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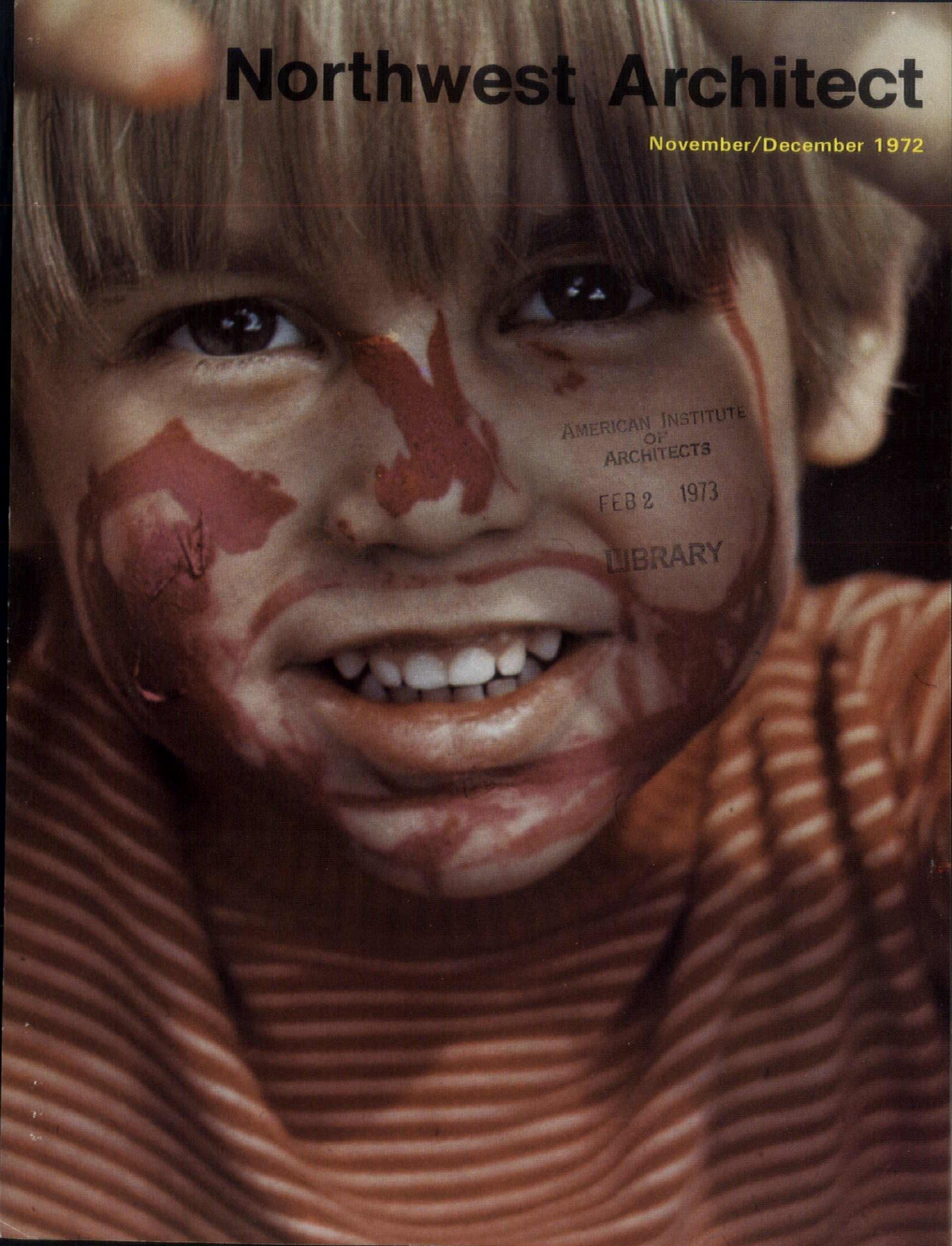
November/December 1972



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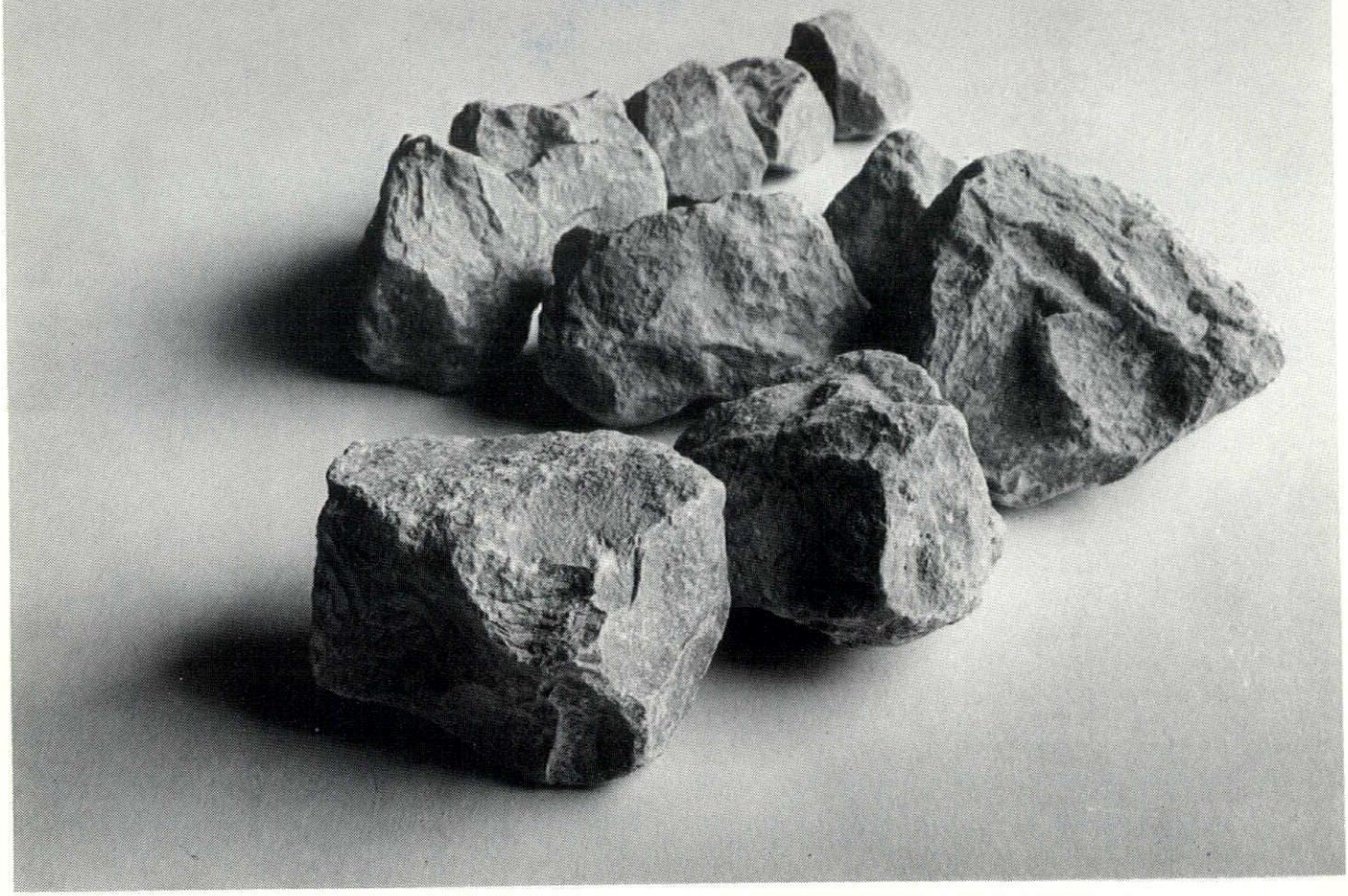

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November-December, 1972
Volume XXXVI Number 6

School Design and Construction in Minnesota

This special issue of Northwest Architect dramatizes the significant concerns and innovations which are affecting the design and construction of school buildings.

Cover Photo by Phillip MacMillan James

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School Building Construction, Operation and Maintenance in Minnesota

By Howard B. Casmey

During the past decade school districts in Minnesota voted to issue more than $800,000,000 in school bonds for building purposes. The replacement value of all school buildings in Minnesota used for programs from the kindergarten level through vocational school was 3-1/2 billion dollars in 1970-71. The cost of operating and maintaining these buildings in 1970-71 approached $100,000,000. As these figures indicate, the construction, operation and maintenance of school buildings in Minnesota is a huge enterprise and the citizens of Minnesota have a tremendous investment in their school buildings.

In these days when all educational costs are under close scrutiny it is essential that every effort be made to construct school buildings which have a low initial cost but which will still render school operations effective and efficient. Next it is incumbent upon school people to operate these plants as efficiently as possible and to protect the public's investment in these facilities by effective maintenance programs. School people should also be concerned in a larger context with the conservation of energy, and the effect of wasteful production of energy on our environment.

The achievement of the optimum in the construction of school buildings and in their operation and maintenance is not a simple task. Let me suggest some factors which are making this task even more difficult at this time.

Enactment by the 1971 legislature of a number of changes in the State School Aid Law may have an impact on school construction in Minnesota. It has become exceedingly difficult to pass bond issues for school buildings in Minnesota. During the last four years, 1968-72, only 51% of the bond issues submitted to voters in Minnesota school districts were passed. This compares to an 81% success figure for the six years of 1962-68. A look at what has happened in the last two years is even more discouraging. The percentage of successful bond issue votes dropped to 33% in 1970-71 and 43% in 1971-72. Because of these failures school districts vote two, three and even four times on progressively more austere school building programs. In attempts to maintain adequate space in a proposed facility the quality of the building is many times sacrificed. It has been my experience that the features in school buildings which suffer first are the roofs and the windows.

In all five of the school districts I have served the windows of a building have had to be replaced. In three of these same districts roofs of buildings have had to be repaired. It is possible to design and construct roofs and windows for school buildings which will last the life of the building. The question then arises: have schools knowingly specified inferior quality roofs and windows in building projects, knowing that the excessive operation and maintenance funds these buildings require are more readily available than initial construction funds?

The new school finance plan limits expenditures for all current operating expenses. A limit on such expenditures means that school districts with inefficiently operating school plants and/or school plants that require the expenditure of excessive funds for their repair and upkeep will have less money to spend on their instructional programs. Under these circumstances it would seem that the most effective and efficient use of the funds available for schools would require the construction of school buildings which are economical to operate and maintain.

There are specific steps which can be taken to reduce the operation and maintenance costs of school buildings. Heat losses which occur because of poorly designed or poorly constructed windows and roofs, or insufficient insulation, are to a large extent preventable. The lighting in schools probably can be reduced or at least used more efficiently. Smaller heating systems operating continuously may be more efficient than oversized equipment operating intermittently to handle peak loads. The constantly increasing costs of fuel and light makes it essential for schools to give consideration to questions such as these. Also critical is the growing shortage of fuel and electricity, the increasing pressure to conserve energy.

There are ways to save energy that do not necessarily add to construction costs. The orientation of a building has an effect on how much it costs to operate. Building shape will also affect its cost of operation, as will the use of available shade or shelter for low structures. Most of the savings, however, will come only if school districts acknowledge the seriousness of the problem and show a willingness to concern themselves

(Continued on page 284)

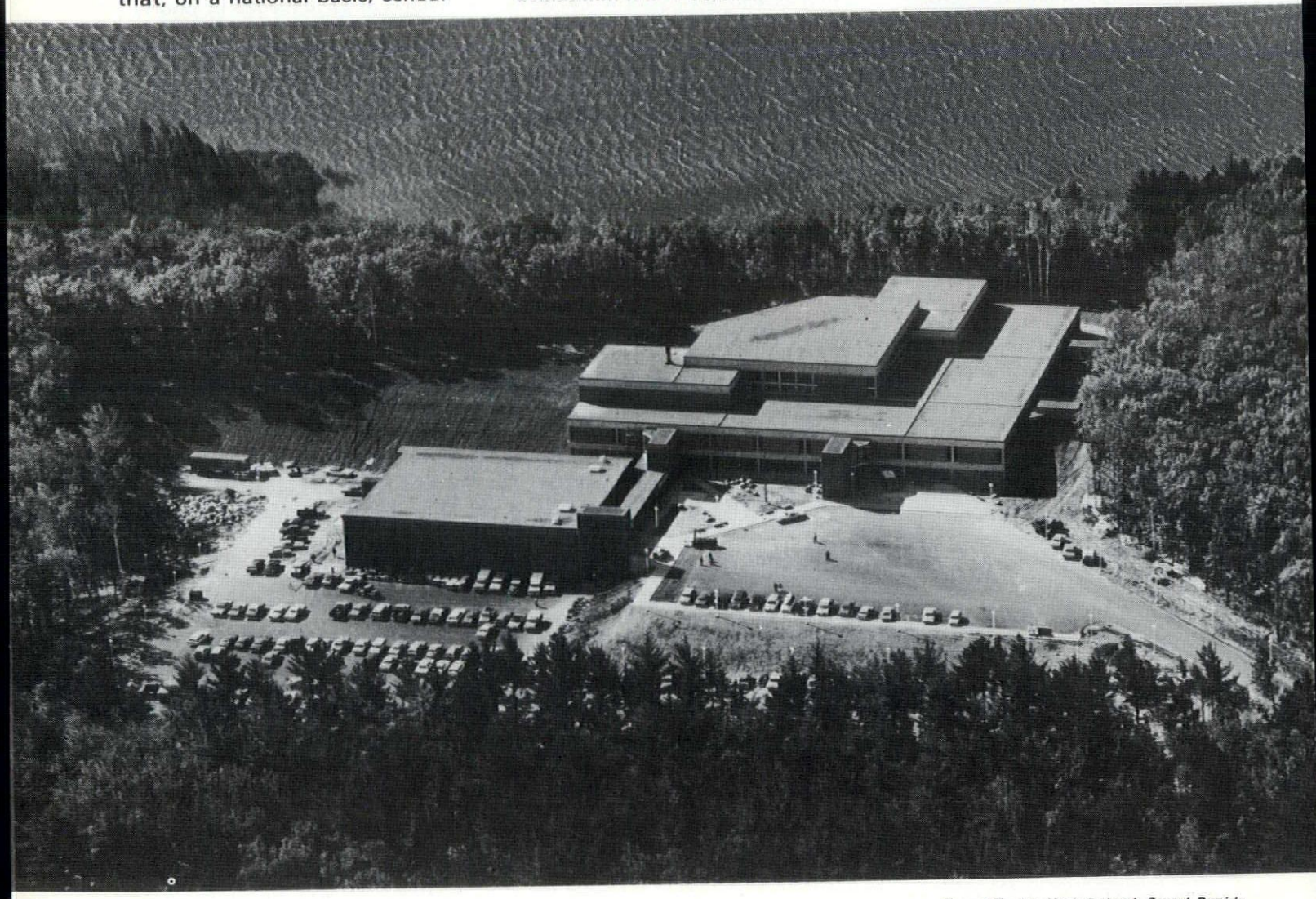
Howard B. Casmey is Commissioner of the Minnesota State Department of Education.

The Realities of School Construction Costs

School construction costs continue to increase. Data from the Minnesota Department of Education indicate the average construction cost of a high school in 1970-1971 was $22.23 per square foot as compared to $14.40 per square foot in 1959-1960. This increase confirms figures reported by the American Institute of Architects which show that, on a national basis, school construction costs have doubled in the last 20 years. It is proper to note, however, that this same report indicates that the cost of all building construction has tripled in the same period. This is a measure of the effort on the part of all those involved to control the cost increase of school construction.

School construction costs invite evaluation and comparison. Understanding the actual costs of providing buildings and grounds for educational programs is difficult. This is due basically to the variability and complexity of financing, planning and construction procedures. In answering the following questions, which are typical of those often asked, two facts must be kept in mind.

1. No two school districts, educational programs, buildings or



Grand Rapids High School, Grand Rapids, Minn.
Architects: Ellerbe Architects-Engineers-Planners, St. Paul

sites are exactly alike. There is an infinite variety of factors affecting costs.

2. Statistical cost information based on many projects can not be used to predict any specific project's cost.

The assumption that all things are predictable if all factors are known is an academic truism only if there are finite variables and *all* variables are considered. Project data compiled by the Minnesota Department of Education confirm the random nature of the variables involved in all construction projects.

Who Is Responsible for the Costs of a Building Project?

The prime responsibility lies with the team of owner-architect. There are, however, many factors which are not totally controllable by this team. Some of these factors are the state of the local economy at the time of bidding, availability of qualified contractors, familiarity of those available contractors with the type of construction specified, availability of local labor and materials, site considerations and restrictions of code requirements.

How Does the Architect Affect Building Costs?

The architect has an ethical and moral obligation to the client and to the architectural profession to design a building within the client's budget. His primary concern is to fulfill the requirements of the building program. He must do this by creating an environment which is pleasing, functional and economical.

Two philosophies of economy must be evaluated by the architect-owner team: *initial and long-range*. If initial economy is to be the objective, then the studies must include methods which serve to achieve this. Unfortunately, this often results in a loss of quality and possibly an increase in maintenance costs. If long-range economy is to be the objective, then the studies must be directed accordingly. This approach adds to the quality of the building and reduces the cost of maintenance but unfortunately often results in higher initial costs.

The architect must evaluate all factors. He must select the building systems, building techniques and building materials which are compatible with needs of the building program while keeping in mind the quality of the environment to be created and anticipated construction costs.

How Does the Owner Affect Building Costs?

Only the owner can determine his needs and these needs must be carefully established. He must weigh such factors as student enrollment, economic base of the community, economic climate of the community, state and nation, desired educational environment, desired physical environment of building and site, existing facilities, maintenance, community use of the physical plant and government participation.

Evaluation of these factors will determine the need for a building program as well as its objective. Economic studies should be made to determine whether the objective is to be a remodeling, an addition, a totally new structure or any combination of the three.

The owner has an obligation to formulate a building program within his budget limitations. The owner - architect team must communicate and assist each other during this period in order to form a system of checks and balances. This programming phase of a project is extremely important as it forms the basis for the entire project.

The site for a new structure can become a major cost factor in a building program. A decision to accommodate future building requirements will also affect initial cost of a structure. Another effect is the desired degree of sophistication of the physical environment and equipment within the building. The owner can not be totally responsible for decisions like these; however, he does play a major role in making them. Many decisions require a combined effort on the part of the owner, owner's staff and architect/ engineer, as well as other consultants.

Is a Reduction in Quality Construction Worth the Price?

A reduction in the quality of the building will not necessarily result in savings. The life expectancy of a product, as well as its maintenance, must be carefully weighed. It may be generally stated that the lower the quality of construction the higher the maintenance cost of a given facility.

A community can ill afford to construct either a "cheap" school or a "lavish" school. In both cases money is spent that could be better used to educate the student. Proper communication among architect, owner and community will result in optimum quality of construction.

How Are School Building Costs Reported?

Construction costs of public school buildings are reported to the Minnesota Department of Education. The Department of Education tabulates this material and determines the cost per square foot, the cost per student and the cost per teaching station

(Continued on page 287)

The Architect and New Methods of Construction

By Alphonse Wegleitner

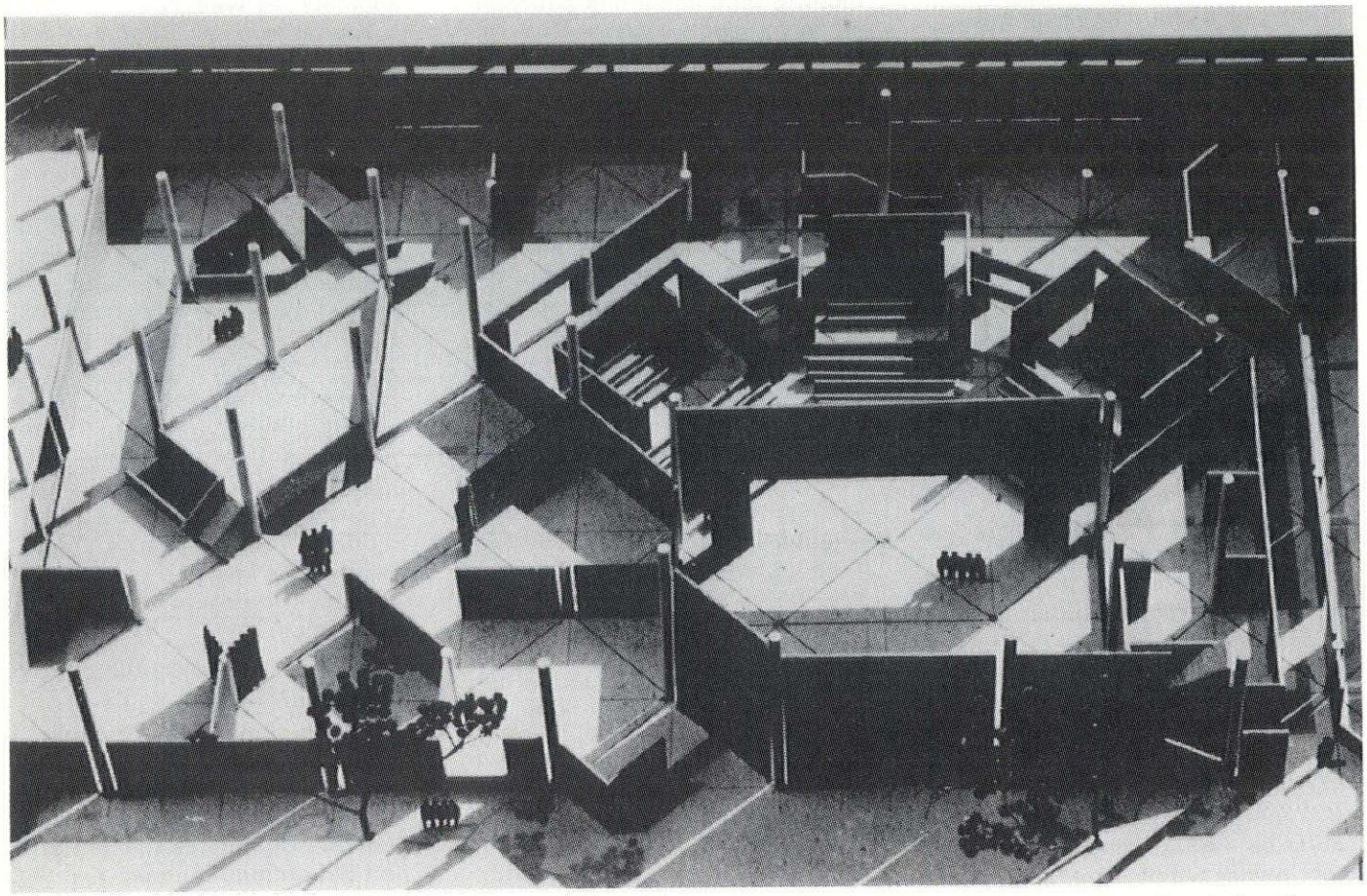
Today's educational planner is surrounded by a complex of technology which puts an unprecedented burden on those concerned with planning and construction. No longer is the free spirit allowed to draw his simple geometric figure and proceed to construct. Today there are rules, codes and ever changing federal and state standards which must be conformed to.

If a standard or rule is changed or varied for one segment in the complex, it causes variation and adjustment in another.

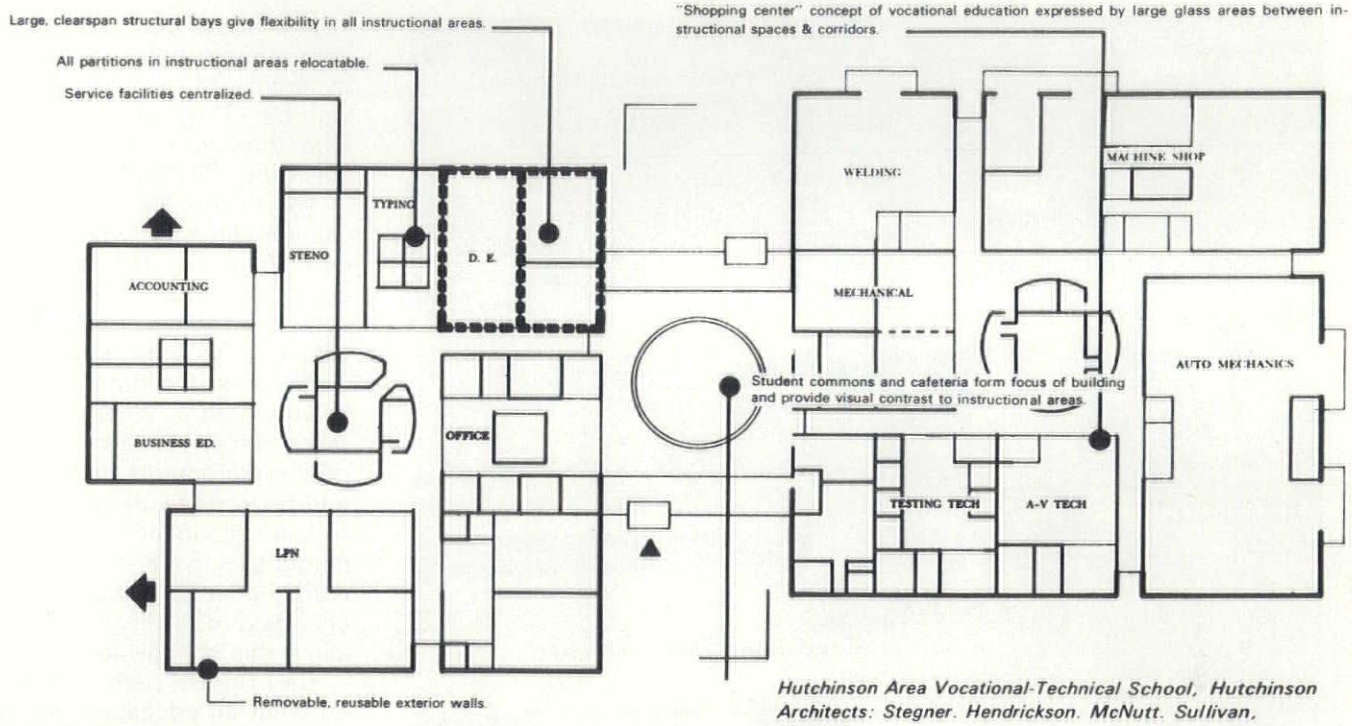
The interelationships are becoming so binding that communication among the participants is taking up a longer and larger portion of the planning and construction process. Time has actually been reduced in the construction process but added into the planning process. Attempts are now being made to "telescope" the two in an effort at time saving.

The changes that have come about in the educational building planning process in the past are staggering; however, the greatest changes are yet to come.

The architect's job is to translate the client's needs into a viable, functioning building. To accomplish this expeditiously requires that all the participants in the planning and building process organize and communicate their contributions with maximum efficiency. The architect is the interpreter who tells the builder what to do. To do this the architect must at times wear the striped shirt of a referee, the turban and crystal ball of a soothsayer and occasionally must resort to technique of the curved couch. Fortunately, today he can be aided in the planning process by consultants and by the accumulated experience available through



Kellogg Senior High School, Roseville
Architects: Thorsen and Thorshov Associates, Minneapolis



Hutchinson Area Vocational-Technical School, Hutchinson Architects: Stegner. Hendrickson. McNutt. Sullivan, Marshall

organized data systems.

For the educator planning school expansion the first necessity is a well organized start. May we suggest an approach?

When the architect arrives on his first working visit it's not necessary to meet him at the door; rather have your secretary send him back to your lair, take your phone off the hook and proceed somewhat as follows.

1 — Give him a written copy of the educational specifications for your proposed expansion. (If one has not been worked out and the project is of such a nature that definitive decisions have not been made, perhaps a little free discussion with the architect relative to the work will turn up some ideas. A date could probably be set up for a further brain picking session with the administration, board members, the architect and members of the consulting staff of the State Department of Education.)

2 — Establish a chain of command, defining responsibilities. With whom will the architect be working?

3 — Clarify limitations and restrictions such as budget etc.

4 — Provide land surveys and plans of existing buildings.

5 — Discuss district trends as to population, concentrations of growth, politics and local concerns.

6 — Converse about physical factors such as roads, flooding, drainage, ground water levels, sewage, electrical service, etc.

7 — Have the architect make a visual inspection of the existing buildings if they are involved in the contemplated expansion program.

8 — Inspect the site or sites with the architect, again calling to his attention any unusual characteristics which are not evident.

At this first meeting, the architect will explain his contract and services and review the school boards' responsibility for land surveys, test borings, etc., as called for in the contract. He will also explain the office system with regard to coordination with the various local and state agencies, discuss a possible preliminary time schedule for the project and designate the person in responsible charge of the work in the architect's office.

Generally, once the program has progressed beyond the design development stage the client has very nearly exhausted his input of information and reliance must be placed on the technical competence of the architect and his consultants.

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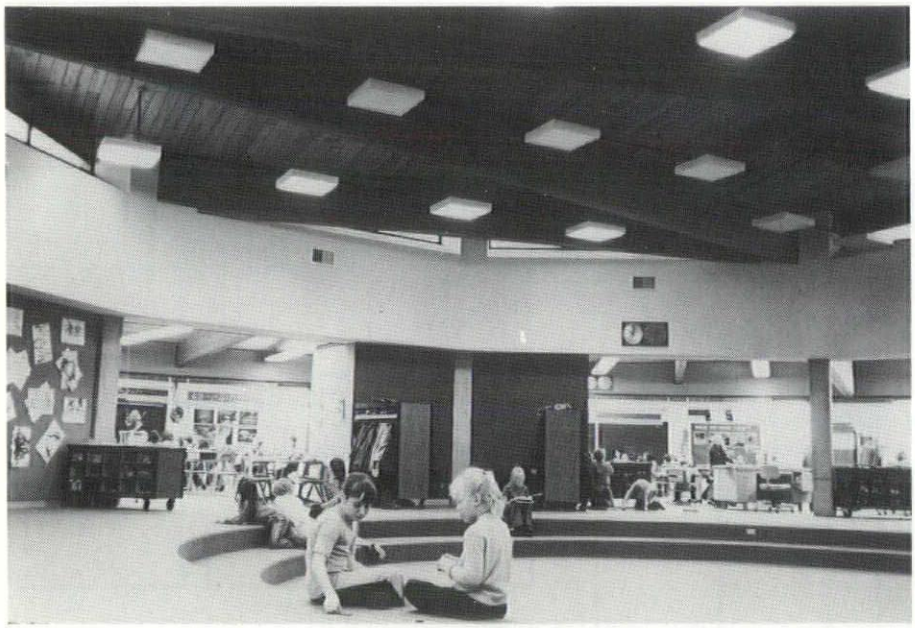
Alphonse Wegleitner is a principal in the firm of Matson, Wegleitner and Abendroth Architects, of Minneapolis.

Architects as Educators

By Jene T. Sigvertsen



Elementary School, Sauk Rapids

Apollo Senior High School, St. Cloud
Architects: Traynor, Hermanson and Hahn Architects, St. Cloud

Architects play a major role in determining how innovative and dynamic an educational facility will be. They are the catalyzers who transform educational concepts into physical environments.

The school facility is the physical container in which education must function. The school facility is the structure in which the resource information that the individual draws from is located.

There are no time or space limits to where or when learning takes place; yet there are often rigid requirements as to where and how, particularly, children are to learn. Education must be dynamic to survive — it must be readily adaptable and flexible to change and facility design must allow this change to happen.

Carl Rogers perhaps best stated what an education is when he said, "The only man who is educated is the man who has learned how to learn, the man who has learned how to adapt and change, the man who has realized that no knowledge is secure, that only the process of seeking knowledge gives a basis for security."

Concepts concerning school facilities design have been going in many directions. We are still creating cubicles into which to plug masses of people when we should be creating centers of learning where the environment, curriculum and methodology are organized around the individual. Perhaps the single biggest problem facing architects in schoool design is the creation of space which by its very nature must be dynamic or continually changing. However, buildings are static physical structures and as such are obsolete the instant they are created. Therein is the paradox of school design.

Trends which affect the archi-

tect directly have been developing over the last few years. There has been a distinct move away from the rigid box classrooms of yesterday. The teaching of facts is being replaced by procedural discovery and conceptualism. Traditional grade levels are breaking down because students learn at individual rates. Contact with different levels of learning within a school facility and contact across disciplinary lines lead to better understanding of the operational systems about us. Education may follow the mass or it may follow another drum beat. A school facility must provide the location and variety of spaces where the very best resources for concentrated learning can be situated.

Mass media and mass communication have drastically altered the concept of learning. Educational facilities no longer dominate as the places for learning as they once did. When a child today graduates from high school the chances are great that he or she may have spent more time watching television than learning in a classroom. Are we today creating schools where individuals go not for information but for a *perception* of information? Involvement in the discovery of knowledge and its interrelationships can take place almost anywhere but a school is the place where professional guidance in the discovery of knowledge is given.

Schools should be three dimensional, quality packed experiences, even though education is still often presented in linear form. The architect, by innovation in design, can lead us toward multi-dimensional learning. Today's students often read, watch television and eat at the same time; tomorrow's students may read one thing, listen to a second and write another at the same time. Individual patterns, like nature, seldom follow straight lines but are instead complex intersections at multi-dimensional levels.

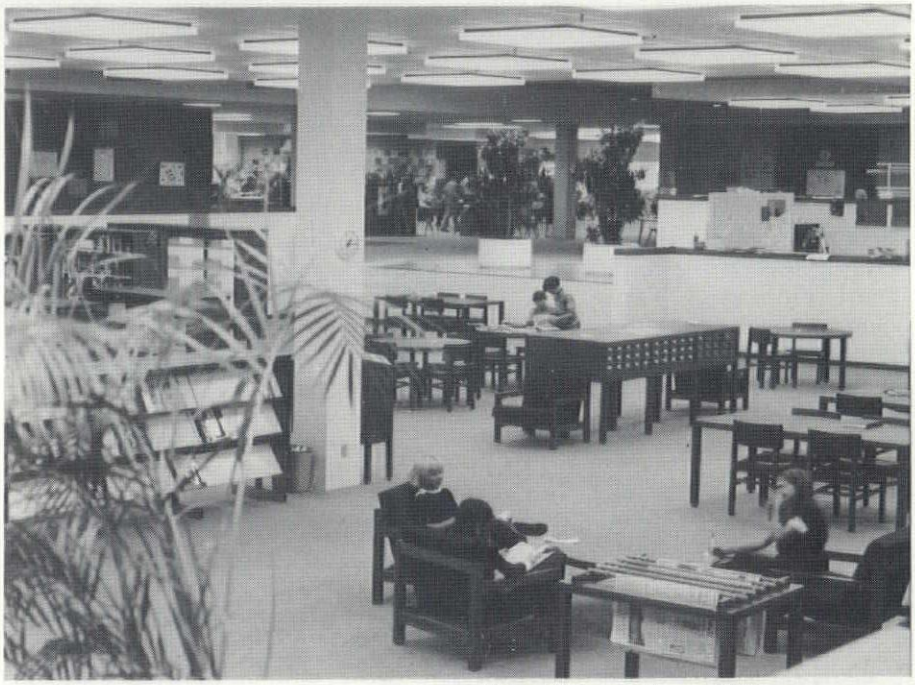


Photo #2 (see text page 292)
Architects: Hammel, Green & Abrahamson, St. Paul

A school should bring students of diverse needs together. It should encourage healthy questioning, skepticism and disagreement. It should encompass a rich diversity of behavioral and cultural input. The school facility ideally serves as a container of resources for the development of thinking individuals.

The architect has the responsibility of relating to a school district's total program and he may even, in the design of a facility, need to suggest a reorganization of the staff as part of his problem solving proposal. The school district asks the architect to resolve the complexities of its problem into a logical physical format which must be efficient, economical and meet the time requirements imposed. To design is to solve a problem. If the contractor has the responsibility of actually building a facility and the school district has the responsibility of defining and presenting a problem, then the architect's responsibility is to assure that the problem is solved adequately and built accordingly.

Today's architects are responsible for creating tomorrow's school facilities. Every successful environment has a conceptual structure that precedes its physical structure. The resulting facility must be

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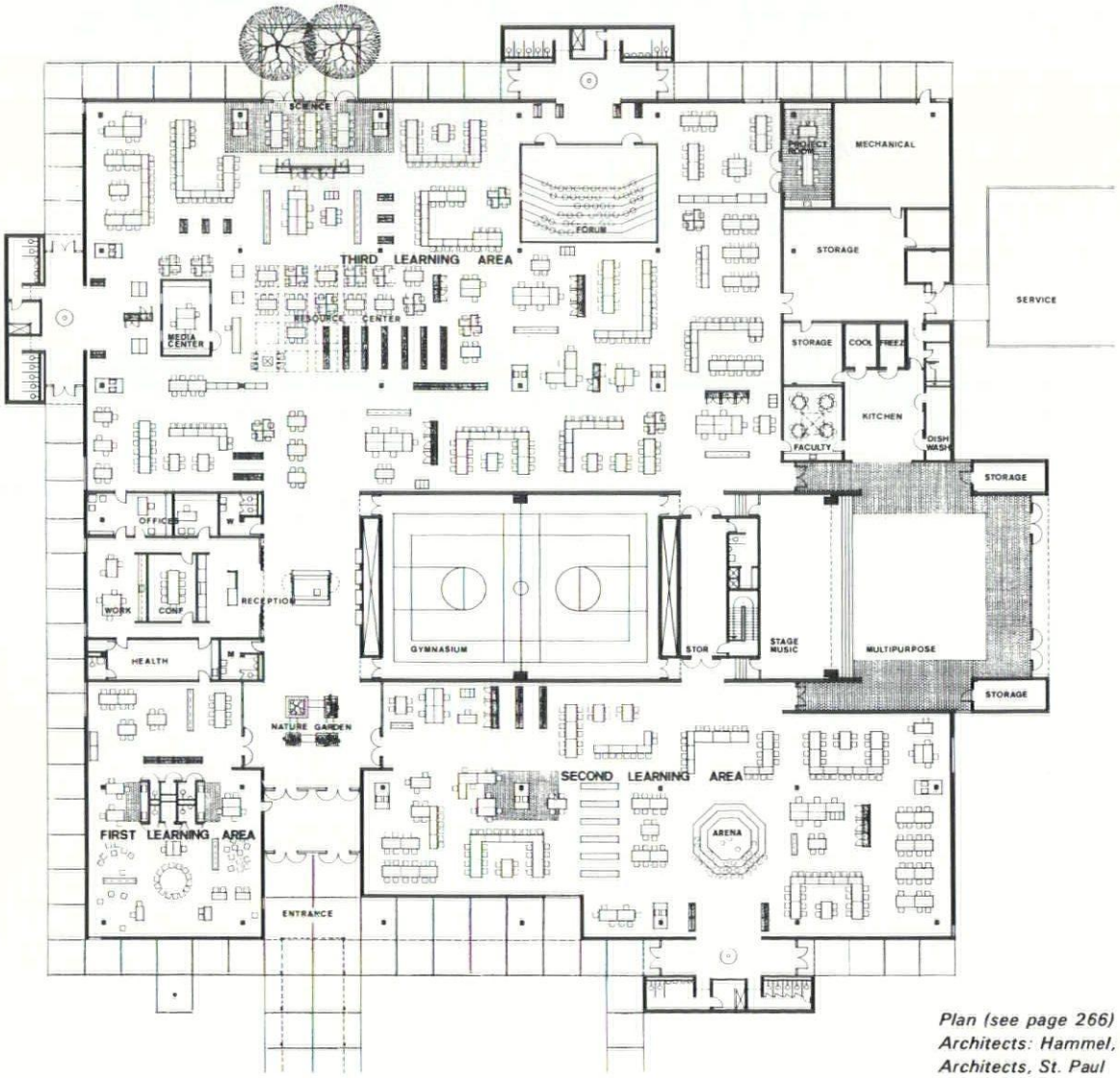
Jene T. Sigvertsen is Executive Director, School Plant Planning & Maintenance, Independent School District 625, Saint Paul, Minnesota.

Changes in School Design

By Richard F. Hammel

The tremendous forces at play in American society are reflected by, and in some cases are the result of, changes in the methodology and philosophies of public and private formal education. These changes occur so frequently that public interest in them is at an understandably low level. Only a few of them, for instance the beginning of "Family Life" classes, cause much public discussion. In the schoolhouse, however, these changes can be easily observed. They are most dramatically apparent in buildings provided for the earlier years of formal education but are also evident to a thoughtful observer in the character of the buildings on college and university campuses.

At the elementary level change seems to be occurring deliberately — and thoughtfully — as the profession seeks to discover how best to encourage the development of each individual. College educators, at the other end of the path of formal education, are not so obviously concerned about individual development. Rather they face the problem of collecting, storing and transmitting the knowledge, wisdom and techniques of an intricate civilization which are fundamental to its survival. In performing these tasks they have had to surround themselves with unique spaces vastly



Plan (see page 266)
Architects: Hammel, Green & Abrahamson, Architects, St. Paul

See text page 294
Architects: Hammel, Green & Abrahamson, Architects, St. Paul

more complex than the quiet classrooms of "Old Main" and the generous lawns of the nineteenth century college for the elite. The schoolhouses for higher education in the twentieth century are workshops of a very complex nature.

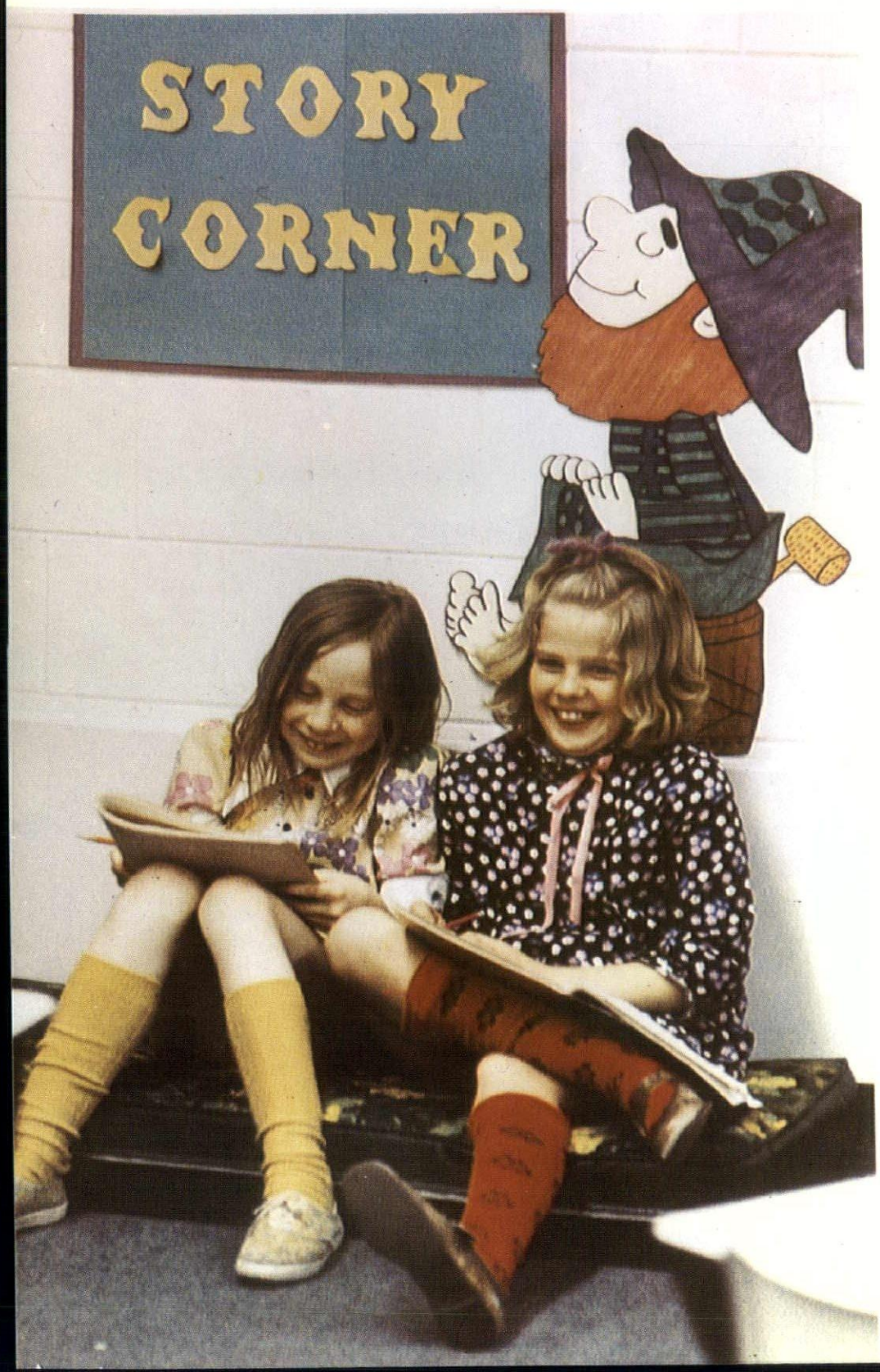
The persisting difficulties in procuring adequate funds for the housing of educational activities have imposed on the schoolhouse restraints that are inhibiting and often defeating. The staggering size of the educational burden has led to the success of the prophets of economy, who would be applauded by all of us if it were not that they have become entranced by numbers rather than purpose. There is a tendency to believe that *larger* means more *economical* which means *better* and, as a corollary, to consider students in numerical terms and their schoolhouses as places where society has allotted them a certain number of square feet. On the other hand the necessity to practice every economy consistent with the function of the schoolhouse has led both client and architect to continuing analyses of cost-effectiveness, which have at

(Continued on page 290)

Richard F. Hammel is a principal in the firm of Hammel, Green and Abrahamson of St. Paul.

School Buildings for People

By Fredrik Christiansen



At a recent conference I had dinner with an educational consultant who had been called to a small school district in Iowa to prepare the program for a new secondary school. When he first met with the board he was directed to "program the building to the absolute minimum," since the school district had very limited resources. He found, however, that the district was without debt and had a very high evaluation per student. Following the meeting, at which board members had emphasized the poverty of the district, the consultant was taken to a posh local country club by the board. A board member next to the consultant said he was a member and it *only* cost him $1,800 a year. The consultant then asked the board member how that compared with his taxes. The board member read the implication and became somewhat distant.

School buildings, as well as programs, depend for their support upon the citizenry. If the education, safety and welfare of children is low on their scale of priorities, this is apparent in the quality and maintenance of their school buildings. It is interesting that bank buildings are generally expensively constructed and maintained despite the fact that they are not utilized by as many people as are schools. Perhaps we place a higher priority on the keeping of money than we do on the keeping of "little people."

There are surveys of human satisfaction with space that indi-

(Continued on page 298)

Fredrik M. Christiansen is Director of Facilities Planning and Operations, Minnesota State Department of Education.

Photo courtesey of Hammel, Green & Abrahamson, Architects, St. Paul

School Design Over the Years

By W. A. Wettergren

Thirty-four years ago I attended my first school board meeting and was then asked to accompany the superintendent of schools,with other members of the board, on a tour of the school buildings to ascertain what had to be done by way of repair over the summer months. Even though it had not been too many years since I had attended this high school, I was impressed with a number of things. The first was that even though the putty and paint in the old wooden window frames had deteriorated so much that the panes only hung in the windows by the grace of God, the school board was really seriously considering whether they should be repaired that summer or whether they could stand one more year.

As we walked through the hallways I could not believe that in my many days in that school I had not really noticed how dank and dirty the classrooms and hallways were and how foul odors permeated the building. We went down into the basement, the old shower rooms and the boiler room and it was like viewing a horror movie. Our feet stuck to the floor, the water ran down the sides of the walls and the paper bags from lunches carried to school on the last day were everywhere because the custodians were too busy mowing the lawn (by hand) to clean up the inside of the building.

Eventually the school board got around to talking about a new school, or at least an addition to the facilities. One of the big discussions related to how many glass windows we could put in to let in light from the outside without being accused of frivolous extravagance. To discuss glass block or lightweight block was simply out of the question and the suggestion of anything other than plaster on the walls was met with a gasp of horror. To suggest that carpeting on the floor of the classrooms would be more conducive to the learning process at really no additional cost was sure proof that one was ready for one of the state's mental institutions.

I can remember the first time an architect came to visit the school board. He insisted that the school building addition was going to be all stone because, if the taxpayers were going to pay for it, they would insist that the building last at least 100 years. There was not a thought as to whether the school population or the educational program might change. The architect insisted that if he did not plaster the walls he might be barred from his profession. I can well remember his arguing for putting wooden floors in the entire building. It did not impress me since I had just gone through the old building and wondered how many layers of oil and wax had been put on those floors over the years.

Now when I have the opportunity to visit schools, I am impressed by how inadequate our thinking was as we looked to the future. School buildings now are open and airy and are designed to let the outside world into the classroom instead of shutting it out. I get a kick out of watching a young lad come down the hallway clicking his heels and then walk into a classroom that is carpeted. Did you ever notice the change of pace that takes place? It lends something different to his attitude. Very few schools exist today in which 500 different odors hit you in the face when you open the front door. The old costly plastered walls have given way to more attractive and economical materials.

Many changes have taken place over the years in the thinking of architects, school boards, administrators and teachers and more will take place in the next few years. In my view the majority of the changes have been for the benefit of the taxpayer over the long haul. Schools are certainly more attractive and much easier to keep clean. Most important, the schools today do not look like prisons to which we have to send our children every morning. They are buildings to which most pupils are proud to go. Why shouldn't this be so? The pupil spends more of his waking hours in school than he does in his home.

For the past 15 years or so the Minnesota Society of Architects and the board of directors of the Minnesota School Boards Association have had joint committees that meet regularly to discuss the common problems of school boards and architects. I think it is fair to say that in Minnesota this cooperation has done much to encourage the building of school facilities which better expedite the educational process for the pupils of our state. All in all this is the only valid reason for the construction of school facilities. ■

W. A. Wettergren is Executive Secretary of the Minnesota School Boards Association.

New Guide for the Design and Construction of Schools in Minnesota

By Daniel J. Sheridan

Since the end of World War II Minnesota has retained nationwide its reputation as a leader in the design and construction of outstanding educational facilities.

In the late 1960's the phenomenon of Taxpayers' Populism arose here also. While the cost of construction and maintenance of school facilities is, on an average, less than 9% of an entire school district's budget, this 9% is the only portion of the educational budget about which the citizen has a voice.

Faced with continued school facility needs and the reluctance of the taxpayer to provide these needs, school board members became at first concerned, then alarmed.

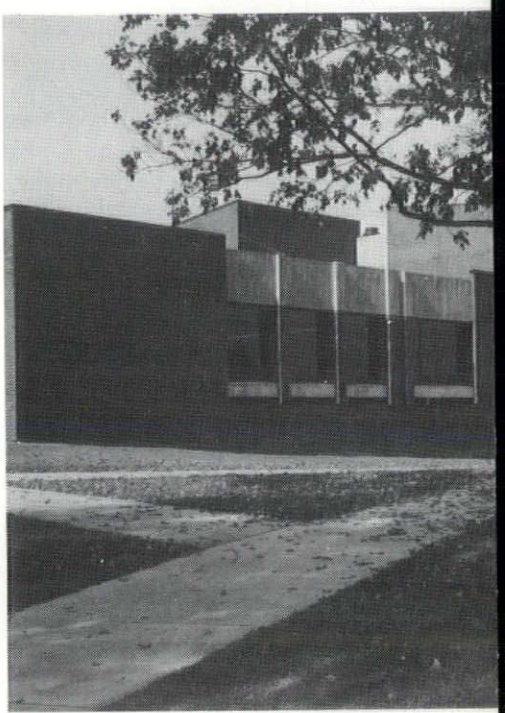
In the design and construction of schools school board members became concerned over whether the facilities they were building were flexible, economical and maintenance free. They became increasingly concerned over who was responsible should equipment or facilities malfunction. They demanded accountability from the construction industry and the design professions.

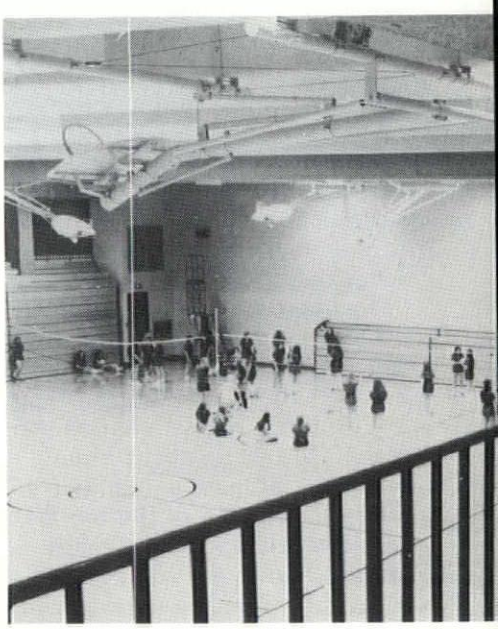
In 1971, at the Delegate Assembly of the Minnesota School Boards Association, this concern surfaced in the form of a resolution seeking to find improved ways to design and construct economical, low-maintenance facilities.

At the suggestion of Peter Popovich, legal counsel for the Minnesota School Boards Association, and William Wettergren, executive secretary of the MSBA, negotiating teams were established to develop a new contract for architectural services and to give attention to many of the concerns identified in the joint group. In addition to Wettergren and Popovich, the Minnesota School Board Boards Association was represented by George Seaberg, chairman of the Roseville School Board, and a school board member for more than 25 years. Representing the Minnesota Society of Architects were Fred Traynor, a St. Cloud architect with considerable background in design of Minnesota schools, Ken Skold, an architect and a member of the Hopkins School Board for nine years, Al Wegleitner, Minneapolis architect, Clarence Hart, legal counsel for the Minnesota Society of Architects and one of the nation's leading construction law experts, and Daniel Sheridan, executive director of the Minnesota Society of Architects. Out of these discussions, a new contract for architectural services has been prepared as well as a new Guide for the Design and Construction for Minnesota Schools.

The purpose of the new guide is to present a brief overview of the procedures and steps involved in the process of solving a school district's facilities needs. The guide includes the list of typical steps and a sample time table for the entire process. The appendix includes a projected time table for the hypothetical case of a school district with an enrollment of 4,000 students, and an anticipated need to construct a new high school facility. (1,200 students-grades 9-12).

The School Boards Association and representatives of the design profession will continue their close working relationship which in the 1940's led to the first joint contract.

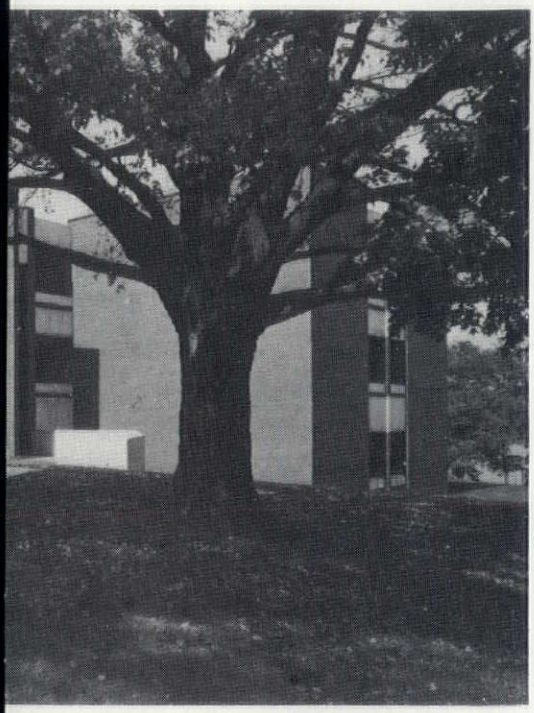




Daniel J. Sheridan is Executive Director of the Minnesota Society of Architects.

Bringing a New School Into Fruition

By Dr. John S. Hoyt, Jr.



Lakeview Elementary School, Albert Lea
Architect: The Lundgren Associates, St. Paul

Edina High School, Edina
Architects: Armstrong, Torseth, Skold and Rydeen, Minneapolis

Aside from the preliminaries — such as passing a bond referendum to obtain the money necessary and employing a highly competent architectural firm — there are only two things that a school board chairman needs in order to bring a new school facility into fruition.

The first is a school district business manager who is both superbly competent and experienced. The second is an "on board" school administrator who both knows the educational process in depth and who is (or can be) a people-oriented "clerk of the works."

Our district has two such people — Don Pryor, our director of business affairs, and James Cabalka, our "clerk of the works" during construction and now principal of the newly completed Edina West Upper Division (10-12) facility.

Perhaps the single most important event in the entire process was, in reality, a comprehensive series of events. Pryor, and/or Cabalka, together with representatives of our architectural firm, Armstrong, Torseth, Skold and Rydeen, met with virtually every member of the administrative staff and the secondary faculty to prepare a "Building Program" for the campus. Based on agreed upon assumptions about the educational processes which were to take place within (and outside) the facility, detailed *program* specifications were drawn up for each process. These details ranged from the number of square feet needed for towel storage in the physical education area, to the flow of vehicular traffic, to the functional interrelationships, to the adjacent junior high facility, to the number of faculty stations and the number of students in each program area, to the number of square feet required for toilets, lockers and showers for the central custodial area.

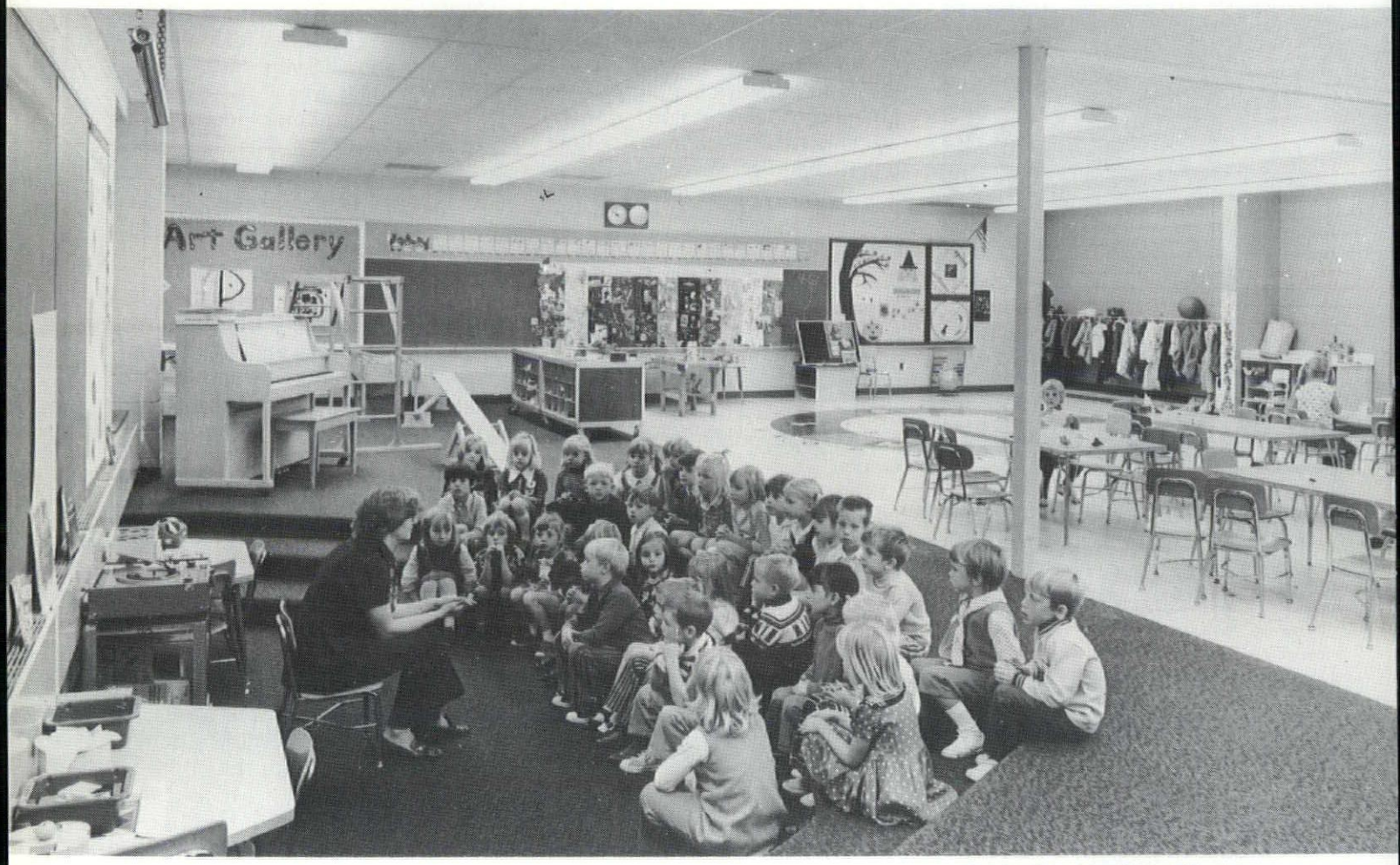
Summary memoranda of these meetings and the decisions made — and in many cases revised and readjusted — were circulated to all board members. In almost every case our questions were answered before we had to ask them. In short, we have brought a $9.2 million facility from a successful bond referendum in October 1970 to an operating building on December 4, 1972 (if you discount lost time due to two strikes) in less than two years of actual elapsed time. We think it's quite a record. As a board member and more recently as board chairman what could well have been a major headache to me has, instead, been as pleasant an experience as I have had on the board.

The key(s): competent people at all levels, careful *and* forward planning and extraordinary communications through the entire process. ■

Dr. John S. Hoyt, Jr., is Chairman of the Edina School Board.

Design for Learning

By Suzanne Marcoux



Chaska Elementary School, Chaska Architects: Armstrong, Torseth, Skold and Rydeen Architects, Minneapolis

The environment in which most adults have spent a minimum of 12 years is one which is totally different from any other. Generally, the majority of spaces in schools are equal-size boxes called classrooms. In these rooms 25-30 people are usually focused on one individual, the teacher. The other spaces are equally recognizable — the gym, auditorium and library. Often they are linked by tiled hallways in typical institutionalized colors of tan, pale green, beige or mustard.

A space which stimulates creative thinking and problem-solving is the ultimate schoolhouse. The design which promotes the learning experience is constantly being re-conceptualized and improved.

Design is recognized as that variable which stimulates or discourages a certain type of behavior.

What can design do to the learning experience? How can the environment enhance the learning potential? On the rudimentary level, of course, design can help produce the best possible acoustics, temperature and lighting. Beyond that, however, design can define different behavioral objectives such as individualized work or class discussion. It can even induce behavior problems or cognitive processes.

A recent psychological study *(Educational Technology,* August

(Continued on page 301)

Suzanne Marcoux is a teacher of Journalism and English in Robbinsdale Senior High School in Robbinsdale, Minn.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A Curriculum of Reality

By Donald Jacob Christensen

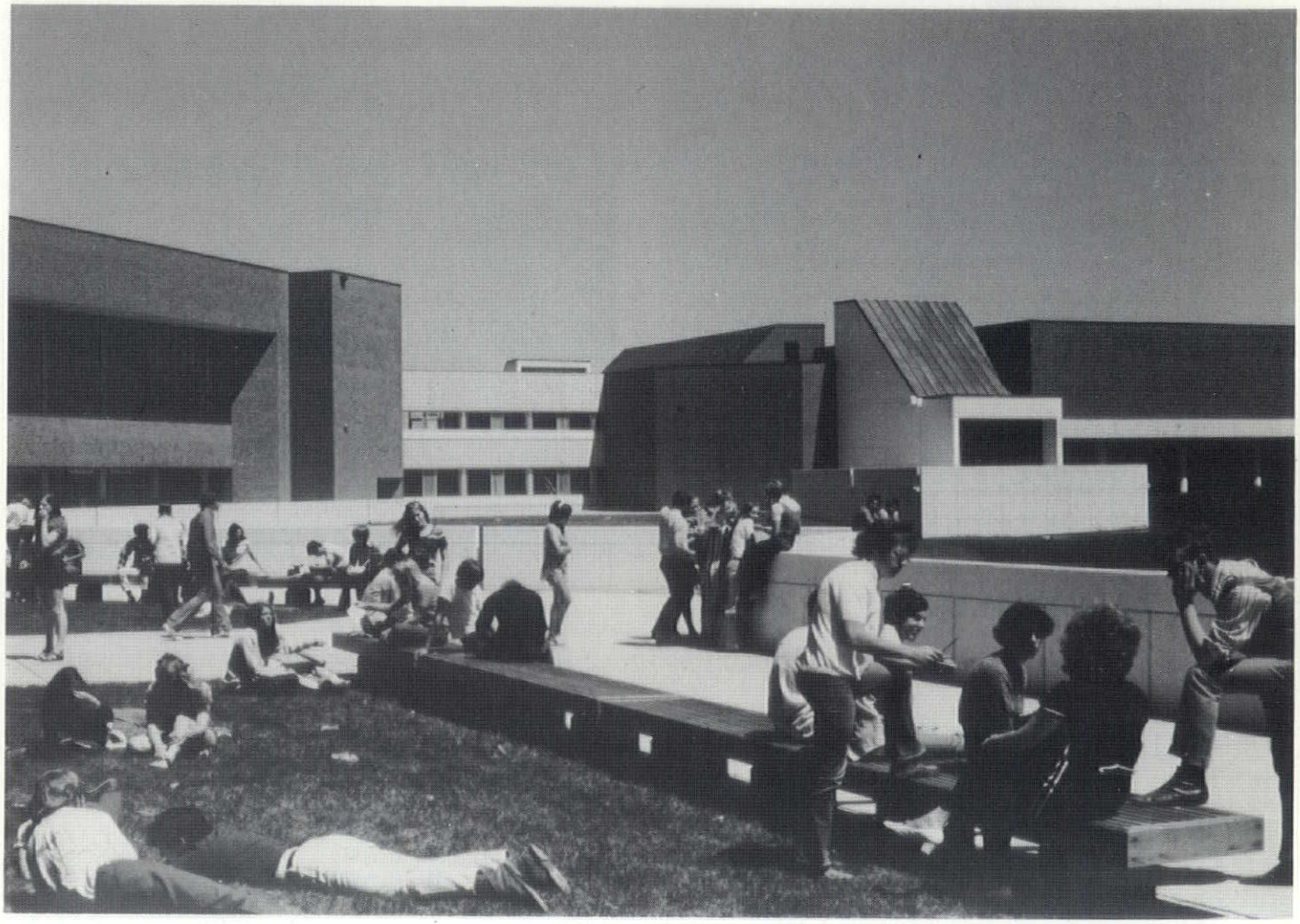
"It being one chief project of that old deluder, Satan, to keep men from the knowledge of the Scriptures . . . obscuring the true sense and meaning . . . learning was in danger of being buried in the graves of our fathers . . . "

Dr. Donald Jacob Christensen is Director of Curriculum and Instruction for Independent School District No. 196 in Rosemount, Minn.

The preamble to the Massachusettes Law of 1647, "The old deluder Satan Act," announced what is recognized as the first public school law in this country. The law charged:

"every town having fifty householders should at once appoint a teacher of reading and writing . . . and every town having one hundred householders must provide a grammer school to fit youths for the university . . . "

Education historians generally acknowledge this law as a harbinger of subsequent acts establishing America's public school system and demonstrating a pervasive faith in education as the route to a better life and prosperous society. Education has been heralded in this nation as the route to success. Generations of parents, seeking a better life for their progeny, sent them off to



Armstrong Senior High School, New Hope
Architects: Bissell, Belair and Green, Minneapolis

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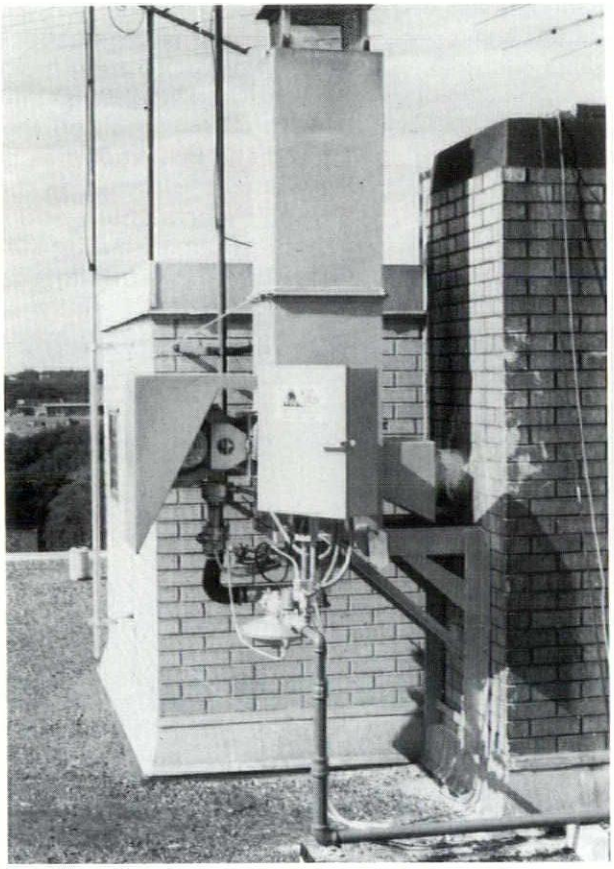

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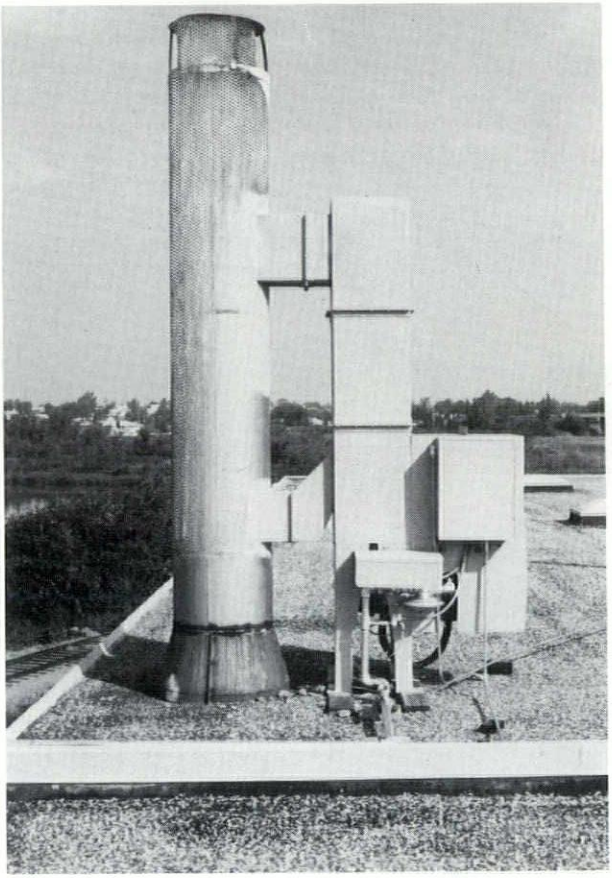

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high school and college.

It is, then, notably ironic that two and a quarter centuries later, from literally the same place in the United States, Christopher Jencks at Harvard University substantially challenges the notion that education has been the route to a better life. Jencks notes that:

". . . schools have few long term effects on the later success of those who attend them . . . even when schools exert an unusual influence on children, the resulting changes are not likely to persist to adulthood . . . children seem to be more influenced by what happens at home, on the streets, and on television, than by what happens in school."

Another dilemma grows out of the definition of the central purpose of education. Classic arguments among educational thinkers usually fall within two general viewpoints: education is to serve the social order; it is the means to a revised, better social order. Kneller paraphrases the philosophy of Dewey by noting that:

". . . education is not adjustment to society, or to the external world, or to perennial standards of goodness, but education is the reorganization of experience which increases the ability to direct subsequent experiences."

School districts must deal with the issues underlying these apparent dilemmas. For what reason has each Minnesota school district provided between $700.00 and $1200.00 per pupil? What might school managers undertake to deal with issues involved in these observations? A productive course may be to undertake substantive measures to address curriculum development and accountability.

Curriculum Development

Unlike law, medicine or architecture, curriculum development has no meticulously defined body of knowledge. Indeed, it may be, as suggested in the recent report by the American Educational Research Association,[5] that the closest approximation to a curriculum development discipline is manifest in the labors of publishers who place textbooks in public school classrooms.

Typical curriculum development is an empirical process adjusting, modifying, making more relevant or humanizing the existing curriculum which includes a standard bill of fare of reading, mathematics, science, home economics, social studies and so forth. What must be reviewed for substantive curriculum development is the very content base of curriculum. It may be that suggestions of education ineffectiveness drawn from Jenck's conclusions could be addressed if all curriculum content were structured around one of three major theses. These three dimensions form a logical content model that is based on the actualities of life.

1. Society. Living as we understand it today, and as recorded in history, is a social process. Whether the society is good or could be improved, the central issue is that man lives in society and living requires skills for interaction with other men to enable the society to function.

2. Individual. The individual, in order to be either a productive citizen or a provocative change agent, must know and understand himself. Personal development and awareness involve intellectual, physical, emotional and esthetic dimensions.

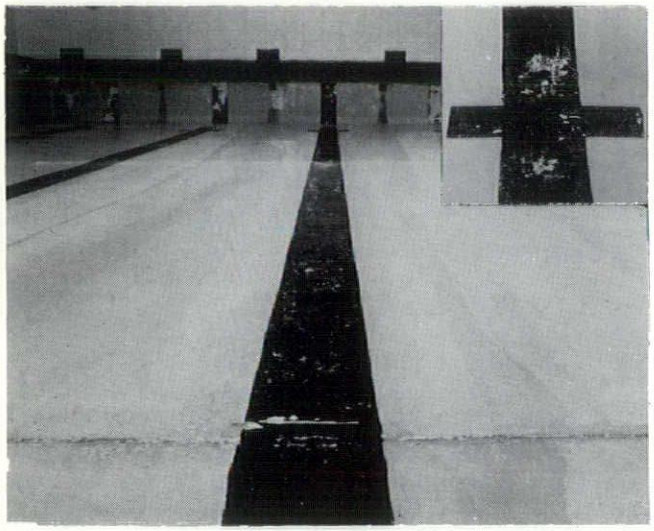
3. Environment. Man must know and understand his individual relationship to the physical environment, as well as the social relationship to the physical environment.

Educators are daily confronted with reports of youth who graduate from high schools ill equipped to perform to employer expectations. Accusations are leveled that curriculum content used in classrooms is archaic because the amount of available knowledge doubles every 3 or 5 or N number of years, therefore making information taught in one year likely to be outdated in subsequent years.

No person can predict the nature of society facing future generations. Accordingly, we cannot judge whether existing curriculum will provide youth with relevant skills. These allegations may well be correct, particularly if what Jencks suggests is valid. The schools need not shrink pathetically from this confrontation. Neither should schools seek artifical arguments to justify an outdated curriculum. Curriculum development efforts must build a content base that draws from real life. The suggestion that all curricula be built from a three-dimensioned premise of social interaction, individual growth and physical environment squarely addresses a curriculum of reality. Educated persons need sufficient awareness, sensitivity and intellectual skill to govern their individual lives, to interact purposefully with other persons and to understand the physical environment that supports the whole affair.

ACCOUNTABILITY

One might speculate that a universal element in all



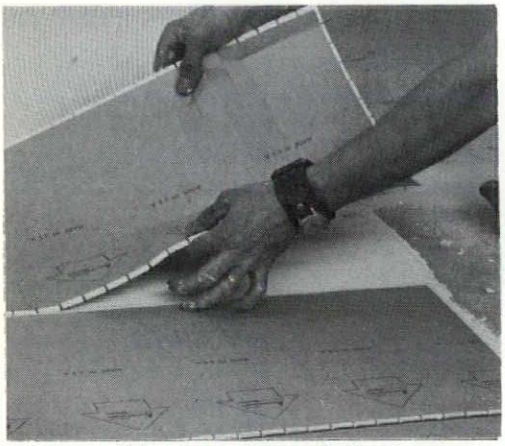
Before – pool surface is cracking and peeling (see inset). Pool needs daily cleaning and filtering system maintenance once a week.

CERAMIC TILE ELIMINATES HIGH COSTS OF SWIMMING POOL MAINTENANCE.

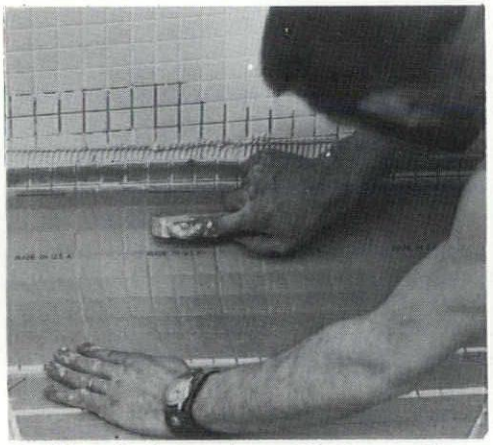
That's what officials at Park Senior High School, Cottage Grove, Minnesota, concluded when they totaled the cost of maintaining their painted pool from 1966 to 1972.

The maintenance and contracted work included sandblasting, painting, cleaning paint chips from the filtering system, daily pool cleaning, etc.

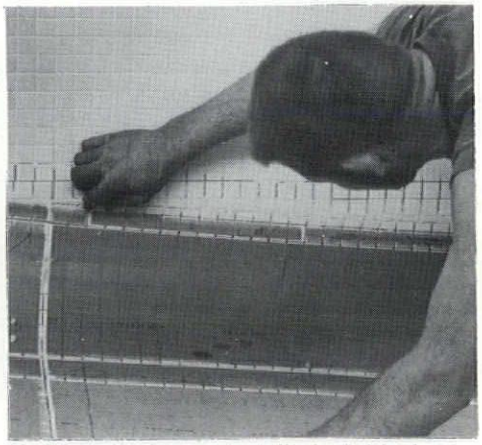
Officials decided to cut costs with Ceramic Tile early this spring. Now with work completed, they have a beautiful pool that will last indefinitely – *with minimum maintenance.*



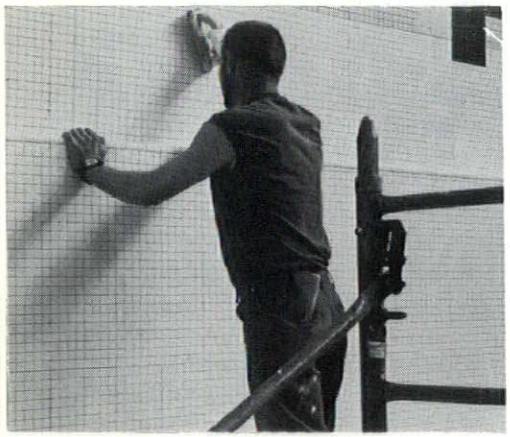
After sandblasting paint and cleaning surface, Ceramic Tiling begins.



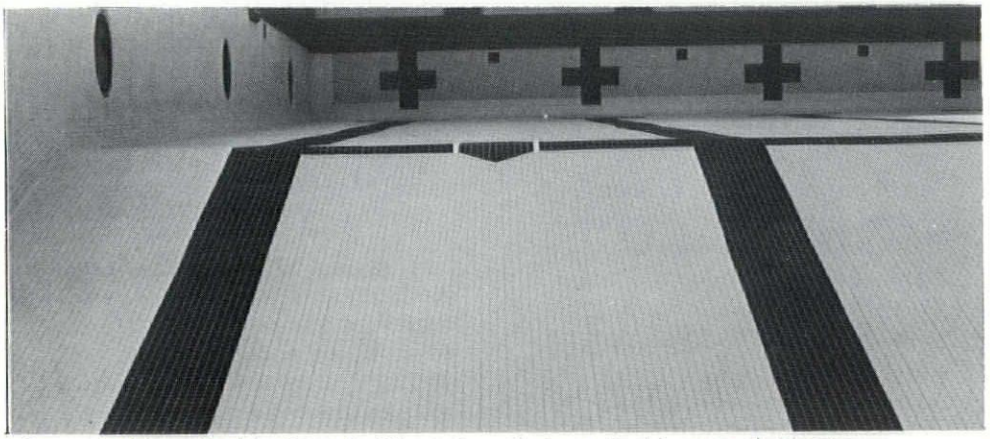
Guildset Craftsman beats Tile into setting bed for permanent installation.



Guildset Craftsman installs individual mitered Tiles for uniform finish.



Grouting completes installation of trouble-free Ceramic Tile.



After – pool has durable Ceramic Tile surface that won't chip or peel. Maintenance costs are cut and pool will look new for years.

Guildset TILING

OLD AS HISTORY – MODERN AS TOMORROW

MINNESOTA CERAMIC TILE INDUSTRY

perceptions of accountability is a dissatisfaction with all or part of education. Perceptions of accountability usually involve dollars in one way or another. A graphic illustration of concerns for fiscal accountability in public school matters is found in action of the 1971 Minnesota legislature. During that session legislation was enacted that sought to limit expenditures for pupil maintenance for all school districts in the state. Districts were charged to keep expenditures at $750.00 per pupil unit for the 1972-1973 school year.

Accountability in education must go beyond the narrow perspective of financial control or greater detail in financial records. The dictionary defines accountability as:

". . . the state of being accountable . . . giving an account . . . a statement of reasons . . . a reason giving rise to an action or other results."

The last phrase points to a proper focus for educational accountability — results! Accountability must begin with a description of obtainable results. Results are defined as what children learn or attain or acquire from being in school. Accountability in the sense of describing the educational product is a serious, crucial and generally missing element in contemporary education. All matters dealing with school management are rationally addressed when the product is known and understood.

There is an obvious intersection between accountability and curriculum development. The central focus of curriculum development must describe the three-part curriculum content learning outcomes for pupils. Curriculum becomes a dynamic, real substance only as children learn. Curriculum is not a static shopping list of knowledge. Curriculum links

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man's spirit, intellect and culture to an ordered body of knowledge. The responsibility of educators in curriculum development is to describe content as what students learn.

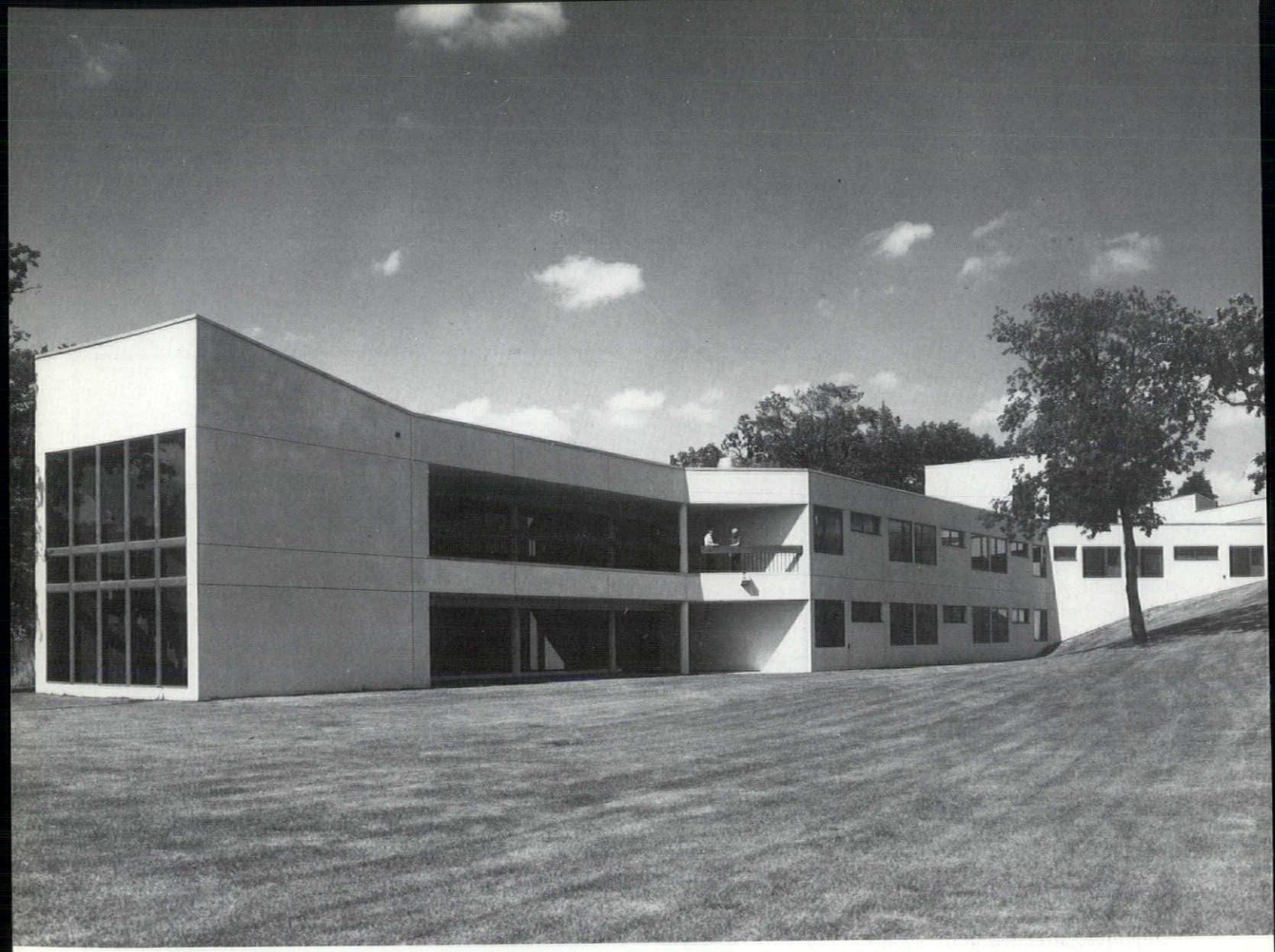
All matters associated with financial accounting, facility planning, staffing and other resource allocation begin with a clear description of what pupils will learn and how these learnings will be indicated. Only after the educational product has been defined can the cost of that product be assessed. Financial accounting or programmed accounting can be accomplished by systematic analysis of costs involved in reaching a specified and measured educational achievement.

The state of the pedagogical art is such that there are instruments and procedures available to assess pupil achievement in cognitive, affective and psychomotor domains. If a school district is dissatisfied with available devices, it is well within reasonable expectations for educational craftsmen to produce their own instruments to assess pupil achievement.

Education can no longer function behind a veil of mystical processes in the classroom. The old bromides of "Teaching" being too mysterious or complex or high level to examine are benchmarks of an uninformed past. Education can deal with challenges to its mission, its costs or its role only to the extent the total undertaking can precisely define its product.

Summary

Conventional wisdom holds education as a route to the good life. Recent writings of contemporary educators challenge that view. Education may be seen as an agency to prepare citizens for productive membership in an es-



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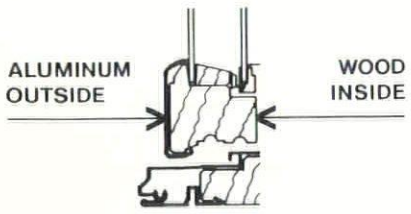

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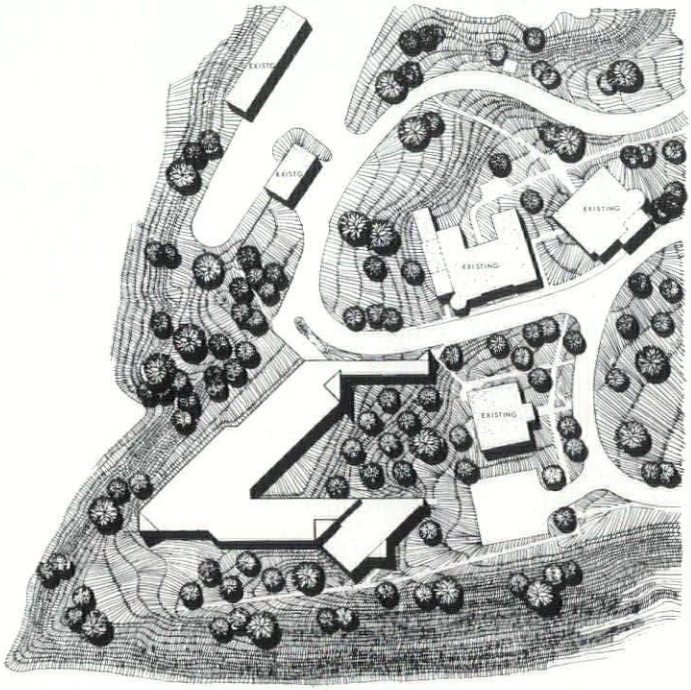

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tablished social order or as preparing citizens to produce a better social order. Two avenues were suggested for addressing this apparent dilemma. One involves a reoriented curriculum toward a three-dimensioned base. Such a curriculum would consist of content dealing with man's interaction with man, man's awareness of his individual growth and development and man's awareness and understanding of the physical environment that sustains life. Another avenue toward upgrading education involves moving it toward a product-oriented model. Education must describe its total function as what students learn during 12 years of instruction.

References

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2. ibid., p. 365.
3. Christopher Jencks and Mary Jo Bane, "The Schools and Equal Opportunity." *The Saturday Review; EDUCATION;* September 15, 1972, p. 40.
4. George Kneller, *Introduction to the Philosophy of Education*. Wiley and Sons, New York, 1964, p.95.
5. Michael Kirst and Decker Walker, "An Analysis of Curriculum Policy-Making." *Review of Educational Research;* Vol. 41, No. 5; December, 1971; p. 479 ff.
6. The 1971 legislature accepted $662.00 per pupil unit as a reasonable expenditure for state school districts during the 1970-1971 school year. Districts with expenditures exceeding that figure were called high spending districts. Districts spending less than $662.00 were called low spending districts. Two state aid formulas were prepared for the 1971-1973 biennium, one formula for low spending districts and one formula for high spending districts. The formula for low spending districts provided financial aid procedures to allow approximately 6% increase up to $750.00 by the 1972-1973 school year. The formula for high spending districts provided financial aid procedures to reduce spending toward $750.00 by the 1972-1973 school year. The formula for high spending districts provided financial aid procedures to reduce spending toward $ $750.00 per pupil unit. No specific date was established by the 1971 legislature to bring high spending districts to the per pupil level of $750.00. Because the law was for a two-year period, new schoool finance legislation will be drawn by the 1973 state legislature. It is likely the $750.00 per pupil expenditure spending limit will be increased.

   Conference with Donald F. Warkentien, Director of Business Services, Independent School District 196, Rosemount, Minn. 55068.
7. Merriam-Webster, *Webster's Seventh New Collegiate Dictionary*. C. C. Merriam Co., 1967, p. 6 ■

School Building in Minnesota

(Continued from page 259)

with the economics of operation and maintenance as well as the inital cost of the building.

Architects and school plant planners should also be concerned with another environmental factor in the design and construction of school buildings — noise pollution. Man's limited tolerance for noise above a certain decibel rate is too often not given enough consideration in school building design. We are not sure of the effect on man of the noise that has become almost inescapable but scientists report that animals "grow sullen, unresponsive, erratic or violent" when made to listen to noise. Schools have a need to be and can be insulated from outside noises which come from the sounds of sirens, airplanes, traffic, etc.

A slightly different but somewhat related need in the area of school construction is a standard, valid method of comparing school costs. Although the American Institute of Architects has a recommended procedure for computing building area and volume, many school districts use their own methods. In computing costs some school districts include site development, other districts exclude it. Some include furniture installed under the general contract as part of the construction cost, others exclude the cost of all furnishings and cabinet work. Some include carpeting and folding partitions.

Other methods of comparing school construction costs do not seem to be satisfactory either. Measures such as the cost per student and cost per classroom are said to be more exacting than dollars per square or cubic foot. However, if there is no agreement on what the cost per student or

the cost per classroom should be, there is no standard against which to compare these costs. Two schools can vary greatly in overall area, provide the same amount of teaching space and not be at all comparable in cost.

One must also be careful in comparing school building costs that the total cost figures used are comparable. Budget figures should be compared with budget figures, contract amounts with contract amounts and final costs with final costs. Unless this is done, valid cost comparisons are impossible.

My aim in writing this article was to draw attention to a number of general problem areas, to be considered by school people in the construction, operation and maintenance of school buildings in Minnesota, not necessarily to present a complete review of any specific area. If school districts can be made more aware of the long term implications, both economic and moral, of their decisions concerning initial school building construction costs my purpose will have been served. ■

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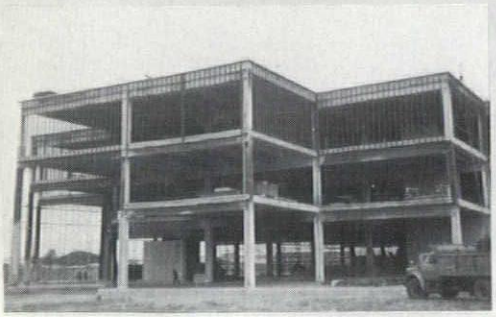

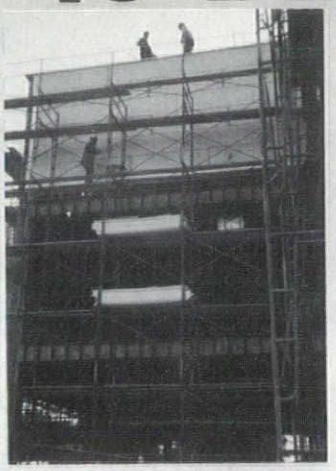

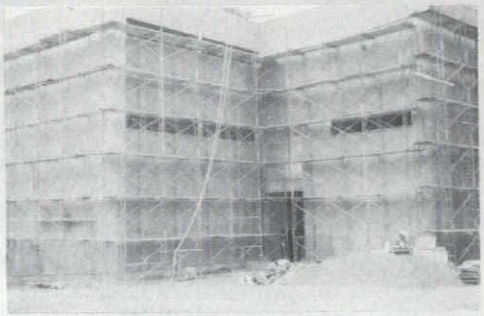

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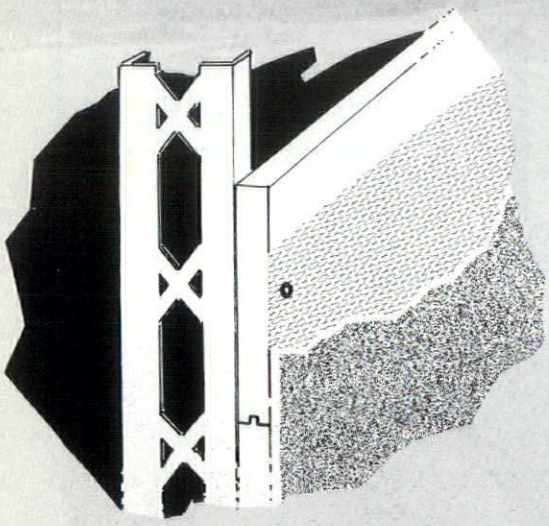

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School Construction Costs

(Continued from page 261)

by reviewing the reported costs with the project plans and specifications, which they have on file. This data is available to interested parties.

Why Are Unit Cost Figures Such as Cost per Square Foot and Cost per Pupil Not Reliable for Comparison Purposes?

The variables previously discussed, plus differences in the definition of "cost of the project," cause these unit cost figures to lack consistency. This can be seen in the following examples of possible site and building variables.

The size of the site and the amount of site work and improvements which are to be accomplished as part of the building construction cost. — Are there special site problems? Are there special utility extensions required? Are athletic fields and surfaced parking areas included in the construction costs?

The building itself, its program and its size — Is it new construction or an addition? Is provision made for future construction by oversizing certain systems and core facilities? What is the quality of interior finishes? What is the extent of educational equipment and special systems and are they part of the basic building cost? What is the degree of sophistication of the mechanical and electrical systems?

The square-foot costs reported on new high schools bid in the period 1970-1971 in Minnesota range from a low of $16.56 per square foot to a high of $27.56 per square foot. This range gives indication of the problem of making viable comparisons.

School construction costs will continue to invite evaluation and comparison. To make such comparisons valid, one must possess a complete knowledge of the projects being compared. Costs are affected by many variables, all of which must be analyzed. This evaluation should be done jointly by the owner-architect team.

To assist the owner-architect team in its evaluation of school construction costs, a more uniform method of recording data is

needed. A committee of the Minnesota Society of Architects is presently working with the Minnesota Department of Education toward the development of a more uniform system of cost reporting. It is the goal of this committee to create a standard reporting form which will be comprehensive. This proposed form will record basic cost data as well as identify variables which significantly contribute to the cost.

Inflation, unfortunately, has taken a large bite out of the tax dollar and it will continue to do so. In the past 10 years the rate of inflation has risen drastically. Nationally accepted cost indices indicate a rise of approximately 65% to 75%, most of it within the last five years.

Inflation places a new emphasis on proper planning. With costs continuing to rise, we must plan today for the future. Future building sites should be purchased well in advance of their actual need. Buildings must also be planned with sufficient flexibility to easily accommodate future expansion. This may mean a higher initial construction cost but it will save money in the long run.

A community should demand the construction of high quality buildings which meet its educational needs, both present and future. It is the challenge to all persons involved with building construction to work diligently toward a better understanding of the factors which determine construction costs and toward a utilization of this knowledge in an effort to further control these costs without reducing the quality of the buildings. ■

This article was researched and written by the Minnesota Society of Architects' School and College Architecture Subcommittee on Understanding Construction Costs, Robert Rietow, chairman, James Lindberg, Basil Filonowich, Peter Norum, Fredrick Christiansen and Thomas Hendrix.

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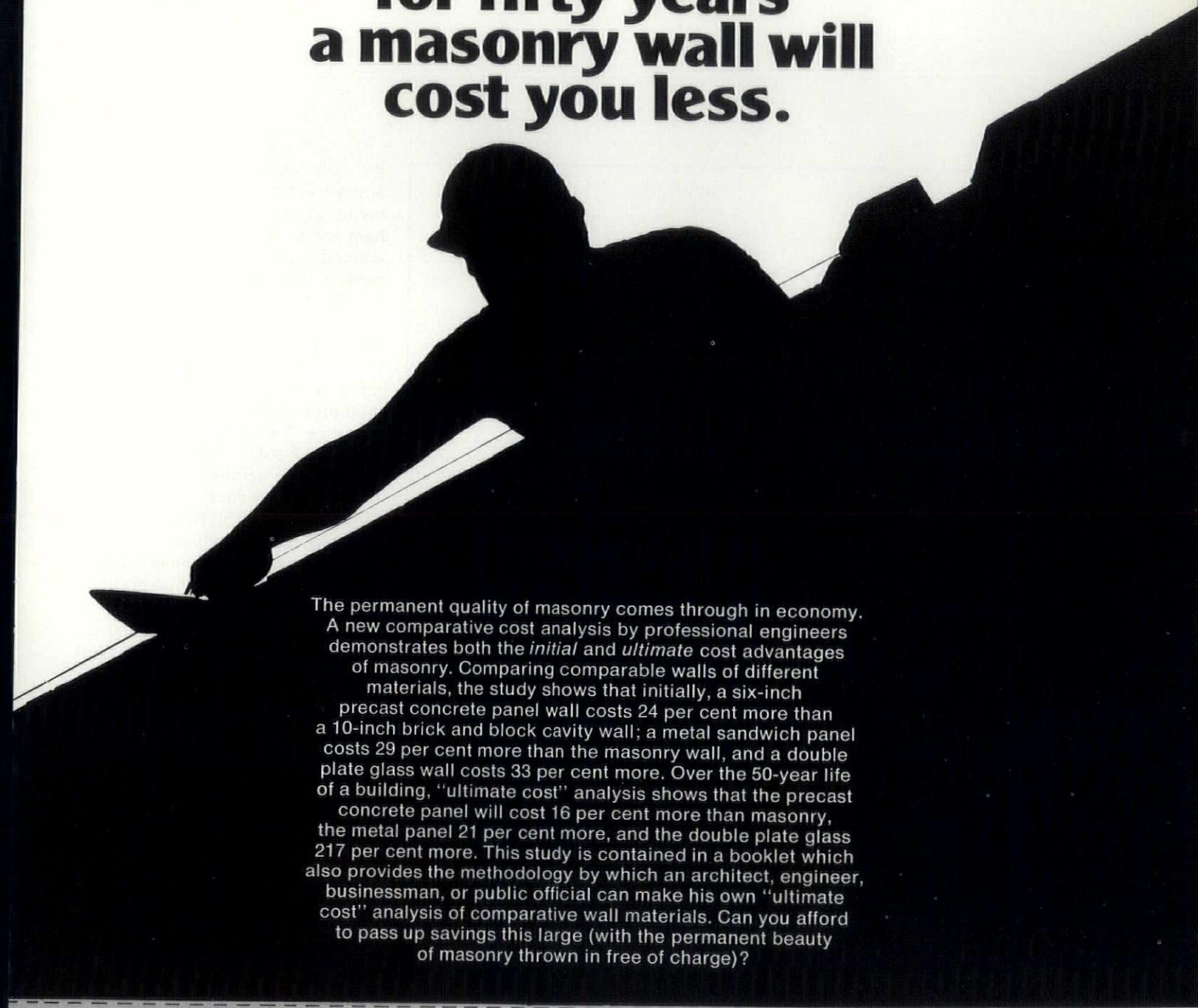

The permanent quality of masonry comes through in economy. A new comparative cost analysis by professional engineers demonstrates both the *initial* and *ultimate* cost advantages of masonry. Comparing comparable walls of different materials, the study shows that initially, a six-inch precast concrete panel wall costs 24 per cent more than a 10-inch brick and block cavity wall; a metal sandwich panel costs 29 per cent more than the masonry wall, and a double plate glass wall costs 33 per cent more. Over the 50-year life of a building, "ultimate cost" analysis shows that the precast concrete panel will cost 16 per cent more than masonry, the metal panel 21 per cent more, and the double plate glass 217 per cent more. This study is contained in a booklet which also provides the methodology by which an architect, engineer, businessman, or public official can make his own "ultimate cost" analysis of comparative wall materials. Can you afford to pass up savings this large (with the permanent beauty of masonry thrown in free of charge)?

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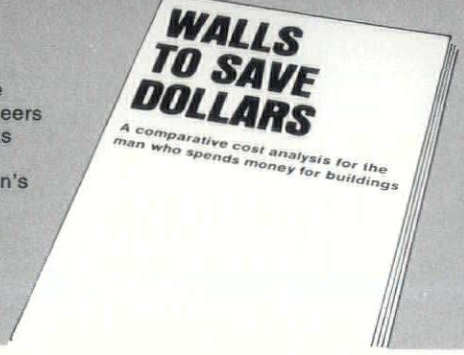

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Changes in School Design

(Continued from page 267)

the very least destroyed the archaic concept of the schoolhouse-as-monument and at the best led to rethinking of the basic concepts upon which plans for most of the world's educational buildings were based.

The most fundamental aspect of education in America is the result of our insistence that *every* child must go to school until he is well into or has completed adolescence. The philosophy of our system of public education can only be appreciated in relation to this significant fact — all children must be in school, blind children, crippled children, children with massive learning problems, hyperactive children, dull children, musical children, children with IQ's of 150 and 50.

The taxpayer, the grudging but generous, halting but intelligent butt of all jibes, the source of all progress, is about to realize that even as his father could drive his horse to water but not make him drink, so too can he insist that his children, and all other children, attend school but cannot *make* them profit by the experience. When this is seen with some clarity schoolhouses will change even more than they have in the past. Architects will be encouraged to make schoolhouses which are attractive and will be recommended because their talents have provided buildings which are pleasant, stimulating, carefully planned and budgeted. The three tenets of architecture — commodity, firmness and delight — will then all be equally applicable in judging the success of schoolhouses.

Elementary schools have reacted most visibly to educational change. They have until recently delivered their message through the solitary teacher who, in a room equipped for most of the

children's needs and interests, ministered to her ward of 25 or 30 children much as a benign ship captain might care for his passengers, secure in the knowledge that he ruled without fear of contradiction by them. The room was appropriately labeled the "self-contained classroom."

In the fifties educators recognized that the small classroom was inhibiting and that one teacher could not command or transmit all knowledge or techniques. Teachers began to work together in small groups to plan their instructional programs and to teach together in the classroom. Although elementary teachers were possibly the last group of professionals to combine their talents and to work together as a group, they began to specialize and to give students the advantage of their special skills.

The label *team teaching* was first applied to teams of two teachers working with up to 60 children. Now a much larger group of professionals, perhaps as many as seven or eight, under the leadership of one of them and assisted by a number of student interns and para-professionals, directs the activities of a much larger group of students. These groups no longer can be accommodated in the self-contained classroom; they require much larger rooms. The elementary school shown in the plan on page 266 is an example of new schools for larger teams. It is clearly derived from older forms of schools in that the beginning child enters his formal education via an isolated and independent kindergarten, progresses to another stage of experience (in a somewhat larger environment of some 200 students) for his next two years and finally to another pod

(containing space for about 450 students) for his last years. The school is at the same time radically different from previous schools in that at every level the staff is working in teams and the students in very large groups which divide into every kind of sub-groups as required. As in the older schools every attempt is made to deal with the student as an individual but here they are members of a large community with numerous adult leaders and helpers to identify with and seek help from, with a corresponding increase in their freedom and opportunity to react as individuals.

The environment in such an open-plan school (see page 265) is characterized by a great feeling of freedom and independence although it retains a sense of community. The vacant, sheet-metal lined hallways are gone, the locked doors and the walls they enclosed are gone. Furnishings take on great importance as they create much of the atmosphere — or much of the chaos, if not controlled. Landscaping becomes part of the indoor environment.

Acoustical control becomes extremely important. Spaces which are high noise generators, such as music rooms, gyms, locker areas and kitchens, are isolated as fully as possible. In open spaces every effort is made to avoid unnecessary noise. Heavy carpeting eliminates the sound of footsteps and furniture movement; it also absorbs much sound energy. Projector speakers are not used for group viewing. Instead the projector is plugged into an outlet which shunts its output to low sound level speakers in the ceiling and as much as possible individual equipment is used to enable either low speaker volumes or the

use of earphones. Air horn sounds can still be disturbing in the open school and every member of the school community needs to be aware of his own sound generation capabilities. Surprisingly, rooms with fewer than 150 persons in them are less successful than larger rooms and numbers, as the sounds from the larger number of individuals create a more random and constant sound spectrum.

Without the normal walls on which to hang chalk and tackboards, cupboards and cases, clocks, sinks and electric outlets, new techniques for providing them have been developed. The chalkboard is disappearing as lessons are dispensed via copy machines. Cupboards and cases are made self-standing and movable. Those on wheels seem to be so easily moved that the large spaces are always in disarray; recently, therefore, architects have been placing them on smooth plastic laminate bottoms instead of on wheels so their movement is more easily controlled. Clocks are of much less importance than before. One properly placed takes the place of four. Electric power and signals can be brought through underfloor conduits to almost any location. Since few schools seem willing to cut their carpets to install outlets, recent schools are utilizing "telephone poles," 2" x 2" or similar tubes reaching to ceiling locations and easily relocated. Access to sinks and their associated waste and vent systems must be carefully planned. It is desirable to provide a substantial amount of redundancy in these systems to permit future change.

At the high school level, a second-generation of schoolhouses is

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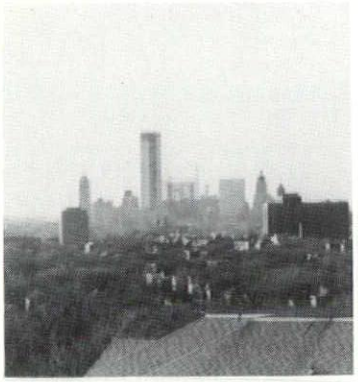

Closeup of IDS Building

The spectacular IDS Building in Minneapolis is a striking accent on that city's well known skyline. Interest in the structure as it was being built was keen and it has increased with completion. The towering design speaks of fascinating features contained within.

Because of this widespread interest in the IDS Building Northwest Architect will in the spring of 1973 publish a special publication in co-operation with the Minnesota Society of Architects. Printed in four colors, this publication will present in depth the many features of the new structure.

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Architects as Educators

(Continued from page 265)

now being occupied
The first generation of high schools really began early in this century. They were different from elementary schools only in two ways: they were larger and they contained a greater variety of spaces.

The building has become an educational shopping center with a central mall or "Main Street" surrounded by specialty shops offering educational opportunities in various areas of specialization, such as communications, sciences or literature (see page 267). The "specialty shops," again as in a shopping center, are planned to receive new tenants as old ones lose their leases. To assist in such future changes the areas are made as large as reason and code will allow, equipped with demountable or disposable partitions based on a repetitive module related to user needs and so arranged that power, atmosphere and waste requirements can be satisfied at any module. As a student moves from space to space throughout the day the " specialty shop" area is considered as a piece of universal space subject to frequent change. The Main Street becomes the integrating experience, the community space, and is given much natural light and animation.

This building, like the elementary school, houses *all* of our children, every one of whom is considered as an individual capable of "success" in relation to his abilities. The building therefore can become a powerful tool in assisting the educational process. Not only does the high school building provide space where education in an extremely wide variety of subjects can be offered, it must also be attractive and pleasant. ■

adaptable to tomorrow's changes. Therefore, it is incumbent upon the architect to consider how the building will operate in the future and how it will adapt to an ever changing educational philosophy. Often, though, educational techniques benefit from the stimulation of innovation by architects and it sometimes becomes the architect's responsibility to present and demonstrate how an educational technique can best utilize space. The architect sometimes must lead or expand the educator's vision to develop the very best solution.

The master plan is a framework into which the future becomes molded. The architect's responsibility is to allow the future into his plans. Architects must consid-

er the needs of the whole community.

Education may be everybody's business but the responsibility for planning school facilities belongs to the school board. It is the school board, in the public interest, which makes the final decisions. Board members choose the architect(s) whom they feel will best satisfy the needs. The selection of an architect should be based generally on performance and ability, motivation and ethics. Selection should never be made on the basis of political influence or public relations. The architect can best present himself to a school board by giving its members facts. Some of the concerns school boards have are past performance and how specific programs were effected and innovated by the architect, the architect's techincal competency necessary to provide the service, the architect's ability to meet economic and time requirements and past clients' references.

Architects should never be concerned about admitting to an error. Architects should be willing to help correct an error with a minimum of burden to the user. An architect should never remove himself from the responsibility of

School Buildings for People

(Continued from page 268)

assuring the owner that a building is built as designed. A good example comes from a recent principals' meeting's notes concerning a particular high school:

"We call attention to the fact that (Hypothetical) High School was opened in a state of incompletion in 1972 and remains incomplete. The lack of ventilation and climate control is reinforced on every moderately warm spring or fall day when room temperatures range from 85° to 90°, with accompanying high humidity and stagnant and fetid air. The use of more than 100 portable fans does little but stir the air and the noise adds to the difficulty of conducting classes. The 13 windowless rooms become almost unbearable. Our students and teachers deserve a climate conducive to learning."

The responsibility may not have been the architect's alone — often a school board will be forced to reduce project budgets and allow a minimum system to be designed but it becomes the architect's responsibility to present the school board with this information as well as alternatives for their decision.

How we look at each other will often depend upon how we look at our environment and schools must be human places which "turn us on" to the excitement of learning. ■

cate that, in general, people are happiest in spaces that have been *designed* with "sensitivity to human needs," including "artistic" awareness. Also every person desires the opportunity of directing his own environment to some degree. This extends from the baby who just wants to roll over and see the space differently to the graduate student who wants the opportunity of arranging his own little study alcove. It is not only possible but economical to provide for his human need in school buildings! Economical because school buildings are such a small portion of the educational budget. People-costs (salaries) are the largest (and should be) but these costs are wasted if the people aren't happy. If people can be made happy by allowing their participation in the design of schools, that in itself is a good enough reason to provide for it. The business executive arranges his office environment pretty much the way he wishes. Why can't a student or teacher do the same? Change in human productivity may not be measurable in *either* case *but* just ask the people whether they would be happier if they "did it themselves!" The constraints on the company executives are usually imposed by costs, business operations, codes and so forth. The restraints on students and school staff should only be those imposed by cost, function, safety regulations and freedom from encroachment. The average expenditure for raw capital for industrial-commercial buildings is about 7% of their total operating budget. The same figure for the average Minnesota school district is about 4%. (The total spent for debt service and capital outlay in schools averages about 10%.) Many school districts are under-capitalized to the point that some buildings are downright unsafe.

Schools are often designed with little or no occupant participation around traditional models and with minimum thought given to the physical *activities* that actually take place within the spaces or the *need* for beauty. Perhaps these reasons, rather than the low capitalization, is why school buildings are so often inflexible, drab and, most importantly, not even functional. (Unused school buildings are called "White Elephants" because they are inflexible, uneconomical to use and ugly.)

There are buildings being built in Minnesota in 1972 which, except for a few "technical" improvements, are essentially the same as school buildings built 50 years ago because educators, as well as architects, substitute stylistic change for real change and new euphemisms for honest response to human needs. Since it is the designer's job to help others fulfull their needs, they must take the trouble to understand and articulate those needs so truly responsive solutions can be found. Man-made environments can create more happiness. To some degree every person needs physical comfort, beauty (mental comfort) and the opportunity for self direction. ■

Architect and New Methods

(Continued from page 263)

The most usual compensation method at the present time for architectural services is based on a percentage of the construction cost of the project. Other methods of compensation are based on direct personnel costs (hourly charges plus reimbursable expenses), a professional fee plus expenses, a fixed sum, a combination of the above methods or a per diem or hourly rate.

Architectural services are also available to a client on fragmented or consulting basis in any area of the architect's practice.

Unquestionably there is a trend developing which has been used in other sections of the country in the construction and school design industry in which designing and construction elements are "telescoped" into an overlapping rather than a sequential process in the interest of time saving. These approaches are being tried with varying degrees of success in our immediate area. However, requirements for public bidding and the generally accepted concept of controlled cost within a budget of approved funds have been deterents to applying the new "free wheeling" approaches to public school construction in Minnesota. This is particularly true in the majority of projects which involve only one building. Multi-building school projects do allow for some latitude in the shifting of funds from one unit to another within the framework of an approved bond issue.

The three prevalent systems are as follows:

1. *Fast Tracking* — Simultaneous design and construction process. Segments of the project are bid and construction started while the planning and designing are still being worked on. Although there is currently a great deal of discussion of "fast tracking," the majority of school construction in

St. Cloud High School, St. Cloud
Architects: Traynor and Hermanson, Architects, St. Cloud

Minnesota, because of its size, does not lend itself to this system.

However, the method is being and has been used with varying degrees of success on a number of projects in the state. A most notable recent example is the County Center being constructed for Hennepin County in Minneapolis.

A fast track system must justify itself by a saving of time and money. It is questionable whether a public school project in our area could be justified, given present construction market conditions, unless it were in the multi-million dollar range.

Fast tracking is justified on the basis of time saving toward occupancy. During a period of high economy and construction activity, such as we experienced four years ago, costs were scaling upward at approximately 1% per month. Obviously a speed-up in the occupancy of a building saved 6% in accelerated construction costs in six months.

However, today the upward construction cost spiral has been reduced to half or less than 1/2% per month. It then follows that at least half of the economic advantage has now been removed.

There are three considerations which each school district and its architect must resolve before implementing the fast tracking method: (1) the value placed on earlier occupancy of the educational space, (2) will fast tracking actually save time, particularly, considering local building codes and the limited building season and (3) can the project be completed within the legally available monies?

2. *Systems Building* — A construction approach which is generally based on a performance type specification requiring suppliers to bid building components which comply with the specifications and relate properly to each other when erected. A prime contractor (or contractors) is assigned successful component bidders for coordination and total responsibility for erection and operational function.

Minor variations have been adapted from this system.

Again, an exact evaluation of the system has not been made in public school construction for this area. Perhaps the only definitive answer at this time to the question of advantages or disadvan-

Lyndale Elementary School, Minneapolis
Architects: Graffudener, Berreau & Associates, Minneapolis

Design for Learning

(Continued from page 272)

tages of this method would be obtained if two school projects with identical educational specifications were bid and built, one by present conventional methods and one using a total systems building method.

It appears, however, that this system presently would be economically adaptable only to larger projects in close proximity to the metropolitan area because bidding interest would be minimal on moderate or small sized projects and coordination costs on a smaller project would be disproportionate.

A fragmented, or partial system, approach has been used successfully by a number of the architectural firms which are doing educational work in the state. It appears that the systems approach may increase in usage as added impetus is given by manufacturers, on the one hand, area planners on the other and as contractors adjust their operations.

3 Turn Key — Total responsibility resides in one party. He provides the complete package — design, coordination and construction — and upon conclusion of the project he literally turns over to the client the key of an operable building for a fixed price.

Although this approach has been used occasionally in the state for auxiliary buildings, such as garages and temporary classroom units, it has not been attempted for more complex educational structures.

In all cases the first priority must be placed on careful planning. Progressive thinking generates new ideas — this will most certainly be the case in the future evolution of school plant design and construction. ■

1972) provides some data about design operants on human behavior. Two separate classrooms of students with similar abilities were presented with various learning tasks. In one the teacher was annoyed because students talked continually and were not working individually. Although the project appeared to be worthwhile and interesting, the children were distracted and learning tasks seemed to go unrealized. Yet the learning activities in the other classroom were readily accepted and students completed projects with enthusiasm.

A comparison of the two groups revealed some striking contrasts of design in the two rooms. In both there was a bright, colorful decor and variety of furniture. In the classroom S (satisfactory), however, the seating arrangements permitted only two or three children sitting together at a desk cluster. The other room D (classroom difficulty) had a typical desk row arrangement of 12 students. In the rooms two or three tasks were performed concomitantly. In D the concentration was difficult and noise volume and visual-access inference were disruptive. In S children worked at individualized projects with lower degrees of distraction. A number of two-tiered desks and individual study areas in corners of the room were available in S. However, in D students engaged in social conversation continually since the large cluster seemed to physically cue them to social behavior.

The S classroom also had several cubicles for private spaces. The total room arrangement allowed various levels of different activity with great mobility and a minimum of distraction. The architecture in S appeared to support desired behavior and reduce the probability of occurrence of inappropriate behavior. In classroom D, on the other hand, the teacher stated one set of objectives; the design encouraged another.

It is not to say that the physical space is the sole or even major determinant to behavior. However, if students have to work against their environment, it is an unnecessary obstacle.

Nationally the basic schoolhouse design has not altered radically in the 1900's. The small town one-room schoolhouse was simply a magnified cluster arrangement in large cities. Through the 1950's traditional scheduling dominated design. (Students attended classes four out of six-hour blocks, ate lunch for one and had study hall for the other.) They were structured in classes of 25-30 persons for their total school time. The advent of modular scheduling and school within a school concept in the 60's created the need for spaces to accommodate large groups (100-400 persons), medium groups (20-30, the standard room size) and small group rooms (5-10 persons). Yet the large blocks of unstructured time for students have recently caused modular scheduling to be scrutinized anew. The medium-size class was recognized as the most effective and it is back to where it all started. Ironically, the little room schoolhouse again appears as a model with its various levels of activity and individual projects contained in one room. In this situation the brighter students often tutor others and various learning tasks are initiated simultaneously. Of course the little red schoolhouse means most

of all individualized learning experiences.

The recognition of the individual is the one constant of educational philosophies that will continue to influence design. Realistically, however, with school aid being given on a per student basis, the 20-30 classroom size will most likely be maintained.

The disparity between individual instruction and groups of 30 can be overcome by the room's built-in flexibility. It must be adaptable to the different activities of lecture, individual work and class discussion. Small groups must be able to work together but working amidst several other small groups. The room must also provide private spaces and the possibility for separation for individual study.

Finally, architecture itself can help state objectives. The school design which can deliberately promote full development of the human potential is the ideal schoolhouse. As in the past, it should invite students to listen, learn and discover. The well-designed physical environment will not create — singularly — the ideal school but it does not seem likely that the ideal can exist without it. ■

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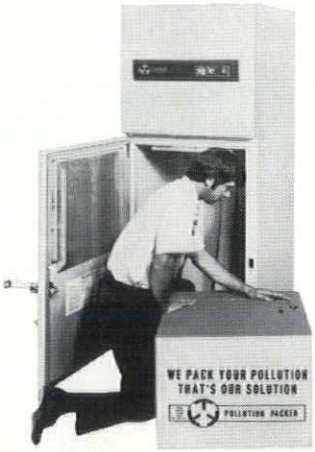

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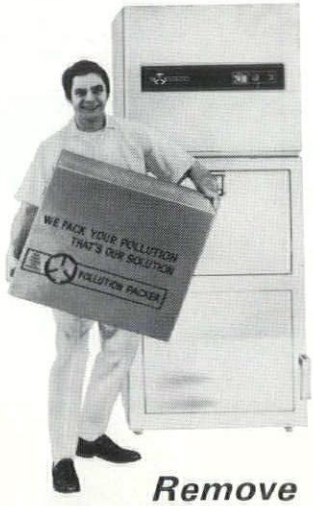

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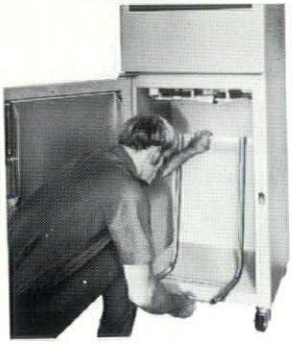

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SECRETS OF THE GREAT PYRAMID

By Peter Tompkins, with an appendix by Livio Catullo Stecchini. Harper and Row, New York, 1971, $12.50

Reviewed by **Rosamond Tryon**

Ms. Tryon is a freelance writer long associated with the architectural profession.

Here is a fascinating and provocative book for leisure reading, which is an odd thing to say about a supposedly serious and exhaustive study of a very technical subject. Secrets of the Great Pyramid is a handsomely printed and lavishly illustrated study of the search for the hidden meaning and purpose of the Great Pyramid, generally assumed by Egyptologists (and readers of Banister Fletcher) to have been built as a mausoleum for Cheops (or Khufu), the second king of the Fourth Dynasty, about 4,500 years ago.

The account starts with fragments of ancient references to the pyramid, including Pliny's account of Roman tourists watching the natives "gambolling up the polished sides." It recounts the more serious explorations in the 9th century of Abdullah Al Mamun, son of Harun Al-Rashid, and of scores of determined men who succeeded him over the centuries, from commercial grave robbers to crackpot fanatics, to distinguished scientists such as Flinders Petrie, who in 1880 spent many months making precise measurements of the pyramid, often in his underwear or less in order to keep nosy Victorian tourists at bay. Whatev- their motives, these men were uniformly intrepid and energetic, wriggling through noisome narrow passages over piles of bat dung, digging through solid stone for weeks only to find themselves at a dead end and working long hours in the stifling, stinking and

unventilated air of the interior chambers.

Tompkins also covers the theories developed over the centuries about the pyramids, from complicated mathematical speculations about various ancient units of measurement to the claim of an M. Bovis that the mere *shape* of a pyramid encourages the mumification of dead bodies placed therein. Seldom anticipating the next stage, either physical or theoretical, in his narrative, Tompkins has given his really very detailed and potentially boring story a fine sense of mystery and suspense as new passages are discovered, new theories proposed and tested.

The text is explained and illustrated by many specially drawn, very clear, annotated diagrams and by a fascinating collection of more than 300 engravings, drawings and photographs, many of them taken from old books or manuscripts.There are the earliest photographs taken of various interior chambers. There are a multi-

tude of drawings made by Napoleon's artists during his expedition in Egypt, including a sketch by Napoleon himself. By far the most charming are the tourist pictures — a group of 17th century Europeans with turbaned servants, trotting by on donkeys, an elegant lady being boosted up a great block by Arab guides, Ulysses S. Grant and a large entourage posing stiffly in the sweltering heat and selfconsciously for a long exposure. In the background of all are the pyramids and the Sphinx, deserted for the most part, surrounded and partially covered by drifted sand and debris, a perpetually astonishing sight.

Secrets of the Pyramids, published at $12.50, is an elegant and not unreasonably expensive coffee-table book. It is fascinating for both browsing and reading. It claims, however, to be a serious study of its subject and this claim is not easy to validate or deny. Obviously Tompkins has covered a fantastic amount of ground in great detail, his bibliography is long, his vocabulary and command of mathematical principles etc. are impressive, at least to a layman, and the appendix on the relation of ament measure to the pyramid, written by Professor Stecchini of Weldin Patterson College, adds a scholarly cachet.

On the other hand, specific facts, statements, claims and illustrations are for the most part left completely undocumented, and there is an indiscriminate jumbling of the serious, the trivial and the frankly preposterous. Tompkins' style is journalistic-Sunday-supplement-expository and there is a detectable air of mystical innuendo and inference which, while it adds to the fun, somewhat detracts from the credibility.

Tompkins has a very definite, and apparently highly debatable,

point of view to present. His thesis, shared by many enthusiasts throughout history, is that the pyramids, far from being the tombs of kings, were something more like the tools of priests and scientists — that they were highly sophisticated scientific structures for the observation and prediction of astronomical data and events, models for recording and preserving earth-related measurements and refined mathematical concepts and highly accurate devices for measuring time and space. This means at the least that the very ancient Egyptians had a much more highly developed knowledge of mathematics, astronomy, geography and geodetics than is generally supposed and at the most that some sort of occult or extraterrestrial influences were at work.

Whatever the truth of all this, it is marvelously interesting to read about, a fascinating substitute for detective stories and, I should think, of particular interest to architects, engineers and mathematicians, to say nothing of amateur astrologers and other would-be initiates. ■

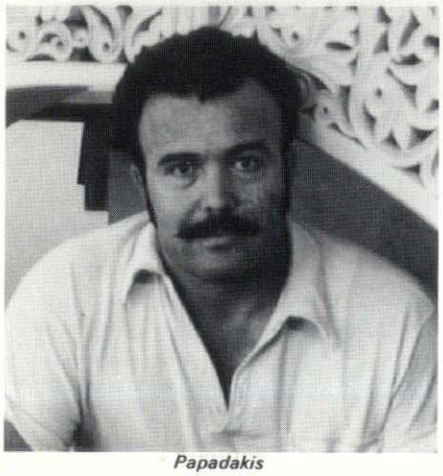
Wood Carver Originates Designs "in Style"

Complete familiarity with the essentials which go into a style has enabled Konstantinos Papadakis, Minneapolis wood carver, to produce outstanding works whose detailing is original. The finished work, however, is truly in Byzantine, Romanesque, Renaissance or other style.

When Mr. Papadakis was nine, back in his home on the island of Crete, he saw a wood carver at work and was enthralled by his skill and the carvings he produced. He haunted that man until his interest aroused the wood carver's sympathy and he told the lad to practice carving in chalk. After using this soft material to develop basic skill, the Papadakis family moved to Athens so the apprenticeship could be developed in school there.

When he was 14 Mr. Papadakis became a professional carver, competing with some 150 other wood workers in Athens. He came to the United States and to the Twin Cities in 1966, seeking to revive interest in wood carving here because there were so few doing this kind of work.

For several years he worked in his home, then opened his present shop in August of 1971. In true Greek manner, the shop was blessed, a ceremony in the shop itself which is followed for all businesses in Greece.



Papadakis

The iconostasion

Many of the projects completed in recent years are very large. The iconostasion and epitaphio now being completed for St. Michael's Eastern Orthodox Church in Louisville, Ky., is one of the largest Byzantine altar works ever done in the United States. The iconostasion is larger than the 14 1/2x25-foot altar screen completed some time ago for the church in Dauphin, Canada. These screens separate the nave from the altar area and have designed into them areas for the church icons. There are also three symbolic doors used during ceremonies.

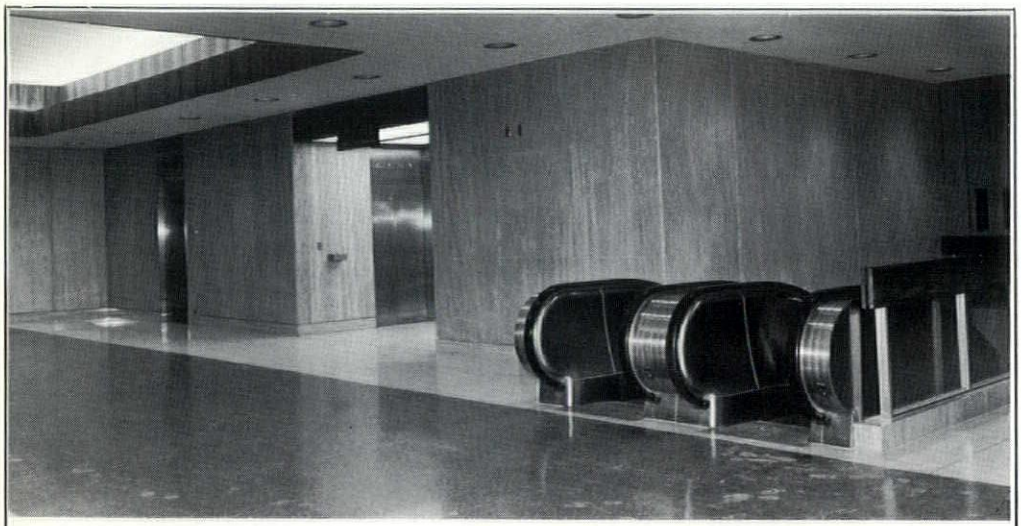
Almost all of the work is done in linden (basswood) and in his work Mr. Papadakis uses an assortment of some 300 special tools. He supervises the installation of the works, some of which take as long as a year to complete. Currently he has two apprentices studying and working with him. Gold leaf and color are used to accent the naturally rich tones of the wood.

This artist creates his own works, sketching first, then transfering creation to the wood itself, which also acts as an inspiration. He feels that copying from other works makes for a loss of freshness, the result looking machine made. It was this that also attracted him to this part of the country for he recognized in people here a liking for hand made things and appreciation of skilled workmanship.

The man himself is well represented in his handclasp — gently strong as it speaks of powerful skill in working with a demanding medium. His work day is long, 12 to as many as 16 hours as he meets the needs of his clients among architects and others in the construction field. In addition to his carving he finds some time to teach and has made a number of television appearances to encourage a resurgence of interest in original carvings in wood. ■

Glen Mar Hutchinson Joins Producers' Council

Newest member of the Minnesota-Dakotas Chapter of the Producers' Council is the Glen Mar Hutchinson Company, Minneapolis, which represents Hough Manufacturing Co., makers of folding doors and walls. John Staum will represent the new member at PC, Glen Lien and Cik Matson being alternates. ■



profile

A healthy improvement in the construction industry, indicated by enlargement of architects' staffs, etc., is seen as 1973's opportunities appear on the horizon. This feeling, according to Rollin B. Child, well known in the field of ceramic tile and now building up his company's carpeting lines, is general.

Very active through many years in the Producers' Council and Construction Specifications Institute, Child was charter secretary-treasurer of the CSI chapter and a member a year before the chapter was formed. He considers specifiers vital keys in the industry and has created a company program to keep them abreast of everything new in tile and carpeting.

Child has been associated with the Romany Spartan trademark for many years. He firmly believes in an established trademark and plans such a reputation for his new line of Childcrest carpeting.

For many years he was chairman of the Hopkins, Minn., school board and presently is vice-chairman of the board of Chapel View Nursing Home.

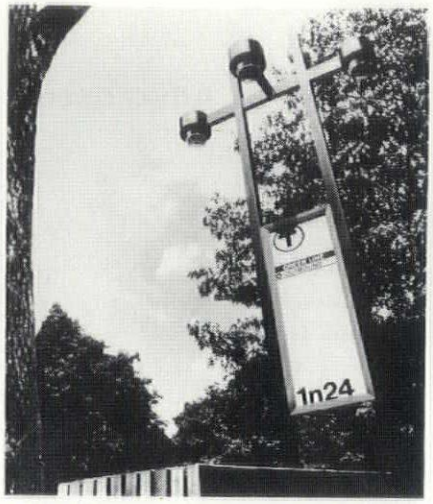
New Products

When you write for information say you saw it in Northwest Architect

Vincent

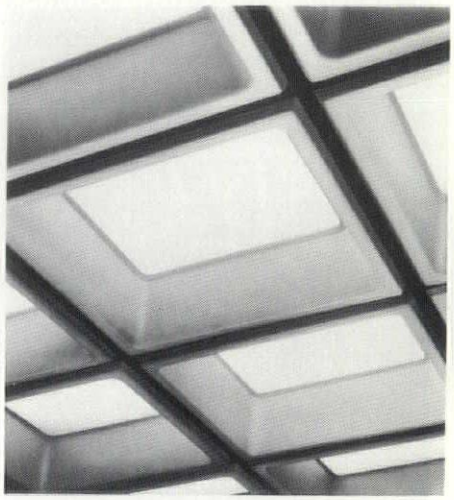
Vincent's Colorklad Is Unique New Material

New and unique is the maker's description of Colorklad, "super-tough" coated steel sheet recently announced by Vincent Brass & Aluminum Company, Minneapolis. Coating is of fluorocarbon-kynar, according to T. A. Patterson, Vincent sales vice-president. "Finish is practically indestructible . . . no additional maintenance for at least 20 years and we offer a warranty free on request to back this up." It is available also from Snow-Larson, 204 Humboldt Ave., No., Minneapolis. ■



Luminaires/Street Furniture Reported from Spaulding

Thirteen lighting groups and five street furniture concepts make up the new Designer Group of J. H. Spaulding Co. Luminaires give choices from low wattage acrylic spheres etc., to 1,000-watt area lights. Aluminum, wood and steel poles and brackets add to versatility in design. Colors are available in good variety. Maker reported these ideal for many situations in residential and commercial areas. Spaulding's address is 3731 Dirr St., Cincinnati, Ohio 45223. ■

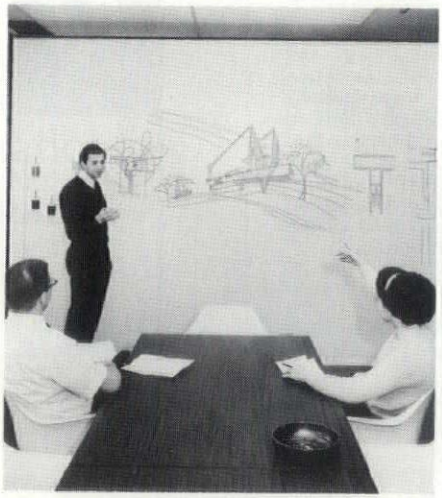


One-piece Coffer Ceiling Is All-acrylic

A one-piece, sculptured, low-brightness light source ceiling which meets Uniform Building Code requirements for luminous ceilings has been announced by United Lighting and Ceiling Corp. Modules come 2x2 feet and 5x5 feet; they are gray-white, gold and aluminum in color and "produce a stately pattern on the ceiling." Collars provide a "color and comfort" shield for diffusers above the ceiling plane. United's address is 513 Independent Road, Oakland, Cal. 94621. ■

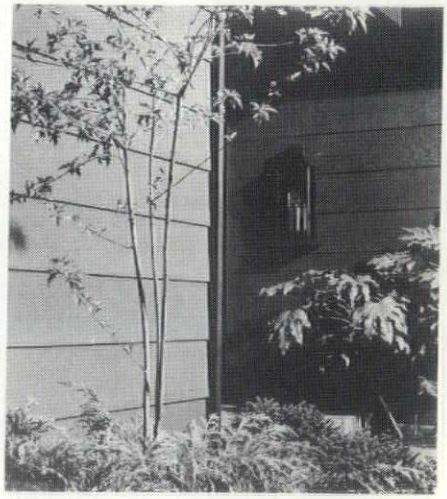
Bradley Tapeswitch Foot Control on Fountains

Virtually flush with the floor, a new tapeswitch for wash fountains has been developed by Bradley Corporation. It streamlines appearance of the fountain and aids in mopping around its base. A solenoid replaces conventional mechanical linkage. To operate, the user stands on a flat plate assembly, close enough for normal washing. Available in all types and sizes, added details can be had from Bradley at P. O. Box 309, Menomonee Falls, Wis. 53051. ■



Marker Board Offers Versatile Surface

Watercolor pens and crayons are used on a new "no-chalk chalkboard" distributed by W. E. Neal Slate Co. Marker Board, which is its trademark, has a surface from which non-permanent markings can be erased with a damp sponge; semi-permanent markings disappear with solvent or ordinary cleanser. The surface can also be used for projection and the board is used in frames, mobile units, etc. Details can be had from Neal Co., 7975 Wallace Rd., Eden Prairie, Minn. 55343. ■



Boise Cascade Broadens Siding Selection

Textured Insulite Siding, hardboard siding with deep textured wood grain surface, is now available factory stained in russet and gold. Provided in 4x8 and 4x9 panels in vertical grooved and reverse board-and-batten patterns and 12"x16' horizontal lap, the face is tung-tempered for added toughness. Low maintenance and neat appearance enhance appeal of the material, maker Boise Cascade said. Address is Timber & Building Materials Group, P.O. Box 2885, Portland, Ore. 97208. ■

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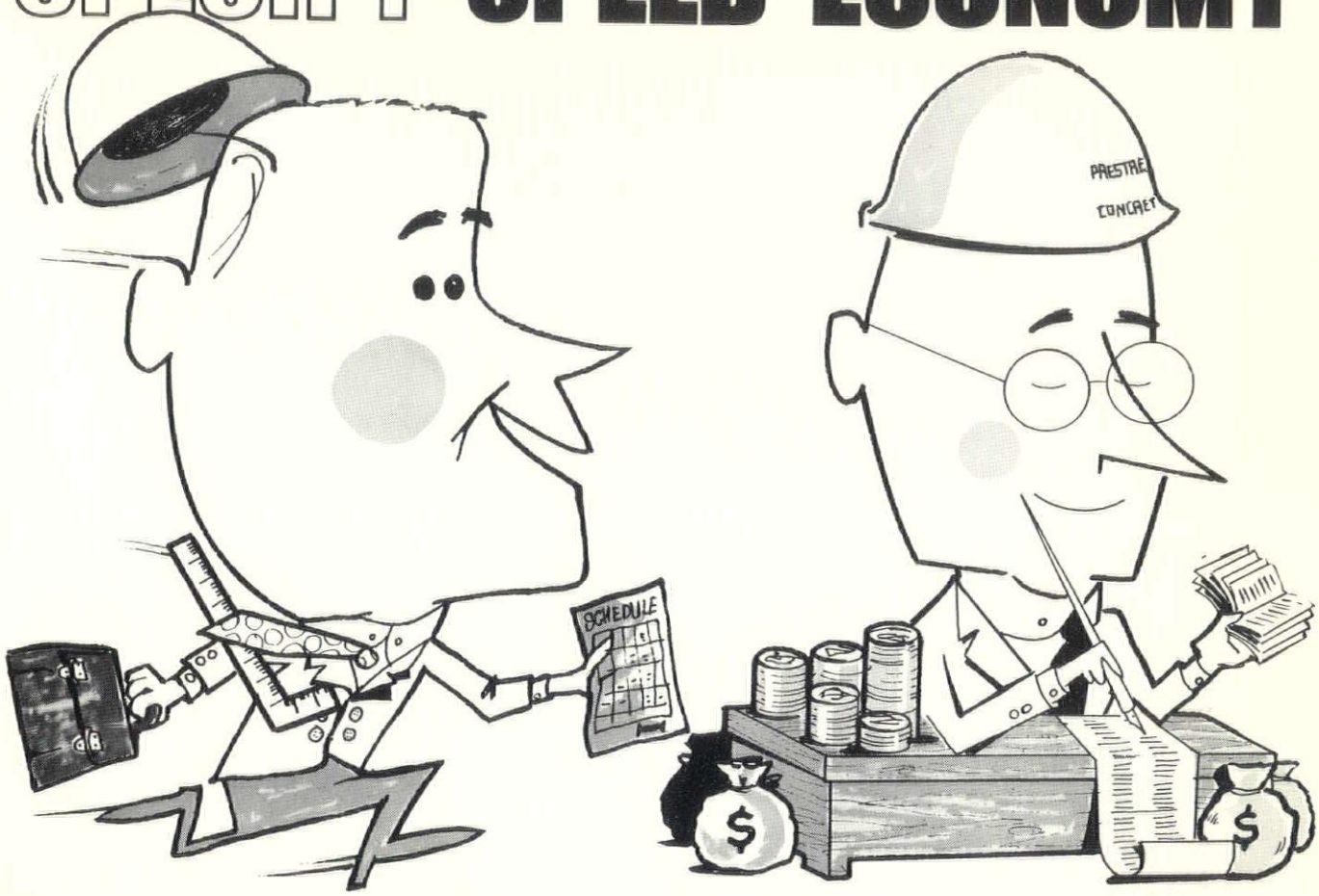

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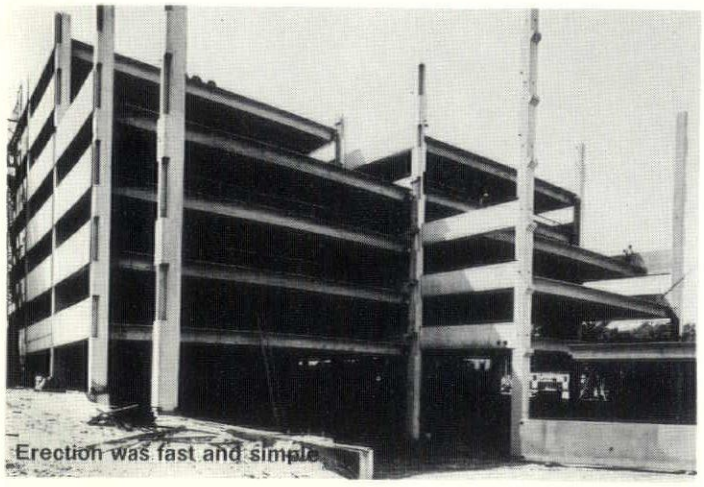
The project—North Memorial Hospital's 600 car parking ramp. The method—the Systems Approach accomplished with precast prestressed concrete double tee floor slabs, columns, facia beams and spandrels—all fabricated off the job site. Over 700 precast pieces were fabricated independent of high-priced on-site construction cost factors. Pieces were delivered to the site as needed for erection. The result—an esthetically pleasing, highly functional parking ramp at a cost of less than $3.00 per square foot for precast structure.



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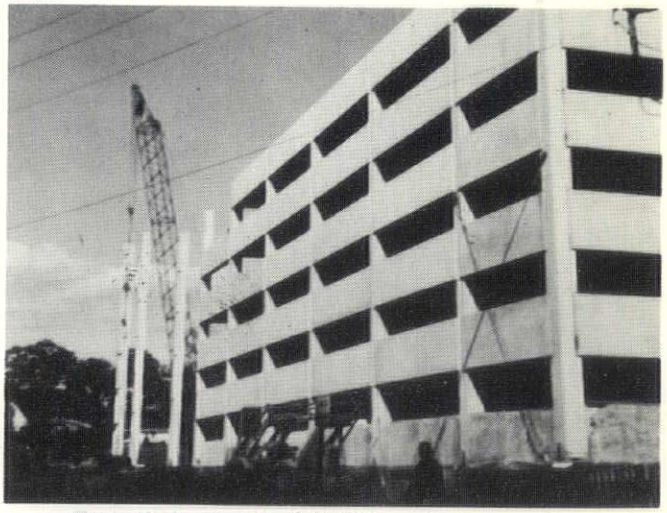

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