
AIA JOURNAL
DEDICATED TO ART.

Specify our fiberglass Gothic Pool or Deluxe Recessed Shower.

Or any of our nine styles in eleven sizes. Everything from an 84″ oval pool to a square oriental soaking tub. Or a 32″ one-piece replacement shower to a 60″ luxury model with a built-in seat. You'll find them all in an assortment of bright, pace-setting colors.

Our line meets the strict standards of the NAHB and receives its coveted label of approval. Fiberglass is economical and easy to install. And when your clients realize you've sold them on a Designer Line fixture that's warm to the touch and easy to keep clean—you might just find *your* name being dropped in the right places.

Designer Line: A good name to drop when specifying fiberglass bath fixtures.

AMERICAN STANDARD

PLUMBING / HEATING

Circle 1 on information card

AIA JOURNAL

Cover: The Renwick Gallery, Washington, D.C., Robert C. Lautman

Donald Canty, Editor; **Mary E. Osman** and **Peter H. Share,** Associate Editors; **James E. Ellison, AIA; Dave Clarke,** Institute Department of Education and Research, Consulting Editors; **Suzy Thomas,** Art Director; **Michael J. Hanley,** Publisher; **Michael M. Wood,** Sales Manager; **George L. Dant,** Manager, Production and Business; **Michael A. Benoit,** Circulation Manager.

AIA Journal, official magazine of The American Institute of Architects, published monthly at 1735 New York Ave., N.W., Washington, D.C. 20006. Telephone: (202) 785-7300. Subscriptions: for those who are, by title, architects, architectural employees, and to those in architectural education (faculty and schools), and to libraries, building construction trade associations and building product manufacturers: basic rate $7 a year, $12 two years, $6 to architectural students in the U.S., its possessions and Canada. For all others: $12 a year in the U.S., its possessions and Canada: other countries to those who are, by title, architects: $12 a year. All others outside the U.S., its possessions and Canada: $22 a year. Single copy: $2, payable in advance. Publisher reserves the right to refuse unqualified subscriptions. Change of address: give Circulation Department both old and new addresses; allow six weeks, second class postage paid at Washington, D.C. Microfilm copies available from University Microfilm, 300 N. Zeeb Road, Ann Arbor, Mich. 48106. Referenced in *The Architectural Index, Architectural Periodicals Index* and *Art Index*. VOL. 61, NO. 5.

A New Set of Proposals For Improving the Quality Of Federal Architecture

Professionalization of the federal client and improved selection procedures for contract architects have been recommended by the National Endowment for the Arts' federal architecture project in a preliminary report which it calls "a framework for debate."

The project was understaken in response to a May 1972 Presidential directive to the endowment to "review and expand" the guiding principles for federal architecture drafted in 1962. The yearlong study has involved a task force of 15 architects and designers and an advisory committee of 20 representatives of federal building agencies.

The report notes that the guidelines have been supplemented by the requirement for the filing of environmental impact statements for federal building projects and by executive orders of the President directing federal agencies to consider a wide range of environmental and social factors in the planning of projects, including accessibility to transportation and availability of housing.

The report then says, "We believe that it is time for the federal government to take a further step—to go beyond environmental protection to environmental improvement as a positive goal of its building program.

"Each federal building dollar should be regarded as an investment in a better man-made environment for the nation. This means attention to the planning factors covered in the environmental impact statement and executive orders. But it also means a greater commitment to architectural quality, which includes the physical linkages of architecture to the surrounding community and the details of design that affect the building's users."

In the achievement of architectural quality, the report says, "principles are not enough. It must emerge from a process of interaction between architect and client."

The following is the text of the report's recommendations, the first set of which is headed "People and Quality":

Left, the federal penitentiary chapel at McNeill Island, Wash., by Moritz Kundig, the result of a design competition. Right, a representative federal office building.

1. Design professionals in government should be at policy levels in design and construction agencies.

2. Government administrators, professional societies and educators should address the special training needs and incentives for attracting and keeping talented design professionals in public service.

3. Architect and engineer selection for major public building contracts should be ranked by selection panels and the ranking, selection process and rationale for the final selection should be a matter of auditable record. In all transactions regarding selection it would be desirable to devise procedures for making all contracts from outside the agency a matter of public record.

4. Since preference in the selection process of consulting professionals for public projects tends to be given to established firms with considerable government experience we urge that selection of both consultants and panelists be based solely on professional qualifications with no undue attention to seniority or political influence. In this way we hope newer and smaller as well as minority firms would be encouraged to apply for public work.

5. Design competitions, properly financed, should be used to encourage public design concern and demonstrate government receptivity to new ideas and people. This selection alternative could be useful for projects of national significance or high public interest and small projects particularly appropriate for attracting new talent.

Purposes and Quality:

1. Federal buildings used by the general public in urban locations should enhance as well as protect the environment by encouraging street vitality and a lively pedestrian setting in and around these buildings. Buildings intended for special purposes or not in urban locations should be designed to improve their surroundings by careful attention to their approaches, landscaping, appropriate scale and design.

2. The federal government should sponsor demonstration projects for new design and building management concepts with the goal of making public buildings accessible and responsive to citizens in both appearance and use, inviting citizens to understand and use the resources of their government.

3. At sites with high urban design impact, federal agencies should plan, design, construct, lease and alter public buildings to provide the widest possible range of uses along with federal use. This may include other levels of government, commercial, educational, institutional, civic, cultural and recreational uses. Community officials should be consulted to insure

going on from page 4
compatibility with local planning goals.

4. Federal agencies should give priority consideration to adapting existing building for federal use, particularly structures of architectural or historic significance. The government should consider purchasing and leasing such structures as an alternative to a new structure, considering relative cost and adaptability of the existing building. This alternative should include consideration of satisfying space needs by adapting a cluster of smaller buildings as well as adapting single, large buildings. (Congress should consider arrangements that allow eventual government ownership of leased adaptive-use projects similar to the present purchase-contract authority.)

Design Awareness:

1. Procurement supply schedules should be reviewed regularly by panels of leading private and public designers.

2. Art works and the design and costs of interiors, furnishings and landscaping should be included in initial building plans and budgets. These items should be nondeductible so that if the budget of a project is reduced they can only be reduced proportionately instead of eliminated altogether.

3. Client agencies and Congress should give more attention to the purposes of government building so the design profession can respond to well-defined building goals. The ultimately responsible designer should participate as early as possible in the development of the project.

4. Post-occupancy evaluation of buildings should include an analysis of how the building meets community and user needs.

5. To encourage a broadened view of architectural excellence a continuing government-wide design awards program should be established.

6. To give continuity to periodic initiatives for federal design achievement, government concern for the design quality of federal facilities should be formalized. An overall design advisory office should monitor all federal building activities with periodic reports measuring government programs and recommending changes in federal policies to raise the level of design achievement.

Maryland Rejects Mandatory Competitive Bidding Measure

Maryland, Minnesota and Florida have adopted new procedures for selection of architects and engineers for state building projects. The Maryland legislature, most recent to act, rejected a mandatory competitive bidding bill passed earlier by the state senate after a vigorous campaign against it led by the Maryland Society of Architects, AIA.

Instead, the legislature adopted a compromise bill which establishes independent professional service selection boards which have the power to determine whether competitive bidding should be used on individual state design projects. Competitive evaluation of both technical and price proposals must be included in the procurement of A/E services involving fees over $25,000, unless the board determines that the specific services cannot be so completely defined as to lend themselves to such a procedure. If the competitive method is used, neither the price nor the technical proposals can be used as the sole criterion in the selection process.

Selection boards will be composed of three state employees involved in design review and facility use and two public members, one of whom may be a design professional.

The Minnesota legislature also has created a state designer selection board composed of five voting members—an architect, an engineer, a state arts council representative and two additional public members—as well as two nonvoting members from the state government. The board reviews the qualifications of interested designers of a publicly announced state project and selects the primary designer. The state department of administration then negotiates for a fee with the selected designer and executes a contract.

The Florida legislature has established a similar process of selection of A/E services for state and local governmental projects, except that the contracting agency, rather than a selection board, is responsible for the screening and selection.

AIA Joins in Support of Campaign Reforms

AIA has joined other public interest groups in supporting major reforms of political campaign financing including substantial public financing. The reforms are contained in federal legislation passed by the Senate before the Easter recess and awaiting House action as May began.

AIA's support was voiced by the board of directors at its March meeting in a resolution which declared that the present campaign financing system, with the enormous expense it involves, lends itself to abuses which "may ultimately result in actions counter to the public interest." Politicians "can and successfully do trade government contracts for large political campaign contributions," and some of the contracts "have involved professional design services."

Declaring that they deplored such abuses and that they would continue to take every remedial action available, the directors pointed out that a professional sociey cannot "deal adequately with this problem under the present campaign financing system." Therefore, it was resolved that the AIA endorses full public disclosure of campaign contributions and expenditures; limitations on individual and cash contributions; matching federal funds for financing campaigns; preservation of the role of political parties in candidate support and control and enforcement of all campaign financing laws by an independent federal elections commission.

The board resolved also to encourage AIA component organizations to work for similar reform. It pledged to commit actively its resources in support of efforts of Congress and other organizations to enact legislation reforming campaign financing.

In a letter to all senators in which the AIA urged legislation for campaign financing reform, Archibald C. Rogers, FAIA, president of the Institute, wrote that "campaigning for the opportunity to serve in public office should be truly competitive, above-board and open to all qualified people." Many qualified persons are discouraged, Rogers stated, because of lack of financial support. Rogers pointed out that the resolution passed by the board reaffirms and expands a statement on campaign financing reform which was passed at the 1971 AIA convention.

The Supreme Court Keeps Its Hands Off Of Restrictive Zoning

The Supreme Court has ruled that when birds of a feather flock together they can use zoning to keep others out of neighboring nests.

By a vote of seven to two, the court upheld a single-family dwelling ordinance in Belle Terre, a village of 700 on Long Island, N. Y. The ordinance forbids occupancy of a residence by more than two unrelated persons and had been challenged by six students with the aid of the American Civil Liberties Union.

A lower court had ruled that the ordinance violated the U.S. Constitution by "discriminating against outsiders and enforcing mere social preferences." Civil rights lawyers hailed the ruling as breaking down "local barriers to persons who were poor, black or nonconformist."

However, the Supreme Court overturned the ruling and said local governments may legitimately establish zones where "family values, youth values and the blessing of quiet seclusion and clean air make the areas a sanctuary for people."

Civil rights lawyers were especially distressed because the somewhat rhapsodic opinion was written by Justice William O. Douglas, noted for his social as well as

continued on page 10

Circle 5 on information card


TIGHT BUDGET?
PARKER
S. PARKER HARDWARE FITS IN!
If a tight budget has you in a bind, relax and check with S. Parker.
We can give you the precision-built quality and smart styling you want at surprisingly competitive prices.
Volume production and sales is the answer . . . an S. Parker policy for over seventy years.
HARDWARE PARKER MFG CORP
ESTABLISHED 1900
Illustrated literature available on request.
S. PARKER HARDWARE MFG. CORP.
27 Ludlow Street, New York, N.Y. 10002 • (212) 925-6300
Sweet's Architectural File 8.30/Pa
Uniform Construction Index 12/72 8p
Representatives in all 50 states.

going on from page 6
environmental concerns. Some of them interpreted the court's action as a message that zoning should remain a state and local matter except in cases of overt racial discrimination.

They suffered a second setback in what the Justice Department had alleged to be one such case, involving the city of Black Jack, Mo., a suburban area which had been incorporated for the expressed purpose of zoning out a federally subsidized moderate-income apartment project.

The case came to national attention when it was cited by former HUD Secretary George Romney as a flagrant example of the use of zoning for racially discriminatory ends. The Justice Department complaint, the first federal action of its kind, charged that Black Jack's incorporation and immediate restrictive zoning were part of "a long and melancholy history of deliberate discrimination in housing by both public and private bodies."

However, Judge James H. Meredith of the U.S. District Court ruled that "evidence does not support a charge of racial motivation, purpose or intent" and that Black Jack's exclusion of multifamily dwellings "is a lawful and proper exercise of the police power of a municipality." At this writing, the possibility of appeal is reported to be the subject of heated debate in Justice and elsewhere in the Administration.

AIA Testimony on Preservation, Highways

In recent testimony before House and Senate committees on appropriations, Robert Burley, AIA, chairman of the AIA Commission on Environment and Design, said that the Institute supports the full $20 million appropriation requested for the historic preservation program of the National Park Service for the coming fiscal year. He said that the program's cost-benefit ratio was "probably one of the most favorable ever achieved in a federal program."

Burley said that the work of the NPS, the National Trust for Historic Preservation, the AIA state preservation coordinators and others "started as an effort to preserve America's heritage" and is now "becoming a major tool in city planning, revitalizing downtown areas and making wiser use of present resources."

Burley testified that the AIA recommends a "substantial increase in funding to continue the development of preservation technology" and that funds available for matching grants to states should be increased "to more nearly approach the level of funding that states are willing to raise. With good demonstration projects of historic value, with technological development and with more survey work completed, the historic preservation program is capable of breeding thousands of adaptive use projects across the country that will carry their own economic weight."

In testimony before a Senate subcommittee which is considering legislation to amend the Highway Beautification Act of 1965, Burley said that the AIA recommends the development of comprehensive motorist information systems to control and replace billboard advertising on the nation's highways. He said that highway beautification should be an integral part of transportation planning and "not merely a remedial measure to patch up environmental damage."

New HUD Standards Mandatory in July

On July 1, revised and updated *Minimum Property Standards* of the Department of Housing and Urban Development will become mandatory for all HUD-involved housing and for housing built with the assistance of the Veterans Administration and the Farmers Home Administration of the Department of Agriculture. The standards are to be used as well as guidelines for family housing built by the Department of Defense for military personnel. They cover detached single-family houses, townhouses, garden apartments and medium and highrise structures. They also affect the siting of buildings.

The new standards include the following, among other requirements:

- Prohibition of the use of lead-based paints.
- Improved insulation standards for energy conservation.
- Strengthening of fire protection standards to increase life safety by required compartmentation in some instances, with a fire door activated by a smoke detector, automatic sprinkler systems, automatic fire alarms, fire-rated doors equipped with self-closing devices and elevators returning to the main floor when activated by a smoke detector in each floor's elevator lobby.
- Stipulation of adequate protection from flood hazards.
- Provisions for siting buildings and the separation of building locations.
- Planning of space so that rooms are designed in terms of the furniture rather than in fixed dimensions.

AIA Journal Cited

The Society of Publication Designers Inc. recently awarded citations of excellence to two issues of the AIA Journal: August and November 1973. The citations "congratulate the AIA Journal for its pursuit of consistent and superior standards in publication design."

Students Compete For Energy Awards

The Association of Student Chapters AIA recently sponsored an energy conservation awards program whose purpose was to "instill an awareness of energy use in the built environment in schools of architecture." Five projects were selected recently by the jury as "superior with regard to creativity, originality and significance toward energy conservation." The program was open to any student enrolled in a school of architecture.

The winning projects are:

- A residential community designed by Bob Evans, Southern California Institute of Architecture.
- A solar energy system design for community energy use submitted by John David, Peter Nelson, Robert Pritchard, Forrest Sheldon, Douglas Bancel, Nicholas Carnevale and Jack Crocker—all 4th year students at the University of Colorado.
- A single family farming complex designed by Rex James Hall, Oklahoma State University.
- An energy-conserving day care center, the work of Kim Wong and William F. Rogers, Cornell University.
- "Eco-Unity," featuring a comprehensive analysis of the natural environment with the use of technological advances to achieve energy-conserving architectural expression, designed by Peter Cleff and Richard Loope, Yale University.

The jury was chaired by Caren Yglesias, student, Virginia Polytechnic Institute. Other members were John P. Eberhard, AIA, president, AIA Research Corporation; Richard Stein, FAIA, New York City; Frank Powell, chief, Thermal Engineering Section, National Bureau of Standards; Larry Degelman, faculty member, School of Architecture, University of Maryland; and Kevin Weiler, student, University of Maryland.

Four Awards for Design in Plywood

The American Plywood Association's annual plywood design awards honor architects whose projects "reflect outstanding structural and esthetic application of softwood plywood." Four firms have won top honors in the 1974 program in which entries were praised by the jury for their "extremely important contribution to the development of a more gracious environment." Chairman Pietro Belluschi, FAIA, was joined on the jury by Edward Dart, FAIA, and Arch Winter, FAIA.

First award was won in the residential/single family category by Peter L. Rumpel, AIA, of Freedman/Clements/Rumpel,

continued on page 14

"COMPAS"

Now the fastest, most accurate fire detection system design and quotation is yours exclusively from Pyr-A-Larm, the world leader in early warning fire detection engineering. We call it COMPAS ...a Computerized Pyr-A-Larm Analysis System. Just meet with your Pyr-A-Larm field representative anywhere at your convenience and submit all available data on your project. Working from a simple questionnaire he'll enter this data into a portable computer terminal that's tied into our central computer via local phone. That's all there is to it. Minutes later the central computer provides a detailed, technically-sophisticated Early Warning Fire Detection design... right before your eyes.

HOW "COMPAS" WORKS

The COMPAS system is astonishingly simple. Programmed into the central computer is everything about the design of the early warning fire detection system for your hazard, including the type of room (select from the 50 most widely used room types) physical characteristics of the room, and air flow information. *Result:* a reliable detailed, accurate analysis that enables you to precisely evaluate and determine your fire detection requirements.

AS EASY AS TYPING

With basic data your Pyr-A-Larm engineer connects his terminal to the phone, then dials a special local number, and submits to the central computer the data you have given him... and instantly the computer starts responding in the form of a documented analysis that provides: a written description for each room in the building showing how the room is used; the physical dimensions; air flow information; square footage; the type of detector recommended for the room; the number of detectors recommended for the room as well as the listed spacing for the type of detector; the actual spacing per detector. If manual stations,

Pyr-A-Larm® COMPAS

Job Number 3796
Print Option 2
Occupancy Type 4

– DATA STRING INPUT FORM –

	ROOM NUMBER 1	ZONE NUMBER 2	ROOM TYPE 3	ROOM LENGTH 4	ROOM WIDTH 5	ROOM HEIGHT 6	MIN A/C 7	CFM 8	NO. BELLS 9	NO. MAN 10	TYPE DET. 11	RAL 12	OPTION 13
1	1	1	95	18	20	9	5	0	0	0	0	0	0
2	2	1	17	14	18	8	8	0	0	0	0	0	0
3	3	2	140	19	19	8	0	0	0	0	0	0	0
4	4	2	170	36	39	11	6	0	0	0	0	0	0
5	5	2	150	36	37	8	8	0	0	0	0	0	0
6	999	0	0	0	0	0	0	0	0	0	0	0	0
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													

OPTIONS

1. To select the detector type enter a 1 in column 13 and the detector type in column 11.
   1 = Ionization
   2 = Rate of rise
   3 = Fixed temperature
   4 = Infrared
2. To specify the number of bells or manual pulls, enter the number required in column 9 or 10.
3. To specify 1 ral for each detector place a 1 in column 12.
4. To delete all bells, manual pulls or rals, place a 99 in column 9 or 10 or 12.
5. See Instruction Manual for additional options and instructions.

Data Input Sheet. Simple take-off from job data.

ROOM IDENTIFICATION CODE

ROOM TYPE NUMBER	DESCRIPTION
5	BATHROOMS
10	BATTERY STORAGE ROOMS
15	BOILER ROOMS
20	BROOM AND JANITOR CLOSETS
25	CLASSROOMS
30	CEILINGS-FALSE PLENUM AREAS
35	COMPUTER ROOMS-ABOVE CEILING AREAS
40	COMPUTER ROOMS-SUBFLOOR AREAS
45	COMPUTER ROOMS-MAIN AREA
50	CONFERENCE ROOMS
55	CORRIDORS W/O SMOKE DOORS
60	CORRIDORS WITH SMOKE DOORS
65	ELEVATOR EQUIPMENT ROOMS
70	ELECTRICAL DISTRIBUTION ROOMS-PRIMARY
75	ELECTRICAL DISTRIBUTION ROOMS-SECONDARY
80	GYMNASIUMS AND AUDITORIUMS
85	HEATING AND VENTILATION PROTECTION
90	KITCHENS
95	LABORATORY FACILITIES
100	LAUNDRY CHUTES
105	LAUNDRY ROOMS
110	LOUNGES AND SMOKING ROOMS
115	LOCKER ROOMS
	LOBBIES AND ENTRANCES
	LUNCH ROOMS AND

Room Identification Code. Includes over 50 of the most widely used room types.

Computerized Pyr-A-Larm Analysis System.

Studies, recommends, and documents the appropriate Early Warning Fire Detection Systems in accordance with the latest Fire Detection engineering practices for your specific hazard.

remote alarm lamps or audible signals are normally used in the room, you'll get that information too. In addition, you'll get suggested guidelines for other good fire detection practices (detector locations, remote alarm lamps, possible explosion-proof requirements, ventilation problems, etc.). Plus system summaries that to date have not been provided, such as, recap by areas, and by zones. Consider all the exclusive benefits of COMPAS. Every analysis incorporates the cumulative knowledge and experience of over a quarter century of early warning fire detection throughout the world. The information comes back to you in minutes, rather than days or weeks. And the data you receive is expressed in a variety of ways, ready for immediate use. This Computerized Analysis System virtually eliminates the risk of incorrectly designing your next fire detection system.

```
========================================
M NUMBER     4 ZONE NUMBER      2 ROOM TYPE 170

M LENGTH      36.0 TIME PER AIR CHANGE      6.0
M WIDTH       39.0 AIR FLOW IN CFM       2574.0
M HEIGHT      11.0 SQUARE FOOTAGE        1404.0
A 101-73[10-1235] REQUIRES SOME ROOMS GT 1000 FT2 TO HAVE TWO EXITS
NDBY POWER ROOMS
IZATION DETECTORS COMBINED WITH INFARED
ECTORS ARE RECOMENDED FOR THIS AREA .
H VENTILATION RATES CAN BE PRESENT IN THESE
AS, CARE SHOULD BE TAKEN IN THE LOCATING OF THE UNITS.
ANUAL PULL STATION IS RECOMENDED HERE.

OF DETECTORS    2  MAXIMUM   SPACING     750.0
UAL SPACING 702.0  SQUARE FEET/DETECTOR
UAL PULLS       1  REMOTE ALARM LAMPS        0
 INFARED DETECTOR REQUIRES A  10 SECOND DELAY

OF DETECTORS    4  MAXIMUM   SPACING     0000.0
UAL SPACING 351.0  SQUARE FEET/DETECTOR
UAL PULLS       1  REMOTE ALARM LAMPS        0
========================================
M NUMBER     5 ZONE NUMBER      2 ROOM TYPE 150

M LENGTH      36.0 TIME PER AIR CHANGE      8.0
M WIDTH       37.0 AIR FLOW IN CFM       1332.0
M HEIGHT       8.0 SQUARE FOOTAGE        1332.0
A 101-73[10-1235] REQUIRES SOME ROOMS GT 1000 FT2 TO HAVE TWO EXITS
IENT ROOMS
            RECOMENDED FOR THIS AREA
            UTSIDE THIS ROOM.
```

Room Print Out From Computer. Includes all input data.

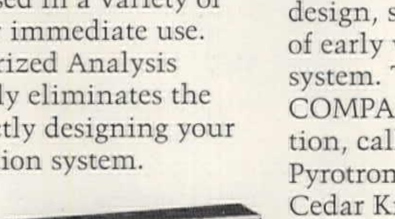
```
YSTEM RECAP BY AREAS--

NE   ROOM    SQ FT/    TYPE OF DETECTORS    #-OF  #-OF #-OF
BER NUMBER  DETECT.  ION R-R THERM INF    BELLS MAN  RALS
      1       360      1   0    0     0     0    1    1
      2       126      0   0    2     0     1    1    0
      3       361      1   0    0     0     0    0    0
      4       351      2   0    0     4     0    1    0
      5       666      2   0    0     0     0    0    2


YSTEM RECAP BY ZONES--

E   NUMBER TOTAL       TYPE OF DETECTORS   ADDITIONAL EQPT
    OF     SQUARE      IN EACH ZONE        IN EACH ZONE
                       ION R-R THERM INF
                       --  ---  --
```

Area Recap/Zone Recap. Returns all data including square footage, detectors, additional equipment and zones.

```
---PRICING INFORMATION---
 1. ALL DETECTORS INCLUDE BASE AND INDICATING LAMP.
 2. ALL PRICES SUBJECT TO REGULAR TERMS.
 3. CONTROL EQUIPMENT IS NOT INCLUDED.
 4. PRICING IS FOR HIGH VOLTAGE ONLY.

PYROTRONICS IONIZATION DET.      4 @93.00 EA      372.00
PYROTRONICS RATE OF RISE         2 @33.50 EA       67.00
INFRARED FLAME DETECTORS         4 @150.00        600.00
BAC-6S POLARIZED ALARM BELL      1 @22.50 EA       22.50
MFS-2 MANUAL STATIONS            3 @19.00 EA       57.00
  (SURFACE MOUNTING BOX NOT INCLUDED)
REMOTE ALARM LAMPS               3 @ 6.50 EA       19.50

 TOTAL PRICE                                     1138.00

TIME              ANALYSIS   14:33
```

Precise Cost of System. Provides exact price of each and every detector!

We invite you to investigate this remarkable breakthrough in the design, specification and pricing of early warning fire detection system. To learn more about COMPAS, or to see a demonstration, call William A. Columbus, Pyrotronics, 8 Ridgedale Avenue, Cedar Knolls, New Jersey 07927 (201) 267-1300.



"COMPAS"

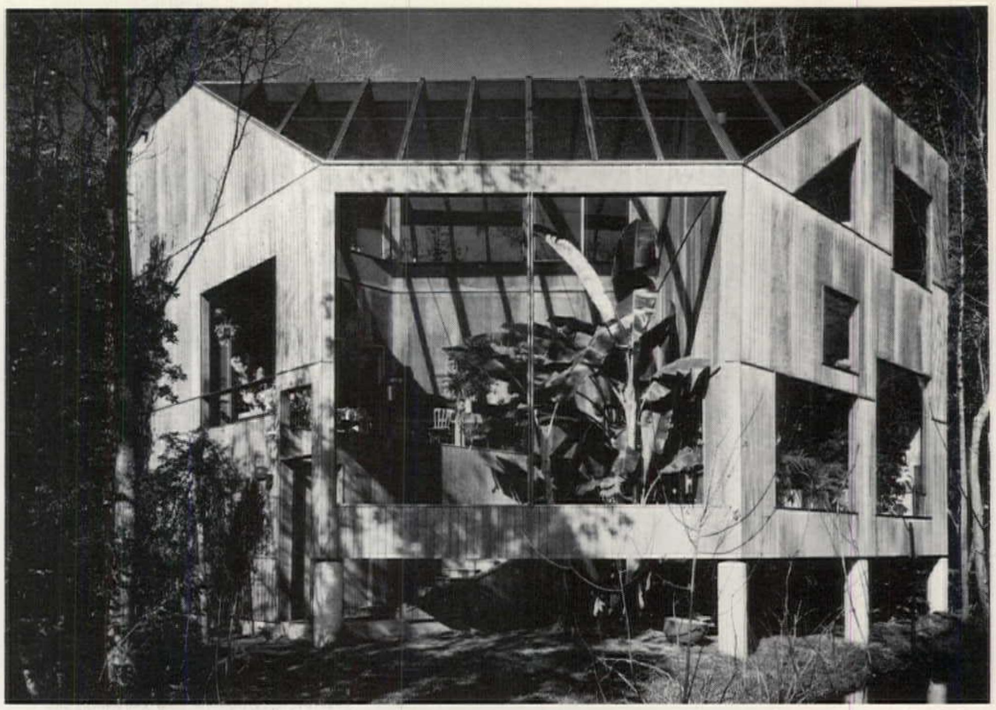
by Pyr-A-Larm®

A Division of Baker Industries, Inc.

BAKER INDUSTRIES

going on from page 10
Jacksonville, Fla., for a home located near downtown Jacksonville. (right) Yu Sing Jung, AIA, of Jung/Brannen Associates, Boston, won the first award in the residential/ multifamily class for student housing at Brandeis University.

In the vacation home category, top honors went to David C. Hoedemaker, AIA, partner of Naramore Bain Brady & Johanson, Seattle, for a resort community of privately owned condominiums at Port Ludlow, Wash. The Shaxted Gift Shop won a first award in the commercial/institutional category for Robinson Neil Bass, AIA, of Robinson Neil Bass & Associates, Nashville. Ten other firms were awarded citations of merit.



1974 Library Awards Honor Five Buildings

There's evidence of greater understanding of the team concept—of architects and librarians working together—in this year's submissions in the Library Building Awards Program, says the jury. Sponsored by the AIA, the American Library Association and the National Book Committee, the program is a biennial event that recognizes outstanding design of academic, public and school libraries.

The jury also notes a trend in public libraries to provide "attractive alternatives for leisure time use, opportunities for cultural enrichment and a format for the exhibition of community life in general,"

with greater emphasis upon continuing education and community activities. School and university libraries are also "moving into an integration into the total life" of their communities. "Today," the jury comments, "a library must be a dynamic environment and a functional resource—a communications center available to all."

Jurors for the 1974 program were Paul A. Kennon, AIA, chairman; Milton Byam, District of Columbia Public Library, Washington, D.C.; W. Byron Ireland, FAIA; Frazer G. Poole, Library of Congress, Washington, D.C.; and David R. Smith, Hennepin County Library, Edina, Minn. Exhibit panels of the winning designs will be shown at the AIA convention this month, and at the convention of the American Library Association in July in New York City.

Honor awards were won by:

- Monroe C. Gutman Library, Harvard Graduate School of Education, Cambridge, Mass. (Academic libraries category.) Architects: Benjamin Thompson & Associates, Inc., principals in charge: Benjamin Thompson, AIA, and Thomas Green, AIA.
- Southdale Hennepin Area Library, Minneapolis. (Public libraries category.) Architects: The Hodne/Stageberg Partners, Inc.
- North Branch Library, Omaha. (Public libraries category.) Architects: Dana Larson Roubal & Associates.

Awards of merit went to:

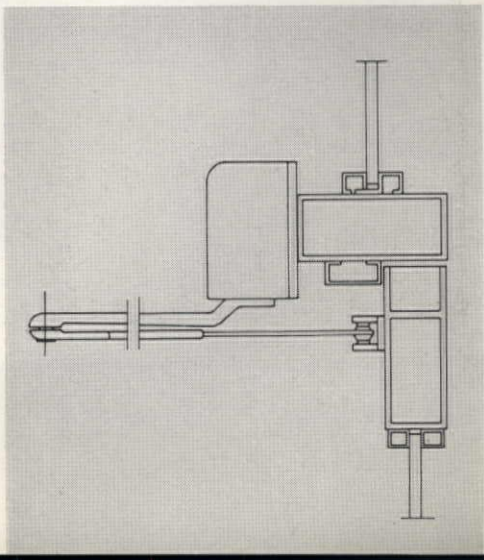
- Villa Angela Academy, Cleveland. (School libraries category.) Architects: Richard Fleischman Architects, Inc.
- Loyola-Notre Dame Library, Baltimore. (Academic libraries category.) Architects: Meyer Ayers Saint Stewart, Inc.; principal in charge: Richard W. Ayers, FAIA; project designer: Stephan Matthias.

Students Compete For Energy Awards

Timonium Elementary School near Baltimore has become the first in the nation to obtain heat from solar energy. It is one of four experiments at schools in northern and middle latitudes of the U.S. to test the use of sunpower for heating funded by the National Research Foundation's program of Research Applied to National Needs.

Some 5,700 square feet of solar energy collector panels on the Baltimore school's roof will heat water to replace an oil-fired steam heat system for one classroom wing. Similar in construction to many schools across the nation, Timonium is a one-

continued on page 16



going on from page 14
story building with window walls on one side of each room. The solar system is phased to collect and store heat one day, use the heat early the next day and then repeat the cycle.

The National Bureau of Standards and the New York City Board of Education are cooperating in another effort for energy conservation by schools. The bureau is "encouraged by studies conducted on other energy-conservant buildings that point to savings as great as 40 percent." A four-year project will conduct a cross-section survey of secondary schools in Manhattan to determine a statistical average of the relationship of types of construction to energy use, make predictions on energy use from alternative engineering options and include design and construction of a prototype facility.

Educational Design Awards

The magazine *American School and University* conducts an annual awards program to encourage excellence in design of educational facilities. This year the Houston firm of Caudill Rowlett Scott came away with three awards. The winning designs are for the De Vry Institution, Bell & Howell Schools, Chicago; the Performing Arts Hall, University of Akron, Akron, Ohio; and student housing at State University College, Brockport, N.Y.

Other winners are:

- McLeod Ferrara Ensign of Washington, D.C., for the College Community Center, Essex Community College, Baltimore County, Md.
- Marshall & Brown of Kansas City, Mo., for the Penn Valley Community College, Kansas City, Mo.
- Reid & Tarics Associates of San Francisco for the Applied Sciences Building, University of California at Santa Cruz.
- DeMars & Wells of Berkeley, Calif., for the College Union, California State University & Colleges, Sacramento, Calif.
- Geddes Brecher Qualls Cunningham of Philadelphia for Stockton State College, Galloway Township, N.J.

For the Unloved

A woman in Vancouver, B.C., has asked the Canadian government for a $33,729 grant to finance a mobile bordello, reports the magazine *Planning* in its December '73 issue. Dominique Danielle has applied for a Local Initiative Project grant for a mobile unit, staffed by "qualified ladies," to travel the province, "stopping unannounced and unexpected where men live alone and unloved."

Getting Electrical Power From Giant Windmills

Don Quixote tilted with windmills, but now that the conservation of energy is a primary concern, they are being given a serious look as feasible means of generating electric power.

Experimentations with windmills as a source of energy were undertaken in Europe in 1930-50, and in 1940, a unit of 1.25 megawatts was erected in Rutland, Vt. and tied into a public utility system.

Interest in windmills declined because they were not economically competitive with fossil fuel generating systems. Over the past two decades, however, developments in materials, computer modeling, meteorology, aerodynamics and fabrication techniques may result in increased capabilities of wind energy systems and decreased costs. Renewed interest in windmills is underscored, of course, by the present fossil fuel shortages.

One study being undertaken to determine the performance, operating and economic characteristics of wind energy systems for the future generation of commercial electric power is a joint venture by the National Science Foundation and the National Aeronautics and Space Ad-

continued on page 21

going on from page 16
ministration. They have entered into an agreement for the design, building and testing of an experimental 100 kilowatt wind turbine generator.

Equipped with a 125-foot diameter rotor blade mounted on a 125-foot tower, the experimental system will be built at NASA's test area in Sandusky, Ohio. NSF says that this 100 kw windmill "is a step toward projected future windmills capable of producing 1-2 megawatts each—that is, systems generating millions of watts of electricity."

Other windmills in the news include a semi-rigid airfoil design called "sailwing," owned by Princeton University. It was developed by aerospace scientist Thomas E. Sweeney and a group of Princeton students. Including its aluminum mast and its 25-foot diameter sailwing motor, it weighs only 300 pounds. Made of dacron, like the sails of a boat, the wing consists of a rigid leading edge, tip and root section. The tip and root of the wing are connected to a trailing edge cable fastened to a wrapped-around sail. There is no need for ribs, braces or further supporting structure. When the winds blow, the wing takes on an airfoil curvature; the fabric lies in a flat plane at rest.

Sweeney has tested the sailwing in gales, freezing rain and heavy snow for a year, and it has been undamaged. He thinks that

the 25-foot sailwing, plus storage and generating system, could be produced to sell for about $3,500 to $4,000, making it an "exceedingly reasonable clean energy source where the wind is dependable." Bigger sailwings, he says, could produce enough energy to supply all of the power for some small windy communities.

Recently, the Grumman Aerospace Corp. obtained exclusive rights and a licensing agreement with Princeton to use the sailwing design in the development of an advanced wind generator system. Grumman expects to develop a prototype system within the next few months.

Federal Funds Available For Bikeways

For the first time, guidelines have been released which authorize the expenditure of federal aid highway funds for the construction of bikeways and pedestrian walkways outside the normal right-of-way along federal aid highways. Except on the Interstate, cyclist and pedestrian facilities may be constructed on a funding basis of 70 percent federal and 30 percent state moneys.

Federal Highway Administrator Norbert T. Tiemann says that the program "does not involve a separate fund for construction of bikeway and pedestrian walkways; rather it simply authorizes the use of funds appropriated for highways for these purposes at the discretion of the state agency administering the funds." Each state agency, then, must decide if it will use a portion of its federal aid highway funds for such purposes.

Gas Stations as Clinics

The fuel shortage has brought about a rash of abandoned filling stations. Since early last year, more than 1,200 gas stations have closed in New York City alone. What to do with these eyesores whose depressing impact is felt by city neighborhoods? One

▲ *Electric Energy Insert*
Circle 12 on information card

suggestion, by Steven P. Papadatos, AIA, is to turn them into emergency and clinic facility hospital satellites. Papadatos, whose designs of filling stations have brought him national attention (*see Mar. '73, page 30*), thinks that all those white enameled facades look like hospital facilities anyway.

Now the closed stations could become a community asset, Papadatos believes. He cites the built-in electrical and plumbing installations already available in the stations and the fact that most of them are located on well-traveled streets and freeways. Also, there's plenty of parking space around them. Some of them might make day-care centers or methadone clinics.

The Elderly Need Space and Privacy

If an elderly person has a private bedroom unit rather than a studio apartment, it can mean the difference between an idle old age and an active one, says Bettyann Raschko, an authority on architectural design for the elderly and assistant professor of architecture at the University of California, San Francisco.

Through research, she has found that senior citizens who live in studios will give up an activity or fail to take up a new hobby because it "messes things up." But those who have a separate bedroom have space to store projects and will pursue new interests. "The elderly," says Professor Raschko, "will let nothing jeopardize a quality of order in their units." Order is so important to them that they will limit or forego activities that could enrich their lives. She urges designers of facilities for the elderly to include private spaces or areas that a person can manage according to his own wishes. "Possession of a tangible piece of space," she says, "seems almost essential for one's identity."

No Retreat On the Environment

This nation must "neither relax nor retreat" from its commitment to achieve and ensure a healthy and humane environment because of the energy crisis, declared Russell E. Train, administrator of the U.S. Environmental Protection Agency, in a recent address to the United Mine Workers in Pittsburgh. He said that the nation must commit itself to a national goal of a 2 to 3 percent annual growth in energy demand, or roughly half the 5 percent rate experienced from 1968 to 1972. If we continue to "indulge in a no-deposit, no-return attitude toward our earth and its resources, we will run out of energy and ruin our environment," he said.

Train called for more energy-efficient building designs, solar conscious plans, wider use of improved insulation, tailored lighting systems in commercial structures and upgraded standards for residences. These and similar measures will be needed, he remarked, to reduce the 1990 energy demand in residential and commercial buildings by at least one third.

Train, newly elected to honorary membership in the AIA, has recommended in a speech before the National Resources Conference of the American Farm Bureau Federation that revenues from the "windfall profits" tax on oil companies proposed by President Nixon be used to promote mass transit. He suggested that we take direct and decisive action to "ensure that we do not waste in gas-guzzling, air-polluting automobiles the fuel that we desperately need for far more basic activities such as the production of food and fiber." He declared that both energy and environmental ills stem essentially from the same source: patterns of development that waste our energy resources and lay waste to the natural environment.

Pioneering Radburn Declared a Neighborhood

For the first time in 45 years, the scheme of mutual covenants and charges established as the legal framework for the extra-municipal government of the greenbelt community of Radburn, N.J., has had an adjudication in court. A judge in Bergen County, N.J., dismissed a suit brought against the Radburn Association by the owner of a commercial building in the town who objected to charges levied against his company by the association. It took two years of legal maneuvering before the decision was handed down.

Radburn's scheme of mutual covenants and charges, established in 1929, called for the association to set up differing categories of charges for industrial, commercial and residential properties. The association, governed by residents, was deeded all the parks and common spaces and entrusted with architectural control by the City Housing Corporation, the developing limited dividend company.

The owner of the store/office building, erected in 1928, claimed that it received no benefits from the swimming pools and tennis courts in Radburn and sued the association to have the scheme of charges declared invalid because Radburn had not realized itself as the "neighborhood" originally contemplated.

When the judge heard the case, the association called Charles S. Ascher, who drafted the documents. He was asked by the judge to testify to the history of "towns for the motor age," beginning with the contributions of Patrick Geddes. Ascher and other witnesses testified that Radburn was, indeed, a "neighborhood."

continued on page 26

going on from page 26
the Growth of Cities." Original papers are welcomed on any aspect of planning, designing, construction and maintenance of tall buildings. Intended authors are asked to send six copies of an abstract of 200-500 words before July 1 to Dr. Arthur N. L. Chiu, University of Hawaii, Holmes Hall 240-PPTBC, 2540 Dole St., Honolulu, Hawaii 96822.

LETTERS

From the Younger Generation: In my article in the October '73 issue titled "Opening Their Eyes to Architecture," I told about my talks to sixth, seventh and eighth graders about the profession of architecture. Perhaps readers will be interested in a few excerpts from "fan mail" from my latest talk:

"I think architecture is a fine subject. I only thought architecture was designing buildings. How much is the price of the materials going up? How much do you get paid on the average building?"

"I think your materials were very good, and your blueprints were good, too. Please don't make any more schools."

"Thank you very much for taking the time to talk to us. I enjoyed it very much. Being an architect must be an interesting job. In fact, I would like to be one."

"Thank you very much for coming to our school and showing us all about architecture. It was very interesting, but I'd still rather be a helicopter pilot like my uncle."

The last letter proves that you can't win 'em all! *David R. Dibner, FAIA*
West Orange, N.J.

Buildings and Winds: The March issue contained an article by me titled "Games That Buildings Play with Winds." For readers who may wish to do further investigation of these matters, I'd like to suggest several references. They are:

1. *Building Research Station Digest,* No. 141, May 1972. Building Research Station, Garston, Watford, England.
2. "Taming Man-Made Winds." Joseph Hanlow. *New Scientist,* June 1972.
3. "Fence Designs to Keep Wind from Being a Nuisance." Michale O'Hare and Richard Kronauer. *Architectural Record,* July 1969.

Ralph W. Crump
Department of Architecture
Cornell University
Ithaca, N.Y.

Environmental Impact Statements: Nils M. Schweitzer, FAIA, served as a good advocate for land conservation in his article titled "The EIS: What It Entails" in the February issue. Unfortunately, his advocacy has given him a false perception of the EIS process.

He states that "understanding of the EIS must begin from the basis of the reverence for life in terms of land." If he had stopped at the word "life," I could agree with him.

My perception of the EIS process and that expressed in recent court decisions is that the EIS provides a mechanism for reaching a balance between the many elements which should be considered in a good design and decision-making process. These include land, people, plants and the totality of life.

Too often, architects assume the posture of the ardent conservationist. As we owe our livelihood to the modification of man's environment, we cannot do this. We can, however, demand a balance of life's processes in the work in which we are engaged. *Edward M. Burke, AIA, AIP*
Seattle

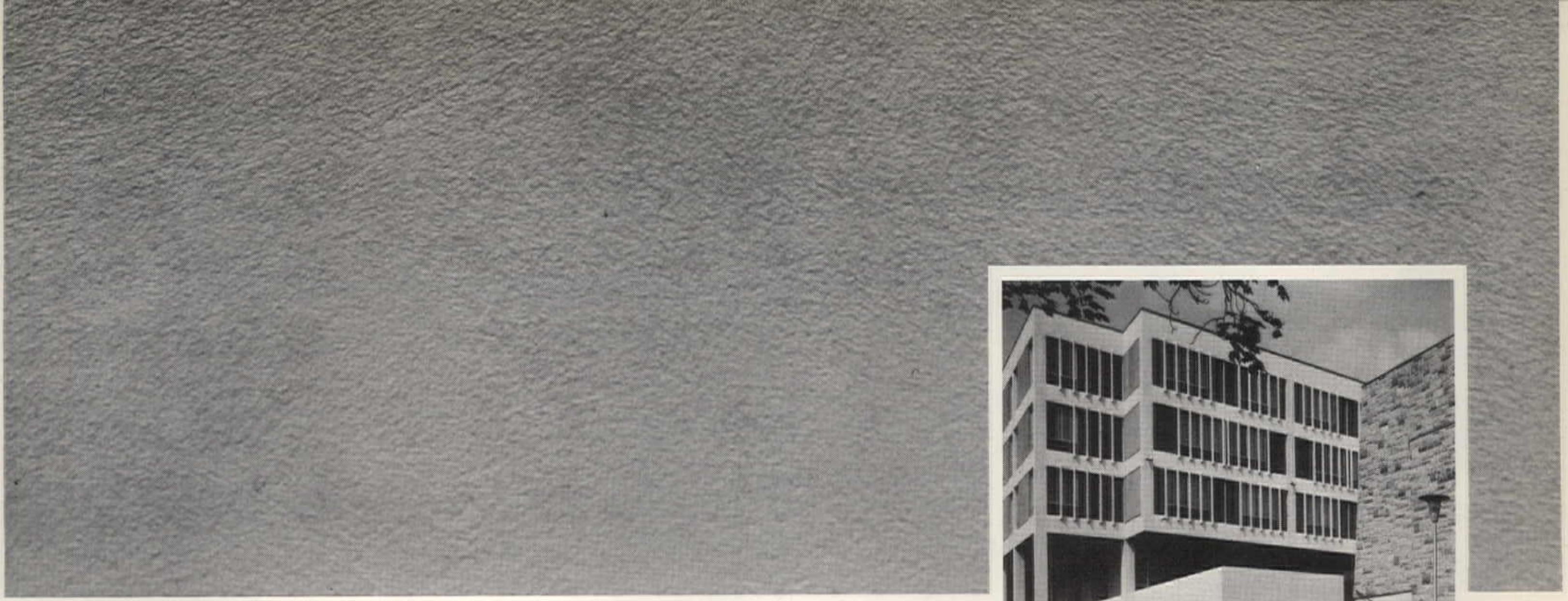
In the Vanguard?: I am a 28-year old architect and work in Winterthur-Zürich, Switzerland. I am interested in exchanging ideas with an avant-garde American architect.

J. J. Potylo-Glanzmann
Talackerstrasse 36
CH-8404 Winterthur-Zürich, Switzerland

The AIA Journal encourages expressions of opinions from its readers but reserves the right to edit for length and style. Address letters to the Editor at AIA Headquarters.

EVENTS

May 19-23: AIA National Convention and Exposition, Sheraton Park & Motor Inn, Washington, D.C. (reconvened session, May 27-30, Madrid.)
May 26-31: International Prestressed Concrete Conference, New York Hilton and Waldorf-Astoria Hotels, New York City. Contact: Prestressed Concrete Institute, 20 N. Wacker Drive, Chicago, Ill. 60606.
May 27-29: International Bicycle/Pedestrian Planning and Design Seminar, London. Contact: Metropolitan Association of Urban Designers and Environmental Planners, P.O. Box 722, Church St. Station, New York, N.Y. 10008.
May 29-31: Industrialized Building Seminar, University of Illinois, Urbana/Champaign, Ill.
May 30-31: Symposium on Basic Questions of Design Theory, Columbia University, New York City.
May 30-June 1: Environmental Design Research Association Conference, Milwaukee. Contact: Dan Carson, University of Wisconsin, School of Architecture, Milwaukee, Wis. 53201.
May 31: Letters of interest due, A/E firms or joint venture to provide planning and design services for a hospital in San Diego. Contact: Naval Facilities Engineering Command, Contractor Liaison Officer, Code 09J, 200 Stovall St., Alexandria, Va. 22332.
June 4-5: Seminar on the Design, Construction, Maintenance and Repair of Concrete Floors, College Park, Md. Contact: Portland Cement Association, Old Orchard Rd., Skokie, Ill. 60076.
June 5-8: Association of Collegiate Schools of Architecture Annual Meeting, Grove Park Inn, Asheville, N.C.
June 7-9: Conference on Land Use Litigation: Critical Issues for Attorneys, Developers and Public Officials, Hyatt Regency O'Hare, Chicago. Contact: Urban Land Institute/American Bar Association Conference, 4025 Chestnut St., Philadelphia, Pa. 19104.
June 9-14: Geothermal Energy Conference, Asilomar Conference Grounds, Pacific Grove, Calif. Contact: Engineering Foundation, 345 E. 47 St., New York, N.Y. 10017.
June 11-13: Building Modernization and Maintenance Exhibition, McCormick Place, Chicago.
June 16-21: International Design Conference, Aspen, Colo. Contact: Aspen '74 Office, Room 10-411, MIT, Cambridge, Mass. 02139.
June 17-19: Design Automation Workshop, Denver Holiday Inn, Denver, Colo. Contact: Nitta P. Dooner, IBM Thomas Watson Center, Yorktown Heights, N.Y. 10598.
June 19-21: Conference on Contract Interior Environment, Merchandise Mart, Chicago.
June 23-28: American Society for Testing and Materials Annual Meeting, Shoreham and Sheraton Park Hotels, Washington, D.C.
June 24-28: Industrial Archeology Institute, Rensselaer Polytechnic Institute, Troy, N.Y.
July 1-3: Architects and Developers Seminar, Graduate School of Design, Harvard University, Cambridge, Mass.
July 3-6: National Society of Interior Designers/American Institute of Interior Designers Joint Conference, Denver, Col. Contact: NSID, 315 E. 62 St., New York, N.Y. 10021.
July 19: Entries due, Prestressed Concrete Institute Awards Program. Contact: PCI, 20 N. Wacker Drive, Chicago, Ill. 60606.
Aug. 2-18: Beautiful Scandinavia Tour. Contact: Historical Society of York County, 250 E. Market St., York, Pa. 17403.
Aug. 18-24: World Congress of the International Federation of Housing and Planning, New Town Hall, Vienna.
Aug. 31: Entries due, Owens-Corning Energy Conservation Awards Program. Contact: N.E. Meeks, Owens-Corning Fiberglas Corp., Architectural Products Division, Fiberglas Tower, Toledo, Ohio 43659. □



What is the place of architecture in an era of scarcity?

Despite widespread willingness to measure the energy crisis by the length of gas-station lines, and to consider it ended once they dwindle or disappear, there is little ground for reasonable doubt that such an era is upon us. Political scientist William Ophuls, writing in *Harper's,* suggests that historians may mark its beginning at the 100 percent rise in the price of Iranian oil last December, although tracing its gestation much further into the past, and characterizes the response of Western nations as combining the behavior of an ostrich and a flock of hens. Ophuls warns that what he terms "the end of the free lunch" may also bring an end to the societal optimism that has characterized the passing era of Western abundance and with it, perhaps, a diminution of liberty. Might architecture also be a casualty, as a kind of optional extra that a scarcity-minded society can no longer afford? The answer may

New Guidelines For Energy Savings in Office Buildings

be affirmative for the kind of architecture chiefly concerned with fashioning ornaments to abundance, which too much of our architecture has been. Conversely, an era of scarcity makes a virtual necessity of another kind of architecture—one based upon rigorous analysis of need and context, mindful of first cost but even more conscious of continued efficiency over the lifetime of the building. The pivotal role of architecture and the other building professions in coping with scarcity is emphasized in a preliminary and personal report by Leo A. Daly, FAIA, chairman of the AIA task force on energy conservation, being mailed to the membership this month.

Daly maintains that "present energy policies, with their emphasis on increased supply, seriously underplay the important role of conservation in general and of conservation in the built environment in particular. This imbalance," he says, "results in forfeiting major opportunities for better investment of the nation's energy resources."

In a complicated but convincing equation, Daly demonstrates that "the conservation potential of buildings is nearly equal to the forecasted shortfall in supply" of all forms of energy.

There is evidence that architects are ready to respond to the new demands of the era of scarcity. The Sweet's Division of McGraw-Hill recently surveyed 58 major firms and found that virtually all had instituted new energy and materials conservation measures in design.

The following two articles are intended to facilitate such response. The first is a checklist of energy-saving opportunities in design of office buildings. The principal value of such a list is as an "idea-jogger," as the Daly report notes, "but the greater need is for individualized professional evaluation of each potential conservation measure as it relates to the highly variable and often difficult to measure factors unique to a particular building and site."

The second article deals with the already painful impact of the era of scarcity—and particularly sporadic and seemingly random materials scarcities—upon the practice of architecture and the production and price of buildings. *Donald Canty*

On the following pages is perhaps the most comprehensive checklist of opportunities for saving energy in office building design yet available. It is drawn from a new General Services Administration document entitled "Energy Conservation Design Guidelines for Office Buildings," and much of it applies to other kinds of buildings as well.

The document was prepared for GSA's Public Buildings Service by the AIA Research Corporation, engineers Dubin-Mindell-Bloome Associates, and architects Heery & Heery. The guidelines that it contains will be applied to GSA's multibillion-dollar construction program, not as mandatory requirements but as stimuli to energy-conscious design. In fact, the document shows a salutary consciousness of the possibilities for generating new opportunities for energy savings through the very process of design.

Many of the guidelines, it acknowledges, "are not mutually compatible. In each case trade-offs must be thoroughly analyzed to select the measures which will be most conducive to energy conservation in a particular building. It is also obvious that a set of guidelines can never replace the intelligence and judgment of architects and engineers in evaluating energy savings against costs, human requirements and esthetic judgments."

And further: "In designing for energy conservation the entire building must be considered as a whole—a system in which there is interaction among the building envelope, the structure, the mechanical and electrical subsystems and the users of the building."

To underscore the point, the authors prepared the chart at right, showing some of the interrelationships that affect a building's design, cost and energy use.

Architects, engineers and members of the construction industry may obtain a copy of the document for $2 by writing to any of GSA's 11 Business Service Centers located in various regions of the country. Until July 1, comments may be directed to Walter A. Meisen, assistant commissioner for construction management, Public Buildings Service, Room 3341, GSA, 18th and F Sts. N.W., Washington, D.C. 20405.

Legend

Read: Items B affect items A

D indicates direct effect

I indicates indirect effect

— indicates no relationship

Priority column indicates magnitude of energy
H = high M = medium L = low

Energy Conservation Potential column indicates how much energy can be saved, potentially, on a scale of 1 to 10 (10 highest).

B \ A	Energy consumption	Solid waste management	Domestic hot water	Natural lighting system	Artificial lighting system	Power system	Cooling system	Heating system	Ventilation system	Natural ventilation	Infiltration amount	Heat gain: business machines	Heat gain: people	Heat gain: solar radiation	Heat gain: artificial lighting	Heat gain: power	Heat gain: temperature differential ventilation	Heat gain: cubic feet per minute ventilation	Heat gain: infiltration	Heat gain: transmission	Heat loss: solar radiation effects	Heat loss: temperature differential ventilation	Heal loss: cubic feet per minute ventilation	Heat loss: infiltration	Heat loss: transmission	Building structure	Building envelope	Building configuration	Building plan	Building orientation	Building site	Codes and standards	Physiological needs	Geographic location	Climate: wind	Climate: sun	Climate: temperature
Climate: temperature	D	—	—	I	—	—	I	I	I	D	—	—	—	—	—	—	D	—	D	D	—	D	—	D	D	—	D	D	D	—	—	—	—	—	—	—	
Climate: sun	D	—	—	D	—	—	I	I	—	D	—	—	—	D	—	—	—	—	—	D	D	—	—	—	D	—	D	D	D	D	—	—	—	—	—		—
Climate: wind	D	—	—	—	—	—	I	I	—	D	D	—	—	—	—	—	—	—	D	D	—	—	—	D	D	—	D	D	—	D	—	—	—	—		—	—
Geographic location	D	D	—	D	D	—	I	I	I	D	D	—	—	D	—	—	D	D	D	D	D	D	D	D	D	D	I	D	I	D	D	—	—		—	—	I
Physiological needs	D	D	D	—	D	I	I	I	D	D	—	D	D	—	D	I	I	D	—	D	—	—	D	—	D	—	—	—	—	—	—	—		—	—	—	—
Codes and standards	D	—	—	D	D	I	I	I	D	D	—	—	D	—	D	—	—	D	I	I	—	—	D	—	I	D	D	—	D	—	D		D	I	—	—	—
Building site	I	D	—	D	—	I	I	I	—	D	I	—	—	D	—	—	I	I	I	I	D	—	—	I	I	D	I	D	D	D		—	—	—	—	—	—
Building orientation	D	—	—	D	—	—	I	I	—	D	D	—	—	D	—	—	—	—	—	D	D	—	—	D	D	I	D	D	D		—	—	—	—	—	—	—
Building plan	D	—	—	D	D	D	D	D	D	D	D	I	—	D	D	D	—	D	D	D	I	—	D	D	D	D	D	D		I	I	—	—	—	—	—	—
Building configuration	D	—	—	D	D	D	D	D	D	D	D	—	—	D	D	—	—	D	D	D	D	—	D	D	D	D	D		D	I	D	—	—	—	—	—	—
Building envelope	D	—	—	D	D	—	D	D	I	D	D	—	—	D	—	—	—	—	D	D	D	—	—	D	D	D		D	I	I	—	—	—	—	—	—	—
Building structure	D	—	—	—	D	—	I	I	I	—	—	—	—	D	D	—	—	—	—	D	D	—	—	—	D		I	I	I	—	—	—	—	—	—	—	—
Heat loss: transmission	D	—	—	D	D	D	D	D	—	D	—	—	—	—	—	D	—	—	—	I	—	—	—	—		—	I	I	I	I	—	—	—	—	—	—	—
Heat loss: infiltration	D	—	—	D	—	I	D	D	D	D	D	—	—	—	—	D	—	I	D	—	—	—	I		—	—	I	I	I	I	—	—	—	—	—	—	—
Heat loss: cubic feet per minute ventilation	D	—	—	—	—	I	D	D	D	D	—	—	—	—	—	D	—	—	—	—	—	—		—	—	—	I	I	I	I	—	—	—	—	—	—	—
Heat loss: temperature differential ventilation	D	—	—	—	—	I	D	D	D	D	—	—	—	—	—	D	—	—	—	—	—		I	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Heat loss: solar radiation effects	D	—	—	D	—	I	D	D	D	D	—	—	—	D	—	I	—	—	—	—		—	—	—	D	—	I	I	I	I	I	I	—	—	—	—	—
Heat gain: transmission	D	—	—	D	D	D	D	D	—	D	—	—	—	—	I	D	—	—	—		—	—	—	—	I	—	I	I	I	I	—	—	—	—	—	—	—
Heat gain: infiltration	D	—	—	D	D	D	D	D	D	D	—	—	—	—	I	I	—	—		—	—	—	I	D	—	—	I	I	I	I	—	—	—	—	—	—	—
Heat gain: cubic feet per minute ventilation	D	—	—	D	D	D	D	D	D	D	—	—	—	—	I	D	D		I	I	—	—	—	—	—	—	I	I	I	—	—	D	—	—	—	—	—
Heat gain: temperature differential ventilation	D	—	—	D	D	D	D	D	D	D	—	—	—	—	I	D		D	I	I	—	—	—	—	—	—	I	I	I	—	I	—	—	—	—	—	—
Heat gain: power	D	—	—	—	—	D	D	D	D	D	—	D	—	—	I		D	D	I	I	—	I	I	—	—	—	I	I	I	—	—	—	—	—	—	—	—
Heat gain: artificial lighting	D	—	—	D	D	D	D	D	D	D	—	—	—	—		I	D	D	I	I	—	D	D	I	I	D	—	—	D	—	—	—	—	—	—	—	—
Heat gain: solar radiation	D	—	—	D	I	D	D	D	D	D	—	—	—		I	—	—	—	—	D	D	—	—	—	D	D	D	D	D	D	I	—	—	—	—	—	—
Heat gain: people	D	—	—	—	—	D	D	D	D	D	—	—		—	—	D	D	D	—	—	—	D	D	—	—	—	I	—	D	—	—	—	—	—	—	—	—
Heat gain: business machines	D	—	—	I	I	D	D	D	D	D	—		—	—	I	I	D	D	—	—	—	D	D	—	—	—	I	I	D	—	—	—	—	—	—	—	—
Infiltration amount	D	—	—	I	—	I	D	D	D	D		—	—	—	—	D	—	D	D	—	—	—	D	D	—	—	D	D	D	D	I	—	—	—	—	—	—
Natural ventilation	D	—	—	—	—	I	D	D	D		D	—	—	I	—	I	—	D	D	—	I	—	D	D	—	I	D	D	D	D	I	—	—	I	—	—	—
Ventilation system	D	—	—	I	I	D	D	D		D	D	—	—	—	I	D	D	D	I	—	—	D	D	I	—	D	I	I	D	—	—	—	—	—	—	—	—
Heating system	D	—	—	I	I	D	D		D	I	—	—	—	—	I	D	—	I	—	—	—	—	I	—	—	D	I	I	D	—	—	—	—	—	—	—	—
Cooling system	D	—	—	I	I	D		D	D	I	—	—	—	—	I	D	—	—	—	—	—	—	—	—	—	D	I	I	D	I	—	—	—	—	—	—	—
Power system	D	—	—	—	I		I	I	I	—	—	D	—	—	D	D	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Artificial lighting system	D	—	—	D		D	D	D	I	—	—	—	—	—	D	D	—	—	—	—	—	—	—	—	—	D	—	I	D	—	—	—	—	—	—	—	—
Natural lighting system	D	—	—		D	I	D	D	D	I	D	—	—	D	D	D	—	I	D	D	D	—	I	D	D	D	D	D	D	D	—	—	—	—	—	—	—
Domestic hot water	D	I		—	—	I	—	—	—	—	—	—	—	—	—	I	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Solid waste management	D		I	—	—	I	—	—	—	—	—	—	—	—	—	I	—	—	—	—	—	—	—	—	—	—	—	—	—	—	I	—	—	I	—	—	—
Energy comsumption		I	D	—	I	D	D	D	D	—	—	D	—	—	I	D	—	—	—	I	—	—	—	—	I	I	I	I	I	I	I	—	—	I	—	—	—
Priority		L	L	L	H	L	H	H	M	L	H	L	L	H	H	L	H	H	H	H	H	H	H	H	H	L	H	M	M	L	L	L	H	H	L	H	H
Energy Conservation Potential		1	2	3	8	2	9	9	5	3	7	2	2	9	10	5	8	8	6	8	7	9	9	7	10	1	9	5	5	3	4	4	10	10	2	7	10

A checklist of energy conservation opportunities, ranked in priority according to climatic conditions.

This checklist of energy-saving opportunities, appended to the guidelines, includes some items that subsume others. Some seem to border on the obvious, yet many contemporary buildings are testimony to the need for even seemingly obvious measures.

The items are ranked in priority and coded to the following climatic features: For winter, *A* indicates a heating season of 6,000 degree-days or more; *B* a heating season of 4,000 to 6,000 degree-days, and *C* 4,000 degree-days or less. The numeral *1* following these letters indicates sun 60 per cent of daylight time or more and wind nine miles per hour or more; *2* indicates the sun condition but not the wind condition; *3* indicates the wind condition without the sun condition, and *4* the absence of either condition.

For summer, the letter *D* indicates a cooling season of more than 1,500 hours at 80 degrees Fahrenheit; *E* 600 to 1,500 hours at the same temperature and *F* less than 600 hours. The numeral *1* indicates a dry climate of 60 per cent relative humidity or less and *2* indicates 60 per cent or more humidity.

Guidelines that are independent of climate are not rated in priority columns and are marked '*'.

SITE

	Priority 1	2	3	N/A
1. Use deciduous trees for their summer sun shading effects and wind break for buildings up to three stories.	A1 D1	A2 D2	A4 E1	C4 F
2. Use conifer trees for summer and winter sun shading and wind breaks.	C4 D1	C1 D2	C2 E1	A2 F
3. Cover exterior walls and/or roof with earth and planting to reduce heat transmission and solar gain.	A1 D1	A2 D2	A4 E1	C4 F
4. Shade walls and paved areas adjacent to building to reduce indoor/outdoor temperature differential.	C2 D1	C1 D2	C3 E1	A2 F
5. Reduce paved areas and use grass or other vegetation to reduce outdoor temperature buildup.	C2 D1	C1 D2	C3 E1	A2 F
6. Use ponds, water fountains, to reduce ambient outdoor air temperature around building.	C2 D1	C1 E1	C3 D2	A4 F
7. Collect rain water for use in building.	*			
8. Locate building on site to induce air flow effects for natural ventilation and cooling.	C2 F	C1 E1	C3 E2	A4 D2
9. Locate buildings to minimize wind effects on exterior surfaces.	A4 F	A1 E2	B4 E1	C2 D1
10. Select site with high air quality (least contaminated) to enhance natural ventilation.	C2 F	C1 E1	C3 E2	A4 D2
11. Select a site which has year-round ambient wet and dry bulb temperatures close to and somewhat lower than those desired within the occupied spaces.	*			
12. Select a site that has topographical features and adjacent structures that provide breaks.	A4 F	A1 E2	B4 E1	C3 D2
13. Select a site that has topographical features and adjacent structures that provide desirable shading.	C2 D2	C1 D1	B2 E2	A1 F
14. Select site that allows optimum orientation and configuration to minimize yearly energy consumption.	*			
15. Select site to reduce specular heat reflections from water.	C2 D2	C1 D1	B2 E2	A4 F
16. Use sloping site to bury building partially or use earth berms to reduce heat transmission and solar radiation.	A4 D1	A1 D2	A3 E1	C2 F
17. Select site that allows occupants to use public transport systems.	*			

BUILDING

	Priority 1	2	3	N/A
1. Construct building with minimum exposed surface area to minimize heat transmission for a given enclosed volume.	A4 D1	A1 D2	A3 E1	C2 F
2. Select building configuration to give minimum north wall to reduce heat losses.	A4	A1	A3	C2
3. Select building configuration to give minimum south wall to reduce cooling load.	D1	D2	E1	F
4. Use building configuration and wall arrangement (horizontal and vertical sloping walls) to provide self shading and wind breaks.	A4 D1	A1 D2	B4 E1	C3
5. Locate insulation for walls and roofs and floors over garages at the exterior surface.	A4 D1	A3 D2	A1 E1	C2 F
6. Construct exterior walls, roof and floors with high thermal mass with a goal of 100 pounds per cubic foot.	A4 D1	A1 D2	A3 E1	C3 F
7. Select insulation to give a composite U factor from 0.06 when outdoor winter design temperatures are less than 10 degrees F. to 0.15 when outdoor design conditions are above 40 degrees F.				
8. Select U factors from 0.06 where sol-air temperatures are above 144 degrees F. up to a U volume of 0.3 with sol-air temperatures below 85 degrees F.				
9. Provide vapor barrier on the interior surface of exterior walls and roof of sufficient impermeability to provide condensation.	*			

10. Use concrete slab-on-grade for ground floors.	A4	A1	A3	C2
	D1	D2	E1	F
11. Avoid cracks and joints in building construction to reduce infiltration.	A4	A1	A3	
	D2	E2	D1	
12. Avoid thermal bridges through the exterior surfaces.	A4	A1	A3	C3
	D2	D1	E2	F
13. Provide textured finish to external surfaces to increase external film coefficiency.	A4	A1	B4	C2
14. Provide solar control for the walls and roof in the same areas where similar solar control is desirable for glazing.	D2	D1	E2	A
15. Consider length and width aspects for rectangular buildings as well as other geometric forms in relationship to building height and interior and exterior floor areas to optimize energy conservation.	A4	A1	A3	C2
	D1	D2	E1	F
16. To minimize heat gain in summer due to solar radiation, finish walls and roofs with a light-colored surface having a high emissivity.	D1	D2	E1	
17. To increase heat gain due to solar radiation on walls and roofs, use a dark-colored finish having a high absorptivity.	A1	A2	A4	C2
18. Reduce heat transmissions through roof by one or more of the following items:				
a. Insulation.	A4	A1	A3	C3
	D1	D2	E1	F
b. Reflective surfaces.	C2	C1	C3	A4
	D1	D2	E1	
c. Roof spray.	D1	E1	F	
d. Roof pond.	D1	E1	F	
e. Sod and planning.	A4	A1	A3	C2
	D1	D2	E1	F
f. Equipment and equipment rooms located on the roof.	A4	A1	A3	
	D1	D2	E1	
g. Provide double roof and ventilate space between.	D1	D2	E1	F
19. Increase roof heat gain when reduction of heat loss in winter exceeds heat gain increase in summer:				
a. Use dark-colored surfaces.	A2	A1	B2	B1
b. Avoid shadows.	A2	A1	B2	B1
20. Insulate slab on grade with both vertical and horizontal perimeter insulation under slab.	A	B	C	
21. Reduce infiltration quantities by one or more of the following measures:				
a. Reduce building height.				
b. Use impermeable exterior surface materials.	A4	A1	A3	C4
c. Reduce crackage area around doors, windows, etc., to a minimum.	D2	E2	D1	F
d. Provide all external doors with weather stripping.				
e. Where operable windows are used, provide them with sealing gaskets and cam latches.				
f. Locate building entrances on downwind side and provide wind break.				
g. Provide all entrances with vestibules; where vestibules are not used, provide revolving doors.				
h. Provide vestibules with self-closing weather-stripped doors to isolate them from the stairwells and elevator shafts.	A4	A1	A3	C4
	D2	E2	D1	F
i. Seal all vertical shafts.				
j. Locate ventilation louvers on downwind side of building and provide wind breaks.				
k. Provide break at intermediate points of elevator shafts and stairwells for tall buildings.				
22. Provide wind protection by using fins, recesses, etc., for any exposed surface having a U value greater than 0.5.	A4	A1	B4	C2
23. Do not heat parking garages.	*			
24. Consider the amount of energy required for the protection of materials and their transport on a life-cycle energy usage.	*			
25. Consider the use of the insulation type which can be most efficiently applied to optimize the thermal resistance of the wall or roof; for example, some types of insulation are difficult to install without voids or shrinkage.	*			
26. Protect insulation from moisture originating outdoors, since volume decreases when wet. Use insulation with low water absorption and one which dries out quickly and regains its original thermal performance after being wet.	*			
27. Where sloping roofs are used, face them to the south for greatest heat gain benefit in the wintertime.	A1	A2	B1	C4
28. To reduce heat loss from windows, consider one or more of the following:				
a. Use minimum ratio of window area to wall area.				
b. Use double glazing.				
c. Use triple glazing.				
d. Use double reflective glazing.	A4	B4	C4	
e. Use minimum percentage of the double glazing on the north wall.	A1	B1	C1	
	A2	B2	C2	
f. Manipulate east and west walls so that windows face south.	A3	B3	C3	
g. Allow direct sun on windows November through March.				

h. Avoid window frames that form a thermal bridge.
i. Use operable thermal shutters which decrease the composite U value to 0.1.

29. To reduce heat gains through windows, consider the following:
- **a.** Use minimum ratio of window area to wall area.
- **b.** Use double glazing.
- **c.** Use triple glazing. D1 E1 F
- **d.** Use double reflective glazing. D2 E2 F
- **e.** Use minimum percentage of double glazing on the south wall.
- **f.** Shade windows from direct sun April through October.

30. To take advantage of natural daylight within the building and reduce electrical energy consumption, consider the following:
- **a.** Increase window size but do not exceed the point where yearly energy consumption, due to heat gains and losses, exceeds the saving made by using natural light.
- **b.** Locate windows high in wall to increase reflection from ceiling, but reduce glare effect on occupants. C2 B2 A2 / C1 B1 A1
- **c.** Control glare with translucent draperies operated by photo cells. C3 B3 A3 / C4 B4 A4
- **d.** Provide exterior shades that eliminate direct sunlight, but reflect light into occupied spaces. F E D
- **e.** Slope vertical wall surfaces so that windows are self-shading and walls below act as light reflectors.
- **f.** Use clear glazing. Reflective or heat absorbing films reduce the quantity of natural light transmitted through the window.

31. To allow the use of natural light in cold zones where heat losses are high energy users, consider operable thermal barriers. A4 A1 B4 C3

32. Use permanently sealed windows to reduce infiltration in climatic zones where this is a large energy user. A1 A4 B1 C3 / D1 D2 E1 F

33. Where codes of regulations require operable windows and infiltration is undesirable, use windows that close against a sealing gasket. A1 A4 B1 C3 / D1 D2 E1 F

34. In climatic zones where outdoor air conditions are suitable for natural ventilation for a major part of the year, provide operable windows. C2 C3 C1 A4 / F E1 E2 D2

35. In climate zones where outdoor air conditions are close to desired indoor conditions for a major portion of the year, consider the following:
- **a.** Adjust building orientation and configuration to take advantage of prevailing winds.
- **b.** Use operable windows to control ingress and egress of air through the building.
- **c** Adjust the configuration of the building to allow natural cross ventilation through occupied spaces. F E1 E2 D2
- **d.** Use stack effect in vertical shafts, stairwells, etc., to promote natural air flow through the building.

PLANNING

Priority			
1	2	3	N/A

1. Group services rooms as a buffer and locate at the north wall to reduce heat loss or the south wall to reduce heat gain, whichever is the greatest yearly energy user. A4 A1 A3 C2 / D1 D2 E1 F

2. Use corridors as heat transfer buffers and locate against external walls. A4 A1 A3 C2 / D1 D2 E1 F

3. Locate rooms with high process heat gain (computer rooms) against outside surfaces that have the highest exposure loss. A4 A1 A3 C2

4. Landscaped open planning allows excess heat from interior spaces to transfer to perimeter spaces which have a heat loss. *

5. Rooms can be grouped in such a manner that the same ventilating air can be used more than once, by operating in cascade through spaces in decreasing order of priority, i.e., office-corridor-toilet. *

6. Reduced ceiling heights reduce the exposed surface area and the enclosed volume. They also increase illumination effectiveness. *

7. Increased density of occupants (less gross floor area per person) reduces the overall size of the building and yearly energy consumption per capita. *

8. Spaces of similar function located adjacent to each other on the same floor reduce the use of elevators. *

9. Offices frequented by the general public located on the ground floor reduce elevator use. *

10. Equipment rooms A4 A3 B4 C2

	1	2	3	N/A
located on the roof reduce unwanted heat gain and heat loss through the surface. They can also allow more direct duct and pipe runs reducing power requirements.	D1	D2	E1	
11. Windows planned to make beneficial use of winter sunshine should be positioned to allow occupants the opportunity of moving out of the direct sun radiation.	*			
12. Deep ceiling voids allow the use of larger duct sizes with low pressure drop and reduce HVAC requirements.	*			
13. Processes that have temperature and humidity requirements different from normal physiological needs should be grouped together and served by one common system.	*			
14. Open planning allows more effective use of lighting fixtures. The reduced area of partitioned walls decreases the light absorption.	*			
15. Judicious use of reflective surfaces such as sloping white ceilings can enhance the effect of natural lighting and increase the yearly energy saved.	*			

VENTILATION AND INFILTRATION

	Priority			
	1	2	3	N/A
1. To minimize infiltration, balance mechanical ventilation so that supply air quantity equals or exceeds exhaust air quantity.	A D	B E	C F	
2. Take credit for infiltration as part of the outdoor air requirements for the building occupants and reduce mechanical ventilation accordingly.	A D	B E	C F	
3. Reduce C.F.M./occupant outdoor air requirements to the minimum considering the task they are performing, room volume and periods of occupancy.	A D	B E	C F	
4. If odor removal requires more than 2,000 cubic feet per minute exhaust and a corresponding introduction of outdoor air, consider recirculating through activated carbon filter.	A D	B E	C F	
5. Where outdoor conditions are close to but less than indoor conditions for major periods of the year, and the air is clean and free from offensive odors, consider the use of natural ventilation when yearly energy trade-offs with other systems are favorable.	C2 F	C1 E1	C3 E2	A2 D2
6. Exchange heat between outdoor air, intake and exhaust air by using heat pipes, thermal wheels, run-around systems, etc.	A D	B E	C F	
7. In areas subjected to high humidities, consider latent heat exchange in addition to sensible.	D2	E2	F	
8. Provide selective ventilation as needed; i.e., 5 cubic feet per minute/occupant for general areas and increased volumes for areas of heavy smoking or odor control.	*			
9. Transfer air from "clean" areas to more contaminated areas (toilet rooms, heavy smoking areas) rather than supply fresh air to all areas regardless of function.	*			
10. Provide controls to shut down all air systems at night and weekends except when used for economizer cycle cooling.	A D	B E	C F	
11. Reduce the energy required to heat or cool ventilation air from outdoor conditions to interior design conditions by considering the following:				
a. Reduce indoor air temperature setting in winter and increase in summer.	A D	B E	C F	
b. Provide outdoor air direct to perimeter of exhaust hoods in kitchens, laboratories, etc. Do not cool this air in summer or heat over 50 degrees F. in winter.	A D	B E	C F	

HEATING, VENTILATION AND AIRCONDITIONING

	Priority			
	1	2	3	N/A
1. Use outdoor air for sensible cooling whenever conditions permit and when recaptured heat cannot be stored.	*			
2. Use adiabatic saturation to reduce temperature of hot, dry air to extend the period of time when "free cooling" can be used.	D1	E1	F	
3. In the summer when the outdoor air temperature at night is lower than indoor temperature, use full outdoor air ventilation to remove excess heat and precool structure.	D1	E1	F	
4. In principle, select the air handling system which operates at the lowest possible air velocity and static pressure. Consider high pressure systems only when other trade-offs such as reduced building size are an overriding factor.	*			
5. To enhance the possibil-	*			

ity of using waste heat from other systems, design air handling systems to circulate sufficient air to enable cooling loads to be met by a 60 degree F. air supply temperature and heating loads to be met by a 90 degree F. air temperature.				
6. Design HVAC systems so that the maximum possible proportion of heat gain to a space can be treated as an equipment load, not as a room load.	*			
7. Schedule air delivery so that exhaust from primary spaces (offices) can be used to heat or cool secondary spaces (corridors).	*			
8. Exhaust air from center zone through the lighting fixtures and use this warmed exhaust air to heat perimeter zones.	*			
9. Design HVAC systems so that they do not heat and cool air simultaneously.	*			
10. To reduce fan horsepower, consider the following:				
a. Design duct systems for low pressure loss.	*			
b. Use high efficiency fans.	*			
c. Use low pressure loss filters concommitant with contaminant removal.	*			
d. Use one common air coil for both heating and cooling.	*			
11. Reduce or eliminate air leakage from duct work.	*			
12. Limit the use of re-heat to a maximum of 10 percent of gross floor area and then only consider its use for areas that have atypical fluctuating internal loads, such as conference rooms.	*			
13. Design chilled water systems to operate with as high a supply temperature as possible—suggested goal: 50 degrees F. (This allows higher suction temperatures at the chiller with increased operating efficiency.)	*			
14. Use modular pumps to give varying flows that can match varying loads.	*			
15. Select high efficiency pumps that match load. Do not oversize.	*			
16. Design piping systems for low pressure loss and select routes and locate equipment to give shortest pipe runs.	*			
17. Adopt as large a temperature differential as possible for chilled water systems and hot water heating systems.	*			
18. Consider operating chillers in series to increase efficiency.	*			
19. Select chillers that can operate over a wide range of condensing temperatures and then consider the following:				
a. Use double bundle condensers to capture waste heat at high condensing temperatures and use directly for heating or store for later use.	*			
b. When waste heat cannot be either used directly or stored, then operate chiller at lowest condensing temperature compatible with ambient outdoor conditions.	*			
20. Consider chilled water storage systems to allow chillers to operate at night when condensing temperatures are lowest.	*			
21. Consider the use of double bundle evaporators so that chillers can be used as heat pumps to upgrade stored heat for use in unoccupied periods.	*			
22. Consider the use of gas or diesel engine drive for chillers and large items of ancilliary equipment and collect and use waste heat for absorption cooling, heating, and/or domestic hot water.	*			
23. Locate cooling towers or evaporative coolers so that induced air movement can be used to provide or supplement garage exhaust ventilation.	*			
24. Use modular boilers for heating and select units so that each module operates at optimum efficiency.	*			
25. Extract waste heat from boiler flue gas by extending surface coils or heat pipes.	*			
26. Select boilers that operate at the lowest practicable supply temperature while avoiding condensation within the furnaces.	*			
27. Use unitary water/air heat pumps that transport heat energy from zone to zone via a common hydronic loop.	*			
28. Consider the use of thermal storage in combination with unit heat pumps and a hydronic loop so that excess heat during the day	*			

continued on page 66

Coping With the New Unpredictability Of Prices and Supply

Charles Thomsen, AIA

Inflation became a fact of life for the architectural profession and the construction industry in the late 1960s and early '70s, as predictable and seemingly uncontrollable as death and taxes. In any given year labor costs could be expected to rise 7 to 9 percent and materials prices 2 to 3 percent. The equally predictable results were budget overruns and schedule delays.

But now the situation has changed. The inflationary market is still with us but its uniformity and predictability aren't. The sudden emergence of energy shortages has combined with world market fluctuations and price controls to produce random scarcity in material supplies with correspondingly random quantum price jumps.

By slapping lids on the prices of certain commodities, price controls made them less profitable. Not surprisingly, many manufacturers turned to noncontrolled products and markets. For example, a price ceiling was placed on scrap iron, from which re-bar (reinforcing rods for concrete) is made. So what happened? Scrap was exported. The result was a severe shortage in re-bar, which happens to be essential to such basic building systems as foundations and structures.

That and similar scenarios are being repeated in hundreds of other cases. And the problem is far from over. Take re-bar again. Domestic and worldwide demand for scrap has increased in the last year to the point that apparently there won't be enough available. The demand is expected to rise this year by still another 50 percent, causing the Associated General Contractor's shortage committee to predict a 15 to 20 percent decline in re-bar supplies in 1974 from 1973.

Similarly, the total world demand for steel is great enough so that steel mills can shift to those product lines that are most profitable and markets that are more lucrative. One small steel mill on the West Coast was locked in by price controls to $124 per ton for its major product. Imagine the mill's reaction when Japan offered to buy its entire 1974 production at $244 a ton.

With the energy shortage to aggravate the situation, the picture has become even cloudier. Many, indeed most, construction materials are energy intensive in their manufacturing process. Much of the price of steel is the cost of the energy used to produce it. Glass, concrete and aluminum are all high energy consumers. And the materials used for gaskets to seal windows and insulate wire is a petroleum product.

Because so many building materials are energy intensive, it's difficult to know just which ones will be affected. Asphalt roofing has proved to be sensitive. In California, asphalt increased from $20 to $45 a ton last fall, and predictions now are that it will go even higher. On the other hand, acoustical tile has remained fairly steady in price. Diesel fuel prices doubled in a few months and continue to increase. This has limited the use of heavy construction equipment, most of which is diesel operated. Slowing down this support activity, delays schedules which increases costs.

Shortages are occurring in conduit, electrical and plumbing fixtures, synthetic fibered carpet, luminous ceilings materials, neoprene waterproofing, plastic flooring, plywood, wire mesh, roofing materials, and on and on, ad infinitum.

The result of all this unpredictability in materials' supply has been, predictably, extreme nervousness on the part of contractors, who have sought—not illogically—to protect themselves with high contingency bidding and, in some cases, to simply back out of contracts.

Typical of their alarm is a letter sent by one roofing contractor to all his customers: "Please be advised that all quoted prices as of this date are revoked and are subject to renegotiation."

A nationally known construction magazine recently reported that several organizations in New England were working on a contract clause regarding additional costs incurred by energy shortages. To wit: "In the event of unreasonable delay, disruption or change occurring as a direct or indirect result of energy shortages and/or energy-related material shortages, the owner or his representative will have the responsibility to make an equitable adjustment in the contract price and contract, time."

Obviously, such a clause destroys the cost effectiveness of a contract, since an infinite number of items can be argued as being "energy related" in any given situation. The fact that such a clause even is being considered is a sign of the absurdity of the times.

Another indicator is the attitude of suppliers, many of whom simply won't quote prices. Contracts for concrete and steel, for instance, are being written with "Price on Date of Delivery" clauses.

Witness the *Wall Street Journal* article of March 26, 1974, "Broken Promises—Many Contracts Now Aren't Worth Paper They're Printed On." As one contributor noted, "A contract used to be a contract. Now it's another stage in the negotiations."

In all fairness, the contractor's position in the construction market isn't enviable right now. He doesn't know (as he usually did in the past) where his price increases are going to come from or when. This is largely because the construction industry is compartmentalized into individual trade specialties. The general contractor may be contracting with 15 or 20 subcontractors, each with his own worries about whether his materials are the next to jump in price.

Taking a "for instance," let's say the general contractor goes to a painter to get the subcontract price for the painting portion of a project. The project has a three-year schedule and painting is one of the final activities. With prices jumping all over the place, the painter has no way of knowing what his supplies or labor are going to cost him more than two years later, but he's got to come up with a figure, so he pads to cover his risks. That pad may be as much as 50 percent.

At the same time, the general is looking around, watching all the contracts that used to be solid and enforceable suddenly become worthless. He knows that if his subs want out of a deal, he's going to have a tough time making them perform, and even if he gets performance, it's going to cost him something extra. He's got no way of averaging the random increases. So, he throws in his own contingency. The final

Mr. Thomsen is president and chairman of the board of the construction management firm of CM Associates in Houston, Texas. CM is an affiliate of the architectural firm of Caudill Rowlett Scott, of which Mr. Thomsen is a former partner.

tab may wind up with a 20 percent pad on top of a 50 percent pad, and guess who gets it. That's right. The buck has to stop somewhere. And the unfortunate candidate is, as usual, the owner—which makes his position even less enviable than the contractor's.

The long and the short of the future building owner's problem is this: Contractors have a number of very profitable years behind them. They've been busy. The industry's been growing. Both generals and subs have become acclimated to good profits. They like it. (Who wouldn't?) They're not about to jeopardize their accumulated profit on this or next year's uncertain economic conditions. The smart ones are playing a holding action: getting some work; paying the overhead and maintaining profits; avoiding exposure and preventing loss of capital. Where they see big risks, they're either not going to bid (thereby decreasing competitiveness), or they're going to pad.

The owner's one chance to avoid paying top dollar for his project is to structure it so that contractor risk is minimized. Fortunately, in the inflationary 1960s and '70s a tool has been developed for doing just that: construction management.

In the traditional building process, an owner and architect got together and designed a building. When they had all the plans and specifications buttoned down, they turned to several general contractors for lump sum bids. The lowest bid got the job. The process was unnecessarily tedious, costing the owner money by costing him time. Bidding didn't start until design was complete. Construction didn't get going until all the bidding was over. Furthermore, the lowest lump sum bid didn't guarantee an owner his lowest price, since no general could count on getting the lowest bids from all the subs.

The core of the construction management idea was to add someone to the building team experienced in both design and construction who could, on the owner's behalf, steer a project around all the cost overruns and schedule delays so common to construction projects. The construction manager was a professional offering a service to the owner, not, as in the case of a general contractor, an entrepreneur selling him a building. He was the owner's agent, hired to protect the owner's interests.

The construction manager concept provides the opportunity to deal directly with each of the subcontractors as primes. More importantly, an owner thus could pinpoint costs that were out of line by looking at all the individual contracts, not just the total.

Adjusting became easier. With a construction manager on the team, schedule and budgetary adjustments could be made long before a design was locked into place. Construction management typically applied phased design and construction on a project. This, along with full-time experienced estimating and value engineering offered continuous cost feedback, thereby permitting on-course corrections. No longer did the building team have to wait for the ax to fall at bid opening.

The cost implications for owner and architect were clear. The owner had a better opportunity to bring this project in on time and within his budget. The architect was less likely to face a complete redesign—for which there probably would be no corresponding reimbursement.

It was a good idea. But the idea alone didn't get the job done. Some projects were attempted without experienced people and were blown. General contractors began referring to negotiated guaranteed maximum cost contracts as construction management and there were some unhappy results. But with the right team, construction management proved it could produce results.

Enter the unpredictable present. And one thing that has helped make construction management so effective in controlling costs up to now—small bid packages— is even more critically needed for protecting owner's construction costs in our currently erratic market. Rather than taking a general contractor's lump sum bid—and therefore committing all contractors to a price now on work which they may not begin for months, even years, when the market may be considerably different—construction management offers the owner the alternatives of buying only those items immediately essential, negotiating contracts for long lead-time materials, and delaying contracts on late construction activities until the project is ready for those activities to begin. By doing this, the owner minimizes the contractor's risks.

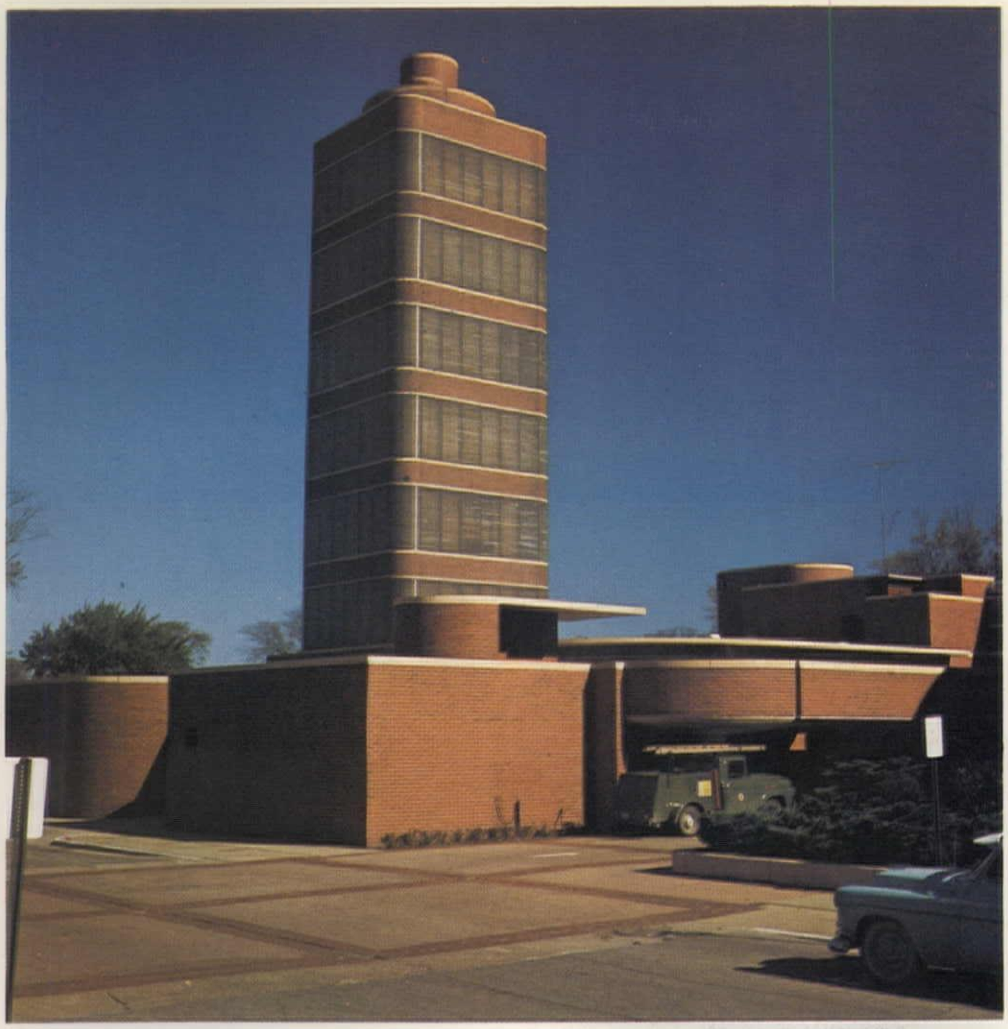
Instead of each contractor assuming the worst and slapping a huge contingency on each contract (and then pocketing the contingency should the worst not happen), the *owner* assumes the worst and budgets for it. Undoubtedly the worst will happen to a few contractors. Some may get hit with a sudden 30 to 40 percent increase. But total inflation across the board probably wno't be more than 12 to 14 percent. After budgeting for the worst, the owner then negotiates with contractors individually at a time when they can assess their risks more directly.

What happens, in effect, is that the owner gains control of the contingency. And because the worst won't happen across the board, he can pocket any favorable difference between what he's budgeted and what he actually contracts for.

Certainly, in operating in this fashion, the owner assumes some risk. But he's had the risk all along, anyway. Contracts have never been automatic. And now they're even less enforceable. (Remember that *Wall Street Journal* article.) What he hasn't had is the control. With an experienced construction manager negotiating on *his* behalf, managing the risk for *him*, the owner stands to gain a substantial amount of contingency that otherwise would have been random, but it also means he has the opportunity to cope with an otherwise unreasonably costly situation.

The ability of an owner to buy his project for a reasonable price is equally important to architects, since the architectural profession, more than most, is dependent upon a healthy clientele. And if too many budgets are blown, the turnkey idea —which, unfortunately, can fix price at the expense of quality—is going to grow.

Construction management affords architects the opportunity to design in an atmosphere of knowns, not only in terms of esthetics, but in terms of cost and time, and that means the ability to design with a manageable strategy in execution. In the last analysis, such a strategy can reduce everyone's risk on the building team—owner, architect, contractors—and that is the most desirable situation of all. □



The 1974 Honor Awards: Seven New Buildings, Two Not So New

The 1974 AIA Honor Awards jury has premiated seven new buildings and one restoration and given the 25-year Award to a Frank Lloyd Wright building for the second year in a row. This award, to be given to a building of "enduring significance" at least a quarter-century old, last year went to Taliesin West and this year, to the S. C. Johnson & Son Inc. Administration Building in Racine, Wisconsin (left), completed in 1939.

The eight honor award winners are shown on the following pages. The jury was comprised of David Pugh, FAIA, chairman, John Carl Becker, Richard M. Bennett, FAIA, Charles Gwathmey, AIA, and Ellamae Ellis League, FAIA. Its report said:

"These eight buildings, representing eight different building types, are to be praised particularly for the way in which they relate to their sites and surroundings, and for the direct way in which they respond to the requirements of their programs. They all express a highly motivated and committed design intent: they are structures in support of architecture—structures of process rather than of styles.

"The clients have played a key role in the development of these award-winning projects. Perhaps the single most important decision the client makes about a building project is the choice of architect, and these eight clients deserve praise, not because they chose these specific architects, but because they made a commitment to good architecture.

"The general level of most of the submittals, however, was below the jury's expectations. Churches, educational buildings and libraries were particularly lacking in spontaneity and inspiration; most educational buildings seemed to possess a monolithic sameness, regardless of location."

A second jury chose one of the eight, the North Carolina National Bank (page 47), for the Bartlett Award, which honors buildings that show a conscious effort to eliminate barriers to the handicapped. This jury, which expressed disappointment that the other seven buildings did not show such effort, was comprised of William Baltzer Fox, chairman, Edward H. Noakes and Richard Downing. □

Track and Field Stadium, University of California at Los Angeles. Architect: Daniel L. Dworsky, FAIA, & Associates.

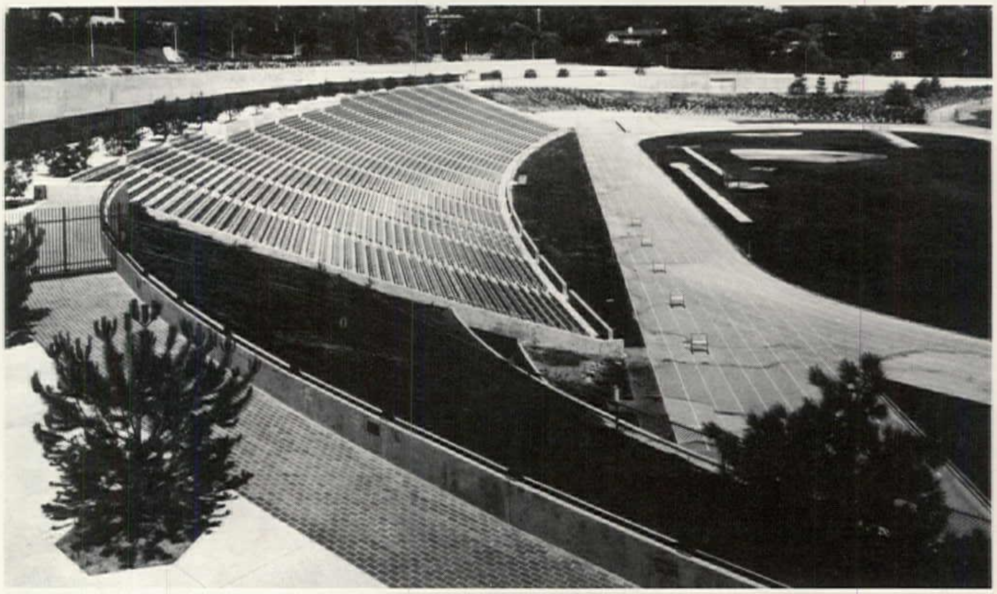
As the jury notes, this 12,000-seat stadium could have been "a massive structure." Instead, the architect specifically attempted, in his words, "to design the elements to read as landscape architecture rather than treating the structures as conventional buildings."

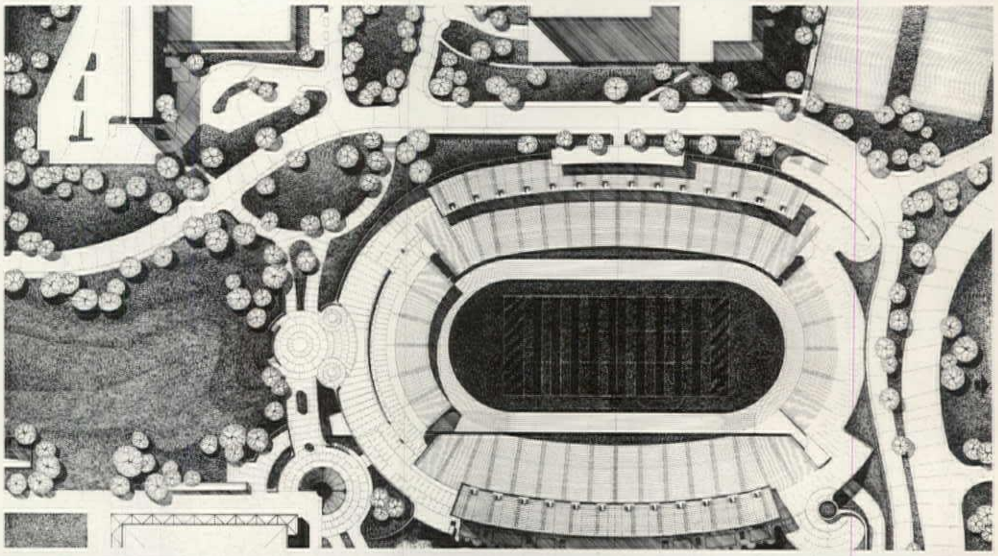
The main field area is an extension of playing fields to the east, where temporary seating can be accommodated when required. Permanent seating was built on a slope west of the track. The stadium is between the academic and dormitory areas of the campus, and its low profile allows it to be a linkage rather than an obstacle between them.

The stadium is shielded to the west by the concrete seating structure and shaded to the east by a row of trees. Additional retaining walls and sloping planted areas bring the track below into the composition.

"The structure accommodates many changes of level while tying together the campus pedestrian circulation," the jury noted. "Simple in concept, the space is made more complex and sensitive by using the site to modulate and control other campus functions. The integration of landscaping and the continuity of detail are visual evidence of the complete execution of the project concept."

Client: University of California at Los Angeles. Structural engineer: Richard Bradshaw. Mechanical engineers: Ayers & Hayakawa. Electrical engineers: Frumhoff & Cohen. Landscape architects: Cornell, Bridgers, Troller & Hazlett. General contractor: Williamson Brothers Inc.





Paul Mellon Center for the Arts, Wallingford, Conn. Architects: I. M. Pei & Partners.

The interlocking geometric forms of this building express its essential duality. It is comprised of a quarter-circular auditorium wing and a triangular teaching and lounge wing and it serves students of two adjacent preparatory schools, Choate and Rosemary Hall.

The wings are separated by a broad diagonal walk, which makes the building a physical link between the two schools' campuses as well as a meeting place for their students. Glass walls flank the walk on both sides.

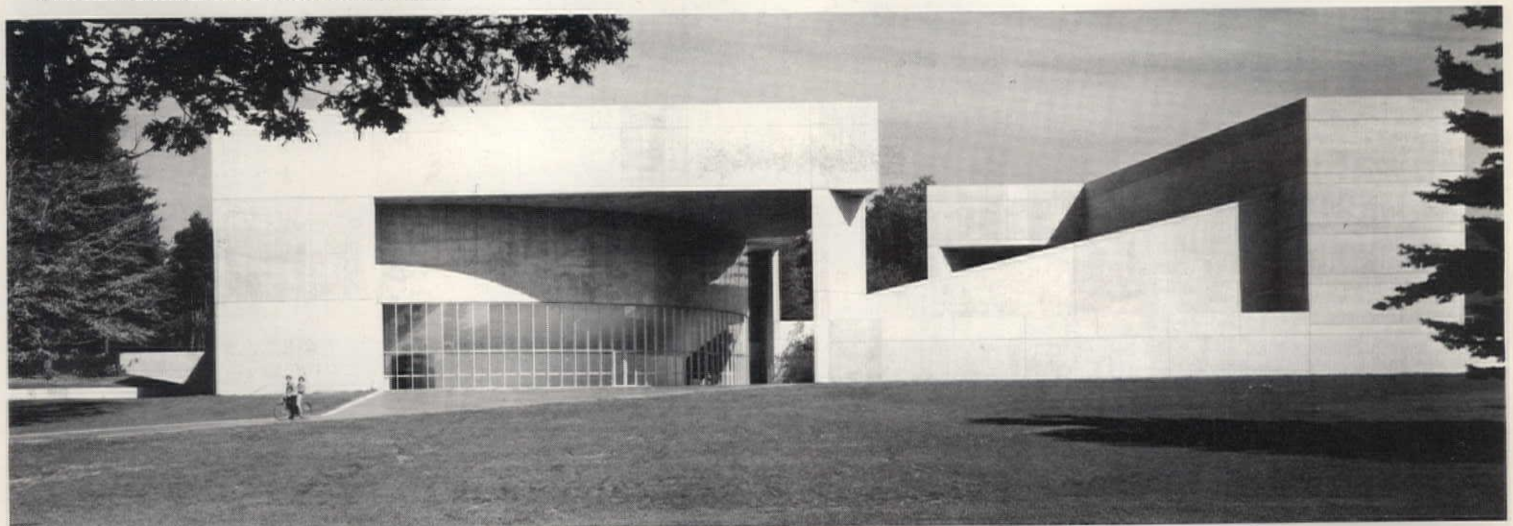
The curvelinear side contains an auditorium seating 840, a stage and a scene shop. The auditorium can be adjusted acoustically for speech, drama or music.

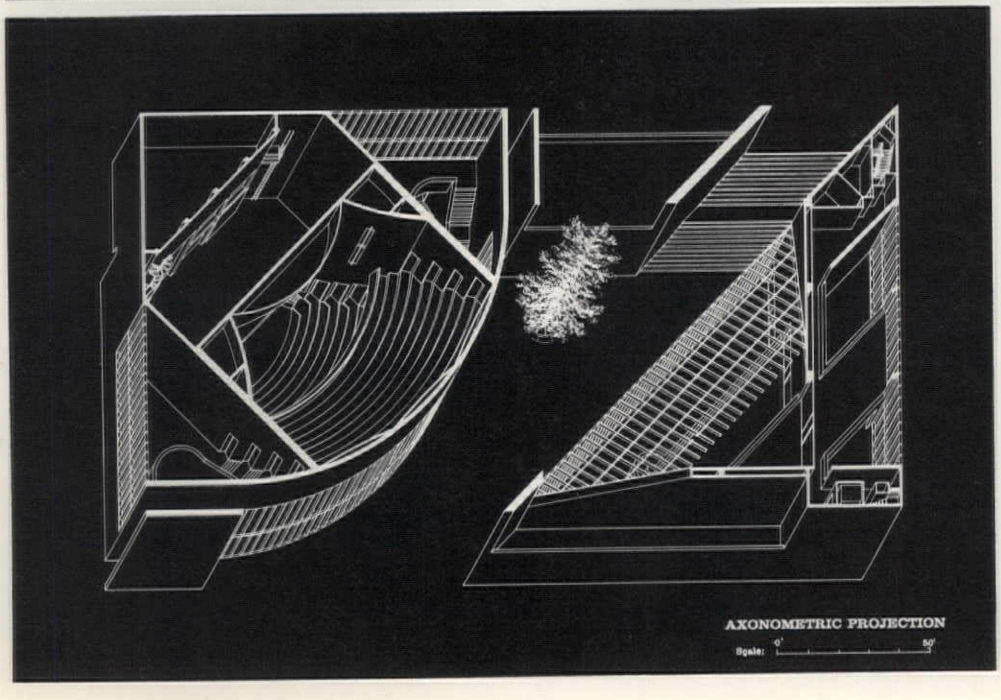
The major element of the teaching wing is a large skylit space that contains a lounge and two stepped mezzanines that are extensions of adjacent studios for painting, weaving and sculpture. Above the studios are music and practice rooms.

The two wings connect at the basement level, which serves both the auditorium and an experimental theater in the teaching wing. A recital room, library and offices are at this level.

The jury termed the bisected building "an elegantly detailed assemblage of volumes." Despite the complexity of the program, it noted, "the clarity of form, modulation of interior and exterior circulation and unity have been maintained."

Client: The Choate School. Structural engineer: Olaf Soot. Mechanical and electrical engineers: Campbell & Friedland. Theater consultant: George C. Izenour Associates. Landscape architect: Joseph R. Gangemi. General contractor: George B. H. MaComber Co.





North Carolina National Bank, Charlotte, N.C. Architects: Wolf Associates Architects.

The bank expected that this branch would do 80 percent of its business on a drive-in basis. Therefore, diagonal automobile lanes were carved out of the volume of the building. Despite this incision, a sense of solidity was achieved by use of tall untextured walls of painted plywood. The configuration and placement of the building allowed preservation of a stand of large trees in the corner of the site, formerly part of a large estate.

The jury praised the handling of the site and the automobile access requirements and said that the building "is not only a sensitive and elegantly proportioned object, but one that serves as a sign and symbol without the need for commercial embellishments." Indeed, the flat street facade of the building almost has the look of an understated billboard.

Client: North Carolina National Bank. Structural engineer: Ray Wasdell. Mechanical engineer: Mechanical Engineers Inc. Electrical engineer: Connor Bullard Associates. General contractor: Rodgers Builders Inc.

MDRT Foundation Hall, Bryn Mawr, Pa. Architects: Mitchell/ Giurgola Associates Architects.

The jury terms this "by far the most mannered building of those selected." It might have added most complicated in use and angular in form.

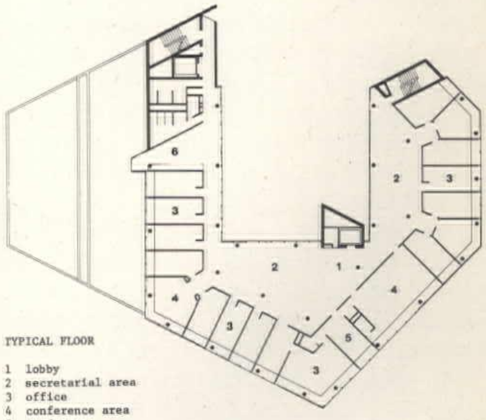
Foundation Hall serves as an adult learning research laboratory for the American College of Life Underwriters. It includes professional color television, film and audio studios, faculty offices, classrooms, seminar rooms, lounges, a library and individual study areas with audio, video and computer capability.

The site is a ridge overlooking the college's valley campus. The building was organized around a granite-paved entrance court that deliberately cuts into its polygonal mass. The large studios, which do not need daylight, form the building's base; classrooms and other heavy-use areas are on the ground and first floors, which are connected by a two-story entrance hall; offices and conference rooms ring the perimeter of the upper floors.

The exterior is clad with frost-proof imported red clay tile. Reflective glass is set in aluminum window frames.

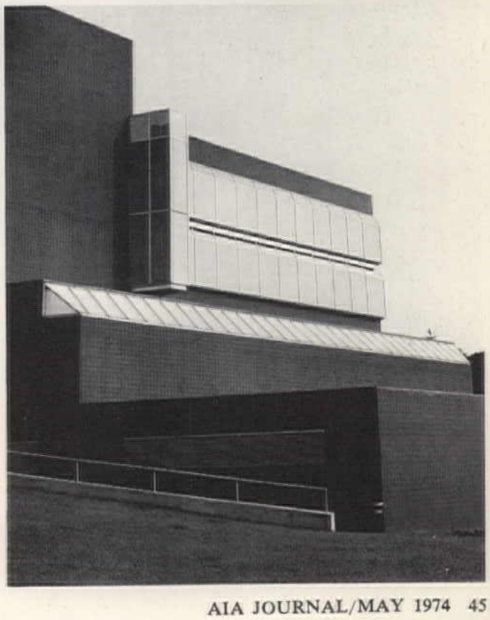
Further jury comment: "This structure uses various architectural vernacular idioms to specifically define changing program and site references. The building is most sensitively designed and elegantly proportioned, reinforcing an existing campus organization. Through the use of reflective materials it adjusts beautifully to the changing views and landscape of its surroundings without losing its own order."

Client: American College of Life Underwriters. Structural engineer: Harry Palmbaum. Mechanical and electrical engineer: Paul H. Yeomans Inc. General contractor: Turner Construction Co.



TYPICAL FLOOR

1 lobby
2 secretarial area
3 office
4 conference area
5 study area
6 lounge



Morgan Residence, Atlantic Beach, Fla. Architects: William Morgan Architects.

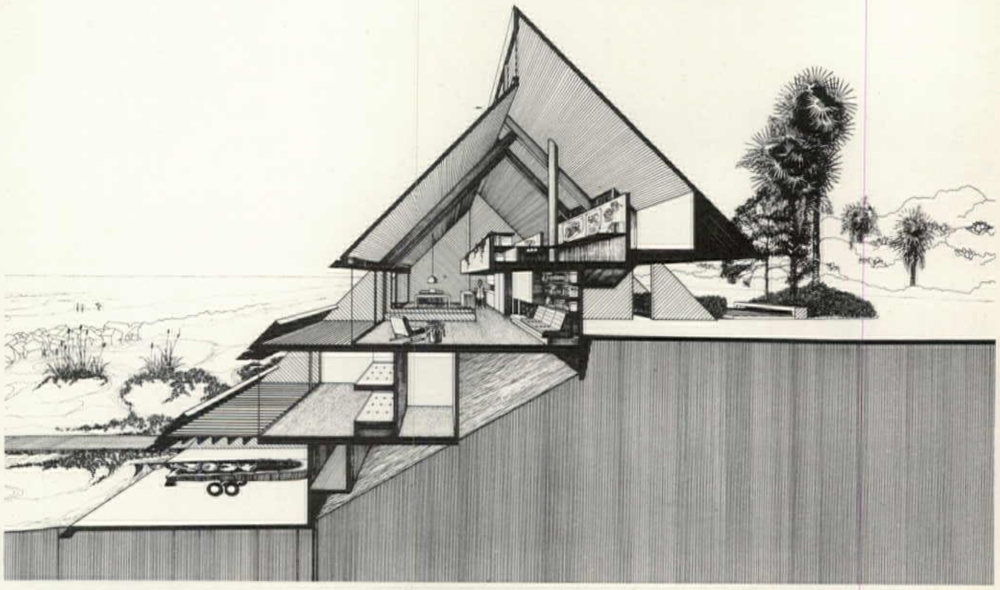
The jury termed this year-round vacation house a "strong simple statement," and it could scarcely be simpler. It consists of two blank, angular side walls jutting sharply upward from a sand dune, between which are terraced four levels of living space.

The lowest level is open to the beach to accommodate sailboat and surfing paraphernalia. Bedrooms for teenage boys occupy the second level; living and dining spaces, the third; and the parent's master bedroom and studio, the fourth. A central stairway connects the four levels.

"From every room," the jury notes, "the roll of the ocean can be seen and heard. But along with this openness, the house provides privacy." The blank side walls shield it from nearby houses, and the sloping roof faces the street.

The structure is concrete grade beams and slabs on wood piling with frame platforms above. Interior and exterior diagonal siding is rough-sawn western cedar; interior decking, Idaho pine with laminated beams; and the roof, machine-cut western cedar shingles.

Owner: William Morgan. Structural engineer: Haley W. Keiser & Associates. Landscape architect: William Morgan. General contractor: Ross Construction Co.



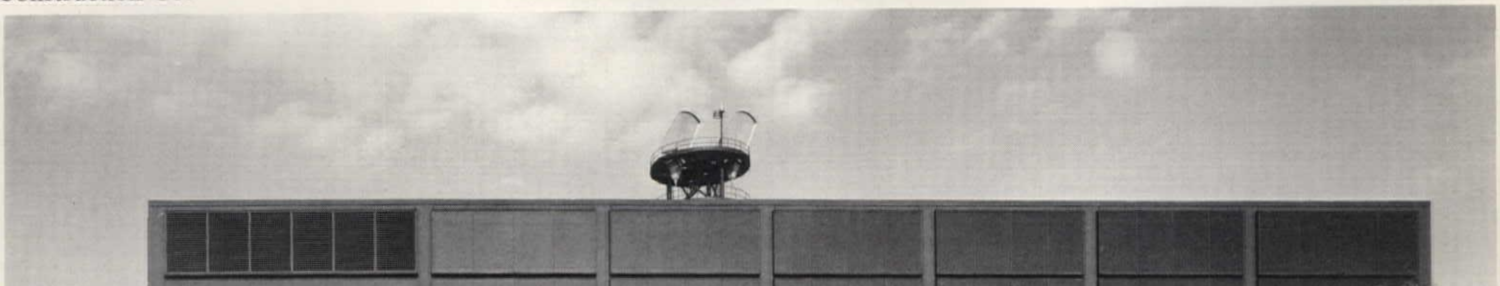
Telephone Equipment Building, Northbrook, Ill. Architects: Holabird & Root.

It is rare that an architect designs a structure for machines rather than for people. This Illinois Bell project offers the viewer a reflection of the landscape through a cool, uncomplicated rectangular facade relieved only by a cylindrical microwave tower and the four stacks rising from mechanical rooms beneath the front plaza.

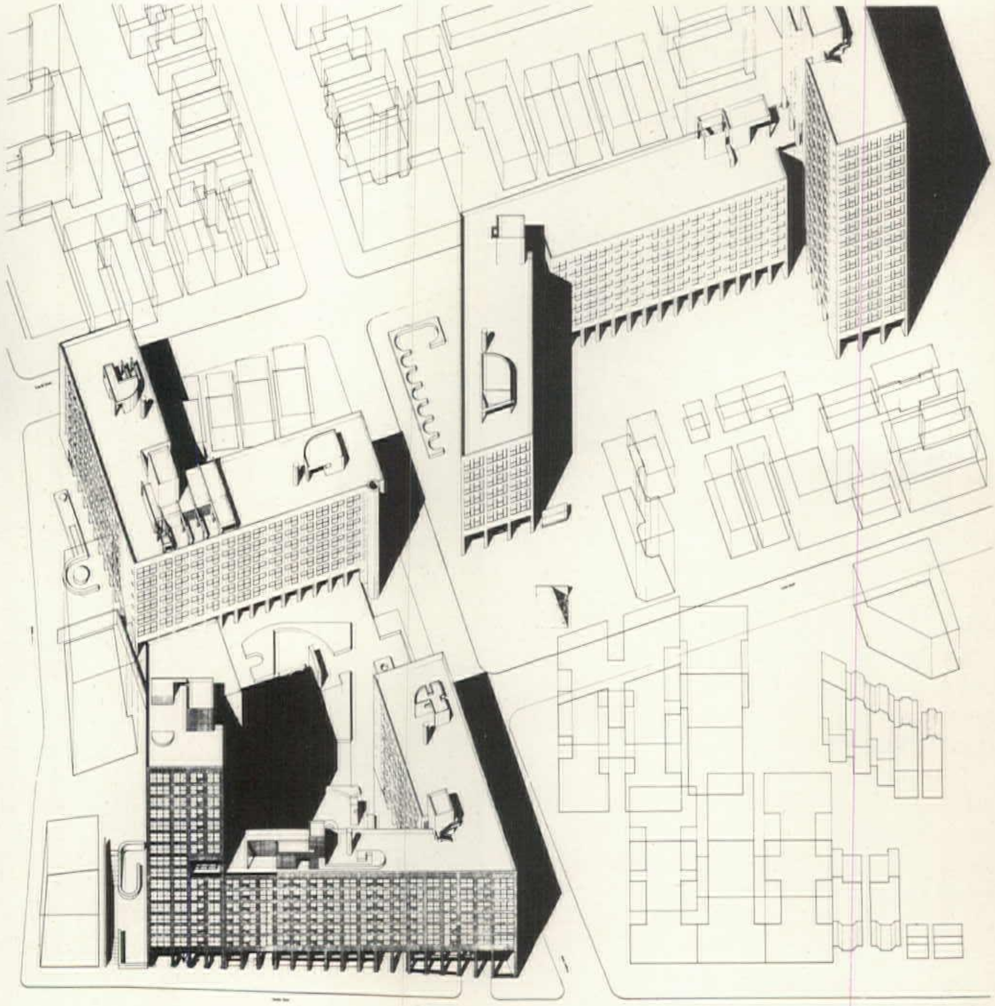
The problem was to design a structure which would allow for both vertical and horizontal expansion and serve as a background for a future suburban office structure. The exterior is therefore made of shop-fabricated steel frame panels with glass or louver in fill, which are bolted to the structure to allow for easy installation and future relocation.

The jury termed the structure "almost more of an object than a building," and said: "This project responds directly to 20th century technology. It is a refreshing use of a prototype. For the viewer, the arrangement and situation of the functional elements is almost pure sculpture."

Client: Illinois Bell Telephone Co. Structural, mechanical and electrical engineers: Holabird & Root. Landscape architect: Holabird & Root and Franz Lipp. General contractor: Pora Construction Co.



Twin Parks Northeast Housing, Bronx, N.Y. Architects: Richard Meier & Associates.



"The successful execution of low-cost urban housing is probably the most difficult architectural problem to be solved today," the jury notes. "Here it is solved with an organization of well-proportioned and consistent building masses that incorporates the existing street fabric and at the same time defines new open urban spaces."

The three buildings of Twin Parks contain 523 housing units. The site was three adjoining blocks in an irregular grid of streets. One of the blocks, the smallest, was vacant; many of the existing residential buildings on the others were retained.

Initially this made it difficult to make the three blocks relate, according to the architect, but "ultimately these existing buildings provided the restrictions which generated the mass relationships and defined the open plaza spaces."

The new elements were designed to harmonize in scale and color with the neighborhood and were shaped by the irregular street grid. Towers at opposite ends of the project provide "visual reference points," in the architect's words.

The buildings rest on a one-story grid of columns, which create walkways under the buildings and direct movement into the major plazas. The ground-level lobbies are glass boxes set obliquely into the column grid. In all, nearly half of the site was given over to open space.

Client: New York State Urban Development Corp. Structural engineer: Robert Rosenwasser. Landscape architect: Joseph Gangemi. General contractor: Leon D. DeMatteis & Sons Inc.

Renwick Gallery Restoration, Washington, D.C. Architects: John Carl Warnecke & Associates; Hugh Newell Jacobsen, FAIA.

Begun in 1859 as the original Corcoran Gallery of Art, this two-story brick building in the French Second Empire style was allowed to deteriorate for nearly a century. In 1962 President and Mrs. John F. Kennedy made it part of the restoration program they had initiated north of the White House for Lafayette Park and the surrounding area.

The restoration of the Renwick's exterior was undertaken by the Warnecke firm along with other construction around the park, and Jacobsen's interior restoration followed after a lapse of two years.

However, in a joint statement to the awards jury, the two architects said that their "concept and design approach were uniquely identical: to evoke the spirit of the original gallery and the spaces so brilliantly created over a century ago." Lighting and air conditioning requirements precluded an "archaeological" approach to the restoration, they said.

The jury praised the restoration as "a masterpiece of creative preservation, a lesson which should be applied in every town and city in the country that has older buildings which should be kept and used," and found in the building a "sense of newness even as it celebrates its historic values."

Client: The Smithsonian Institution.

Structural engineers: Kraas & Mok. Mechanical engineer: Geza Illes. Lighting consultant: Douglas Baker. General contractors: Associated Builders, Inc. (phase one) and Technical Construction, Inc. (phase two). □

Metrication and the Construction Industry: Potential Problems and Promising Opportunities

Robert Wehrli, AIA

What new world awaits us as we haphazardly slip and slide—which is what we are presently doing—into the international world of metric measurement? Our lack of planning can become, if it has not already, serious. And this applies, perhaps especially, to the building industry.

As optimists we used to say, "my glass is half full"; as pessimists, "half empty." Any confusion about what "half" meant was not compounded by some bleared image about measurement. It meant about four ounces, maybe six for a large glass. The new destination which awaits us demands that we understand that our glass, whether half full or half empty, means that it has 2.5 deciliters in it. The confusion about measures must be resolved soon.

Questions that will briefly be touched on here are the differences between "soft" and "hard" conversion, since how we convert to metrication can profoundly affect the construction industry; what benefits or problems might be expected from soft or hard conversion and, hence, which we should plan for; the role of engineering standards if revised to change the actual dimensions for products so they will better fit into the international world of metrics; the role of modular precoordination as an adjunct to engineering standards; and, finally, a few general considerations about what might happen to buildings in relation to the people who use them —or how metrication might be turned to advantage for the users of buildings. To begin consideration of such questions, we should have clearly in mind the two stages involved in metric conversion.

Soft conversion. In soft conversion to metrication customary units are simply set aside and metric units adopted. This means that measuring devices scaled in feet, quarts and pounds are discarded in favor of scales marked off in meters, liters and kilograms. In soft conversion, for example, the actual length of a foot-long hot dog remains 12 inches, but those 12 inches will be scaled with the new metric ruler and so come out 30.48 centimeters. Before metrication, one can calculate the cost per inch of wiener by dividing the total cost by 12; after soft conversion, one can compute the cost per *centimeter* by dividing the sandwich price by 30.48. This, then, is soft conversion, imposing metric measurements on products still built to customary standards. But soft conversion would be fraught with the following types of problems:

The hot dog illustrates that one of the championed benefits of the metric—easy calculation—would not have been achieved, for division by the new 30.48, if anything, would be more difficult than division by the old 12.

Also, in the softest of conversions, even the packaging of products might remain unchanged. Paint and turpentine would be merchandised in the old pint, quart and gallon containers, but these would have new labels announcing their contents to be 0.473, 0.946 and 3.784 liters respectively, not a comforting prospect for those expecting that the metric system will simplify business transactions.

Early changes to metric may be difficult and costly. To avoid troubles with liquids, half-liter, liter and four-liter cans must be provided. Such containers will be needed for all liquid products, and therefore will be available promptly for construction-industry liquids. However, in contrast to solid products, fluids are easy to handle in conversion. They take the shape of their containers, and since they are applied in very thin layers are compatible dimensionally with other building products.

Another disadvantage of a change to metrication involves loss of familiar measures. Out will go the pint, quart, gallon and (bless it) the fifth. Although it may be difficult to get sentimental over the disappearance of these old friends, the terms do fall on American ears with more humane familiarity than liter and half-liter.

More serious for design and construction people is the demise of the foot. It has no counterpart in metric dimensions, which jump from the decimeter (about four inches) to the meter (longer than a yard) with no intermediate unit for general usage. The loss of the foot will be especially hard felt in measurements of area, since so many factors are calculated and tabulated on a square-foot basis: thermal loss and gain; illumination and light reflection; wall, floor, roof and building costs; materials weights and many others. There will be no more foot-candle and no board-foot. Moreover, some of our square foot constants are complicated as, for example, the ubiquitous heat transmission "U-factor" defined as the "number of British thermal units loss (or gain) per square foot of enclosure per degree Fahrenheit difference between indoor and outdoor temperature per hour." Familiar to us now and highly useful, this type of factor and constant will have to be retained, but their units converted.

Loss of the foot, which has no metric counterpart, may be especially painful.

However, once we have trained ourselves to think metric, we can relax and reap the joys. Prior to that, however, designers and builders will not only have to remember how many joules in a British thermal unit, how many square centimeters in a square foot, and how to convert Fahrenheit to Celsius, but also how all these fit together in metric U-factors and other combined units. We will have not only to memorize but also to comprehend what all these factors, or units, *mean* in metric.

Advantages of soft conversion. Advantages in soft conversion lie mainly in the simple nature of the measuring units and their relationships within the measuring system. Units of length, mass or volume are in easy multiples of 10; there is no need for a mixture of decimal numbers and fractions, decimal numbers being used exclusively. Furthermore, the measurement system for foreign commerce will be the same as for domestic; hopefully, this will facilitate foreign trade in U.S. building products. Likewise, the measurements for research will be the same as for commerce, making feasible a greater meshing of research with practice in the U.S. construction industry which, unlike other industries, has never enjoyed a strong research-to-application linkage.

Mr. Wehrli is chief, Architectural Research Section, Technical Evaluation and Application Division, Center for Building Technology, National Bureau of Standards, Gaithersburg, Maryland.

Hard conversion. Problems not solved in soft conversion can be resolved by hard conversion—where the standard dimensions of solid products are altered for purposes of simplification. Thus, our foot-long Coney Island would probably be slightly shortened, going from 30.48 to the simpler-to-handle 30 centimeters, and become standardized at 30. This helps manufacturers, distributors, sellers and buyers alike since it is easier to remember 30, and it's easier to divide by 30. Of course, the hot dog example is inconsequential since very few hot dogs ever measure a full foot, and no one cares about their unit prices—whether by inch or by centimeter. The point to be made is that hard conversion goes well beyond the provision of metric containers for fluids and beyond the mere adoption of metric units and scales.

It is important for the construction industry, then, to understand that soft conversion, while a possible first step in metrication, is not the most important one nor even, probably, a desirable one. The vital step is in deciding upon new dimensional standards for products. This is especially critical in the construction industry where large numbers of diversified parts are assembled into complex components and systems which are then erected in buildings—buildings which then exert, as they always do, a crucial impact upon the shape of everyday human affairs.

'The vital step is in deciding on new dimensional standards for products.'

Therefore, the careful choice of future dimensional standards should include what is critical for design, manufacture and construction so the choice will contribute to the highest use and enjoyment of buildings.

There are three types of hard conversion standards which must be considered —engineering standards, modular standards and human standards.

The industry may elect to consider any combination of the three, but by far the greatest progress would flow from a combined approach where engineering, modular and human standards are developed in a unified, comprehensive effort. This is complicated by two disparate circumstances, namely, the superabundance of engineering standards contrasted with the dearth of U.S. modular standards and human standards.

Metrication and engineering standards. To begin with engineering standards, there are thousands of them which apply to nearly every product from the smallest screw to the largest building truss. Cement and paint, nails and light bulbs, screen doors and linoleum, ceiling tile and kitchen cabinets, elevators and door knobs—most all are covered by standards which seek comparability between competing products and enhancement of product quality and reliability. There are standards provisions for *processing* (how products are fabricated, shipped, erected or installed, used, maintained and operated); for *materials* (their chemical and physical constituency and properties); for *functioning* (how the product functions internally and along with interconnected or related products); for *dimensions* (linear sizes); and for *tolerances* (the latitude within which standard dimensions may vary for each product). For the most part, these multitudinous standards involve customary units and will have to be changed to metric.

At first glance, one might believe that metrication, which involves measurement, could concern itself exclusively with the dimensional and tolerance aspects of standards and ignore processing, functional and material aspects. Unfortunately, this is either unwise in some cases or downright impossible in others because the various aspects of standards are often inseparably interdependent. To explore this complication, let's take wall panels as an example and discuss first the dimensional aspects.

In the U.S., wall panels of gypsum and insulation board, plywood and pressed wood, plastic and other sheet materials have standard dimensions of 4 feet wide and 8 feet high. In soft conversion, these dimensions become 121.92 by 243.84 centimeters. Here we immediately see the trouble with soft conversion, illustrated earlier by our foot-long hot dog; these dimensions are difficult—hard to remember, hard to manage. Suppose a panel is to be erected in a vertical position and nailed down its centerline. Everyone involved from the designer to the carpenter has to remember the awkward number, 121.92, and divide by 2 to get 60.96 in order to locate the panel centerline. Thus, engineering standards providing for convenient metric dimension are a must.

Our first thought, then, would be to set a new engineering standard rounding off these metric sizes to 120 by 240 centimeters. While this is only a one or two percent change in dimension, it creates substantive changes for housing and other buildings where, in the most drastic example, ceiling heights will be shrunk. These heights are commonly based upon the 8-foot panel dimension. A panel reduction of 3.84 centimeters (243.84 less 240.00) means that all these ceilings would be 1½ inches lower after hard conversion. Since the 4-foot panel width frequently controls room lengths and widths as well, these would also contract by ¾ inch for every 4 feet of floor dimension.

Without careful planning, carpenters could face some complicated calculations.

Hard conversion, if not carefully planned, might well compound some existing problems. There are already two major shortcomings in the scope of engineering standards. One is that they tend to focus upon the manufacture of products rather than upon the assimilation of these products into the fabric of a building. This historical circumstance came about in a natural way. Engineering standards, if they were to be effective, had to be exercised at the point of origin, the point of production. A wall panel of quality materials, internally sound and formed to straight and true dimensions in the factory, would probably cause no special problems on the job site. Every panel would be identical to all others and would fit neatly with them when erected.

Furthermore, manufacturers of like products recognized that they could benefit from cooperative engineering standards in the marketplace where designers and builders are reluctant to specify one-of-a kind products which cannot be weighed against comparable items for cost and performance, and for which price competition cannot be had. Also, in the event of shortages, one type of standardized product can be substituted for another or one manufacturer can be substituted for another. To achieve the needed standardization, single-product groups banded together and developed consensus standards. This worked especially well when new product lines like steel joists and concrete masonry were launched. Engineering standards gave them immediate consistency and reliability, hence acceptability in the marketplace.

However, this partitioning of the industry by product groups has in many cases worked against the easy assembly of different products in the field. For example, door manufacturers have agreed to standards for doors, but these standards are not always compatible with those for the walls or partitions which receive the doors. This means that disparities must be taken up in architectural design or in construction, often wasting material, labor and time. Moreover, engineering standards, mostly written and agreed upon by

Metrication could be used to achieve modular coordination among products.

engineers (also by historic happenstance) often lack considerations which architects might supply, but again, traditionally have not provided. Could not planning the industry's hard-conversion shift-over solve some of these troubles?

To further illustrate these problems, let's consider the installation of a standard pedestrian door in a wall built of standard concrete blocks. The most common standards for the height of a door is 6 feet 8 inches; the metal frame extending across the head of the door is usually 2 inches high; and the door should be held ½ to 1 inch above the floor to accommodate floor coverings. The overall height of the door assembly, then, is between 6 feet 10½ inches and 6 feet 11 inches. But concrete masonry units lay up in multiples of 4 and 8 inches so that the nearest wall opening using uncut blocks would be 6 feet 8 inches, or 7 feet high. Thus, the door and frame don't fit the opening and a costly field adjustment must be made. To complicate matters, wood door frames tend to be of a different size from metal frames—they still don't fit the block masonry opening and are not dimensionally interchangeable with steel frames. Again, how could hard conversion help or hinder the situation?

How the present awkward state of affairs, illustrated by the mismatching of doors with their frames, came about is understandable. It would have been slow and difficult for the manufacturers of one type of product to secure acceptance of other product-type manufacturers. Furthermore, engineering standards became popular when buildings were simpler, consisting of fewer parts, materials and systems. Moreover, the time for construction was more relaxed and there were fewer choices to be made. There were, in sum, fewer demands for modular standards across products.

Now a new climate prevails: Time schedules are tight; more buildings are needed; they will be extremely complex; there are demands for a high degree of systemization and coordination beginning at the point of fabrication and extending across construction; and consumers are impatient with wasteful, inefficient methods which raise costs and often lower quality. In view of this climate and the results which can be achieved by enlarging engineering standards to encompass modular standards, a symbiotic solution is at hand. Looked at in this way, the impending conversion to metric can become a far greater gain than is at first glance apparent, for modular standards can be achieved as a part of engineering standards at little or no added cost if we carefully plan the U.S. metrication.

Metrication and modular standards. Modular theory closes the gap between fabrication and construction, provides a basis for common dimensional standards among product lines and renders more efficient and economical the entire process. The ideas were generated by Albert Farwell Bemis and published in 1934. Since then the application of modular precoordination has been spotty. It was adopted almost from the outset by the concrete masonry industry which mushroomed after World War II. But, surprisingly, modular has not been uniformly embraced by brick manufacturers who had the same rationale for adoption but were constrained by tradition, the costs of plant conversion and other factors. Hope-

The 'M' or 10-centimeter module is the logical replacement for the foot.

fully, conversions to modular can now accompany conversions to metric, thereby helping the industry to change.

To return to Bemis' conception for modular precoordination, it is so elegant that one wonders why it emerged no earlier and why it has had not greater success in the U.S., where it was originated. The concept is simply that all building parts be capable of assembly in multiples of 4 inches. Applied to bricks, this is feasible by reducing the old 8-inch brick so that its brick-plus-joint length is 8 inches, and by setting its height so that 3 bricks and 3 joints equal 8 inches. This simplifies bricklaying and facilitates construction of walls of brick and concrete blocks, whose nominal face dimensions are 8 inches (3 rows of brick) high and 16 inches (2 bricks) long.

The Bemis module has a happy relationship to the metric since 4 inches are within a fraction of 10 centimeters. The handy 10-centimeter module has been adopted in the construction industries in nearly all European countries and is designated by the symbol "M."

In the design and layout of buildings, so-called planning modules, or supermodules, are also employed. To conform to the Bemis module, planning modules should be a multiple of 4 inches—customarily 16, 24 or 32 inches for housing. When walls and partitions are aligned with these planning modules, modular products are assembled readily, thereby drastically reducing on-site labor, cutting and waste. The 4-inch module also regulates assembly, erection and installation on the construction site. When modular is accepted, manufacturers can predicate product design upon its regulating discipline. Thus, new doors and frames of metal, wood or any other material can be so many M's wide and so many M's high to fit neatly in the modular openings of brick, block or other walls. Likewise, kitchen cabinets and appliances, windows, registers and grilles, lighting fixtures and most other building products can be precoordinated in the factory to go together smoothly in the field.

Since the 4-inch (10 centimeter) module is the same for one product line as it is for another, various manufacturers can begin developing dimensional standards for their own products with the assurance of cross-product compatibility in construction.

By this time, the reader can understand why soft conversion (the mere adoption of metric scales and units without altering the standard dimensions of products) is inadequate. Hard conversion with revised engineering standards with simplified, rounded-off dimensions is needed. But even such engineering standards would fall short of our goal for integrating factory and field construction by making different products dimensionally compatible, thereby providing higher productivity and efficiency. For this, modular principles are needed as an integral part of engineering standards. Thus, engineering and architectural concerns can be brought into harmony. And, as a fortuitous byproduct, the M, or 10-centimeter module, is introduced to replace the foot which was shown to be missing.

Human standards. One important element still remains neglected in this discussion—the human element. Most of our concern heretofore has been with the building as an artifact: how it and its component parts function and how they are processed—developed, manufactured and assembled. But the ultimate building occupant cares very little about this. Instead, the user is concerned about the building as a stimulating environment that does, or does not, supply the kind of space and arrangement needed for work, sleep or play. The user is constantly in contact with buildings and other man-made objects and environments. He touches, smells, hears and sees them. To some extent, they shape his behavior and, in turn, his opinions and beliefs. But what has metrication to do with this? Quite a lot. For as we select modular and other standards, we fix dimensions which appear and reappear in buildings. People spend their lives up against them. It is essential that designers and constructors satisfy human needs for harmony, order, style, rhythm and for scale and proportion. Dimensions fix scale and, in turn, proportion. And, as we have seen, standards determine dimensions.

Earlier, the dimensions of standard wall panels were discussed. The suggestion was that panel heights, and along with them ceilings, be reduced by about 1½ inches to provide a convenient metric engineering standard of 240 centimeters. But each generation of Americans is slightly taller than the previous generation. Perhaps ceilings should be higher rather than lower. Moreover, people like the higher ceilings of earlier eras. Maybe metrication offers an opportunity to return to the spaciousness of these earlier times. Taking account of user needs, as in the case of wall panels, involves perplexing assessments to decide upon the most acceptable height and width. What size looks best? What size works best for rooms and spaces which accommodate people and

Metrication also offers a chance to reemphasize the human factor in design.

their needs for safety, security and livability? How can we study these human needs and arrive at decisions for building dimensions?

Is there a way that engineering standards in hard conversion could incorporate these human problems, meaning man's need to relate comfortably and happily to his built surroundings? Le Corbusier thought so. During World War II, when construction in Paris was at a standstill, Le Corbusier and his colleagues devised a set of standards know as the "Modulor," and published two books to describe them. Going beyond its foundation in anthropometrics, the science of the human body and its movements, the Modulor offers, in addition, relationships of various scale measurements to mathematical series, which are referred to as the "red" and the "blue." Separately, or in combination, these mathematical guidelines provide a wide variety of dimensions for rectangles which product manufacturers and building designers can use.

All of these shapes, according to Le Corbusier, are pleasing to the human eye as well as supportive to human behavior. They are bound in tradition to the square, doubled square and the "golden section," which the ancients believed ideal, even sacred, for human environments. (The golden section, a rectangle of 1 to 1.618 ratio, Le Corbusier thought, was the key to many harmonious relationships within a rigid framework.) Whereas Bemis' modular precoordination tends to foster a regular, repetitive grid of squares, all equal in size, the Modulor features a variety of pleasing shapes, all different but related. And whereas the modular employs a 4-inch module well-suited to the production of building parts and their accumulation into buildings, the Modulor begins instead with human needs and human scale.

Beyond Modulor, there are other developments which promise morle advanced, yet more radical, approaches which engineering standards based on hard metrication might further. Edward T. Hall has observed that people have a predilection for a "hidden dimension," a way of deciding instinctively how to sit, stand or walk in relationship to others. He has invented "proxemics" to measure these social dimensions, one example being how people queue up to buy movie tickets. No doubt, Hall's social dimensions are closely linked to the anthropometrics of Le Corbusier, but no one has demonstrated what the linkage is nor precisely which dimensions would be required for buildings and the urban spaces between them.

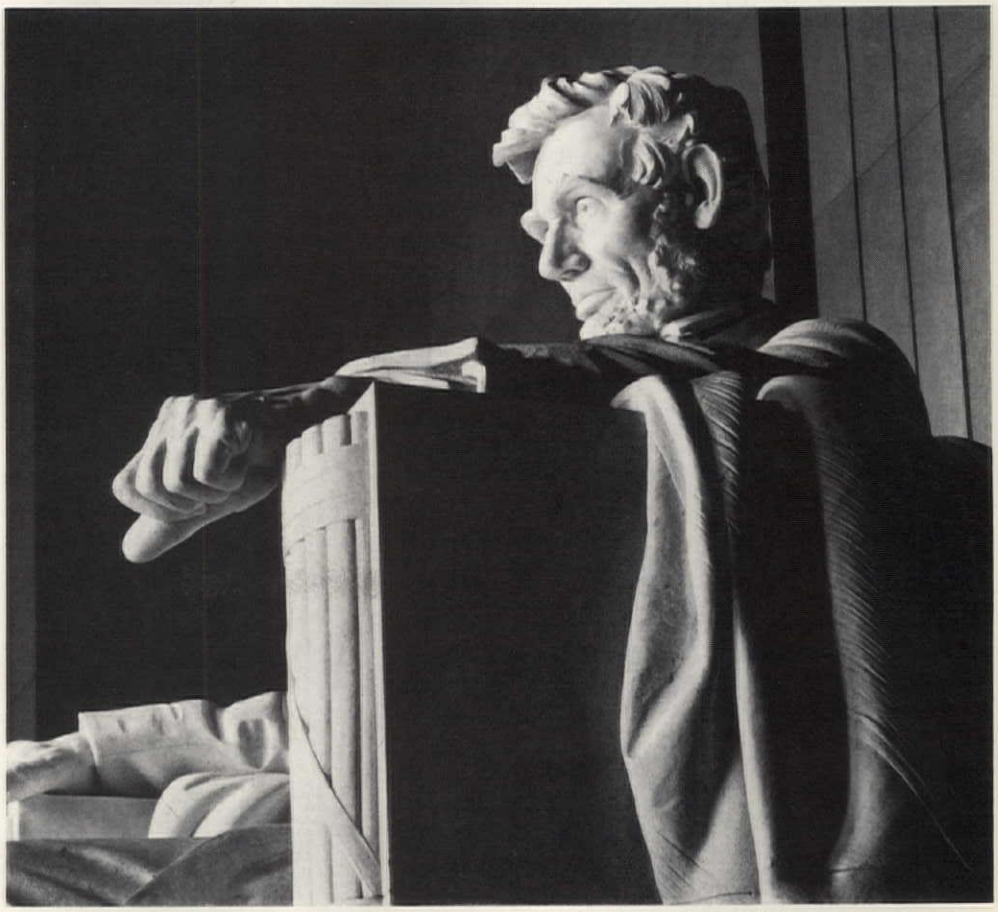
Best road to metrication. That we should proceed to convert to the metric system with its broad ramifications seems evident, even when considering such problems as those set forth above. And

continued on page 64

Washington, Contd. Henry Bacon's Magnificent Temple

Leslie N. Boney Jr., FAIA

EDITOR'S NOTE: *Washington proved to be too large a subject to be encompassed in a single issue, even one so sizable as last month's special pre-convention issue. Therefore, on this and the following pages is a brief collection of supplementary material on Washington: on two of the capital's monuments, one structural and the other natural; on living in the city during a period of social change; on a particularly public-minded architectural practice in this most publicly oriented of American cities.*



The Lincoln Memorial is among the best known symbols of our democracy, appearing on the penny and the five-dollar bill and terminating the west end of the Mall in Washington. It is also perhaps the most architectural of the capital's monuments.

The monument was dedicated 52 years ago this month and a year later its architect, Henry Bacon, FAIA, of New York, was borne down the Mall's reflecting pool on a ceremonial barge pulled by architectural students using underwater cables.

Arriving at the torchlit memorial, Bacon was escorted up the steps by AIA President William B. Faville and William Howard Taft, chief justice, former President, and chairman of the Lincoln Memorial Commission that had chosen Bacon.

Once at the memorial, Bacon was awarded the AIA gold medal by President Warren G. Harding. He was only the third American architect to receive the gold medal, which was awarded less frequently in the first two decades of its existence than it is now.

During the gold medal ceremony, art critic Royall Cortissoz, who had composed the inscription above the statue of Lincoln, said of the memorial:

"There never was a more profoundly considered design. That building was studied and restudied and restudied again. Its smallest detail, as well as its mass, represents ceaseless meditation.

"What is the style of the Lincoln Memorial? A natural reply would be: 'the style of ancient Greece.'

"But for my own part I would prefer to call it 'the style of Henry Bacon.' The great principles of the Lincoln Memorial, its majesty, its strong refinement, its simplicity, its beauty, its monumental serenity, you will find running through the entire long procession of Bacon's buildings.

"We must call him, I suppose, a classicist, but he has made the classic idiom absolutely his own and gives to his designs a superb individuality.

"Bacon had more to do than recreate the type of the antique Greek temple. Scholarship could do that. He had to express the spirit of calm, settled fidelity in which the millions . . . stand by the name and fame of Abraham Lincoln.

"Has he not, like the poet, risen to the height of his great argument? Has he not stated in enduring beauty the faith of a nation in an immortal leader?"

The son of a civil engineer, Henry Bacon had only one year of formal architectural training. He worked for a Boston firm, then for McKim, Mead & White in New York, and established a practice in his own name in 1903.

He was commissioned to design the memorial shortly thereafter. The project had been delayed for more than 40 years by the inability of Congress to agree on the type of memorial that Mr. Lincoln should have.

Bacon chose the great Daniel Chester French as sculptor of the seated Lincoln, which was to become his masterpiece after its execution by the Piccirilli Brothers, and Jules Guerin as the artist for the memorial's murals.

Bacon was a "small firm" architect, seldom employing more than one or two draftsmen, doing much of the work with his own creative hands. The memorial was almost totally consuming of his time.

He died less than a year after receiving the gold medal, leaving a legacy of work and service that makes the architect a more respected and responsible member of our society. □

Mr. Boney practices in Wilmington, N.C., where Henry Bacon spent many of his boyhood years.

The Frustrated Effort To Make the Potomac A Model Urban River

Colden Florance, AIA

The Potomac is as much a symbol of the Federal City as any of its famous monuments. In most people's mind, the Potomac is the river over which George Washington allegedly threw that coin (actually, it was across the Rappahannock). And national politicians, once in Washington, succumb to "Potomac fever" and can never bring themselves to leave.

The Potomac River basin, some 14,600 square miles, includes Maryland, Virginia, the District of Columbia and, farther upstream, West Virginia and Pennsylvania. The river flows by a region of legendary places: Harpers Ferry, Gettysburg, Great Falls, Georgetown, the C&O Canal, Alexandria, Mount Vernon, and into Chesapeake Bay. As it flows across three distinct physiographic regions (the Allegheny Plateau, the Ridge and Valley Province and the Great Valley), it reaches two more: the Piedmont and the Coastal Plain, where it becomes the underlying structure of the Washington metropolitan area in what is referred to as the "critical 30 miles" from Great Falls to Mount Vernon.

These critical miles include a wild and natural gorge, a man-made urban shoreline, the monumental core of Washington, the Anacostia tributary flowing through the city's backyard and, finally, the estuary with the historic port of Alexandria.

President Johnson said in 1965: "The river, rich in history and memory, which flows by our nation's capital should serve as a model of scenic and recreation values for the entire country . . . . I hope action here will stimulate and inspire similar efforts by state and local governments on other urban rivers and waterfronts . . . . They are potentially the greatest single source of pleasure for those who live in most of our metropolitan areas."

Nine years later the Potomac still has the full range of major problems common to other great rivers in this country. It is "flashy," or subject to extensive flooding. Its sedimentation is considerable, from natural erosion, from farmland cultivation and, most seriously, from extensive new construction. Its water supply capacity is limited and not up to future growth projections. Its waste water treatment capacity is inadequate, both in terms of quantity and quality. This fact is responsible for the almost regionwide construction moratorium now in effect.

Like other great urban rivers, the Potomac is subject to runoff which not only contributes siltation but also, and possibly much more seriously, contributes organic pollution from city streets of significant bacterial content.

Although the river is relatively clean—certainly in comparison to other urban rivers—it is seriously compromised in its role as the principal structuring element of the federal city. The estuary is gravely polluted and the Anacostia, along which there is extensive parkland intended to serve the city dweller, is today far more an environmental liability than an asset.

If the Potomac is of such national prominence and vital importance to the Washington metropolitan area, who, then, is responsible for it? Who is working on it? Who is responding to President Johnson's call for a model effort for the nation?

The answer is complex and an excellent example of the difficulties inherent in the decision-making process for planning and development in the nation's capital and its surroundings.

Involved are four states, the District of Columbia, the City of Alexandria and at least seven major counties. To these must be added the Environmental Protection Agency, the U.S. Corps of Engineers, the Federal Power Commission and the Departments of Interior, Defense, Agriculture and Health, Education and Welfare. The Interstate Commission on the Potomac River Basin has just published a *62-page* directory which lists public and private agencies and organizations which deal with the river in one way or another.

The Interstate Commission was established in 1940 when a sanitation compact was agreed to by Maryland, Virginia, the District of Columbia, West Virginia and Pennsylvania. It was given a purely educational and advisory role; in 1970 its scope was extended to cover water supply and flooding as well as pollution.

The next major event in the river's management occurred in the early 1960s, when the Corps of Engineers prepared a report at the direction of Congress. Published in 1963, it dealt with water supply, water quality, flood control and recreaation. It did not, however, meet the favorable public reaction, largely because it proposed engineering solutions which conflicted with other interests, mostly private (147,000 acres to be inundated by new reservoirs), and did not deal sufficiently with public use of the river.

This report precipitated something of a crisis in planning for the basin and led President Johnson to instruct Stewart L. Udall, then Secretary of the Interior, to appoint an interdepartmental task force to review it and come up with a program which would be a "model" for the nation. One of the more interesting byproducts was *The Potomac,* a report in 1967 from the Potomac Planning Task Force, which had been assembled by The American Institute of Architects. This is without a doubt the most informative, graceful and readable document among the mountains of material generated to date on behalf of the Potomac River.

Although the Udall task force was instructed to consult with state and local authorities, this was not effectively done at the outset. In response, the governors of the four states and the president of the Board of Commissioners of the District of Columbia formed the Potomac River Basin Advisory Committee (PRBAC) to represent state and local views to the federal task force.

PRBAC recommended a new Federal/Interstate Compact patterned after a similar instrument established to deal with the Delaware River. This compact was to have six signatories: Maryland, Virginia, D.C., West Virginia, Pennsylvania and the federal government.

To date, Maryland and Virginia alone have enacted the compact; West Virginia and Pennsylvania are unlikely ever to do so, and D.C. cannot until the other four have agreed, as Congress acts for the District and the federal government at the same time but only after all other parties have signed.

Mr. Florance is an associate partner and director of planning for the firm of Keyes, Lethbridge & Condon, Washington, D.C.

It remains entangled in a maze of agencies all too characteristic of decision-making, Washington style.

With the compact stalled through the early 1970s, the need for action in the Washington metropolitan area grew more urgent, particularly as the region experienced runaway growth. To meet this need, still another body came into being: an ad hoc committee, the Washington Area Interstate Water Resources Program, comprised of representatives of Maryland, Virginia and D.C. in cooperation with the Metropolitan Washington Council of Governments. This committee presented a series of recommendations in 1973 but failed to treat the essential question of who would coordinate and implement them. In the letter of transmittal, however, recognition was made of a significant Congressional action: the 1972 amendments to the Federal Water Pollution Control Act which require governors of interstate areas with water quality control problems to cooperate on areawide waste treatment management plans.

This law brought the EPA squarely into the act. Under its provisions the governors of concerned states (and the mayor of Washington in the city's case) were to have designated an organization to make such plans by March 13, 1974. The governors did not and therefore lost the exclusive authority to do so. Local governments now share authority to organize such an agency, which must be based on guidelines established by EPA and be approved by it.

The long-standing Interstate Commission, to date endowed only with advisory powers, could be designated as the areawide planning agency but lacks sufficiently broad area participation. The Metropolitan Washington Council of Governments wants the job very much but has no representation from the northern-most Virginia part of the urban area. The Maryland Environmental Service is also in the picture.

What really hurts is that regional cooperation is only one part of the problem. Federal budgetary and fiscal policy is another and it strikes at the implementation of projects. In fiscal years 1973, '74 and '75, Congress authorized a total of $18 billion under the Federal Water Pollution Control Act for the entire nation. But the Nixon Administration has impounded $9 billion of this and through fiscal year 1974 has obligated only $1.8 billion. Several states have filed suits for release of funds.

The difficulty with the obligation of funds stems from excessively rigid EPA regulations concerning actual projects (they have since been rewritten to offer some relaxation) coupled with the idea that fiscal cash flow can be controlled by delay in obligating allocated funds just as effectively as by impoundment. The effect of these actions (or nonactions) on the jurisdictions of the Potomac River basin has, of course, been crippling. These jurisdictions see considerable irony in the fact that there has been no corresponding relaxation of standards or timetables for achievement of federal water quality regulations.

The sheer multiplicity of agencies involved in the case of the Potomac and the awkward, bureaucratic and uncertain nature of federal participation have caused unconscionable delay and a truly comprehensive effort remains maddeningly frustrated. □

Arthur Cotton Moore/Associates Of Washington

Practice Profile

Twenty-eighth Street in Georgetown is in the heart of Washington, D.C.'s most flavorful and historic residential precinct, a place of finely scaled and sensitively restored Georgiana perhaps unmatched in any American city.

It may seem surprising that behind what appears to be another old facade (center in photo below) is quartered an architectural firm notable for its concerns with the problems of architecture in today's society. It is not so surprising if one knows that the firm—Arthur Cotton Moore/Associates—is strongly committed to the idea that the buildings of the past have a significant role to play in the solution of these problems.

The firm's headquarters was formerly a mouldering old garage wedged between houses. The original roof now supports the top level of the structure where there are conference rooms, a reception area and offices. The old brick is left exposed, contrasting interestingly with colorful contemporary furnishings. From the first level, the visitor descends two levels to drafting rooms.

This physical environment has determined the organization of the firm into two "studios," with space available for possible growth to a third. The studios—headed by senior associates Pierre Paul Childs, AIA, and Harold Adler, AIA, and junior associate David C. Cox, AIA—are run almost independently under the direction of Arthur Cotton Moore, AIA.

The firm consists of 13 architects and three supporting staff members. There is no special expertise by studio. Each may be working on eight to ten projects simultaneously. The range of jobs is broad—"from fuzzy planning and zoning issues to the nuts and bolts stuff," Moore says. The firm's operations are decided by the associates, who meet at least once a week, often three or four times ("Sometimes over lunch in a local beanery") to decide which studio will be responsible for a project and to assign job captains or project team leaders.

Moore established the firm in 1965 after working in the Washington offices of Satterlee & Smith (1960-61) and Chloethiel Woodard Smith & Associates (1961-65). He started out remodeling a house for a friend—a job never consummated—and in the process picked up other small projects. Once things were at such a low ebb that the only job on the boards was one for a sign.

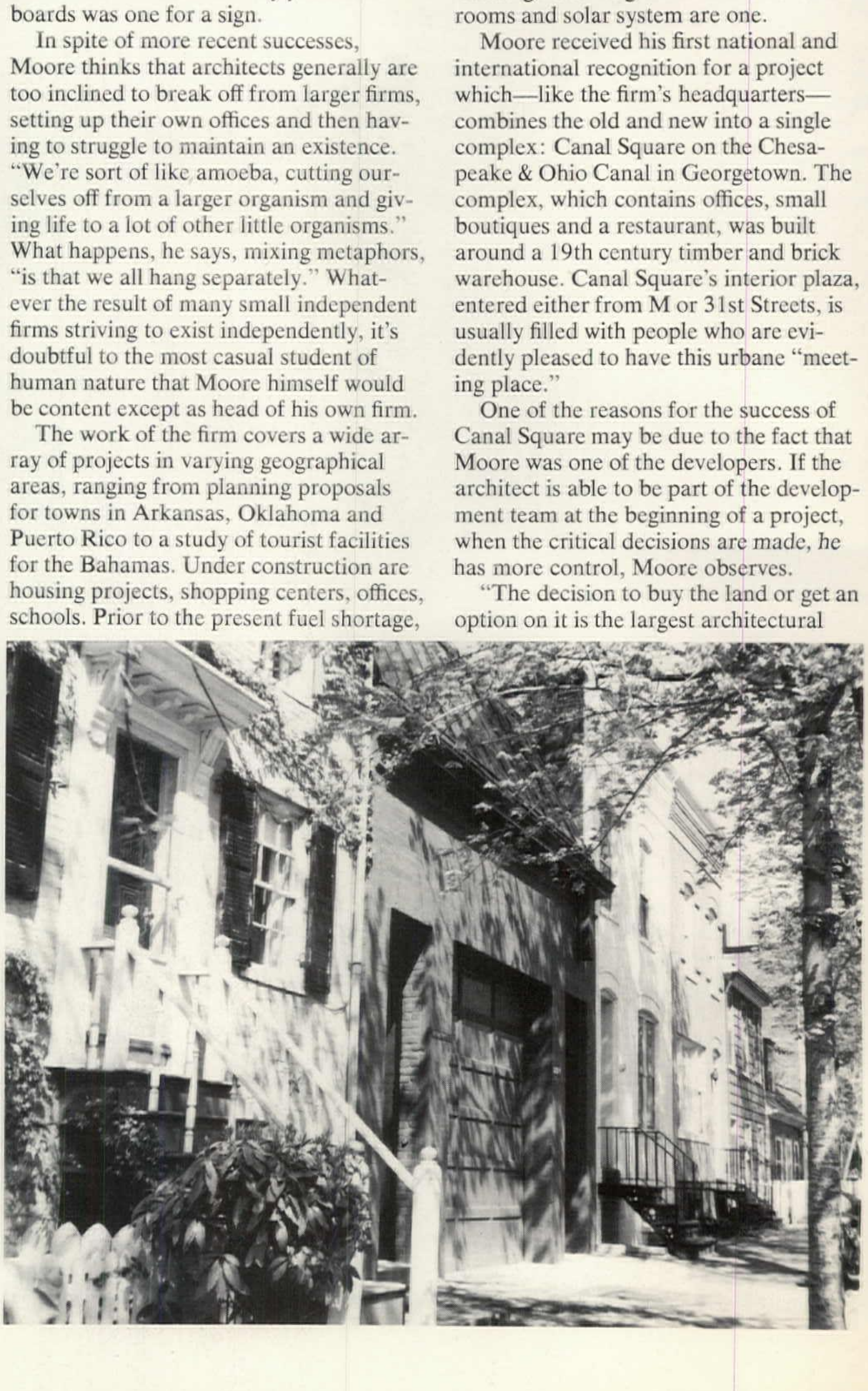
In spite of more recent successes, Moore thinks that architects generally are too inclined to break off from larger firms, setting up their own offices and then having to struggle to maintain an existence. "We're sort of like amoeba, cutting ourselves off from a larger organism and giving life to a lot of other little organisms." What happens, he says, mixing metaphors, "is that we all hang separately." Whatever the result of many small independent firms striving to exist independently, it's doubtful to the most casual student of human nature that Moore himself would be content except as head of his own firm.

The work of the firm covers a wide array of projects in varying geographical areas, ranging from planning proposals for towns in Arkansas, Oklahoma and Puerto Rico to a study of tourist facilities for the Bahamas. Under construction are housing projects, shopping centers, offices, schools. Prior to the present fuel shortage, the firm devised an economically feasible method of cooling and heating by the sun, and it has planned a solar energy science building for a Virginia school where classrooms and solar system are one.

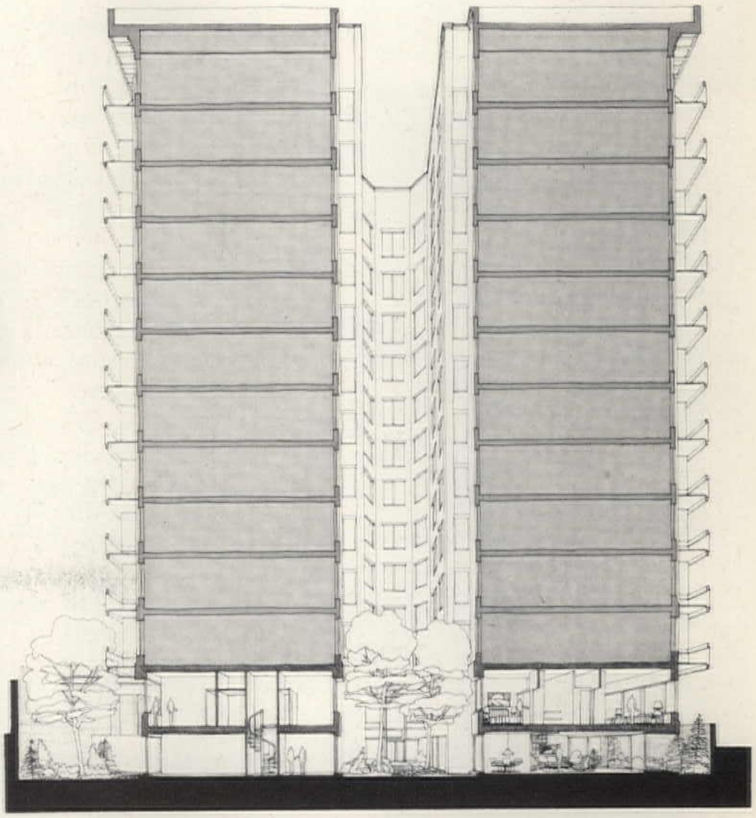
Moore received his first national and international recognition for a project which—like the firm's headquarters—combines the old and new into a single complex: Canal Square on the Chesapeake & Ohio Canal in Georgetown. The complex, which contains offices, small boutiques and a restaurant, was built around a 19th century timber and brick warehouse. Canal Square's interior plaza, entered either from M or 31st Streets, is usually filled with people who are evidently pleased to have this urbane "meeting place."

One of the reasons for the success of Canal Square may be due to the fact that Moore was one of the developers. If the architect is able to be part of the development team at the beginning of a project, when the critical decisions are made, he has more control, Moore observes.

"The decision to buy the land or get an option on it is the largest architectural



The Cairo Hotel: The Moore philosophy in action turns a run-down 78-year-old inner-city hotel into middle-income housing, and makes 276 rooms into 170 homes.



design decision," Moore says. The next "and only slightly less important architecturally is the decision about the land's use—what the general package will be." Both are often made by the developer alone, "based on some kind of bloodless analysis, but they have tremendous implications for the architecture." If the architect is not a member of the team, he may wind up being "just a decorator trying to ameliorate some horribly bad or dense project."

If the economically knowledgeable architect is part of the development team, he can suggest better revenue-producing uses, and he also may be able to reduce the total mass to be built. And if the architect can work creatively with the economics, he will provide more freedom in design for himself. And that, Moore declares, "is the ultimate goal: to have the freedom to design what the architect thinks is, in fact, right."

Moore makes a hardnosed economic case for the reuse of old buildings. "If we don't have to build the shell, there's an economic credit," he explains. "The second economic benefit is that when the shell is filled in with the new use, the resulting space is more appealing, more rentable. So to make something less expensive and more rentable is really talking the developer's language. And that's the only way we're going to save old buildings, except for the very few that are turned into museums."

Moore relates the reuse of old buildings to the whole matter of conservation of resources at a time of rising costs and growing scarcities. "Old buildings, a tremendous resource, have great equity in them. They have qualities and detail that will never be replaced. When they're torn down, they're gone forever. It's like death. Total."

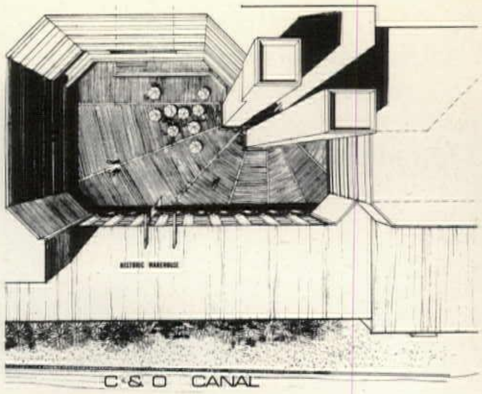
The firm uses the detail of old buildings as a fundamental decorative element. The eye-catching old is left alone. This allows new structures in a complex to be "quite utilitarian." And because they aren't so elaborate, they aren't so expensive.

Moore says that the architect also can use old buildings as a device to soften the impact of new developments. People like the old, the familiar, and old buildings can be a strategic tool in making a proposed development more acceptable to the citizenry.

The firm has several projects in process which combine the old and the new, and three typify its approach to such work. The first is a self-help project in the Bedford-Stuyvesant section of Brooklyn sponsored by the Bedford-Stuyvesant Restoration Committee. About 50 percent of the complex involves old buildings in a series of commercial structures within a block. "We're hooking the old with the new and playing one against the other," Moore says. It is hoped that the vitality of the new commercial area will generate an economic foundation for a new and self-contained community.

The second project is in Washington where the firm is renovating the old Cairo Hotel on Que Street. When constructed in 1894, the Cairo so angered people with its height that an act of Congress resulted which limits heights of structures in the District. "But today, people like the old monster," Moore says, with evident affec-

Canal Square: Fated to become a parking lot, an old warehouse becomes the basis for a functioning new office building and mall in an historic area where community pressure is palpable.

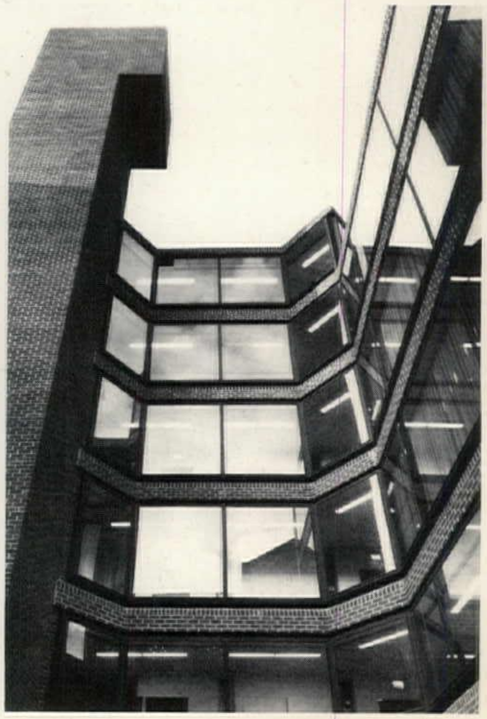


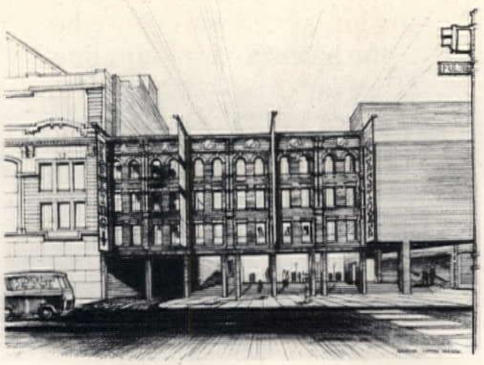
tion on his own part. When the Inland Steel Development Corporation acquired the Cairo, the Moore firm was engaged to turn it into a moderate-income apartment building.

The third project, a more ambitious recycling effort, is being planned for four blocks, one of which is in the historic district, in Charleston, South Carolina. When a developer bought the property and proposed to build a highrise there, the citizens moved to stop it. They successfully raised funds to buy the property and have resold it to sympathetic developers—with strings attached. What goes on the property now must conform to tight standards of height and density. Old warehouses in the area will be recycled in a fashion somewhat similar to Canal Square, with the complex combining commercial and residential uses.

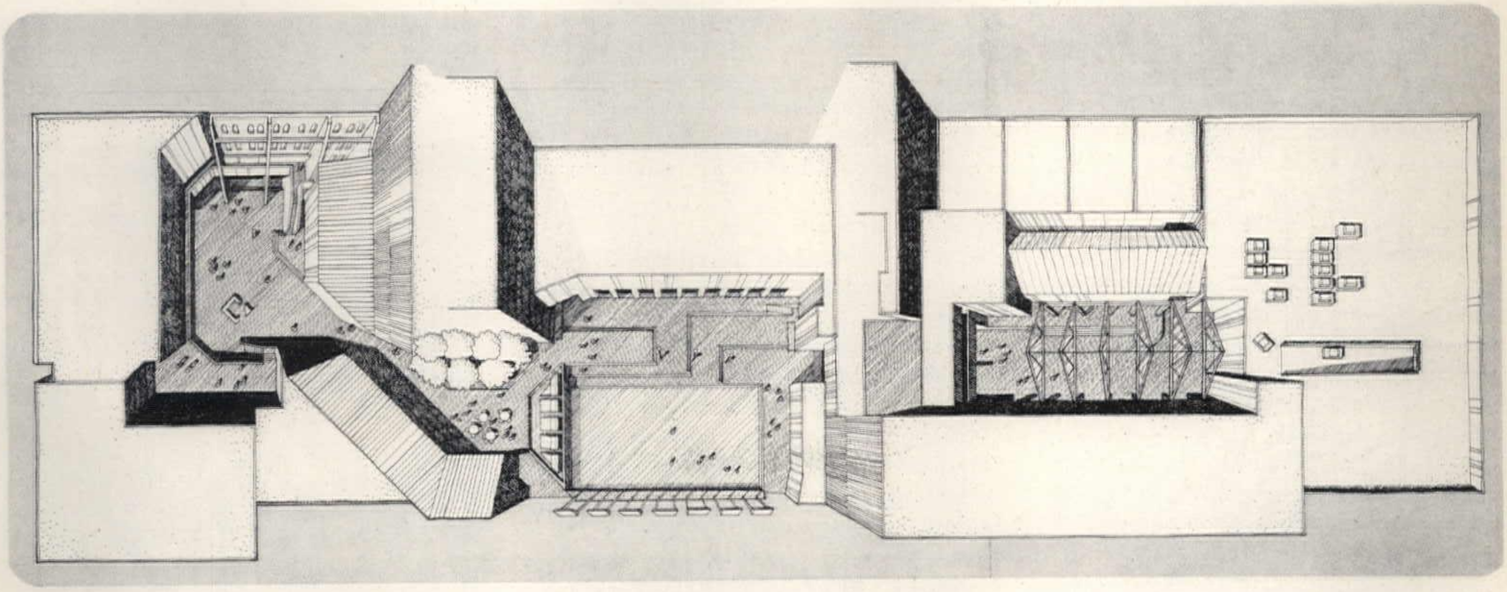
"What's interesting," Moore comments, "is that instead of trying to stop the development with a protractive hassle in the courts, the citizens became involved in a positive way. It took courage and hard work, but they did it because they care about their city."

A "hassle in courts" is in Moore's opinion the "poorest forum for planning.





Bedford-Stuyvesant commercial center: Two levels to contain shops, a theater, a restaurant, a skating rink, a medical clinic—and to further encourage new business in a depressed area.



The legal process cuts off communication." He speaks from recent experience. The firm was commissioned—in consortium with Elbasant/Logan/Severin and Sasaki, Dawson, DeMay Associates—to design a mixed-use development on the dilapidated Georgetown waterfront for the Inland Steel Development Corporation. The design was hailed by local architectural critics for its sensitivity and urbanity, but it ran into vehement opposition from some local citizen groups who preferred to see little or no development on the waterfront.

The groups took the developers to court. Moore recalls that one hearing followed a rape case: "Then suddenly the judges and lawyers were involved in abstract architectural and planning theories." The developer won the initial rounds, but the whole issue has not been decided. Presently, the first building, to contain shops and offices, is under construction.

The Moore firm brought a knowledge of waterfronts to the Georgetown job. It has made a comprehensive study of waterfronts in six American cities. The resulting report, titled *Bright, Breathing Edges of City Life,* was prepared under the Department of the Interior's Water Resources Research Office. Moore believes that waterfronts, like old buildings, are a fundamental asset, but that neglect has to be stripped away to see their true value. New uses should be inserted gradually—incrementally: "Don't tear the whole thing out and come in with a supercity with all the tax writeoffs," Moore advises. "Think small."

Despite the Georgetown waterfront experience, Moore believes that an "open process" is the only way to approach the citizenry regarding any proposed change. This means, he says, that the architect must develop skills of communication and must learn how to use graphics effectively and to talk "almost like a politician" about complex issues. "In brief, the architect must be able to negotiate and design with the public's good in mind." Today, when there is this conflict between people and developers, "the public must be considered as the *real* client."

The firm keeps the public as client in mind with its *pro bono publico* work. If there's some civic issue at stake in which the firm has an interest, it will try to find ways to solve the problem. Moore spends about 10 to 20 percent of his time on such work. One example was a proposal by the firm for use of the land occupied by the Washington National Airport. The firm proposed that the airport's expansion be stopped and that a new-town-in-town be built on National-occupied land and that an in-town terminal be built to serve Dulles International Airport with flight-connecting mobile lounges, similar to those in use at Dulles now, which transfer people from terminal to planes.

Other *pro bono publico* efforts have included alternatives to the demolition of the Old Post Office building on Pennsylvania Avenue. The firm suggested that it be turned into a downtown hotel, backing up its ideas with an in-depth series of cash flow studies and cost estimates to show that the plan was economically feasible. The firm has proposed also that another way to bring vitality to the downtown would be to stop bulldozing the small stores in the urban renewal areas and to let the small businesses continue while new construction takes place over and behind the present stores, with a minimum of disruption during the renovation process.

Moore believes that architects anywhere can play a singularly important role in helping solve civic issues. Architects can do more than oppose; they have the ability to propose creative, viable alternatives. "In our negative world," he says, "a positive idea confounds absolutely."

Moore says that the overriding goal of his firm is to "connect architecture with the rest of society." The profession of architecture, he thinks, looks inward too much to find design resources. "The task, rather, is to look outward and to interrelate architecture with all of society."

Mary E. Osman

Black and White In Washington: A Personal View

Penny Wright

We first came to Washington, D.C., in 1950. As we approach the bicentennial year of 1976, I look back with something like wonder on how relations between blacks and whites in the capital have changed in the intervening years.

The early 1950s were a strange time. Negroes sat at the back of the bus. Schools and even playgrounds were segregated. Washington was still a very sleepy city, with most of the laws and racial attitudes of a small Southern town.

Because Actor's Equity refused to allow its members to play in a theater "for whites only," the only legitimate theater was closed. Movie houses were segregated and dark-skinned African students or diplomats were allowed to attend only upon presentation of their passports.

A year after we moved to Washington, we had a small cocktail party for a visiting architect. Among those invited was a young black architect in my husband's office. (His partner taught at the Howard University School of Architecture and had always taken into his office for a year or so one of the best students of the graduating class.) We assured each other that our party would be a happy affair — that architects were nice people, and that both the guest of honor and the young black architect would feel welcome.

As it turned out, he was the center of attention. I will never forget the look of astonishment on our seven-year-old son's face when he rushed in from playing and saw in the group, a "brown" man standing holding a cocktail glass. Years later I learned that the young man and one of our guests had wanted to continue their discussion, and planned to go out to dinner together. Since eating places were segregated by law, they ended up continuing their discussion at the home of the white architect.

The young black architect was unable to eat in the cafeteria in my husband's firm's downtown office building. At lunchtime he used to hop on the streetcar and ride up to 14th and U Streets (the heart of the black northwest area of the city) to get his lunch. He told me this a month ago when we were lunching together in one of Washington's most elegant French restaurants.

When it became necessary for the firm to move, a new and attractive office building on Connecticut Avenue was desirable but not possible. The firm was told that separate washroom facilities would be necessary and that none was available. The firm moved elsewhere.

Not until September 1954 was our children's school desegregated. President Eisenhower then called upon the capital to serve as an example to the rest of the nation. As PTA president, I was asked if I would be including Negro parents on the executive committee; I replied that of course I would.

But some white mothers on the executive committee could not bring themselves to attend the first few meetings because they had never sat down at a table to talk and work with a Negro person. Eventually they did. The Negro parents had become so thoroughly a part of the PTA that, when I resigned, one of them was nominated by these same white parents to take my place.

In October 1956 we moved into a new house designed by my husband. We had made friends with a number of black people, through the State Department Foreign Service, drama and the arts. Soon after we moved, our day worker of many years called me into the kitchen and rebuked me for inviting members of her race, whom she called "second class" citizens to our home. For the same reason she also refused to register and vote.

During the period, I worked for the Washington office of the American Civil Liberties Union, and spent a lot of time on Capitol Hill. One of my friends was a black ex-newspaperwomen who served on the staff of a Senate Committee. Having lunch together on the Hill was not easy— if we ate at a "greasy spoon" that we could afford we would be put in a dark corner of the restaurant, and the sooner we left the better. Lunch at a high-class restaurant would break our pocketbooks,

but the restaurant help might think she was the wife of a well-known Congressman.

By 1960 much of that had changed. John F. Kennedy was elected President. After his inauguration there was an intoxicating sense of euphoria in the nation's capital. Miracles could be achieved overnight. Volunteer work became the "in" thing, especially volunteer work in the "inner city" with black children. Any chic Washington cocktail party had to include a few charming, intelligent and preferably well-dressed black couples. A black couple moved into an intellectual, liberal, upperclass section of residential Washington and was promptly invited, to the point of exhaustion, to all cocktail parties in the neighborhood.

In May 1963 we had the March on Washington, with Dr. Martin Luther King, Jr., on a warm and sunny day, speaking to several hundred thousand people, black and white, from the steps of the Lincoln Memorial, saying, "I have a dream. . ." It was beautiful and we all loved each other regardless. . . .

Mrs. Wright spent seven years with the National Association of Intergroup Relations Officials and is now on the staff of the District of Columbia Office of Bicentennial Programs. She is the wife of architect Thomas W. D. Wright, FAIA.

Then President Kennedy was assassinated, and Lyndon Johnson, with his deep concern about civil rights, became President. Much legislation was passed and implemented in the areas of civil rights, poverty, housing, etc. A longtime resident of Washington, D.C., Walter Washington, a black man, lawyer and former public housing official, was appointed mayor of our city.

Public service agencies were required to have on their boards members whose presence would assure "maximum feasible participation of the poor." The results were mixed. Some capable individuals moved into significant posts, enabling them to serve the entire community, both black and white. Others, less capable, were catapulted into instant local and even national fame, moved into positions for which they were ill prepared and have since sunk into obscurity.

Discrimination became more covert. We had our riot in the spring of 1968. Few people had understood the depth of black people's frustration.

Young people in April 1968, who rioted, looted and burned, were those to whom their parents may have said after May 1954, when the Supreme Court handed down the school integration decision, "From now on everything is going to be all right." Fourteen years later, everything was not all right.

During the riot I spent the night and early morning answering the telephone at our city hall's riot control center. Telephone calls poured in with offers of help, especially from affluent white people, who up until that time had perhaps never thought of their city as a whole. As a city, and not as the nation's capital, we were, possibly for the first time in the last hundred years, as our mayor says, coming "all together."

Mixed parties (our high school children had called them "salt and pepper parties") had become socially quite acceptable, but dancing was different. In the early 1960s, along with some other couples, we set up a subscription dinner dance. A few years later, at a committee meeting, we expressed the wish to invite some of our black friends to whose dances over the years we had been invited. There was talk of the commitment on a subscription basis to people who might not want to dance with black people. We dropped the subject. A couple of years later, when the mood of our all-white committee had changed, we were urged to invite some of our black friends; our response was "don't use our black friends to make you feel good." Our dance group, however, is now happily integrated.

Mt. Zion Cemetery in Georgetown was during part of its history a Freedman's (freed slaves) cemetery. It has been neglected for many years. Recently the largely white Georgetown Historical Association voted to donate $5,000 towards its preservation and the Dumbarton United Methodist Church, which owns the property, donated the land. It has been designated a bicentennial project, and currently, every Saturday, groups of blacks and whites, old and young, meet at the cemetery to help clean out the underbrush. Their landscape adviser is a nationally known (white) landscape architect.

These past couple of years, as a member of the staff of the D.C. Office of Bicentennial Programs, I have been attending our Bicentennial Assembly meeting. Some members (including my husband) were appointed by the mayor and others were elected. While attending a Bicentennial Assembly meeting, standing at the back of the nave of a church in Southwest Washington, I could see white and black (and now brown) writers, civic leaders, young people, old people, all working toward our goals for 1976. "What is there to celebrate?" ask some people, especially the young and black. We have little to celebrate, but if throughout the city we share our goals and concerns then by 1976 we may feel and even see that we are moving.

Our city has changed. We are more sophisticated in every way. We enjoy the reputation of becoming one of the foremost art meccas of the country. There are more concerts and plays than anyone could possibly attend. And ironically, the back of the bus is now the young blacks' chosen turf. ☐

metrication from page 53

how to convert? The needed agenda for metrication appears to be: for a soft conversion wherein we learn to think metric followed quickly with a hard conversion which sets building product dimensions that can account for fabrication and within-product conformity (engineering standards); for "among-products" integration and building design and construction efficiency (modular precoordination); for individual human and esthetic needs (the Modulor); and for social needs (proxemics) as well. Moreover, if we do the necessary planning now we might and move directly into hard conversion.

To accomplish this agenda in time to control the conversion to metric, which will now be upon us all too soon, is a large order. There is much to consider. We have a plethora of engineering standards, the basic theory of modular precoordination, and the history of metrication's acceptance and use in foreign countries. Specifically, we have Le Corbusier's careful documentation of his theory of Modulor and the anthropometric and mathematical rationale behind it. We also have some beginnings toward a concomitant theory of social dimensions. Furthermore, we have related techniques and approaches by means of which these seemingly diverse approaches can be harnessed in a single direction—approaches like building management systems, systems building and the performance philosophy.

Offsetting these pluses are certain minuses: Engineering standards combine dimensional aspects with process, functional and material aspects which are highly interdependent. Dimensions and related tolerances cannot be altered without broad and fundamental consideration of these interdependencies. Further, whereas the theory of modular coordination is viable, some knotty problems such as the following must be solved: how to deal with wall thicknesses which, because of varying wall-covering thicknesses, are hard to keep modular, and what to do about wall thicknesses themselves, since the walls subtract from otherwise modular rooms, making them nonmodular. Another problem is that while both modular precoordination and Le Corbusier's Modulor are fairly well outlined and developed, there are basic and, perhaps, irrevocable differences between the two. For example, Le Corbusier's wall panels would be about 7 feet 6 inches high compared to the 8 feet of our customary panels or the 7 feet 10½ inches (240 centimeters) suggested for hard conversion.

To surmount such roadblocks, the U.S. construction industry should move quickly and effectively not only to adopt the metric system, but also to adopt it in such a way that it will best serve those who use the buildings we make for them. □

Outside Inside.

Genuine Buckingham Slate® is the natural balance between architecture and nature

VCU Girls' Dormitory Va. Commonwealth University
Architect: Lee, King, & Poole

(Above and right) Woody's Funeral Home, Parham Chapel, Richmond, Va.
Architect: Ballou and Justice • Photos: Garber-Huffman

Interior imagination! Add nature's own warmth with the rich, natural texture of Buckingham Slate®. Result—smart contemporary design endowed with timeless dignity and enduring traditional values. Pleasing, comfortable beauty!

Flair, too. The floating airiness of stairs in slate is just one challenging design-in-slate idea!

Write or call for information or see our catalogs in Sweet's Architectural File or B.S.I. Stone Catalog.

Buckingham Slate®

Buckingham-Virginia Slate Corporation
4110 Fitzhugh Avenue, Richmond, Virginia 23230
Telephone: 804/355-4351

Circle 20 on information card

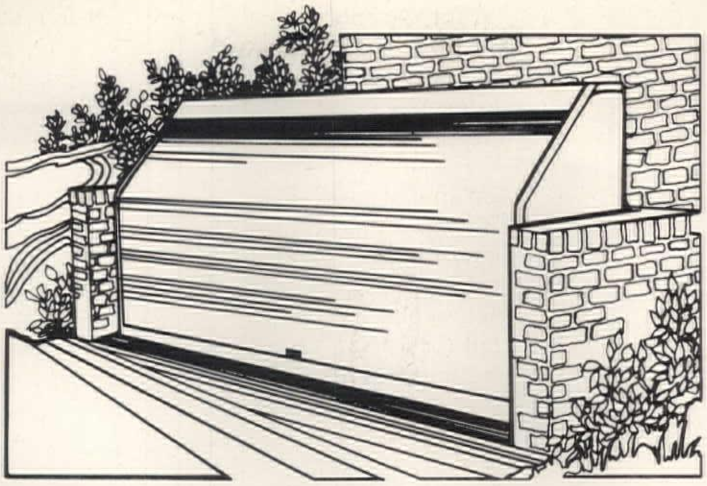
energy from page 38

can be captured and stored for use at night.				
29. Consider the use of heat pumps both water/air and air/air if a continuing source of low-grade heat exists near the building, such as lake, river, etc.	*			
30. Consider the direct use of solar energy via a system of collectors for heating in winter and absorption cooling in summer.	*			
31. Minimize requirements for snow melting to those that are absolutely necessary and, where possible, use waste heat for this service.	*			
32. Provide all outside air dampers with accurate position indicators and insure that dampers are air-tight when closed.	*			
33. If electric heating is contemplated, consider the use of heat pumps in place of direct resistance heating; by comparison they consume one-third of the energy per unit output.	*			
34. Consider the use of spot heating and/or cooling in spaces having large volume and low occupancy.	*			
35. Use electric ignition in place of gas pilots for gas burners.	*			
36. Consider the use of a total energy system if the life-cycle costs are favorable.	*			

LIGHTING AND POWER

	Priority			
	1	2	3	N/A
	C	B	A	
	F	E	D	
1. a. Use natural illumination in areas where effective when a net energy conservation gain is possible vis-a-vis heating and cooling loads.				
b. Provide exterior reflectors at windows for more effective internal illumination.	*			
2. Consider a selective lighting system in regard to the following:				
a. Reduce the wattage required for each specific task by review of user needs and method of providing illumination.	*			
b. Consider only the amount of illumination required for the specific task considering the duration and character and user performance required as per design criteria.	*			
c. Group similar tasks together for optimum conservation of energy per floor.	*			
d. Design switch circuits to permit turning off unused and unnecessary light.	*			
e. Illuminate tasks with fixtures built into furniture and maintain low intensity lighting elsewhere.	*			
f. Consider the use of polarized lenses to improve quality of lighting at tasks.	*			
g. Provide timers to automatically turn off lights in remote or little-used areas.	*			
h. Use multilevel ballasts to permit varying the lumen output for fixtures by adding or removing lamps when tasks are changed in location or requirements.	*			
i. Arrange electrical systems to accommodate relocatable luminaires which can be removed to suit changing furniture layouts.	*			
j. Consider the use of ballasts which can accommodate sodium metal-halide bulbs interchangeably with other lamps.	*			
3. Consider the use of high frequency lighting to reduce wattage per lumen output. Additional benefits are reduced ballast heat loss into the room and longer lamp life.	*			
4. Consider the use of landscape office planning to improve lighting efficiency. Approximately 25 percent less wattage per foot-candles on task for open planning versus partitions.	*			
5. Consider the use of light colors for walls, floors and ceilings to increase reflectance, but avoid specular reflections.	*			
6. Lower the ceilings or mounting height of luminaires to increase level of illumination with less wattage.	*			
7. Consider dry heat-of-light systems to improve lamp performance and reduce heat gain to space.	*			
8. Consider wet heat-of-light system to improve lamp performance and reduce heat gain to space and refrigeration load.	*			
9. Use fixtures that give high contrast rendition factor at task.	*			
10. Provide suggestions to GSA for analysis of tasks to increase use of high contrast material which requires less illumination.	*			
11. Select furniture and interior appointments that do not have glossy surfaces or give specular reflections.	*			
12. Use light spills from characteristic areas to illuminate noncharacteristic areas.	*			
13. Consider use of greater contrast between tasks and background lighting, such as 8 to 1 and 10 to 1.	*			
14. Consider washers and special illumination for features such as plants, murals, etc., in place of overhead space lighting to maintain proper contrast ratios.	*			
15. For horizontal tasks or duties, consider fixtures whose main light component is oblique and then locate for maximum ESI foot-candles on task.	*			
16. Consider using 250 watt mercury vapor lamps and metal-halide lamps in place of 500 watt incandescent lamps for special applications.	*			
17. Use lamps with higher lumens per watt input, such as:				
a. One 8-foot fluorescent lamp versus two 4-foot lamps.	*			
b. One 4-foot fluorescent	*			

continued on page 68



Tee-M Storage Systems are designed to fit in. Everywhere.

For apartments, townhouses, condominiums. Not to mention office buildings, industrial applications, schools and hospitals.

Neat. Sanitary. Economical. (Can eliminate expensive private trash hauling systems.) And there's a wide range of sizes to hold from two to ten 30 gallon cans or 55 gallon drums. All units are shipped fully assembled and ready for installation.

Now there's a new leasing plan for orders of $10,000 or more. Reduces capital outlay, and no down payment is necessary. For more information, send in the coupon. We'll send back the facts.

It's easy to specify the unit you want with Wilson's Spec-Chart. Custom designed units are available for unique applications.

MODEL DESCRIPTION

Standard Tee-M Units for 30 gallon cans

Model-No.	Cap. (30 Gal. Cans)	D H L	App. Crated Shipping Wts.
TM 200	2 cans	27"x55"x 49"	350 lbs.
TM 300	3 cans	27"x55"x 74"	450 lbs.
TM 400	4 cans	27"x55"x 97"	600 lbs.
TM 500	5 cans	27"x55"x121"	750 lbs.
Special Units for 55 gallon drums			
Double Depth Tee-M Units for 30 gallon cans			
TM 4430-DD	4 cans	54"x55"x 49"	650 lbs.
TM 6630-DD	6 cans	54"x55"x 74"	750 lbs.
TM 8830-DD	8 cans	54"x55"x 97"	875 lbs.
TM 1030-DD	10 cans	54"x55"x121"	1,000 lbs.
Special Units for 55 Gallon Drums			

The JG WILSON Corporation
QUALITY PRODUCTS SINCE 1876
P.O. Box 599, Norfolk, Virginia 23501

☐ Please send more information on Tee-M Storage Systems.
☐ Please send Leasing Bulletin TML 1173.

Name ______
Title ______
Company ______
Address ______
City ______ State ______ Zip ______
Telephone ______
Comments ______

Tee-M STORAGE SYSTEMS
Undercover Agent No. 1
TM

energy from page 66

lamp versus two 2-foot lamps.

c. U-tube lamps versus two individual lamps. *

d. Fluorescent lamps in place of all incandescent lamps except for very close task lighting, such as at a typewriter paper holder. *

18. Use high utilization and maintenance factors in design calculations and instruct users to keep fixtures clean and change lamps earlier. *

19. Avoid decorative floodlighting and display lighting. *

20. Direct exterior security lighting at entrances and avoid illuminating large areas adjacent to building. *

21. Consider switches activated by intruder devices rather than permanently lit security lighting. *

22. If already available, use street lighting for security purposes.

23. Reduce lighting requirements for hazards by:

a. Using light fixtures close to and focused on hazard. *

b. Increasing contrast of hazard; i.e., paint stair treads and risers white with black nosing. *

24. Consider the following methods of coping with code requirements:

a. Obtaining variance from existing codes. *

b. Changing codes to just fulfill health and safety functions of lighting by varying the qualitative and quantitative requirements to specific application. *

25. Consider the use of a total energy system integrated with all other systems. *

26. Where steam is available, use turbine drive for large items of equipment. *

27. Use heat pumps in place of electric resistance heating and take advantage of the favorable coefficient of performance. *

28. Match motor sizes to equipment shaft power requirements and select to operate at the most efficient point. *

29. Maintain power factor as close to unity as possible. *

30. Minimize power losses in distribution system by:

a. Reducing length of cable runs. *

b. Increasing conductor size within limits indicated by life-cycle costing. *

c. Use high voltage distribution within the building. *

31. Match characteristics of electric motors to the characteristics of the driven machine. *

32. Design and select machinery to start in an unloaded condition to reduce starting torque requirements. (For example, start pumps against closed valves.) *

33. Use direct drive whenever possible to eliminate drive train losses. *

34. Use high efficiency transformers (these are good candidates for life-cycle costing). *

35. Use liquid-cooled transformers and captive waste heat for beneficial use in other systems. *

36. In canteen kitchens, use gas for cooking rather than electricity. *

37. Use conventional ovens rather than self-cleaning type. *

The checklist concludes with sections similar to those above on transportation in buildings, domestic hot and cold water, solid waste management, and the operation of management of buildings for energy savings. In addition to the guidelines and checklist the GSA document includes an exploration of alternative energy sources, a bibliography and appendices containing detailed backup data. □

BOOKS

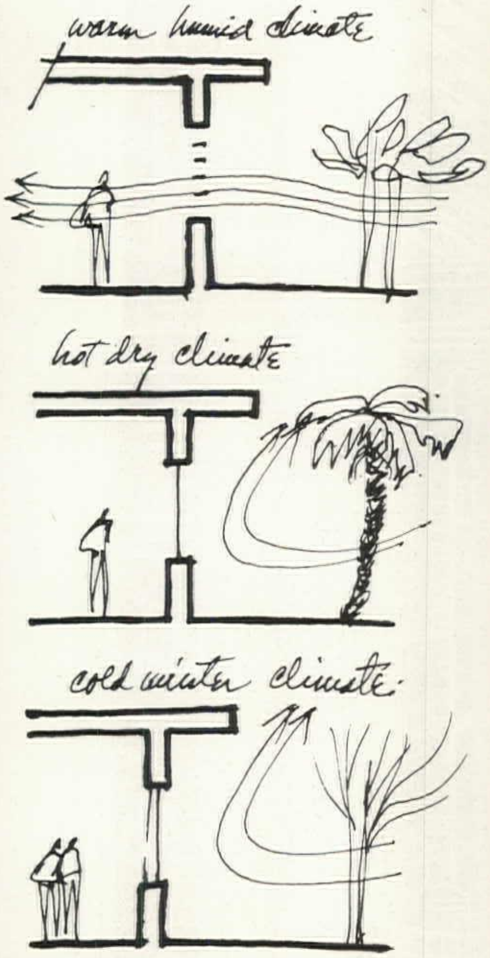
A Bucket of Oil: The Humanistic Approach to Building Design for Energy Conservation. William Wayne Caudill, Frank D. Lawyer and Thomas A. Bullock. Boston: Cahners Books, 1974. 90 pp. $9.85 AIA members; $10.95 nonmembers.

This little book provokes a series of mixed reactions, ranging from a sense of admiration for its bright format and ability to popularize a number of concepts evolving from fuel stringencies to a feeling of disappointment in its superficiality and its distortions of the present architectural and cultural crisis.

Primarily a picture book, it demonstrates its message with photographs of the varied buildings produced by CRS over the last couple of decades, accompanied by expanded captions, observations and occasional sketches. An introductory chapter dashes through the recent years to tell us how we got where we are and in a series of terse directives to inform us about some things to do and other things to avoid. As is generally realized by now, the choices are, for the most part, embarrassingly simple and self-evident. We can only hope that their continuing repetition speeds their adoption.

Although not overtly stated, the prevailing themes appear to be the necessity for designing each structure in response to its specific climatic and site characteristics and, secondarily, for making the delivery of services—light and air—as controllable and variable as technology and economics permit. A third theme, missing from the book but one that will become increasingly important, is the development of systems and controls that supplement natural systems.

Our investigation of energy consumption of educational buildings reveals that the most energy-economic structures appear to be those that are not dependent on mechanical systems 100 percent of the time. In mechanized control systems, there have been problems in maintaining system balance when windows were operable, which leads to the authors' ultimatium: "There must be a commitment to one system—mechanical or natural ventilation." This is surrounded by a confus-



ing conflict of suggestions in which mechanical ventilation, airconditioning and natural ventilation are placed in opposition to one another. The important concept of the mechanical systems' intervening when natural systems can no longer provide comfort conditions is not given as an alternative approach. An occupant's judgment seems to be a control device that does make such a dual system work.

This book makes its most effective contribution in its recognition of the humanistic implication of re-examined building methods. It should leave its lay readers with a deeper realization that an architecture more closely responsive to varying and specific needs will generate a more humane environment as well as one that uses energy more efficiently. If we consider the effect of the book on the architectural audience, we must note several serious shortcomings. Aside from the National Bureau of Standards, whose contribution is evident throughout the book, virtually the only other source cited for all the attitudes, discoveries and speculations is the CRS team. As a result, the book leaves one with a feeling that it is primarily a promotional publication for the firm—a fact that tends to diminish its impact on the very important question that it addresses.

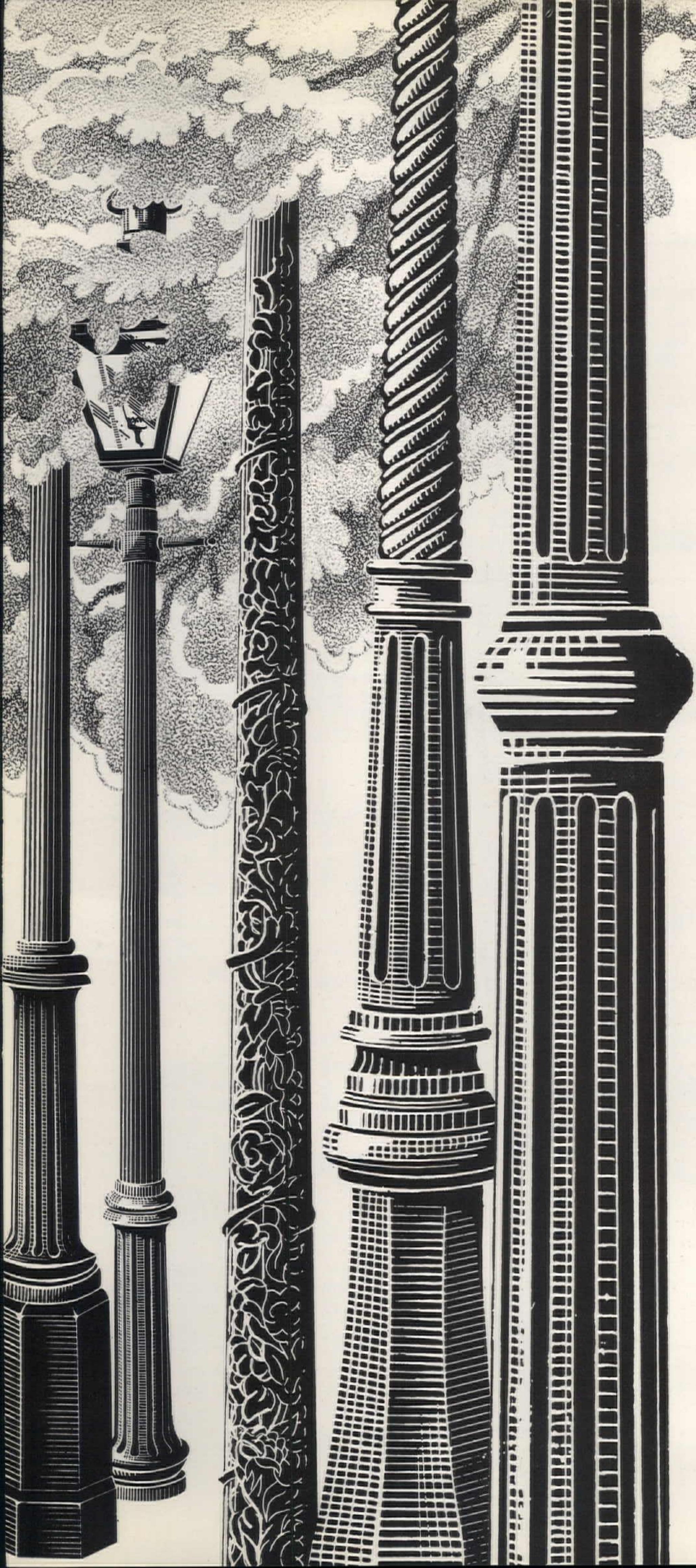
There is nothing proprietary about the energy problem or the avenues open to solve it. Quite the reverse. It is only through the rapid development and exchange of ideas that we can hope for longer-term resolution of our collective burden.

Fallacious principles and technology, which have led to the enormously wasteful use of energy in buildings, must be analyzed. New, or old, methods of satisfying requirements simply should be freely publicized and exchanged among professionals, not for the sake of promotional advantage but rather to help us get back on a more rational path. This may even mean crediting someone else. Possibly the hurried preparation of the book prevented the research that might have overcome this weakness.

The book makes no effort to place the problem in any perspective that would give the general public a feeling for how to choose among the various available alternatives or what the consequences would be on the energy shortages which will deepen in the coming years. There is nothing to tell us what part of the 65 billion wasted gallons of oil can be saved by various options and what steps and attitudes are necessary to effect the savings. The random listing of some energy-consuming habits and alternative approaches to the problems under examination is useful in suggesting that our whole accepted building vocabulary needs re-examination and that, somehow, a more humanistic architecture and environment will result. The attitudes which the book encourages would permit a redefinition of the building program.

Those of us within the profession will look to the book for an architectural

continued on page 74



In Winter *she wants an* Indoor Pool. In Summer *she wants an* Outdoor Pool.

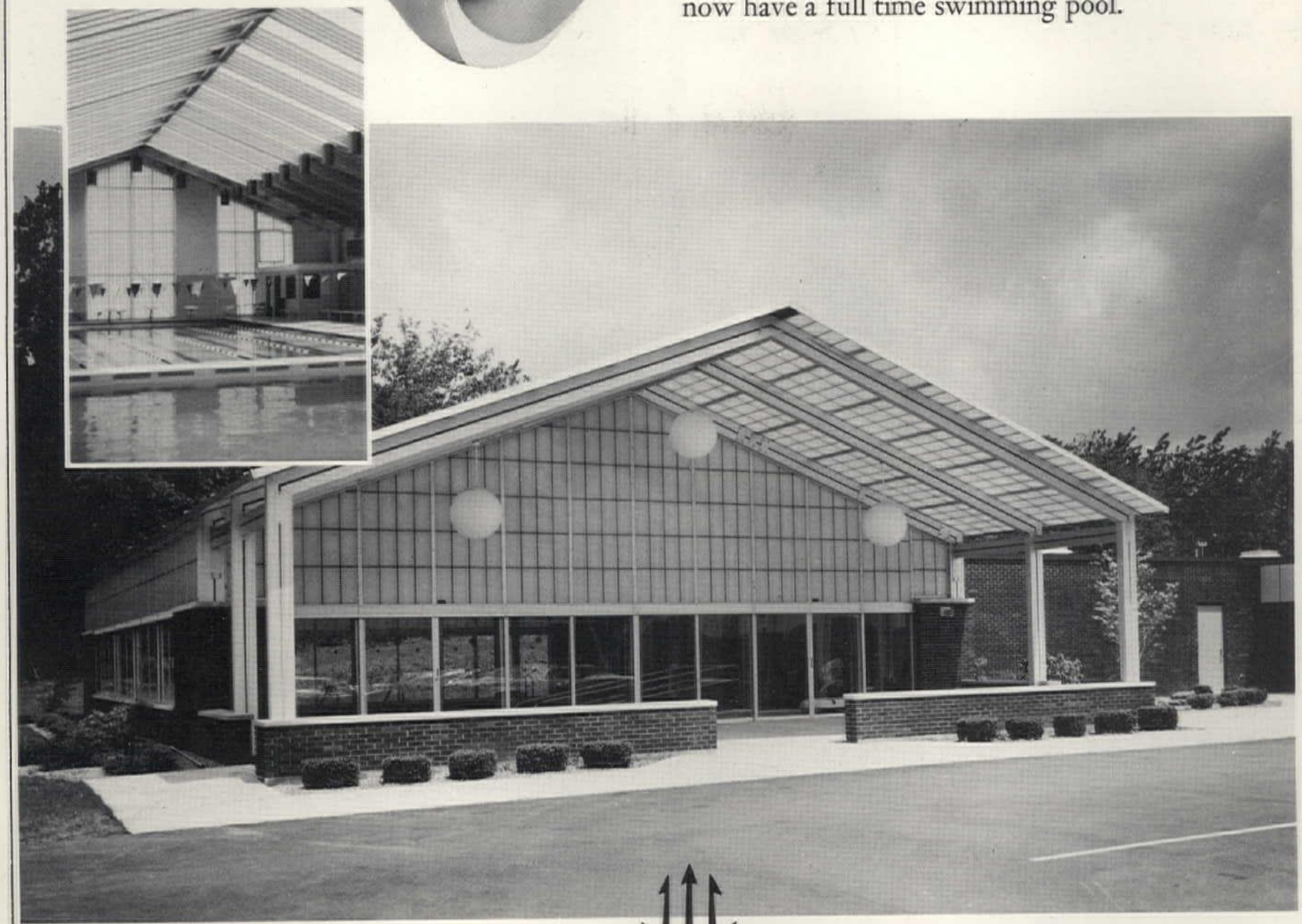
No, it's not too much to ask. Swimming is a year round sport, and today's pool project should offer the pleasure of comfortable indoor recreation in the Winter and glorious outdoor sun-worshipping in the Summer.

The Paddock "Swimming Pool System" features the Skywall Natatorium, the swimming pool enclosure that opens approximately 50% of its translucent roof and two-thirds of its glass sidewalls to Summer's sun.

Then for comfort in Winter or inclement weather, it provides complete air distribution and humidity control.

Select the Paddock "Swimming Pool System" for your next pool project. Beginning with Paddock's IFRS system of pipeless recirculation through a complete line of filters and accessories to the Paddock Skywall Natatorium, you place single responsibility with one company that has set the standard of leadership in the industry since 1920.

For a price within your budget, you can now have a full time swimming pool.



For detailed brochure, specifications and a list of installations, write Marketing Director, Paddock Pool Industries, P.O. Box 511, Paddock Parkway, Roch Hill, S.C. 29730.

Paddock
OF CALIFORNIA, INC.

books from page 70

statement of the problem. It does not stand up well, however, under this kind of scrutiny. Ironically, some of the most interesting work of William Caudill was done back in the early '50s in the studies of one-story schools designed for natural cooling. Those early wind-tunnel tested forms, the sensitivity to site, temperature and subtle variations in building configuration and the concepts for human comfort suggest the kind of research that must be resumed today. The resurrection of this material probably represents the most interesting part of the book to the architect. It still maintains a quality of quiet conviction and invention without bizarreness that demonstrates how a carefully conducted research can shape building form and influence building programs.

Unfortunately, the rest of the book has neither the originality nor the clarity of these early studies. There are too many instances of misleading explanations, oversimplified theories, incorrect statistics and usurped credits to be overlooked. They tend to denigrate and deny the contributions that have been made by professionals (and amateurs) in architecture and engineering.

Inconsistencies within the book lead to confusion. Pages 22, 30, 38 and 40 make conflicting statements on the use of glass and solid walls, each of which is true to some extent.

A photograph on page 61, showing energy saved through reduced heat gain at the CRS office achieved by large overhangs shading the windows, also shows a uniform overhead lighting of probably 200 fc., which completely ignores the light provided by the windows. With regard to lighting in particular, statements regarding percentage savings never refer to the base against which the savings are made. The percentages themselves are questionable, i.e., "using 50 instead of 150 fc. reduces energy consumption by 90 percent" (over optimistic) and "low general lighting with specific . . . light (for specific tasks) reduces electric demand 20 to 50 percent." (Conservative.)

There are other figures that might be checked out more carefully. For example, a statement that 70 fc. of uniform lighting requires 6 watts/square foot is at least 50 percent too high.

It might have been more generous and factual had the book given credit for some of its ideas to those people who had an early responsibility for their development and testing. Specifically, one could go back to the books (and buildings) of Le Corbusier and find the complete development of the sun shield, the *brise soleil,* in the '30s. The solar farms that CRS visualizes developing in the desert to convert solar energy to electric energy have been researched and prototypes built by the Meinels in Tucson. The forms and techniques for solar houses have been studied for several decades. Dr. Maria Telkes' prophetic houses of the post-World War II years had rooftop solar collectors and chemical heat storage provisions. Zomeworks in New Mexico and other nonestablishment groups have built, tested and publicized their units. The '30s also saw the installation of large wind-powered generating equipment in Vermont, a development that came to a halt with the abundant availability of fossil fuel-fired plants. Ross Merriwether and others have pioneered in developing computer programs that simulate building performance under complex conditions. The successful British school building system was operating and tested before any significant American efforts were directed to the problem of systems building.

The purpose of listing some of the people and groups who have concerned themselves with these problems long before they became fashionable is to bring the question of energy use back into the perspective that it demands. Any book presented as a professional point of view on the question that fails to suggest the dimension of the problem and the full cast of characters who have been involved in its investigation must be considered to have a serious shortcoming, regardless of how bright and attractive its format may be. *Richard G. Stein, FAIA*

Questions About Your Subscription

To insure fast service on inquiries concerning your *AIA JOURNAL* subscription, please include the address label from the most recent issue received.

ATTACH
LABEL
HERE

Change of Address

Four weeks' notice required for change of address. Include address label from most recent issue and new address information in space provided below.

NEW SUBSCRIPTION

☐ Please check here if you wish subscription rate information.

Name________________

Address________________

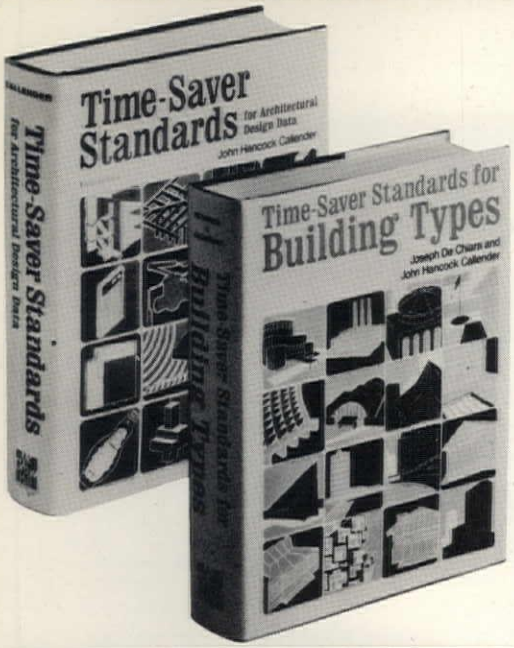
City________________

State________________ Zip________

MAIL TO:

AIA JOURNAL
Circulation Dept.
1735 New York Ave., N.W.
Washington, D.C. 20006

For the Architect's bookshelf—McGraw-Hill Recommends...



TIME-SAVER STANDARDS: A Handbook of Architectural Design, 4 Ed.

By John Hancock Callender

1,299 pp. 8½" x 11", 2,000 illus.

This classic has been greatly revised and expanded to provide coverage on such new material as steel domes—space frames—suspension structures—plastic design—high strength steel—reinforced concrete beam and slab tables, etc. Also included for the first time are—motels—shopping centers—housing for the aged—residential air conditioning—cavity wall construction—plank and beam construction—welded connections, and much more. Illustrations, diagrams, charts, and tables make it easy for you to visualize and utilize the information given.

Time-Saver Standards for Building Types

Edited by Joseph De Chiara and John Hancock Callender

1,065 pp. 8½" x 11", over 1,500 illus.

Evolving from and following the practical features of the past 4 editions of the famed Time-Saver Standards, here is an altogether new master reference for your profession. It gives you instant access to the most needed design criteria for major types of buildings, including: residential—educational—cultural—health—religious—government and public—commercial — transportation — industrial — recreation and entertainment—et al. You will constantly find yourself referring to Time-Saver Standards for Building Types for specific solutions to all your design problems.

INTERIOR SPACES DESIGNED BY ARCHITECTS

An architectural Record Book
Edited by Barclay F. Gordon, Assoc. Ed., Architectural Record

256 pp., 9" x 12", 800 illus.

Here in one volume are some of the best examples of architectural interiors, reflecting the increased interest in the architectural profession for this expanding area of practice. Taken together, the numerous illustrations and detailed descriptions constitute a visual and analytical definition of interior architectural design, 1968-1973. Designing for today and tomorrow as well is the theme, and the articles abound in fresh, striking, imaginative, and innovative ideas for both new construction and renovations.

CAMPUS PLANNING AND DESIGN

An Architectural Record Book
Edited by Mildred F. Schmertz, A.I.A., Senior Editor, Architectural Record

264 pp., 9" x 12", 710 illus.

If you're taking on a project in campus development or expansion, you'll find this a really practical and rewarding source of information and inspiration. Each chapter is based on feature articles from Architectural Record and prefaced by an introduction highlighting special problems and solutions explored therein—designing the single building—designing the campus library—single building or complex designed as part of campus master plan—architecture giving the campus the unity of a single building—campus performing art centers—designing campus interiors.

HOW TO MARKET PROFESSIONAL DESIGN SERVICES

By Gerre L. Jones, Marketing and Public Relations Consultant

368 pp., 35 illus.

This book has one specific purpose—to help you bring in more business. Eminently practical, it shows how and where to find prospects ... build bridges to them ... and sell them—with carefully planned presentations and proven follow-up techniques. The author explains the obstacles and pitfalls of professional services marketing, shows how to spotlight best selling points of your firm and gives clear-cut blueprints for demonstrating why yours is the best firm for the job.

ARCHITECTURAL DELINEATION: A Photographic Approach to Presentation

By Ernest Burden

310 pp., 8½" x 11¼" over 600 illus.

You have probably often felt that traditional rendering methods are tedious, cumbersome, time-consuming, and inflexible. Now an award-winning architect has developed a totally new approach—a simple, flexible method that employs photography and can be used at your workbench or in the field, enabling you to depict architectural projects in true perspective ... and in less time than you'd ever imagine.

ENCYCLOPEDIA OF URBAN PLANNING

Arnold Whittick, Editor-in-Chief

1,204 pp., 7½" x 9¼", 592 illus.

70 outstanding international authorities contributed to this long-needed reference. It brings to your desk the most complete compilation of urban planning information ever assembled in a single source. Its scope is so vast, its coverage so detailed, that you can turn to it for expert intelligence on such far-ranging matters as: what to include in comprehensive surveys for urban development plans; economic and social considerations involved in developing new residential or industrial areas; whether a proposed plan has been previously used and with what results.

NEW DIMENSIONS IN SHOPPING CENTERS AND STORES

By Louis G. Redstone, F.A.I.A.

323 pp., 8½" x 11"

This book will save valuable time and effort. It outlines step-by-step procedures necessary in making initial decisions to build a shopping center. It stimulates new ideas by presenting complete portfolios of over 30 representative centers and individual stores throughout the world. There is a short history of the shopping center development to date as well as specific material serving as a guide or manual. It is definitely a practical resource book showing just how to proceed with the development of a shopping center.

FREE EXAMINATION CARD—MAIL TODAY—NO POSTAGE NEEDED

McGRAW-HILL BOOK COMPANY
1221 AVENUE OF AMERICA, NEW YORK, N.Y. 10020

SEND ME the book(s) checked for 10 days on approval. At the end of that time I will remit for the book(s) I keep plus local tax, postage and handling, and return the unwanted book(s) postpaid.

☐ I PREFER TO BUY ON TERMS. In 10 days I will remit one-third of the total price of the books retained, plus local tax, postage and handling. I will pay the balance in not more than 2 equal installments every 30 days. (Minimum order for terms is $18.00.)

There is no finance charge for purchases under these terms.

This order subject to acceptance by McGraw-Hill

- ☐ **TIME-SAVER STANDARDS, 4 Ed. (07-009646-5) $28.50**
- ☐ **TIME-SAVER STANDARDS FOR BUILDING TYPES (07-016218-2) $27.50**
- ☐ **INTERIOR SPACES DESIGNED BY ARCHITECTS (07-002220-8) $22.50**
- ☐ **HOW TO MARKET PROFESSIONAL SERVICES (07-32800-5) $14.50**
- ☐ **ENCYCLOPEDIA OF URBAN PLANNING (07-070075-3) $29.50**
- ☐ **CAMPUS PLANNING AND DESIGN (07-002216-X) $22.50**
- ☐ **ARCHITECTURAL DELINEATION (07-008924-8) $19,95**
- ☐ **NEW DIMENSIONS IN SHOPPING CENTERS AND STORES (07-051365-1) $21.85**

PRINT NAME ____________________

STREET ____________________

CITY ____________________

STATE ____________________ ZIP ____________

23-F712-4000-3

PAY NOW AND SAVE MONEY!

Remit in full with this order, plus local tax and McGraw-Hill pays all postage and handling costs.

Return books in 10 days for full refund if not completely satisfied.

Circle 30 on information card

ADVERTISERS

Michael J. Hanley
Publisher
Michael M. Wood
Sales Manager
Tom Crow
National Accounts Manager
George L. Dant
Manager, Production and Business
1735 New York Ave. N.W.
Washington, D. C. 20006
(202) 785-7300

ADVERTISING SALES OFFICES

Chicago (312) 787-4477
Larry Benson
William Coffee
Phil Davis
Laurence F. Benson Co., Inc.
200 E. Ontario St.
Chicago, Ill. 60611

New York (201) 729-9331
Tom Crow
79 Hilltop Trail
Sparta, N.J. 07871

Washington, D.C. (202) 785-7271
Michael M. Wood
1735 New York Ave. N.W.
Washington, D.C. 20006

West Coast Representative
(213) 459-3278
Genia Logan
615 Kingman Ave.
Santa Monica, Calif. 90402

ADVERTISERS

Acknowledgements: 4, National Endowment for the Arts' federal architecture project; 14, above left, Ezra Stoller; center left, Balthazar Korab; below left, Joel Strasser; above right, American Plywood Association; center right, Erol Akyavas; below right, J. Alexander; 21, Grumman Aerospace Corp.; 41, above, Ueli Roth; below, S.C. Johnson 42, Jordan Lagman; 43, Joseph W. Molitor; 44, Gordon Schenck Jr.; 45, Rollin R. La France; 46, Ron Thomas; 47, center, Janis O. Lazda; below, Philip Turner; 48, Ezra Stoller; 49, Robert C. Lautman; 54-55, Robert C. Lautman; 57, National Park Service, W. Woodbridge Williams; 58, Bess Balchen; 59, Arthur Cotton Moore/Associates; 60, above, Arthur Cotton Moore/Associates; center and below, Norman McGrath; 61, Arthur Cotton Moore/Associates; 62, D.C. Bicentennial Commission.


Jeanne
for
SongGirl
Polymarble passed the school board's exam.
The requirements were very demanding. "Give us durability, light weight, attractive design, and accent color at a cost comparable to ordinary cast iron fountains."
Haws had the answer with polymarble. Offering color at no extra cost. Color that won't chalk, fade or yellow. Color that runs through the entire material thickness.
The enduring quality of polymarble helped win final approval. Today many polymarble models are excelling in practical application.
For further details on highly rated Model 1070, in a choice of five colors or white, write Haws Drinking Faucet Co., 1441 Fourth St., Berkeley, California 94710.
Haws
DRINKING FOUNTAINS
Haws offers the world's best drink.
Circle 31 on information card

Because some things in business should not go unsaid.
A sense of values. Ability. Authority. All the measures of a man's success. These are things best said succinctly by his office. And for this, Franc'ly Speaking sets a notable stage. It is frankly businesslike in construction, but dramatically styled in textured loops. A 44 oz. Acrylic-Modacrylic blend, Franc'ly Speaking is a unique combination of durability and good looks. In any of ten multicolor hues. Like the French word for business, this carpet suggests a beautiful relationship. It can make an office **les affaires** to be remembered. Franc'ly Speaking is one of five Capital Assets carpets. All rugged, but each styled differently for areas where appearances are important. These carpets complete the Wellco line of commercial carpet for every commercial installation, available in most commercial fibers, constructions and prices. Write or call for catalogs.

Because we're committed to commercial quality and nothing else.

wellcocarpetcorporation

WELLCO CARPET CORPORATION □ P. O. BOX 281 □ CALHOUN, GEORGIA 30701 □ TELEPHONE: 404/629-9276 □ A WHOLLY OWNED SUBSIDIARY OF MANNINGTON MILLS, INC. SALEM, N. J.

Circle 32 on information card