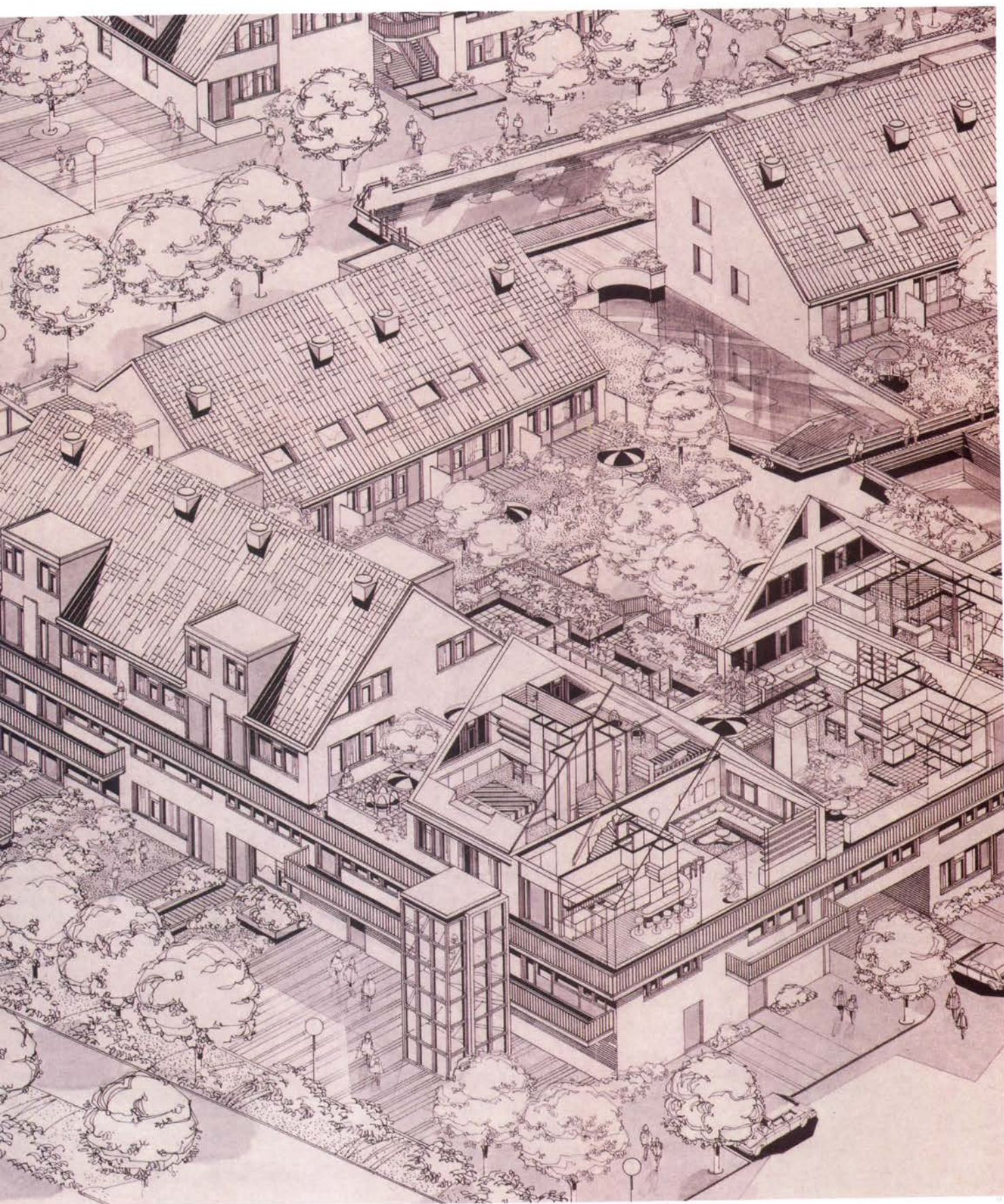
has been aimed at the development of methods that allow various participants in housing production to negotiate which decisions are to be made by each player.

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 architectural 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.

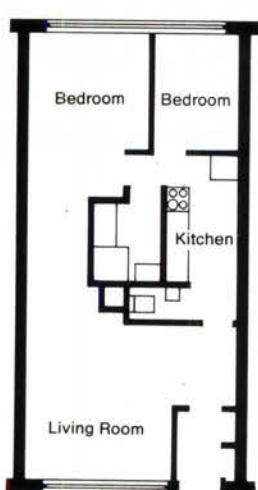
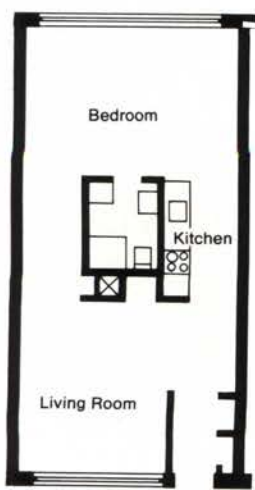
In recent years, however, public sector support of the housing industry has declined, with significant consequences. Many architects have no work, and the housing industry finds itself with excess capacity, since the country is for the most part "already built."

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.





Photographs by Stephen Kendall



Top photos, construction of the concrete support structure; 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 Erf, a principal of Workgroup Kokon in Rotterdam.

The project uses conventional Dutch housing patterns in its urban streetscape and courtyard form. But unlike conventional Dutch public-sector housing, this project untangles support and infill 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 customized 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 20-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.

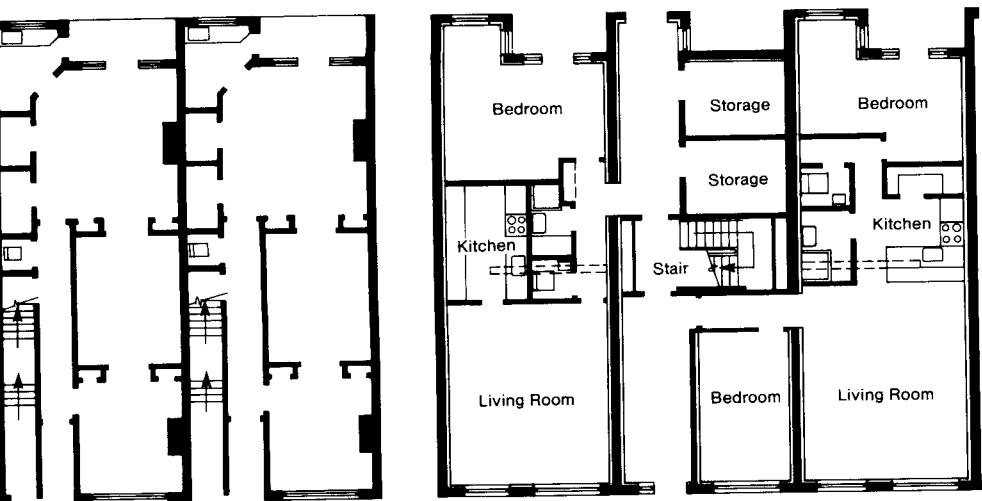
The space plan was used, together with a computer program, to enable the layouts within the support to be drawn up, estimated, and translated into rent figures, so tenants could receive immediate feedback on the financial consequences of their choices. The support was already under construction when 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, unbeknown 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

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 highly 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.

nance 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

An architect working in Tokyo, Mr. Watanabe was a correspondent for Architecture Plus and is a frequent contributor

At its most streamlined, that is the process by which an industrialized house by one producer called Misawa Homes can get built in Japan.

Industrialized housing is big business in Japan and getting bigger. To get an idea of its scale, one need only consult figures released in July by the Japan Prefabricated Construction Suppliers and Manufacturers Association, the industry organization. Last year 199,702 prefab houses (which is what industrialized houses are called in Japan) were sold in that country, the highest ever recorded since 1973 at the peak of a housing boom that was subsequently dented by the energy crisis. In 1985 industrialized houses represented 16 percent of the total number of housing starts, the highest percentage on record.

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

Despite their now-stable positions and the sheer size of their businesses—in volume of sales the top three or four are in the same league as the major Japanese construction companies—the prefab housing companies remain, whether out of choice or necessity, something of outsiders. They do not belong to the Building Contractors Society to which giant, established construction 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 Homes is nearly alone among successful prefab housing companies in being based in the Kanto area, the area situated around Tokyo; the others are based in the Kansai region, centered on Osaka. Misawa is also the sole prefab housing producer among the top five that is concentrated in the housing industry; the others are affiliates of large industrial organizations or of a general construction 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 building components and the franchises that deliver the houses to consumers at the local or district level are independent entities, 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 University 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 experienced Japanese architects, engineers, and academics had never thought of doing. Why did Misawa? [Probably because] when



Salespersons at Misawa dealer showrooms, left, help customers adjust standard plans for local regulations and particular locations. The Misawa Expert System simplifies the process of retrieving 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 a 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



bove, 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 one day. Two more weeks of construction are required (for wiring, plumbing, and finish work) before a house is ready for occupancy, right.



modeled on dealers in the automobile industry—"customize" houses 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 at 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 is 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 prefabricated 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, Kunihiro Hayakawa, and Toyoo 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 prefabricated 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 prefabricated 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 Guang Ming Freshtown; 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 challenge 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

Arnold J. Aho, AIA, is professor of architecture in charge of the building systems curriculum at Mississippi State University. He is currently project manager of a research program investigating Swedish housing technologies, under grant from the

n organized team approach

rtly 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 or 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 counterparts. 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 in 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 indi-

Panels, complete with interior and exterior finishes, can be prefabricated 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.



visualized 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 color 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.

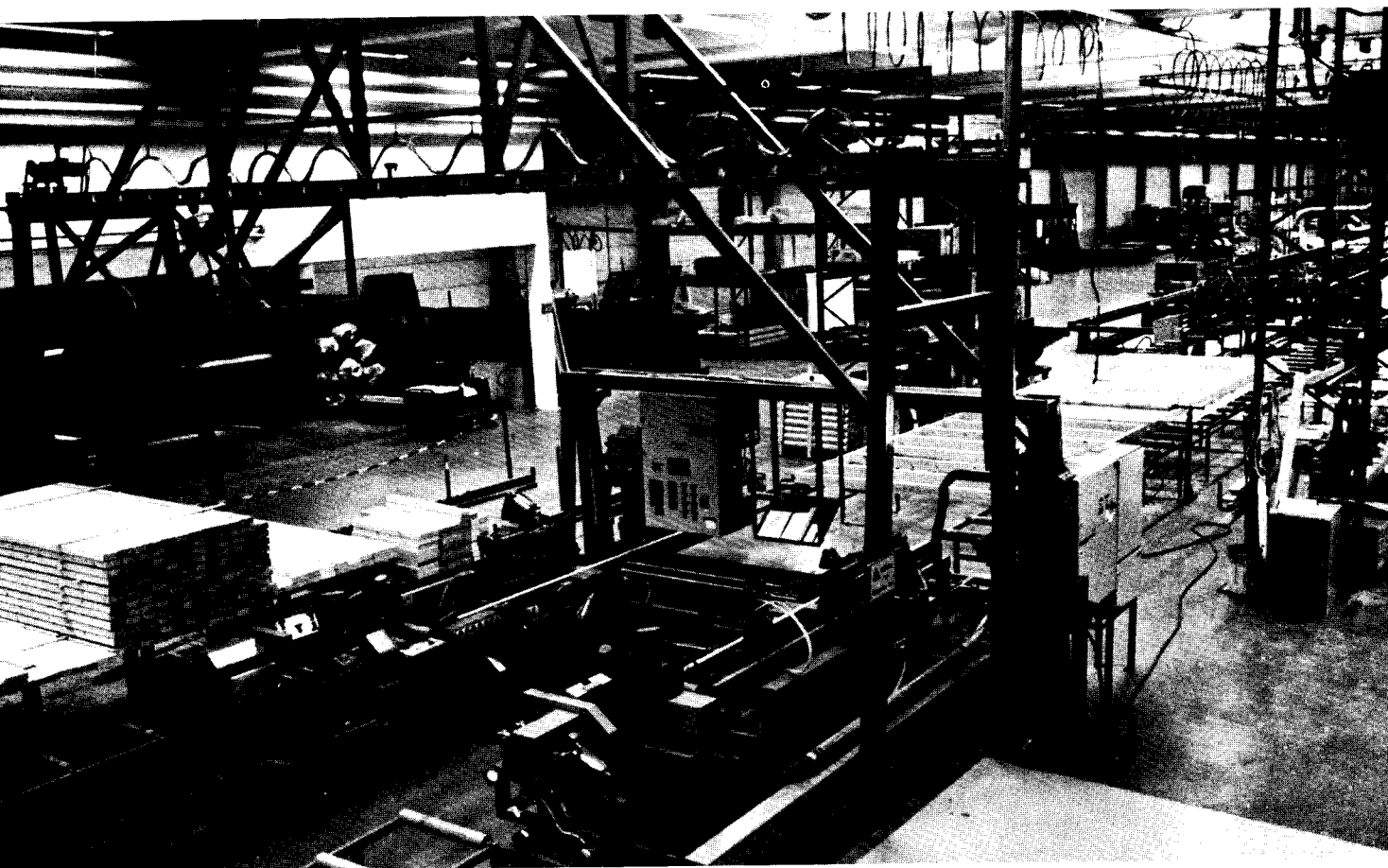
The *modular volume* system consists of a room, or series of rooms, completely fabricated at the factory and shipped to the construction site. The only on-site work consists of providing foundation (often quite minimal) and connecting the utility services. Modular volumes make the most sense on remote 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 wood 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

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.

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 pre-painted, pre-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's little reason to believe that, in one form or another, Scandinavian technologies will stay out of the United States for long.

United States: Agreements Among Competitors Could Make Houses Smart

By Karen Haas Smith

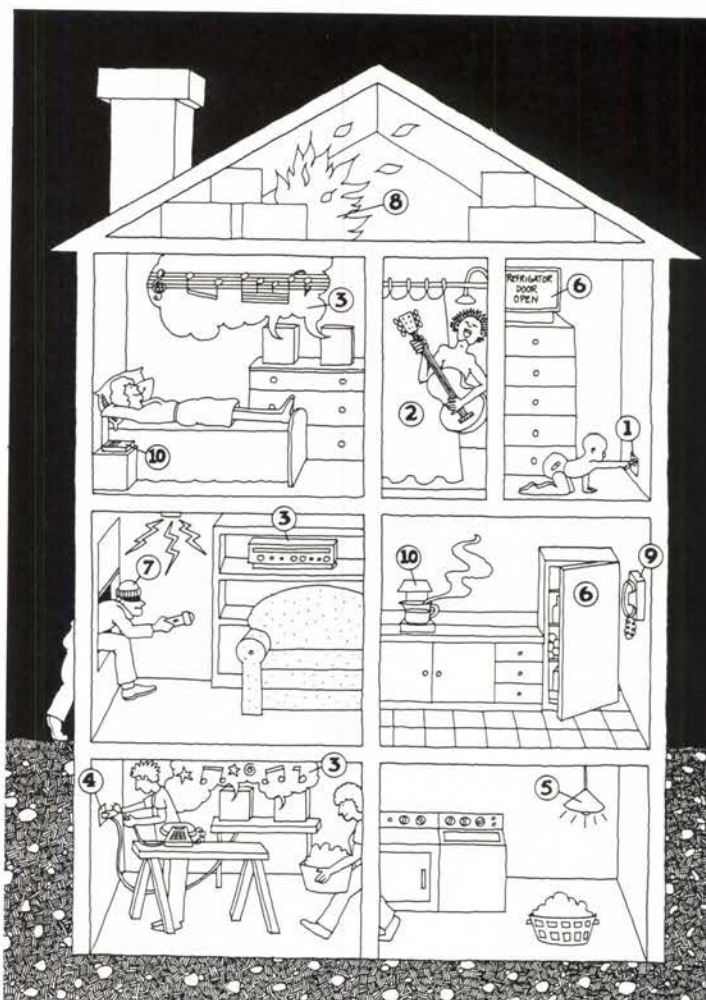
Change comes slowly to the U.S. housing market. Like television programming, most housing is designed around some market researcher's idea of what people like. The basic product hardly ever changes—few builders are willing to compound the inherent risk in the housing market by offering a truly innovative 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, electronics, 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-



Some of the features NAHB/RF proposes as part of the ideal smart house: 1. A chip in each smart-house device identifies what is being plugged into any outlet, the amount of current needed for its operation, and whether it is "authorized" to receive current. 2. The smart-house can be instructed not to apply power to an electric guitar plugged into a bathroom outlet. 3. Stereo speakers can be plugged into any outlet without additional wiring. 4. Any smart-house device can operate in any outlet; the stereo speaker and the telephone plug into the same outlet. 5. Lights can turn off automatically when a person leaves the room. 6. A centrally located video display tells when the refrigerator is left open, the door is unlocked, etc. 7. Sensors activate alarms when intruders enter, but pets won't set them off. 8. Sensors detect smoke and fire, as well as regulate temperature. 9. The user can control the system remotely by telephone. 10. All devices receive instruction from a central panel.

Karen Haas Smith, former acting editor of ARCHITECTURAL TECHNOLOGY, is president of Editor's Ink of Washington, an editorial consultation firm.

s 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 pre-programmed instructions, and alert the homeowner to malfunctions (see "How the Smart House System Works," page 103).

The possible uses of this integrated electrical/electronic/communications network are endless. In the morning, the heating or airconditioning and hot water could be programmed to kick on automatically a half-hour before the wake-up alarm goes 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 family 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).

Plenty of consumer appeal

Such a system would unquestionably appeal to American consumers, conditioned as they are to competitive consumption of the latest high-tech gadgets. The last decade alone has brought microwave ovens, personal computers, food processors, and video cassette recorders into most middle-class homes. The fact that the smart-house system also represents a dramatic improvement in the quality of home wiring and offers the potential for significantly improving home safety, security, and energy efficiency are not likely to be its strongest selling points. If the price is right, Americans will buy a refrigerator that "talks" and a lighting system that "sees."

Centralized controllers can actually reduce the complexity and cost of home appliances. For example, a smart-house washing machine could operate on a DC motor, which is simpler than existing AC motors and potentially less expensive. The transmissions that put conventional washing machines through their various speed cycles could be eliminated; so could the

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.

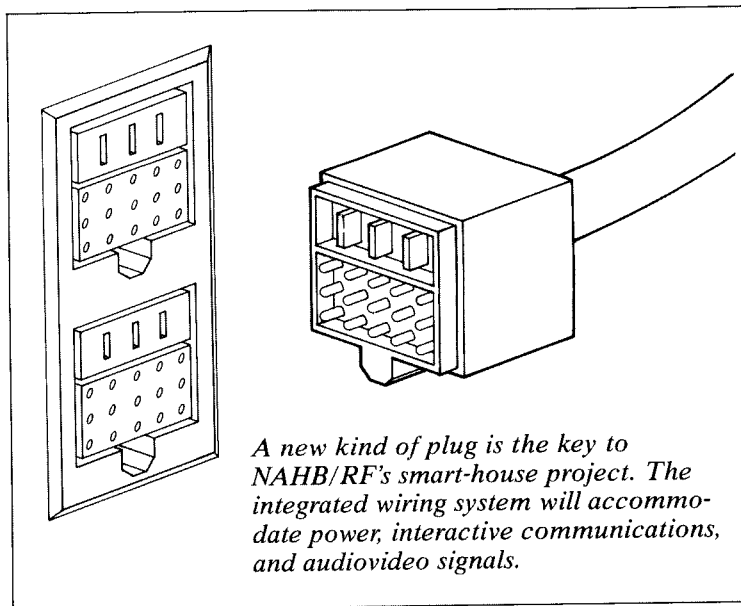
But how much would the smart house cost? NAHB/RF estimates the wiring systems and controllers would add 30 percent to the \$2,000 to \$5,000 cost of installing conventional wiring in a new house. That's not a prohibitive price for a technology offering appealing amenities, with the chance to save lots 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.

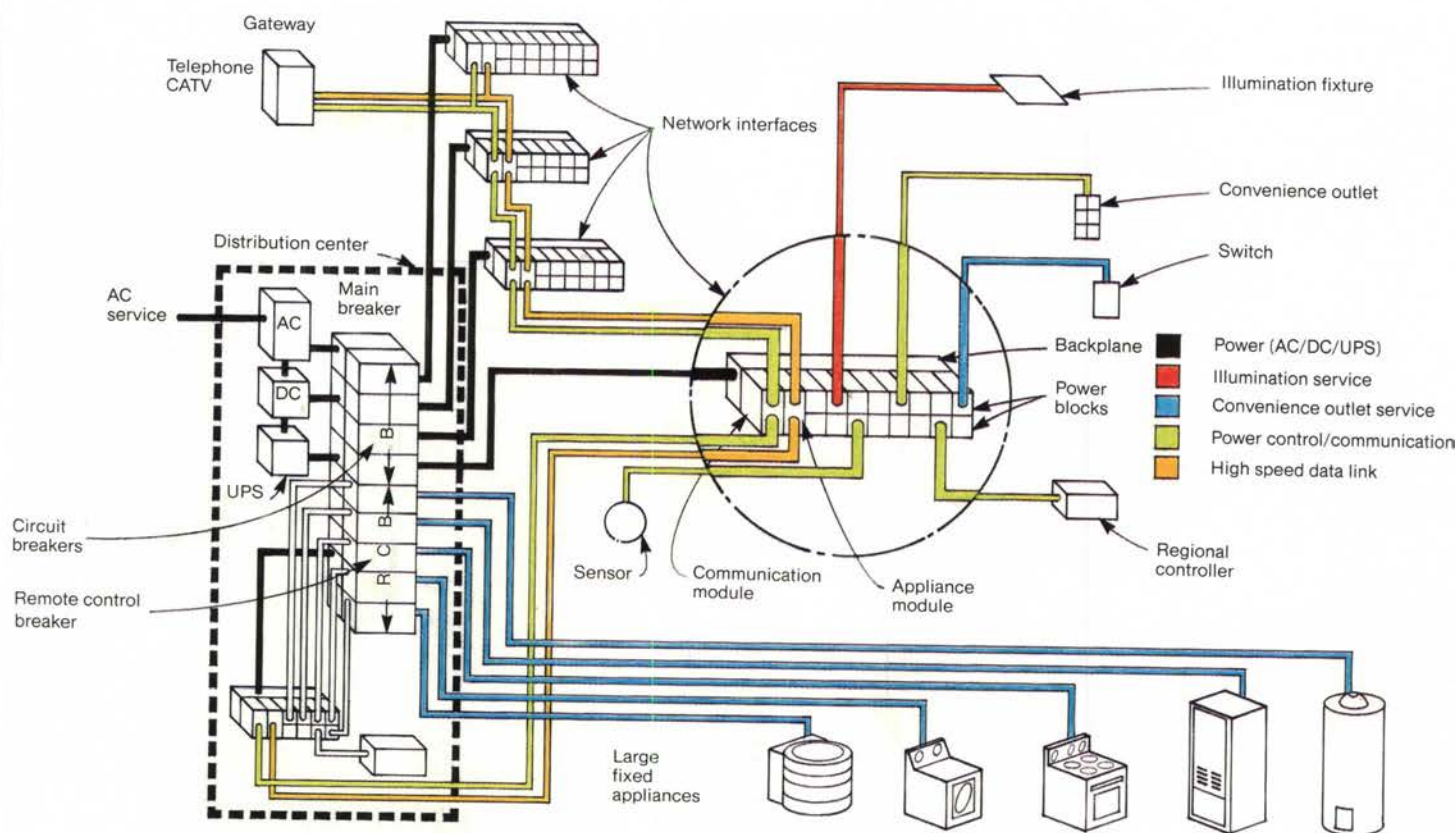
Will the smart-house concept really fly?

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, and 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 when the house is unoccupied is an obvious way to save energy. Programmable HVAC and lighting systems combined with occu-



How the Smart-House System Works



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 circuits.

- **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 recognition and

thetic 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/RMI staff. For example, the controller hasn't been designed: the decision whether to use electromechanical relays or semiconductor devices 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

... 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. Photosensors and dimmable ballasts 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 conventional 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 a smart house to life.

Another big problem was solved in December 1985 with approval of changes in the National Electrical Code (NEC). The 1987 editing of the NEC will permit home use of these innovative wiring systems.

But the big question is whether large-volume home appliance and home equipment manufacturers will commit the necessary resources to development and production of smart-house products. NAHB/RF's smart-house project was the first consortium formed under the 1984 legislation. Current lists indicate 38 companies are participating in the smart-house project, including such major firms as AT&T, Carrier, General Electric, Honeywell, Lennox, North American Philips, and Whirlpool. These companies paid a fee to join the project and have contributed engineering and management talent to a series of meetings over the last two years that has hammered out the basic design of the smart-house system.

But now it's time for commitment. This fall, NAHB/RF is asking companies to join a limited partnership, Smart House Development Venture, and to sign product licensing agreements obligating them to develop specific products on a stated schedule. Each company will fund its own development costs, and must pay royalties back to the limited partnership, which will handle 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 Brintec, 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 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 Grand 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." □

References and Further Reading

- Bender, Richard. *A Crack in the Rear View Mirror*. Van Nostrand Reinhold, New York. 1973.
- Bruce, Alfred and Harold Sandbank. *A History of Prefabrication*. Arno Press, New York. 1972.
- Dean, Edward. "The New Foreign Import: Manufactured Housing Systems," *Journal of Architectural Education*. Spring/Summer 1984.
- Dekker, Karen. "Supports Can Be Less Costly," *The Dutch Architects Yearbook*. DAY, the Netherlands. 1982.
- Dietz, Albert G.H. *Dwelling House Construction*. MIT Press, Cambridge, Mass. 1974.
- Dietz, Albert G.H. and Lawrence S. Cutler, eds. *Industrialized Building Systems for Housing*. MIT Press, Cambridge, Mass. 1971.
- Dluhosch, Eric. "The Japanese Approach to Industrialized Housing," *Systems Building News*. Montreal. Nov. 1971.
- Eichler, Ned. *The Merchant Builders*. MIT Press, Cambridge, Mass. 1974.
- Habraken, N.J. *The Appearance of Form: Four Essays on the Position Designing Takes Between People and Things*. Awater Press, Cambridge, Mass. 1985.
- Habraken, N.J. "The Built Environment and the Limits of Professional Practice," *Housing Form and Public Policy in the U.S.* Praeger Press, New York. 1980.
- Habraken, N.J. *Supports: An Alternative to Mass Housing*. The Architectural Press, Cambridge, Mass. 1972.
- Habraken, N.J. *Transformation of the Site*. Awater Press, Cambridge, Mass. 1983.
- Habraken, N.J. *Variations: The Systematic Design of Supports*. The Lab of Architecture and Planning, MIT, Cambridge, Mass. 1976.
- Hatch, Richard, ed. *The Scope of Social Architecture*. Van Nostrand Reinhold Company, New York. 1984.
- Herbert, Gilbert. *The Dream of the Factory-Made House*. MIT Press, Cambridge, Mass. 1984.
- Kando, Paul. "Made in Sweden: Better Houses Come Ashore," *Solar Age*. March 1984.
- Kendall, Stephen and Thomas Chalmers. *Shell/Infill: A Technical Study of a New Strategy for 2x4 Housebuilding*. A DHP Publication, MIT, Cambridge, Mass. June 1986.
- Lucas, Paul. *New Concepts—Housing, Supports in the Netherlands*. Network, Cambridge, Mass. 1986.
- McMillan, Charles J. *The Japanese Industrial System*. Walter de Gruyter, New York. 1984.
- Nutt-Powell, Thomas E. *Manufactured Homes: Making Sense of a Housing Opportunity*. Auburn House Publishing, Boston. 1982.
- Patrick, H. and H. Rosovsky, eds. *Asia's New Giant*. The Brookings Institute, Washington, D.C. 1986.
- Russell, Barry. *Building Systems, Industrialization and Architecture*. John Wiley and Sons, New York. 1981.
- U.S. Department of Housing and Urban Development. "Custom-Built Assembly Line Homes Capture Japanese Market," *Urban Innovations Abroad*. HUD, Washington, D.C. Vol.8, No.2. Feb. 1984.
- Van der Werf, Franz and Hubert Paul Froyen. *Molenvliet-Wilgendonk: Experimental Housing Project, the Netherlands*. The Harvard Architecture Review, MIT Press, Cambridge, Mass. Spring, 1980.

Announcing the Contemporary Solution to a Classic Architectural Problem

For centuries, architects have grappled with the tedium of re-tracing frequently-used design details — like columns — onto their plans.

Until the invention of this modern technique: I.N.T.™ Custom Transfers.

Dry transfer sheets of your own construction details, title blocks, and logos to rub down as you need them. For crisp, consistent graphics and type in

minutes. Details that stay put yet can be dry erased as your design changes.

Create I.N.T. transfers from original mylar or vellum drawings — or even from your CAD/CAM output. You can make your own I.N.T. sheets in-house; equipment and materials cost only as much as a track drafting machine. Or order I.N.T. images as you need them from a Color Imaging Center.

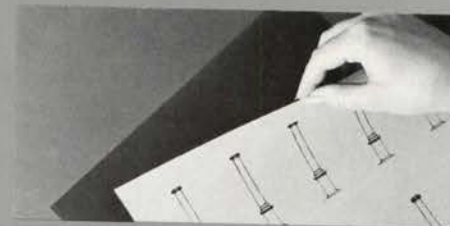
Call 1-800-526-9073 for the location of a Letraset Dealer or Color Imaging Center nearest to you. And solve a classic architectural problem in your own time.

Letraset™

I.N.T. and Color Key are registered trademarks of 3M.

© Letraset USA 1986

⊗ ESSELTE



It's easy to make your own I.N.T. transfers in-house. First, create a Color Key™ Photo Mask Instant Negative of your original design.



Next, expose your Photo Mask negative and I.N.T. film to a UV light.



Then, develop the I.N.T. transfer image. And you're ready to rub down your details!

Get the Details!

AT LCZ 9/10-5

- ☐ Tell me how I.N.T. custom transfers could save drafting time for my firm

Name _____

Occupation _____

Firm _____

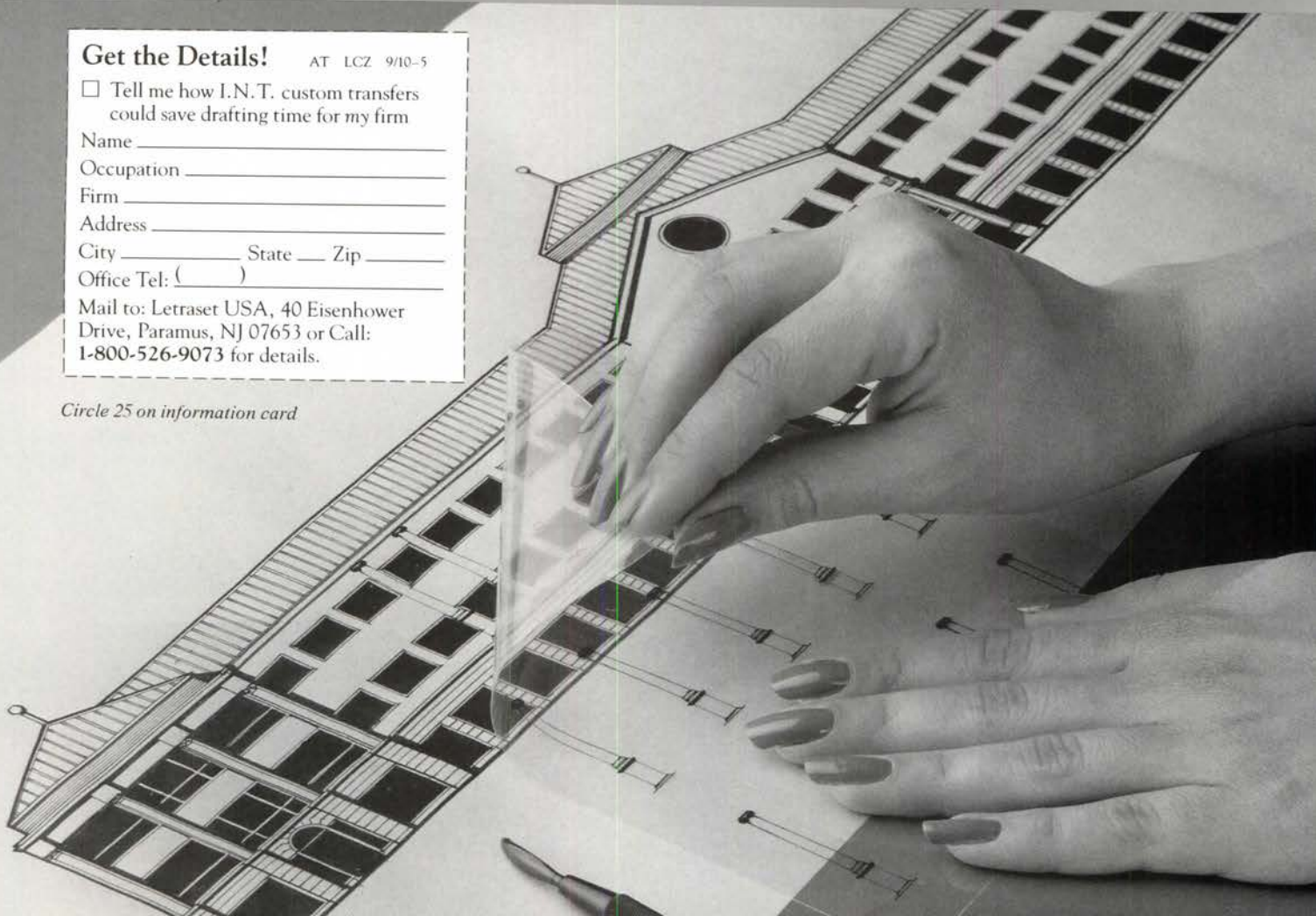
Address _____

City _____ State _____ Zip _____

Office Tel: (____) _____

Mail to: Letraset USA, 40 Eisenhower Drive, Paramus, NJ 07653 or Call: 1-800-526-9073 for details.

Circle 25 on information card



Design/Build Methods Mature

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

by 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. Detractors maintain that it raises serious and as yet unresolved legal and ethical problems. Both sides agree, however, that design/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 for 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 projects 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 over 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.

Christopher Wist is director of legal research for AIA's documents program.

"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/building 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.

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."

This feature represents a dramatic departure from the tradi-

tion's fiduciary duties of loyalty, trust, and openness inherent in the conventional project delivery method, through which the architect constantly advises the owner concerning the project. In purely legal terms, the owner-architect relationship in design/build can best be characterized as an "arm's-length business relationship," similar to that existing between a merchant and his or her customer. Architects involved in design/build, however, flatly deny that their relationship with owners is more distant. 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 earnest. Norman Coplan speculates that this may be because the design/build owner is 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.



builders from using certain business arrangements, although the prohibition is not usually phrased in explicit terms. For example, certain states bar some forms of corporations from practicing 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 payroll. Other considerations, such as partnership liability, may also influence the choice of business format.

Licensing: Design services under a design/build contract could be provided by a registered design professional licensed in 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 intermediary 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/build firm usually makes warranty-like representations concerning the overall quality of the completed building. Generally, such warranties are not made by architects 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/build firm 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/build firm 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, according 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 phenomenon 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 continued attention of individuals with a serious interest in the evolution of architectural practice. □



Specify Manville.

You won't have to burn the midnight oil making roofing systems decisions.

Manville supplies all three major roofing systems: built-up, modified bitumen and single-ply.

That's why Manville can eliminate a lot of after-hours work for you in the selection, design and specifications stage of your project. Manville can offer you impartial, objective recommendations resulting in the best possible roof for your building design. And this means you'll receive Manville quality in every component in the roofing system, from the deck up. Including insulation, fasteners, accessories, and, of course, the membrane itself.

More than that, you can receive design and specification assistance from the industry's largest, most knowledgeable staff of full-time roofing specialists. Experienced district engineers work with you on your project from start to finish, including inspections and on-site problem solving.

Manville gives you true single-source supply and backs it with single-source responsibility for the performance of the roofing system. Manville's unique guaranteed guarantee offers the roofing industry's broadest coverage.

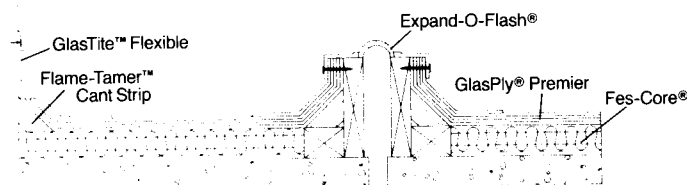
Specify Manville and you'll save yourself a lot of time-consuming decision making. A helpful Manville roofing specialist is as close as your phone. Just call (303) 978-4900. For export, telex 454404 JOHNMANVL DVR.

21,000 people with one goal:
To be your best supplier.

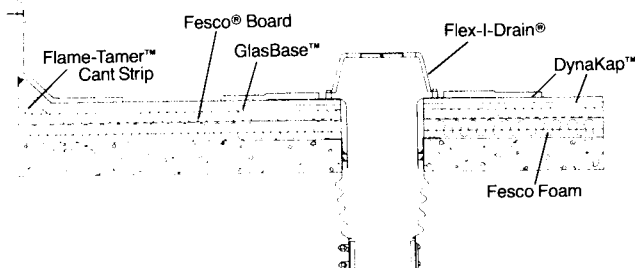
Manville

Circle 26 on information card

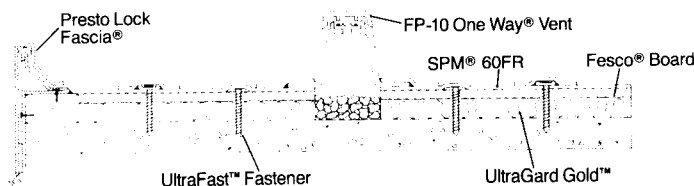
BUILT-UP ROOFING SYSTEM



MODIFIED BITUMEN ROOFING SYSTEM



SINGLE PLY ROOFING SYSTEM



Home is Where the Art Is

Architects turn owner-homebuilders on to architecture

By Michael J. Crosbie



Courtesy of Yestermorrow Design/Build School

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 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 the 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 who 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 DeGrandpre. "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 is 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 a ball-point pen on rough paper. You have to put soft pencils in 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 reuse and try to get them over their fear of making mistakes." For some students models are the best tools for visualizing the spaces they are designing. Martin Gehner, associate dean 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."

Translating the architect's language

Another hurdle for both students and teachers to clear is architectural language—the way architects talk about their discipline that is not readily understood by lay people. "The first year, I think, I was being too abstract and using a lot of architectural jargon," says Smith. "If an abstract word comes into my mind, I try to shift gears quickly and think, 'How would I explain this to my mother?'" Several students remark that the instructor's ability to translate design ideas into simple English makes them feel that architecture is accessible to them; they aren't intimidated by it. "Sometimes Martin would get into design theory or structure that for some was a bit over their heads," says student Edward Bunce, a manufacturing supervisor from Rochester, N.Y., and an engineer by training. "He was very willing to stop and go back, or slow down, or work individually with people."

As the students become familiar with architectural conventions and modes of expression, instructors attempt to understand the ways in which the students think about their living environments in an effort to broaden their ideas about design. "I try not to use words like 'kitchen' and 'living room,'" explains Smith, "because I want students to think of those spaces in terms of activity. Maybe a giant bathroom is a status symbol, but it might not be appropriate for the way they want to live." Meyer adds that most students' attitudes about architecture are grounded in what they've been brought up with. "They have a hard time visualizing the spaces that they live in."

Some instructors present slide shows of work by architects such as Venturi, Graves, or Gehry to show a range of ways of designing a house. Students usually bridle at such unconventional houses as Gehry's, or dismiss them because of budget. This year Gehner showed examples of domestic vernacular archi-

itecture from different cultures. "The class commented that they got quite a bit out of it from the standpoint that it was always within their reach in terms of scale and cost, yet it had as much variation as the houses designed by name architects," says Gehner. "It opened up their thinking about materials, color, textures, solar applications, etc."

Following their mornings in design studio, the students spend the afternoon on building sites working on construction projects. Students and instructors agree that the connection between designing and building is weak because students do not usually see a construction project in its entirety. This summer a class constructed a gazebo, a building small enough to include all the aspects of construction within the scope of two weeks. Apparently this project gave the students a breadth of hands-on experience that the course usually lacks.

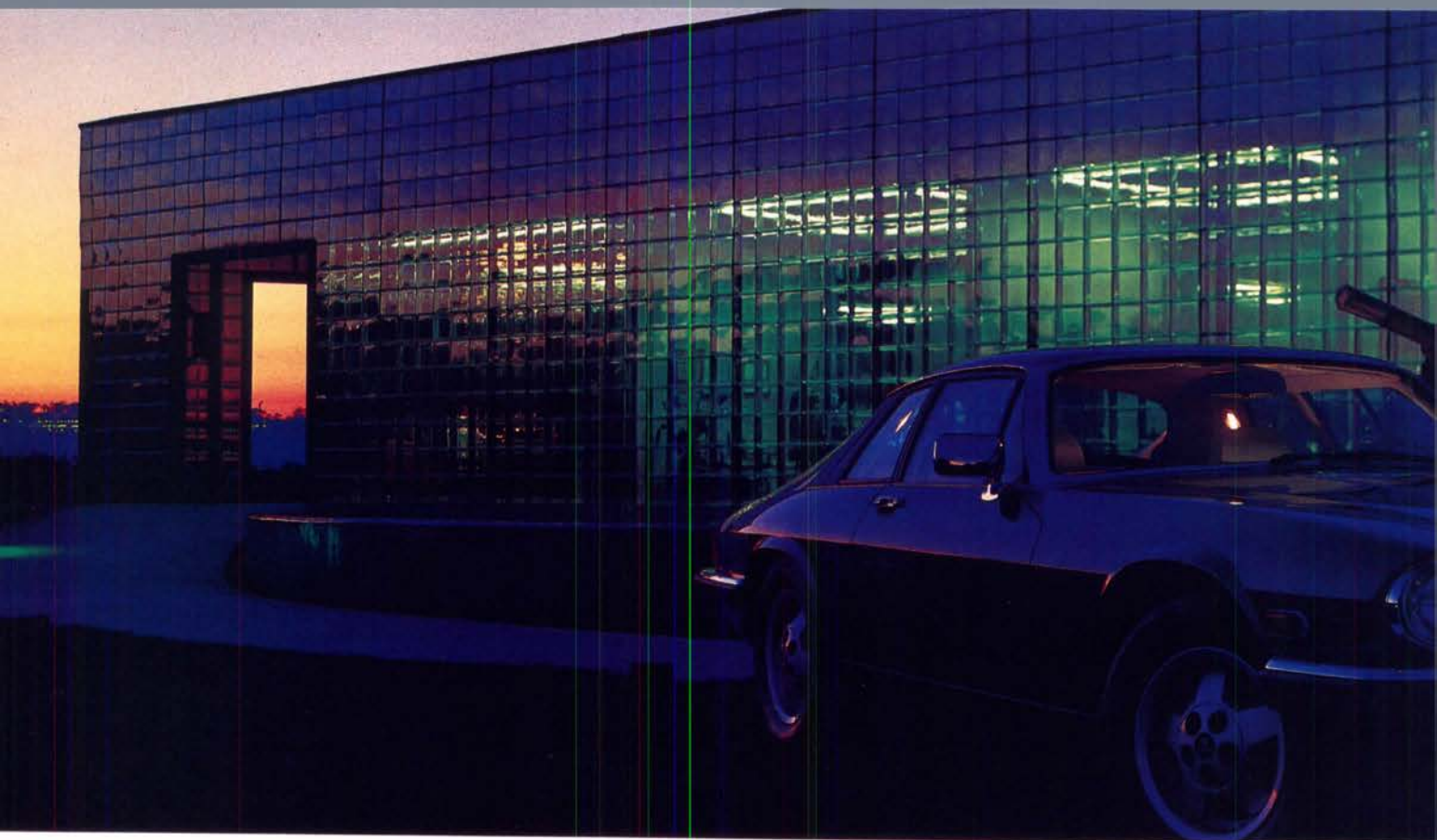
The culmination of the course is a day-long design review where students present their projects to visiting jurors. The review I was invited to attend this summer included a range of projects—from refined stock plans and renovations and additions, to houses designed from scratch. One of the most interesting was a Long Island house designed by a writer interested in astronomy for him and his wife, who is a painter. The house included images of seaside cottages and lighthouses and was distinguished by a tower where the designer could retreat to write or star gaze. "I had no concrete connection between my fantasy of a house and how you make it a reality," says Val Schaffner, the designer. "The course got me excited about the process of design. It made me consider how a building functions and how that relates to its appearance." Schaffner adds that he continues to develop his design, and other students report that since completing the course they have reconsidered their plans, further refining them or starting over.

Besides raising the consciousness of lay people about 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." □



Martin Gehner



MORE ARCHITECTS FREE THEIR MINDS WITH CALCOMP THAN ANY OTHER CAD SYSTEM.

Before you buy a CAD system, consider this. In computer-aided design, CalComp has more going for it.

More professional design software for both PCs and large scale systems. More production drawing speed in its architectural CAD System 25. More built-in system simplicity, so it is especially easy to learn and use. And with CalComp, productivity gains of 5:1 or more are common.

As a result, more architects have gone with CalComp than any other CAD system.

Worldwide, more architects leave the design options and drafting, materials and cost estimating to CalComp, so they can keep on creating.

The CalComp System 25 was developed specifically for architectural designing, drafting, space planning, materials and cost estimating. So you don't have to adapt to it. System 25 is already adapted to your needs.

Unlike other architec-

tural CAD systems, System 25 is a continuum, from the CADVANCE-based 100 Series for PC users through 300 Series, to the high-performance multi-user 600 Series. So it fits the needs and budget of every size architectural firm.

And System 25 is backed by the worldwide resources of a Fortune 500 company. Our commitment includes installation, training, regional support teams and an 800 number hot-line.

To learn more about why more architects free their minds with CalComp, just write or call for our 8-minute video. It's titled "CAD to Reality," and you can order it on VHS or Beta for just \$5 to cover mailing and handling. Then decide which CAD system to buy.

CalComp, P.O. Box
3250, Anaheim, California
92803. Call toll free:
1-800-CALCOMP.

CALCOMP
A Sanders Company

©1986 CalComp





Located in Arlington, VA, The Arlington Hospital is a full-service general hospital. Staffed by more than 700 licensed physicians, the 350-bed teaching hospital has been affiliated with Georgetown University School of Medicine since 1950.

"Scrubbing up at The Arlington Hospital is always a successful operation with Sloan OPTIMA® No-Hands Systems."

Cleanliness and efficiency are two essential aspects of providing responsible patient care. In a busy 350-bed teaching hospital, maintaining a sterile environment is a must. The Arlington



Hospital has discovered an efficient way to ensure cleanliness with the

installation of 58 Sloan OPTIMA No-Hands systems. In the emergency room, the operating suites, and the labor and delivery rooms, Sloan OPTIMA No-Hands systems are helping to reduce maintenance, enhance cleanliness and promote

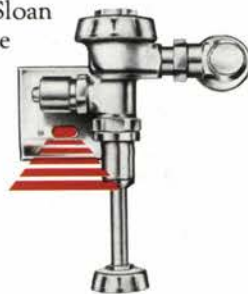
water savings. An electronic sensor "sees" the user, and the OPTIMA system automatically turns the faucets on and off—only as needed. Awkward arm- or leg-actuated faucets are eliminated to provide a quick, no-hands scrub-up.

The results: a more sterile, efficient scrub station. Reduced maintenance and water usage. And greater convenience for medical personnel.

Easily installed in any new or retrofit situation, the Sloan OPTIMA system meets all building codes and readily adapts to existing sink and plumbing hookups. The system is also compatible with soap dispensers, hand dryers,

shower heads, and more.

Ask your Sloan representative about Sloan No-Hands automated systems. Or write us.



SLOAN VALVE COMPANY
10500 Seymour Avenue, Franklin Park, IL 60131
A Tradition of Quality and Pride

Curtain Call for Curtain Walls

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.

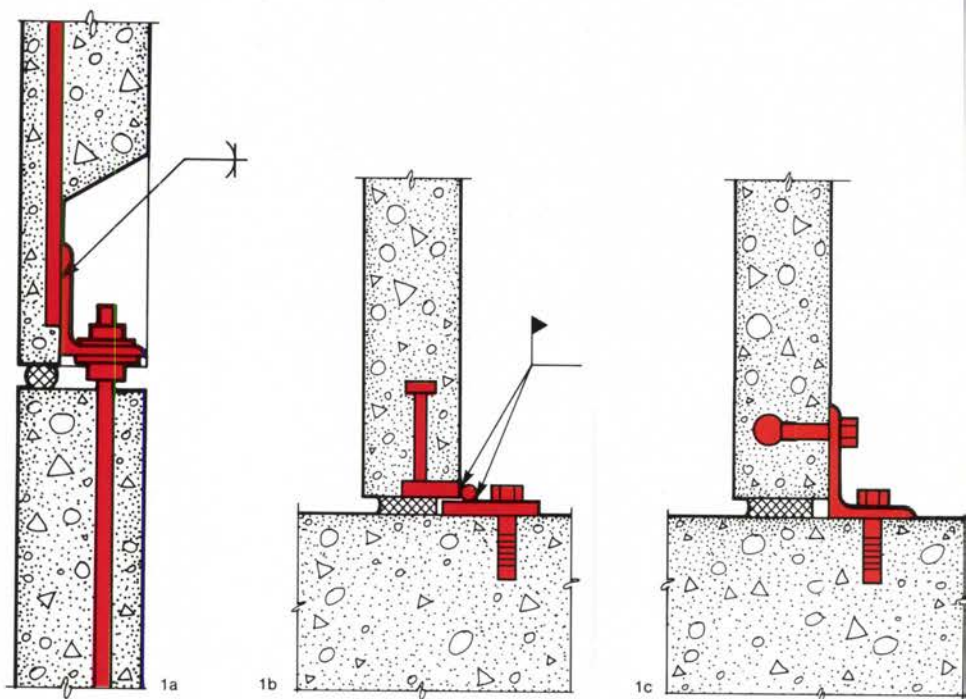
Connection details for precast-concrete panels include a wide range of hardware combinations, including reinforcing bars, studs, coil inserts, structural steel shapes, bolts, and threaded rods. Load transfer from the concrete panels occurs either through anchorage of the hardware to the concrete by bond, 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.

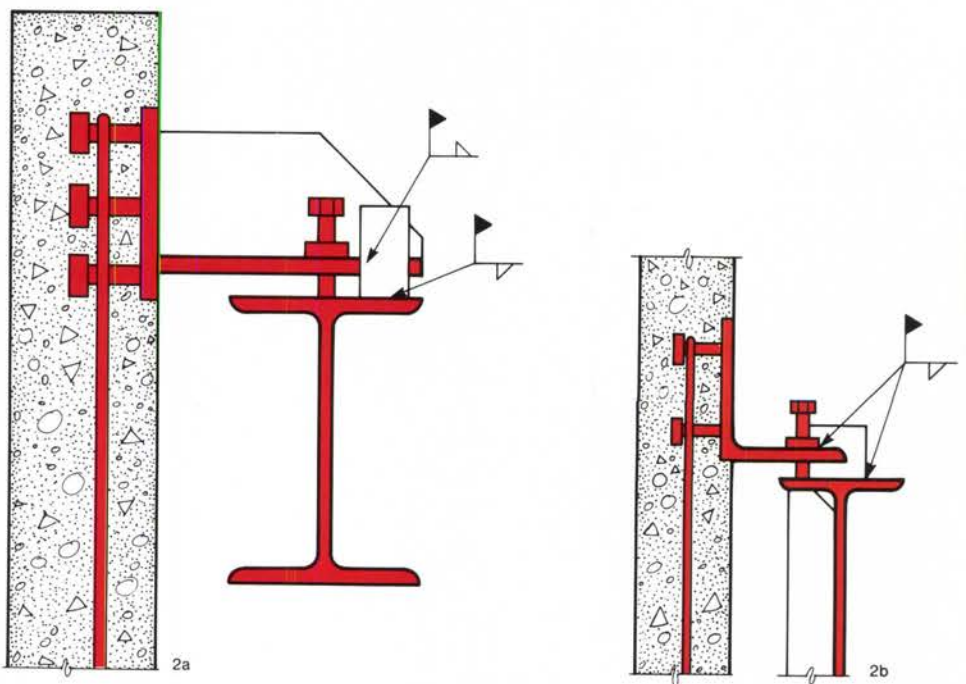
Details illustrated are not "standard;" they show a range of possible hardware combinations.

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 project 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 section connections fasten to concrete or to a supporting tee (2b).

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

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

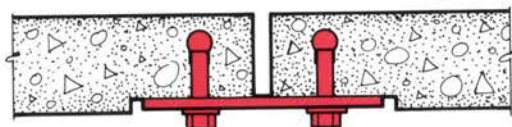
volume change accommodation to allow movement, thus relieving the stresses of creep, shrinkage, and temperature change strains on the precast panels and their supports.

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 painting, as do most other connections.

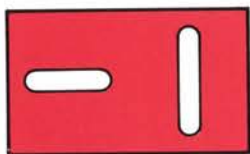
guarding against condensation, from humidity in the interior of the building from thermal bridges, may require additional corrosion protection. The architect may wish to consider the following methods, presented in order of increasing cost: paint with shop primer, painting with zinc-rich paint, zinc 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 degree of fire protection should equal the degree 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



3a



3b

Above: Alignment connections attach panel to panel side-by-side (3a) or at corners (3b). Below: Tie-back connections use welded plates (4a), bolts (4b), or a combination of welds and bolts (4c).

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

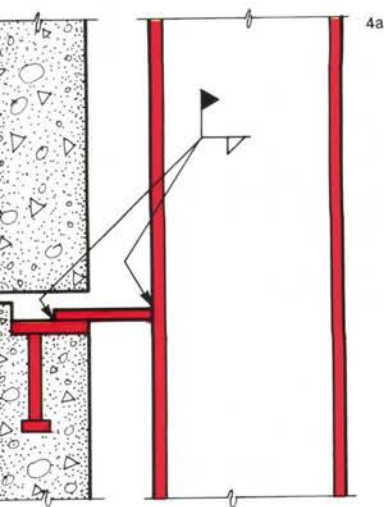
Bearing connections usually transfer the load from the panels to the support system either directly (via panel edge, corbel, or cast-in structural sections) or indirectly (with bolted or welded clip angles, plates, or other sections). The

designer may include plumbing or leveling devices with bearing connections for alignment.

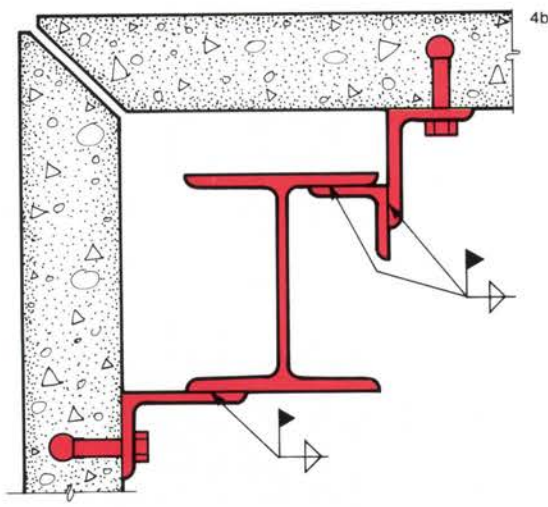
Direct bearing connections accomplish the actual load transfer through shims; the joint is then caulked or dry-packed. The various connections include anchor bolts projecting from the supporting member (figure 1a), welded connections (figure 1b), and drilled-in expansion anchors (figure 1c). The use 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

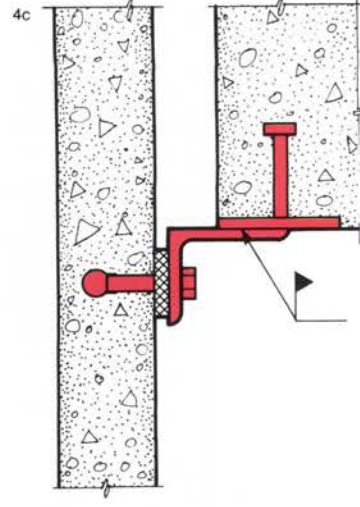
continued on page 118



4a



4b



4c

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.

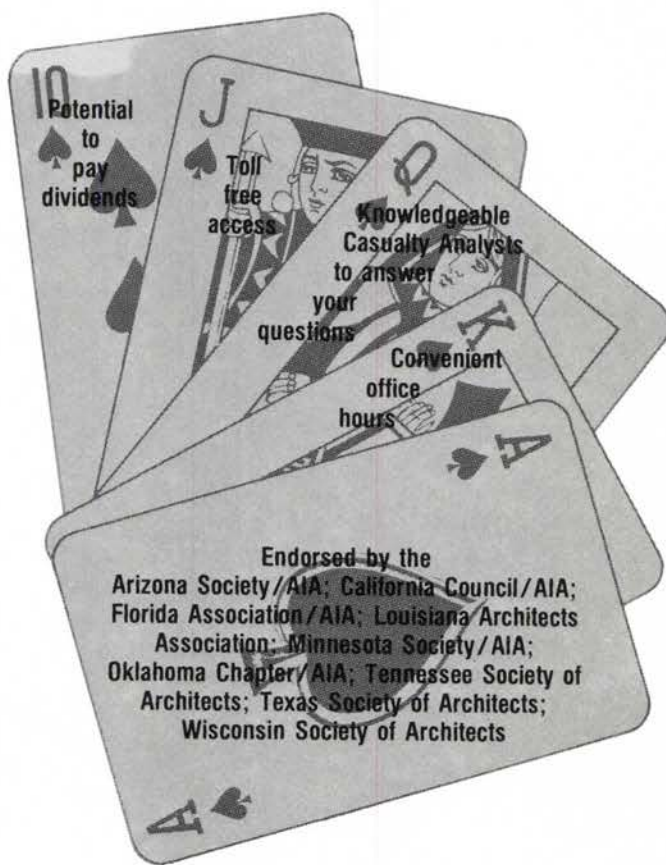
Alignment connections

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

IS YOUR WORKERS' COMPENSATION INSURANCE CARRIER PLAYING WITH A FULL DECK?



If you haven't been dealt a full hand by your current workers' compensation insurance carrier, throw it in and let AA&C deal you a winning hand!

For more information about the Design Professionals Safety Association's good deal,* please contact Donna Olmsted or Cheryl Ann Boden:



ASSOCIATION ADMINISTRATORS & CONSULTANTS, INC.

19000 MacArthur Boulevard, Suite 500
Irvine, California 92715

1-800-854-0491 Toll Free

(714) 833-0673 Collect in Alaska, California, or Hawaii

*Not available in all states

MOVEABLE FEAST.

The assignment: Redesign a decades-old Pullman sleeper into a rolling hotel for business travel.

The media: WILSONART Color Quest™ decorative laminates and Decorative Metals.

The designer: Thomas J. Bolin, ASID, Planning & Design, Inc., Minneapolis.

Bolin comments: "WILSONART surfacing products offered me both the color and surfacing finish choices and the easy-care, hard-wearing characteristics I had to have to pull off this assignment."

"I needed a comfortable, luxuriously appointed interior that wouldn't feel confining despite the space limitations (of an 85' x 10' car), while meeting the unusual functional requirements of outfitting a moving, smoke-spewing train. WILSONART gave me the solution."



Thomas J. Bolin
ASID

Thomas J. Bolin, ASID
 Planning & Design, Inc., Minneapolis

The dining/conference area (photo below) set the Art Deco design referent used throughout the car. The visual expansion is created with a color progression of Mauve Mist to Wildrose to Amethyst gloss decorative laminates on the inset ceiling.

The same palette forms table tops and decorative inlays on Northsea-clad cabinets, with gloss Black accents.

WILSONART Satin Brushed Natural Aluminum clads pocket dividers which open to pass-through service from the kitchen.

The results: A delighted client, whose goals have been fully realized through fine design partnered with WILSONART materials.

WILSONART Color Quest... color that keeps pace with your ideas.

HOTLINE:

If you have a project you think belongs in this space, please call on us.

For product samples, literature and technical information, call toll-free (within the continental USA):

1-800-433-3222

In Texas: 1-800-792-6000

Circle 30 on information card

WILSONART®
 BRAND DECORATIVE LAMINATE

Bringing new solutions to the surface™

Photo: Craig Anderson
 ©1986, Ralph Wilson Plastics Co., Temple, TX





Karastan exhibits great grace under pressure.

It's not how good a carpet looks when it's new that's impressive. It's how good it continues to look over the years.

So Karastan's Lehigh carpet was woven on our advanced Kara-loc® II loom, creating an exceptionally dense, stable surface.

The design, a solid background of ultra-dense cut and loop pile, will retain its texture for years.

The fiber, ANTRON® nylon, provides soil-concealing easy care, durability, and built-in static-control.

Practicalities aside, Lehigh is also available in 19 elegant Karastan colors.

So bring on your high heels and wet galoshes. Track in your mud. We can take it. For years.

Karastan



The Decorative Designs of the Adam Family

Robert and James Adam: Birth of a Style. Joseph and Anne Rykwert. (Rizzoli, \$25.)
Designs for Castles and Country Villas by Robert and James Adam. Alistair Rowan. (Rizzoli, \$65.)

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 latter 18th century. In the succeeding 200 years their style has been imitated and copied: It survived as interior decoration

and 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)

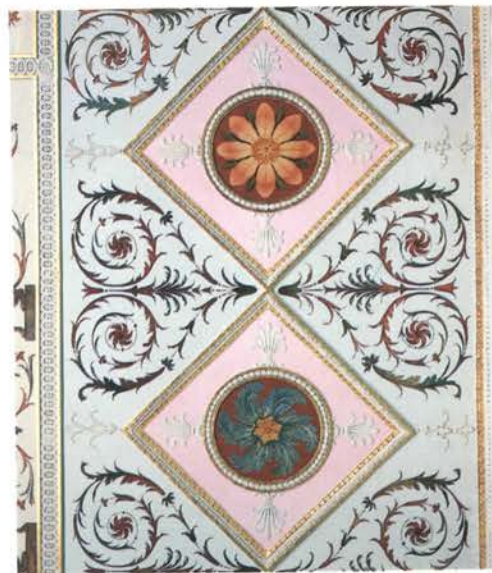
Above, Robert Adam's Lansdowne House drawing room, now at the Philadelphia Museum of Art; right, ceiling detail.

located in the Philadelphia Museum of Art with its violent purples and blues has raised cries of “Pomo” or “Miami Vice,” though the research going into the re-painting 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 applied 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.

continued on page 122



Books from page 121

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, that significantly 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, apsidal ends, and columnar 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 Mellerstain, 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 19th century architecture. Beauty was their major goal.

Joseph and Anne Rykwert's *Robert and James Adam* provides a comprehensive introduction to their work. Containing 216 illustrations with a number of interiors and drawings reproduced in color, the book is based upon the more thorough contributions of other scholars such as John

Fleming, Alistair Rowan, and Damie Struanman. The book offers no new interpretations or information, but its virtue is its completeness and attention that is paid to rooms and facades and their parts. Some of the writing is pedestrian, several captions are reversed, and several errors exist, such as having Robert Adam die in 1799 rather than the generally accepted date of 1792.

Alistair Rowan's book is very different, being more specialized, and yet of great interest. Basically an archeological reconstruction, Rowan has discovered evidence that Robert and James Adam intended to publish a book of their later designs for modest villas and castles. From the over 8,500 drawings in the Soane museum, Rowan, a respected Adam scholar, has assembled—or reconstructed—a book of a builder's manual such as they might have intended. Rowan reproduces 64 plates of elevations, sections, and plans, plus commentary. The designs are fascinating and while not containing the interior detail we expect, indicate the tremendous fertility of creation from thatched cottages to large castles. The castles will be unfamiliar to most people, and yet the awesome size, the creative diagonal axes, and the site adjustments add a new dimension to the Adam reputation. If it had been published during their lifetime, our view of what is the Adam style might be very different.

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

Dr. Wilson teaches architectural history at the University of Virginia.

Modest Mansions. Donald Prowler. (Roddale Press, \$19.95.) **The Small House: An Artful Guide to Affordable Residential Design.** Duo Dickinson. (McGraw Hill, \$34.95.)

New houses built in the U.S. are getting smaller because of rising costs and decreasing family size. Smaller houses are also cheaper to heat and maintain. These two books take note of these facts, with an eye toward aiding the design of better small houses.

For Donald Prowler, the small house is a welcomed development. "American houses—like too many Americans themselves—are bloated," Prowler observes, adding that we too often equate bigness with comfort and confuse quality of space with quantity. How big is a small house? Prowler is more interested in the use of space than its amount. He is curious



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.

mes the reader is too, about why one
se might appear more spacious than
her of the exact same square footage.
rowler examines the history of small
se design, such as "trinity" row houses
hadelphia (so named because each
their three stories contains a single
n), traditional Japanese houses, igloos,
rtyard houses, Charleston single
ses, and mobile homes.

he core of the book covers small house
ign and construction, including issues
n as lighting, storage, heating and cool-
and furnishings. There is also a sec-
on modest additions and improve-
nts. As examples of many of these prin-
les in use, the last part of the book
sents 10 modest mansions (a mixture
primary and vacation houses, none over
00 square feet) by architects such as
er Bohlin, Turner Brooks, and Rob-
Venturi. The plans for these houses
rawn at the same scale so they can
ily be compared.

n his book on the same subject, Duo
ckinson takes the position that the small
use has never made a lasting or signifi-
nt impact on house design because it
s traditionally been the province of
ung architects trying out wild, usually
inhabitable ideas, or of developers such
Levitt who plunk down uninspired
xes. He concludes that "the architect-
signed small house is rapidly becom-
g the only uncompromising solution to
e coming crisis in housing as the baby
om babies have babies."

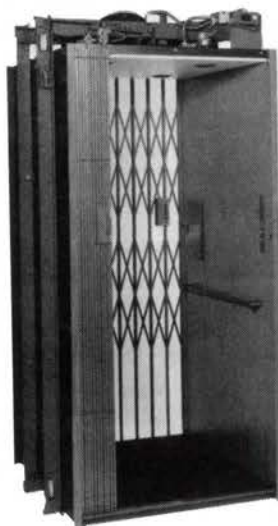
Thus, Dickinson identifies his small
use clients in the growing wave of
ppies who seek smaller and better built
rs, refined and classically cut cloth-
g, and unpretentious designer furnish-
gs. To this list he would add small
t finely appointed houses for all those
or upwardly mobile types who have
en "forced into the condominium com-
omise." And, Dickinson proffers, it
"only by using knowledgeable archi-
cts that people can make sense of
eir homes in a world of shrinking expec-
tions." Willing to pay two bucks for
scoop of Häagen-Dazs, Dickinson's
potential clients have anything but
rinking expectations.

Dickinson points out, as does Prowler,
e obvious advantages of building small
d sets down his philosophy of the small
ouse: It shouldn't appear or feel small;
"working parts" should have maximum
fficiency to liberate its "living parts";
anipulation of scale is essential. The
resentations of 30 house designs that
ake up the bulk of the book are to
ow "the state of the art in small-house
esign."

Dickinson defines "small" as fewer
an 2,000 square feet for one- and two-
edroom houses, 2,500 for three and four
edrooms, and 3,500 for five or more.
hese are pretty good sized houses, con-
dering that the average American house
continued on page 124

Residence Elevators and Dumbwaiters

SEDGWICK



RESIDENCE ELEVATORS—adds something very special to a fine multi-level house or condominium
DUMBWAITERS—available to handle anything from a letter to a 500-lb. load.

NEW! MICROPROCESSOR CONTROL SYSTEM—provides greater reliability over conventional relay logic controllers.

We bring Upstairs Downstairs

Sedgwick Lifts, Inc.

P.O. Box 630, Poughkeepsie, N.Y. 12602 • 914-454-5400
Toll Free: 800-431-8262

Circle 32 on information card

Herman Miller Has A New Table

A new table designed
by Bruce Burdick.

- Color, size and shape options
- Design freedom
- Expressive

There's no time like the present to introduce yourself to a new design.
Call 1-800-851-1196
(Michigan, 1-800-642-7944)

© Herman Miller, Inc.,
Zeeland, Michigan 49464



 **herman miller**

Circle 33 on information card

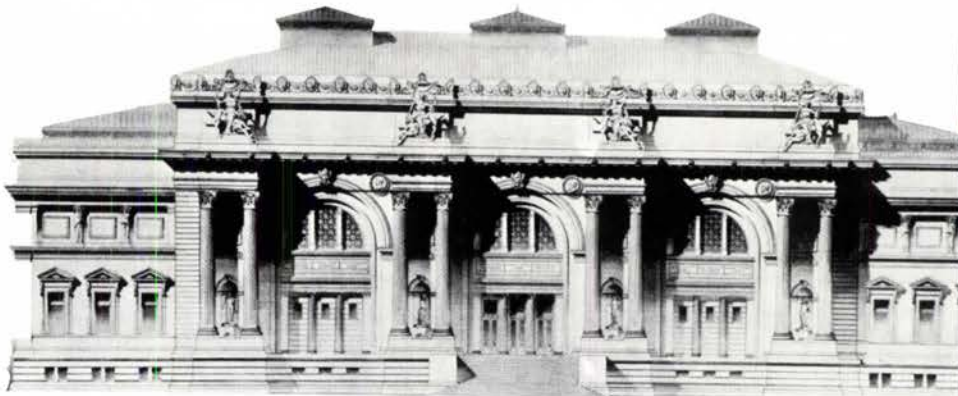
Books from page 123

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



The Architecture of Richard Morris Hunt. Edited by Susan R. Stein. (University of Chicago Press, \$16.95.)

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 wishes and an earlier suggestion by AIA Secretary Glenn Brown, gave to the Institute "some 8,000 original drawings, 15,000 collected 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, the École des Beaux-Arts, eclecticism, and 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 founding fathers of AIA and an undeniably illustrious figure in the pantheon of our national architecture. Born in 1827 in Bellingham, Vt., Hunt spent his youth in New England and Washington, D.C. At 16 he moved with his family to Europe. In 1846 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 Biltmore, not in Rhode Island but North Carolina. His architectural hallmark was the florid, overdecorated style in François 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 that did not lead on to the later work. It becomes clear that Hunt's interest in sculpture and promotion of the allied arts was an inevitable and necessary accompaniment to his Beaux-Arts stylistic orientation.

Picture color and texture in concrete. Then talk to Scofield.

With Scofield's coloring and texturing systems, concrete comes alive. As the focal point or a complement to your design, Scofield gives you the cost-effective tools to take the ordinary...and make it extraordinary.

The Scofield system.

From beautiful granite pinks to rich grays, Scofield's CHROMIX® Admixtures give you uniform, non-fading color-conditioned concrete and a virtually infinite spectrum of standard or custom colors. Add creative texture and shadow interest with our high-reuse elastomeric LITHOTEX® Formliners, and the possibilities are endless. Of course we also offer shake-on LITHOCHROME® Color Hardener and a full line of color-matched cures, stains, caulking and coatings.

The Scofield promise.

We've put color and texture in concrete for over 52 years. Our systems work. If you want a project to look great and stay looking great, picture color and texture in concrete. Then talk to Scofield. Our products are distributed nationally for easy availability.



L.M. SCOFIELD COMPANY
MANUFACTURER & MARKETER OF BUILDING SPECIALTIES SINCE 1933
5533 Bandini Blvd. • Los Angeles, CA 90040 • (213) 725-7112
(800) 222-4100 (Outside CA) • (800) 392-8300 (In CA)

Regional Offices:

Phoenix, AZ (602) 224-5662 • San Francisco, CA (415) 930-6712
San Diego, CA (619) 271-1265 • Ft. Lauderdale, FL (305) 491-2105
Orlando, FL (305) 298-8646 • New York, NY (212) 557-0406
Dallas/Ft. Worth, TX (817) 792-3488 • Houston/San Antonio/Austin, TX (713) 558-8128
Washington, D.C. (202) 296-5592 • Telex: 215560 LMSC UR

ssionalism, 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.

Wood, Brick & Stone: The North American Settlement Landscape. Volume 1: Houses; Volume 2: Barns and Farm Structures. Allen G. Noble. (University of Massachusetts Press, \$30 per volume.)

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*

AMERICAN BUILDINGS AND THEIR ARCHITECTS

Now available from OXFORD PAPERBACKS

Volume 1: The Colonial and Neoclassical Styles

WILLIAM H. PIERSON, JR.

528 pp. paper \$15.95

Volume 2: Technology and the Picturesque, the Corporate and the Early Gothic Styles

WILLIAM H. PIERSON, JR.

528 pp. paper \$15.95

Volume 4: Progressive and Academic Ideals at the Turn of the Twentieth Century

WILLIAM H. JORDY

420 pp. paper \$15.95

Volume 5: The Impact of European Modernism in the Mid-Twentieth Century

WILLIAM H. JORDY

469 pp. paper \$15.95

Volume 3 is forthcoming.

American Buildings and Their Architects, an ambitious five-volume series, traces the development of American architecture by studying representative buildings by America's most prominent architects.

At better bookstores or directly from the publisher.

OXFORD PAPERBACKS

Oxford University Press

200 Madison Avenue, New York, NY 10016

Circle 35 on information card

Herman Miller Has A New Chair



A new chair designed by Dragomir Ivičević.

- Unique corner connector
- Clean design
- Guest chair

There's no time like the present to introduce yourself to a new design.

Call 1-800-851-1196

(Michigan, 1-800-642-7944)

© Herman Miller, Inc., Zeeland, Michigan 49464



 herman miller

Circle 36 on information card



WE'LL ADMIT KROY® HAS THIS REDEEMING QUALITY YOU CAN TRADE IT IN ON A MERLIN®.

It isn't often that we'll in any way tout the competition. But in this case, it's for our own good. As well as yours.

Right now, for a limited time, you can trade-in your old spin-and-print Kroy 80® E or any other lettering machine at your Varitronics dealer. You'll receive a substantial trade-in allowance toward the purchase of a Merlin® electronic lettering system.

There's never been a better time to buy a better lettering system. One that's already very affordable as well as easy

to use. And it's *five times faster* than your Kroy 80E.

Think of the time you'll save. Not to mention the money. Merlin will make even your biggest lettering projects seem easier.

For the name of the Varitronics dealer nearest you, simply complete and mail the coupon. Or call 1-800-MERLIN-1 (1-800-637-5461). In Minnesota, call

1-612-542-1580.

Hurry, this redeeming quality of Kroy's will last only as long as this trade-in offer.



Call 1-800-MERLIN-1 (1-800-637-5461)

☐ Send me the name of the nearest Varitronics dealer.
☐ I'd like a demonstration of Merlin.

Varitronic Systems, Inc.
Dept. No. 01241086
P.O. Box 234
Minneapolis, MN 55440

Name _____
Bus. Phone (____) _____
Company _____
Bus. Address _____
City _____ State _____ Zip _____

Merlin®—a registered trademark of Varitronic Systems, Inc.; Kroy® and Kroy 80® E—a registered trademark of Kroy



MERLIN®

ooks from page 125

st of the coverage is centered in the
., inevitably beginning in the North-
tern region, then gradually drifting
ward the Midwest and South, and finally
ling tidbits of Western development for
sert. English, French, Dutch, German,
d Spanish cultural influences are
iewed with enthusiasm, and Fenno-
andinavian, Haitian, and other contri-
utions are mentioned.

Early dwellings in Western America are
esented out of chronological order,
cluding those of the native Americans
ose stewardship of the land preceded
rs. The Plains Indian tipi, the Navajo
gan, and the Indian pueblo are among
ose included, but the lowland middle
merican house does not appear, the
minole house warrants one sentence,
d the Mandan house isn't mentioned,
en in an enchanting review of the Mid-
stern soddy, that ancestor of the earth-
eltered architecture of today.

Considerable attention is given to the
olution of the plans of the houses that
d European derivation and to their met-
morphism under the pressures of social,
onomic, and environmental influences.
st the names of some of the house forms
e a feast for the imagination: the catslide
ottage, the shotgun house, the dog-trot
ouse, and the cornbelt cube. Postmod-
nists whose reservoirs are running low
ll find more than sufficient stimulus here
sustain them into the next fashion.

Even then, says Noble, styles were "arti-
cially created and fated to last only a
w decades, to be succeeded by some
ew fashion." He comments that "one of
e psychological characteristics most often
oticed by foreign observers of the North
merican personality is the tendency to
nore whatever is not current or modern
r progressive," perhaps helping explain
ur profession's relentless search for inven-
on, sometimes in spite of the determi-
ants of the task at hand. The author's
alking of styles ends with the Wrightian
rairie style and the bungalow. It would
ave been interesting had he pressed on
o the present, but we can understand that
e might shrink from analysis of our cur-
ent omnidirectional frolics in the urban
nd suburban environmental maelstroms.

Volume two, on barns and farm struc-
ures, proves to be just as scholarly but is
onsiderably more entertaining. Here forms
volve from the demands of function and
ne characteristics of the environment, exe-
uted with economy in the materials of
ne region. "Styles" appear only in response
o changes in those factors, and fashion
s seldom seen. Farm buildings of increas-
ng complexity remain honest and forth-
ight, always seeming to rest comfortably
n their particular landscapes. Borrowing
he words of another, the author observes
hat "the architectural qualities of cathed-
ral-like barns and elegant granaries are
often superior to those of the farmhouses

continued on page 129

The Lapeyre Stair®



SPACE-SAVING DESIGN:

The Lapeyre Stair uses less floor space than conventional stairs and is safer and easier to use than spirals. The patented alternating-tread design provides easy, safe access to lofts, balconies, basements or attics—any location where space is restricted.

CALL 1-800-535-7631

(in LA, call 504-733-6009)

for more information,
or to order. We need
only one accurate
dimension: lower to
upper floor height,
to give you price and
floor space required.

**LAPEYRE
STAIR INC.**

P.O. Box 50699
New Orleans, LA 70150

Circle 38 on information card

Herman Miller Has A New Keyboard Tray



A new keyboard tray
designed by Jack Kelley.

- Freestanding and moveable
- Height and tilt adjustments
- Color options

There's no time like the
present to introduce
yourself to a new design.
Call 1-800-851-1196
(Michigan,
1-800-642-7944)

© Herman Miller, Inc.,
Zeeland, Michigan 49464



herman miller

Circle 39 on information card



Heat MirrorTM takes windows out of the Dark Ages.

In days of old, controlling solar heat gain through windows meant limiting natural light as well. Today, however, there's Heat Mirror insulating glass — liberating windows and views from the gloom of dark and reflective glazings.

Compared to dark tinted or reflective glass, Heat Mirror gives you the same level of solar control, yet lets in up to four times *more* natural light. Available in any standard glass color, including clear, Heat Mirror insulating glass is ideal for both renovation and new construction.

Because windows (and skylights) with Heat Mirror let in more daylight, less artificial lighting is required. This means lower lighting bills and reduced air conditioning costs. And, you can often downsize HVAC equipment for significant, "up-front" cost savings.

What it all adds up to is fewer compromises. With Heat Mirror, you can maximize aesthetic opportunities without sacrificing energy efficiency.

Heat Mirror has been the state-of-the-art in insulating glass since 1981. Only Heat Mirror offers

Total Performance: controlling summer heat gain, winter heat loss, sound transmission, ultraviolet radiation, and condensation better than any other insulating glass.

So, make the enlightened choice and join the window renaissance: specify Heat Mirror insulating glass. For details and technical information, call or write Southwall Technologies, 1029 Corporation Way, Palo Alto, CA 94303. 415-962-9111. Or see us in Sweet's: 8.26a/Sou.



Southwall
Technologies

Heat Mirror is a trademark
of Southwall Technologies

HEAT MIRRORTM

For total performance windows.

© Southwall Technologies 1986

ooks from page 127

ey served." The barns and other farm
ildings also are related to their cultural
arths and ethnic origins, and here the
n-Northeastern regions of North America
t their recognition. In addition to those
eady mentioned, the Belgian, Ukrainian,
orwegian, Amish, Mennonite, and Mor-
on contributions are recorded.

The most interesting forms may be the
bacco barns of the Southeast, the silos
the Midwest, and the windmills, hay
ricks, fences, and other minor utilitar-
n forms that gave character to the farm-
ead and filled the rural landscape with
eir lean functionalism. The barns, of
ourse, were the masterpieces of passive
nvironmental control: designed to con-
erve the heat generated by the animals
uring winter nights, to ventilate through
eep steamy summers, and to provide
atural light where needed.

Several visual deficiencies must be
ported, for they affect the communica-
on of concepts so elegantly stated in
e text. All too many of the 560 floor
ans, drawings, and photographs are
sappointing. The photographs are pre-
med to be Noble's own work, and what
chitect wouldn't envy his odyssey across
merica, a pilgrimage that took nearly
o decades, according to the picture cap-
ons. Sadly, the reproductions of the pho-
graphs picture a gray continent. Whether
ken in crisp frozen winter or sunny sum-
er, too many of these handsome archi-
tural artifacts seem to have been viewed
rough smoked glass and are rarely re-
orded in the full sweep of their land-
ape context. And, in the fashion of some
our stylish architectural journals, the
ouses and farms appear to be uninhabited
age sets, with lively exceptions.

It is the original sketches that nearly
ndermine the work. They are amateurish,
ten flat, and certainly not equal to the
uality of Noble's research and writing.
he author, and all architects, are directed
Lester Walker's *American Shelter* (Over-
ok Press, 1981), which is the model for
nchanting drawings that illustrate the
story of the American house.

In compensation, a special treasure of
nselfish professorial statesmanship is
ound in the last chapter of the second
olume. Noble lists 23 "unanswered ques-
ons" and a 45-item "research agenda for
e future." This gift, at a minimum, pro-
des any serious investigator with a broad
noice of topics for a doctoral thesis and
e prospect of several lifetimes of adven-
ure in researching the unexpected aspects
f North America's settlement landscape.
his is but the last of many reasons to
ank the author for his significant con-
tribution to our understanding of this con-
nent's architectural heritage.

—ROBERT E. McCONNELL, FAIA

Dr. McConnell is professor of architec-
ture and former dean of the college of
architecture, University of Arizona.

CAL-SHAKE®



Capitalize on the **Beauty, Safety, and Value** of a fireproof **CAL-SHAKE** roof!

Call for a Free Consultation
or Free Estimate by an Independent Contractor

In California **(800) 242-ROOF**
Outside California **(800) 826-0072**



CAL-SHAKE, INC.

P.O. Box 2048

5355 North Vincent Avenue

Irwindale, CA 91706-2081

Circle 41 on information card

Herman Miller Expands Burdick Group

More components
designed
by Bruce Burdick.

- Computer support components
- Table and storage components
- Color and finish options

There's no time like the
present to introduce
yourself to a new design.
Call 1-800-851-1196
(Michigan,
1-800-642-7944)

© Herman Miller, Inc.,
Zeeland, Michigan 49464



herman miller

Circle 42 on information card

INTRODUCING THE NETWORKING. AMP

Today there is a new entity in networking and construction. It draws the considerable expertise of a number of AMP technologies into a single cohesive force that can help solve your networking problems. It is the AMP NETCON Division.

Whether your media is twisted pair or coax, fiber optics or undercarpet, the AMP NETCON Division has the ability to

interconnect every major technology.

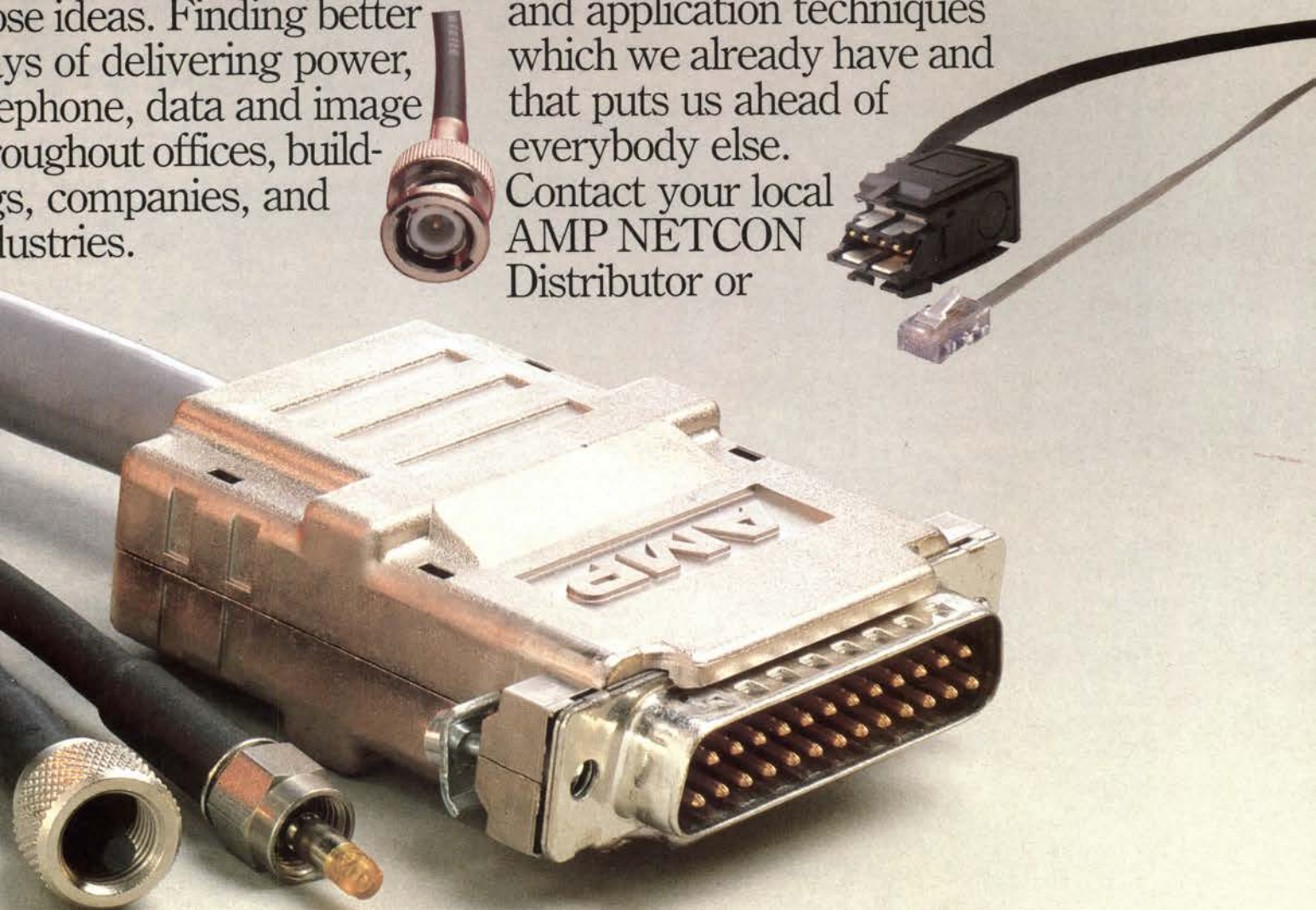
As the world leader in interconnection technology, we recognize that networking is a concept for wiring management as much as it is a hard-wired idea. Our whole heritage is in finding better ways in dealing with

NEWEST IDEA IN NETCON DIVISION.

ose ideas. Finding better
ays of delivering power,
ephone, data and image
roughout offices, build-
gs, companies, and
ustries.

and application techniques
which we already have and
that puts us ahead of
everybody else.

Contact your local
AMP NETCON
Distributor or



For us networking isn't
an exotic idea.

It's just the
newest
way of using
products

call us toll-free today,
1-800-852-5000 Ext. 75,
and put our networking
construction experience to
work for you.

AMP NETCON

INTERCONNECTIONS FOR NETWORKING/CONSTRUCTION
Division of AMP Products Corporation, Valley Forge, PA 19482

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, esthetic, 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 Harold Hammerman award sponsored by the National Association of the Remodeling Industry. The award will recognize excellence in training and education in the remodeling industry. 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).

Architect: The Jan Abell Kenneth Garcia Partnership Architects, Tampa. General contractor: Royalwood Enterprises Inc., John Ballinger. Rear door: Peachtree. Floor surfacing: Astra Tile, Dan's Trading Company, Floors by Mike, Pat Craft. Lighting: Lightolier. Plumbing fittings and showerheads: Kohler. Saunas: John Ballinger. Water fountains: Kohler. Security and fire detection: Diversified Electronic Systems. Windows: Winco Ventilator. Skylights: Arrow Sheet Metal. Paint and stain: Benjamin Moore. Bathroom tile: American Olean.

Shay Residence, San Francisco (page 48).

Architect: James Shay, AIA, Architect, San Francisco. General contractor: Jones and Kiefer; Claude Kennedy, foreman. Structural engineer: Cecil Shumway, C.E.

Hom. Soils engineer: Don Hillebrandt, Associate. Mechanical engineer: Cho Ng. Inspection engineer for compliance with structural: Testing Engineers Inc. Environmental control systems: Rheem. Flooring surfacing: Tracy Floors. Foundation: Malcolm Drilling. Handrails: Cherry Heat Welding. Lighting: Lightolier, Rambusch. Roofing: Berridge. Plumbing fittings and showerheads: American Standard. Tubs and lavatories: American Standard. Water closets: American Standard. Kitchen: Gagganau, AEG. Security and fire detection: Northwest Security. Signage: Adcraft. Wall surfacing: K&D Cedar, U.S. Gypsum, Bovenzi Drywall. Windows: Bonelli, Torrance Steel. Hinges: Baldwin. Paint and stain: Cabot, Fuller-O'Brien. Integral color stucco: James Goodwin, Peerless. Countertops: Corian. Ceramic tile: American Olean. Kitchen cabinets: Plus Kitchens. Fireplace tile: Terra Bella, Donna Billick. Floor and roof joists: Standard Structures. Steel frame: Crown Iron Works. Glass block: PPG.

Yacht House, New Forest, Hampshire, England (page 56).

Architect: Richard Horden, London. Ceiling surfacing system: Technical Blinds Ltd. Doors: Rawneer UK Ltd. Environmental control systems: D.A. East Ltd. Structural wind frame: Ian Proctor Masts. Interior floors: Habitat. Exterior paving: Hilliers. Foundation: Anton & Manston. Lighting: Habitat, Bailey Electrical. Waterproofing and sealants: Service, Kwickstick, Adshead Ratcliffe. Wall surfacing: Technical Blinds, British Alcan. Windows: Rawneer UK Ltd. Skylights: Essex Aluminum Systems. Paint: Powder Coating. Partitions: D.H. Ridout, The Kite Store. Plumbing: Alpha Dorset. Tubs and lavatories: Armitage Shanks. Communication and intercom: Megaset and Communications Systems. Computer room: Wang. Kitchen: D.H. Ridout. Signage: Lawrence Bagette

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

Architect: Zervas Group Architects, Seattle. Doors: Peachtree, Vancore. Environmental control systems: Wesco, E-Z Vent. Floor surfacing: American Olean, Armstrong. Exterior lighting: Lightcraft. Interior lighting: Lightolier. Roofing: Certainteed. Plumbing fittings and showerheads: Delta. Toilet stalls: Lay-American Standard. Tubs: Tub-Hytec. Washroom and bathroom accessories: Nutone, Hallmack. Water closets: American Standard. Kitchen appliances: Hotpoint. Security and fire detection: BRK. Solar panels: Grumman, Sunstream. Stairs: RCA, Munson. Skylights: Milgard. Hardware: Stanley, Best.

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

Architect: Roland/Miller Associates, Santa Rosa, Calif. Ceiling surfacing system: U.S. Gypsum. Doors: Therma-Tru, Cal Wood. Floor surfacing: Custom

Waterproofing and sealants: Johns-Manville. Flush valves: Moen. Toilet stalls: Kohler. Kitchen: Whirlpool. Wall surfacing: U.S. Plywood, U.S. Gypsum. Windows: Milgard. Hardware: Schlage. Paint and stain: Fuller O'Brien.

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

Architect: Herman Hassinger Architects, Moorestown, N.J. Doors: Brosco, U.I.L. Interior floors: Bruce Oak Flooring. Ceiling surfacing system: Drywall. Lighting: Lightolier. Roofing: Red Cedar. Plumbing fittings and showerheads: American Standard. Prefab showers: Fiat. Kitchen: J-Wood. Wall surfacing: U.S. Gypsum. Windows: Andersen. Skylights: Velux. Locksets: Schlage.

McInerney Residence, San Francisco (page 70).

Architect: Charles Pfister Associates, San Francisco. Elevators: Waupaca Elevator Co. Foundation: Villeroy & Boch. Lighting: Pfister, Boyd Lighting. Kitchen appliances: Thermador, Subzero. Allmilmo, Clervi Marble.

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

Architect: Sam Davis, FAIA, Architects, Shen/Glass Architects, Berkeley, Calif. Doors: Sacramento A1 Doors. Environmental control systems: Lanco. Floor surfacing: Armstrong, Kentile World Carpets. Lighting: Wellmade, Hubbell. Roofing: Johns-Manville. Flush valves: Sloan. Plumbing fittings and showerheads: Delta. Toilet stalls: American Sheetmetal. Tubs and lavatories: Kimstock. Water closets: Briggs. Kitchen: Whirlpool. Laundry: Whirlpool. Stairs: Valley Stairways. Wall surfacing: T1-11. Windows: Blomberg. Locksets: Kwickset. Paint: Mason. Movable partitions: Air Acoustic.

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

Architect: Lyndon/Buchanan Associates, Berkeley, Calif. Plumbing fittings and showerheads: Jado. Tubs and lavatories: Kohler. Water closets: Kohler. Wall surfacing: Pacific Coast Builders. Windows: Pozzi. Locksets: Jado. Paint: Dunn-Edwards.

The Beach Apartments, Albuquerque, N.M. (page 78).

Architect: Antoine Predock, FAIA, Albuquerque. Doors: Valient Door. Environmental control systems: First Company. Handrails: B&D Steel Fabricators. Lighting: Southwest Outdoor Electric Co., Progress. Kitchen: Westinghouse. Laundry: Westinghouse. Signage: Southwest Outdoor Electric Co. Stairs: B&D Steel Fabricators. Wall surfacing: El-Rey Color Coat. Windows: General Aluminum. Skylights: Skyview. Paint: Wellborn Paint. Plumbing fittings and showerheads: Sterling Faucet. Saunas and whirlpool baths: Owens-Corning. Tubs and lavatories: Kilgore, Owens-Corning. Water

WE CALL IT THE PERSONAL ARCHITECT. NOT THE PERSONAL DRAFTSMAN.

We named it on purpose. This is a tool for the entire architectural practice, combining automated design and drafting capabilities on industry-standard IBM* PC ATs and compatibles.

Use the Personal Architect to design buildings. While other systems work with lines and arcs, the Personal Architect lets you work with floors, walls, roofs, and rooms. In 3-D. In perspective. So you can create a true model of your building design.

Use the Personal Architect to present designs.

This system gives you the tools you need to make effective presentations. Like perspective views with hidden lines removed. Shaded pictures. And area takeoffs.

Use the Personal Architect to produce drawings. The system

has expert drafting capability to get your production work done. And can edit drawings quickly too.

On-screen icon menus get you up and running fast. And a graphic symbol library of over 1,000 architectural symbols gives you great flexibility.

The Personal Architect. It can help you get more business and do more business. And isn't that the name of the game?



Get more business done. On-screen menus (left screen) facilitate the production of contract documents. Drawing courtesy of Heard & Associates, Chicago, Illinois.

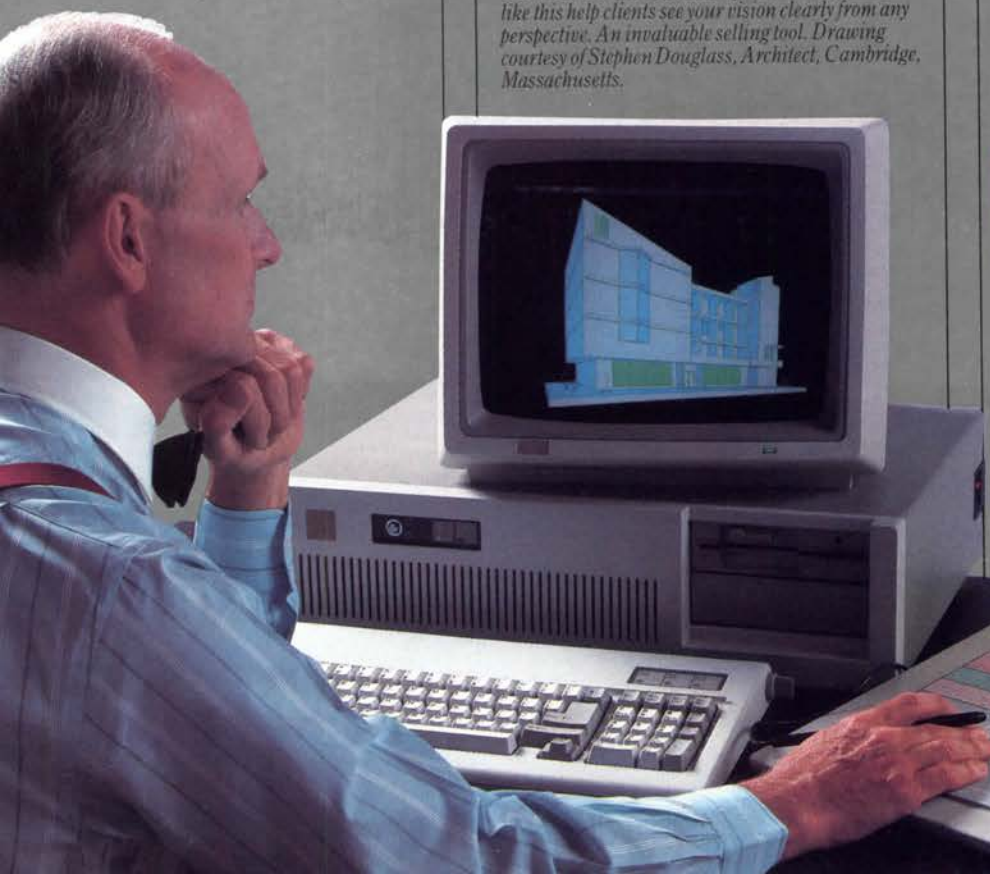
Get more business. Shaded pictures (right screen) like this help clients see your vision clearly from any perspective. An invaluable selling tool. Drawing courtesy of Stephen Douglass, Architect, Cambridge, Massachusetts.

For more information on the Personal Architect write: Computervision Corporation, Personal Systems Business Unit, Building 16-2, 100 Crosby Drive, Bedford, MA 01730.


COMPUTERVISION
Personal Architect

Circle 44 on information card

*IBM is a registered trademark of International Business Machines Corp.



Specify National— the Practical Choice, by Design.



We feature GM cars like this Cadillac Sedan de Ville.



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.

 **National Car Rental[®]**



In Europe, Africa and the Middle East it's Europcar. In Canada it's Tilden.

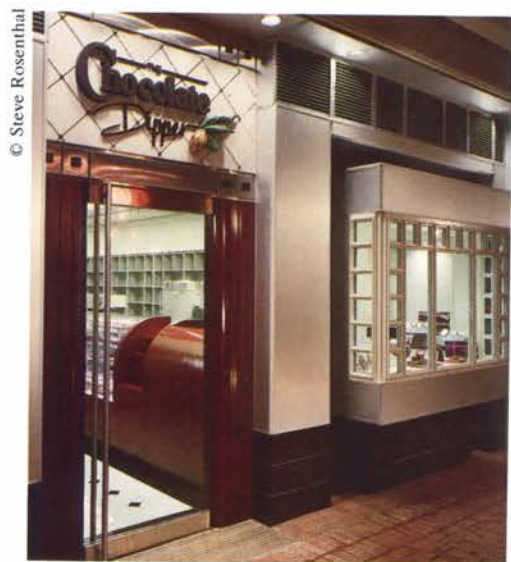
Circle 64 on information card

Interiors



*I*n 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 flroid 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



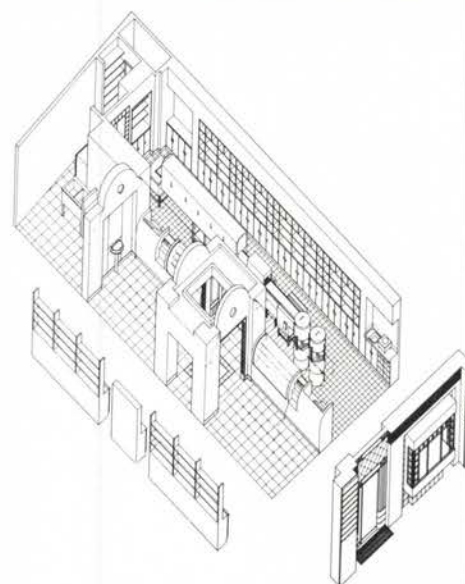
© Steve Rosenthal



© Steve Rosenthal



© Steve Rosenthal



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, David Hoggatt, Laura Gottwald, and Mary Meuer) places a long arcade down the center of the showroom (bottom). On the arcade are "storefronts"—some pushed back, others forward to create a gentle rhythm to the space. Each brand name has a suite of small offices (located behind the protruding facades) and a larger executive office (behind the pushed back storefronts) 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.



Langdon Clay



Langdon Clay



Langdon Clay

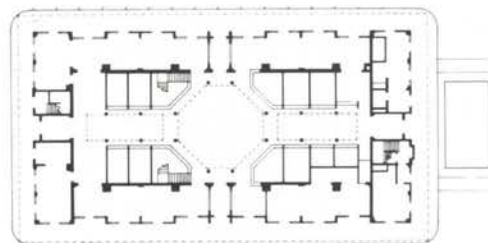


Often discount stores are virtually undecorated warehouses crammed with merchandise. One exception to the rule is the prototype design for Gemco by the New York City firm of Walker Group/CNI, where clearly designed circulation paths draw the customers through a dazzling display of objects ranging from 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 super-graphic 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



© Norman McGrath

Got a question
about metal roofing?



Perhaps Follansbee can help.
Call us toll-free
800-624-6906

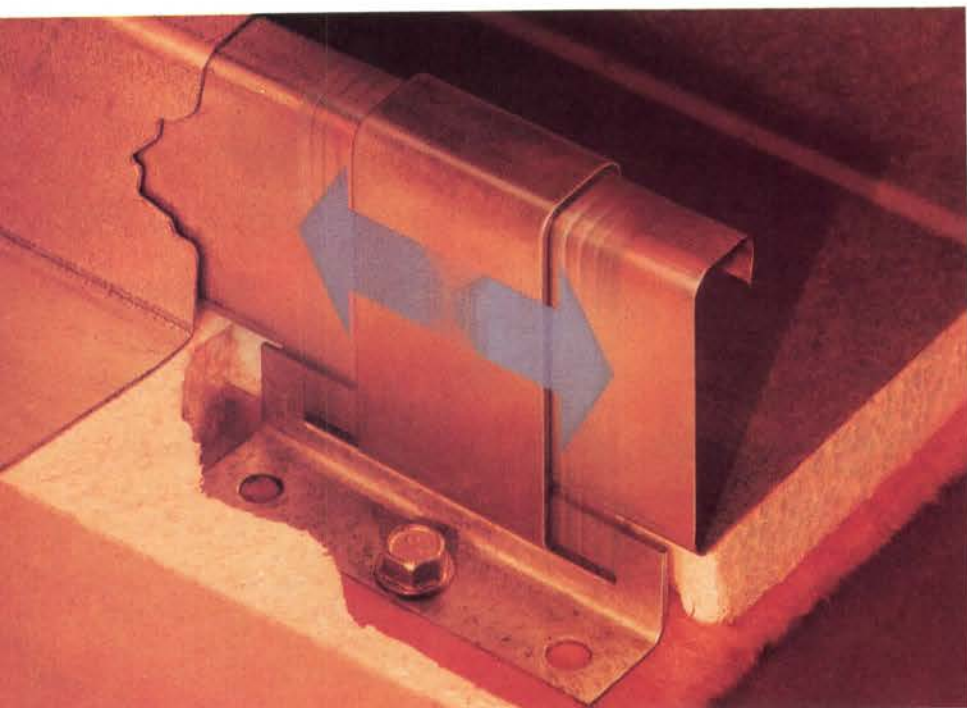
FOLLANSBEE

MANUFACTURERS OF TERNE AND TCS (TERNE-COATED STAINLESS STEEL) ... THE LIFETIME ROOFING METALS

FOLLANSBEE STEEL CORPORATION

FOLLANSBEE, WEST VIRGINIA 26037

PRODUCTS



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 flush with the eave. The one-piece rib panel comes in any length; and machine-seamed 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.*

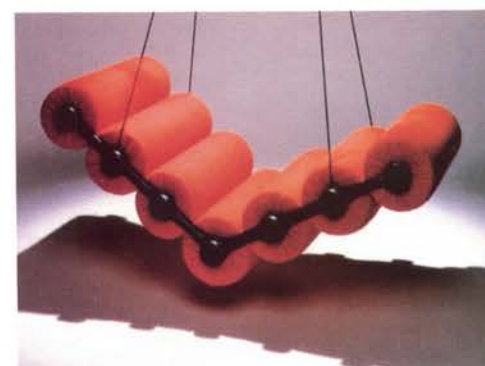
The European-designed "**High Roller**" chair (right), available from Benton Brothers Systems, adjusts to any position by interlocking the frame position to fit body contours. The chair comes in one- or two-person widths, with the upholstered fabric foam rollers in red, yellow, medium gray, black, or 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, $\frac{1}{16}$ -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 $2\frac{1}{2}$ -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—pre-design, 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 233 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

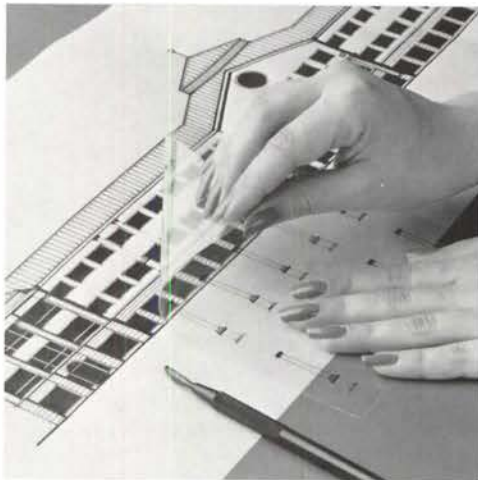
Bronze Sun Control Film

3M claims RE35BRARL Scotchint 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 1/4-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.

Letraset 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 3/8-inch risers and 3/4-inch manifolds to provide quick heat recovery. A 40-gallon tank, insulated with cap 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 Diazit Dart 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 or 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

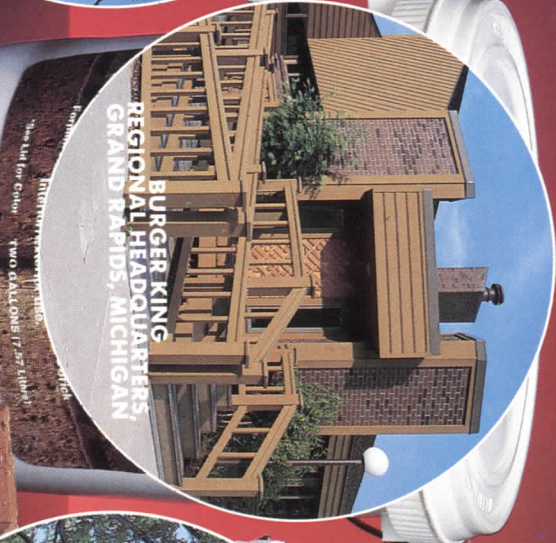
The Best Lock 5P cabinet lock masterkeys into any existing or new Best lock system so that one customized key operates office doors, desk, equipment, file

US BRICK

Insulated 1/2-inch Panelized Kiln-Fired Clay Brick

Maintenance free exterior
Economical and easy installation
Durable and fire-resistant

Enhances property values
Versatile product and systems
Higher insulating "R" factors



al Brick
Group
Brick, Inc.
nally national
company),
argest
cer of half-
n fired clay
or use in
ations as
as there are
ts to be
nplated.

Brick, Inc., Real Brick Products Group,
West Main St., Owosso, MI 48867.
For information about U.S. Brick Systems call toll-free at
1-800-447-7440. In Michigan call 517-723-8380.

The revolution has begun...

Products from page 142

cabinets, and other locks. Four mounting types make the 5P adaptable for all standard file cabinets.

Best Lock machines their Lock housings 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

Thermostat Measures Conditions Inside and Out

Team Perimeter Energy Control uses direct BTU measurements through the skin of commercial office buildings for control of perimeter make up heat in fan-powered boxes.

The system responds on a real-time basis to all outside weather conditions, such as solar gain, wind, and rain.

TransMet Engineering

Circle 235 on information card

Air Conditioning Brochure

A brochure describing the Uni-Pak compact, ready-to-install central airconditioning system contains diagrams illustrating the system's components and details of the system's different features. Flexible, pre-insulated ducts allow the Uni-Pak to adapt to any type of structure without major carpentry work.

UniCo

Circle 236 on information card

Free Structural Glazing Brochure

A comprehensive, full-color brochure describing the "Pilkington Wall" all-glass structural glazing system provides pictures 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 237 on information card

New Grout Admix

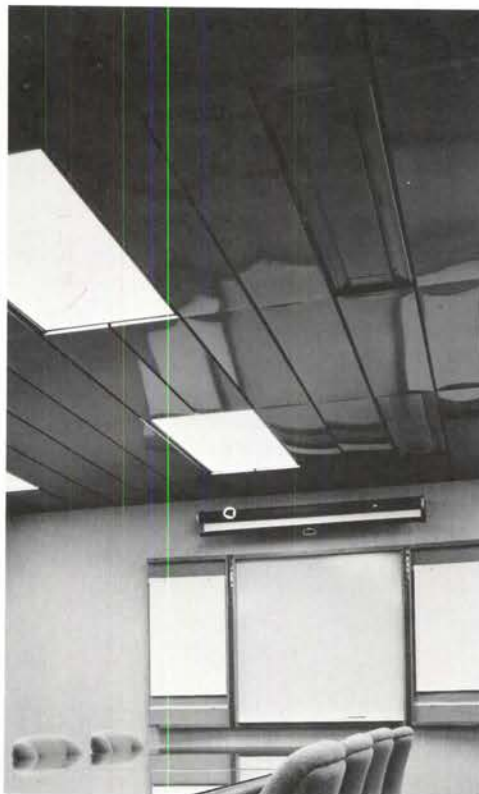
Laticrete Grout Admix Plus was formulated to allow fast, easy-to-clean addition of grout admixtures without damaging or affecting grout color. The admix resists staining, locks in grout color, and prevents cracking, powdering, and color fading of joints. It produces frost-shock- and chemical-resistant grouts and joint fillers, which can be used for both interior and exterior applications of ceramic tile, pavers, brick, marble, and natural stone. The Admix forms part of a complete 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



rier system. Without modification, the Panorama ceiling panels may be incorporated into most standard ceiling grid configurations without removing the existing system. Alcan provides two standard panel sizes: a 2 x 2-foot flush-fitting profile or a 1 x 4-foot profile with a reveal along the four-foot side. The system's options include supplied light and air systems, acoustic treatments, and wall and light trim accessories, but it can also be used in conjunction with existing light and air systems. The user can choose among three standard colors or opt for custom color matching.

Alcan Building Products

Circle 239 on information card

CRSI Guide

A free pamphlet offered by the Concrete Reinforcing Steel Institute (CRSI) gives a comprehensive listing of institute publications and software available on reinforced concrete design and construction. The panel also contains an illustrated outline of each publication's content and function and a complete schedule of indexed bulletins and reports. A supplementary insert describes publication pricing and ordering information, book ordering codes and descriptions for all CRSI literature, and detailed information about order forms, terms of payment, and delivery.

Concrete Reinforcing Steel Institute

Circle 240 on information card

Multi-Use Door Sills

Perma-Door offers three new types of door sills/thresholds for use with a complete insulated steel entry system. When used with extensions, each sill accommodates a number of common jamb depths

conditions. The adjustable and non-adjustable sills, both with effective thermal breaks, feature a nailable polystyrene base designed to reduce door unit assembly 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 switchplates, 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 cellular core sandwiched between two layers of hardboard and two layers of steel set 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 drawing surface to accommodate a drafting machine. The user can recover the table with replacement vinyl surfaces, available 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. Constructed of mineral board and glass fiber substrates, the panels provide sound absorption through mineral board and glass fiber substrate construction. Panels measure 1 1/8-inches thick and come in two sizes to fit standard and narrow flange ceiling grids.


Capaul

Circle 197 on information card

Roofing System

A.A.T. 432 Sure-Seal lightweight, adhered roofing system works for both new construction and renovations. The system uses a bonding adhesive that is applied

The best laid plans...



... Oft go awry. Unless you're aware of the latest code changes. As a member of the National Fire Protection Association you will be the first to know about current trends and changes in the fire protection industry. So you'll be better equipped to make sure your plans comply.

In addition, all NFPA Members have access to the National Fire Code Subscription Service. It's a sure-fire way to keep informed about Code changes before they're law. But more importantly, you'll join 35,000 other professionals, members of NFPA, who want to make certain the buildings they design, build, inspect and occupy are fire-safe structures.

Call toll-free **1-800-344-3555**, 8:30 AM to 8:00 PM, ET, *People Protecting People*
Monday through Friday for membership details.



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 castors, 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 1/8-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 1 3/4-inch tubular steel legs and a 1 1/4-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

continued on page 14

Show us your window project... we'll respond with a custom design!



Dick Gann, President, Custom Window, shows the design harmony of history and technology — Custom Window's 8300 series design for historical renovation projects. True divided light fenestration with the advantages of thermal barrier construction.

We'll work with you to design the windows. We'll make them of exceptional and guaranteed quality. We'll price them competitively. And we'll meet your construction schedule.

COMMERCIAL WINDOW SYSTEMS —thermal barrier or non-thermal, casement, stationary, projected. We're talking about an aluminum, custom window engineering and production service that is second to none!

Call **CUSTOM WINDOW** today. We'll enjoy helping you.

2770 S. Vallejo
Englewood, CO 80110
303-761-2909





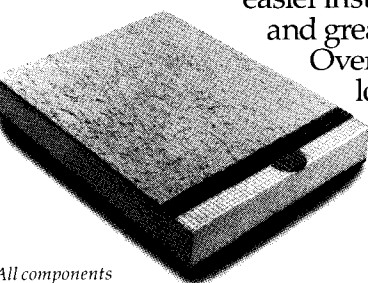
PLEKO'S THERM SYSTEM STANDS UP TO JUST ABOUT ANYTHING THAT BLOWS YOUR WAY.

With Pleko's mechanical fastener, our Therm System is designed to withstand even the most serious of wind loading conditions. And unlike conventional glue-on applications that are too often gone with the wind, the Pleko fastener holds the insulation board securely to the substrate. And Pleko's insulating exterior wall coating system is built to take the heat or the cold that can crack, chip and fade many finishes.

For new construction or retrofit projects, Pleko's Therm System saves time and money. Pleko means faster and easier installations, less material waste, and greater job site efficiency.

Over the long run, energy savings and low-cost upkeep save even more.

Talk to the Pleko distributor in your area. They can show you why the winds of change are moving towards Pleko.



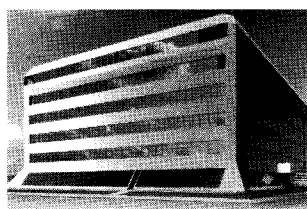
All components are manufactured to achieve excellent R-values and meet ICBO fire requirements.

Pleko Southwest, Inc.,
824 E. 6th St.,
Tempe, AZ 85281
(602) 968-0113

Pleko Products, Inc.,
P.O. Box 98360,
Tacoma, WA 98498-0360
(206) 472-9637

Pleko East, Inc.,
4-57 26th Ave.,
Astoria, NY 11102
(718) 726-0687

Pleko Southeast Corp.,
915 W. Memorial Blvd.,
Lakeland, FL 33801
(813) 683-6726



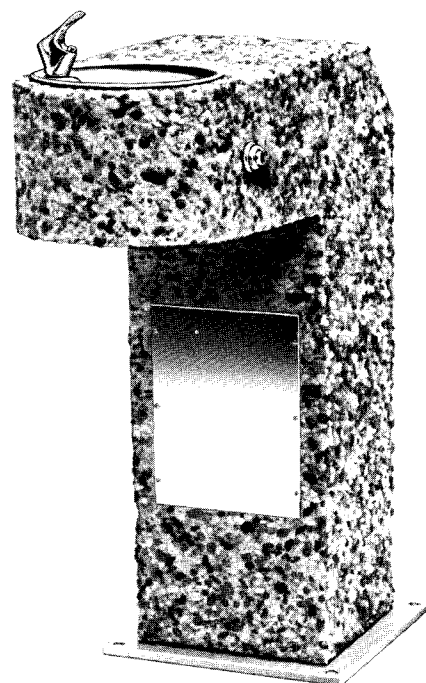
A wide range of finish textures and colors offer many design possibilities.

Pleko
LOOKS LIKE STUCCO.
LASTS LIKE PLEKO.

When your
client says
"High traffic
location,"
this is the
one. It's the
Survivor.



Stern-Williams rugged outdoor drinking fountain reduces work for maintenance departments, frustrates vandals, and serves wheelchair users as well as the general public. And it's better looking than the competition. We designed it that way. PROOF: outdoor drinking fountains can be rugged and beautiful, too.



Model APF-3501

STERN-WILLIAMS, INC.
P.O. Box 8004 • Shawnee Mission, Kansas 66208

We make drinking fountains.
We deliver dependability.

Circle 51 on information card

Products from page 146

lacquered top comes in natural beech or black stained mahogany.

Kroin

Circle 191 on information card

SMART-HOUSE PRODUCTS

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-foot 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 accessible 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



Computerized Management System

The HomeBrain monitors security, energy management, lighting, appliance control, vacation, and home maintenance through the use of a complete, stand-alone package. The HomeBrain runs by itself once programmed through a personal computer. Once programmed, the system can be linked to a PC to accommodate individual specifications.

The homeowner can access the standard system by telephone. Standard commands include: to turn lights on and off as a person enters or exits a room, to turn on outside lights when a car pulls into the drive, and to make all lights in the house flash while an automatic dial out is made to police in the event of a break-in.

A battery inside the system's clock keeps accurate time and date even during leap year and allows operation in the event of a power failure.

An optional color touchscreen allows control by touch through only one monitor. Voice output that responds whenever the screen is touched to activate a command is also available.

Hypertek

Circle 206 on information card

Automatic Motion Detection System

The Litronic RF and Litronic RF2 motion detection systems are two of a series of security lighting devices designed for residential, commercial, and industrial use.

The Litronic RF provides security and energy management control of lighting through automatic light switching when motion is detected, utilizing a preset time delay feature that switches off the power once motion is no longer detected. The user can adjust detection and time delay patterns. The unit contains a built-in photodetector for night operation, and operates in one of three modes: manual, automatic, and darkness-only.

The Litronic RF2 automatic light motion detector can be activated within three adjustable light patterns, with adjustable sensitivity and time delays. Additional detectors extend coverage to larger or unusually shaped areas.

Lithonia Control Systems

Circle 207 on information card

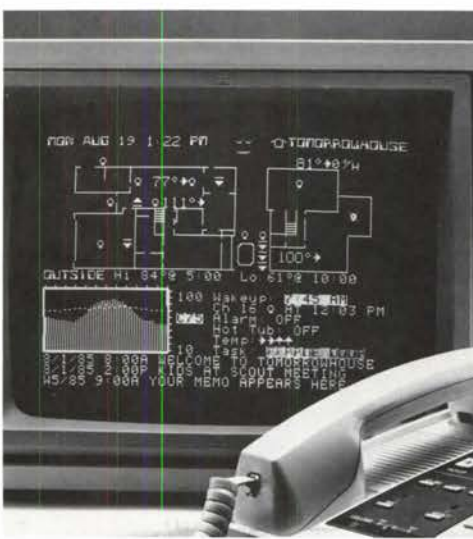
Presence-Sensing Light Switch

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.

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 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 closings 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 siren driver attached to a speaker. Authorized people can gain access to specified zones at particular times with passcodes.

The Home Manager also controls app

continued on page

Expand your professional horizons.

Join IFRAA, the Interfaith Forum in Religion, Art and Architecture.

IFRAA is an affiliate of the American Institute of Architects.

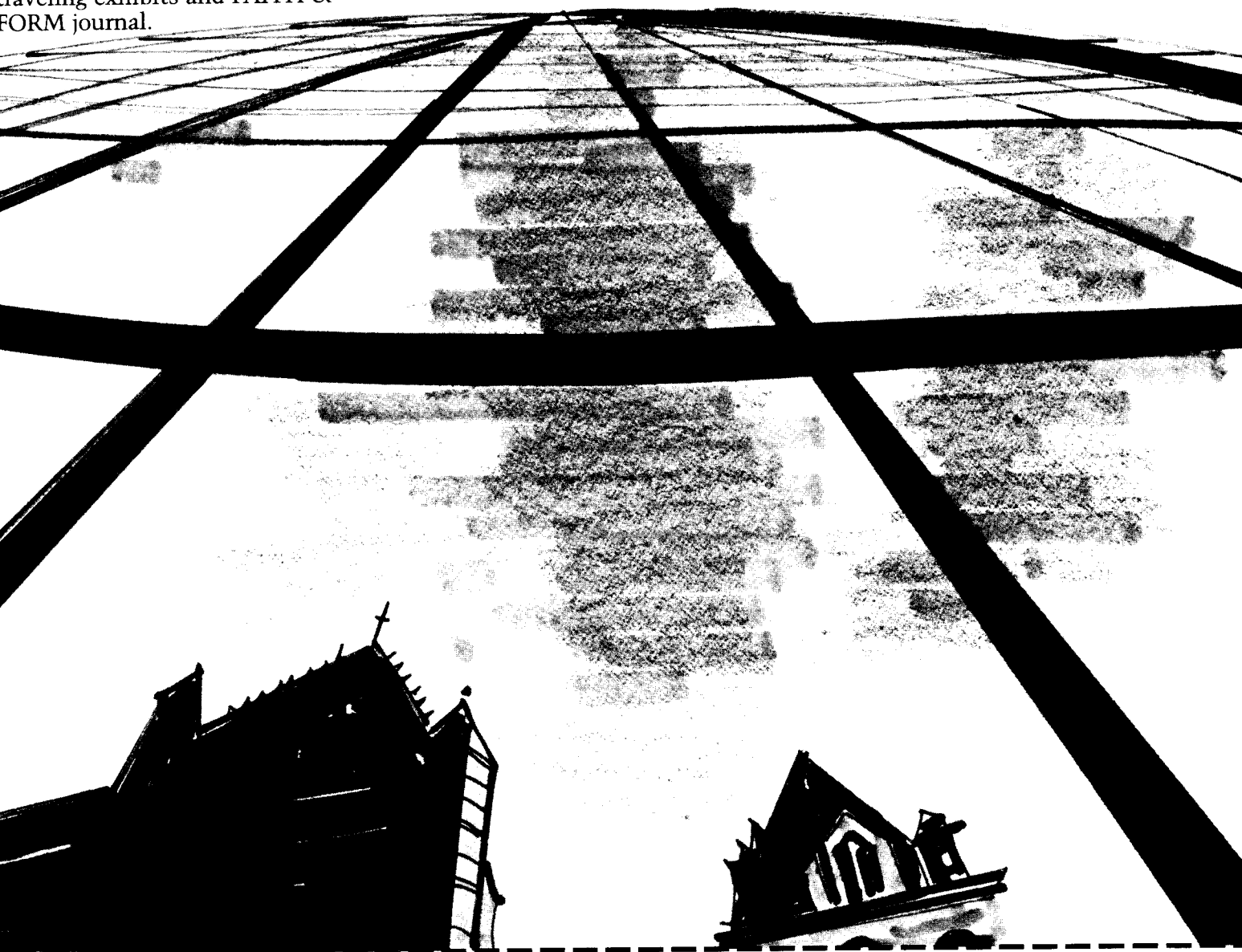
Increase your knowledge concerning the need of today's Liturgist, Clergy, Artist and Building Committees. Better understand the acting contemporary influences on modern design parameters.

IFRAA is an international society composed of Architects, Artists, Church Administrators, Clergy, Building Committees and Manufacturers. It is an ecumenical organization relating to all religious communities.

**National Architectural Design
Awards and Art Awards program**
Winning entries are featured in
traveling exhibits and FAITH &
FORM journal.

- **FAITH & FORM journal**
- **Quarterly newsletter**

- **National Conferences and Post-
Conference Tours**
- **Regional Workshops**



Send coupon today for IFRAA membership information and **FREE** issue of FAITH & FORM journal.

To: IFRAA, 1777 Church Street, NW, Washington, DC 20036 Tel. (202) 387-8333

Name _____

Company _____

Address _____



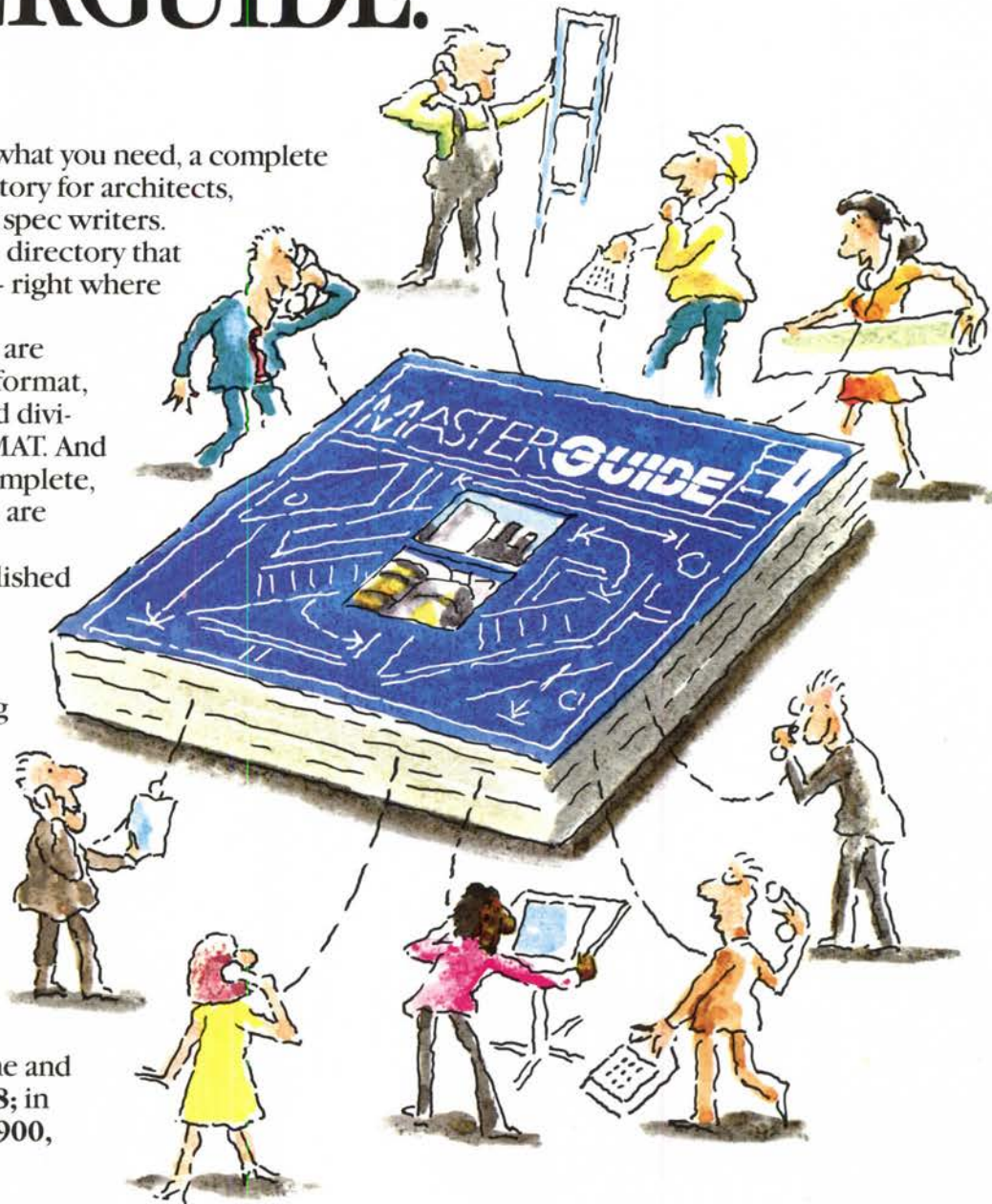
Before you specify a product, specify a directory MASTERGUIDE.™

MASTERGUIDE™ is exactly what you need, a complete specifying and buying directory for architects, contractors, engineers, and spec writers. It's the only comprehensive directory that you can keep on your desk—right where a directory belongs.

Over 70,000 suppliers are included in an easy-to-use format, organized in the 16 standard divisions of CSI's MASTERFORMAT. And with a directory that's so complete, those hard-to-find suppliers are suddenly at your fingertips.

MASTERGUIDE is published in five regional editions so that wherever you work—from Maine to California—you have an extensive listing of nearby sources.

This is the directory designed by working professionals for working professionals. Because you need quick, up-to-date, and accurate product information, you need MASTERGUIDE. It's as simple to order as it is to use: just pick up the phone and call 1-800-874-7717, ext. 68; in California, call 1-800-831-6900, ext. 68.



MASTERGUIDE™

The Official Specifying and Buying Directory of The American Institute of Architects

Get What You Need, When You Need It.

Circle 55 on information card

ces, indoor and outdoor lighting, pool equipment, automatic sprinkler systems, spas, jacuzzis, and greenhouse climate systems. Systems connected to the Home Manager operate directly through low-voltage wires, or without wires using multiple control modules plugged into up to 64 standard AC circuits, controlled together or on independent schedules.

The system's central control unit, installed in a utility closet or basement, comprises: electronic hardware; a 24-hour clock that automatically adjusts for daylight savings time and leap years; non-volatile memory, which remembers the user's settings for up to 1,000 hours during extended power failures; optional battery back-up for uninterrupted security during power failures; and manual override. Built-in circuitry and software allow the homeowner to expand the system's capabilities.

Circle 212 on information card

Control System Utilizes Television Set

The HomeMinder electronic control system works through existing house wiring control up to 100 lights and appliances inside and outside the home.

The system runs as a free-standing unit at works through a standard television as a feature built into a 25-inch GE component television. By using graphic displays on the television monitor, the user programs the heating and cooling as well as lights and appliances. Each HomeMinder system comes equipped with one light module and one appliance module.

The system contains a remote control unit, telephone cable to connect the system to any modular telephone jack for operating the system outside the house, and connecting cable and video connector for the standard television hook-up. Appliances and lighting modules are sold separately. An optional MiniMinder controller installed elsewhere in the house can control up to eight lights and appliances.

Circle 213 on information card



Enhanced Clock Thermostat

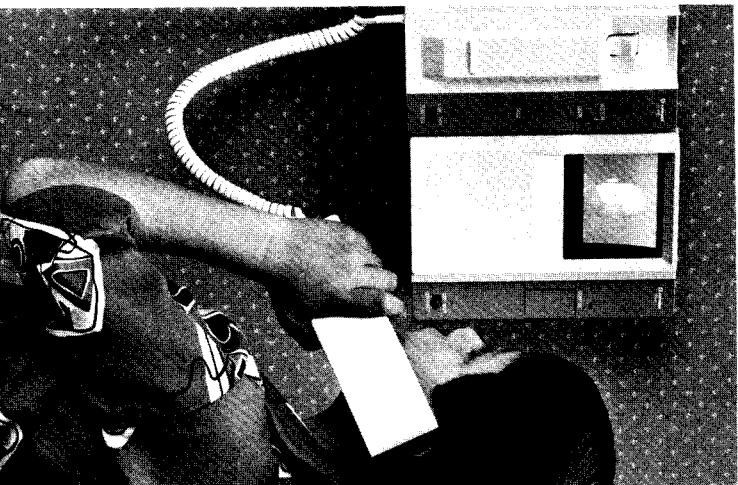
An enhanced version of the T8200 micro-electric clock thermostat makes interface

with the thermostat and heating/cooling system easier than with previous models. The T8200 features include an energy-saving light indicating when the thermostat is in offset mode (either setup or setback), a system light indicating when heating/cooling equipment is operating and offset adjustments in 2.5 degree increments, enlarged graphics, and a continuous digital clock readout.

The thermostat runs on a schedule at two energy-saving and two comfort periods a day. The user may skip the daylight offset period on weekends, while maintaining a nightly schedule seven days a week. The thermostat can also skip the next programmed energy-saving period.

Honeywell

Circle 214 on information card



Residential Video Intercom

The Aiphone video intercom allows residents to see and talk with visitors before opening the door. When the outside call button is pushed, a lamp automatically illuminates the caller in a soft, unobtrusive light. An inside monitor displays the caller's image immediately after the call tone sounds. The outside intercom enables the caller to talk completely hands-free.

Each station contains an instant-on television screen, handset, volume control, contrast/brightness adjustment, door release button, and a monitor button for audio and visual surveillance of the entry area. Each room station is less than seven inches wide, projects 2 5/8-inches from the wall and is 1 9/16-inches deep.

The outside heavy-aluminum door station, designed to be vandal-proof, houses a wide-angle camera lens with a 50-degree coverage. A high impact-resistant shield protects the camera lens, and a beam sensor protects against excessive light.

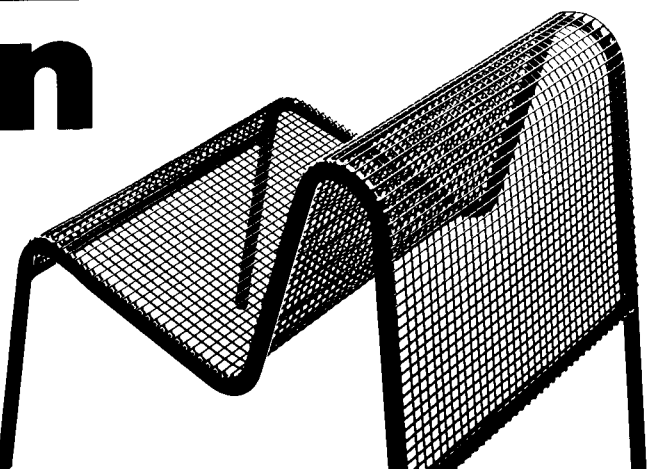
continued on page 152

Kroin Incorporated

Charles Square, Suite 300
Cambridge, Massachusetts 02138

Telephone 617 492-4000
Telex 951650

Kroin



Mobil stationary and moveable outdoor seating is unique in its ability to conform to sharp angles and uneven topography. Unlimited seating arrangements facing inside or out are possible by altering the sequence of the three modules offered in this system. Simultaneous back-to-back seating is possible through the use of 2-sided Seat Bowls.

Anchors and ganging clamps insure configuration integrity and deter vandalism when moveable seating is grouped in sequence.

Mobil is part of a series of Park and Garden Furniture, manufactured in synthetic coated tubular steel and wire mesh, available exclusively from Kroin.

Circle 80 on information card

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 Underwriter Laboratories for electrical safety.

Ultraflow

Circle 217 on information card

Remote Controlled Home Security

Amgard 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 a 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

continued on page 15

MRC

mission research corporation

Specialized - Worldwide Experience

- SHIELDED ENCLOSURES
- TEMPEST
- EMP
- RFI
- TESTING

Design and consulting with
Architect-Engineering firms

Contact: Pat Chapman

Electromagnetic Applications Division
1720 Randolph Road S.E.
Albuquerque, New Mexico 87106
(505) 843-7200

East & West Coast Offices

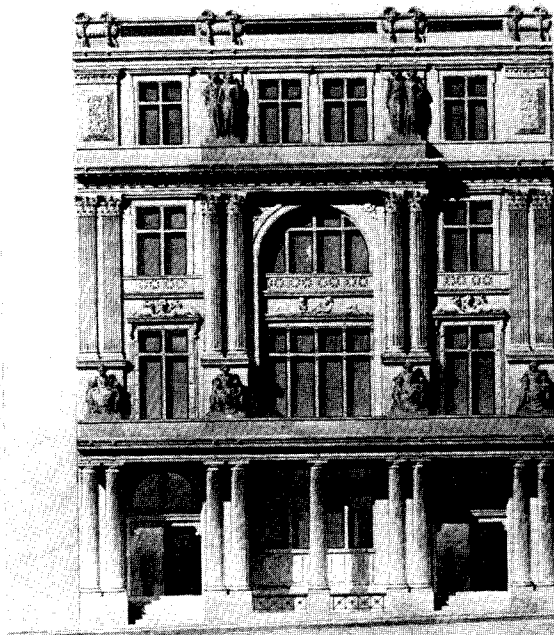
PORCH-LIFT

VERTICAL WHEELCHAIR LIFT
provides a safe, simple solution
to architectural barriers



Whether you're modifying an existing building or designing a new one, accessibility to the handicapped is important. And PORCH-LIFT provides the simple, economical solution... indoors or outdoors. This safe vertical wheelchair lift platform anchors permanently beside the steps, using a minimum of space. Motor and mechanisms are enclosed. Run on 110 volt current. Weatherproof finish. Choose from nine models with varying lifting heights. Shipped ready for installation.

WRITE FOR A FREE BROCHURE AND NAME OF THE DEALER NEAREST YOU
AMERICAN STAIR-GLIDE CORPORATION



RICHARD MORRIS HUNT
NEW YORK STOCK EXCHANGE, 1880
AIA FOUNDATION

Following its premier at the Metropolitan Museum of Art, a major exhibition, "The Architecture of Richard Morris Hunt," opened at the Octagon Museum, Washington, D.C., September 12, 1986, and will continue through September 28. Organized by the American Institute of Architects Foundation and the Metropolitan Museum, New York, the exhibition contains 200 original drawings and historic photographs, documenting Hunt's career. The exhibition will travel to the Art Institute of Chicago and the Tacoma, Washington, Museum of Art in 1987.

THE
AMERICAN
INSTITUTE
OF
ARCHITECTS
FOUNDATION



American Institute of Architects Foundation
1799 New York Avenue, NW • Washington, DC 20006

PLEASE SEND THE FOLLOWING:

Information regarding the AIA Foundation _____
EXHIBITION
Information on obtaining the travelling exhibition _____
Schedule of cities where the exhibition will tour _____
POSTER — New York Stock Exchange, 1880
Pastel watercolor wash, 23" w × 38" h _____ @ \$20.00 ea. _____
BOOK — *The Architecture of Richard Morris Hunt*
Edited by Susan R. Stein, Hardcover _____ @ \$39.95 ea. _____
224 pp., 16 color plates, Paperback _____ @ \$16.95 ea. _____
Shipping and handling **\$3.00** per item + _____
A check payable to *AIA Foundation* is enclosed for this amount. TOTAL _____
SHIP TO: _____

Thank you.

**"WHEN I
HEARD ABOUT
U.S. SAVINGS BONDS'
COMPETITIVE
RATE..."**

**I COULDN'T
BELIEVE
MY
EARS."**



©WARNER BROS. INC. 1986 Used With Permission.

Everyone's amazed when they hear what U.S. Savings Bonds have to offer. Savings Bonds earn market-based interest rates—just like money market accounts—so you're guaranteed a competitive return, no matter what happens to interest rates. All you have to do is hold your Bonds for five years. What's more, the interest you earn is completely free from state and local income taxes. And federal taxes can be deferred. For more information, call 1-800-US-BONDS. U.S. Savings Bonds—They'll make your ears perk up.

U.S. SAVINGS BONDS 

Bonds held less than five years earn a lower rate.
A public service of this publication.

Products from page 152
or other emergencies.

The system distinguishes among the four types of alarms. If an alarm reaches the monitoring center and a verifying telephone call made to the premises goes unanswered (or is answered without a prearranged code), the system relays an alarm to the selected emergency personnel. Other options include a smoke detector interface.

Amway

Circle 211 on information card

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 lavatory, 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.

American Standard

Circle 219 on information card

Computerized Irrigation Controller

A 12-station micro-computer irrigation controller from Weather-matic 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.

Weather-matic

Circle 221 on information card

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.

Delta-Dore Electronics

Circle 222 on information card

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, or prime coat (to allow the user to paint or wallcover 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.

LiteTouch

Circle 224 on information card

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.

American Standard

Circle 220 on information card

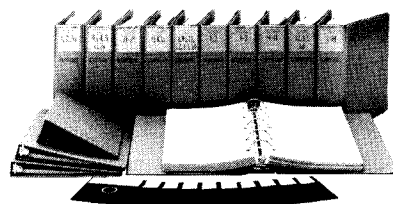
When you want to make every spec-writing minute count.

the front runners how they beat the
k. The answer is **MASTERSPEC®**.
Whether you use it exclusively or
augment your office master,
MASTERSPEC® helps you get
ahead by shaving crucial hours
days off your spec writing
with the system that's
becoming the industry
standard. Plus your time-
sheets will reflect a dramatic
decrease in billable hours.
When will your company
put out in front? With
MASTERSPEC®, it's just
a matter of time.

MASTERSPEC® AT:

Convention, June 8-11,
Antonio Convention Center.
Convention, Booth 1829,
June 20-22,
Los Angeles Convention Center.
MASTERSPEC SYSTEMS® '86,
Booth 1260, June 24-27,
Cormick Place, Chicago.

MASTERSPEC®



In hard copy & diskette

It takes a lot of work out of
a lot of your work.

SPEC THIS OR CALL 800-424-5080.

You'll receive your complimentary portfolio complete with
MASTERSPEC® Table of Contents and a sample
MASTERSPEC® section.



Name _____
Title _____
Firm _____
Address _____
City _____ State _____ Zip _____
()
Telephone _____ A 1086

MAIL TO: AIA Service Corporation, 1735 New York Ave., NW
Washington, DC 20006

Circle 59 on information card

MAIN OFFICE

1735 New York Avenue N.W.
Washington, D.C. 20015
(202) 626-7300

James P. Cramer

Group Publisher

Jesse Sims

Production Manager

Christi L. Wilkins

Business Manager

Bernard F. Kroeger

Circulation Manager

Brenda L. Owens

Assistant Circulation Manager

Lisa B. Klevatt

Administrative Assistant

Nancy Perri

Assistant to the Publisher

Bob Kliesch

Publisher

ADVERTISING SALES OFFICES

West/Northwest (619) 450-6462

James A. Anderson

5830 Oberlin Dr., Suite 1110

San Diego, Calif. 92121

Midwest (312) 663-4116

Geoffrey C. Welch

Barbara Mitchel Friscia

53 West Jackson Blvd., Suite 1604

Chicago, Ill. 60604

New York City (212) 685-4114

Anna M. Matranga

267 Fifth Ave., Suite 1110

New York, N.Y. 10016

Philadelphia/Pittsburgh (215) 254-9800

Linda C. Cherry

995 Old Eagle School Rd., Suite 301

Wayne, Pa. 19087

Southeast (215) 254-9800

James A. Bauschka

995 Old Eagle School Rd., Suite 301

Wayne, Pa. 19087

New England (215) 254-9800

James A. Bauschka

995 Old Eagle School Rd., Suite 301

Wayne, Pa. 19087

Southwest (314) 569-3210

Richard Grater

1466 Summerhaven

St. Louis, Mo. 63146

Circle No.	Page No.
59 AIA Prof. Systems	155
43 AMP Products	130
<i>Lewis, Gilman & Kynett</i>	
63 AMP Products	131
<i>Lewis, Gilman & Kynett</i>	
10 American Plywood Assoc.	13
<i>Borders, Perrin and Norrander</i>	
52 American Stair Glide Corp.	152
<i>Aspen Advertising Agency</i>	
16 American Standard	27
<i>Calet, Hirsch & Spector, Inc.</i>	
29 Association Administrators	118
17 Brite Vue Glass	29
<i>Peter Kelly Adv.</i>	
15 CNA Insurance	26
<i>Frank C. Nahser, Inc.</i>	
41 Cal-Shake Inc.	129
27 Calcomp Systems	114
<i>Jansen Assoc.</i>	
18 California Redwood	31
<i>Foote, Cone & Belding, Inc.</i>	
44 Computer Vision	133
<i>Ingalls, Quinn & Johnson</i>	
49 Custom Windows	146
<i>The Capener Co.</i>	
100 Dupont-Hypalon (insert)	17-20
<i>NW Ayer, Inc.</i>	
12 Falcon Lock	22
<i>Joel Goldstein Marketing Comm.</i>	
46 Follansbee Steel Corp.	140
<i>Group Marketing & Comm.</i>	
4 Forms + Surfaces	7
<i>Sherrill Broudy Assoc.</i>	
8 Fry Reglet	11
<i>McNall & Blackstock</i>	
19 Haws Drinking Faucet Co.	32
<i>Mandabach & Simms Inc.</i>	
33 Herman Miller Inc.	123
<i>J.D. Thomas Co.</i>	
36 Herman Miller Inc.	125
<i>J.D. Thomas Co.</i>	
39 Herman Miller Inc.	127
<i>J.D. Thomas Co.</i>	
42 Herman Miller Inc.	129
<i>J.D. Thomas Co.</i>	
7 Hewlett-Packard	10
<i>Leo Burnett U.S.A.</i>	
13 Homosote Co.	23
<i>Gillespie Adv.</i>	
21 Hordis Brothers	36
54 Interfaith Forum	149
31 Karastan Rug Mills	120
<i>Ally and Gargano Adv.</i>	
3 Koppers Co.	4-5
<i>The Advertising Center</i>	
80 Kroin Inc.	151
34 L.M. Scofield Co.	124
<i>Buscaglia Atkinson & Assoc.</i>	
38 Lapeyre Stair	127
<i>LiDgroup</i>	
11 Lehigh Portland Cement Co.	14
<i>Winchell Marketing Communications</i>	

Circle No.	Page No.
25 Letraset	1
60 LiteTouch	Cov
<i>Winget Adv.</i>	
61 Lutron	Cov
<i>Lutron Marketing</i>	
9 Manville Corp.	
<i>Broyles, Allebaugh & Davis</i>	
26 Manville Corp.	110-1
<i>Broyles, Allebaugh & Davis</i>	
53 Mission Research	1
56 Morton Thiokol, Inc.	
64 National Car Rental	1
48 Nat'l Fire Protection Agency	1
<i>NFPA Advertising Agency</i>	
35 Oxford University Press	1
<i>Jameson Adv.</i>	
55 PacTel Publishing	1
14 Peerless Electric Co.	
<i>Hayes, Davidson, Inc.</i>	
6 Plan Hold Corp.	
<i>Plan Hold Adv.</i>	
50 Pleko Products	1
<i>Ehrig and Assoc.</i>	
57 Public Outreach/AIA Foundation	1
23 Rixson-Firemark	8
<i>The Delos Co., LTD</i>	
32 Sedgewick Lifts, Inc.	1
<i>Graddon Comm., Inc.</i>	
5 Shakertown	
<i>Borders, Perrin and Norrander</i>	
24 Sigma Design	8
28 Sloan Valve Co.	1
<i>McKinney Inc.</i>	
40 Southwall Technologies	12
<i>Murphy Adv.</i>	
51 Stern-Williams Co.	1
<i>Ad Mar Co.</i>	
47 U.S. Brick	1
<i>Real Brick Products Group</i>	
1 U.S. Gypsum	Cov
<i>Marstrat</i>	
2 U.S. Gypsum	
<i>Marstrat</i>	
20 U.S. Gypsum	3
<i>Marstrat</i>	
37 Varitronic Systems Inc.	12
<i>Bozell, Jacobs, Kenyon & Eckhardt</i>	
22 Western Wood Products	82-8
<i>Borders, Perrin and Norrander</i>	
30 Wilsonart	11
<i>McKone & Co., Inc.</i>	

LiteTouch is the right touch...

A single touch to light the way between the bedroom and kitchen for a late-night snack.

Master panel in master bedroom that controls every light in the house.

Gallery – for the low voltage lighting your masterpieces.

Hear a noise? One touch turns on all your security lighting.

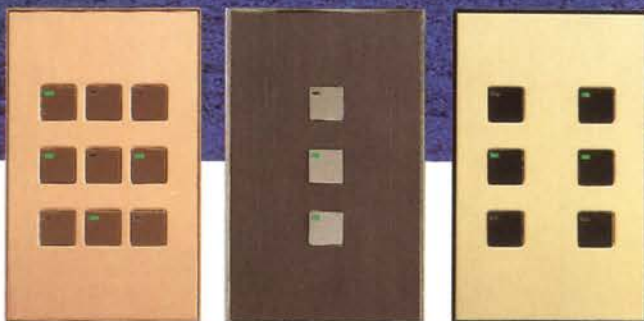
Entertaining? Preset lighting elegance in the dining room to create a mood.

Leaving? Master off turns off everything.

Family room – dim lights to watch T.V.

Path of light from the garage to the kitchen when your arms are full of groceries.

But not for everyone.



Decorator face plates compliment the architectural design.
Indicator lights tell which lights are on in the house.

Touch is the right touch...

It's not for everyone. It's only for those who live life with a light touch . . . sensitive, discriminating, appreciative of the finer things in life. LiteTouch is for those who can appreciate the ease and simplicity of a low voltage system that allows you to control the play of light anywhere in the home from any of several control locations. Lighting with LiteTouch is so much more than simply switching on and off. With dimming and presetting, it's the grace, charm and elegance of your home in its best light. LiteTouch may cost a little more than conventional systems, but LiteTouch is so much more . . . it's just the right touch.

Never chase lights again. Control them.

LiteTouch®

2855 South 220 West
Salt Lake City, Utah 84115
Tel: (801) 466-9142

Circle 60 on information card

NEW

Thin Profile Lighting Controls

NOVA T[☆]

(Nova T-Star)



*Undercut back plate gives
Nova T[☆] a unique floating
appearance.*

→ | | ← .130"
→ | | ← .295"
(excluding backbox)

Streamlined Elegance—Just Over 1/4" Thin

- Wallbox dimmers for incandescent, low voltage and fluorescent lighting
- Touch-switches and slide switches for non-dimmed circuits
- Controls available for High Power and Pre-Pack systems

- Five colors—white, beige, gray, brown, and black
- Custom finishes, engraving, and silkscreening available

*Call today for a color brochure:
(800) 523-9466, (800) 222-4509 in Pa. Or write
Lutron, Suter Rd., Box 205, Coopersburg, PA 18036*

This product is covered by one or more of the following U.S. Patents: 3,735,020; 3,746,923; 3,927,345; 3,824,428; 3,919,592; 3,927,345; 4,350,935; 4,207,498; 3,731,142; DES 227,557; and corresponding foreign patents. Foreign and U.S. Patents pending. Lutron and Nova are registered trademarks. Nova T[☆], High Power, and Pre-Pack are trademarks of Lutron. Copyright © 1986 Lutron Electronics Co., Inc.



LUTRON