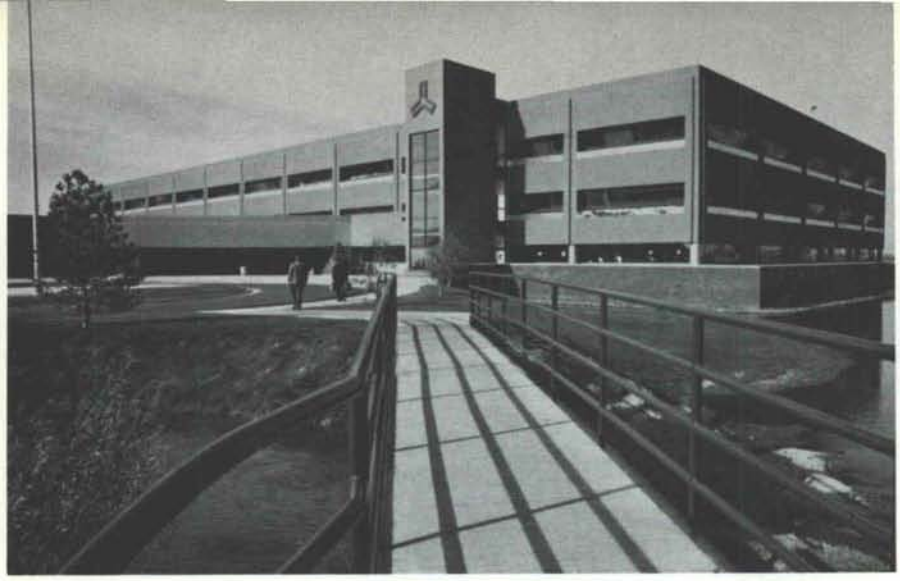


WILLOW CREEK OFFICE BUILDING

Owner: E.G. & G., Idaho, Inc.
Architect: Flatow, Moore, Bryan and Associates, Albuquerque

MODEL ENERGY EFFICIENT OFFICE BUILDING WINS NEW MEXICO SOCIETY OF ARCHITECTS AND OWENS CORNING AWARDS

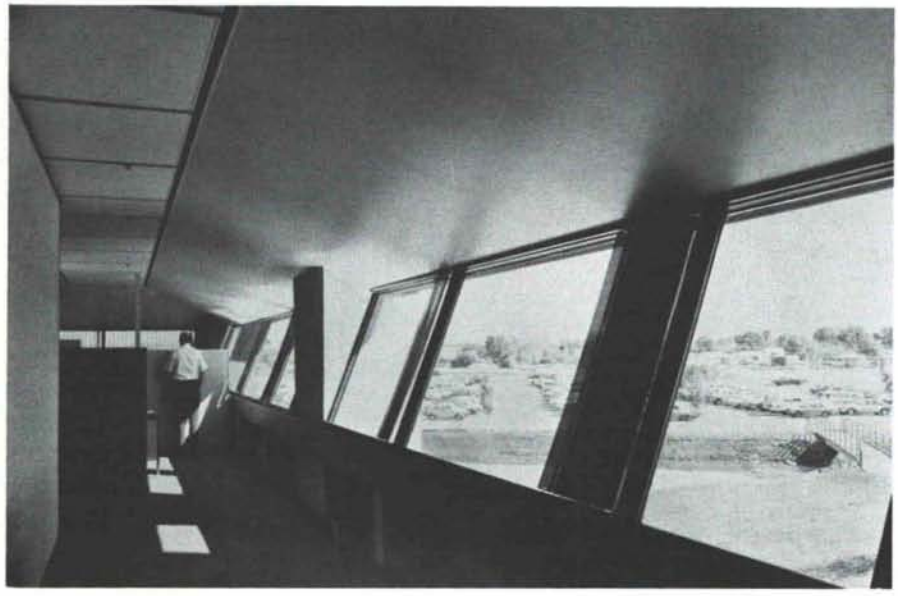
Willow Creek Office Building, Idaho Falls, Idaho, represents a major commitment by EG&G the Department of Energy, and Flatow, Moore, Bryan and Associates Architects to meet standards of low energy consumption. The building is sited adjacent to a city park on the banks of the Snake River, contains 284,000 sq. ft., and houses 1500 people of the administrative offices of EG&G, Idaho, Inc. The FMBA design team considered every system affecting energy consumption, the building envelope, including exterior walls, roof, windows, skylights, lighting system and basic HVAC system.

A computer run life-cycle cost analysis revealed that a heat pump system with thermal storage in water tanks would be 54% more cost effective than any other system. The 284,000 square foot facility consumes less than 38,000 Btu's per square foot per year (measured April 1979—April 1980) and operates 26% more efficient than the new energy standard of 54,000 Btu's per square foot per year set by the Department of Energy. Comparable office buildings consume 125,000 to 150,000 Btu's per square foot per year. The Willow Creek Building was designed to take special advantage of natural energy sunlight and body heat—and to utilize today's efficient lighting and heat transfer technology. The major energy conservation features included in the design of the new model office building are as follows:

1. Heat from lights and people is captured to provide all the heat necessary to maintain building temperatures until outside temperature drops to —6°F.
2. Light from individually controlled lamps is reflected off especially reflective ceiling panels to work stations.
3. High-pressure, sodium-vapor lighting reduces energy consumption to 50% of that used by conventional lighting systems.
4. Walls, roofs, and windows are well insulated.
5. Reflective, tilted windowsills reflect natural light into the building's perimeter zones.
6. The heat-ventilation-air-conditioning (HVAC) system is automatically set back at night.
7. The HVAC system has the capability of drawing 100% outside air.
8. A four-compartment, 200,000-gallon storage tank allows:
   1. Heat storage and recovery.
   2. Power purchase during off-peak hours.
   3. Energy savings under future time-of-day billings.
   4. Cold water storage for cooling.
9. Two cooling towers cool water for summer air circulation.
10. Two, 250-ton chiller/heat pumps recapture heat from lights and people to heat and cool the air system and storage tank.
11. The HVAC system is portioned into 309, individually controlled zones. Small, local water heaters heat water used in lavatories.

The result is a 375% increase in energy efficiency over that of the buildings replaced by the existing Willow Creek building.

This office facility is unique in many respects. In addition to the low energy consumption. the building represents one of the largest open plan office facilities in the western U.S. incorporating task/ambient lighting and is one of the first office buildings to use a high pressure sodium light as the primary source. Due to the Owner's move-in time requirements the facility was designed and construction began four



months after the design contract was initiated.

FMBA has been named the winner for its energy efficient design of the Willow Creek Office Building in the commercial-built category of Owens-Corning Fiberglas 1980 energy conservation awards. Owens-Corning's annual awards program, instituted in 1972, recognizes architects, engineers and building owners who have made significant contributions to energy conservation through creative design techniques.

"This building design is one of the few entries that actually had recorded historical energy data. And this data is quite impressive," says William J. Coad, affiliate professor of mechanical engineering at Washington University, and a member of this year's awards jury.

CONSULTANTS: KETCHUM, KONKEL, BARRETT, NICKEL & AUSTIN, INC.
Structural Engineers
Denver, CO 80226

BRIDGERS & PAXTON CONSULTING ENGINEERS, INC.
Mechanical Engineers
Albuquerque, NM 87108

UHL & LOPEZ ENGINEERS, INC.
Electrical Engineers
Albuquerque, NM 87108

Continued from page 13

> "(Subdivision) design will not be approved unless each lot has unobstructed solar access to an area of not less than 100 square feet falling in a horizontal plane 10 feet above the grade of the buildable area on the lot. This area must have unobstructed skyview of the sun between azimuths of the sun at 45° east and 45° west of true south on December 21."

The San Diego ordinance is primarily designed to protect domestic hot water heaters, which explains the 100 square foot requirement. This is sensible since space heating and cooling loads are low, making solar heating and cooling economically unattractive. The 45° angle requirement is the equivalent of specifying the time of day during which the right to solar access exists. By doing the appropriate calculations for December 21st at San Diego's latitude, the hours of unobstructed skyview are from about 9 a.m. to 3 p.m. solar time.

Albuquerque's proposed ordinance defines solar access in terms of sky planes. In discussing the allowed height of buildings, the ordinance says:

> "(2) The height shall not exceed a 23-degree-angle plane drawn-upward from a horizontal line located two feet above grade at either:
> (a) A line lying five feet within the lot lying to the north and parallel to the general south side of the neighboring lot which is most nearly perpendicular to cardinal north, if the lot is vacant and no building permit for a structure has been applied for; or
> (b) The facade of the principal residential building on the lot lying to the north, which most nearly faces cardinal south if the lot has an existing building intended for permanent occupancy or a building permit for such a structure has been issued.
> (c) The plane shall be made up on lines drawn cardinally south, 23 degrees above horizontal, along all points identifying said southerly setback lines or building lines."

The 23° requirement corresponds to solar access existing from 10 a.m. to 2 p.m., solar time, on December 21st.

Santa Clara's proposed ordinance is similar to Albuquerque's in that it, too, defines solar access in terms of planes.

As can be seen, a variety of methods are used. All of them, however, fit into the category of either a solar envelope or a hypothetical wall. These are both equivalent as can be seen with the aid of Figure 1. Figure 1 shows two houses, A and B, with B to the north of A. Assume that the south wall of B is the collector and it must be protected down to ground level. The angle 0 is the angle that a ray of sunshine makes with the horizontal at the earliest (or latest) time of day for which solar access is guaranteed.

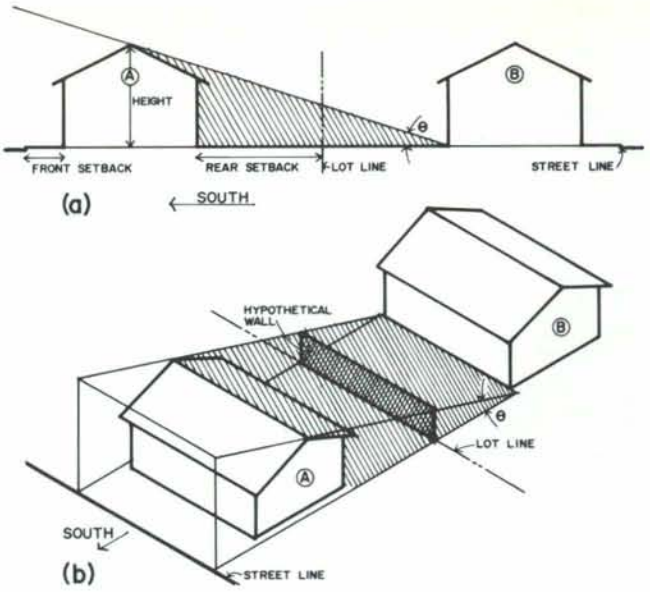


FIGURE 1 THE EQUIVALENCE OF THE ENVELOPE, HYPOTHETICAL WALL, AND HEIGHT AND SETBACK METHODS FOR GUARANTEEING SOLAR ACCESS

An envelope can be drawn around the lot of house A, as shown in Figure 1b. If nothing is permitted to penetrate the upper plane of the envelope, the south wall of house B will not be shaded. The Albuquerque and Santa Clara ordinances are of the solar envelope type. Figure 1b also shows a vertical plane labeled "hypothetical wall" which is inside the solar envelope and runs along the lot line. This is the hypothetical wall used in the Los Alamos ordinance. One can remove the solar envelope, leave the hypothetical wall, and provide the same protection for the south wall of house B as was provided by the solar envelope. Finally, the size and location of both the solar envelope and hypothetical wall are determined by the height of house A, the rear setbacks of houses A and B, and the angle 0. A simple equation from trigonometry relates these three quantities:

$$\text{tangent } 0 = \frac{\text{height of house A}}{\text{rear setback of house A + rear set back of house B}}$$

Thus, solar access for the example shown in Figure 1 can be provided by height and set back restrictions.

In an attempt to provide some guidance to local zoning officials, Eisenstadt et. al. used a computer to generate some pertinent curves (2). Figure 2 shows the length of the shadow cast by an object one foot high at the solstices and the equinox. The curves are applicable at 35° north latitude. The burden placed on the neighbor of a solar collector owner depends upon the shadow length. The figure shows that declaring solar access much before 9 a.m. on December 21st may place an unreasonable burden on a collector owner's neighbor since shadow lengths would be quite long during the solar access period.

The amount of solar insolation available to a vertical surface is shown in Figure 3. The figure shows how the available solar energy varies with time of day. The total amount of solar energy available to one

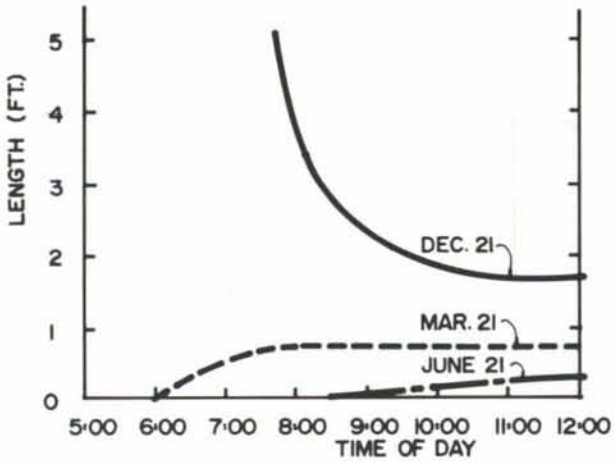


FIGURE 2 LENGTH OF A SHADOW CAST NORTH OF A ONE FOOT HIGH OBJECT, 35° NORTH LATITUDE

square foot of a vertical surface is given. For example, on December 21st the total solar radiation striking a square foot of vertical areas is shown as 1,918 BTU/-day. This is not the amount of energy collected by a square foot of collector since a collector will not collect all of the energy available to it. For our purposes, we need not be concerned with the effect of collector efficiency.

Of particular relevance are the small vertical lines that extend down from the curves. The distance between adjacent lines represents the time required for five percent of the total available daily solar energy to strike the surface. As an example, consider the curve the December 21st. Sunrise occurs at about 6:45 a.m. The first vertical line on the December 21st curve appers at about 8:15 a.m. (note that the small vertical line that appears near the intersection of the December 21st curve and the March 21st curve belongs to March 21st). Thus, it takes about one and a half hours for the first five percent to reach the collector. By contrast, about five percent arrives at the collector between 11:40 and noon. If the right to solar access began at 9 a.m., the collector owner might lose about 12% of the available solar. Note that the curves are symmetric about noon. If the solar right were specified as being from 9 a.m. to 3 p.m., 12% would be lost in the morning and another 12% in the afternoon. An entire series of curves like Figure 3 are available in reference 20, and show the same data for various tilt angles and for tracking as well as flat plate collectors.

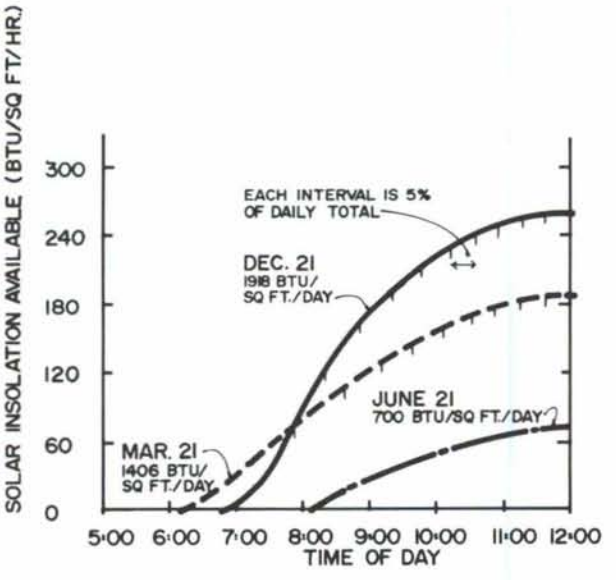


FIGURE 3 INSTANTANEOUS INSOLATION AVAILABLE TO A VERTICAL SOUTH FACING SURFACE AT 35° NORTH LAT. APPLICABLE TO FLAT PLATE COLLECTORS OR PASSIVES

This information was generated in order to aid zoning officials in determining when solar access should exist. Figure 2 describes the burden on the neighbor while figure 3 describes that on the collector owner. With this information, it was anticipated that zoning officials could decide on the tradeoffs. The feedback that has been received indicates that the method is viewed as somewhat complex and a definition of solar access in terms of height and setback is desired[21].

Three methods of defining solar access rights for a zoning ordinance have been presented, (solar envelope, hypothetical wall, height and setbacks). The best one is probably the one that is most understandable to the lay person. The solar envelope method is the most complex since it involves the measuring of angles and several imaginary planes. The hypothetical wall removes the problem of measuring angles but an imaginary plane (the wall) still exists. Height and setback have the advantage of being generally understood concepts. Simplicity would dictate that either the hypothetical wall or height and setback be used.

The example shown in Figure 1 is typical of a residential area. Things become more complex in higher density areas with some existing development. There, the solar envelope concept has some distinct advantages.

The concept of solar zoning is catching on and we will probably see more of it in the future. Some standardization of the methods used for specifying the right to solar access would be helpful to everyone involved. *M.M.E.*

(Continued Page 19 ☞)

Why Masonry Construction Is Good For Business

Shopping center developers and managers agree. Whether it's brick, block, tile, terrazzo or stone, masonry construction is good for business. Its rich, warm textures enhance the visual appeal of a center, inside and out—attracting tenants and consumer traffic. But masonry's beauty isn't just cosmetic. Masonry centers are built fast, with an initial economy that is matched by long term cost savings. Masonry is fire resistant, offers excellent sound control and needs virtually no maintenance. And the thermal performance of masonry walls helps reduce energy consumption. So the masonry center helps satisfy both the government's energy conservation requirements and the tenant's demands for heating/cooling cost economy.

Next time you're thinking about building a new center or renovating an old one, make sure you're thinking about the kind of construction that's good for business. Masonry.

If you'd like to know more about doing good business in masonry, write the International Masonry Institute, 823 15th Street, N.W., Washington, D.C. 20005.

INTERNATIONAL MASONRY INSTITUTE

(The Bricklayers' International Union and the Mason Contractors in the U.S. and Canada)

Printed in U.S.A.

"Now that we're renovating more and more centers, we're using more and more masonry. Beautiful, economical and versatile, it's an excellent tool for rehab projects."
Carl Barefoot
Vice President
Crown American Corporation
Johnstown, Pa.

"You can't beat masonry walls and floors for easy maintenance—inside and out. So while we economize in building with masonry, we also save money maintaining it."
Louis DiBitonto
Construction & Design
Mall Management Associates, Inc.
Towson, Md.

"Masonry walls help keep a center cooler in summer, warmer in winter. With government regulations and fuel prices what they are, masonry's energy efficiency is pretty hard to ignore."
Don Rake, CSM
Ostendorf-Morris
Cleveland, Ohio

MASON CONTRACTORS ASSOCIATION of NEW MEXICO

FOOTNOTE AND REFERENCES

1. For an early case involving the doctrine, see Aldred's Case, Coke's Reports, vol. 5, p. 102, 1826 Edition.

2. See *Story v. Odin*, Massachusetts Reporter, vol. 12, pg. 157 (1815).

3. *Parker v. Foote*, New York Reporter (Wendall) vol. 19, pg. 309 (1838.)

4. *Fountainbleu Hotel Corporation vs. Forty-five Twenty-Five, Inc.*, Southern Reporter, Second Series, vol. 114, pg. 357 (Florida Court of Appeals, 1959).

5. See reference 5 at page 359.

6. See M. Eisenstadt and A. Utton, "Solar Rights and Their Effect on Solar Heating and Cooling", Technical Report ME 66 (75) ERB-360-1, Univ. of New Mexico, College of Engineering 7-10 (1975). A slightly abbreviated form of that report appears in the Natural Resources Journal, vol. 16, pg. 363 (1976). The solar rights question was also raised by W. Thomas and R. Robbins, "Solar Energy and the Law", Extended Abstracts of the 1975 Meeting of the International Solar Energy Society (1975).

7. *Siu vs. McCully-Citron Co., Ltd.*, District Court of Hawaii, Civil Docket No. 56405, decided on January 9, 1979. A short description of the case can be found in the Solar Law Reporter, vol. 1, pg. 542 (1979).

8. Blackstone, the well known English jurist, stated that "to whomsoever the soil belongs, he also owns to the sky and to the depths", Blackstone Commentaries, 8th edition, page 18 (1788). The advent of aviation (and the possibilities of aircraft trespassing in private airspace) required some modification of this concept (see 49 United State Code 1304 and *U.S. vs. Causby*, United States Reports, vol. 328, page 256, United States Supreme Court, 1948). At present, a landowner has sufficient rights in his airspace so that the acquistion of a solar access right by his northerly neighbor would reduce the landowner's rights in his own airspace.

9. Personal communication with Senator John Carroll of the Hawaii legislature. Senator Carroll represented Siu in the case.

10. G.B. Hayes, Solar Access Law: "Protecting Access to Sunlight for Solar Energy Systems", Environmental Law Institute, Washington, D.C., 1979.

11. See *Mach vs. Dept. of Assessment of Baltimore City*, Atlantic Reporter, Second Series, vol. 296, page 162 (1972) and *Irving Trust Company vs. Anahma Realty Corp.*, Northeastern Reporter, Second Series, vol. 35, page 21 (1941).

12. Calif. Public Resources Code, Division 15, Chapter 12, Sections 25980 thru 25985, approved by the Governor on Sept. 29, 1978.

13. New Mexico Statutes Annotated, Chapter 47, Article 3, Sections 47-3-1 thru 47-3-5, 1978 Compilation.

14. Vernon N. Kerr, "New Mexico's Solar Rights Act: The Meaning of the Statute", Solar Law Reporter, vol. 1, pg. 737. 1979.

15. Karin Hillhouse and William Hillhouse, "New Mexico's Solar Rights Act: A Cloud Over Solar Rights", Solar Law Reporter, vol. 1, pg. 751, 1979. References 13 and 14 are available from the Solar Law Reporter, Solar Energy Research Institute, 1617 Cole Blvd., Golden, Colo., 80401.

16. See reference 1-, page 746.

17. See reference 14, page 753.

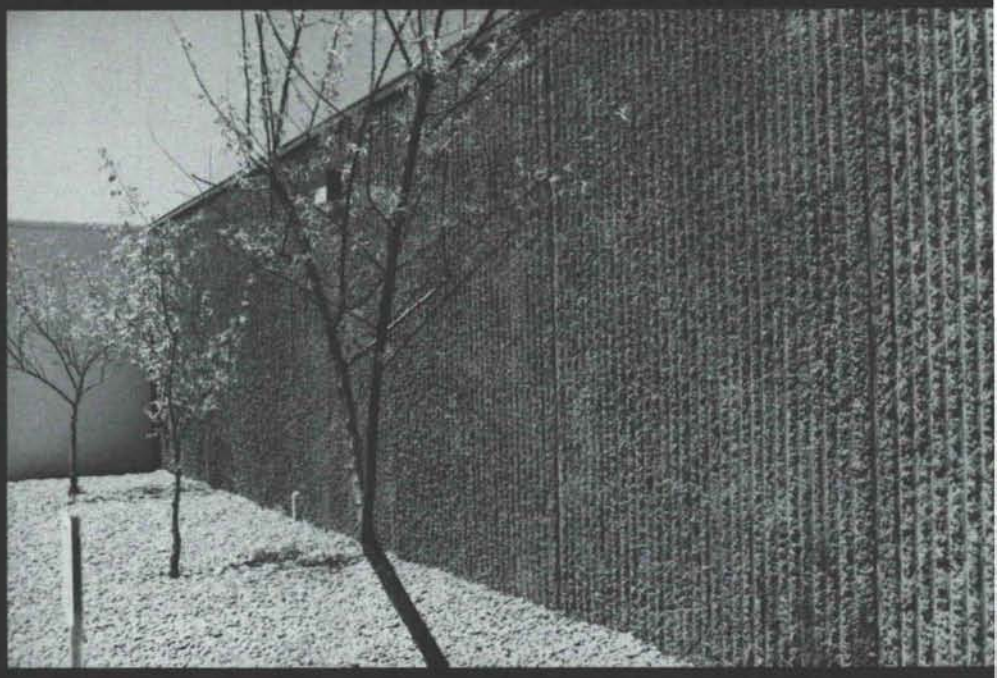
18. Reference 13, page 749.

19. M. Eisenstadt, S. Long and A. Utton, "A Proposed Solar Zoning Ordinance", Urban Law Annual, vol. 15, pg. 211, 1978. Also see reference 10, chapter and S. White et. al. "Santa Clara, California, Community Center, Commercial Solar Demonstration, Legal Alternatives, Implications, and Financing of Solar Heating and Cooling by a Municipal Corporation", City of Santa Clara, 1500 Warburton Ave., Santa Clara, Calif. 95050 (1976).

20. The article by Eisenstadt et. al., is available in report form from the New Mexico Energy Institute, 117 Richmond N.E., Albuquerque, New Mexico 87106. The report number is NMEI Report No. 760103, November 1977.

21. The writer was a speaker at a solar access workshop held in Nebraska recently. All three concepts of providing solar access were presented. The audience was composed of about sixty zoning people. They voted about five to one in favor of expressing the solar access right in terms of height and setback.

Stan-Wall I-8



New from Stanley Structures, Stan-Wall I-8 . . . an energy efficient and economical wall system which is fire resistant and durable.

Stan-Wall I-8 is a prestressed/precast insulated sandwich wall panel. It has the ability to withstand stresses caused by handling, temperature and wind, as well as roof and floor loads.

Stan-Wall I-8 provides you with an attractive, sculptured exterior finish and a smooth interior wall surface.

Consider Stan-Wall I-8 for your next building project as an economical way to achieve an architecturally pleasing look with considerable savings in energy, maintenance and insurance costs.

To help you tailor Stan-Wall I-8 to your design needs, or for additional information on cost and details, contact one of Stanley Structures' sales representatives.

Stan-Wall I-8 panels from Stanley Structures offer these benefits.

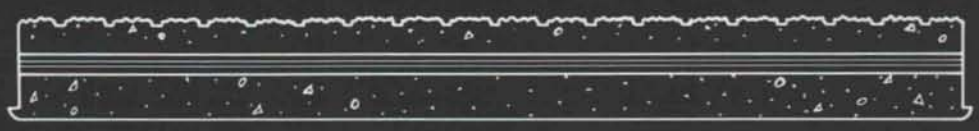
☐ Our Stan-Wall I-8 sculptured exterior surface is manufactured in a tasteful, modern design. Panels are 8 feet wide with thicknesses of 8, 10, or 12 inches with varying heights according to your design requirements.

☐ A layer of quality foam assures even insulation over the panel's entire surface.

☐ The layer of insulation is sandwiched between two prestressed concrete panels, forming a resilient wall that flexes without cracking.

☐ Compatible with any framing system.

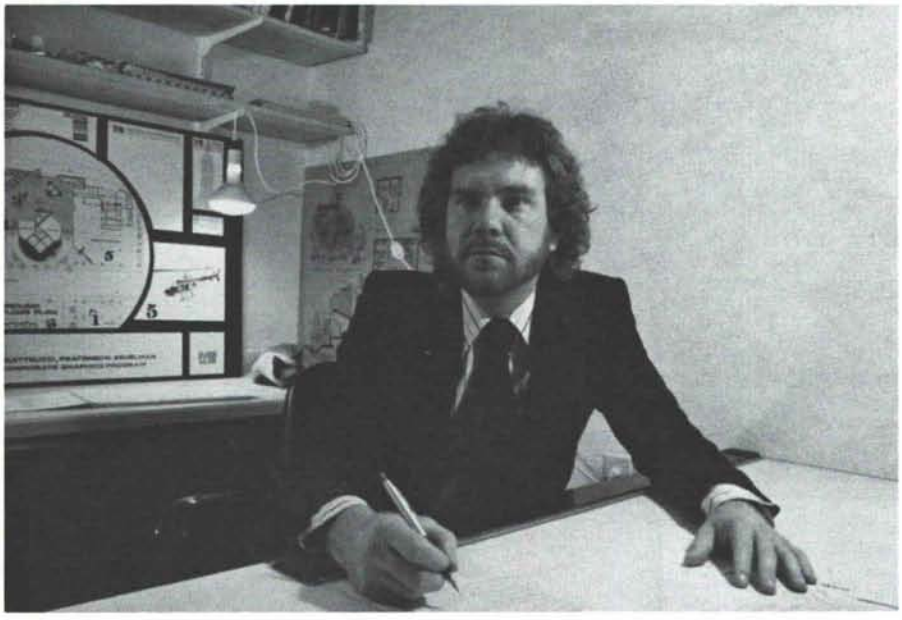
☐ The hard interior surface forms a functional wall that resists damage from forklifts or other handling equipment.



Stanley Structures

2340 Alamo Southeast
Suite 106
Albuquerque, New Mexico 87106
Phone 505-247-0391

UNM ARCHITECTURE STUDENT RECEIVES NATIONAL FELLOWSHIP



Mark Paul Eshelman, student intern with the architectural firm of Boehning, Protz, Cook and Pogue of Albuquerque has received the American Institute of Architects National Research Communications Fellowship for the 1981-1982 Academic year.

The research project entitled "Communications Between the Visually Handicapped and the Built Environment: A Tactile Building Directory", will commence in the Fall of 1981 and will conclude with the presentation of the findings to the AIA in the Summer of 1982. Eshelman remarked, "As architects and designers, we need to strive for ways to enhance people's ability to communicate with and find directions in the built environment". The purpose of this research is to develop appropriate design criteria, to design, construct and to test the proto-type of a second generation tactile building directory for the visually handicapped.

Eshelman, a graduate student at the University of New Mexico, School of Architecture and Planning, is also the recipient of the 1981 Alpha Rho Chi, National Professional Fraternity of Architecture, medal. He hopes to complete his Masters degree while working toward his professional registration.