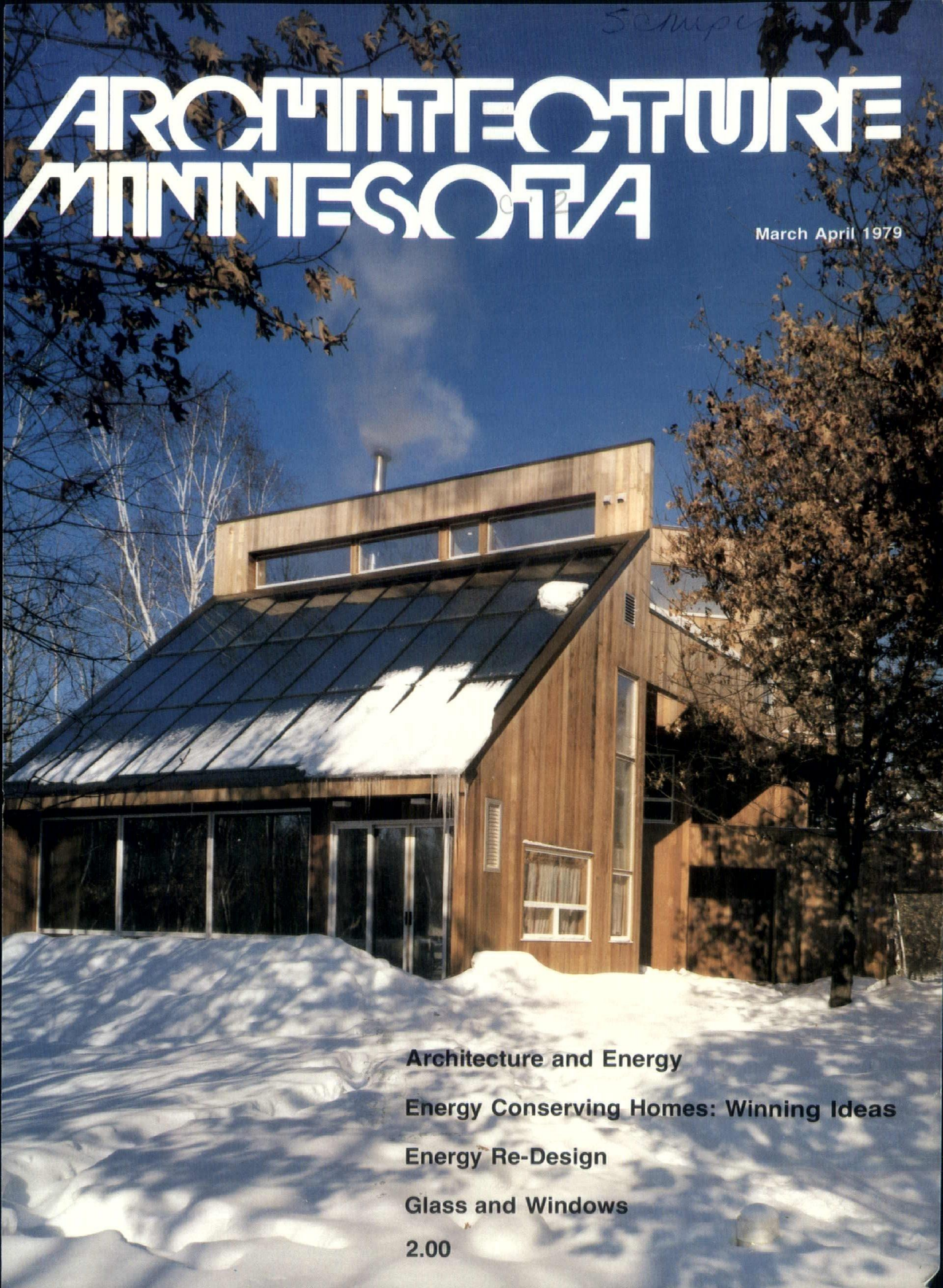

ARCHITECTURE MINNESOTA

March April 1979

Architecture and Energy

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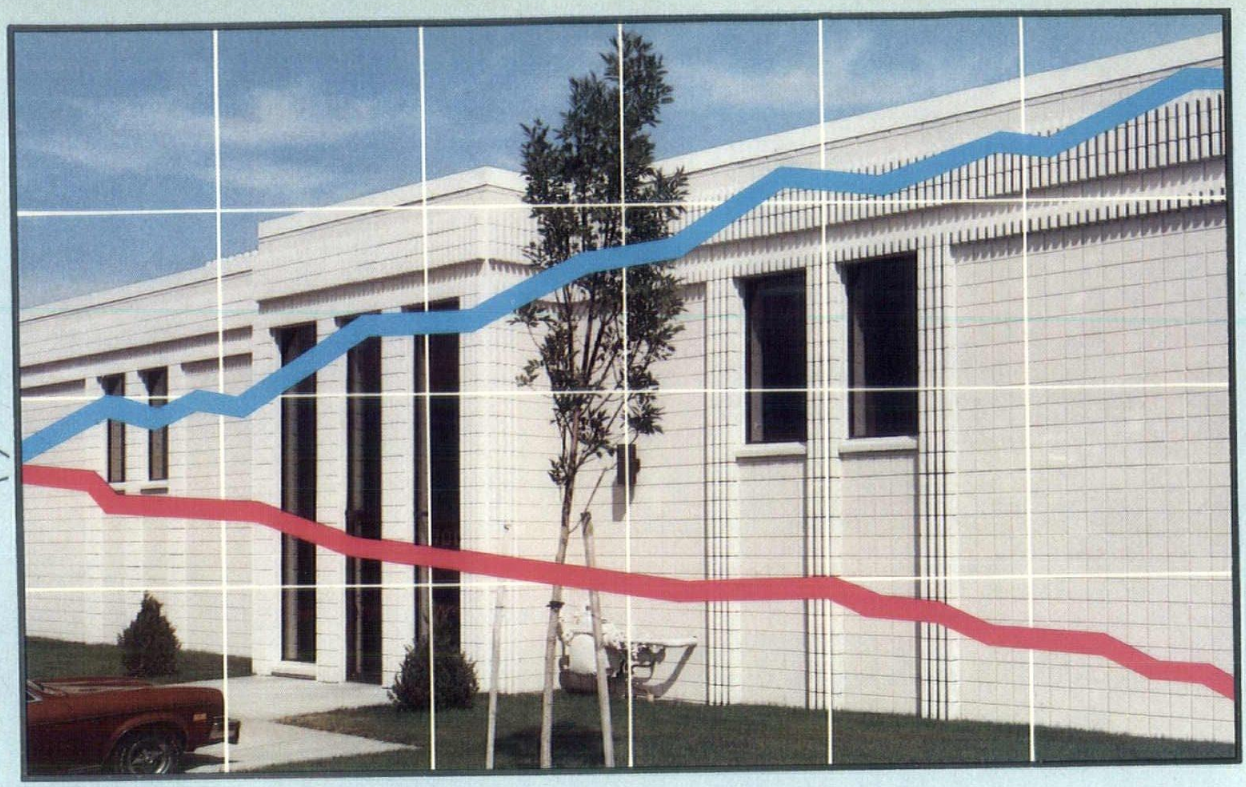

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ARCHITECTURE MINNESOTA

The magazine for Upper Midwest design professionals and their clients

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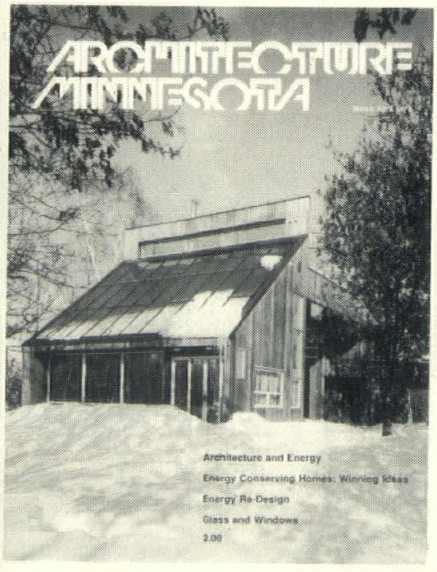

Cover: Schleder Residence, Forest Lake, Minnesota. Architectural Alliance, Minneapolis. Photo by Franz C. Hall, Architectural Alliance.

This three-story 3,300 square feet residence, completed in December 1978, has 600 sq. ft. of solar air collectors which provide space heating and hot water and 250 sq. ft. of south-facing glass which provides for passive solar collection. The house has a central wood-burning stove and an oil back-up heating system.

CONTENTS

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EDITORIAL

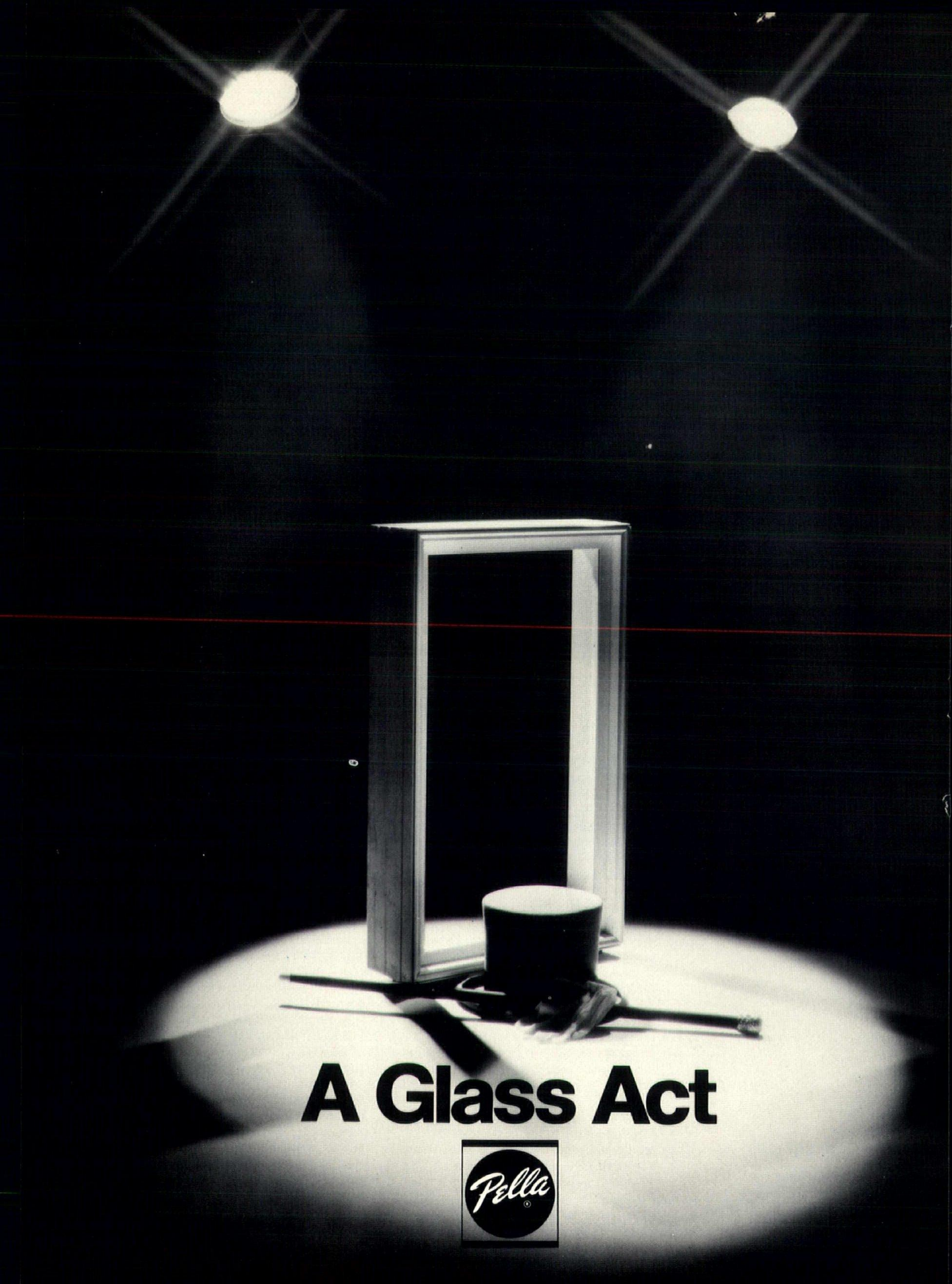
What If Diogenes Were Alive And Well Today And Studying Architecture?

Would he be using candles to look for the latest truths in Post-Modernism or would he resign himself to a flashlight or a mercury vapor lamp? He very likely would read by candlelight. He would study the long history of architecture and, with all other students of architecture, marvel at the wonders of the world that have survived the milennia of occupation. He would quickly appreciate that the history of architecture is a history of adaptation and that its excesses have been quite specific and circumstantial. The few real monuments that do exist represent expressions of a needed community (or environmental) symbol. The adaptation to life on this planet at different locations under very varied political and religious conditions has been extraordinary in its courage, accomplishments and beauty. Diogenes would also find that significant ideas sometimes took centuries and centuries to evolve and develop and that, unfashionably, architecture was very deliberate. In the process of developing from one stage to the next, however, erratic and sometimes unripe ideas were advanced. These quickly became absorbed in the development of the main stream of the time.

Our time is not so different. Energy-conscious design, as so many articles in this issue illustrate, is rapidly maturing and becoming a supremely effective environmental approach. It will not be another post-modernist phase, for it is not architectural design at all. A sun collector is no more (and no less) a form giver than a window or a door is. Its placement, size, relationship proportions, will be subjugated to an overall intent, sometimes a form, which will then make for design.

Energy conscious design is a powerful concommitant of any responsible design. Because—at its best—energy conscious design will take all of its clues from the specific environment for which it is intended, we can expect it to significantly influence architectural design and to enhance the development of regional architecture. On a worldwide basis this should mean the flourishing again of truly regional design, design that reflects the locale very accurately and is as varied as the Austrian Alps and Lake Tahoe. Architecture of the modern age is being enriched and it will survive also the post-modern movement.

—Bernard Jacob


A Glass Act
Pella

ARCHITECTURE AT A GLANCE

Exterior and Interior of Setter, Leach & Lindstrom's medical office building with Galleria in St. Paul.

Setter, Leach & Lindstrom, Minneapolis, are keeping a pace this winter as the designers of a new office building for the **Veterans Administration at the Fort Snelling National Cemetery,** adjacent to Minneapolis/Saint Paul International Airport. The low lying building of Minnesota stone is to be earth sheltered for energy conservation purposes while at the same time relating the structure to its surroundings. In **Saint Paul,** the firm is designing one of the most extensive additions to the city's interior pedestrian system, a medical office building, commercial block and galleria. The **galleria** is intended as a glass-enclosed link between the existing Science Museum of Minnesota to the east, a future housing tower to the north and the commercial office complex. Offices will be rectilinear brick, commercial areas will be curvilinear panels and public spaces will be transparent.

Design One, Inc., Minneapolis, is working on plans for a $2 million-plus shopping center on a 12 acre plot adjacent to Interstate 35 on the edge of **Hinckley,** Minnesota. The center will be patterned after a famous restaurant, "Tobie's," which attracted highway travelers between Minneapolis and Duluth for many years. The buildings will be of Early American country style construction with bay windows, rough sawn board siding accented by bricked in panels and will have recessed doorways. All buildings will have large overhanging awning type roofs allowing customers to walk from store to store under cover. An eventual second phase of the project will consist of an additional three buildings with a total square footage of 26,400 and additional parking. Overall, the center will contain 65,000 square feet of building space for shops and stores. All buildings will be clustered around an open type center mall.

Up to three townhouses in the **McDonough Public Housing** project on Saint Paul's Timberlake Road, will be converted to handicapped housing by the Public Housing Agency of the City of Saint Paul. The project will be accomplished in consultation with the National Handicapped Housing Institute, a private, non-profit housing corporation. Architects for the redesign are **Hammel Green and Abrahamson, Inc.,** Saint Paul. The project is part of

an ongoing rehabilitation program by the Public Housing Agency to convert family units to accommodate handicapped family members. Funding for the project is from HUD. Construction costs are estimated at $15,000. The firm's boards are also busy with a downtown Saint Paul project, to be known as **Northwest Crossing,** in which the Northwestern National Bank of Saint Paul will convert a portion of its parking ramp to retail space, providing new second level retail activities in the skyway level portion of the ramp. Future skyway construction will also connect the project to the Oxford development on the adjacent block. Completion is expected in early to mid-1980.

Korsunsky Krank Erickson Architects, Inc., have been selected architects for a new **First Brookdale State Bank in Brooklyn Center** and the **Park National Bank in St. Louis Park.** Two other banking facilities designed by the firm have recently opened their doors. They are the **Arden Hills office of the Northwestern National Bank of Saint Paul** and the Edina-located **Valley View office** of the **Northwestern National Bank of Hopkins.**

Also keeping busy is the Minneapolis firm, **Centrum Architects, Inc.,** designers of a new 8,000 square foot retail, wholesale and greenhouse complex near the University of Minnesota's Saint Paul campus, for **Hermes Floral of Falcon Heights.** Culminating a two-year feasibility and site analysis study, the firm has been selected to design a new facility for the **Brooklyn Center Evangelical Free Church.** In Saint Paul, the Centrum team has designed a building at the corner of Grand and Chatsworth featuring six condominium apartments over office and commercial rental space on the first floor.

As previously reported, a complete $4 million interior and exterior of the historic **Times Building** at the corner of Fourth Street and Marquette Avenue in downtown Minneapolis, is underway. Under the direction of **Cuningham Architects,** Minneapolis, the project is one of the largest renovation projects ever undertaken by a private developer (The Kerr Companies), in the city's history. On the outside, new brick piers on Fourth Street are visible, and soon to follow will be new windows throughout and ground level glass-wall store fronts and canvas canopies. Inside, the building's lobby is being enlarged, and will be incorporated into a six-story atrium rising from the lobby floor to the roof of the building. Completion is scheduled for mid-summer and primary tenants are expected to be professionals, including attorneys, architects and advertising agencies, along with a variety of specialty shops.

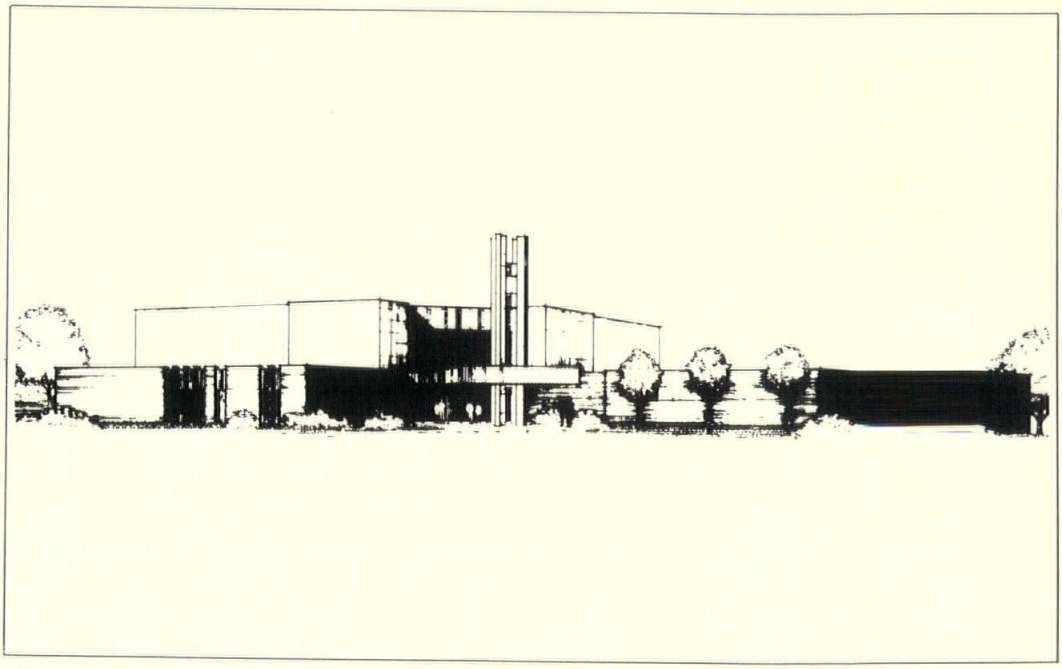
Aurora, Minnesota has a new addition to the community, "Irongate," as announced by **Architectural Properties,** Minneapolis. The development consists of 62 senior citizen apartments and 16 townhouse units for low income families. The project, designed by **Smiley Glotter Associates,** Minneapolis, will provide low-cost quality housing in a three story building and will include three units especially designed for the handicapped. The building also provides community spaces of lounges, arts and crafts, library and meeting rooms, service spaces and recreational activity areas. The City of Aurora will develop a new park abutting the project with one acre of project land being donated to the city for park use. Financing is being handled through the Minnesota Housing Finance Agency, which will allow for low income tenants to use only 25 percent of their income for rent.

Currently under construction in the western Minnesota community of Willmar, is a new worship facility for the **Willmar Assembly of God church.** Designed by **Dennis Batty & Associates,** Architects, Minneapolis, the $1,055,000 - 33,000 square foot structure is scheduled for completion this June.

Minneapolis architects and developers, **L. K. Mahal & Associates** have designed a three-story, $2 million **office building in Edina,** which will have special energy conservation features utilizing electric light and body heat. According to Ken Mahal, thick insulation glass, weather-resistant walls and a special air conditioning system will be used. For additional protection against the weather, there will be heated underground parking plus sheltered reserve and surplus parking areas. Each office will have its controls for heating and cooling.

Baker Associates, Inc., Minneapolis, are the architects for a 12 story addition to the downtown Minneapolis headquarters of **Twin City Federal Savings & Loan.** The $11 million addition will add 240,000 square feet of leasable office space to downtown on the southwest corner of Eighth Street and Second Avenue. Because the project is an addition to an existing five-story structure, therefore not requiring timely foundation construction, TCF officials admittedly hope to get a jump on other planned downtown facilities and gain a solid advantage in attracting tenants. The structure will be linked to the skyway system through the adjoining bank office at Eighth Street and Marquette Avenue.

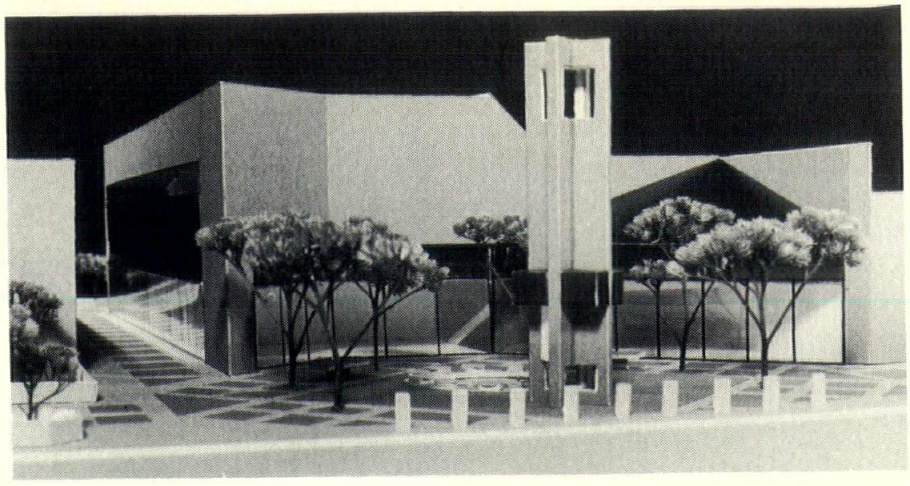
A split-level retail center, resembling a town square complete with a carillon tower, promenade walk, skylight windows and a fountain, began to take shape last



Times Annex Building
Cuningham Architects

Willmar Assembly Church of God
Dennis Batty and Associates

Valley View Office
Northwestern National Bank of Hopkins
Korsunsky Krank Erickson Architects, Inc.



A carillon tower and fountain will highlight the mall-type entranceway of the Carillon Building in Edina, Dickey/Kodet Architects.

Dickey/Kodet Photo

December in Edina with the start of framework erection. Music will be heard from the 30-ft. tower, housing electronic chimes, next May when the $1 million center is to be completed. The project marks the culmination of a $2.2 million community Housing and Redevelopment Authority program started three years ago to add shopping "punch" to the area of 50th Street and France Avenue. Called the **Carillon Building,** the brick structure is to be the focal point for business in that area, according to designer Arthur Dickey, of **Dickey/Kodet Architects, Inc.,** Edina. Dickey and Minneapolis attorneys Earl Myhre and Hosmer Brown are the building owners. A touch of old Edina also is being built into the center, in keeping with the community architecture. A community bulletin board, for instance, will be posted on the tower for passersby and shoppers. Among notices will be the announcement that a grand opening reception for tenants is planned for early next summer, according to the owners. The contractor is **C.O. Field Co.,** Minneapolis. Financing is provided by **Eberhardt Co.,** Edina, and the **First Edina National Bank.**

Financing has been approved for a $1.4 million senior citizens highrise apartment building to be completed this year in the northern Minnesota community of **Eveleth.** Designed by **Miller, Hanson, Westerbeck & Bell, Minneapolis,** features of the project include an elevator, community room with kitchen, tenant lounge, laundry areas on alternate floors—all protected by a security system. The six-story facility will be located on a one acre site and will have 54 units, some specifically designed for the handicapped. Construction will be of precast concrete faced with brick. Site lighting is also planned as well as complete landscaping featuring outside seating facilities.

Construction has begun at Kroy Industries, Inc., a Stillwater manufacturer of thermoplastic components, on an executive office addition and retrofit of existing technical facilities. The three level, 18,000 square foot addition, designed by **be architects, inc.,** Lake Elmo, incorporates a skylighted and landscaped atrium that runs the length of the structure. This approach accomplishes substantial energy savings, while providing light and views to occupants of all three floors. A structure of precast concrete panels and a brick exterior finish, combined with daylight, plants and the liberal use of laminated wood provide a superior working environment, according to the designers.

The Leonard Parker Associates Architects, Inc., Minneapolis, has won an **honorable mention** in the institutional category of Owens-Corning Fiberglass Corporation's seventh annual Energy Conservation Awards Program, held recently in New York City. The firm was cited for its use of energy saving components in designing the new **University of Minnesota Law School.** The facility's south side, for example, is designed in blocks to achieve shading, added insulation and use of natural daylight.

Thomas J. Osterberg and Ronald D. Halgerson have announced the opening of their newly-formed architectural practice in Marshall, Minnesota. The firm will be known as **Group II Architects.** The new partnership represents 22 and one-half years of combined practical experience in the profession. The firm intends to provide continuing and readily available architectural services, serving the needs of area governments, industry, commerce and private clients. We wish them best regards and good luck.

Ralph Rapson, Professor and Head of the School of Architecture and Landscape Architecture at the University of Minnesota, has been appointed to the three-man Federal Reserve Bank architectural review board. ▶

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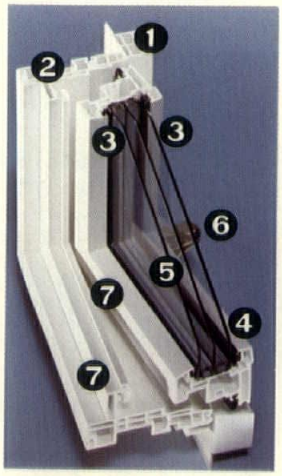

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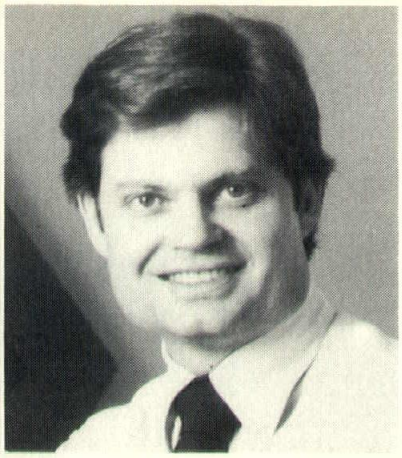


Smiley Glotter Associates, Architects and Engineers, announce the appointment of **Harold C. Olsen AIA** and **Garold Nyberg AIA** to Associates in the firm, and **Ralph Y. Laiderman AIA** Firm Associate, has been appointed Director of Business Development. Olsen is the Project Architect for the Medical School Basic Sciences Building at the University of Minnesota, Duluth, Minnesota, presently in construction, and the Project Architect of the Minnesota Veterans 250 bed Nursing Care Facility, for the State of Minnesota. He has been designated as the architect for the Loring Greenway Condominium office project soon to get underway. Garold Nyberg is responsible for design of the solar award-winning Straight River Rest Stops for the State of Minnesota Highway Department. As Director of Interior Design and Graphics, he participates extensively with the design team in most major projects. Ralph Laiderman was managing architect for the design and construction of the Litton Industries Offices and Micro Wave Manufacturing Plant in Minneapolis Industrial Park. Currently he is the architect for Montgomery Ward Stores at Rosedale Shopping Center, Roseville, Minnesota, and Wooddale Shopping Center, Woodbury, Minnesota.

New members of **George Klein & Co., Architects, Inc.,** are **Ronald Buelow AIA,** of Saint Paul, and **Peter Carlsen,** recent graduate and recipient of the AIA merit award for scholastic achievement at the School of Architecture, U. of Minn. **Cliff Buikema** has been named Vice President and appointed to the Board of Directors of the firm.

George S. Withy, President of Shaw Lumber Co., Saint Paul, was honored as the recipient of the **Builders Exchange of Saint Paul Distinguished Member Award** for 1978. The Award was made at the 79th Annual Dinner-Dance of the organization, held on December 13, 1978, at the Prom Center in Saint Paul. Mr. Withy was cited for his many years of service to the Builders Exchange of Saint Paul, the building industry and the community. He is a past Director of the Builders Exchange and has held key positions in the National Lumber & Building Material Dealers Assn. He was 1958 President of the Independent Retail Lumber Dealers Assn. He has served on the Board of Directors of the Saint Paul Chamber of Commerce, Saint Paul Employers Assn., Credit Bureau of Saint Paul, Saint Paul Athletic Club, Kiwanis Club and the Big Brothers Organization. He has authored, or co-authored three publications: "Lumber Dealers Electronic Data Processing Book;" "Profitable Money Management Report #1;" and "Management Information System."

H. Thomas Becken, Cemstone Products Co., Saint Paul, was elected **President of the Builders Exchange of Saint Paul,** at the organization's 79th Annual Meeting. **Earl R. Madison,** McGough Construction Co., Inc., was elected Vice President and **Richard M. Schmitt,** Dillon-Lilly Co., Inc., was appointed Treasurer. Newly-elected Directors to serve for a two-year term are: **Eberhard L. Bulach,** E. L. Bulach Const. Co., Inc.; **Thomas L. Campbell,** Northwestern States Portland Cement Co.; **Robert L. Domler,** T. C. Field & Co.; **Jack Kritta,** Metzger Building Materials Co.; **Bruce R. Meyer,** Dayton's Bluff Sheet Metal, Inc.; and **Richard J. Naughton,** Steele Construction Co. **Dick M. Schafer,** H. E. Erickson

Co., Inc., has been appointed to serve a one-year term on the Board of Directors. **Roger E. Miller** is Executive Secretary.

Cottle-Herman Architects, Inc. of Minneapolis has announced that **Gregory Hollenkamp** has become a corporate officer of the firm. He joined the firm after graduating from the University of Minnesota in 1974. ■

For further information contact the Minnesota Society AIA (612) 874-8771.

Left column: Nyberg, Olsen, Laiderman
Right column: Becken, Hollenkamp

Duluth's Streetcar Suburbs: Glen Avon and Hunter's Park

Gerald M. Kimball

Many forces work against the spirit and cohesiveness of neighborhoods today. Retail economics mutilated the corner store. Education economics continue to threaten the neighborhood school. The mechanics of leisure are oriented away from neighborhood outlets to either staying in the house or driving out of the city. These forces seem to work against the idea of "place" to the degree that neighborhood, in more cases than not, is just a planner's outdated point of reference.

Traditionally successful neighborhoods exist for reasons such as distinct boundaries, strong social leadership and features uncommon to adjacent districts. Two intriguing trends, the streetcar suburb and the company town, combined with creditable architecture, give identity to many Duluth neighborhoods.

Less prominent than Duluth's Morgan Park—the classic "planned" steel plant neighborhood—but richer in variety and range of architecture are Glen Avon and Hunter's Park neighborhoods. The streetcar system was electrified in Duluth in 1890, and city residents began to

left:
Glen Avon Station
Duluth
1892
Architect Unknown

S.P. Morterud House
1909
John J. Wangenstein, Duluth, Architect

William J. McCabe House
1914
Arthur Hanford, Architect

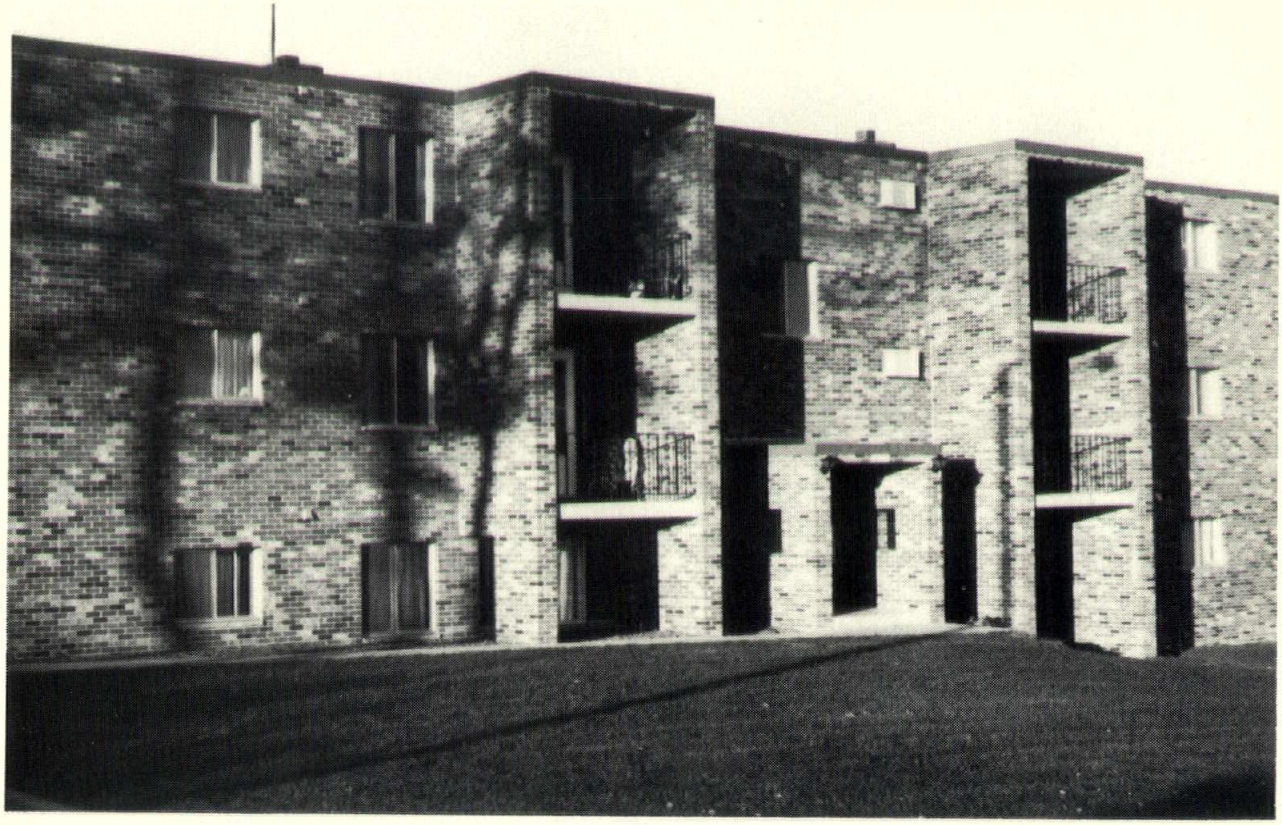
spread out with ready transportation into the city. People with stable work and predictable routes of travel to work—store owners, lawyers, bankers, contractors and brokers—were lured to the streetcar suburbs of Glen Avon and Hunter's Park. Clerks, teamsters and tailors also took advantage of the cheap outlying lots and reliable streetcar service. Glen Avon and Hunter's Park possessed "all of the benefits of the city without the discomforts."[1] ■

Duluth's Legacy Volume I: Architecture, a 165-page publication of the City of Duluth through the office of the Department of Planning and Development (written by James Allen Scott), says that "the last long hue of nineteenth century Romanticism found its strongest tincture in Glen Avon and Hunter's Park."

1. *Annual Report of the Duluth Board of Trade*. 1890.

Gerald M. Kimball is Director of the Physical Planning Division for the City of Duluth, and is the Editor and Coordinator of the Duluth Legacy *Series.*

LOAD-BEARING MASONRY WILL SHOULDER THE BURDEN



UNDER THE ENERGY CRUNCH

Today, good construction demands good energy-efficiency. Load-bearing masonry can meet that demand, as it has in the apartment buildings in Sartell, Minnesota illustrated above.

MASONRY FEATURES:
Mason contractor Dave Guggenberger has combined brick, block and pre-cast hollow core plank to make these eight 12-plexes very energy efficient. Each apartment costs only $112.00 to heat in 1976, even with last winter's record-breaking cold temperatures. The design of the buildings called for a total thermal break in the outside walls which, when combined with the energy-saving characteristics of masonry construction, adds up to real fuel conservation.

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This load-bearing masonry construction method also resulted in impressive data in terms of time, dollars and appeal: total construction time, ground-breaking to occupancy, was 90 days; fire insurance premiums for all 96 units total only $2800 yearly; per-square-foot cost was a mere $18.10, including fireplaces, appliances and beamed ceilings. The structures will continue to be a true asset to the community with protection against fire and vandalism as they age.

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Is The Energy Crisis For Real?

Architects and an engineer talk about the issues

James P. Cramer, Executive Director of the Minnesota Society AIA, recently talked with John Weidt AIA, Chris Johnson AIA and Bob Michaud, PE, about energy.

JOHN WEIDT, AIA, is President of John Weidt Associates in Chaska, specializing in energy research and consulting projects. He is currently doing work for the National Bureau of Standards, the Minnesota Energy Agency, the U. S. Department of Energy and the Lawrence Berkley Laboratories. He serves on the AIA Energy Committee and as a technical advisor to the AIA Research Corporation.

"I try to make sure that whenever I do something it is better than what I did the last time," commented John during the interview. "We have to re-introduce the importance of energy and materials conservation across the board with our legislators, our bureaucrats, the people involved in planning, operating and building buildings, and especially within the design community—not so much in terms of retrofitting mechanical or electrical systems, but in terms of helping the user understand a building so that it can be used properly."

Cramer: Recently in Los Angeles, within a period of half an hour, I had both a taxi driver and the president of an insurance company tell me that they were sure this energy crisis was a hoax.

Michaud: I feel strongly that there is an energy problem. I feel that a third of this problem comes from existing structures, and that potentially much of the energy used in those buildings should be saved. We are buying time to develop new technology, be it solar, coal from Montana or nuclear.

Johnson: I'm not convinced that there is an energy problem today, but during the lifetime of the buildings we are designing today there certainly will be an energy problem.

Weidt: I am firmly convinced that there is an energy problem at this time that we are covering up through economics by not assigning costs to the things we are combusting. When you burn materials, there are consequences. Even Congress can't repeal the Law of Thermodynamics! It convinces me that we have an energy problem.

Cramer: What is the level of awareness of energy conservation?

Johnson: An owner is aware of energy conservation as it relates to his building or his business but I'm not sure he is aware when it comes to the design of a building—the very important energy issues to be considered.

Weidt: The owner may be guided by the architect but at the same time the architect and the engineer are directed by the owner and his budget. Something slips through the cracks—energy.

ROBERT MICHAUD, PE, is President of Michaud, Cooley, Hallberg, Erickson and Associates Consulting Engineers in Minneapolis. He is a nationally recognized authority on energy conservation and recycling technology, and recently developed an energy management program that incorporates an energy use budget on a monthly basis with a computerized evaluation of the program each month. Bob hopes "for greater awareness of energy **use**, particularly in existing buildings. People are aware of energy and its implications, but they are having to fight with themselves to 'bite the bullet' because many of them are making a profit selling energy."

Michaud: In new buildings the consciousness is tremendously greater than it is in existing buildings. Owners are demanding an explanation of how the energy is being saved and what methods are being used and so forth. People are aware of energy and its implications. Many, however, must fight with themselves because, at the bottom line, using energy can be very profitable.

Cramer: Are owners and builders receptive to the idea of payback, that an energy system will pay for itself in so many years?

Photography by Stu West

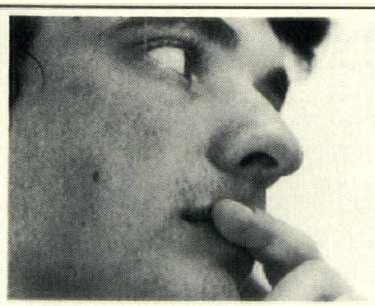
Johnson: Yes. When our firm takes the initiative to make them aware of the things they can put into their buildings as far as energy conservation goes, owners are willing to pay for the extra effort to research payback.

Cramer: It's a matter of education. Once they see that there is a real cost advantage in energy-conscious design it will be saleable.

Weidt: The saleability aspect of energy conservation is tied to an economy now that is nuts when you talk about the actual dollar value of a BTU. The prices attached to energy right now do not realistically take into account either the costs of replacing or doing without systems, in terms of social and environmental costs. As environmental designers, we should be more worried about energy conservation that about proving a 7-year payback for a sophisticated system.

Cramer: Do architects and engineers have the most current and best information relating to energy?

Johnson: There are energy experts in particular areas like solar installations, commercial buildings, residential, but it's very hard to find anybody who knows the whole comprehensive gamut involving energy in all building decisions. The American Institute of Architects has made an effort to disseminate information that has been gathered both locally and nationally. Their 3-volume "Energy Notebook" is updated quarterly and informs architects about what is happening with energy both on a commercial and residential scale.



CHRIS JOHNSON, AIA, works for the Architectural Alliance in Minneapolis. He says that "the big problem for architects is to get energy technology into all projects, rather than having one project being 'energy conscious.' " He is working to integrate energy as much as possible with the architectural process of planning and building. Johnson previously worked on numerous energy projects at Burt, Hill, Kosar and Rittelman in Butler, Pennsylvania. He serves on the AIA Energy Information Committee, is working on the AIA Energy Notebook, and has reviewed solar system grants for HUD.

Michaud: Sometimes we speak out of one side of our mouths but our drawing pencil is doing something else. The classic example to me is the skyway system. They are still being designed the way they were originally designed—as two major panes of glass. Is that energy-conscious design? First I must ask, why do we even heat or air condition the skyways? Do we have to do both?

Cramer: Will the design and building process be significantly different in the future due to the impact of energy concerns?

Johnson: I am trying to integrate energy technology into the architectural design process for all projects, rather than having 'energy conscious' projects.

Weidt: You are talking about the process of design and how that process changes when you use energy conservation as an element. You start with what it is that you *really* need to supply to the occupants of this building—people, plants, animals and equipment—and supply those needs in the most efficient and comfortable manner.

Michaud: Glass has been and still is a predominant design material. But we must look beyond the aesthetics of glass to the environmental conditions created by glass.

Weidt: Glass used wisely can be one of the best energy conservation tools. However, glass is often applied foolishly. The greatest amount of energy used in some 16,000 buildings audited by the AIA Research Corporation was artificial lighting, averaging some 50% of the total energy consumption in those buildings. We must control the use of natural light so as not to create an energy loss.

Michaud: People are still not conscious of the light in a building. If continued maintenance is necessary for a lighting system to remain efficient, there's a problem—no one wants to get up and clean the fixture.

Cramer: Do you agree that aesthetics and personal enjoyment need not be sacrificed and may even be enhanced by energy-conscious design?

Johnson: Look at the dreams of a homeowner—one of them is to wake up in the morning with the sun coming through the window and falling across his face. One of the ways that can happen is if you design the home so that morning sunlight comes through the window. That is an element of energy-conscious design—to try to orient your house toward the south.

James P. Cramer, MSAIA Director

Another example is to put decks on the outside of the building toward the south rather than toward the north. Research has found that people **use** south plazas.

Weidt: Let in the natural elements or temperature—that's all you really need t do. Temper nature to provide an atmosphere for activities that can't take place outside. You don't need to fight nature—you don't need to air-condition building in Minnesota in the wintertime.

Johnson: Most of the time energy is jus thought of as a technical issue and until becomes an emotional issue, I think we won't solve the energy problem.

Weidt: I like the term environmental design. We are really designing environments. The idea that the architect is designing just for people at the expens of everything else is antagonistic to the world as a whole. Energy is one part of the balance between man's activities and the world in which he is acting.

Cramer: Will our growth concepts change?

Weidt: Yes. One of our first questions to the client might be "Should we really build this?" "Do you **really** need this building?" Are they better off with a new building or would adaptive reuse of the existing facility be more appropriate?

Cramer: Do we need legislation?

Johnson: We need intelligence and incentives. I see three things the legislature can do: tax credits, tax incentives and demonstration programs. Tax credits and tax incentives can be very unpopular because legislators want to keep costs down for the taxpayer. But they can serve as a tremendous vehicle for educating the public about energy conservation.

Weidt: The State can make it either more or less advantageous for building owners

to waste or not to waste energy. The first thing the state can do is to take away the incentive for waste that is built into our governmental system today through zoning. Delivering energy services to urban areas is very expensive, therefore people move to the suburbs.

Michaud: The thrust legislatively has been to try to stimulate solar energy and wind energy, but we have not had a real thrust on existing structures. Within existing structures, one-third of the energy used should be conserved.

Cramer: Should architects, engineers and planners be saying something about the energy implications of transportation?

Johnson: I once designed an energy conserving home in a typical sub-division in the suburbs. I looked at energy use and was able to reduce energy consumption of that residence by 50%. But 50% of the energy use of that family went into driving the cars. Until we solve some urban planning issues I don't think we will really solve the energy problem.

Weidt: The fabric of our cities requires auto transportation now. Alternatively, building transportation routes encourages urban sprawl. We don't really need to talk about transportation as much as we need to talk about the effects of what we build and where we build.

Cramer: Environmentally, are you in the camp that says we can proceed with nuclear power?

Michaud: Yes, we have to start to develop the technology we have lost. The rest of the world is taking over the lead in nuclear energy.

Weidt: Nuclear power doesn't have any appropriateness of scale because it doesn't give anything back of a positive nature to the world; neither does coal. I don't know what we'll do with the stuff that comes out of the fast breeder. If that problem can be solved it doesn't scare me as much.

Cramer: Are solar and wind our salvation?

Michaud: Simple calculations will tell you that if you fill up half the U.S. with solar panels, it won't take care of a third of the required energy.

Weidt: Required or used? There is a big difference.

Michaud: I am saying **required.**

Weidt: I would say **used.**

Cramer: Is the wave of the future to group our families together in town houses?

Michaud: Economists say that private housing is a thing of the past except for the very wealthy. I see a lot of thinking being done—not alot of action—in combining housing and officing.

Cramer: Is the University teaching energy concerns?

Michaud: I believe students are being trained now to think more for themselves than students in the past. I look to the younger generation to come up with some suggestions to the problems and some goals. I still see 30 and 40-year old professionals coming up with problems and not coming up with solutions to those problems. The School of Architecture does a better job than does the School of Engineering in really honing in on the economic and social problems related to their professions.

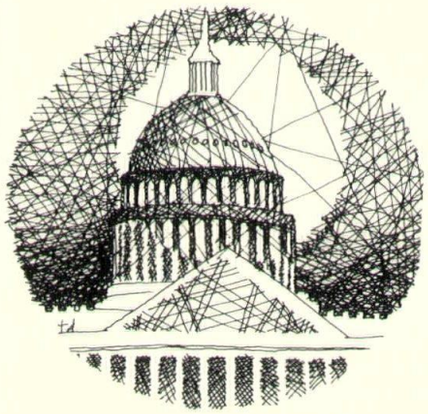
Johnson: The opportunity to combine the technical issues (mechanical systems, lighting, etc.) of energy with design would help the educational process.

Michaud: I have been working closely with a major suburban school district to discuss energy education at the elementary level. It has been tried in a couple of third grade classes with tremendous response from students and parents.

Weidt: I concern myself with the 20, 30, 50 years old group of practicing technicians or professionals. Environmental consciousness has to be plowed into the spirit of the individual. ■

The Looking Glass

Chris Johnson



Drawing by Tom DeAngelo

Where am I? What happened? Did I really do all that? Slowly the once sleeping person comes back to grips with reality with a hangover still clouding his brain. He gets up and begins to look forward to a new day. As a nation, after drinking voracious amounts of energy, we too are slowly awakening and seeing, as of yet, an unclear future.

Are we hooked? Or can we change our direction? The following is Margaret Mead's reply. "Can we do it? Of course we can. We can change our direction now just as we have changed it before. We can convert to low energy, greater settlement density, localization of manufacture, suitable transportation, just as we converted to our present high energy, dehumanizing, destruction-bound present way of life."

Avoiding Crisis

The real question is how? Historically, the United States has been politically reactive rather than anticipatory in its legislation, resulting in too little, too late responses. The recently passed National Energy Act is a typical example. The Act was a response to the Arab oil embargo of November 1973. Five years later, the much debated and watered down Act was finally approved. In 1979, as a nation, we now use considerable more oil than we did when the Arabs first cut us off. Our import bill for foreign oil has increased from $3 billion to $45 billion since 1973!

So much for trying to reduce our dependence. We're hooked. With little warning, we could again be in a crisis. To avert **rapid** and disruptive changes in people's lifestyles, the lifestyles need to be **gradually** redefined over time. Higher prices and decreased supplies of energy will be increasingly painful for an unprepared public. The best preparation right now is to cut down on our energy demand.

In the Twin Cities, like many other cities, the gradual changing of lifestyles is becoming apparent. The exodus to suburbia has slowed and as the time, money, and energy for transportation increase, physically adjacent housing, working and shopping are being demanded. The manifestation of this trend may be a European village community with a distinctive American twist. An example may be the transformation of Southdale, the typical American shopping center. Like many regional downtowns and shopping malls, Southdale may slowly lose its ability to attract sizable numbers of people from great distances with the private automobile. The eventual addition of higher density energy efficient housing adjacent to the shopping mall, however, may serve to maintain its economic viability. The housing designed will use the sun for heating and will be plotted to minimize shading from neighbors. Gardening and greenhouses will be encouraged to reduce the energy waste of moving food across the continent. As the density increases, bus transportation at Southdale will improve and may eventually be replaced with a more sophisticated system. The money saved from not buying out-of-state oil will be used to generate in-state jobs for local industries using renewable energy sources and local materials. The economic, energy and political structure of the nation will slowly decentralize, revitalizing local democracy. Local communities and individuals will be connected by an energy efficient communication system based on our present TV, radio, telephone, and computers resulting in the rapid dissemination of new ideas and technologies.

However slowly, these future communities are developing with the help of government actions. Through the weak National Energy Act, the government is attempting to foster a philosophy of energy conservation in our buildings. There are two general types of programs to encourage conservation incentives and regulation. Both are primarily the result of Legislative action.

Incentives for Energy Conservation

Up to this point, incentives have been the primary method to move the marketplace, with the federal government taking a dominant lead. In the building industry, the government has sponsored applied research through the U.S. Department of Energy. Solar projects, both residential and commercial have resulted. The collector systems on the University of Minnesota bookstore and the new Minnesota Zoological Gardens are good examples. Government assistance has been instrumental in a recently completed study by the American Institute of Architects/Research Corporation which contains data on energy use of 16 different building types in 7 different climatic regions of the United States. This information will assist in the design of future buildings. Local architects have been involved in this monumental study with many design efforts illustrated and explained in this issue.

The National Energy Act contains incentives, including:

- energy studies for residences, schools, hospitals and public buildings
- energy conservation and solar financing program
- solar energy demonstration program

- residential and business tax credits for solar and energy conservation

Incentives in all forms should be encouraged and strengthened. But, regrettably, most incentives must be subsidized by the government. Any new subsidies, especially those envisioned for substantial energy conservation and use of renewable energy sources promise to be controversial in a period of chronic budget deficits and rampant inflation.

Regulation

The other method to encourage energy conservation is through regulation. For example, existing building codes have been updated to mandate energy conscious design. Politically this may be an easier direction to take. No direct money is required by the government for energy conscious features but is instead hidden into the other costs of the building construction.

In Minnesota, we presently have such a code. The code was prepared nationally by the American Society of Heating, Refrigerating and Air Conditioning Engineers and is commonly called ASHRAE 90-75. However, recent studies[1] have shown the application of ASHRAE 90-75 to be ineffective in curbing energy consumption, primarily because the requirements are so low. Within the following years ASHRAE 90-75 will hopefully be replaced by a performance code. The more equitable performance code will be based on the concept of an energy budget (BTU/Sq. Ft./Yr.). The designer will be given the freedom to determine how to best meet the energy budget goal but may be responsible to show compliance by the use of extensive calculations. Over time, the energy budget guidelines will be constantly upgraded, mandating better construction.

The proliferation of educational materials in the form of publications, conferences and organizations offer more indirect incentives. Minnesota can take pride in being a leader in the development of information regarding energy conserving earth sheltered housing by supporting the development of the recently published University of Minnesota book entitled "Earth Sheltered Housing Design," an excellent technical manual explaining the issues of building underground. The state government has further sponsored the construction of earth sheltered houses by the Department of Natural Resources. A description of the project's concepts, problems and status are included in this issue, along with illustrations of the state's 1978 Residential Design Competition.

As important as the national and state programs have been, the single best incentive would be the **gradual** and **predictable** increase of the cost of energy to the point of making energy waste unacceptable. Such price increases would need to be stretched over a long period of time so as to not quickly disrupt a family's or business's lifestyle. As new cars, buildings, and equipment are bought, energy efficient purchasing would become mandatory. The price increases for energy would need to be greater than the rate of inflation. With today's double digit inflation, an increase of 10% or greater would be needed. However, increasing energy costs would require the least amount in government intervention and programs. The political problems of promoting such a program are tremendous due to the effect on lower and middle class lifestyles. An increasing percentage of a family's or business's total needs would need to be devoted to energy costs. A legislator would have a difficult time remaining in office if he proposed such a program.

Both ASHRAE 90-75 and the performance code are regulations. Both tend to be minimal at present, requiring little innovation in energy conscious design. The dilemma posed by regulations is how to foster innovation by means of tighter standards without burying the designer in regulatory forms or involving code officials checking for compliance. Some of the joy of the profession could easily be lost.

The Need for Caution

To encourage energy conservation in the building profession, the concept of incentives must be supported while regulation must be watched with a wary eye. Incentives, if properly stated, will hold the interest of the designer allowing for more as yet unknown breakthroughs in technology or changes in living patterns. Regulation with rigid compliance, on the other hand, could easily be run with a very heavy hand by disinterested code officials, untrained in the technical analysis of a building's energy performance. The need for caution cannot be over emphasized.

The future, if one could see with a "Looking Glass," may achieve low energy use and also the best emotional and physical environment for people to live, work and play in—but only if we are diligent in setting up the proper legislative programs. ■

1 Phase One/Phase Two reports, U.S. Department of Energy, Office of Conservation and Solar Applications, Washington D.C.

Solar Reliant Greenhouses and Architecture

Jay M. Johnson

GARDENS. GRASSROOTS. COMMUNITY ACTION. GROWTH. SELF SUFFICIENCY. WORKSHOPS. INDEPENDENCE. INTERDEPENDENCE. PASSIVE. PHOTOSYNTHESIS. NUTRITION. SOLAR. STRUCTURE. CONSTRUCTION. ALTERNATIVE SOURCES OF ENERGY. APPROPRIATE TECHNOLOGY. ARCHITECTURE?

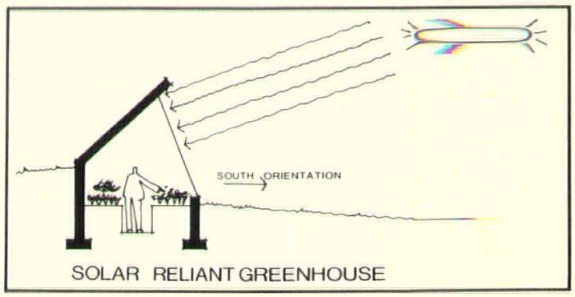
These words are reflections of activity around the country which may have some interesting implications for architecture. The activity is at a grassroots level, with growing sophistication and support, and it includes highly diverse groups and individuals with a variety of interests and motivations. Energy conservation, experimentation with alternative sources and uses of energy, serious pursuit of ''appropriate technologies'' gardening, nutrition and simplification of lifestyles are part of this movement; study groups, action organizations, magazines, information ''networks,'' design and construction workshops and seminars, research and demonstration grants and community activities are being oriented around these activities and goals.

The movement probably has evolved from various concerns—the energy crisis, the ''back-to-nature'' and self-sufficiency trends, rising environmental consciousness, increasing community awareness and activity and the growing understanding of the potentials of the use of the sun's energy. In this context and due to the rising costs of food production and the decreasing quality of commercially grown off-season produce, considerable work has emerged in developing buildings which would allow for food production in colder climates with a minimum need for outside fuel sources. The solar greenhouse is a response to this need.

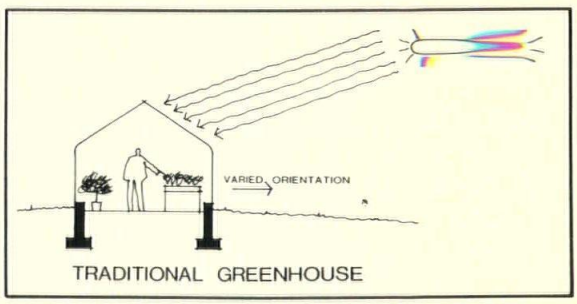
It is discussed here because of its simplicity and its ability to illustrate some basic concepts of building design. It is a one room, single purpose structure in which we can observe a) building forms based upon thorough analysis of basic environmental needs and processes, b) some basic principles of passive solar design, and c) the concept of a building as a vital part of the life process within itself.

Let's assume, for example, that a one-room building of any kind is situated in Minnesota and expected to function as a shelter for people or plants throughout the winter. We have come to expect that the building will freeze up and offer no capability of shelter unless it is heated, usually with fuel of a non-renewable nature such as gas or oil.

If, however, this building is designed with consciousness of the natural processes and conditions of the environment so that the sun's energy, the thermal properties of its materials, the surrounding environment, and the organic processes within are allowed to work together toward supporting life in this structure, it is fully possible that life inside could be maintained in this Minnesota winter climate with little or no outside heat. The solar greenhouse is such a structure.



SOLAR RELIANT GREENHOUSE



TRADITIONAL GREENHOUSE

The term ''solar greenhouse'' seems redundant since the nature of any greenhouse is obviously ''solar'' in its use of the sun's energy for growth; ''solar-reliant'' is probably a better term. While traditional greenhouses are all glass for the use of both direct and indirect solar energy, the solar-reliant greenhouse is oriented primarily to the south, for direct radiation while bundling up the north, east and west and top to minimize heat losses. A traditional greenhouse is an obvious net heat loser, requiring large amounts of fuel for heat while a solar reliant greenhouse may be a net heat gainer with excess thermal energy available for another space or use.

Generally, the following characteristics apply to solar reliant greenhouses in the Minnesota environment. They are designed to:

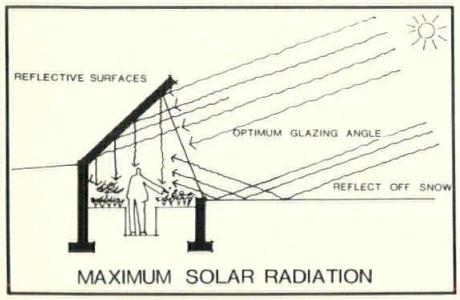
Take full advantage of the sun's direct radiation.

- optimum glazing on the south orientation
- vertical angle of glazing 60°–90° depending on reflective surfaces

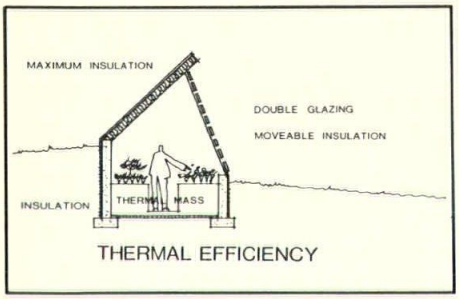
- optimum reflectance of heat and light (snow, reflector panels, adjacent surfaces, colors, etc.)

Minimize heat losses

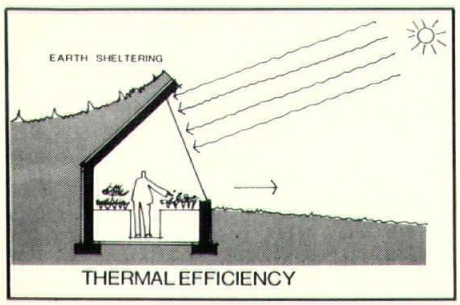
- convection—provide maximum thermal insulation on north, east and west walls (and roof, depending on design) and foundation; consider earth sheltering to utilize the higher ground temperatures and to minimize temperature fluctuation; include moveable insulation over all glazed surfaces for night time and cloudy periods; use double glazing on south windows and triple glazing on north, west, east glass
- infiltration—tight construction with appropriate sealant at joints; quality, weatherstripped operating windows and doors; plan with entry air locks; protection from winter winds
- radiation—control of radiation from warm to cold surfaces



MAXIMUM SOLAR RADIATION



THERMAL EFFICIENCY



THERMAL EFFICIENCY

Provide heat storage and re-distribution methods

- earth, rock, water, or other thermally massive materials for storage of heat for use when the sun is not shining
- design of storage and greenhouse to take advantage of natural convection principles
- possible mechanical high heat recovery and distribution to storage
- possible mechanical or passive heat transfer to other spaces
- possible heat exchange to water for other uses

Provide capacity to reject or transfer solar or thermal energy when not needed

- proper natural ventilation by design
- shading devices (landscaping, overhangs, sunscreens, etc.)
- shutters
- heat transfer to storage or adjacent spaces

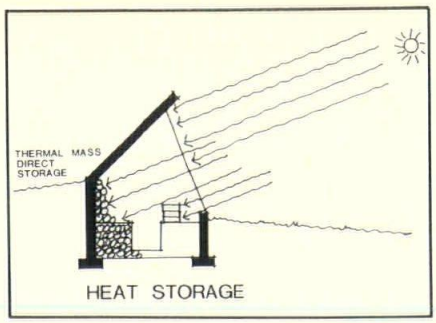
The resulting structure is totally functional, with all parts of its design directed toward the purpose of supporting life inside. The forms, materials and appearance and the architectural sophistication vary considerably from climate to climate and use to use, and this further emphasizes the responsive nature of design based upon environmental awareness along with all other needs.

The practical applications are apparent. Agricultural groups are experimenting with ways to utilize these concepts to provide larger scale, less expensive means of producing fresh food in the off-season of colder climates. Homeowners and community groups have built greenhouses to extend the gardening experience and the availability of fresh produce. Greenhouses are becoming educational tools as people see the natural processes of energy and growth in action. Homes are being designed and built using solar greenhouse spaces (or techniques) for the collection of solar energy for space heating. And the extension of energy conscious design into larger scale building is evolving.

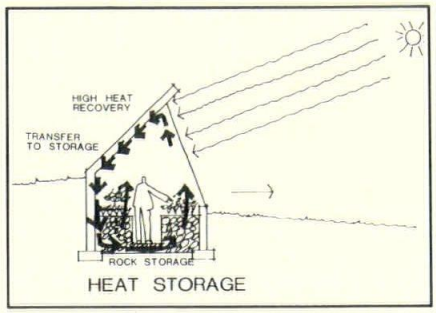
The implications of solar reliant greenhouses for building design in general may be less apparent, but the concepts are worth reconsidering in a broader sense.

A physical structure has been illustrated in which orientation, materials, building forms, layout and use are designed to take maximum advantage of environmental processes. Design responds to the sun's radiation, to the natural forces and conditions of air movement, to heat storage and transfer principles, to the life processes of growth and exchange, and to complimentary parts creating a unique whole. In this way the building forms are vital and significant. As architects orient themselves to these concepts within the traditional design goals of function, utility and beauty, there is the opportunity for architecture which is correspondingly new, bold and vital.

The solar greenhouse could be considered a biological structure as it is permitted to be a facilitator for the processes of life, be it for plants, animals, or humans. The design itself collects energy for plant



HEAT STORAGE



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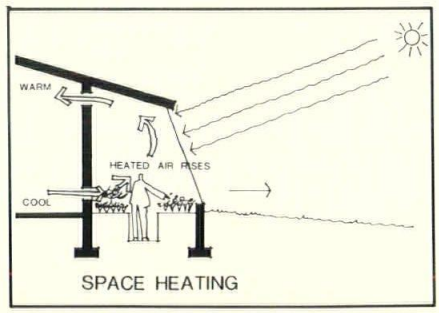
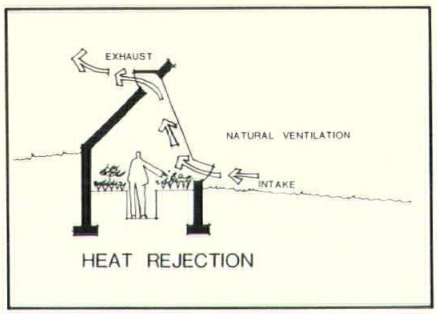
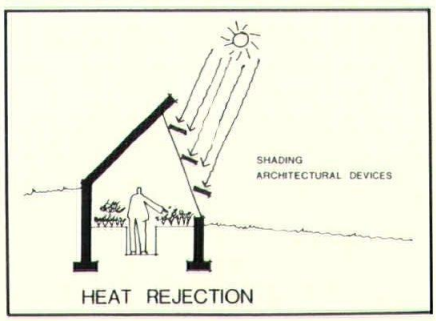


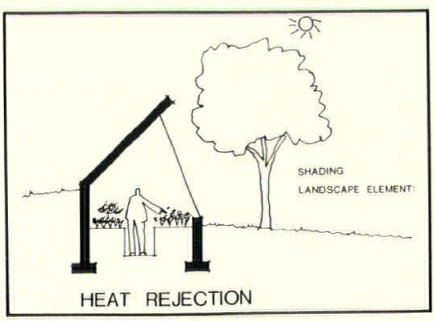
SPACE HEATING



HEAT REJECTION



HEAT REJECTION



HEAT REJECTION

growth; plants in turn provide oxygen and food for human life. The structure is a part of the cycle.

And the greenhouse structure may embody certain philosophical values. The concepts of self-sufficiency and the awareness of the interdependence of life processes have been expressed in many and varying ways in recent years. As they are integrated into building design, architecture comes to be both a representation of those ideas and a part of them.

The long sought goals of integration of systems, forms and use in architecture are thus addressed. The concept of a solar greenhouse is one of a growing, changing, dynamic organism.

The following references were helpful in understanding the greenhouse concepts discussed here, and they would be useful to readers for further details.

The Food and Heat Producing Solar Greenhouse—R. Fisher and B. Yanda, John Muir Press, 1977

The Solar Greenhouse Book—ed. James McCullagh, Rodale Press, 1978

The Solar Home Book—Bruce Anderson, McGraw-Hill, 1976

Natural Solar Architecture—David Wright AIA, Van Nostrand Reinhold, 1978

Designing and Building a Solar House—Donald Watson, Gardenway, 1977

Earth Sheltered Housing Designs—The Underground Space Center, University of Minnesota, [1978]

"Alternative Sources of Energy" magazine

"Solar Age" magazine

"Rain" magazine

Jay M. Johnson AIA is a project architect at Miller Hanson Westerbeck Bell of Minneapolis. He was one of the Phase I winners of the Minnesota Energy Agency's 1978 Residential Design Competition.

Passive Solar residence of J. W. Balcomb
Los Alamos, New Mexico
Sun Mountain Design
Carlotta Collette Photo

Passive/Active Solar Home in Colorado
David Elfring, Architect
David Elfring Photo

Energy Tax Credits

The Minnesota Energy Agency issued a reminder that energy tax credits are available this year.

The tax credits—for both homeowners and renters—cover investments in conservation, solar and other alternative energy measures between April 20, 1977 and the end of 1985.

The conservation credit allows 15 percent of the cost, up to $300. It covers a variety of conservation measures, including insulation, efficient furnace replacement burners, devices for modifying flue openings, electronic ignition systems for furnaces, storm and thermal doors and windows, automatic setback and clock thermostats, caulking, weatherstripping, and meters which display the cost of energy usage.

The credit can only be taken on a house built before April 20, 1977, provided it is the taxpayer's principal residence.

The alternative energy credit allows 30 percent of the first $2,000 spent plus 20 percent of the next $8,000, and can be used for both old and new homes.

Eligible items are wind, solar, or geothermal energy equipment used to heat or cool the home or to provide hot water. Labor costs for the on-site preparation and installation of the equipment also qualify.

Director of the Agency said, "Energy tax credits are one important way in which Minnesotans can offset the increasing prices of fuel. Conservation and solar improvements usually pay for themselves in saved fuel costs within a few years. These tax credits will help pay back the cost of the improvements even faster. We hope people will take advantage of them." ■

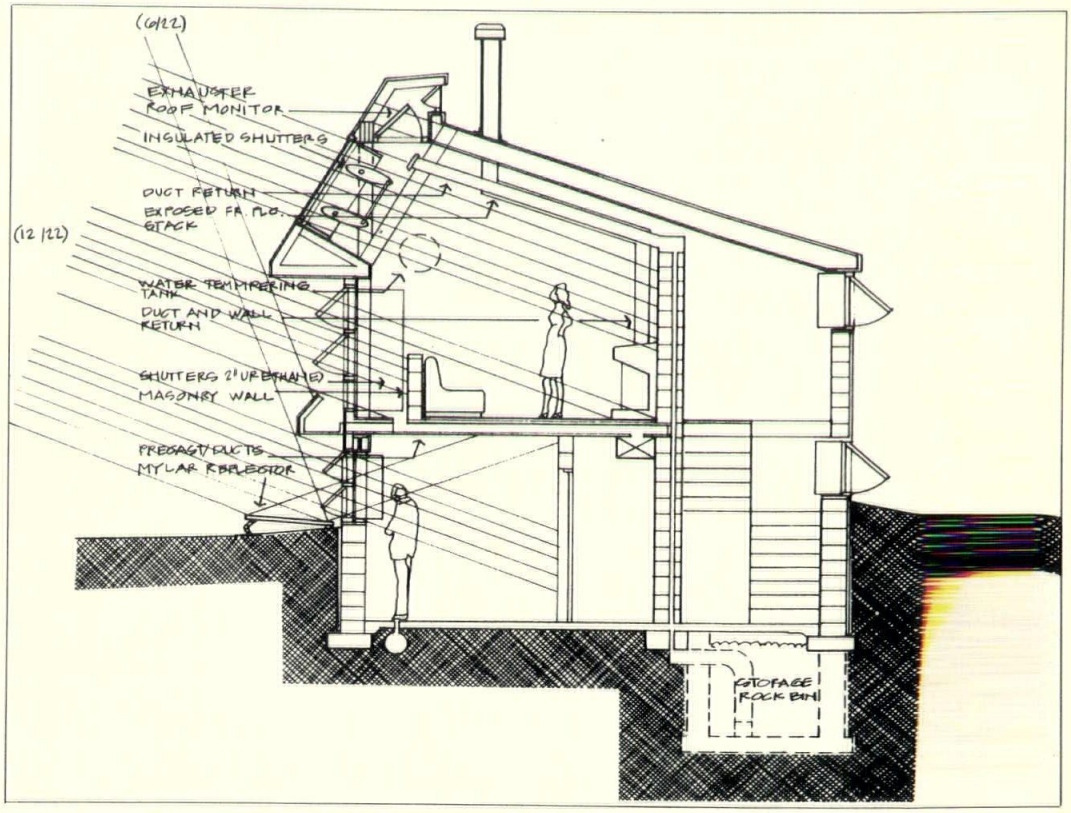
Four Winning Ideas in Energy Conservation

Sola' Home
Architect: Michael Cox

*The **1978 Competition** sponsored by the **Minnesota Energy Agency** encouraged the design and energy analysis of an innovative, energy-efficient, single family dwelling on a specific site. The designs included the dwelling and all environmental elements which make them a model of a total energy efficient system. The winners illustrate new and innovative energy conserving ideas which synthesize the passive effects of environmental conditions including the sun, the atmosphere and the earth, its surface and subsurface, with the active systems in the dwelling.*

The four final winners were chosen from twenty five schematic design awards. The entrants had to show the energy implications of the site, building orientation, landscaping, climate, passive and/or active solar systems, space management, thermal insulation and thermal mass of materials, ventilation and natural climate control, natural lighting, energy efficiency of appliances and other significant design characteristics.

The four final winners were awarded grants to construct their designs. These grants cover the costs of financing, contract documents, and construction supervision. The projects will be open to the public in the fall of 1979 for a specified time.



In designing for the average home the budget constraints were the deciding factor in what alternate energy techniques were possible. Since conventional homes are difficult to build for $55,000, active solar systems did not seem like an affordable possibility without sacrificing housing quality. Passive solar appeared to be the solution because of the dual purpose of many of the passive components. For example, the windows that allow solar heat also provide light and ventilation and the masonry that provides a heat sink also acts as the structure for the walls and floors. Without exotic energy components a balanced building budget would allow more house amenities than just a solar collector overhead.

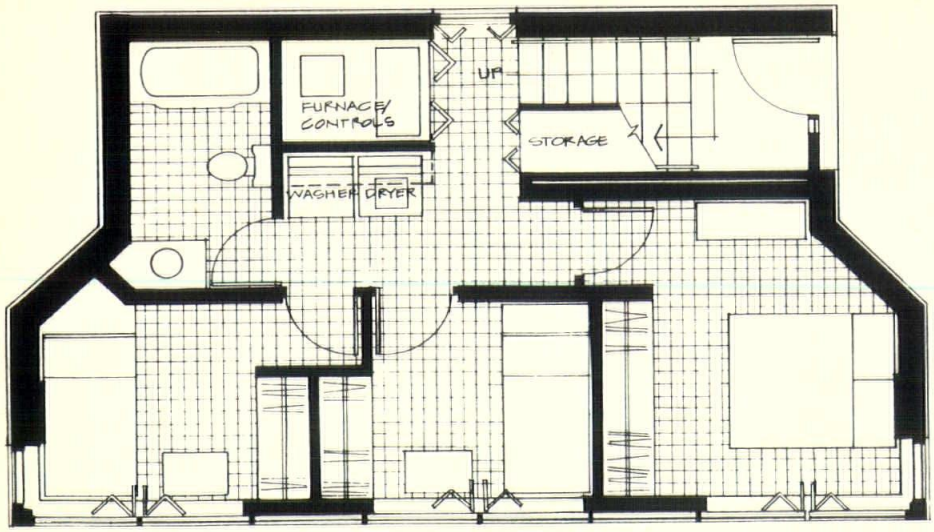
The house is designed on an east-west axis for south facing window orientation which is made possible by a 40′ corner Minneapolis city lot. Solutions for overheating and heat loss attributed to the windows are controlled by overhangs, window shutters, and automatic skylids.

Heat is accumulated as the sun shines through the windows onto the dark concrete block walls and quarry tile floors. The slow cool down action of masonry creates a thermal storage effect. A standard forced air furnace with recirculating fan moves air through underground ducts with the intent of utilizing the storage effect of earth similar to the masonry mass concept. With the use of solar gains the house has been calculated to require 2.25 BTU/ft.²/DD/year of heat energy.

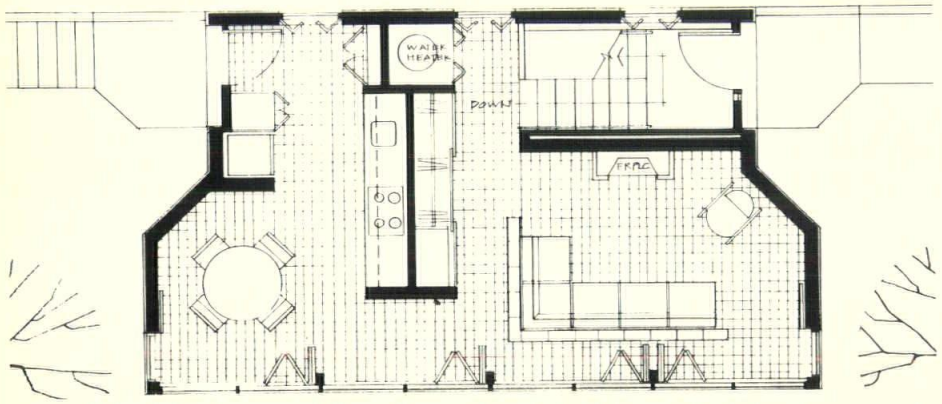
The living spaces of the house are all oriented on the south side with circulation and storage on the north. The thin mass of the house allows cross ventilation and high roof vents further benefit ventilation.

The form was derived for maximum solar exposure and control, and to look like it wants to 'catch sun.' The form also promotes wind shadows on south glazed areas in winter and directs summer breezes to the interior.

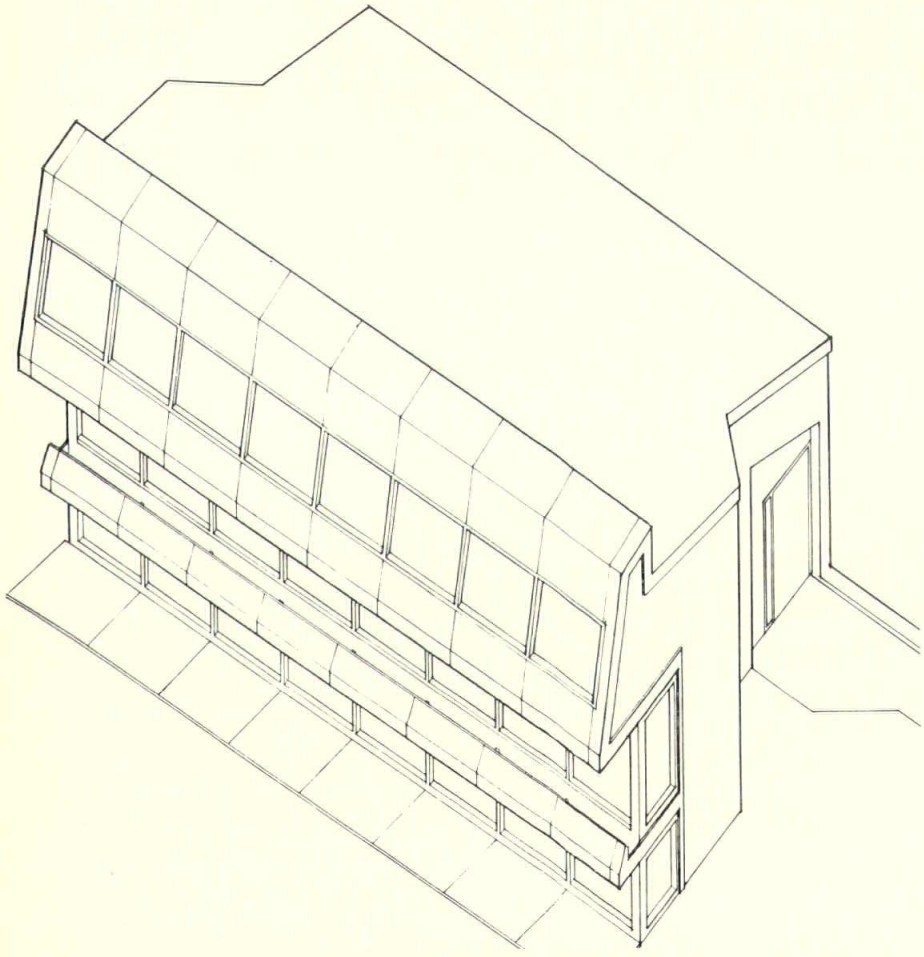
The attempt of this design, given the problem, was to explore the simple methods available to an average home buyer's budget. The outcome indicates that passive solar is affordable and that conventional building techniques can be utilized for passive design concepts.



Sola' Home
Lower Sleeping Level



Sola' Home
Upper Living Level



Sola' Home
Axonometric

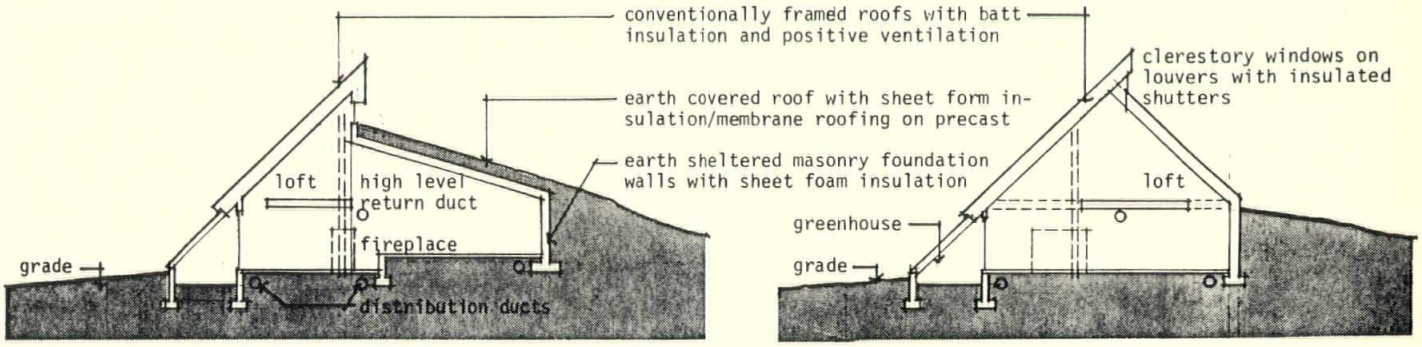
Underground Dwelling

Architects: Bressler, Armitage and Lunde

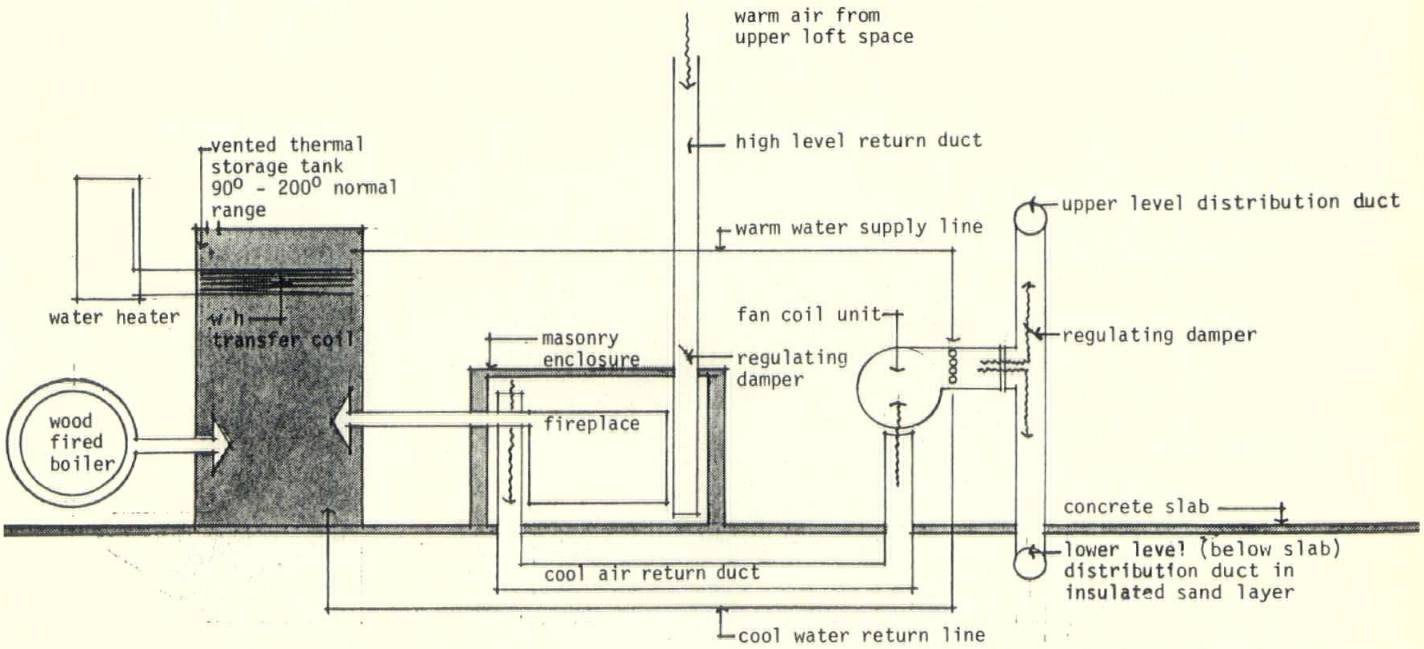
The original design consisted of a basically underground house with exposures to the south and east. Because of the nature of the site and the mechanical system there was a two-level portion of the house to take advantage of internal heat stratification to aid in exhausting warm air in the summer and recollecting and distributing warm air in the winter months. Refer to the diagramatic sketches.

After taking bids on the initial design and seeking financing from five different financial institutions in the metropolitan area it became apparent that the costs not only of construction were higher than anticipated but the problems of financing an underground residence were even more boggling. These stumbling blocks made it necessary to reanalyze the project's strong points and weak points, establishing the following priorities:

1. The design elements could not preclude conventional financing. The underground roof in particular placed us in the 50 percent mortgage category which was simply prohibitive.
2. The design elements had to be more carefully analyzed as to intra-trade difficulties/coordination problems and cost effectiveness.
3. The design should be more compact and of simpler construction.

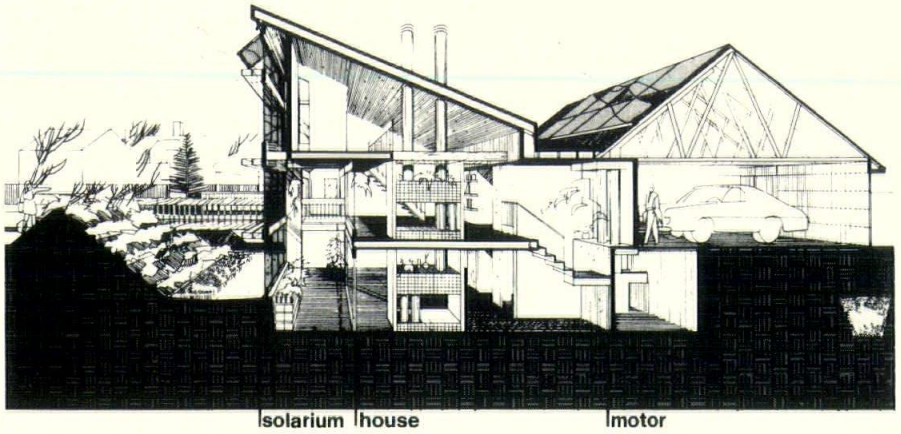


sections



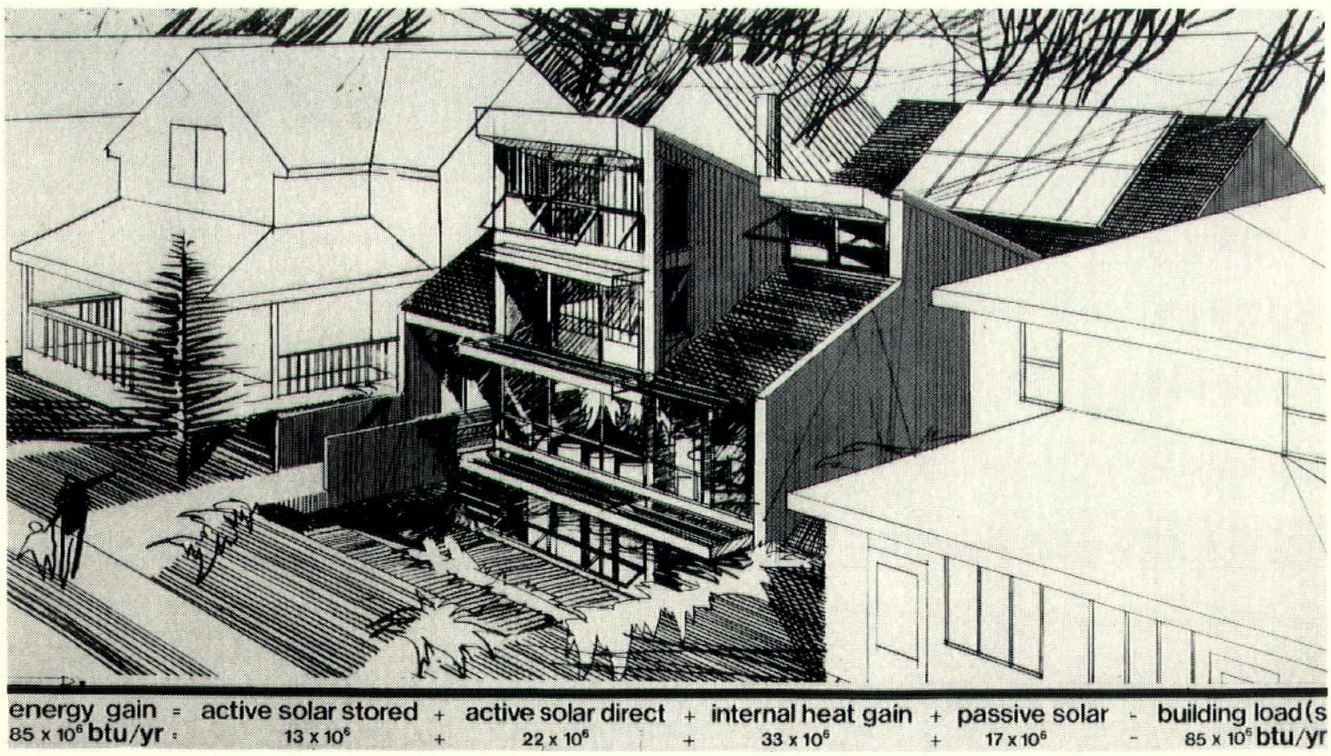
systems schematic

Humphreys Residence
Saint Paul, Minnesota
Owner: Alan Humphreys
Architects: Ritter, Suppes, Plautz/ Architects



The accompanying diagram graphically summarizes the key aspect of this house; annual cycle heat collection, storage and use. Excess heat in July, August, September and October is collected and stored to balance the energy demand curve when solar insolence is low in winter. This permitted smaller collector areas since their frequency of use was greatly increased. All other energy aspects of the house build upon this basic principle.

Three distinct elements comprise the basic plan. A ''motor'' (garage, active air-type solar collectors and summer-collected heat storage) is a buffer to the north on the site. A two-story plus mezzanine house is positioned between the ''motor'' and solarium to the south. Major sleeping areas are below the on-grade main level. The solarium space is both functional and aesthetic, extending the Minnesota seasons as a ''porch'' while providing heat and a visual focus to all major spaces of the house. The elevational ''solar piggy-back'' profile was derived from the intent of placing all major spaces on the relatively narrow southern frontage while maximizing both active and passive solar gain.



An Energy Efficient Urban Dwelling

Design Team: Kenneth Lillquist, Richard McCarthy, Jeffery Sweitzer, Michael Sharratt

Program: To design, develop and build a dwelling suitable for a family of four within a construction budget of $55,000.00.

To generalize the design so as to appeal to many different lifestyles.

To demonstrate the marketability of the "state of the art" in solar design by selling the completed project on the open market.

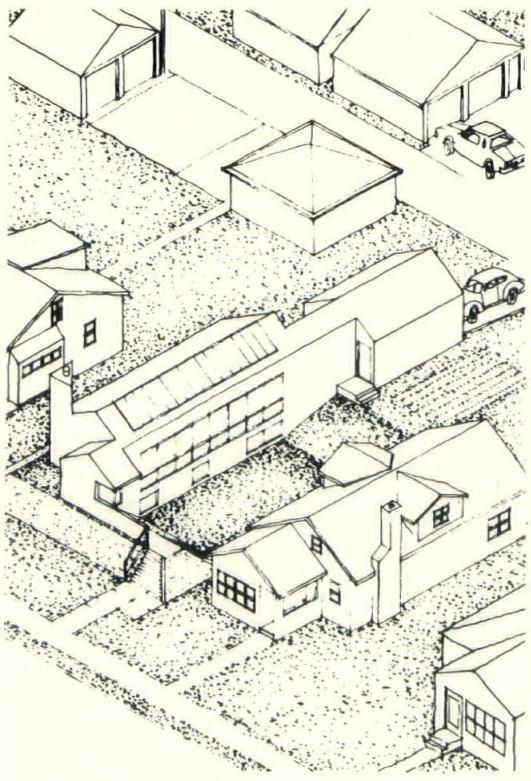
To maximize use of the available site by providing functional house design combined with active and passive energy efficient design features.

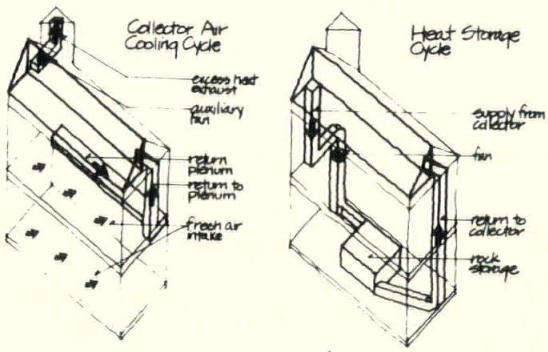
The entire scope of the project was considered in the energy systems design. Siting of the house dictated a linear arrangement due to the height of the dwelling to the south coupled with a desire to achieve as much southern exposure as possible. A straight-forward plan developed that placed highly used living areas on the upper level thus enabling the maximization of view and sunlight. Sleeping spaces considered more passive in nature were placed on the Lower Level because of their requirements for less light and cooler temperatures. Landscaped berms were used on the west, north and portions of the east elevations to provide insulation and wind protection as well as decrease the amount of exterior finish material. Stucco was chosen because of its compatibility with the neighborhood as well as its life cycle advantages.

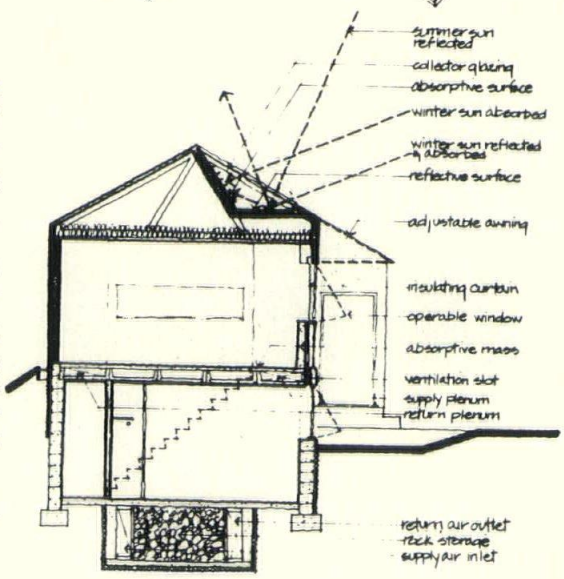
Interior design features are as follows: Thermal mass storage was employed by providing for a masonry rail and floor on the upper level. Natural ventilation is made possible by virtue of a continuous slot along the glass wall and the mass storage wall. An insulated drape inside along the glass wall is used to prevent heat from escaping at night. Awnings were used outside to prohibit unwanted solar gain during the day.

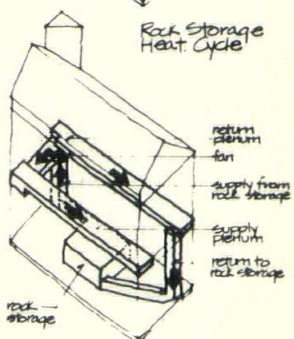
The active solar system is a forced air plenum that is seasonally selective by virtue of absorptive and reflective surfaces arranged such that they concentrate or reject energy depending on the angle of the incoming sun.

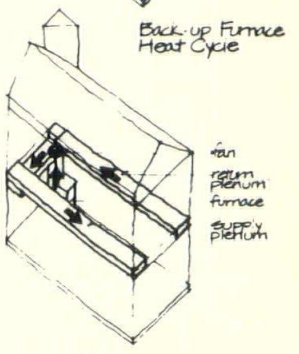
Due to the prototypical nature of the design it was intended that this house could fit on most inner-city east-west lots with minor modifications and due respect to the neighborhoods. ■



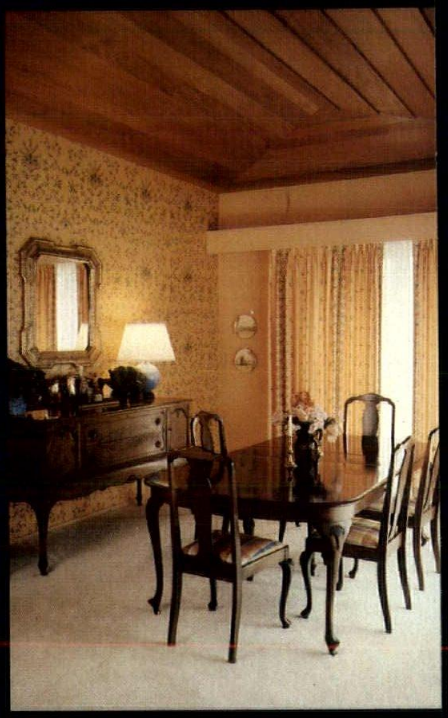


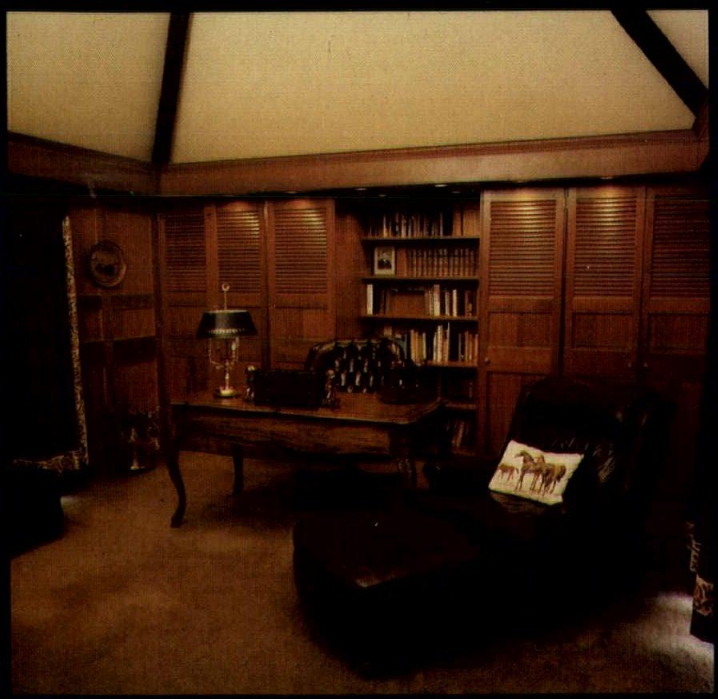






VERSATILE





ARCHITECT: Humphrey & Hardenbergh, Wayzata, Minnes
INTERIORS: Humphrey and Hardenbergh
Karen Canton, Associate

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Building Energy Performance Standards

John Weidt

The need for a consistent energy-conservation reference for design professionals has led to the development of proposed Building Energy Performance Standards. The U.S. Department of Energy (USDOE) in collaboration with the Department of Housing and Urban Development (HUD) and its subcontractor, the American Institute of Architects Research Corporation (AIA/RC), published in November 1978 a preliminary draft of standards representing the largest architectural research project ever undertaken.

When Congress approved the Energy Conservation Act of 1976, Public Law 94-385, it ordered performance standards to be developed and implemented by 1980. HUD and DOE contracted with the American Institute of Architects Research Corporation to provide data on the designed energy performance of residential and commercial buildings and to develop energy budgets for the design of new buildings. The AIA/RC formed a Technical Advisory Group (TAG) of 13 representatives from 5 professional societies. These societies were:

- American Institute of Architects (AIA)
- American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
- American Consulting Engineers Council (ACEC)
- Illuminating Engineering Society of North America (IES)
- National Society of Professional Engineers/Professional Engineers in Private Practice (NSPE/PEPP)

The TAG was formed to overview and advise the project direction. The AIA/RC also subcontracted with a number of major architectural, engineering and research organizations and individuals. Principal subcontractors during the first phase of work were Syska and Hennessy, The Ehrenkrantz Group, and the National Association of Home Builders/Research Foundation (NAHB).

The Building Energy Performance Standards (BEPS) program is divided into three phases:

Phase I

The objective of this phase was to establish a consistent reference or baseline of current practice. Designed energy consumption data was collected on 1,661 new commercial and 170,000 new residential buildings or units in 7 different climatic zones of the United States and computer-analyzed to determine their **designed** energy performance.

Phase II

This phase involved the development of Designed Energy Performance Standards to provide three sets of data about commercial (including multi-family residences), single-family dwellings, and mobile homes. The three sets of data compiled were:

- the energy performance of the buildings as originally designed in 1975–76;
- the energy performance of originally designed buildings with input dates adjusted to meet the minimum requirements of existing standards; and
- the energy performance of the buildings as redesigned to the maximum practicable levels of energy conservation.

To perform this work, the AIA/RC contracted with 168 of the teams who had designed buildings in the original sample of 1,661 commercial buildings and had them redesign their buildings to the maximum practicable limits of energy conservation given the same budget, program, and location restraints as the original building. Designers submitted detailed data on both the original and redesigned buildings for thorough analysis by the Syska and Hennessey Long Form AXCESS computer program. Analysis of residential buildings by employment of FHA, HUD and Thermal Performance Guidelines was done by the NAHB Research Foundation. Consultants in the energy-efficient residential design field were contracted to design homes demonstrating maximum practicable energy performance. Results of these designs were analyzed by computer to establish their baseline of performance.

Phase III

This phase of the project will involve testing and promulgation of these standards nationally by 1980.

The results of the Phase II effort proved impressive. The original buildings as redesigned by a typical cross-section of practicing architects and engineers evidenced a **40% average energy savings** when compared to the earlier typical designs and a savings nearly as large when compared to such current energy standards as ASHRAE 90-75. Most important, these results were not obtained by individuals specializing in the field of energy conserving design, but from **typical practitioners** with real-world programs, sites, and constraints who were given the motivation to investigate energy-conservative techniques.

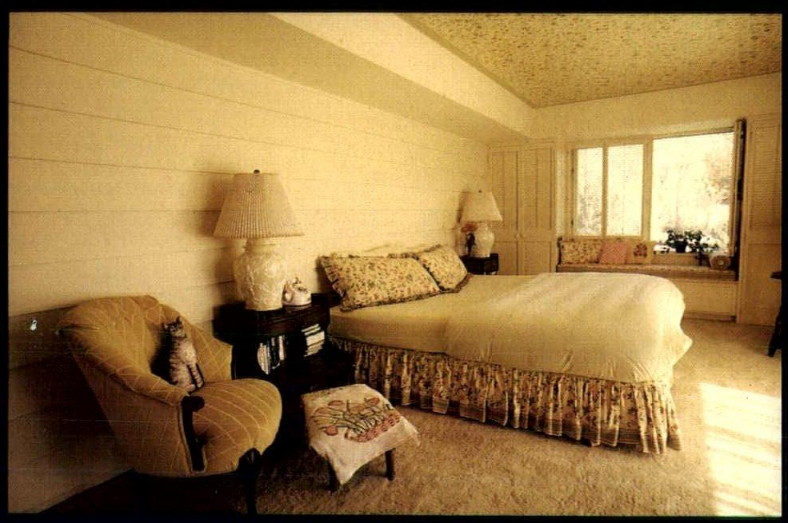
Phase III, that of implementation, is now underway. DOE has not issued trial energy budget figures for buildings as of this writing but they expect to have such numbers available for public review and comment by early 1979. DOE and HUD did issue a preliminary document late in 1978 outlining issues and alternatives that has drawn heavy criticism. Unlike the Phase II effort, the Phase III effort is still embryonic and encompasses many vague issues. Of critical importance in this promulgation phase are the issues of implementation and certification. Issues aside from those basic to the designed energy performance standard have been introduced and their value is hotly contested.

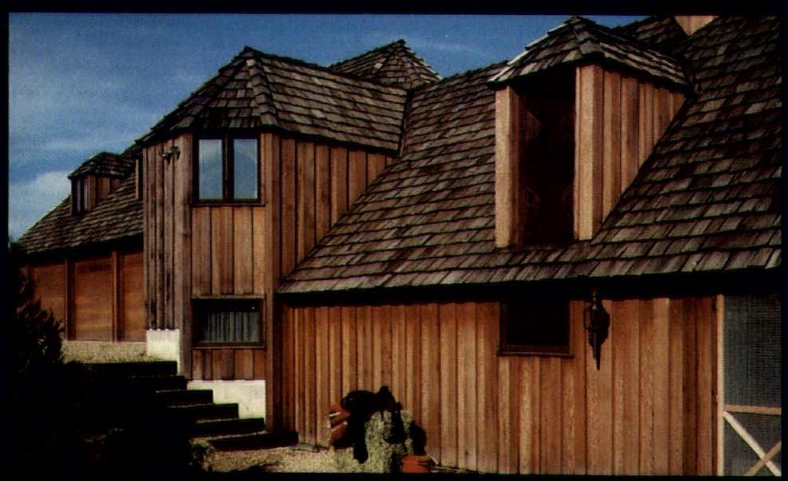
The issues of implementation and certification are currently of prime interest to most critics of the promulgation phase. The means by which this document is to be put in place and administered by building officials has not been adequately addressed. A number of individuals are insisting that the entire performance standard be adopted as Chapter 10 of ASHRAE 90-75 and Chapter 4 of the National Conference of States on Building Codes and Standards (NCSBCS) Model Code—an approach certain to minimize the promulgation problem but also to virtually eliminate the impact and consequent energy-saving features of the budget approach, since it allows—in fact, encourages—the use of simpler, less effective piecemeal design instead of a systems approach.

Of paramount importance for the design professional is that—for the first time—the concept of **energy performance as a part of the total design process,** and not as the proper selection of bits and parts of buildings is being seriously considered by government. It is obvious from the Phase II activities that this concept has far **more potential value for energy conservation** than any standard heretofore developed. It is a standard that almost miraculously encourages the designer to **do things right.**

When the major objections to the standard are condensed to their basic elements, they do not criticize the concept of such a standard, but contend that designers are not up to the task. I can agree that considerable training, testing, and education will be needed on an ongoing basis to upgrade our current skills, but this is a requirement that all design professionals must meet for a variety of parameters in their daily practice. I agree that there are a number of problems to solve, but to shrink from a process that encompasses the proper procedures for good design because of these problems is akin to throwing out the baby with the bathwater! ■

REDWOOD





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HUD Redesign

Of the 168 teams participating in the Phase II H.U.D. re-design effort there were a number of participants from Minnesota. Four of these local projects are presented here.

Each of these projects represents the program for a building actually built in Minnesota; these buildings were re-designed with the same functional and site requirements for maximum energy conservation. The architects and engineers all participated in the educational and analysis process of the AIA Research Corporation along with participants from all over the country, and from this experience emerged the re-designs shown here. Each project has shown significant energy savings, and in differing ways, they all illustrate the potential impact which energy consciousness may have on architectural form and planning.

These Minnesota firms and projects were also selected for energy redesign contracts:

Adkins Association, St. Paul
Gladstone Park Medical Building,
West St. Paul

be Architects, Lake Elmo
Kilkenny Court Apartment Building,
Forest Lake

Centrum Architects, Minneapolis
Phalen Park Dental Clinic,
St. Paul

Dickey/Kodet Architects, Edina
Embers Restaurant,
Madison, Wisconsin

Horty, Elving and Associates, Minneapolis
Presbyterian Homes,
Arden Hills

Miller, Dunwiddie Architects, Minneapolis
Fuller Park Neighborhood Center,
Minneapolis

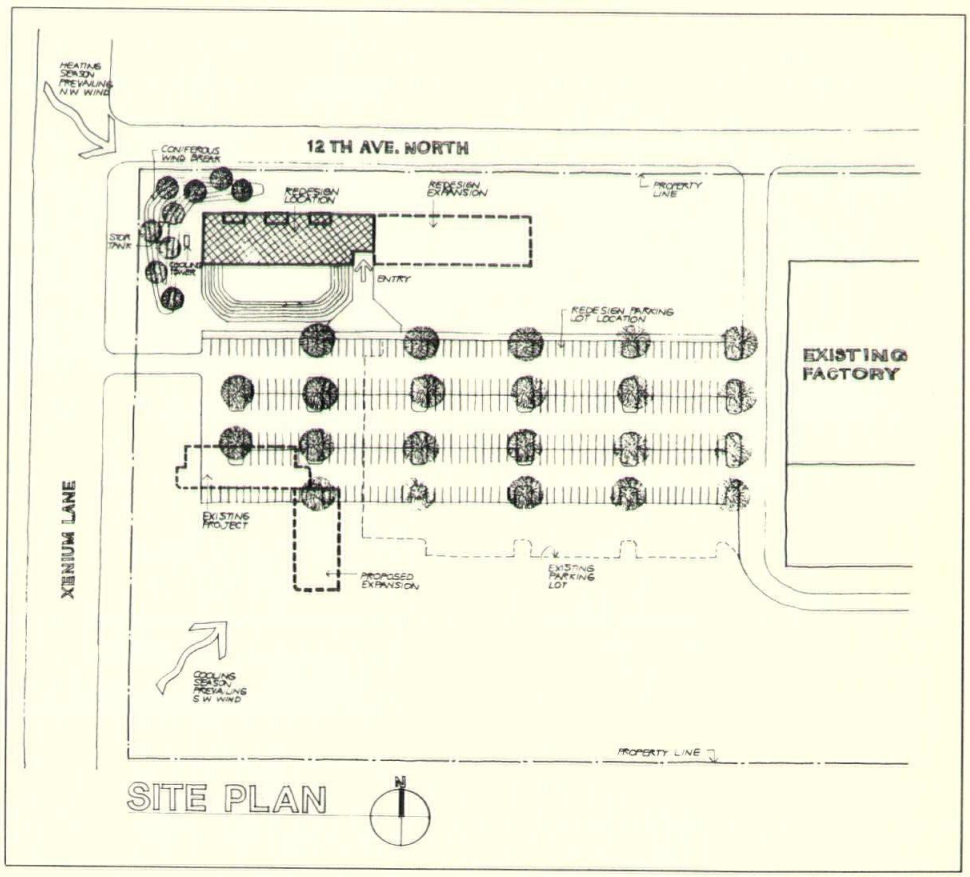
Paul Pink and Associates, Minneapolis
Apple Valley Shopping Center,
Apple Valley

Reese/Rova Associates, Minneapolis
40-unit high rise apartment,
South Minneapolis

Smith Architects, Minneapolis
Twin Cities office building

The Wold Association, St. Paul
Richfield Towers,
Richfield

Corporate Office Headquarters
Hustad-Pontinen Architects, Inc., Edina
Pace Engineering, Inc., Minneapolis

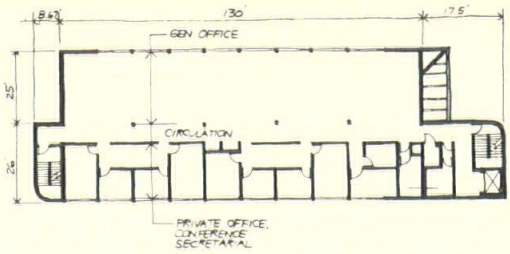


The constructed project is a corporate office headquarters building approximately 29,000 square feet on four levels. The top three floors are completely above grade while the lowest level is partially exposed to the north via an excavated pocket on a large, flat site. The plan form is rectangular, roughly 150 feet × 50 feet (long axis east-west) enclosing a double loaded corridor scheme with the majority of the transparent assemblies occurring on the north and south surfaces about equally. The main entry to the building occurs on the east wall at the second level. The structural assembly is a steel frame with steel joists and roof deck utilizing steel stud exterior walls clad with a medium color face brick. The metabolic system is composed of water to air heat pumps located in ceiling plenums with conditioned air distributed through ductwork. Heat recovery is provided and will preheat or precool outside air. The existing structure is tentatively proposed to be expanded in 1979 by a similar plan form unit (long axis north-south) containing an area similar to the initial building.

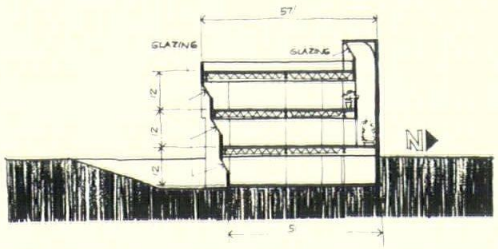
The first redesign approach relocated the building to the northwest corner of the site and considered an artificially earth sheltered enclosure. A three level plan would be used excavating an area to the south of the east-west long axis, 200 feet × 20 feet rectangle, exposing the south wall of the lowest level and providing most of the material from a borrow pit for a 3 to 1 sloped earth fill covering the north, west and east walls and roof of the upper two levels. The south wall in the scheme would contain all of the transparent assemblies with light and ventilation shafts located at the north wall with south facing monitors above the earth fill to provide natural light to reduce artificial illumination requirements and to be used in economizer cycle operation. An assumption was made that the reduced finished exterior skin area, transparent assembly area and insulation quantity would trade off for the additional structural requirements and earth moving costs. The reduced circulation accrued from the four to three level scheme provided space for the light and ventilation shafts. A preliminary estimate and appraisal of the earth sheltered

approach indicated that due to the small size of the project (particularly in relation to concrete framing costs) the concept would exceed limits beyond the budget requirements.

An acceptable redesign concept used the form and volume of the earth sheltered scheme (200 feet × 50 feet, three level) fully exposing two levels above grade providing an excavated area to expose the south face of the lowest level. The plan of the existing structure is revised to provide a strip approximately eight feet wide along the north wall arranging service elements (stairs, elevator, light shafts, toilets and storage) of non-conditioned space to serve as an environmental buffer. The majority of the private office spaces are relocated from the south wall to a central strip allowing the open areas to be immediately adjacent to the windows.

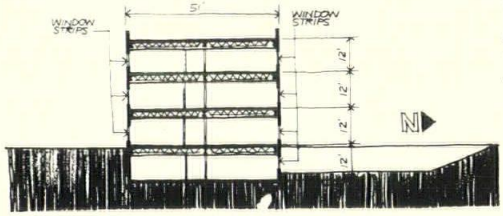


EXISTING BLDG. TYPICAL FLOOR

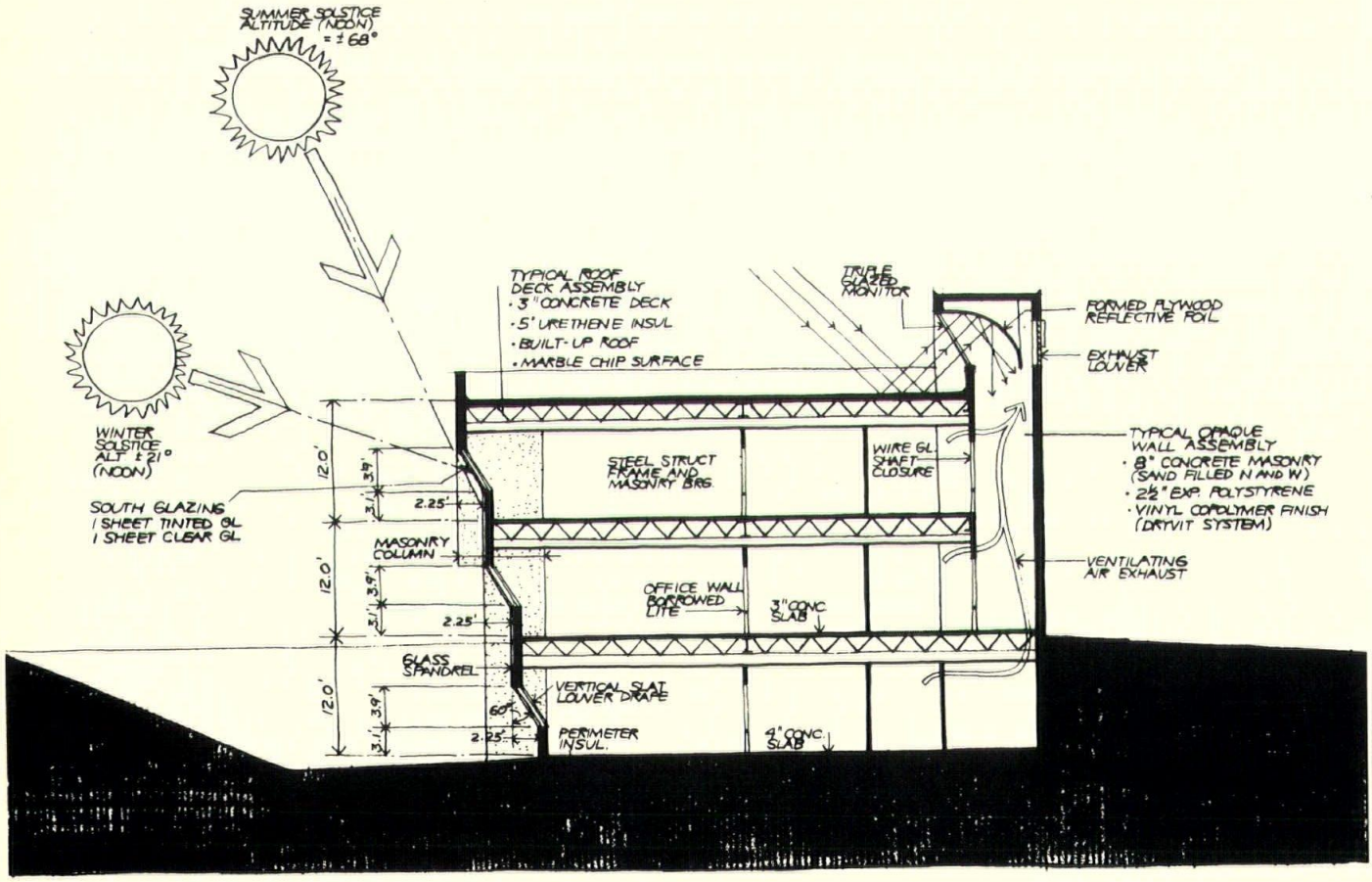


REDESIGNED SECTION

REDESIGN STRATEGIES
1. OMIT NORTH GLAZING
2. REDUCE EAST WEST GLAZING
3. INCREASE THERMAL INERTIA AND ENVELOPE 'U' VALUES
4. PROVIDE COOLING SEASON SHADING FOR MAJOR TRANSPARENT ASSEMBLY
5. INSTALL REFLECTIVE ROOF SURFACE FOR INCREASED NATURAL LIGHTING AND REDUCED EXTERNAL HEAT LOADING
6. DESIGN FOR SIMILAR EXPANSION ORIENTATION CAPABILITIES
7. INCORPORATE LIGHT, VENTILATION MONITORS AND SHAFTS
8. REVISED METABOLIC SYSTEMS - SEE MECHANICAL ELECTRICAL DRAWINGS



EXISTING SECTION



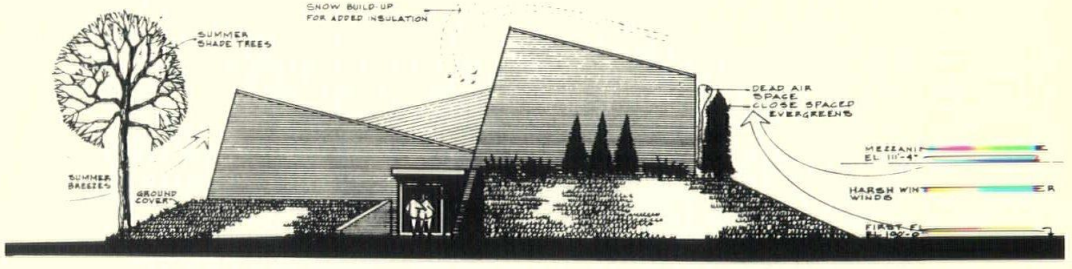
Banking Facility For a Small City in East Central Minnesota

Dykins Associates Architects, Minneapolis
Fred Dukatz, Minneapolis, Engineer.

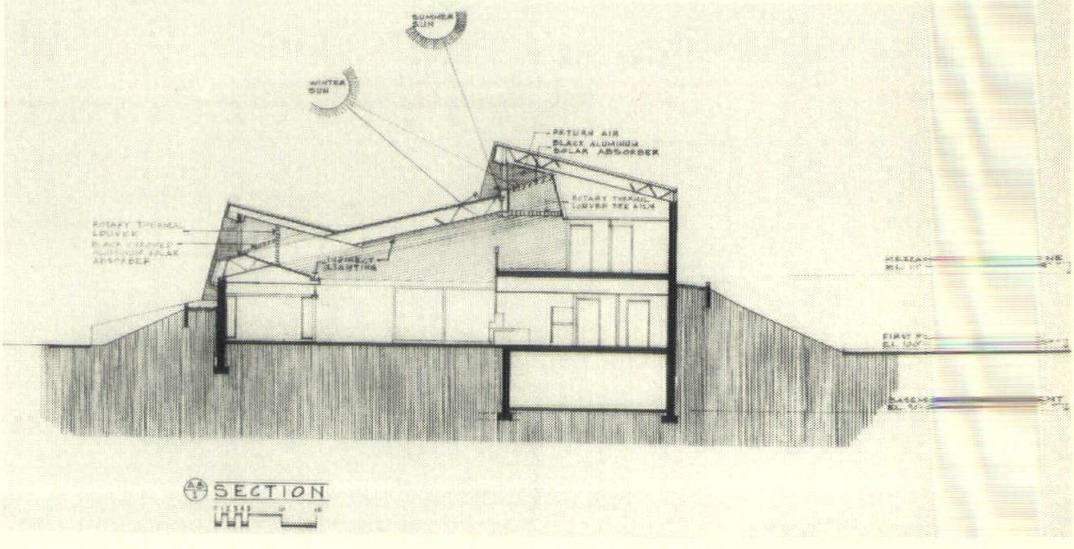
The original banking facility was a 8,200 sq.ft., with a net conditioned area (heated and/or cooled) of 6,500 sq.ft., building with a partial basement, first floor and a mezzanine level. The basic design was a rectangle with window exposures on all four sides and a flat roof. The heating, ventilating and air-conditioning system consisted of three heating and cooling gas fired roof top units connected to a duct system for tempered ventilation in conjunction with a hydronic perimeter radiation system supplied by a gas fired boiler.

The redesigned banking facility had a gross floor area of 8,100 sq. ft., with a net conditioned area of 6,300 sq.ft., consisting of the partial basement, first floor and a mezzanine. The floor plans of the bank basically remained as in the original design along with the rectangular configuration with limited window exposure on two sides and controlled exposure on the south side. Sloping roofs were chosen for reducing the total wall exposure.

The drive-up window was relocated from the north side of the bank to the west exposure in order to berm the north walls, thus reducing the effects of the harsh winter winds. Accordingly, with no windows facing north and only the drive-up window on the west, and with a canopy providing sun shading, the two most critical orientations were solved for conserving energy. The east walls were also windowless, except for an entrance, and bermed again to minimize the wall exposure. The south wall was also partially bermed and clerestory windows were used for natural lighting. Black chromed solar absorber collection devices supplemented the heating system. Rotary thermal louvers were installed below the clerestory windows in order to reduce heat loss when solar energy is unavailable.



EAST ELEVATION



SECTION

Law School, University of Minnesota, West Bank

The Leonard Parker Associates, Architects Inc.
Ericksen Ellison & Associates, Consulting Engineers

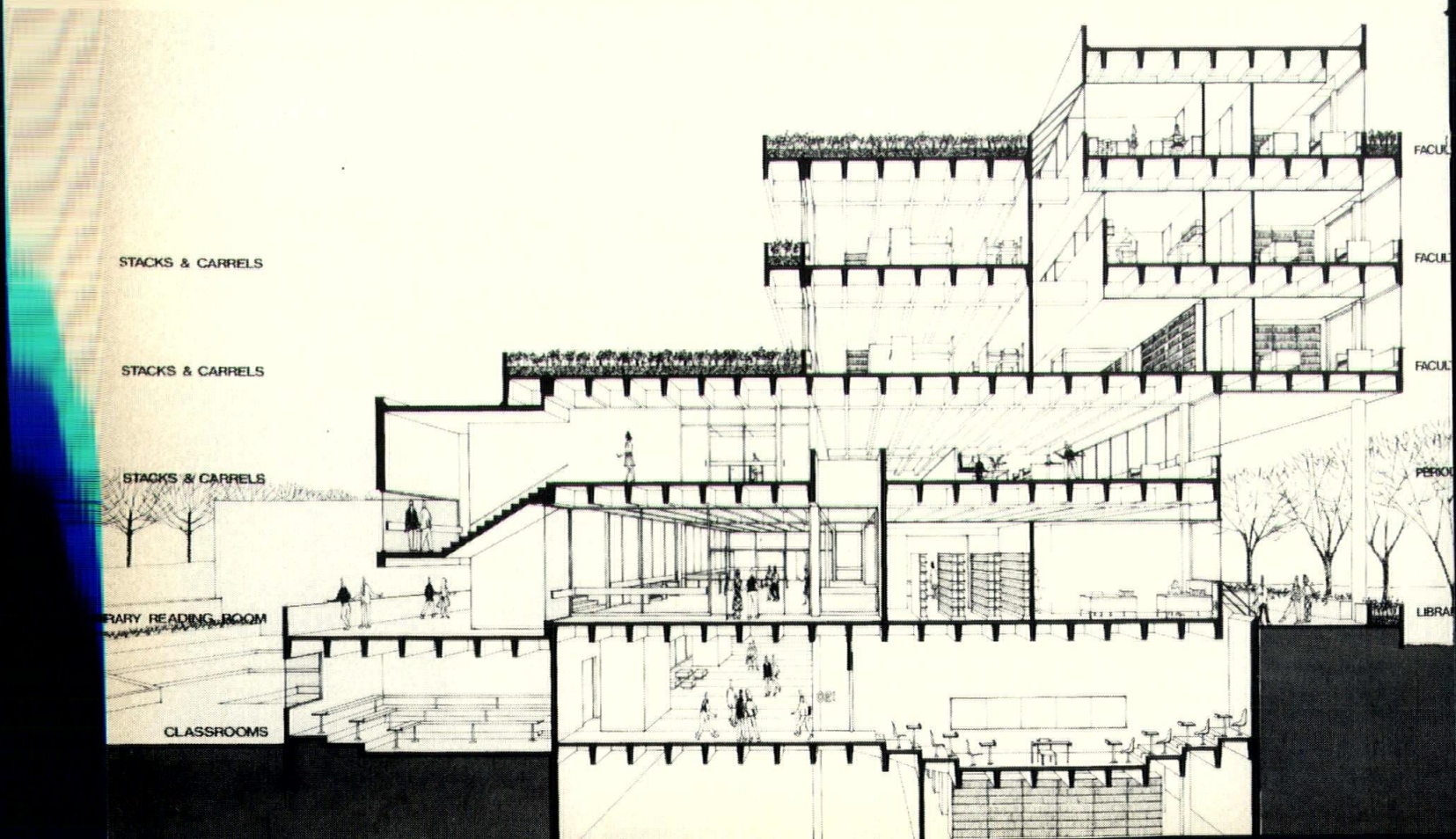
Approach: The first redesign solution left the building configuration as initially designed and built. The reasoning for this decision was that much energy conscious design had already been incorporated into the building as built. Only those areas now needing further considerations as a result of information gathered at the seminar held at Santa Monica had to be modified. The seminar reinforced the original design in that the great extent of mass on the south exposure, the planted roofs, poured concerte structure and masonry walls, assisted in dampening or delaying the peak heating and cooling loads thus assisting in the passive role for energy conservation. Also at Santa Monica we learned that the original design had a very large surface to volume ratio which normally contributes to too much heat gain and heat loss. However, our team concluded at that time that the building was so well insulated in its exterior skin that the large amount of surface exposure should not be considered a problem.

We also know that the use of reflective insulating glass, task lighting, planted roofs, interior offices related to a light well, overhangs at south exposure, air introduced at the perimeter and allowed to filter thru the stack area were all good energy conscious features that had been designed into the building.

Thus, the first redesign efforts were directed towards expanding on these features throughout the building where possible. The main entrance became a double row of the all-glass total vision system. The north pedestrian arcade was enclosed with a glass wall to diminish the exposure to the two story curtainwall at the plaza and second floors and to the underside of the third floor faculty office area. Solar shutters or shades were proposed that could be lowered across vertical areas and skylights at night to diminish heat loss. Enclosed office areas were converted to open office landscape for better zone control and potential of shared heating and cooling. Air return fixtures were utilized to reduce heat gain from fixture lamps.

At the redesign in Chicago the reviewing consultants responded with conflicting reports to our efforts. The mechanical engineer indicated that consideration should be given to a building that is already quite well designed for energy conservation and that a total redesign was not necessary. The architect accepted our project only as a retrofit and not as a redesign. The team then had to decide to stay with the first efforts and refine them or to respond to the challenge of a redesign. We chose the latter.

In the resulting redesign the "building blocks" of the Law School were reconfigured so as to reduce the surface to volume ratio, to reorient the main entrance from northwest to a northeast exposure, and to enclose the pedestrian arcade along the north facade continuing the concept of the "pedestrian street" as built on the east.



Elementary School, Apple Valley, Minnesota

Hammel Green & Abrahamson, Inc. Architects and Engineers

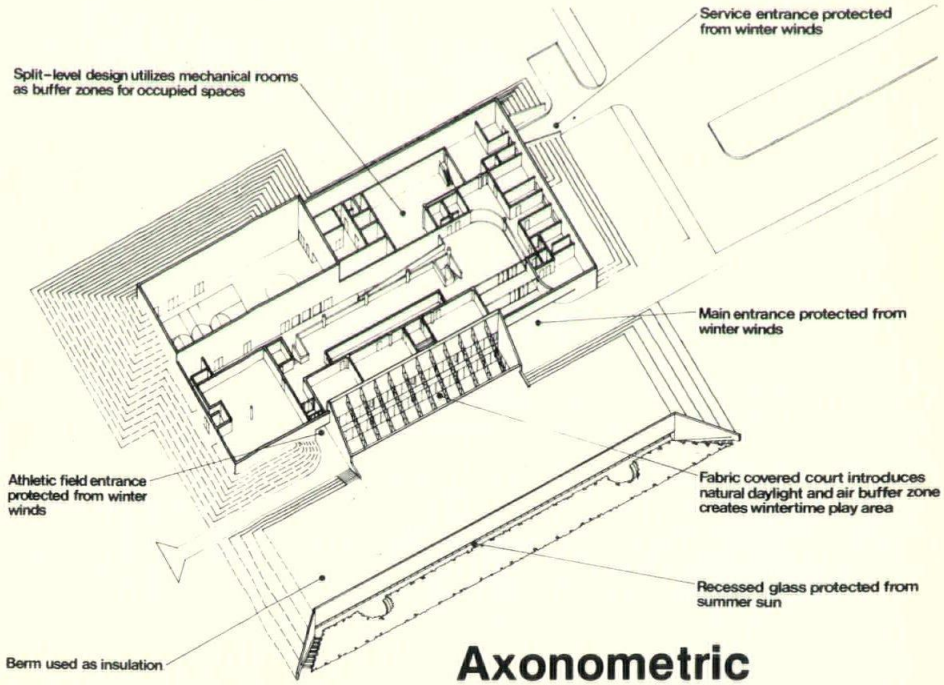
Berm walls, sod roofs, shaded glass and a play court protected by fabric comprise the passive techniques for a suburban Minnesota elementary school.

The roof of the court is covered with Teflon-coated fabric which introduces natural light and creates an air buffer zone for wintertime play. The court also has vent windows at the bottom and top for natural ventilation.

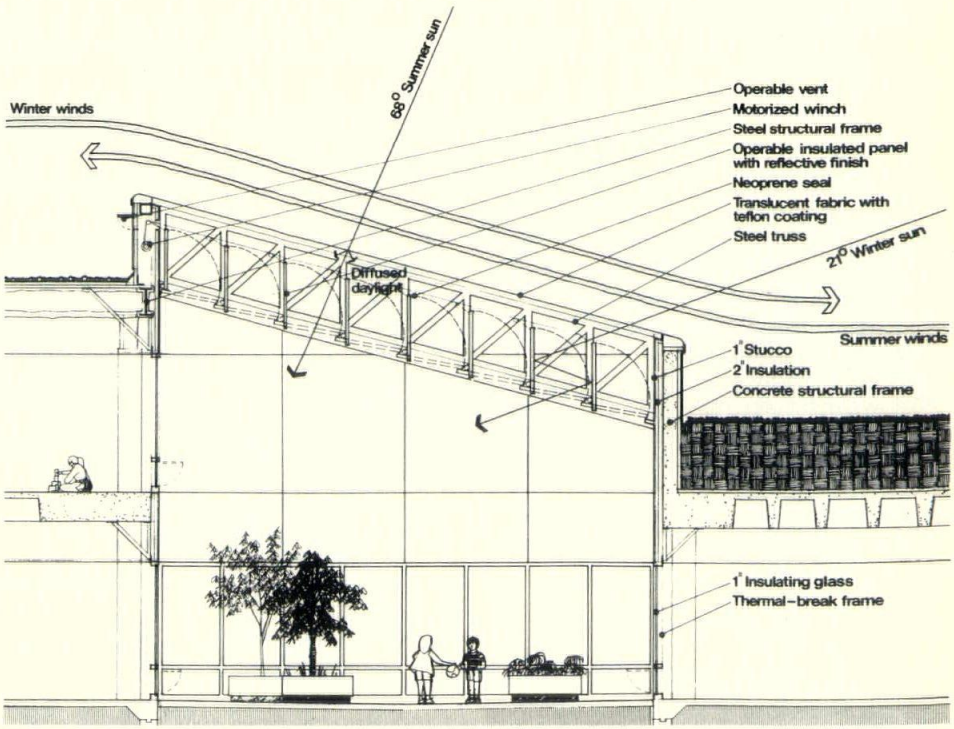
The overhang of a south-facing glazed wall shields it from sun in summer. A Trombe wall behind the glass supplements winter heating. The split-level design utilizes mechanical rooms as buffer zones for occupied spaces. The main entrance, service entrance, and athletic field entrance are sheltered from winter winds.

Luminaires in the classroom spaces next to the court and next to glass on the south facade of the building are connected to photocell control.

Estimated reduction of the mechanical loads is 33 percent.



Axonometric



Section at court

Bob Katchmark at remodeled Le Carrousel Restaurant, Radisson St. Paul. Designer: Herman Crawford, Contract Services Associates. Wallcovering: "Executive Wood.

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Demonstration Homes

Alexander Ritter

As a response to the acute interest in Minnesota in energy conservation and alternative energy systems for residential construction, the 1977 legislature allocated $490,000 to the Minnesota Housing Finance Agency (MHFA) for the design and construction of single family homes which would demonstrate energy conservation techniques, earth sheltered construction, passive and active solar systems. The MHFA "Solar/Earth Sheltered Demonstration Homes Program" is a result of this appropriation.

Through this program the MHFA hopes to provide highly visible and accessible demonstration homes; to assist in establishing market values and acceptance of earth sheltered homes; and to acquire reliable data on the homes' construction costs and operating expenses. To accomplish these goals the demonstration program was divided into two segments, a private sector grant program under which five grants of $17,000 have been awarded to design/build teams and a public sector program under which three Department of Natural Resources park manager residences are being built. All of the houses are being monitored by the University of Minnesota Underground Space Center to establish each home's energy use and characteristics. The DNR homes will be monitored extensively and used for on-going experiments. The private sector homes will be monitored less extensively, and will be sold on the open market to give some measure of acceptance and market value. All of the residences will be open to the public for ninety days.

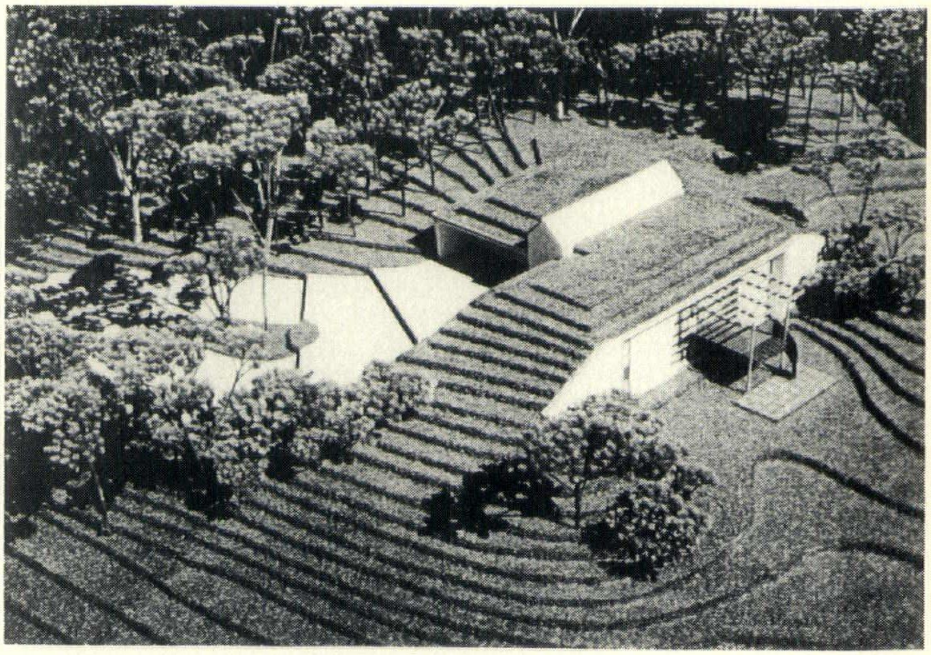
Alexander Ritter of Ritter, Suppes, Plautz/Architects was a program consultant to the MHFA for the Solar/Earth Sheltered Demonstration Homes Program.

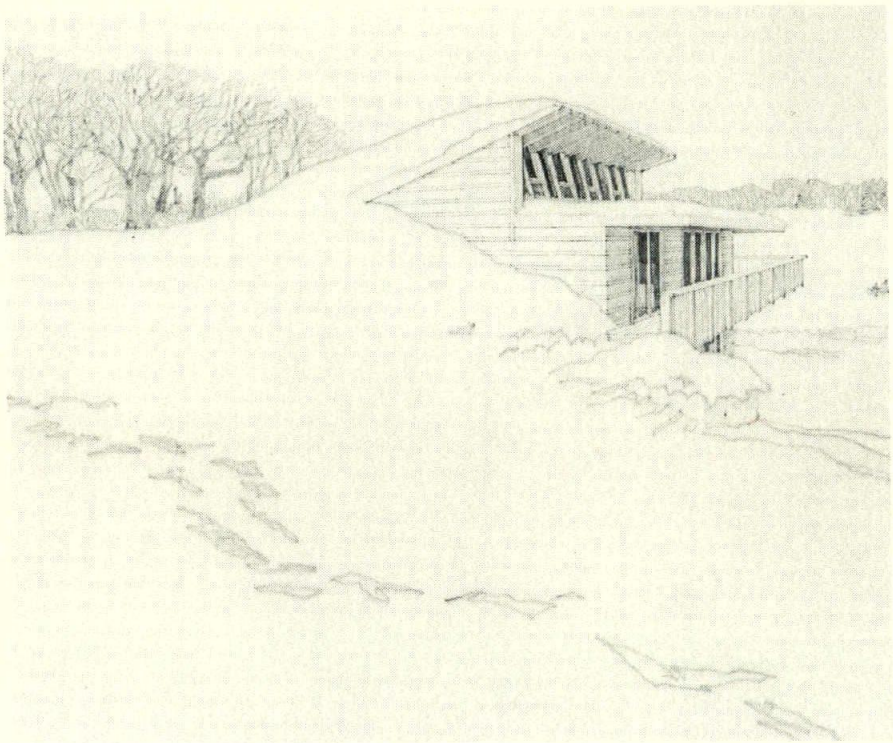
Department Of Natural Resources Park Managers Residences

Initially four DNR residences were planned, but due to budgeting constraints only three will be built. The construction prices are somewhat higher than anticipated due to the difficult bidding climate, the involvement of multiple state agencies, the state bidding requirements and the unusual construction techniques for residential applications.

Whitewater State Park, Winona County
Architects: Close Associates
Minneapolis, Minnesota

The Whitewater residence is a two story house set into the side of a south facing hillside. The garage and entry are on the upper northeast side and all of the glazing is south facing. The bearing walls are reinforced concrete and the intermediate floor and roof deck are precast concrete plank. The house takes advantage of passive solar gain as well as having an active solar system for both hot water and space heating. The house contains 2200 gross square feet plus a two-car earth covered garage and will be constructed for approximately $45 per square foot.

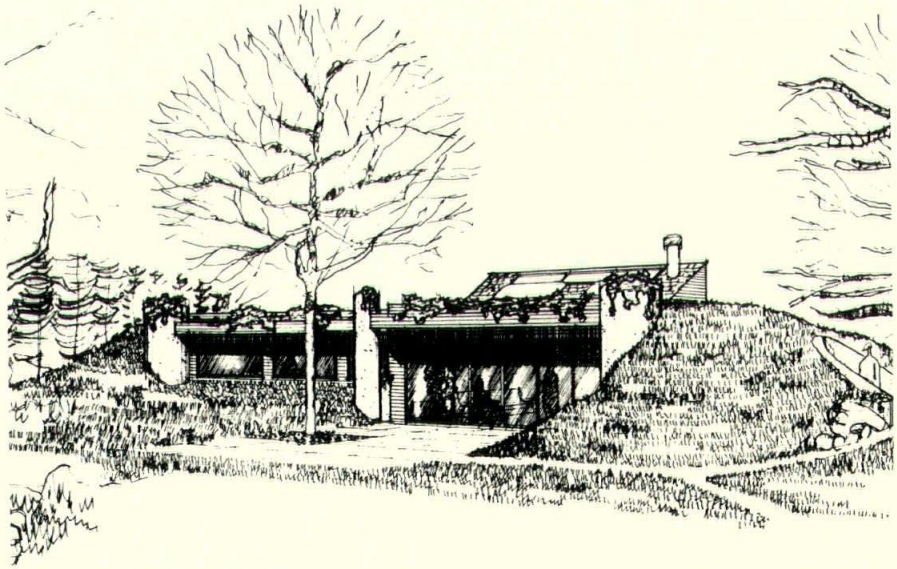




Wild River Park, Chicago County
Architects: McGuire/Engler
Stillwater, Minnesota

The Wild River residence is a two story house set into the side of a small ravine. The exterior walls against the hill are reinforced concrete block. The remaining structure is wood construction. All glazing is oriented to take full advantage of passive solar energy. A wood fired furnace will be the primary heating system. The house contains 1920 gross square feet and will be built for approximately $54 per square foot.

These three houses will provide an on-going source of reliable data demonstrating the performance of alternative energy systems and earth sheltered construction techniques in our severe Minnesota climate.

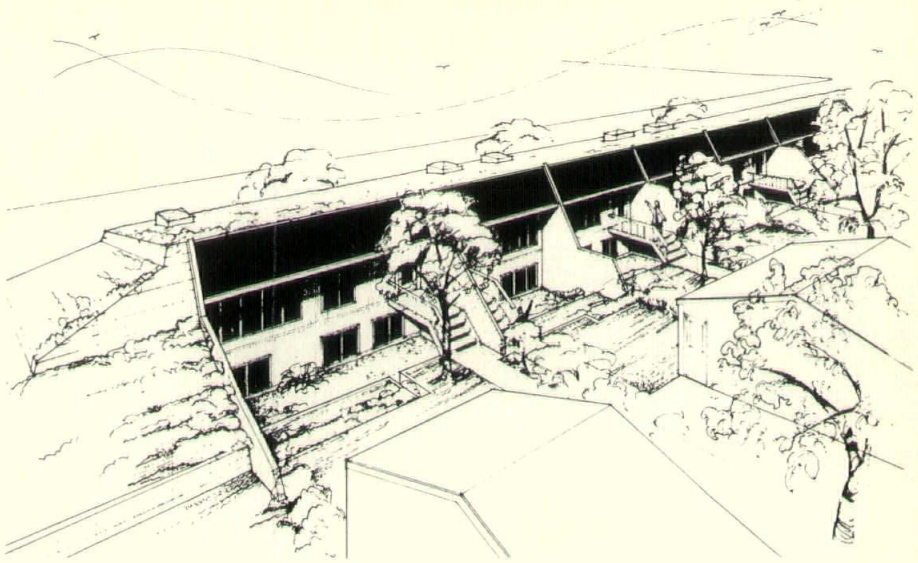


Camden State Park, Lyon County
Architects: Architectural Alliance
Minneapolis, Minnesota

This is a single story house on a relatively flat site with all glazing on the south elevation. The house has reinforced concrete block bearing walls with a precast concrete roof deck and is fully earth covered. A light monitor provides light and ventilation to the kitchen and dining areas. Precast concrete tubes are used as retaining walls and entry access. Passive solar energy is expected to provide a significant portion of the heating while an active solar system will heat the hot water. The house contains 1640 square feet and will be constructed for approximately $63 per square foot.

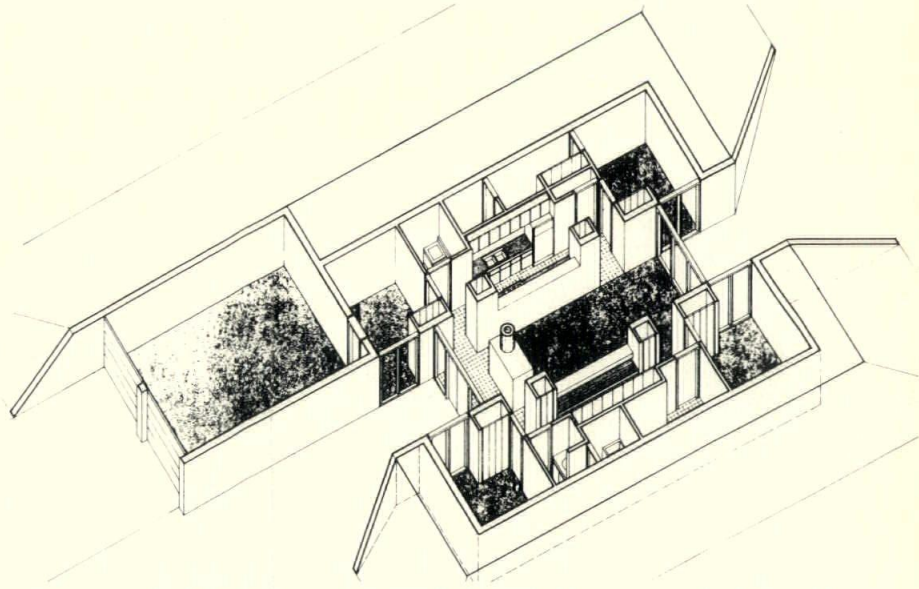
Private Sector Demonstration Homes

The private sector homes are intended to give a measure of market interest and acceptance of earth sheltered construction. Each of the design/build teams brought to the program a strong personal interest in alternative energy systems and earth sheltered construction. This commitment has been necessary to meet the budgetary constraints of the program and to deal with the demands of innovative construction techniques.



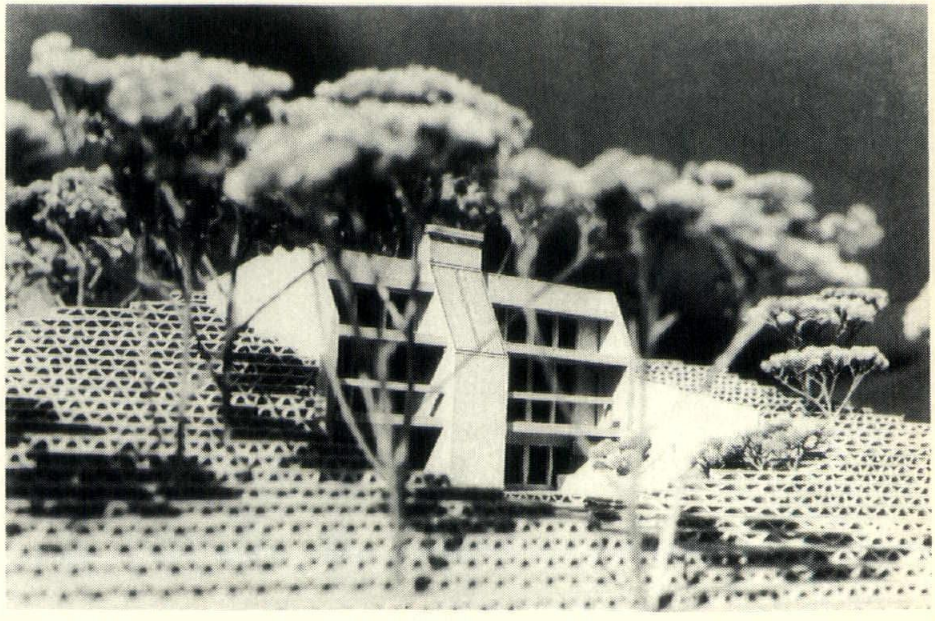
Seward West Redesign
Minneapolis, Minnesota
Architects: Close Associates
Minneapolis, Minnesota

This project will have 9 two-bedroom and 3 three-bedroom townhouses which will sell for $65,000 to $75,000. All units will be earth covered, take advantage of passive solar gain, and have an active solar system for hot water and space heating. The earth sheltered design makes it possible to provide premium housing on a very difficult urban site adjacent to a freeway. Construction will start in March of this year.



Associated Lumber Marts, Inc.
Waseca, Minnesota
Architects: The Design Consortium
Minneapolis, Minnesota

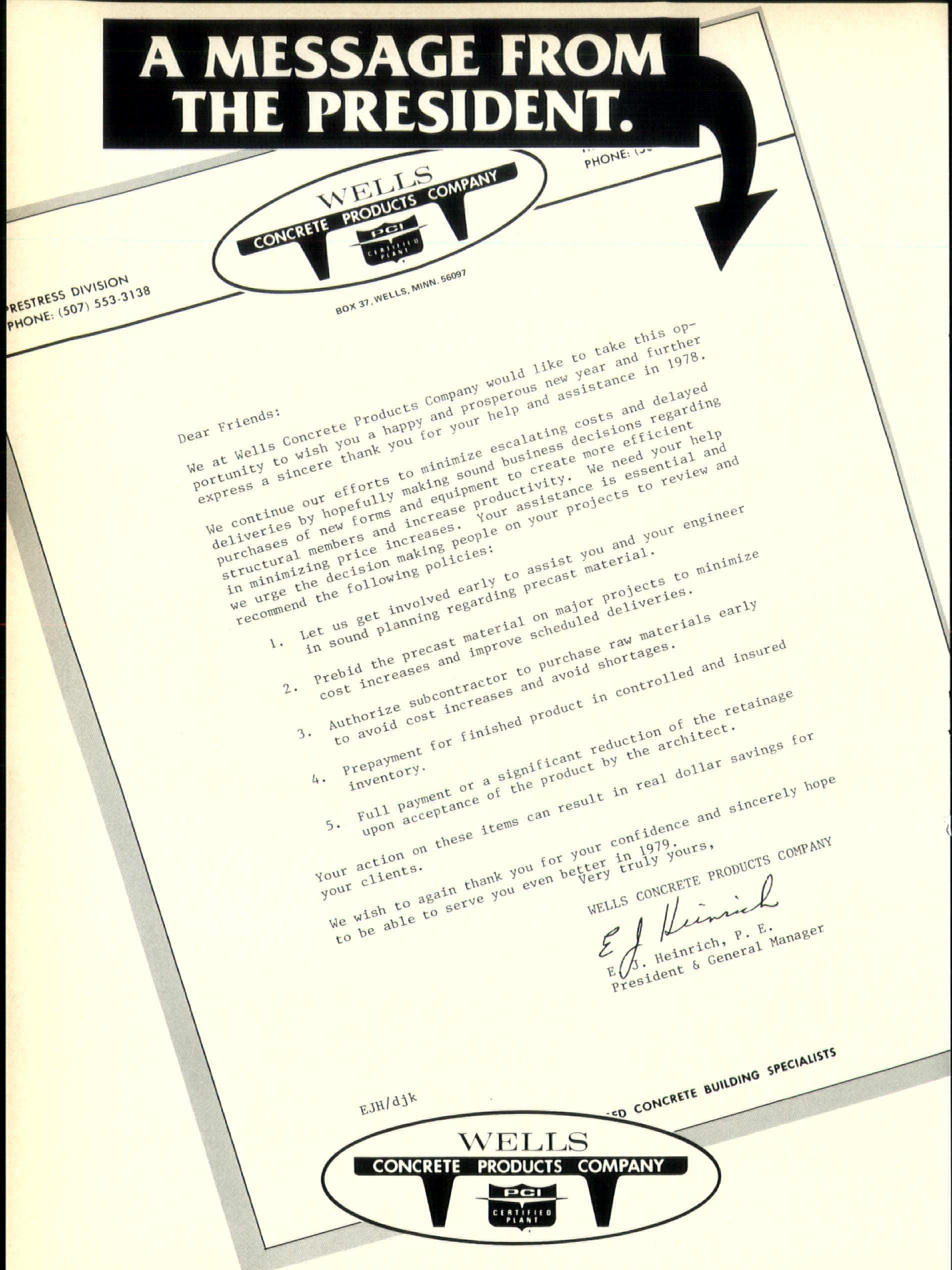
This atrium plan house has been designed for a flat site in a new subdivision. The house has reinforced concrete bearing walls and a precast concrete roof system. A large central roof monitor provides light to the central court. All other windows are onto the front and rear entry courts. Construction will be complete in April 1979.



Carmody Ellison Builders, Burnsville
Architects: Carmody and Ellison
Burnsville, Minnesota

The Carmody and Ellison house is a two story house carved into the crest of a hill. All bearing walls are reinforced concrete block and the intermediate floor and roof are precast concrete. The attached garage and entry are from the north while all glazing faces south. The house is totally earth covered. Construction will be complete in April 1979.

A MESSAGE FROM THE PRESIDENT.



Window Design Strategies to Conserve Energy

by S. Robert Hastings and Richard W. Crenshaw

This outstanding book published as NBS Building Science Series 104 *by the Architectural Research section, Center for Building Technology, Institute for Applied Technology, National Bureau of Standards, Washington, D.C. and sponsored by the Energy Research and Development Administration and the U.S. Department of Housing and Urban Development is available through the Architectural Center in Saint Paul. The following text represents the conclusion of this remarkably detailed and informative volume.*

A window can be a solar collector introducing valuable energy which can lower winter heating costs; a source of illumination which can substitute for artificial lighting to lower electricity expenditure; and a means of natural ventilation which can postpone the need for air conditioning in the spring and fall, and substitute for air conditioning on cool summer evenings.

Numerous design strategies can improve these capabilities of a window. The solar energy a window receives can be increased by light-colored adjacent ground surfaces and by favoring southern exposures. The usefulness of sunlight inside the building can be increased by providing mass to store part of the sun's heat. The utility of daylight can be increased by providing light-colored walls and ceilings, and by facilitating the substitution of daylight for electric light. Examples include separate switching of perimeter lighting, task lighting separate from ambient lighting, and automatic control systems driven by light sensors and/or timers. Finally, the ability of windows to provide ventilation can be improved through proper orientation to prevailing winds and by selecting operating window types which effectively direct the entering and exiting air stream. Even when fixed glass is required opportunities for admitting outside air are available with frame ventilators or thru-glass ventilators.

Design strategies can likewise minimize the window thermal load on mechanical systems. Winter heat loss through windows can be reduced with double glazing, storm sash, or edge-sealed transparent roll shades. Night-time heat loss can be minimized with tight-fitting draperies, opaque roll shades, or insulating shutters. Leakage of unconditioned outside air in and conditioned inside air out through window cracks can be greatly reduced by initially installing good quality windows, by providing weatherstripping, and by landscaping and exterior appendages which reduce the force of the wind. Finally, there are numerous means of blocking solar heat gain in the summer, the most effective solutions being exterior appendages or site solutions.

Window design strategies can provide occupants with more freedom in managing their individual environments, and when effectively used, they can improve comfort, and reduce purchased energy expenditures. ■

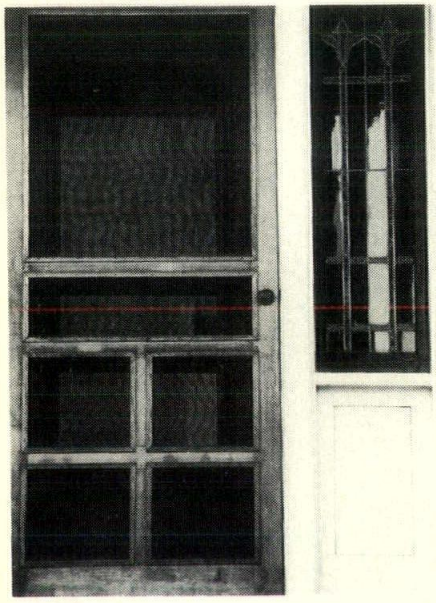
Photography: Gary Wicks

Windows

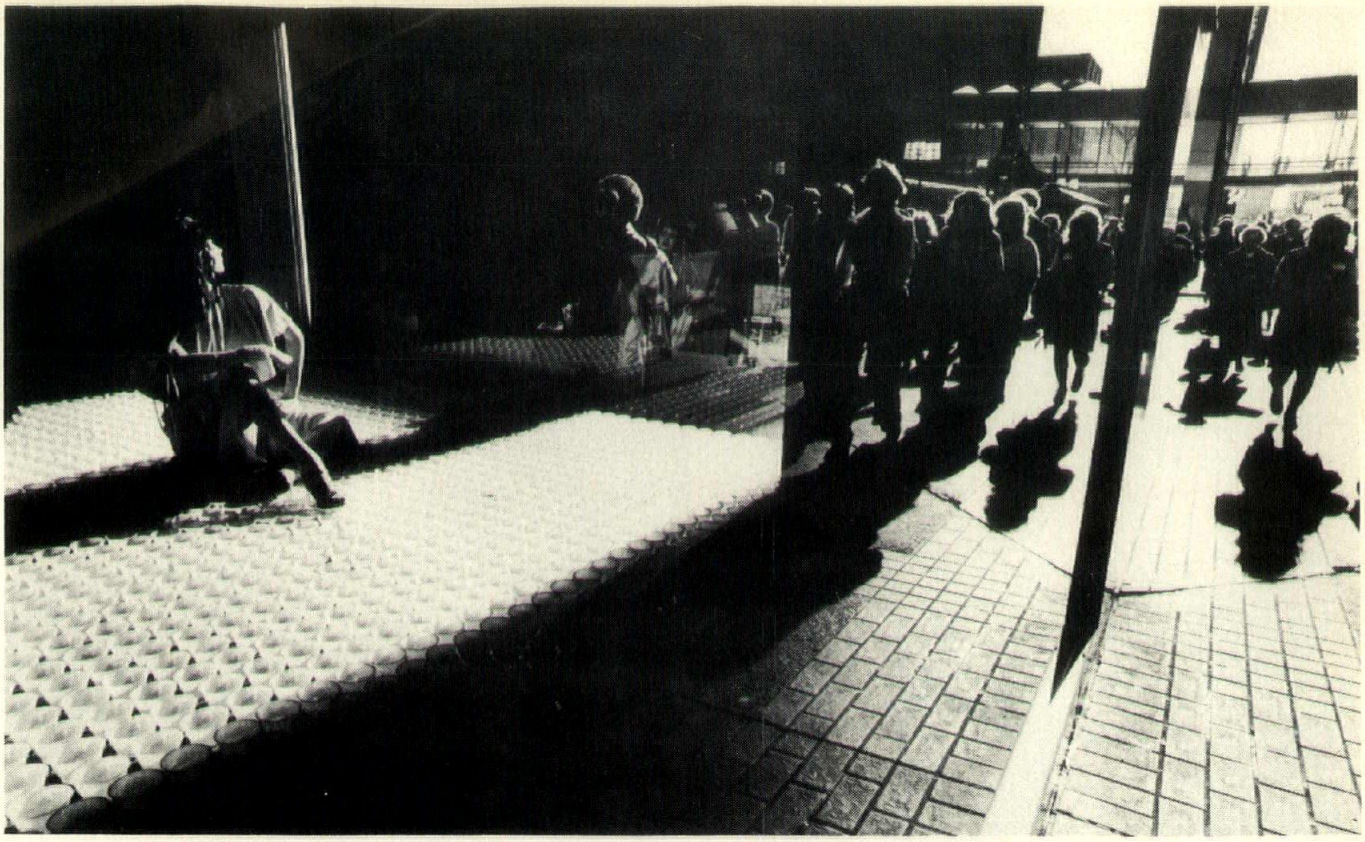
In early February *Architecture Minnesota* asked photography students from the Minneapolis College of Art and Design to do a photographic essay on the theme of "windows." The following photographs are a result of this contact.

Students from the studio class taught by assistant professor **Pat Osse** and the photojournalism class taught by instructor **Rik Sferra** were given one week to complete the project. Included in this essay are the students' many interpretations of a window and its functions as light transmitter, opening, barrier, graphic shape, and photographic prop. The students enjoyed the project and we hope you will too.

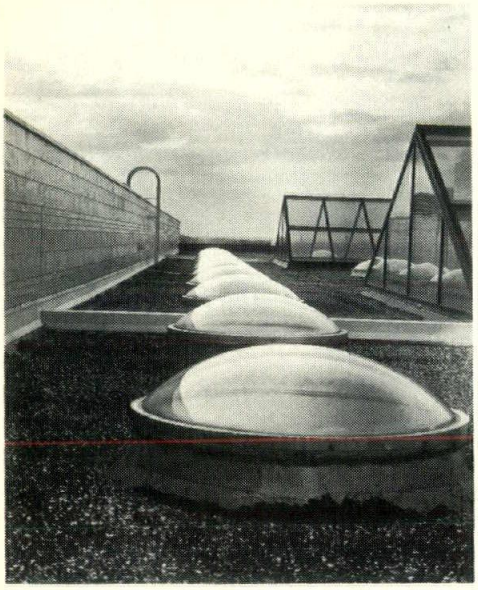
Left: Susanna Clement
Right: Paul Sinkler
Bottom: Leslie Benda



Opposite
Top: Larry Roepke
Bottom: Gary Wicks



Left: David Hodgson
Right: Larry W. Roepke
Bottom: Randy Willoughby



Energy Conservation in Large Scale Building Design

Peter Pfister

Designing an energy conserving building for commercial, industrial or institutional use is different from designing a single family residence in two main aspects. First, the client is a corporate or institutional entity that is directed by corporate officers, a building committee or a board of directors. Decision making about energy concerns in these types of organizations usually reverts back to "company policy" which is usually based on a "cash flow" or "payback" analysis determined by the accounting department. Usually not present in these situations is the strong influence of a single individual (the homeowner in the case of a residence) who, for example, can say "this building *will* use renewable energy because I believe in it."

The second major aspect where commercial, industrial and institutional buildings differ from residential buildings is that they are much larger in size than single family residences. Small buildings, such as residences, are "skin loaded" buildings. Their main energy load is determined by the relationship between the building skin or envelope and the environment. These buildings are responsive to their environment, they get cold when the environment gets cold and they get hot when the environment is hot. Typically, 60%–75% of the energy consumed in a residence is used to counteract the effects of the buildings' environment.

Large buildings, such as offices, are typically "internally loaded" buildings. The majority of the energy consumed by these buildings is for lighting, equipment power, communications, hot water heating, ventilation, and cooling of the interior zones of the building. In a well-designed large office building less than 35%–45% of the energy is used to counteract the effects of the environment on the building envelope. Because these buildings are "non-responsive" to their environment they often require cooling throughout the year.

The ratio of the volume within a 150,000 square foot fifteen story office building to the surface area required to enclose that volume may be on the order of 25 to 1, whereas the volume to surface area ratio for a residence is on the order of 5 to 1. An analogy between an inanimate object (the building) and a living organism (an amoeba) can be made. The membrane, or skin of the amoeba is the intermediary between the needed resources of its exterior environment and life functions ongoing within the membrane. In order for these functions to occur, a certain ratio between internal volume and exterior surface area must be maintained. As the amoeba grows in size the ratio of volume to membrane increases until the membrane can no longer supply all of the needs (resources) required. At this critical point, the amoeba splits in two, regenerating itself, and reducing the volume of membrane ratio to an acceptable level.

Buildings, because they provide an enclosure or "skin" for their living occupants, also must provide resources of light and air. When the volume to skin area of a building is small, such as in a residence, light and air can be provided directly through the building skin. But, when the volume to skin ratio is large, interior spaces are no longer in contact with the exterior environment through the skin. Unlike an amoeba, a building may function better with a large volume to skin ratio, but lighting and ventilating systems must be designed to provide these resources to interior spaces. The energy required to light, power and ventilate the interior space of an office building ultimately produces heat as a byproduct which when combined with the body heat generated by the occupants produces the characteristic cooling load for the interior zones. The additional energy used by interior lighting and equipment requires a greater quantity of cooling energy to remove the excess heat. Energy efficient lighting and equipment not only saves energy at the point of use but also allows for less energy to be consumed to keep the space at comfort conditions.

The two main areas where energy is used in large scale buildings, then, are the energy required at the building skin to counteract the effects of the exterior environment, and the energy required to maintain comfort conditions and for process energy in the interior of the building. In order to achieve minimum energy utilization in building operation, a building designer should consider and optimize the performance of all the elements responsible for energy consumption in a building. Because of budget and time limitations this holistic approach is seldom possible.

The Long Range Development Plan (LRDP) undertaken by the Architectural Alliance and its consultants for the 3M Company's proposed Carlton Park research facilities in Oakdale and Lake Elmo, Minnesota provided an opportunity to look at energy consumption on a community scale. The 563-acre development involved the planning for eleven million square feet of research facilities and office space capable of accommodating 18,000 employees. In planning a facility of this size that would be developed over a 20 to 25 year period, energy plays a very important role in determining the building skin, interior components, and in shaping the site development.

Perhaps the most unusual aspect of the 3M LRDP is the scope of the project. The size of the project mandated that the future costs and availability of a variety of energy sources be considered. The master plan recommended a Central Utility Plant capable of utilizing heavy oil, coal, natural gas or solid waste as energy sources. A Central Utility Plant was recommended rather than a multiple number of smaller decentralized heating, cooling and electrical substations because:

1. The Central Utility Plant could be constructed in phases so that there would be no need for excessive capital investment.
2. The gross area required for the Central Plant would be much smaller than the sum of the decentralized plants.
3. Due to diversity of loads between building increments, the gross installed capacity of the central boilers, turbines, chillers, generators, pumps and auxiliary equipment would be smaller.
4. Energy conservation equipment could be installed in the Central Utility Plant and could be operated more economically.
5. A solid waste processing system could only be justified economically when centralized.

Although somewhat removed from the center of the building site, the area selected for the Central Utility Plant was at the southeast corner of the site near existing rail service and in an area that would minimize the impact of effluent discharge, noise and potential fire hazards on the laboratory areas. As shown on the accompanying diagram a central service and distribution corridor to be used for the distribution of energy, materials and personnel was developed connecting the Central Utility Plant with all of the laboratory facilities.

The capitalization costs for the Central

Site model of the 3M Company's proposed Carlton Park research facility in Lake Elmo/Oakdale, Minnesota. The eleven million square feet of research and development laboratories are organized around node points connected by a linear axis. The Central Utility Plant is located at the bottom right. The Long Range Development Plant (LRDP) was undertaken by the Architectural Alliance Planning Team.

Utility Plant with oil fired, oil/coal fired, and oil/coal/solid waste fired boilers were estimated to be as follows:

Oil	Oil/coal	Oil/coal/ solid waste
$18,000,000	$27,000,000	$31,000,000

The estimated fuel costs using various fuels is as follows:

Oil	Oil/coal	Oil/coal/ solid wastes
$29,000,000	$21,000,000	$8,000,000

The costs of an oil/coal/solid waste installation as opposed to an all-oil installation involve an added expenditure of approximately $13,400,000 to accomplish an annual fuel savings of approximately $20,600,000. Therefore, it was recomended that oil/coal/solid waste fired boilers be considered for installation and that a pneumatic refuse collection system be installed.

The commitment made by the 3M Company allowed for an extensive series of computer analyses to evaluate the effects of various energy saving alternatives. A base building of 500,000 square feet was used for the simulations. From these simulations annual energy budgets of 65,000 BTU/square foot for office space and 140,000 BTU/square foot for laboratory space were established as being reasonable and attainable.

The computer analysis allowed for variations in the ventilation rates, lighting levels, space allocation rates, insulation levels, glazed areas, shading factors, roof ponds, etc. to be evaluated and compared. For instance, the mass or weight of the exterior walls and roof of the building does have a significant impact on rate and time release of solar transmission through the construction. It was concluded from the analysis that walls of the building that are exposed to direct solar radiation in the summer time (primarily the east and west facing walls) should have a density of not less than 70 pounds/square foot nor more than 100 pounds/square foot. The density of a heavy wall soaks up and holds heat (much like a sponge holds water until it is saturated) and delays the heat transfer to the interior spaces. This reduces the "peak" cooling load allowing for smaller mechanical equipment to cool the building and will help shift the cooling load due to solar gain to evening hours when the building is not occupied.

To return to the analogy of the amoeba for brief moment, the amoeba's immediate environment is essentially uniform around itself, no one direction provides any unusual stimulants. A building, by contrast, is subjected to very distinct and predictable environmental

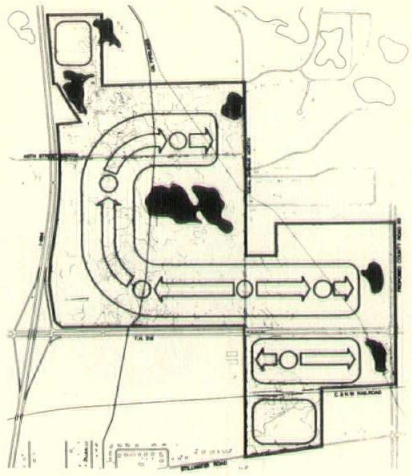


Diagram showing growth pattern of the laboratory facilities and Central Utility Plant (bottom right).

forces associated with each of its major orientations. Therefore, a building's "skin" or envelope should not be of a uniform composition and material. To respond to the major environmental forces, the building's east and west walls and roof should be of heavy construction to delay and retard unwanted summer heat gain. The north exposure should be well insulated and protected from cold northwest winter winds. The south wall should be primarily transparent to allow desirable low angle winter sunshine to enter the building and should be provided with a shading mechanism to keep out excessive summer sun. Applying these concepts in the design of a building is to simply allow the building to respond naturally to the environmental forces that act on it.

These simple concepts are evident in and formed the basis for the recent design of the North Central Plymouth Operations Office buildings now under construction in Plymouth for the Prudential Insurance Company of America. The four-story, 475,000 square foot building is earth sheltered with two exposed floors and minimal glass exposure on the north, east and west elevations. Circulation, service, and enclosed offices are located along a "buffer zone" on the north. Major open office space, the cafeteria and an outdoor dining area are oriented south to take advantage of a favorable micro-climate developed by the building, earth berming and vegetation. The major glass area is oriented south overlooking a pond and is shaded from unwanted summer heat gain by a cantilevered sunscreen. This allows the glass to be a slightly tinted glass instead of a reflective glass which would produce color shifts and reduce desirable passive solar gain in the winter. East and west facing glass is minimal to reduce summer solar heat gain.

Excess heat from the operation of the computer facilities in the building is recovered and is adequate to heat the building down to an outside temperature of 10 degrees. Excess heat from the building occupants and lights is recovered through the light fixtures, and the electrical consumption for office lighting is under two watts per square foot. These and other energy conservation features utilize existing off-the-shelf components to achieve a projected energy budget of 52,000 BTU/GSF/Year (exclusive of computer requirements).

Designing and constructing buildings for minimum energy usage is an evolutionary process. Over the past several years, the concern, the expertise, the components and systems necessary to design energy efficient buildings have continued to grow. The design of each building allows a deeper study and understanding of both conventional and innovative building components and systems. Solar energy systems, for instance, have been factored into the design of both the 3M Company's Carlton Park Long Range Development Plan and Prudential's Plymouth Operations Office. A solar energy system is being evaluated for hot water heating, ventilation air heating and air conditioning at the Land O' Lakes Corporate Headquarters in Arden Hills now being designed by the Architectural Alliance.

Solar energy systems have been tested and proven on residential and small commercial applications in this area and to a limited extent on large scale installations such as the Honeywell General Offices in Minneapolis and the Control Data Corporation World Distribution Center in St. Paul. The Architectural Alliance Planning Team recommended in the 3M Company's Carlton Park Long Range Development Plan that serious consideration be given to acceptance of longer payback periods (on the order of 10 to 20 years instead of the typical 3 to 5 years) for renewable energy and energy conservation systems. Energy concerns are not short term concerns—the fossil and uranium energies that now provide the basis of our energy system had their beginnings many thousands of years ago. We have built our industrial, technological, energy consuming society on the basis of a greater and greater consumption of non-renewable energy. Somebody must factor into the equation society's true values and concerns for energy. ■

Peter Pfister is a registered architect with the Architectural Alliance of Minneapolis and holds Bachelor of Science and Master of Architecture Degrees from the University of Wisconsin. He is chairman of the Minnesota Solar Energy Society, Minnesota Representative to the Program Review and Planning Board of the Mid America Solar Energy Complex, and Chairman of the Minnesota Solar Resource Advisory Panel.

BOTTOM LINE SAVINGS

$56 million

Over the 10 year period from 1968 through 1977, **separate** general, mechanical, and electrical bids on public building and heavy construction projects saved New Jersey taxpayers well over 56 million dollars. The average saving was 8.7%, on projects ranging from less than 100 thousand to more than 20 million dollars.

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SOURCE: New Jersey Mechanical Contractors Association

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OF MINNEAPOLIS AND ST. PAUL

Energy Resources

1. The Minnesota Society American Institute of Architects Energy Conservation and Building Design Committee

This committee was organized for the purpose of serving the public, gaining personal knowledge and rewards and assisting and advising the membership with information about energy efficient design techniques, including: site analysis, building shell, building systems, operations and maintenance, energy use data and analysis, material use and retrofitting and remodeling.

The Committee is concerned with conventional and alternative sources, and with land use and activity planning, programming power facilities, programming transportation systems, programming user services, and ecology and environment.

They have been active in advocating energy conservation, participating in National AIA activities, formulating and reviewing State and Federal regulations and documents, participating in convention activities and resolutions, sponsoring seminars and workshops and participating in Minnesota Energy Agency programs.

Contact the MSAIA at (612) 874-8771 or by writing to 314 Clifton Avenue, Minneapolis 55403.

2. Minnesota Energy Agency

Created by the state legislature in March 1974, the Minnesota Energy Agency (MEA) covers the entire scope of energy activities in the State. Under the act which set up MEA, the legislature "seeks to encourage thrift in the use of energy and to maximize the use of energy-efficient systems, thereby reducing the rate of growth of energy consumption, prudently conserving energy resources and assuring statewide environmental protection consistent with an adequate, reliable supply of energy."

The agency's activities include (1) developing conservation manuals for specific energy-intensive industries in Minnesota, sponsoring seminars and interacting with trade associations; (2) monitoring implementation of energy standards for certain existing public buildings; (3) operating an energy library and energy conservation information center, and creating a public awareness of the energy crisis; (4) assisting local governments in the implementation of energy conservation programs and providing liaison for other MEA activities; (5) developing educational materials and programs to be used in courses given by the state vocational school system; and (6) evaluating the feasibility of shifts in the types of fuel used in the residential, commercial and industrial sectors.

Conservation. The conservation division works with business, institutions and individuals to promote and coordinate energy conservation. It is also the focal point for the state energy conservation plan developed under the Energy Policy and Conservation Act of 1975 (PL 94-163). The division has five distinct functions: federal programs coordination, building technical services, special technical services, information and education, and local services.

Building technical services. This group works with the building code division on energy codes for new buildings and coordinates energy audit programs for existing buildings and industrial processes.

Special technical services. Agency efforts on transportation, state and local procurement, weatherization and other miscellaneous conservation activities are coordinated by the special technical services unit.

Information and education. This group prepares published materials, including reports, brochures, fact sheets and news releases. In addition, it coordinates and operates the Energy Conservation Information Center, which provides answers to citizen inquiries on energy conservation, supply and use, as well as on alternative energy technologies. It also coordinates energy curriculum development with the Department of Education.

Local services. Two major programs are the focal point of the local services effort. One is a community outreach program; the other is the fuel allocation program which handles the allocation of petroleum products and propane under the terms of the federal allocation program.

Administration. The administration division provides management, personnel, fiscal and external liaison services for the agency and is responsible for consolidated administrative services.

Data and analysis. Functions under the assistant director for data and analysis include policy analysis, data systems, forecasting and certificate of need.

Data systems. All data processing services for the agency, including the project management system and the Regional Energy Information System (REIS), are coordinated by the data systems unit.

Forecasting. Through various techniques, including computer models, this group measures the impacts of present or future energy policies or situations in Minnesota.

Certificate of need. This unit analyzes applications for large energy facilities, conducts hearings and provides information upon which the MEA director bases certificate-of-need decisions. It also processes applications for variances from the general prohibition on gas lamps, which became effective April 20, 1977.

Policy analysis. This group analyzes policy questions related primarily to energy supply, particularly with traditional fuels such as natural gas, petroleum and coal, and coordinates agency efforts to promote district heating and cogeneration.

Research. The research division monitors and promotes alternative energy technologies, and administers alternative energy grant programs.

3. Mid-American Solar Energy Complex

MASEC, in Eagan, Minnesota, is funded by federal money from the U.S. Department of Energy. It is one of four regional solar energy centers in the United States with the national Solar Energy Research Institute (SERI) in Golden, Colorado. MASEC was formed in 1978 to actively promote the commercialization of solar energy and solar related energy conservation within the twelve state mid-west region.

The organizational and policy functions of MASEC are determined by a Board of Directors whose members are appointed by the governors of each of the twelve states. Program review and planning for MASEC is determined by the Program Review and Planning Board (described below).

A state solar office and a Solar Resource Advisory Panel have been established by MASEC in each of the twelve states. Donald Anderson is Director of MASEC. More information is available from MASEC, 1256 Trapp Road, Eagan, Minnesota 55121, 612-452-5300.

4. Minnesota Solar Office

State solar offices have been established by MASEC in each of the twelve midwestern states. The primary purpose of these offices is to establish personal contact with business, industry and consumers in each state and to provide an information and planning link through MASEC to the U.S. Department of Energy.

The Minnesota Solar Office (MSO) is housed in the Minnesota Energy Agency's Alternative Energy Development Division and will become the focus for MEA solar programs. The MSO has a number of objectives, including recommending state policy for commercialization of solar energy, promoting public awareness of solar energy, and looking at ways of removing financial and institutional barriers to solar commercialization. MSO has recently completed an up-to-date list of solar distributors in Minnesota. John Dunlop is Coordinator of MSO. More information is available from MSO, Minnesota Energy Agency, 980 American Center Building, 150 East Kellogg Blvd., Saint Paul, Minnesota 55101, 612-296-4737.

5. Solar Resource Advisory Panel

SRAP has been formed in each state within MASEC's twelve state region to advise MASEC on how best to promote solar commercialization.

The Minnesota SRAP met initially in April 1978 and again in June and November of last year. Membership is open to any person directly or indirectly involved in some aspect of the development and/or application of renewable energy sources in Minnesota, including legislators, financiers, appraisers, builders, developers, educators, manufacturers, installers, designers, and representatives of state and federal agencies. In addition to directly advising MASEC and having one voting representative on MASEC's Program Review and Planning Board, SRAP is also working with the Minnesota Solar Office in formulating its solar programs.

At the first SRAP meeting in April, five representatives and one alternate were elected. The representatives are: Peter Pfister, Architectural Alliance, Minneapolis; Merton Jacobson, Anoka Vo-Technical Institute, Anoka; Ina Haugen, Center for Local Self-Reliance, Minneapolis; Dan Flaherty, Energy Alternatives, Plymouth; and John Weber, Creative Alternatives, Long Prairie. The representatives comprise the SRAP Executive Committee and meet monthly to organize SRAP activities.
Executive Committee and meet monthly to organize SRAP activities.

At its most recent meeting in November, SRAP established four committees to facilitate communication between the SRAP Executive Committee and SRAP members. Those committees are: Government Programs and Policies (Mary Trigg and Suzan Stewart, co-chairpersons), SRAP Program Planning (Karen Wilson, Chairperson), Market Development and Financing (Dale Horton, chairperson), Design, Construction and System Integration (Dan Flaherty, chairperson).

The next full SRAP meeting is scheduled for May 1979. At that meeting by-laws will be adopted and new representatives will be elected.

6. Program Review and Planning Board

PRPB reviews programs for MASEC. It is the official channel for the Solar Resource Advisory Panels in each state to propose specific programs to MASEC. The PRPB is composed of 24 members, twelve representatives chosen by the state Solar Resource Advisory Panels and twelve representatives appointed by the governors of each state. Minnesota's representative to the PRPB is Peter Pfister from the Minnesota SRAP.

7. Minnesota Solar Energy Association

The Minnesota Solar Energy Association is a local Chapter of the American Section of the International Solar Energy Society (ISES). Recently formed, MSEA's membership is drawn from architects and engineers, installers, manufacturers and researchers of solar (renewable) energy systems. The organization meets monthly with technical presentations by local, regional and occasionally nationally known solar experts.

8. THE UNDERGROUND SPACE CENTER

Established in 1977 by the Minnesota Legislature, the Underground Space Center is working to promote the wise and orderly development of underground space use in the State. It acts as a research and information center for all aspects of underground construction. The Center edits a bi-monthly magazine "Underground Space" and has published the book "Underground Designs" on earth sheltered housing design. The Underground Space Center is at Room 11, Mines and Metallurgy Building, University of Minnesota, Minneapolis, phone 612-376-5341. ■

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*Available from The Architectural Center, St. Paul, 227-0761.

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***Standards**—*ASHRAE Standard 90-75 Energy Conservation in New Building Design $10.00 plus 35¢ postage and handling.* From: ASHRAE Circulation Sales Dept., 345 East 47th St., New York, N.Y. 10017.

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Energy Agency's Re-Design Competition Open

The Minnesota Energy Agency recently announced the opening of its second design competition—a Home Re-Design Competition—this time for increasing the energy-efficiency of a single or double family home. Prize money of $85,000 will be awarded to 113 winners.

Awards will be given for the best set of changes to increase a house's energy efficiency. The package of changes, known as retrofitting, could include: modifications to the structure of the house, its heating, cooling, and ventilating systems, and its surroundings.

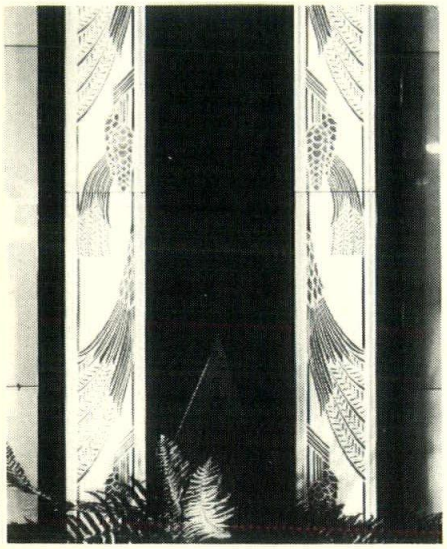
In this year's contest, applicants must submit a plan for a set of changes to an existing house by 2 p.m., May 15, 1979.

For a copy of the rules and additional information, call or write the Minnesota Energy Agency. The phone number is 612/296-8437.

Entries should be sent to the Minnesota Energy Agency, 980 American Center Building, 150 East Kellogg Boulevard, Saint Paul, Minnesota 55101. ■

Scotties' On Seventh Interior Saved

Bruce N. Wright



Jim Tittle

After five years of long negotiations with many potential developers, the City of Minneapolis has finally started the clearing and vacating procedures needed to prepare one-and-a-half blocks in downtown for the $100-million urban development project called "City Center". Scheduled to go, along with several one-story buildings, an old hotel, a men's clothing store and a seven-story school of business, is the historically significant Art Deco interior of Scotties on Seventh (formerly the Forum Cafeteria). The only building to be left standing will be the 1960's white glazed brick Radisson Trade Mart; presumably because it is too large and too new to remove.

If all goes smoothly, the city will hand over the cleared property to Oxford Development Properties of Edmonton, Canada, by late Spring this year. The interior and the Beaux-Arts terra cotta exterior are both on the National Register of Historic Places; curiously, the **interior only** is on the Minneapolis Heritage Preservation Commission's list. Nevertheless this has meant very little because the city council has veto power over both organizations and is unlikely to rule against a project it has painstakingly nurtured for so long.

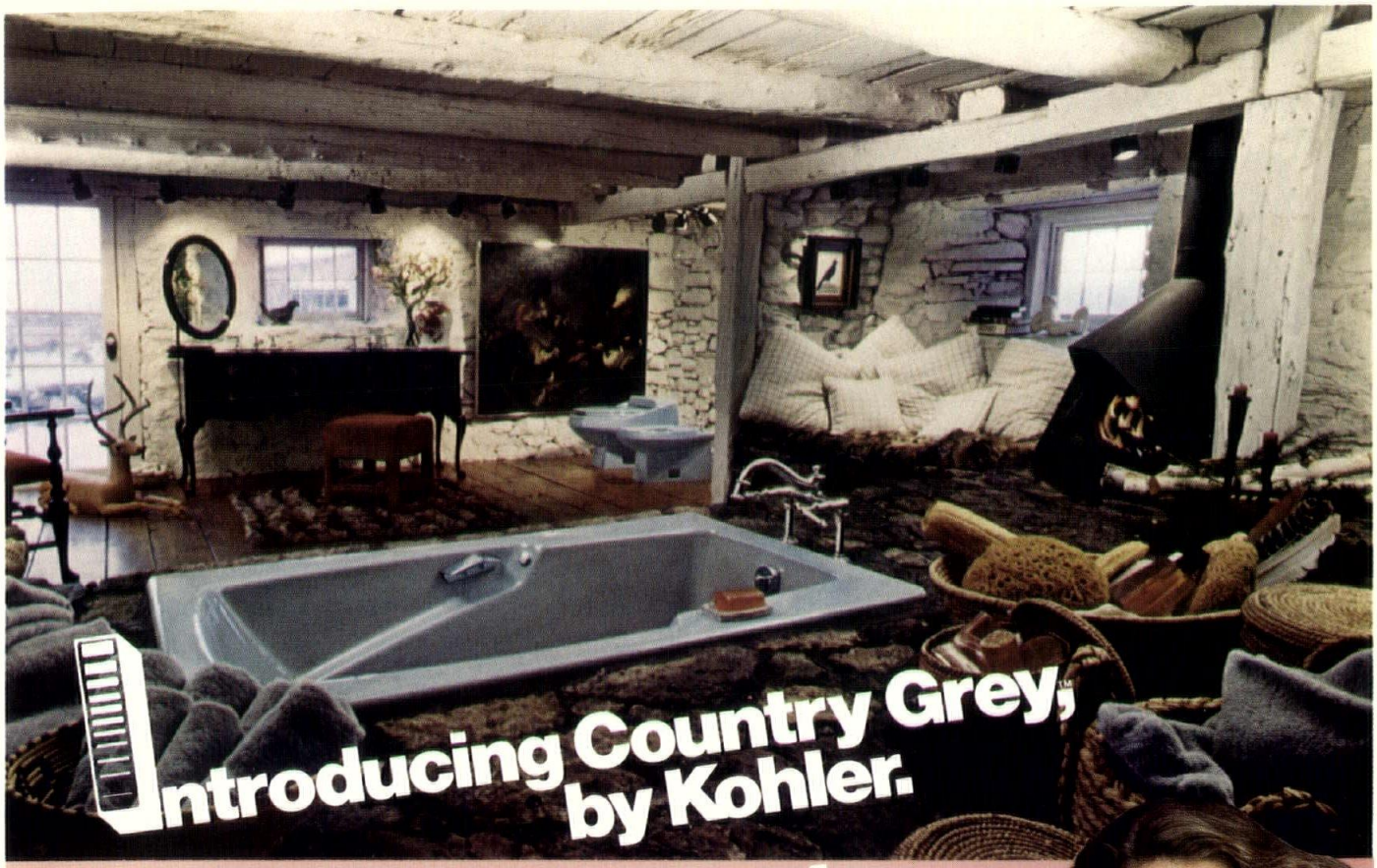
Architects for the development are Skidmore, Owings, and Merrill (Denver). They describe the project as having a 3-level glass and steel shopping arcade as a base, topped by an 18-story, 600 room luxury hotel (managed by Western International Hotels), a 28-story office tower, and a 38-story office tower. Included in the lower framework is a 1.4 million-plus square foot retail facility for Donaldsons and a 300 car underground parking ramp.

Though most citizens support the concept of high density development in downtown Minneapolis, critical opposition to City Center has tended to focus on Scotties and the future of its marvelous interior. According to Oxford's assistant project manager Harold Brandt in a recent interview, the structure itself is not the problem. "We need the ground beneath it for a loading dock area for City Center," Brandt said. And Oxford's marketing officials say the site is needed for an as yet unnamed prestigious department store.

There is still hope for the interior. The present owners filed suit in January against the city and Oxford challenging the constitutionality of the use of "quick clearing" under the city's right of eminent domain, and Oxford's failure to file a complete Environmental Impact Statement. Issues debated in the District Court were: the historical significance of the facade, the possibility of Oxford building around Scotties, the feasibility of taking the glass tiled interior down, and the relocation of Scotties. The trial ended, however, when Scotties, Oxford and the city reached an out-of-court settlement. Oxford and the city agreed to pay Scotties $1-million (up from the original city offer of $700,000); Oxford will dismantle the interior, restoring it to its original 1929 appearance, and relocate it at ground level within City Center on Sixth Street; and finally, Scotties will be given a long term lease to operate the interior in its new location.

Many local critics feel that any new development downtown, especially of this size and in this location should give more than it takes away. To some, a City Center without the old Forum sacrifices too much in urbanistic quality and diminishes by one more precious building Minneapolis' fading sense of history: gone are many architecturally significant buildings from downtown. Some were lost to fire, but most to a hunger for newer, better answers. As one concerned citizen said, "There is a tendency in planners and developers to equate newness with goodness." ■

Bruce Wright is a graduate architect with Horty, Elving and Associates, Minneapolis.



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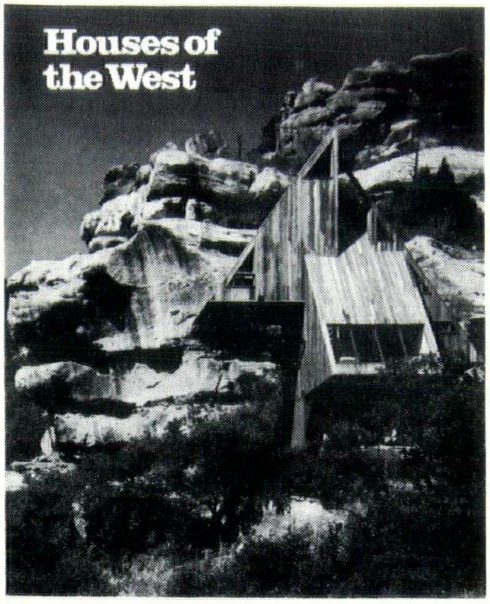

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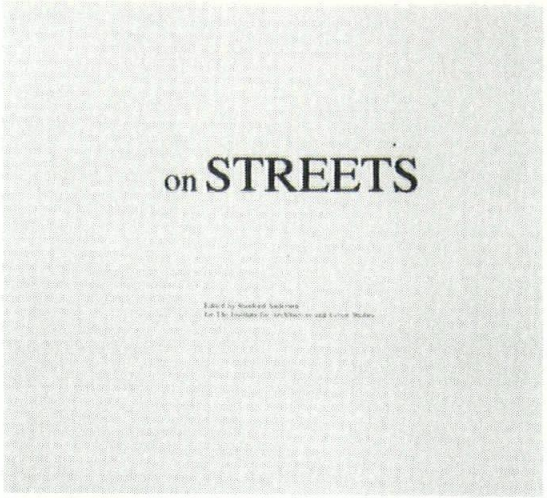

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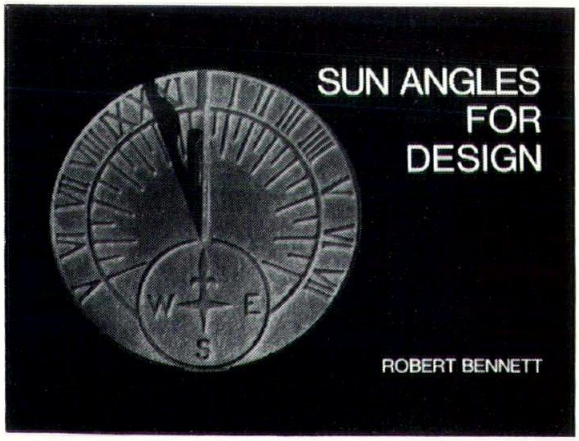

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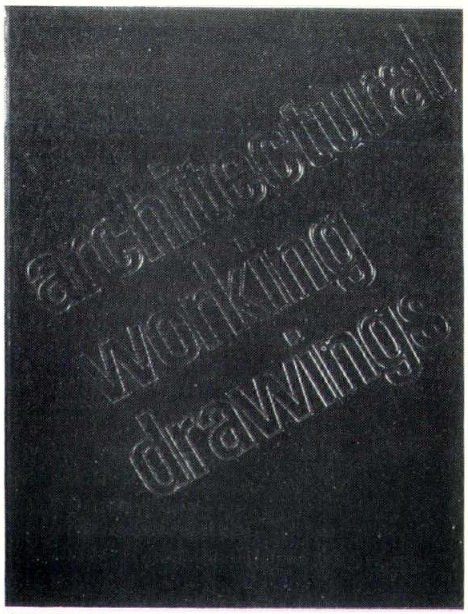

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SKYWAY BUILDING SAINT PAUL 55101 (612) 227-0761

BOOKS

Susan Davis

Frank Lloyd Wright: His Life and his Architecture, by Robert C. Twombley, John Wiley, 19.95

This is Twombley's second biography of Frank Lloyd Wright. It focuses on Wright's buildings, which when viewed as biographical as well as social statements, become primary sources for investigating his intellectual, emotional and psychological make-up.

"After I completed the manuscript of 'Frank Lloyd Wright: An Interpretive Biography' . . . I thought I had given the man enough of my time. But Frank Lloyd Wright is a compelling man. Once bitten by his bug, one finds it difficult to regain immunity. Like William Faulkner's people he 'endured,' but he also triumphed over hostility, indifference, boredom, and the ignorance of well meaning people—and he continues to triumph over saccharine cultism—to herald an individuality and a vision of social harmony to which most of his words and deeds were directed. There is much about the man not to like, much to object to, but his life's goal was to bring about a humane world through architecture, and that cannot be faulted. He also lived with such flair and his life had such drama that he was, and continues to be, fascinating. Like a good book he is difficult to put down." From the author's preface.

Frank Lloyd Wright

The Decorative Designs of Frank Lloyd Wright, by David A. Hanks, E. P. Dutton, 9.95

This major study is of special importance as it concentrates, for the first time, on the decorative arts in many of the important buildings designed by Frank Lloyd Wright. Wright's aim was always to create a totally cohesive environment for his clients; no detail was too small for his attention. Here then are those details which have been in the background for so long.

Mr. Hanks has been Associate Curator of American Decorative Arts at The Art Institute of Chicago and Curator in the Department of American Art at the Philadelphia Museum of Art. He is currently working on a decorative arts survey for the Smithsonian Institution in Washington, D.C.

A Survey of Passive Solar Buildings, AIA Research Corporation, 12.95

The survey is divided into three main sections concerning solar heating: direct gain, indirect gain and isolated gain. There is also a short section on solar cooling. Each project studied includes climatic data, a description of the building, a description of the solar system, cooling techniques, auxiliary system and performance evaluation.

Earthscape: A Manual of Environmental Planning, John Ormsbee Simonds, McGraw-Hill, 24.95.

"A compendium of practical information and project proposals, with one objective: to show what architects, landscape architects, planners, engineers, students, public officials, entrepreneurs, conservationists and other concerned citizens can do right now to assure that tomorrow's communities will be liveable, productive and beautiful."

The $50 and Up Underground House Book, by Mike Oehler, Mole Publishing Co., 6.00

The author is president of Hobbit Housing Company, an underground design, consulting and construction company near Bonners Ferry, Idaho. He

as lectured on underground housing at universities since 1974. Includes information on: how to cut material costs up to 90%, solving drainage problems and dealing with building codes.

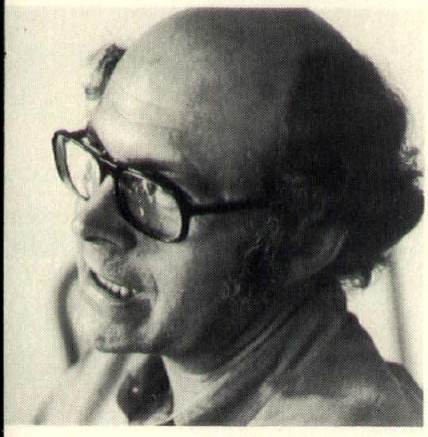
Process Architecture #6: Solar Architecture, Process Architecture Publishing Company, Tokyo, 22.50

Articles include: The Sun: A New Aesthetic Challenge for Architecture, A Rhapsody in Four Parts by John Eberhard; Architecture as Energy by Margaret Villecco; An International Perspective of Solar Energy by John Yallott; Architecture and Energy Conservation by Donald Watson; An Aesthetic Approach to Solar Design by James Lambeth. 32 Projects are pictured.

Writings of Philip Johnson, edited by Peter Eisenman, Oxford University Press, 25.00

Timeless Way of Building, Christopher Alexander, Oxford University Press, 18.50

The longawaited third volume completing the trilogy that *Oregon Experiment* and *Pattern Language* began. ■



James E. Sorensen, 1928-1978

The architectural community in this rea is small and its vigor, its imagination and its strength depend on each f its members. A very unusual nember of this community was Jim orenson, who died of a heart attack n September 12, 1978.

For the last four years of his life, Jim perated his own architectural practice. Prior to that he had been ssociated with several large Twin ities firms and his work encompassd large buildings, such as schools, niversity and college buildings as vell as residential design.

Jim was an unusual colleague and riend. A perfectionist in his professional practice, he was an authority on istorical precedence of our physical nvironment, a constant student and esource of opera, art, film and food, nd a joyful and responsive observer f the political and economic world. is insatiable enthusiasm, his poigant comment and his tender affecon will be most missed and most herished. ■

Special Services Listing

Walter K. Vivrett

George C. Winterowd

The School of Architecture is indeed sorry to report the death of Professor Walter K. Vivrett. Professor Vivrett had continued to work on a full-time basis and throughout the year in spite of the serious physical difficulties caused by the debilitating effects of Parkinson's disease. He died in his sleep in a nursing home in Nashville, Tennessee, within a few blocks of his family home.

Walter Vivrett came to the University of Minnesota in the Fall of 1949 after serving in the Army Corps of Engineers during World War II. He began his architectural career before the war as a student in the School of Architecture of Tulane University in New Orleans and completed work for his professional degree at the University of Illinois in Champaign-Urbana where he graduated with highest honors and received many additional awards for his scholarship and design ability. He continued his education as a graduate student at the Massachusetts Institute of Technology where he was awarded the Master of Architecture degree and taught architectural design for one year at Miami University in Oxford, Ohio before coming to Minnesota.

Professor Vivrett will be remembered nationally for his many contributions to our cultural heritage through his research on housing and geriatrics during the Eisenhower and Kennedy administrations. He also made significant public service contributions to the State of Minnesota ▶

and served on the Governor's Council on Aging, the Minneapolis Urban Renewal Task Force, the Capitol Long-Range Improvements Committee, and numerous research and service committees of the University. He was one of the founding members of the group which conceived the Minnesota Experimental City Project, served as its Director during the early years of its development, and continued research on its many related phases until his death. His more recent publications include *Residential Rehabilitation* which he co-edited with Mr. Carter McFarland, several definitive reports on the Minnesota Experimental City Project, and several articles in journals on architecture and urban design. He also served as Technical Director for the White House Conference on Aging and was an architectural consultant for the Public Housing Administration.

His contributions to architectural education cannot be adequately measured but would include personal contact with every student attending the University of Minnesota, School of Architecture during the decades of the fifties and sixties and every student enrolled in the Master of Architecture graduate program during the past twenty years. He was awarded a special citation for his contributions to architectural education by the Minnesota Society AIA at its 1978 convention and has served on many boards and committees including those of the American Institute of Architects, the National Architectural Accrediting Board, the Association of Collegiate Schools of Architecture, the American Institute of Planners, and the National Council of Architectural Registration Boards. He was also the architect for housing projects in Minnesota and the upper Midwest in general.

A scholarship fund is being established in the School of Architecture and Landscape Architecture in Mr. Vivrett's name; donors may contact the School at the University of Minnesota. ■

George C. Winterowd is Professor at the University of Minnesota's School of Architecture and Landscape Architecture.

The ARCHITECTURE MINNESOTA Marketplace

James P. Cramer, Publisher

The readers of *Architecture Minnesota* purchase, specify or influence the specification of the major portion of the commercial building products and interior furnishings in North Dakota, South Dakota, Wisconsin, Iowa and Minnesota. Included in our readership are:

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- Subscribers and design professionals from all fifty states as well as several foreign countries
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Architecture Minnesota has been acclaimed as one of the most influential regional publications in the design and construction industry. This is in part true because *Architecture Minnesota* covers one of the largest and fastest growing commercial construction markets in the United States. According to Weld Coxe, President of Coxe Associates, 95% of all architect designed buildings are done by AIA member firms. Every AIA member in the region receives *Architecture Minnesota* as the official publication of the MSAIA and as a product and design resource.

According to the AIA Washington, D.C. Office:

- 87% of the architects specify walls, floors and doors.
- 80% specify building exteriors.
- 78% specify roofing, insulation and water-proofing.
- 76% specify interiors and lighting.
- 54% to 60% specify structural framing, solar systems, plumbing and water coolers.

The readers of *Architecture Minnesota* are a very special group because the readers are the influential decision makers proving that "good architecture is good business", and "good architecture is good living". ■

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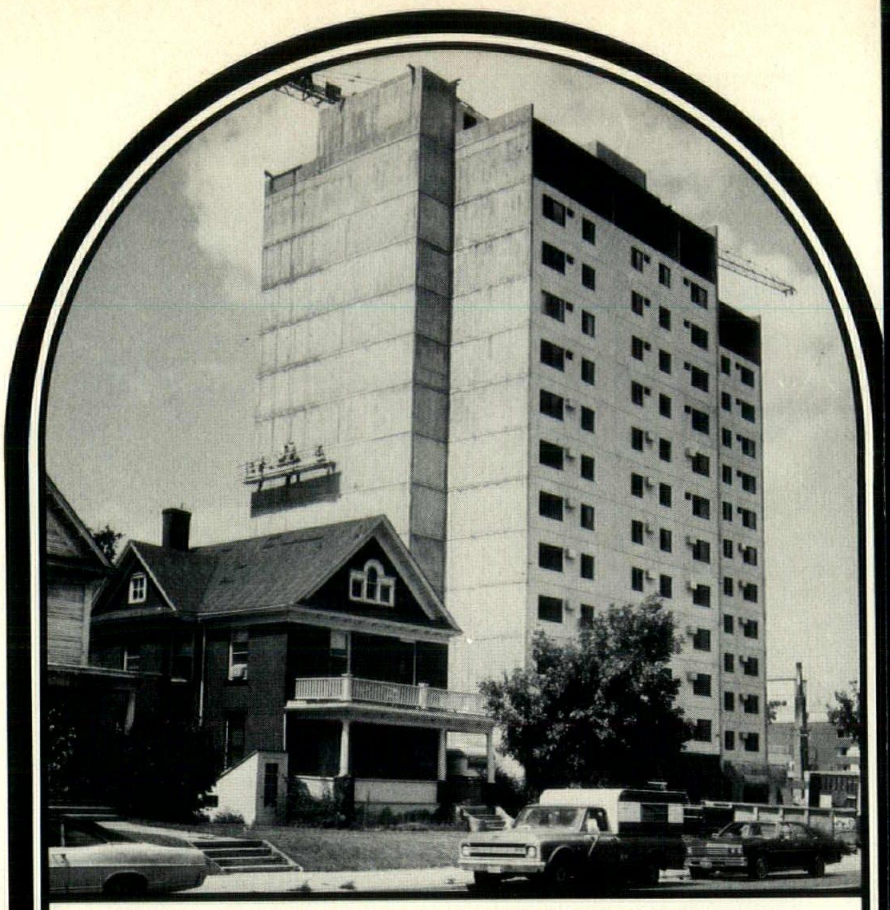

The Augustana Apartments in the Elliot Park neighborhood of Minneapolis is the first element of a nearly two square block elderly housing complex being developed by Augustana Home of Minneapolis. It is the first privately-owned project of this type to be financed with industrial revenue bonds issued by the city. Residents will share in ownership of the 100-unit, 13 story project. Toltz, King, Duvall, Anderson and Assoc., Inc., architects. Kraus-Anderson of Minneapolis, general contractor.

Exterior insulation uses the thermal storage capacity of the wall to reduce peak needs and hence the size of heating/cooling equipment. It also reduces thermal shock to the wall structure.

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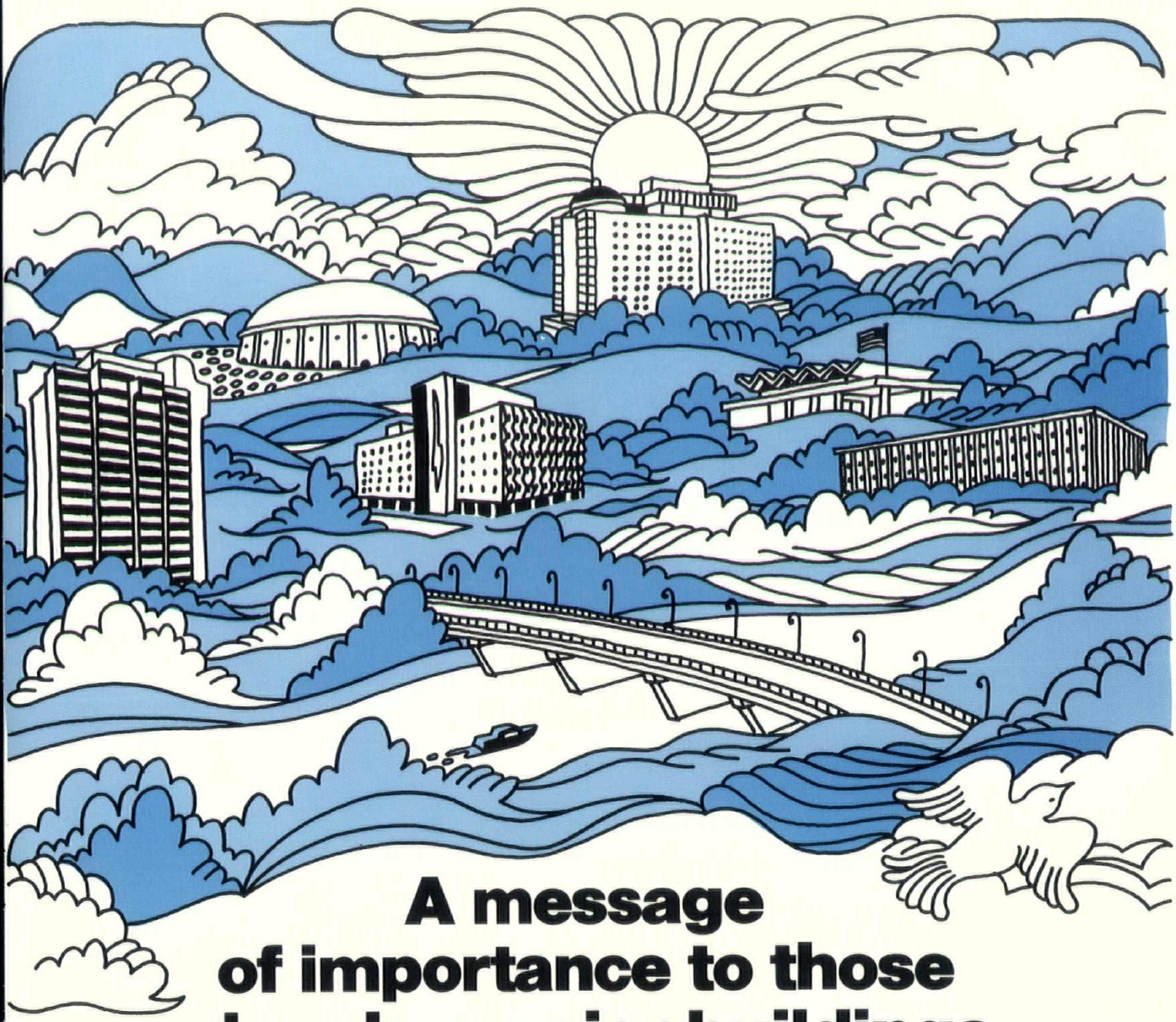

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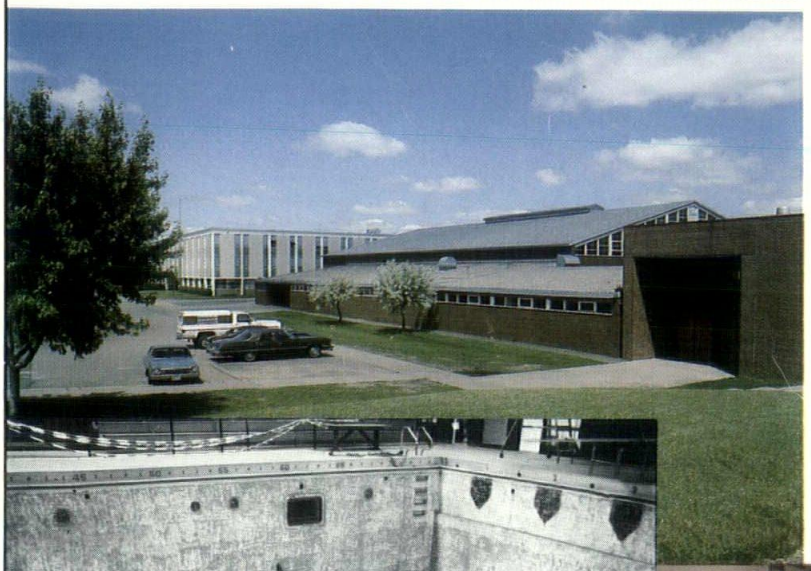

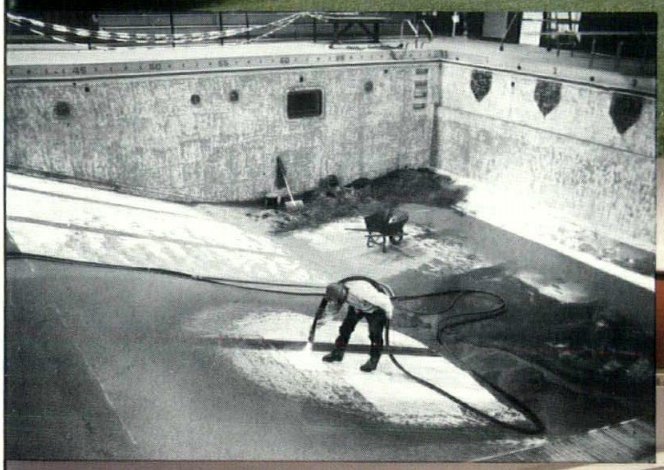

Peeling paint with all-too-frequent pool cleaning and maintenance chores prompted school authorities at West St. Paul's Frances M. Grass Jr. High School to start all over.

They had the pool scraped and sandblasted removing all the paint which was replaced with permanent-finish easy-to-clean, Ceramic Tile . . . more than 5,000 square feet of 1″ × 1″ tiles.

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