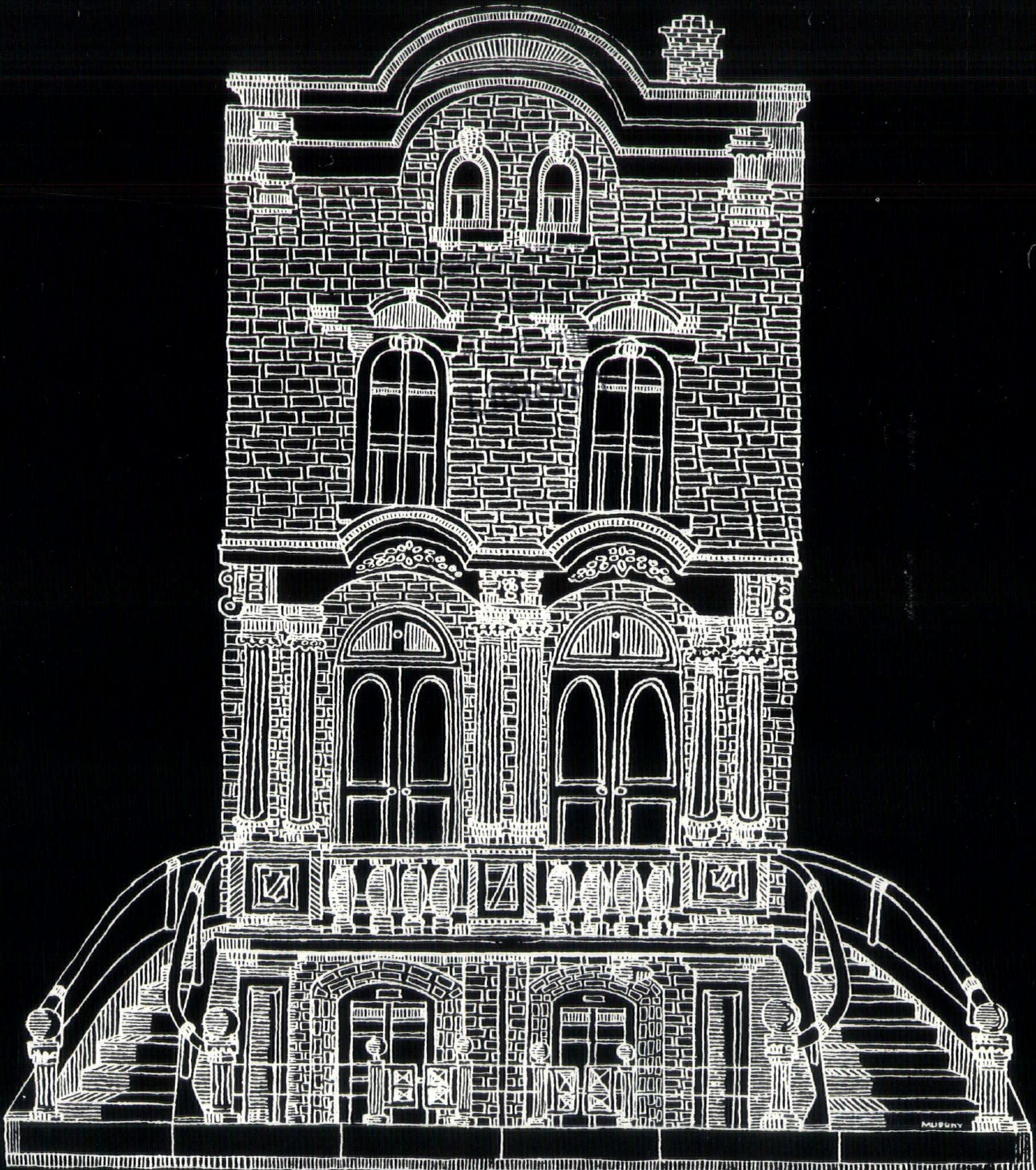
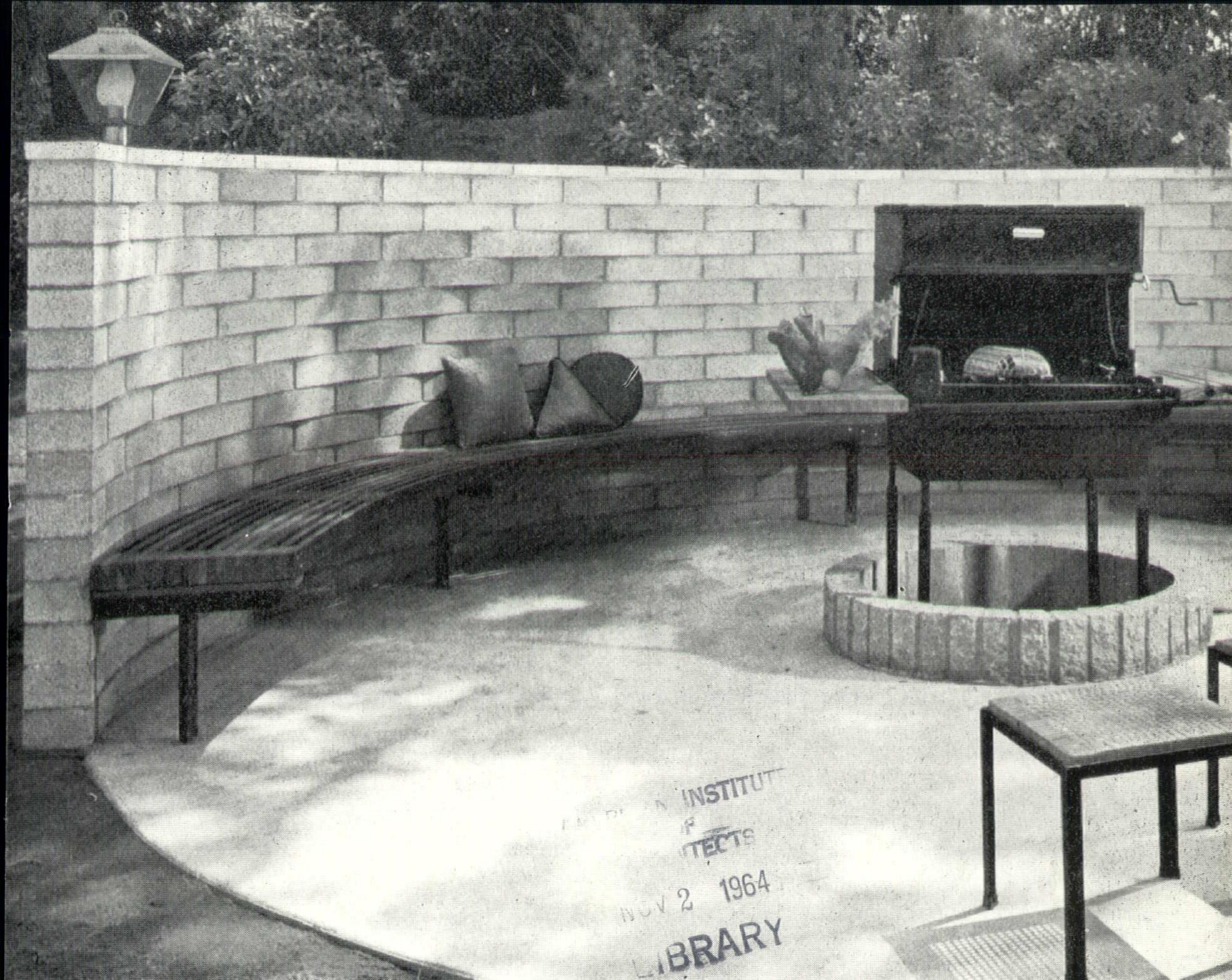
ISCONSIN ARCHITECT

R, 1964





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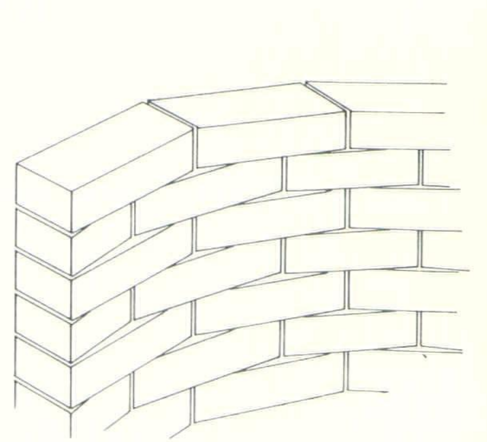

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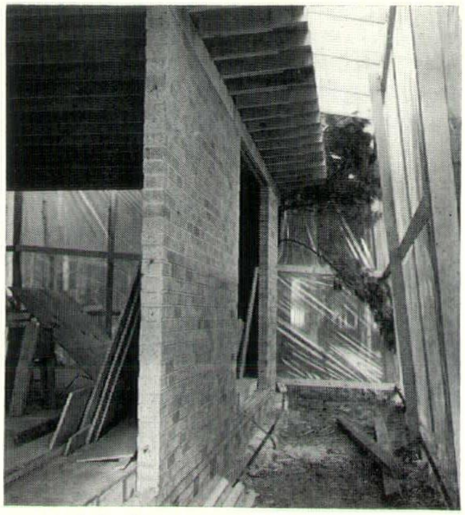

One brick thick? See page 8.

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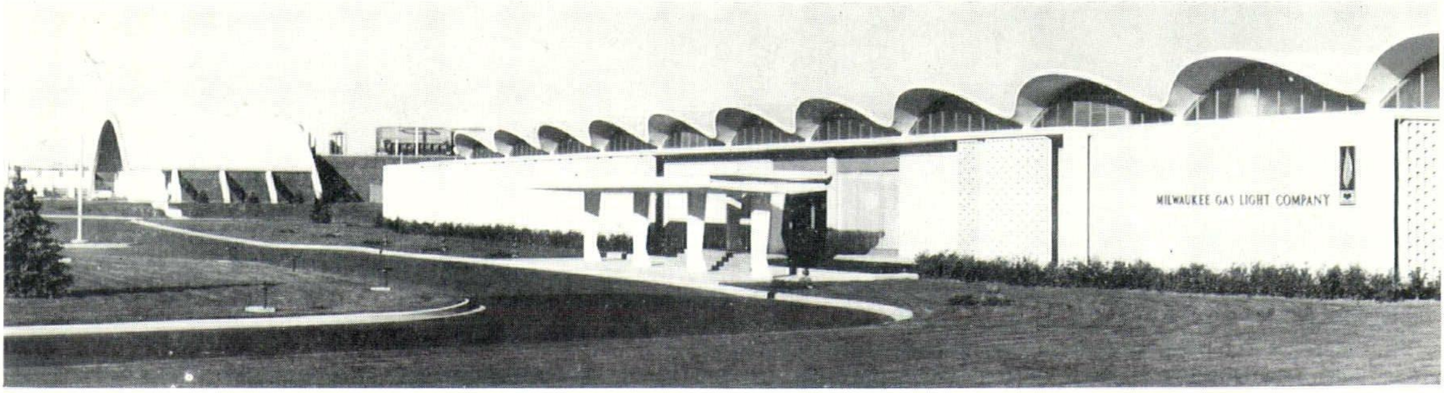
THE ARCHITECT

OCTOBER, 1964

The best site plan of the 1964 merit award program developed into a huge utility service center featured on this month's merit award page. Summer classes for 1964 have ended and next summer's students are now applying for the most opulent school of architecture in the world, described on page 7. According to information from one of the nation's largest chemical companies, bricks are about to become a main prop to prefabrication due to a new discovery outlined on page 8. An architectural writer examines the merits and shortcomings of the new A.I.A. contract on page 10. And page 21 tests your knowledge of the vital terms involved in building with concrete.

THE WISCONSIN ARCHITECT, Volume 32, No. 7. Address all matters pertaining to editorial or advertising content to the Publisher, **Schmidt** Publications, 781 N. Jefferson St., Milwaukee, Wisconsin 53202. Phone BR 1-6400. **The Wisconsin Architect** is the official publication of the Wisconsin Chapter of the American Institute of Architects, Frederick G. Schmidt, Editor. Bruce Brander, Managing Editor. Subscription rate: $5.00 per year.



merit award

Milwaukee Gas Light Company North Service Center

By Von Grossmann, Burroughs & Van Lanen, Inc.

To bring quick installation and maintenance service to gas customers in the northern sector of Milwaukee, a 40 acre triangle of land near the intersection of Green Bay avenue and Silver Spring road was chosen by the Milwaukee Gas Light Company for its north service center.

The building was designed to fill two basic service needs at once. A low section fronting on Green Bay avenue holds administration offices, meeting rooms and training areas. The far larger section behind it houses under its vaulted roof the trucks, storage rooms and workshops needed for the actual task of maintaining and expanding gas facilities in this fast growing part of the city. The large section is also a storage area for the firm's branches in northern Wisconsin.

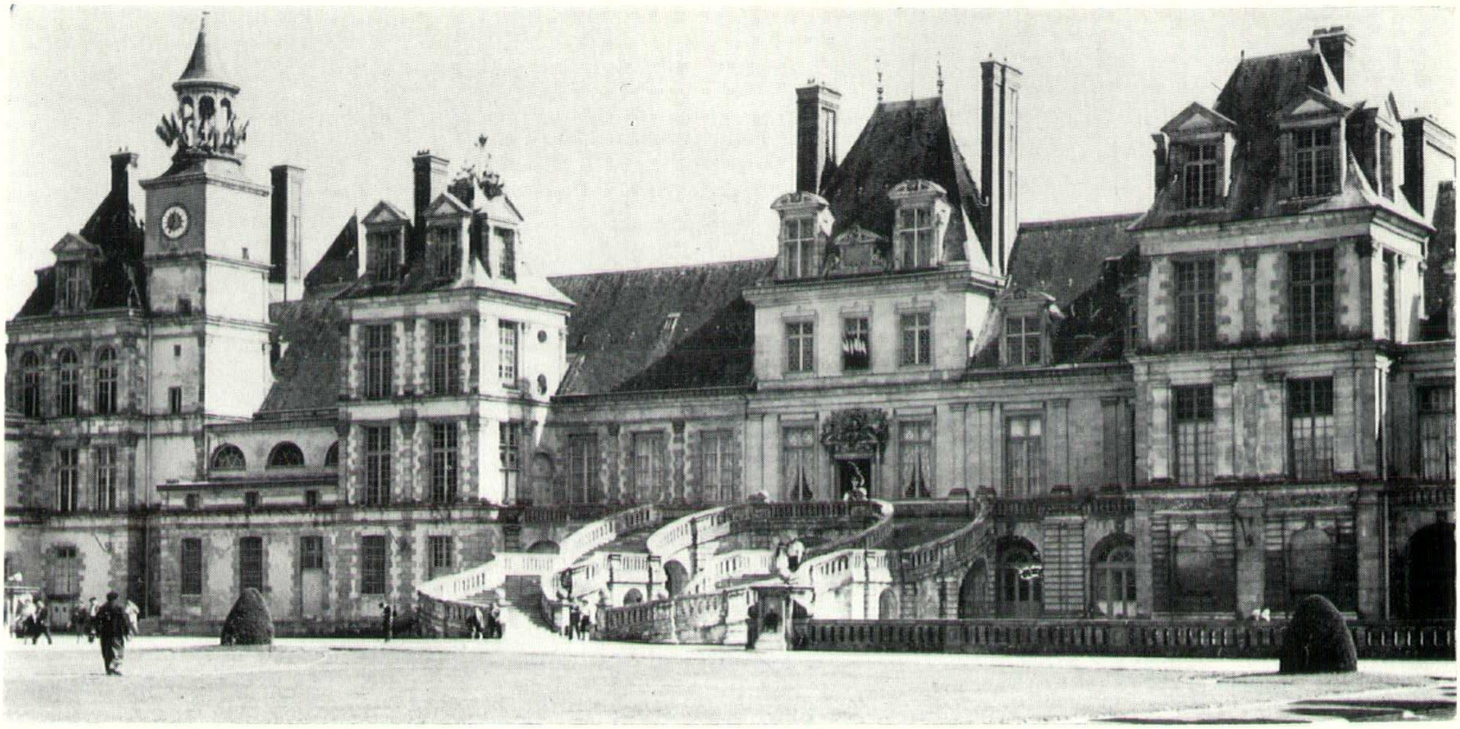
A smaller separate building roofed with a single broad arch holds research rooms and equipment that produces electricity from gas to supply the whole center, keeping it independent of electric company lines.

Since the area around the center is largely residential, both architecture and site were planned to complement the region. Nearly eight acres of land were reserved for lawn to enhance both the center buildings and their neighborhood. Some 50 trees and 270 types of shrubbery are now being planted about the lawn space. According to Gas Light Company officials, the service center has been accepted by the community around it as an aesthetic asset.

To keep nearby streets clear of cars belonging to customers and the center's 350 workers, a large outdoor parking strip was placed behind the buildings. The indoor parking area, large enough for 125 vehicles, is intended mainly for company service trucks.

In choosing the complex for a 1964 merit award, the jury commented: This is the best site plan of all entries. Structurally, the center is not as clear as it should be. The front element appears to be tacked on. The factory building was given thoughtful treatment, but we question the barrel vaults where they cross over the partition. The front entrance is unnecessarily weak. The service side is particularly nice and interior space is handsome.

The office building and the connected factory area cover 171,292 square feet. The complex was built at a cost of $2,829,687.



PHOTOS: FRENCH GOVERNMENT TOURIST OFFICE

Summer At Fontainebleau

A very few very fortunate American students are now readying applications to one of the most opulent schools of architecture in the world. Next spring, they will cross the Atlantic and settle into the Chateau of Fontainebleau 37 miles southeast of Paris to study under world masters of the arts.

Best known as the home of France's kings and emperors, the chateau had its beginnings in the 12th century when Thomas Becket consecrated a royal chapel there and Louis VII moved into a nearby hunting lodge.

The present palace began to rise a few years after Columbus discovered America. On the orders of Francis I, an inept king of his nation who was never the less cultural king of the Renaissance, Architect Gilles le Breton shaped Fontainebleau into the grandest of all royal homes of France.

The palace got its first school a few decades later, when artists from France and Italy joined the court. A succession of schools led finally to the American School of Art, which will b in its 44th year of operation next July and August.

Where dauphins were baptised and kings intrigued, where Napoleon held grand fetes of empire and tourists from the world over now meet, some 60 American students work through the summer in all the fine arts.

Rubenstein and Menuhin hold classes in music. Equally renowned painters and sculptors teach their arts.

In architecture, students attend an average of two lectures a week given by architects, city planners and historians. During the course, they also work on three design problems, submitting their efforts to Richard Neutra and other prestigeous critics. The artistry about them, including the resplendent Salle des Fetes, probably the finest Renaissance chamber in all France, offers five centuries of inspiration within walking distance. And not far from Fontainebleau's ten mile forest are Versailles and Chartres, the Loire chateau and Le Corbusier's chapel at Ronchamp, where study tours round out a rich course in a setting of royal opulence.

Bricks that Stick

The brick is in for a strong comeback. Not that it was ever far in the background. Since Nebuchadnezzar decided his desert-weary queen should have a hanging garden, the humble block of burnt clay has been a constant prop to the building art. But periodically, its popularity has flagged, giving way to wood when the Romans withdrew from north Europe, dominated by stone before the Aztecs of Mexico gave the secret of strong mortar to Renaissance craftsmen.

In recent years, prospects of the brick have sagged under a universal need for speed, a need so far answered only by prefabrication. In terms of efficiency, bricks are an anachronism when concrete can be preshaped into slabs — or, in the U.S.S.R., entire rooms — stacked on the building site and hoisted to steel frameworks.

Yet not even in Poland, where touches of color cheer the instant walls, has concrete approached the brick in decorative beauty. Now, an incipient revolution in mortar formulae promises that bricks will approach concrete in convenience and speed.

Lubricating the revolution is a milky liquid plastic that began to show its startling potential when the Dow Chemical Company of Midland, Michigan, was seeking new markets for the artificial rubbers they originated in the 1930's. This latex was first manufactured into window screens, tubular furniture, fishnets and cellophane coating. Later it was found to add strength when mixed with concrete. Since the fine grained cement that goes into concrete is also used for masonry mortar, the latex, developed further and trademarked Sarabond, offers rejuvenation for the brick industry.

Though a few scientists have claimed the brick cannot hold the weights imposed by modern civilization, the problem of strength does not lie in bricks themselves. A well made brick is a very strong building unit, for practical purposes totally resistant to compression. But when stacked into walls, brickwork sometimes fails under sidewise pressure of wind, earthquake or slow ground shifting. Yet invariably the breaks develop not in the bricks but in the mortar between them.

Sarabond, or QX 3471.2 as the product will be called as long as Dow keeps it in the research stage, eliminates mortar weakness, allowing taller, thinner and generally far stronger brick walls.

Basically, this is how it works. The milky liquid is added instead of water to a carefully controlled mixture of sand and portland cement. No measurements are necessary, since Dow distributes the solid mixture with the latex. Where water used in conventional mortar evaporates, leaving tiny weak spaces, the latex grabs onto cement and exerts a growing adhesion. The precise chemical reactions that take place and a new, glassy substance finally formed in the chemical change, are not fully understood yet. Dow chemists are now working backward to find a theory that will explain what happens.

Meanwhile, tests have proved mortar made with Sarabond up to four times stronger than ordinary mortar, enabling a bond between bricks fully as strong as most bricks now made in the United States. Practically speaking, this enables masonry walls twice as high or half as thick as those now built. More important, perhaps, the new mortar makes prefabricated brick walls a practical reality.

A 3,600 lb. prefabricated brick panel goes up in Denver.

Assuming proper workmanship, walls built with the product are tighter, since the mortar is resistant to both shrinkage and water penetration. At low temperatures, the bond is uneffected. Fire resistance, tested by exposing one side of a wall to 1700° until the other side gained 250°, exceeds one hour without insulation, 90 minutes with it. Sound resistance is good. And, finally, the mortar gains strength as it ages.

The cost of mortar made with Sarabond is more than six times higher than normal mortar cost; it now figures out at $4.54 per cubic foot, according to Dow calculations. However, the company points out, fewer bricks are necessary for a Sarabond wall and, by attention to material costs, overall expenses can be cut by 10 to 20 percent.

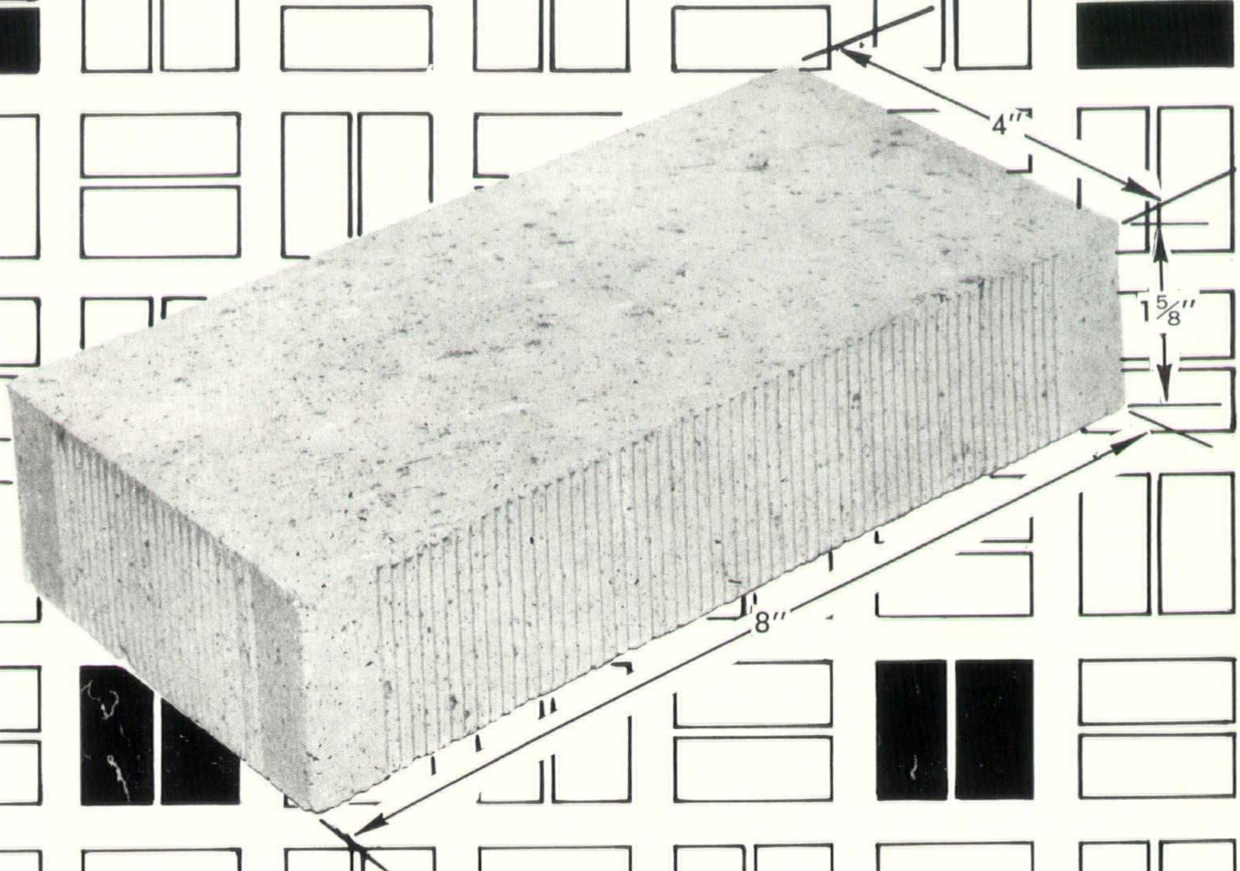
At the moment, Sarabond is not available on the general market. Sales are virtually restricted to Atlanta and Denver, to permit close supervision of its use and study of results on actual jobs. In the way of prefabrication, only one experiment has taken place to date. In Denver last December, single layer brick panels were preconstructed, within steel frames to facilitate handling. Carried on trucks to the city's new United Fund building, 57 sheets of brick were hoisted to the eighth story. In three days, two bricklayers and one welder connected the slabs into load bearing walls for the building's mechanical penthouse. The addition, blending perfectly with the rest of the black brick structure, met all specifications for strength, permanence and lightness of weight. The success of the project has triggered an idea for a brick panel assembly line now complete on paper.

In other parts of the country, Dow specialists have worked with architects and builders on residences and institutional buildings where Sarabond was used. Aside from the Denver penthouse, there are 17 test structures now standing. Among them are a pavilion on the Seattle World's fair grounds, a library and laboratory in Michigan, two buildings on the Eastern New Mexico university campus at Portellis and a demonstration house at Salt Lake City. when the self-supporting, one layer walls of the Salt Lake house were only five days old, an earthquake struck the area. In fright, workmen leaped from the swaying brick columns. But when the quake was over, the walls were completely intact.

Though commercial release dates for Sarabond are still uncertain, Dow is providing continuous information on the product. "Are we being premature?" said A. A. Hill, a technician for the company. "We don't believe so. We think architects and engineers, contractors and unions, code authorities and government groups want to know about a new and novel product well in advance of commercial availability. We think they want to have ample time not only to evaluate its worth unhurriedly . . . but also, through their questions and other voiced needs, to help steer . . . in the final development program."

Dow has competitors aplenty in the prefabrication race. Monsanto is now turning out simulated bricks, Koppers has a new plywood, Union Carbide is prefabricating with plastic and Du Pont is also at the head of the running along with U.S. Ceramic Tile.

Combined, their efforts spell a new and exciting era in building, a coming of age for prefabrication in which beauty and imagination will catch up with the urgent advantage of speed.


4"
1⅝"
8"

The Architect-Owner Contract

by Arthur P. Ziegler Jr.

The author is the managing editor of Charette, the journal of Pennsylvania architecture published in Pittsburgh. To compile this article criticizing and reviewing the most recent suggested contract of the American Institute of Architects, he summarized a panel discussion of five architects from the Northeastern Pennsylvania A.I.A. Chapter. The architects were: George M. D. Lewis, Samuel Z. Moskowitz, Edward J. Rutledge, Joseph Valverde Jr. and Joseph H. Young. Mr. Moskowitz is an A.I.A. Fellow.

Services of professional people are generally rendered without contracts. Even for the most complicated and delicate and extended series of operations, no one thinks of signing a contract with the surgeon. A doctor selected by a family for lifetime consultation is never asked to put his name to the dotted line. Even lawyers, those men who prosper by drawing up and interpreting contracts for others, seldom use them with their own clients.

But with architects the practice is different, or at least it varies. Perhaps because he deals so frequently with businessmen, corporations and the government, the architect is thought of as performing a business service and his duties and fees must therefore be defined in writing.

Although it may well nettle the architect that a doctor and lawyer are received in good faith, that they are expected to act as their experience and training direct while the architect must be bonded in writing, a contract is often to his benefit. After all, he is dealing with those who for various reasons have found it necessary to utilize contracts.

One Pennsylvania architect, for instance, speaks of devoting much time and effort to drawing preliminary plans for a building at the request of a friend. Upon completion of the plans, the client decided that the project was too costly and rejected them as well as the bill for the fee involved. Why should he pay for plans he didn't use? Fortunately before starting the work the architect had written him a letter saying, "It's my understanding that we won't enter into a written contract at this time, but when we do perform the work and as we go along, it will all be done in accordance with the A.I.A.'s scheduled fees and the relationships in this contract." This letter fortunately acted as a binding contract, and the architect got his due compensation.

Contract Questions

The use of contract is really no longer a question of argument; the issues concern rather when it should be applied and what it should entail.

The practice of many architects is probably not to have a contract on small jobs with private individuals, especially for houses. The contract is a nuisance, and, indeed, with many clients it might prove an obstacle, for people often fear paper-signing. But as the jobs become larger and more public and a certain few people are delegated to act on behalf of many, say to construct schools and churches, these representatives do not want to assume full responsibility and therefore feel more secure with a formal agreement. Of course large corporate or public clients usually demand contracts, and in many instances (especially the federal and state governments) supply them.

But perhaps more consideration should be given to contracts with the small client. At least the large clients know what the architect's duties are and have delegated persons to work with him. The small, individual client, however, may not be so sophisticated. Even though the fee is less than $1000, the architect can still find himself plagued by requests and demands from the owner, and he may be frequently admonished to go out and superintend construction of a house every day.

One way to avoid this irritation is to charge per hour, the total not to exceed a certain percentage of the full cost. Here the owner has a choice; he knows how high the cost might go, and (in order to keep his costs down) he may let the architect go about his work as would the family doctor perform his duties. It is also possible in instances where the owner doesn't want a budget to agree on a certain percentage of the final cost, but one not to exceed a pre-established sum.

The content of the contract, however, is not so easily solved. For the owner to assume good faith on the part of the architect and for the architect to assume understanding of the contract on the part of the owner is not enough. Exactly what does the contract oblige the architect to do? This should be defined first.

Contractual Obligations

The contract (A.I.A. Document B-131) divides basic services into four parts:

1. Schematic Design Phase
2. Design Development Phase
3. Construction Documents Phase
4. Construction Phase — General Administration of Construction Contracts.

The first three of these are clear as spelled out in the contract, but the latter has caused trouble because in the past it has made the architect liable for the contractor's work.

In the 1958 edition of the contract the architect was compelled to "supervise the work" and was obliged to make frequent on-site "inspections." As Attorney John R. Clark points out in his article *Concerning Some Legal Responsibilities in the Practice of Architecture and Engineering and Some Recent Changes in the Contract Documents,* "the word 'inspection' connotes a greater degree of checking and attention to the construction process than is intended in the normal case." For that reason the 1961 edition eliminates "supervise the work" and changes "inspection" to "observation" in order to absolve the architect of the contractor's responsibility. The text follows:

The Architect will make periodic visits to the site to familiarize himself generally with the progress and quality of the work and to determine in general if the work is proceeding in accordance with the Contract Documents. He will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the work and he will not be responsible for the Contractors' failure to carry out the construction work in accordance with the Contract Documents. During such visits and on the basis of his observations while at the site, he will keep the Owner informed of the progress of the work, will endeavor to guard the Owner against defects and deficiencies in the work of Contractors, and he may condemn work as failing to conform to the Contract Documents. Based on such observations and the Contractor's Applications for Payment, he will determine the amount owing to the Contractor and will issue Certificates for Payment in such amounts. These Certificates

(Continued to page 13)

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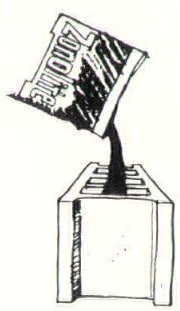

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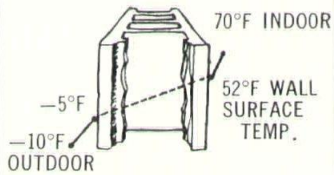
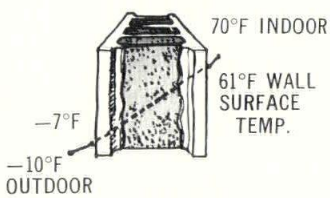


U=.33 WITHOUT MASONRY FILL



U=.17 WITH MASONRY FILL

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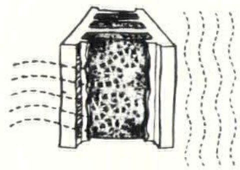
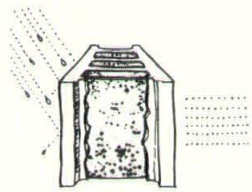


For Uniformity of Temperature The interior surface of the block stays at a comfortable temperature, all over. There are no hot or cold spots, because the method of thermal transmission, convection in the block cells, is baffled. Conduction through the web of block is negligible.



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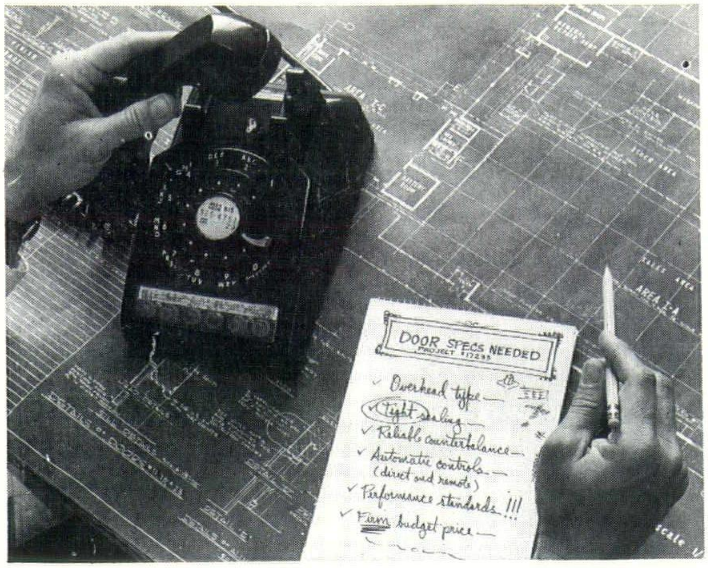

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(Continued from page 10)

will constitute a representation to the Owner, based on such observations and the data comprising the Application for Payment, that the work has progressed to the point indicated. By issuing a Certificate for Payment, the Architect will also represent to the Owner that, to the best of his knowledge, information and belief based on what his observations have revealed, the quality of the work is in accordance with the Contract Documents. He will conduct inspections to determine the dates of substantial and final completion and issue a final Certificate of Payment.

Mr.Clark suggests that the architect be sure to explain to the owner exactly what the intended checking procedures will be and the degree to which they will be carried out.

Martin D. Dubin in his book *Architectural Supervision of Modern Buildings* (Reinhold, 1963) further delineates the role of the architect.

The architect-engineer's responsibility during the construction phase is to administer construction in a manner that will reasonably safeguard the owner from defective or non-conforming work. However, he does not guarantee the performance of the contractor.

The task of project-administration for the architect-engineer consists of interpreting plans and specifications when these are questioned, establishing the required general production quality, rendering assistance in coordinating construction, and helping the contractors to adhere to completion The architect-engineer also checks schedules. contractor payment requests and issues payment certificates in accordance with the contract. (p. 3)

While according to Article 14 of the *The General Conditions of the Contract* (A.I.A. Document A-201) the achitect is not "responsible for the acts or omissions of the superintendent" hired by the contractor, a project representative can be appointed and may operate as a member of the architect's staff. Because his responsibility is not spelled out in either B-131 or A-201, a carefully written separate agreement should be formulated and attached to the contract. A.I.A. Document B-352 does contain suggested instructions to the project representative.

In spite of all the revisions and clarifications, however, the contract has been charged with stating only what the paper work of the architect is and leaving other very important areas of responsibility vague.

Fees Also Problem

Problems also center around fees. Document B-131 calls for a schedule of 5% on signing the contract, then payments in monthly portions for the following:

1. Schematic Design Phase............15%
2. Design Development Phase........35%
3. Construction Documents Phase 75%
4. Receipt of Bids..................................80%
5. Construction Phase......................100%

The controversy flares around that opening payment of 5%, a requirement not in the old contract. The owner is being asked for money even before the architect has put pen to paper, a rather extraordinary request especially by a professional person. It flavors of the fly-by-night little contractor who will sign an agreement upon presentation to him of $100, and it suggests a certain lack of faith in the owner.

Those who favor the payment hold that it is good psychologically for the owner because it gives him an actual invest-

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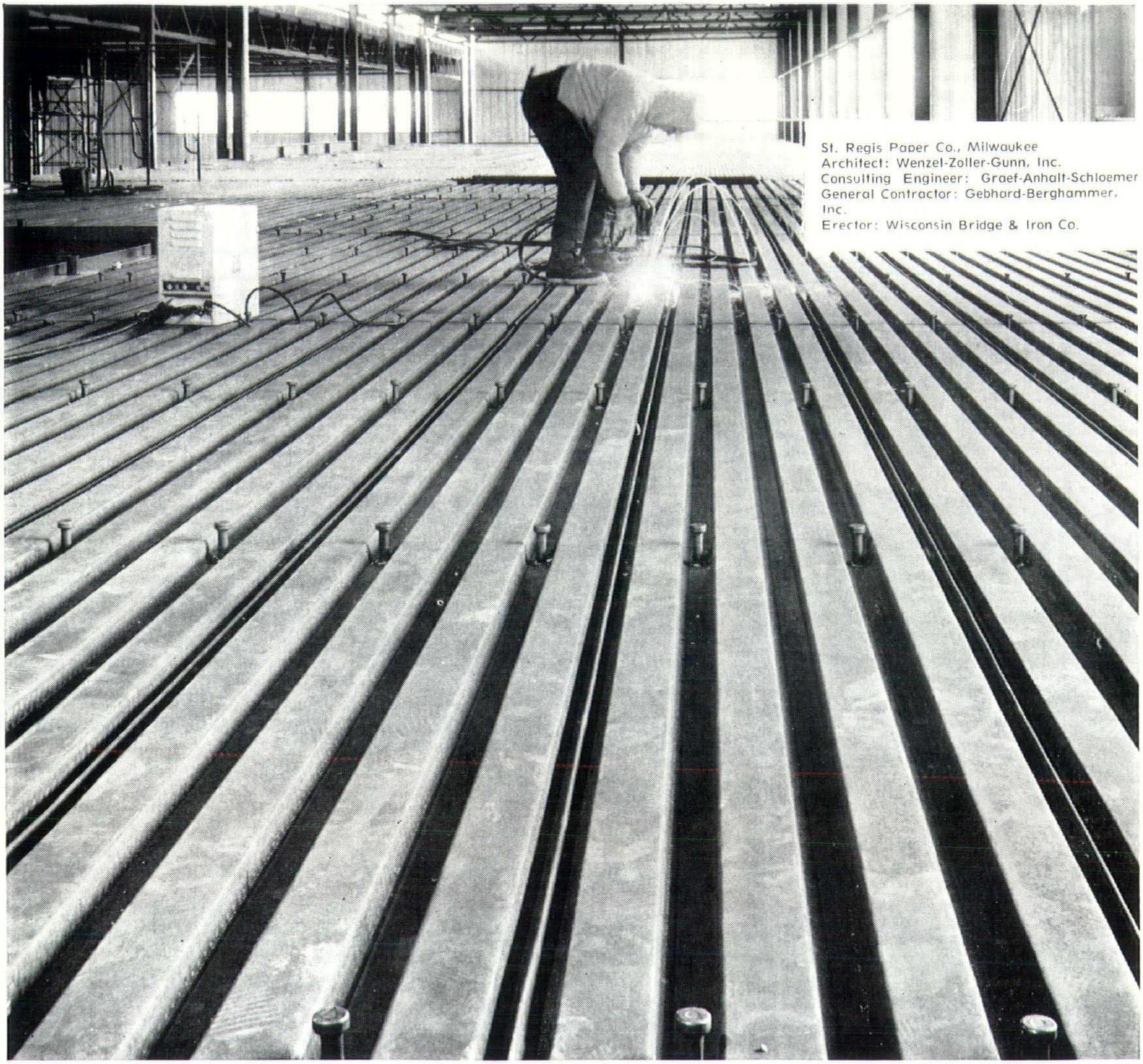

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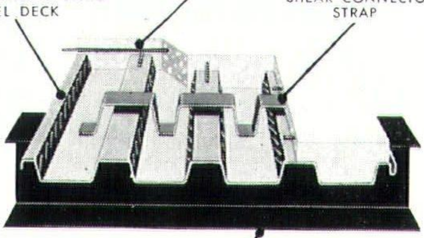

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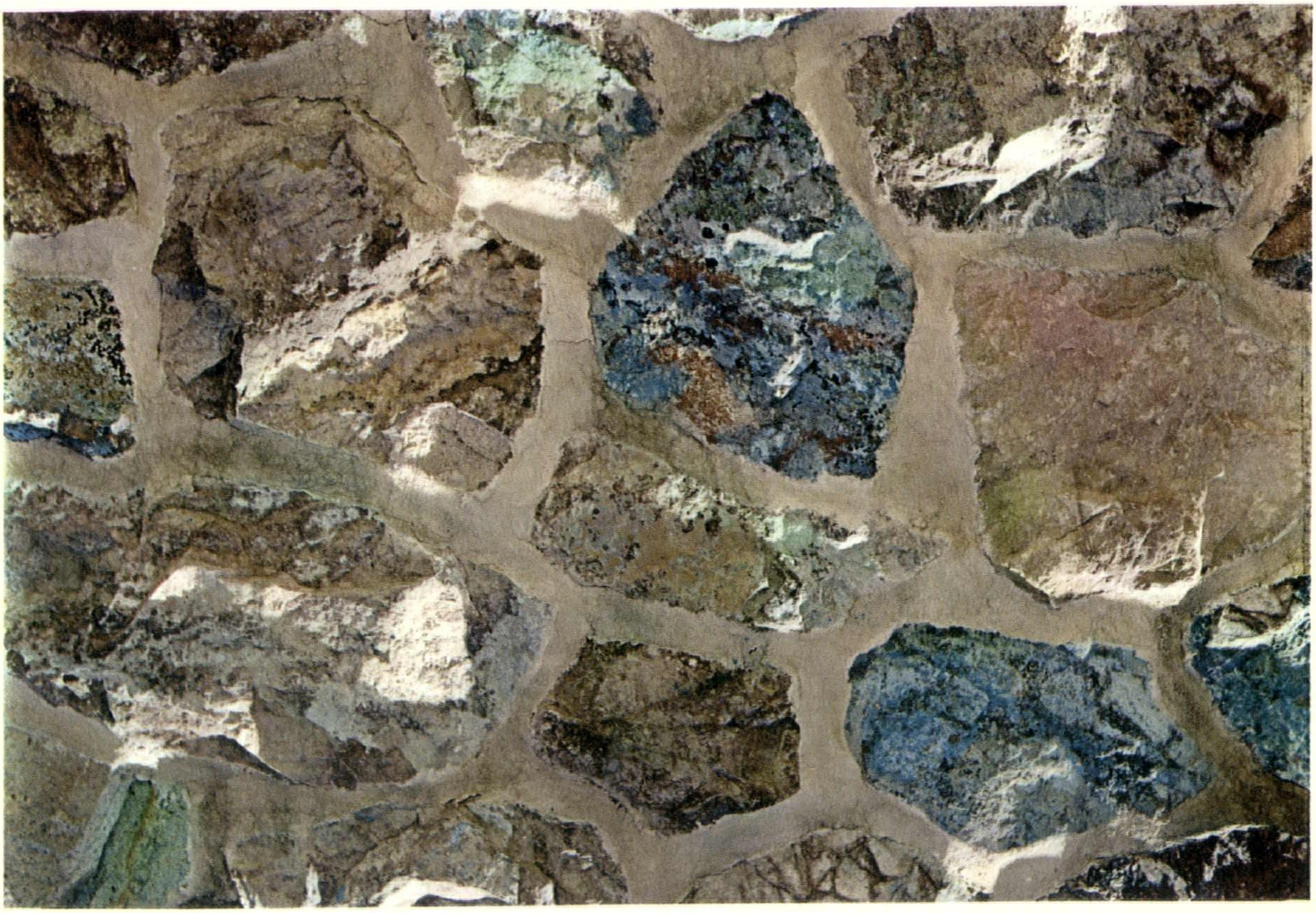

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(*Continued from page 13*)
ment in his building, and it starts him on the routine of regular payments.

There is also the question of whether the architect should apply his percentage to "change orders" that are declined by the owner. That is, the owner requests a bid on a change in construction, the architect draws the plans and collects the bids, then the client decides that the change is too expensive and resorts to the original plan. Should the architect be paid his percentage of the lowest bid anyway? *The General Conditions,* Article 15, seems to imply that the fee of the architect is based on the final cost of the actual job: "All such work shall be executed under the conditions of the original contract . . . ." The architect should be advised, then, to allow for such a development when drawing up the original contract or else formulate a written agreement at the time the change order is requested.

Final Charges

Several other dissatisfactions have arisen about the new B-131 contract. The first is that it is not as well known to legal counsels engaged by clients. While this is a minor obstacle, the rejoinder is obvious: when the old contract was the new contract, it too was an unfamiliar one. Contract forms should not be revised without good cause, however.

Also it is criticized as too complicated, especially for small jobs like houses. Truth must be admitted here. The *Agreement* runs 4 pages and *The General Conditions* fills 10 pages of small print, stating 44 conditions. Perhaps the A.I.A. could devise a less overpowering "short form."

Last, it is alleged that the new contract heavily favors the architect. The unusual feature of the 5% advanced payment, the list of responsibilities of the owner compared to the list of the lack of responsibilities of the architect, the vagaries of architectural "observation," the extra compensations (for instance, "travel"; Where is he going? the owner wonders), the list of "extra services of the architect" spelled out all do tend to give the contract a certain obvious weight in favor of the architect.

Rather than seek yet another contract, however, architects should individually display willingness to alter the contract in their preliminary sessions with the owner. This contract was just formulated in 1961, and the present 1963 edition has not been in use long. Better it is to give it a chance than plunge into the morass of alteration and concomitant altercation. It is, after all, meant as a guide and not the final word.

Registration Board Acts Against Nine

The Wisconsin registration board of architects and professional engineers suspended for 30 days the engineering certificate of Lynn H. Gunderson of Portage. In a hearing on July 16, the board said Mr. Gunderson placed his seal on plans and specifications not prepared by him or under his charge. In doing so, the board added, he aided and abetted an unregistered person in the practice of professional engineering and architecture.

Also on July 16, the board reprimanded John Kenton Primm of Manitowoc for improperly associating himself in the practice of professional engineering with an unregistered person.

Murray L. P. Kinnich, a registered Milwaukee architect, was reprimanded by the board on July 17 for entering into a partnership which did not comply with registration statutes. Thus, the board said, he assisted an unregistered person in unlawful practice of architecture.

At a board revocation hearing on July 17, William G. Losch, a registered Waukesha architect, was reprimanded for entering into a partnership that did not conform to state registration statutes. By doing so, the board added, he aided and abetted an unregistered person to unlawfully practice architecture.

On July 28, the Dane county circuit court issued an injunction restraining D. J. Sweeney, Harlan J. Talley and International Fabricators, Inc., from practicing architecture or professional engineering in Wisconsin. In bringing the action against the two men and the firm, all of Mora, Minn., the state registration board said they had begun construction of a commercial building without submitting plans to the industrial commission. The plans were not prepared by a registered architect or engineer, the board added in its charge.

On August 27, Dane County Judge Edwin M. Wilke restrained Besasie & Sons Engineering company, 1647 N. Van Buren street, from using "engineering" in the company's name until the firm complies with the state registration law for architects and professional engineers.

On August 28, the board revoked the architect's registration certificate of John Hudson Howe, of Rocky River, Ohio. Mr. Howe was charged with sealing plans for several bank buildings erected in Wisconsin without personally supervising preparation of the plans. The board also said construction of the banks was not supervised by an architect, as required under Wisconsin law.

Is Your Meaning

CONCRETE?

A POWERFUL AGENT IS THE RIGHT WORD.
— MARK TWAIN

The right word can often spell the difference between clarity and confusion, success or failure. Many times it's merely a matter of using a better term. In any case, the right word will often greatly influence the regard others will have for a person's technical competency.

Below are just a few words which are frequently used incorrectly in concrete construction parlance.

Joints—contraction, expansion, isolation: These three terms when improperly used often lead to confusion regarding the function of the joint in question. Contraction and expansion joints control cracking resulting from volume changes. Considerably more water than is needed for cement hydration is used to create workability in concrete. When this "placing water" evaporates the concrete shrinks. Because the tensile strength of concrete is low it is unable to resist appreciable amounts of shrinkage. In an ordinary slab-on-grade floor, concrete is usually divided into 10 to 25 foot squares to control such cracking. This type of joint is properly referred to as a contraction joint. Because concrete expands as well as contracts expansion joints are installed to permit elongation of slabs. Ordinarily these two types of joints can be differentiated by noting their width; expansion joints are considerably wider than contraction joints.

Isolation joints are placed between component parts of concrete structures and appurtenances that are expected to experience differential movement due to unlike function, mass or shape. You will find isolation joints, for example, around columns in floor slabs, around the perimeters of buildings with abutting sidewalks and around areas of concrete thickened to support greater loads.

Air entraining, air entrained: Materials used to entrain air, such as certain cements or admixtures, are properly referred to as air entraining. If you are speaking of the grout, mortar, or concrete in which air has been entrained, the proper term to apply is air entrained. "Air entraining" for before the fact; "air entrained" for after the fact.

Pour, place: This is not a matter of correctness but of preferred usage. Despite the fact that much concrete actually is "poured" in place, it is agreed by all authorities that concrete should be "placed." Self-leveling concrete should be a thing of the past in view of our present knowledge of its many disadvantages. "Poured" and "poured-in-place" should be banned from the nomenclature of concrete in favor of "placed" and "cast-in-place."

Strand, cable: Two terms in prestressed concrete terminology that are often incorrectly interchanged are strand and cable. A strand is a factory produced unit of helically wound, small diameter wires. On the other hand, a cable is a composite of several extra high-strength wires.

Admixture, additive, addition: Of these three words, admixture and additive are very commonly used interchangeably, although precise definitions for all three have been set up by the American Society for Testing and Materials and other widely recognized groups. Admixtures are materials added to concrete at the time that its other ingredients (cement, aggregates and water) are mixed. This would properly embrace such materials as air-entraining agents, water reducers, retarders and accelerators. Additives and additions are materials used in the manufacture of portland cement. An additive is introduced into the slurry or raw materials either during or after grinding. It includes grinding aids and deflocculents. An addition is a material, other than gypsum or water, that is interground with the cement clinker in amounts not exceeding two percent. This would embrace such materials as air entraining agents and certain grinding aids.

Screed, straightedge: Confusion regarding the definition of "screed" has been with us for some time now. The word screed is properly used only in reference to the immobile guides for controlling the strike-off height of concrete in slabwork. The word straightedge (or strike-off) should be used when referring to the tool used to strike off the concrete.

Prestressed, post-tensioned: Prestressed

(Continued overleaf)

CHICAGO MARINA CITY RENDERING: BERTRAND GOLDBERG ASSOCIATES

CONCRETE

(Continued from page 21)

concrete is now common on the construction scene, but there is still a great deal of confusion even in construction journals regarding the use of the words prestressed and post-tensioned.

"Prestressing" describes the entire concept of introducing compressive forces in concrete to counteract the tensile stresses to be expected when a load is applied on the member. "Post-tensioning," together with "pretensioning," are terms which indicate the time at which the prestressing steel is stressed in reference to the placing and hardening of concrete in the member. If the steel is stretched before concrete is cast, as it usually is in casting yards, the process is known as pretensioning. If the concrete is cast and hardened before the steel is stressed (often done with members cast on the job site), the correct word is post-tensioning. In either case the basic technique is prestressing.

False set, flash set: In the field the terms "flash set" and "false set" are commonly applied to any condition wherein the concrete hardens rapidly and prematurely. In reality two distinctly different phenomena are involved. False set (sometimes called rubber set or paster set) is a rapid loss of workability or stiffening either during or shortly after the concrete is mixed. An uncommonly high water demand or rapid loss of slump are experienced. In false set, plaster of paris is actually manufactured in the concrete due to physical-chemical and chemical interaction of the cement and water. False set can often be corrected by continued mixing of the concrete and addition of water. The resulting concrete, however, should be held suspect due to the reduced strength, increased cracking, lowered durability, and erratic air contents often encountered.

Flash set, on the other hand, is an irreversible hardening or stiffening of concrete. It can be differentiated from the more common false set by the fact that during flash set a tremendous amount of heat is generated in the concrete as a result of the speeded rate of cement hydration. Chemically speaking, flash set is caused by unusually rapid hydration of the tricalcium aluminate in the cement. This stepped-up hydration generally occurs when there is a lack of sufficient sulfate ions to retard the tricalcium aluminate hydration. The only recourse with flash set is to get out the air hammers.

Cement, concrete: In a survey in which the man on the street was asked about his reactions to the words "cement and concrete," a disquietingly large percentage answered that "cement is good enough for driveways and sidewalks, but you've got to have concrete for buildings and bridges." Even members of the concrete profession too often fail to distinguish between these two basic terms.

To refer to "cement" when "concrete" is meant is precisely like using the word "apple" when "apple pie" is meant, or "wing" for "airplane", or "sand" for "glass". Cement is simply one of the constituents of concrete, and it is never used in construction except in combination with other materials. The words are in no way synonymous or interchangeable and they should never be used interchangeably.

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(Continued from page 20)

whom were in urgent need of financial aid. The Directors, in their deliberation, gave preference, as usual, to those most needy and whose grade average and recommendation from the school attended were superior.

The following students who had previously received consideration proved themselves eligible for further tuition aid:

Patrick K. Jadin '65 —
Green Bay — U. of Oklahoma
William B. Bauhs '65 —
S. Milwaukee — U. of Illinois
Charles Tichy '65 —
La Crosse — Iowa State U.
Victor Aufdemberge '66 —
Berlin — U. of Nebraska
Ann C. Esch 66 —
La Crosse — U. of Washington

Two students had graduated with high honors in June:

Richard J. Jarvis —
Sheboygan — Ill. Inst. of Tech.
Richard H. Kuehl —
Sheboygan — R. I. School of Design

Two students were dropped because they are receiving in-state tuition privilege. (The Foundation's grant is intended to offset the added expense of out-of-state tuition.)

John M. Rakocy '65 —
Milwaukee — U. of Illinois
Richard Koshalek '65 —
Madison — U. of Minnesota

The following students pictured below are receiving tuition grants for the first time:

Michael J. Plautz '67 —
Willard — U. of Illinois
Roger F. Potratz '66 —
Oconomowoc — U. of Oklahoma
Charles J. Radloff '67 —
Oshkosh — U. of Minnesota
John Kreishman '67 —
Wauwatosa — Washington U.
Jack Smuckler '7 —
Milwaukee — U. of Minnesota

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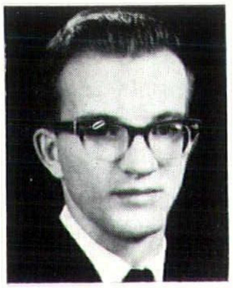

ROGER POTRATZ

JACK SMUCKLER

MICHAEL PLAUTZ

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Side Lighting Found Superior to Overhead

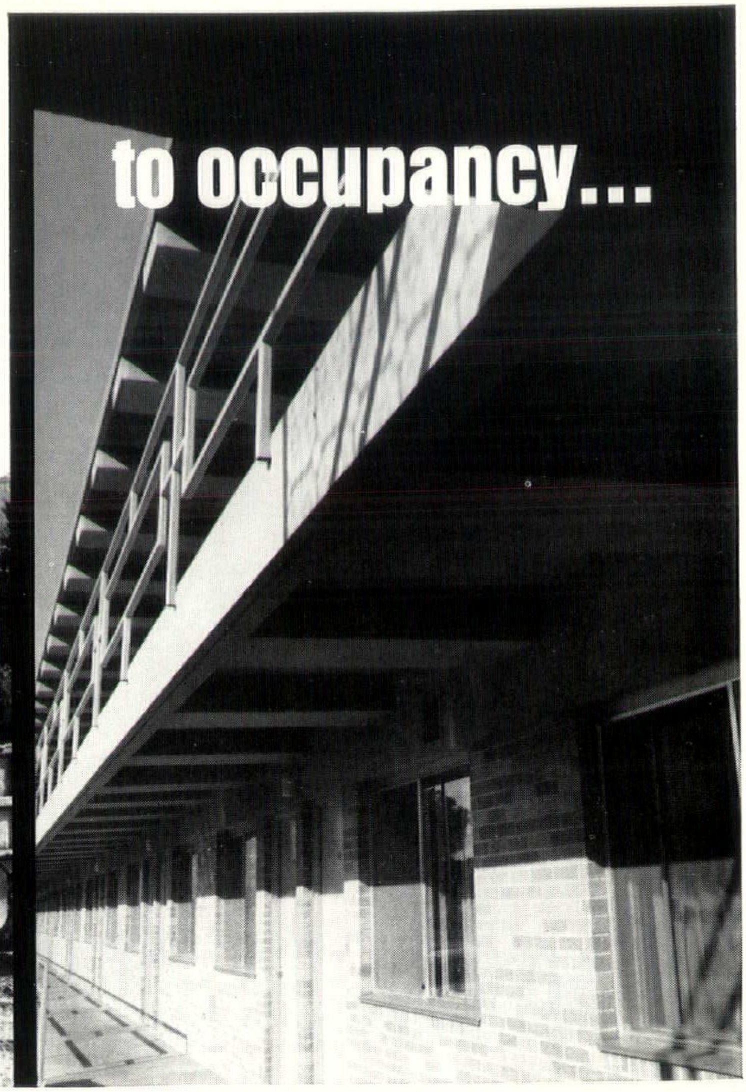
Side windows are more effective than overhead illumination as a main light source, according to recent studies sponsored by the Libbey-Owens-Ford Glass Co. of Toledo.

Since overhead light tends to produce glare when it reflects off books or papers, contrast between the paper and the words on it is reduced. As a result, when illumination comes mainly from above most reading and writing tasks require twice as much light to overcome contrast loss.

The studies tested overhead light from bright skies, cloudy skies, luminous ceilings and fluorescent luminaires. Contrast loss was measured for marks in pencil, liquid ink, ball-point ink and machine printing.

The studies revealed that daylight coming at low angles from side windows was less glaring and therefore more efficient. The researcher, Professor J. W. Griffith of Southern Methodist University, recommended side windows as a primary light source, supplemented by overhead lighting, for maximum efficiency.

It's a long way from bulldozer



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