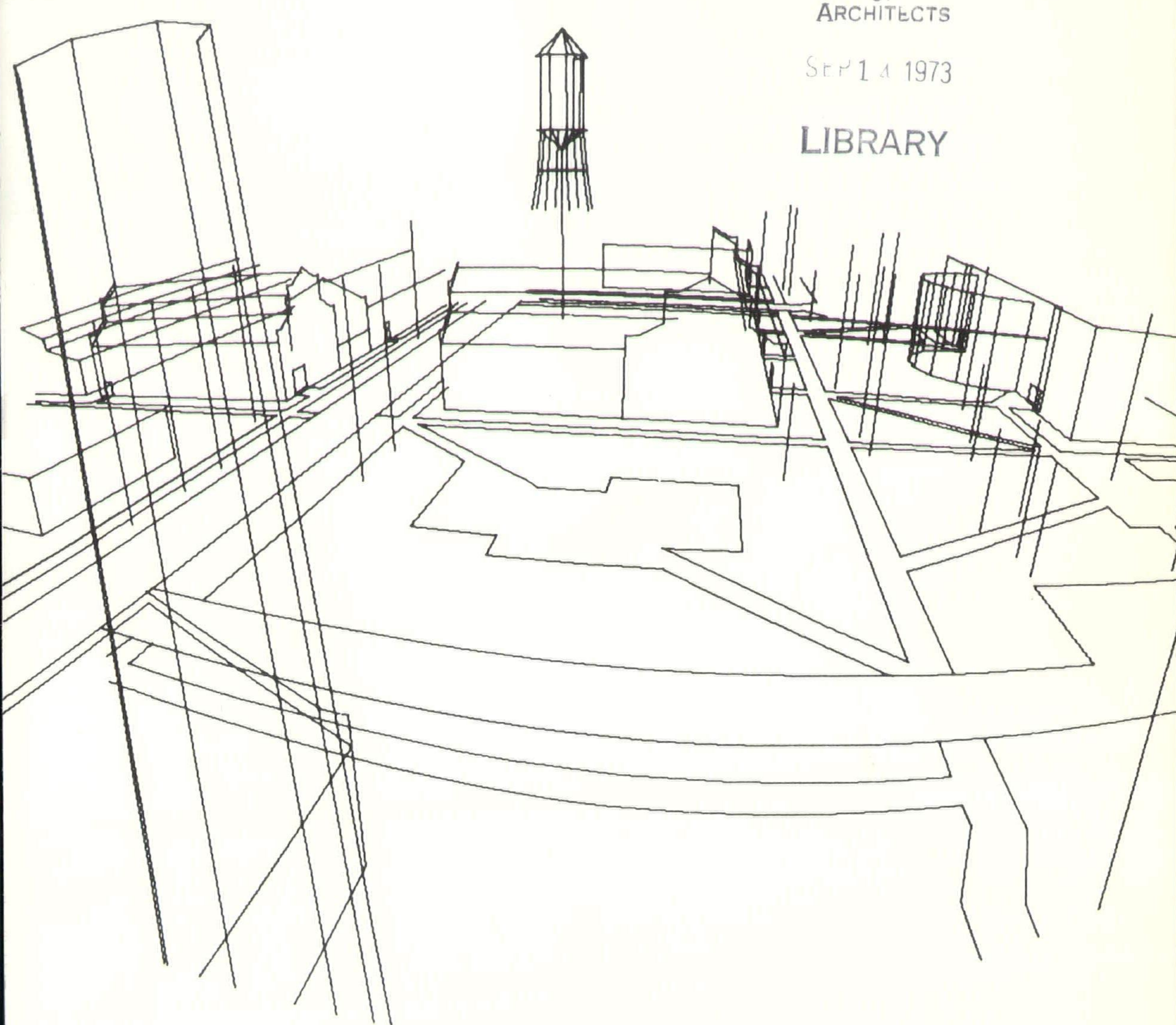
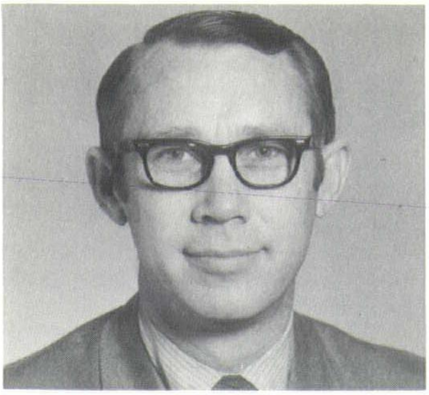


IOWA ARCHITECT

JULY/AUGUST/SEPTEMBER 1973

Editorial



Martin D. Gehner

Much has been said and written about the changing profession of Architecture. Observers are quick to identify change for its own sake without due consideration for dealing with the core of the problem.

Isaac Newton's legendary apple has been falling for some three centuries. The account of Newton's gravity inspiration by the fall of the apple might be looked upon as an architectural myth. An apple ready to fall is presumably ripe, shapely, colored, textured, and potentially tasty. These traits are precisely those most likely to be ignored with simplistic emphasis on the mere fall of the apple. By the logic of the myth, not only the apple falls. With the apple, is man's capacity for understanding the fruit of the earth.

Changes occur. Advocates with a focus on process continue to frequent rapid cycles of change for change sake. On the other hand, advocates of product often are tangled up in values emphasizing things, not man.

Never before in history has the architectural profession confronted so many in dividuals who have dabbled in some area of the profession and attempted by self proclamation to know what is best for the responsibilities of the architect. The State of Iowa continues to maintain four exemptions in the architectural registration laws which continue to perpetuate inadequate services under the guise of professional practice. The legality is clear. The effect is also clear. The impact which it has on our professional practice and education in Iowa is very subtle indeed. Is change required?

Who are the community power actors that we influence? Are we involved enough to effectively establish a fresh scale of values which will improve the quality of life, the dignity of man and nature? Our profession has tremendous capability to develop the necessary relationships for team effort which can demonstrate to the public the potential for improvements in the shaping of our physical environment.

Sometimes changes are slow. Sometimes change is so rapid that we are unprepared to cope with the circumstances. If we truly sense our responsibilities, our visual and technical literacy will be enhanced by our community literacy.

In reference to change that is desirable, it is helpful to search out areas in which change has begun to occur. We can take the hardest case and ask what it shows by way of signs of change. Architectural education has traditionally had its "field" and "laboratory". But, the rise of the economic and the management cults has vastly increased the richness of the "fields". Many young people today have entered architecture by way of unpresumptuous interests. As a result, it seems that the direct relation to experience, as contrasted with the untested learning, may be more alive in this field than in other fields such as the hard sciences of botany and zoology. Youth wants involvement! Educational involvement means professional practice involvement. The two must complement each other. This impressionistic judgement suggests that some of the university programs might usefully aim at less technicized goals. Before moving in towards a skilled use of instruments, statistics, and measurement, it may be better to allow the learner to capture the excitement of a profession by active involvement through experience which is significant. The professional program in Architecture at Iowa State University has an excellent opportunity to work together with practitioners in Iowa, to develop a continuous professional education. It also has an excellent opportunity to develop its outreach in terms of service to the state in terms of applied research. Not a single professional program in the country productively exists without the support and active involvement of the practitioner.

We need more programs, for student, faculty, and practitioner, to serve a process for continuous education to meet the demands of our times. With a new awareness and understanding of the unique value of our planet and its precariousness, we have been challenged to renew a sense of world fraternity and shared responsibilities similar to what the Stoics conceived. This point was formulated very eloquently by Archibald MacLeish who said at the time of the flight of Apollo 8 in 1968,

> "Men's conception of themselves and of each other has always depended upon the notion of the Earth. To see the Earth as it truely is, small, blue and beautiful in the eternal silence where it floats, is to see ourselves as riders on Earth together — borthers who know now they are truely brothers".

These words lead us to another realization of the need for community. What is necessary to be done? How can we best strive to achieve our goals? Without any motivation, involvement in the profession becomes a routine exercise. A motivation exclusive of respect and concern for fellow man and his community will also delimit the effectiveness of our daily performances. We must strive to understand, apply, and use ALL the traits of the apple in our profession. We must achieve the depth of the working experience and combine this knowledge with the wisdom and the courage to serve.

Continued on page 24

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IOWA ARCHITECT

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This computer-produced line drawing of a part of Iowa State's campus is a 90° cone of vision perspective projected onto a cylindrical picture surface. It is part of a series of drawings produced in the experimental computer-aided design course taught by Paul Shao and Ken Dunker.

Editorial:

Martin D. Gehner, head of the Department of Architecture, Iowa State University, reflects on the changing profession of Architecture.

5

Beginning on page 5, the Iowa State University Department of Architecture in Transition.

Acknowledgement:

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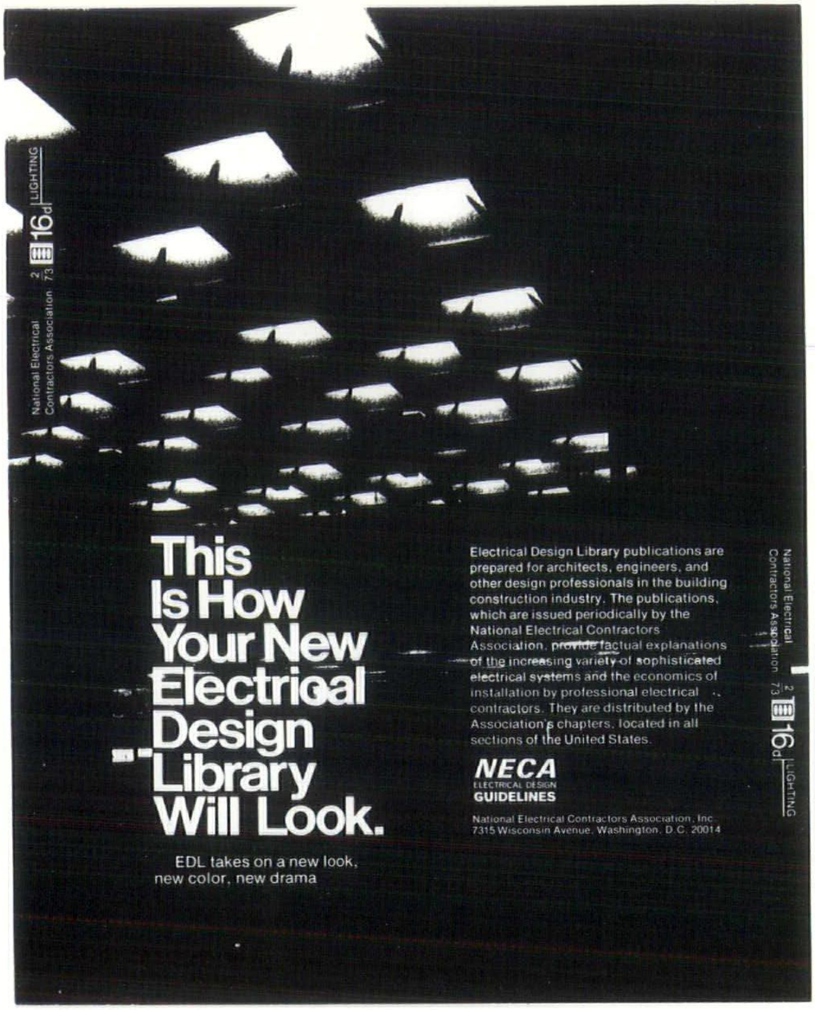

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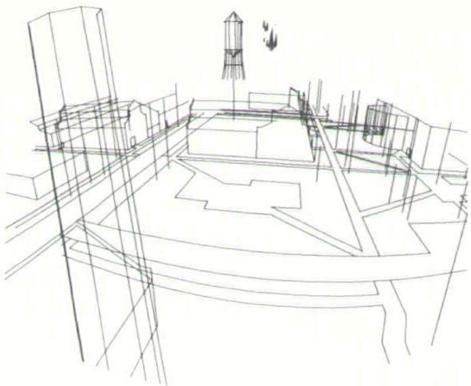


Report: 1973
Department of Architecture
Iowa State University

The Department in Transition

Fine Program Hampered By Space and Facilities

In 1967, Iowa State University's Department of Architecture began a transition from a basic five year bachelor of architecture program to a six-year professional program leading to a master of architecture degree.

The results have been watched and analyzed, adjustments have been made, and the program now, in the opinion of department head M. D. Gehner, is developing to meet both student needs and professional requirements.

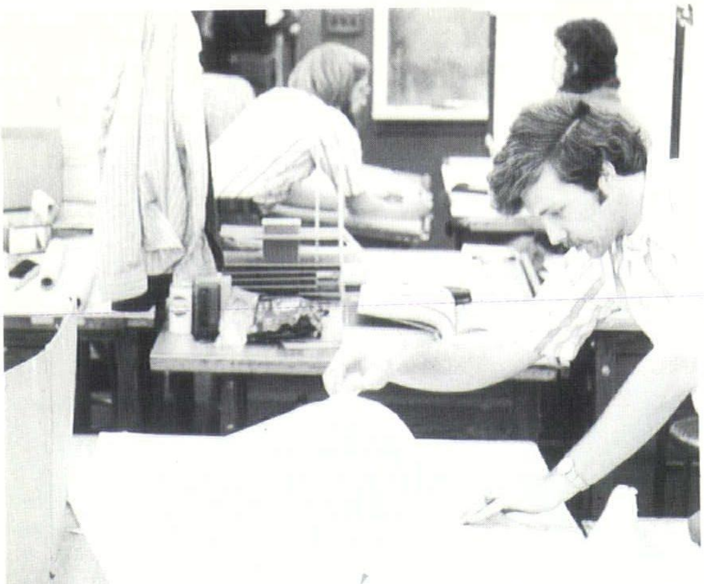
Several considerations prompted the change-over to the new program, which went into effect in 1967-68, three years before Gehner came to Iowa State. One was the desire for each student to have a broad-based liberal arts education integral with the professional education. Another was the need for more flexibility to allow each student to make career decisions at various points during his educational period. The five-year, highly-structured curriculum which led to a bachelor of architecture degree was, Gehner explained, a strong professional degree and a major asset to those who attained it. However, an average of 70 per cent of the students who started the program did not complete it.

Two categories of students were being graduated from this program, Gehner continued. The first were those who were committed to architecture, who went into practice soon after graduation, and who proved themselves to be good professionals.

The second category comprised those students who, after completing three or three and one-half years of the program, "felt themselves to be trapped," Gehner said. "They didn't want to go on; they couldn't transfer out without losing at least a couple of years in another program because they didn't have enough liberal arts courses. They continued in the program, were graduated, but often were not committed professionally."

Not enough attention was being paid to this second type of student, nor was enough attention being given to counseling on a professional basis to try to get students to realistically find roles for themselves in society,

A look around at what some other schools were doing showed that a program which included a two-year pre-professional work were more mature, higher performers and more committed in their decision to enter the profession," Gehner said.



Architectural classes have outgrown the physical space facilities available in the Engineering Annex, where the Department of Architecture is housed.

An additional impetus was given to the change-over to a six-year program when a team from the accreditation board visited the campus in December of 1967. The National Architectural Accrediting Board strongly recommended the new program be initiated at Iowa State.

The six-year program began as a series of two-year segments. Two years were spent in liberal arts courses, then two years were concentrated on basic architecture courses. After four years, the student graduated with a bachelor of arts degree. One year of professional work experience was recommended before the student entered the two-year segment of graduate study.

To give the student who wished to go on into architecture a more mature outlook and some experience in his intended field, the Department recommended that he spend a year working in an architect's office. With his professional role more clearly in sight, he returns to school for the final two years of graduate study leading to the master of architecture degree.

If a student does not want to continue into the profession of architecture after four years in school, he still has the benefit of a general, liberal arts degree which allows him to enter a number of related fields, or even to continue into some other occupation.

While the basic concept of this 2-2-2 sequence has valid aspects, the department found that many entering students are eager, budding architects who are impatient while waiting two years for architecture-related work. By contrast, the second two years were too concentrated. The numerous required studio and laboratory courses created a crowded student schedule. It was therefore decided to integrate the four undergraduate years. The content of the four years remained essentially the same, but the student was allowed more choice and flexibility in planning his own schedule.

This is today's approach and it is working well. A new accreditation team visited Iowa State last January and agreed. The team praised the program itself, but had severe reservations on another facet — the physical facilities which house the program.

The team reported, "The physical space limitations are seriously hampering what would otherwise be a fine program."

The architecture department had been aware of these limitations. In its annual report to the Accrediting Board, Gehner said, "It was reported very honestly and candidly that we have a problem of space — of enough studio space, of research space, of project space, and of classrooms with adequate accommodations for presentation of visual materials. We also have a problem with housing some of our students in unsafe buildings."

Coupled with the problem of physical facilities is that of providing educational opportunities between the Department of Architecture and such other departments as landscape Architecture and Urban Planning and Applied Art. This is viewed as necessary so that architecture students may draw on the resources and inputs of these related fields.

Traditionally, these three departments have operated within the Colleges of Engineering, Agriculture and Home Economics respectively.

Architecture must be a synthesis of many factors. The profession must draw upon the resources of diverse fields as design, mechanical engineering, structural engineering, economics, business administration, geography, sociology, psychology and many others. The whole concept of formulating the physical environment must be the synthesis of the whole.

This does not mean that the architect has to be an expert in all of these areas, but he must have the resources to bring them together as they bear on design. This has led many universities to establish architecture in a separate college of environmental design.

At Iowa State, a solution to the two major problems of establishing links between the related curricula and of providing the needed physical facilities is seen to be the establishment of a separate College of Design.

Preliminary steps towards the establishment of a School of Design were taken nearly ten years ago. The university submitted a proposal to the Board of Regents and, in 1967, it authorized the setting up of a substitute Design Center. The Center is administered by a council from the Departments of Architecture, Landscape Architecture and Applied Art. It currently enrolls students in three team-taught, interdisciplinary courses on "Understanding the Environmental Arts." In its annual program, it brings lecturers and art exhibitions to Iowa State and funds research projects for faculty and students.

The Design Center has not, however, received financing for a separate physical facility. The request for such a facility was at the top of the budgetary requests submitted by the university administration to the Board of Regents last year. The Board of Regents listed the Design Center facility as fourth in its list of budget requests to the Iowa Legislature and Governor Ray. Financing of a new building was not included in the Governor's budget requests, nor was it been approved by the legislature.

Even if such a facility were approved, a major problem remains for the Department of Architecture. The Design Center proposal may not be adequate to provide the real space needs of the department.

Enrollments have already increased beyond projections and trends indicate that further increases may be in store. Gehner explained that the current concern with environmental proglems has been reflected in the shift of enrollments within the University and the College of Engineering, with more students entering architecture.

Even if new facilities were to be approved tomorrow, Gehner said, "We would have perhaps three to five years to continue under the present circumstances, which are intolerable."

What are the alternatives? Gehner said there are no direct answers at present. Short-term solutions are being sought through re-allocation and tighter scheduling of classroom spaces. Gehner said he hopes this will allow the department to meet some of the minimal requirements for space, and at least temporarily alleviate some of the problems.

The question is of some urgency for Iowa State's Department of Architecture. Under the terms of the accreditation team's report, accreditation of the department will be reconsidered within three years if some remedial action on physical facilities has not been taken.

'Arts' Sequence Offered By Design Center

"Understanding the Environmental Arts" is the first series of courses offered by Iowa State's Design Center. The three courses, begun four years ago, allow students to discover ways in which many design disciplines are related. The courses expose students to examples of architecture, landscape architecture, urban design, painting, and allied arts and give them a chance to meet and observe professionals working in these fields.

A team of faculty members from the three departments comprising the Design Center teaches the series. Each course is supervised by one department with assistance from the other two. Harriet Adams, Applied Art Professor, says, "The courses would not have been possible if we had to teach them individually."

Consequently, students taking these courses are exposed to a broad range of experiences as the teachers interact with each other; and they can observe the differing viewpoints of several creative individuals.

The instructors' teaching techniques are extremely varied and usually stress the use of audio-visual aids. Throughout the sequence, a student will see many slides from the collections of the three departments, movies, and demonstration-lectures, including guest musicians and dancers. The students are expected to attend art exhibits in the university's galleries and then submit a critique of the works displayed.

It's wall-to-wall paper in this freehand drawing class. Floor space is adequate only if all extraneous objects are piled outside the door or on top of lockers.

The course content is organized so that they are not bound by a rigid chronological order. This lets instructors make comparisons of cultures which are unrelated geographically and are representative of many different periods. By eliminating historical conventions, many students have the experience of looking at the world according to its aesthetic relationships.

The first quarter course is a discussion of selected highpoints in Western Civilization. Ranging from primitive structures to modern cities, emphasis is on ways man shapes and adapts his environment. The second course explains how the artist relates materials and methods to his culture. And the third course presents significant examples of non-European arts. It includes presentations on brass and bronze castings of the 10th century Noh culture of Western Africa, the sculptures of Oceania, and the influences of Brazilia on urban planning and urban architecture.

Originally the series was developed for students outside the three Design Center departments. Enrollment in the courses the first year averaged about fifty. In the second year, the courses were opened to all students. Since then, enrollment each quarter has steadily increased, averaging 120 last year. Students are divided almost evenly by class, and they come from nearly every department on campus. Thus, they have a wide range of backgrounds, interests and abilities.

Prof. Maves says these courses show the achievements and influences of other cultures to students who "too often come to the university with a knowledge of only American history and arts." These courses are an introduction to the environmental arts of many civilizations.

The success of these Design Center courses has required the three departments to consider offering more courses with greater depth.

And the success of this first cooperative endeavor by the Design Center represents one advantage that would accompany the merging of the departments into an autonomous school of design. Not only would the physical resources of each department be more readily available to the students of all the departments, but the closer proximity of students and faculty in the various design disciplines would tend to stimulate the creative process.

Professional Board Aids Students and Faculty

In January of 1971, the Department established a Professional Advisory Board consisting of seven practicing architects from Iowa and Iowa State University. The formation of this Board served the need for developing direct liaison between the practice of Architecture and the Professional education program.

This Board is represented by practitioners from all geographical locations within the State of Iowa. Its membership includes the President of the Iowa Chapter, AIA, and one member from the State of Iowa Board of Architectural Examiners. The purpose of the Board is to advise the department on matters pertinent to the education of professional architects and to respond to departmental proposals; to maintain direct communication between the practicing the educational segments of our profession; to actively participate in matters pertinent to professional development; to stimulate research; to assist in the development of educational resources; to raise the quality of environmental programs; and to extend the professional activities in areas of new professional growth.

Since its initiation, the Professional Advisory Board has had many interesting meetings with students and faculty. The exchange of concerns has been forthright, open and constructive. Discussions on the current activities of the department, its goals and the relationships to the student and the professional needs has been the center of attention.

In addition, the need of practicing professionals to find creative, competent and sensitive consulting mechanical and electrical engineers has been investigated. How to educate, train and motivate young persons into these areas is yet a problem to resolve.

The issues of professional continuing education generated many discussions and follow-up through a joint committee from the Board of Architectural Examiners, the Iowa Chapter AIA and the Department of Architecture. This committee has presented a proposal for pursuing and developing a continuing education program and coordinating it with national and regional programs. As soon as funding can be established, further realization of the need will emerge.

These beginnings have opened some doors. Mutual benefits can follow. Each Board member's interest and attendance at the meetings have demonstrated a tremendous professional resource. As this Board continues to function, its impact and relation to the Department will continue to grow significantly.

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Courses Stress Practical Approach

Design Techniques Can Lessen Energy Crisis

Even before fuel supplies began dropping to the current "crisis" level, members of the Iowa State Department of Architecture began thinking of ways to cut fuel consumption and still keep life enjoyable. With a grant from Iowa Power and Light Co., the department dug deeply into the energy shortage problem during the university's spring quarter this year.

The department offered two undergraduate classes that explored ways to design buildings and neighborhoods so they would use minimal amounts of fuel. While the buildings had to conserve energy, they had to meet reasonable standards for human comfort.

The classes had three basic rules: 1) It had to be possible to apply designs within the next five years; 2) Taxes, building specifications and other laws bearing on construction were assumed to be as they are now; and 3) Students could be visionary in their building designs, but they had to be pragmatic, too.

Three faculty members, 25 undergraduates and a handful of graduate students studied energy conservation problems during the 12-week quarter.

Fifteen of the students were in their fifth-quarter of design. They tried to find ways to apply principles of energy conservation to various kinds of buildings. The first step required definitions of energy conservation with investigations of alternative applications for building design and site utilization.

The other undergraduates, ten sixth-quarter design students, carried on master planning projects. They studied urban and rural areas.

Graduate students like James L. Schoenfelder worked on individual approaches to the problem. Another research grant from the Design Center permitted the design and development of a solar heating system for residential construction. The solar collector device is pending a patent.

At base, conserving energy through design means developing a philosophy of what Professor Reed called "creative conservatism" — living better using less.

Reed explained some reasoning behind the energy conservation approach to design. With the growing energy crisis, "building a living environment which least exploits the natural environment is more and more important." That will require a shift to new life styles which combine as little energy use and as much human comfort as possible. As a first step, architects have to stop designing odd-shaped, air conditioned structures.

A long-range goal implies a change in architectural education. "We have to teach students to adapt present knowledge to possible unknown future materials," Reed explained.

During spring quarter, the department's students worked with designs to apply the "live better using less" philosophy to a wide range of present problems. Schoenfelder designed an experimental "solar-powered" single family residence. Clark's and Rice's students planned whole population areas with energy conservation as the prime design criterion.

Schoenfelder explained the central idea of his project: "I wanted to design a home, paying primary attention to how the design could use climatic limitations to the best advantage." With that thought in mind, he designed a 1,600-square-foot house that uses the solar system to heat or cool the space.

When the bugs are worked out of the mechanical system, Schoenfelder estimated his house would cost $44,378. That compares with about $42,000 for a comparable house with conventional equipment. "But you have to keep paying for fuel, to heat and cool an ordinary house," he said.

Blueprints of Schoenfelder's house look ordinary enough, except for the "see-through solar energy collectors" instead of windows and heat storage areas where the attic should be.

South walls of the house are see-through solar energy collectors. They use a scheme Schoenfelder designed to capture and circulate the sun's heat energy in the house. The collector unit contains temperature-resistant thermal pane; black, louvered metal screen; circulating air; and gray glass. Because the screen is black, it absorbs better than any other color. Louvers give the screen the same surface area a solid sheet of metal would have. And they make it possible to see through. "If you can see through the glass, it's a lot more useful than if you just use it to collect heat," Schoenfelder said.

From the window-collector, some heated air circulates into living areas. The rest goes to heat storage tanks filled with sodium sulfate. Below 90 degrees Fahrenheit sodium sulfate is a crystal. Above 90, "it goes into solution and can store a lot of heat without significantly changing its own temperature," explained Schoenfelder. One storage area contains the water heater. The heat-collecting window slopes to catch maximum sun all year.

When the sun goes down, stored heat continues to heat the house. In summer, when cooling is the problem, fans ventilate heat storage areas to keep the house cool. Rigid foam panels fold over windows at night to reduce the heat loss.

Schoenfelder's design has other features that conserve heat energy. East, north and west walls are mostly concrete. Much of those three walls is underground. Insulation is thicker than in normal houses. The roof's slope minimizes exposure to sun. An underground air intake uses soil temperature to cool air in summer and warm it in winter. That lowers strain on the house's air treatment system.

Features of the site also help conserve energy. Trees shelter the house from winter winds and from summer sun. Though designed for a south-sloping lot, the house could be adapted to a flat siteo To do so would require back-filling soil around walls normally built into the hillside.

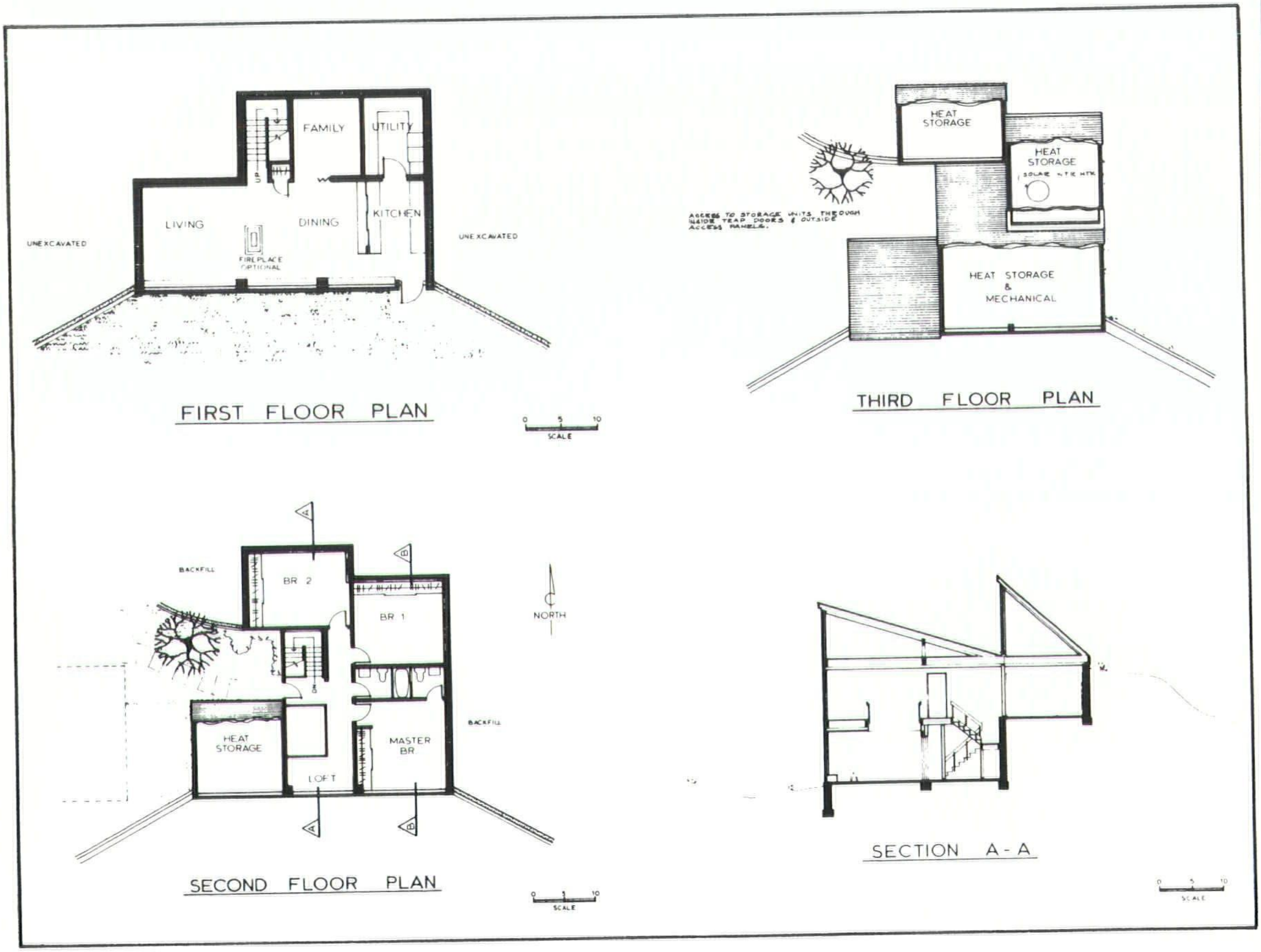
Schoenfelder's project is an example of how one design can conserve energy. But for energy conservation through design to work, the concepts must apply to more than single houses. That notion brought undergraduate students into the picture. Clark's class divided into three teams. Each team picked a central Iowa location to develop, using energy conservation as the key concept of their designs. Meanwhile, Rice's students delved into ways energy-conserving designs could be adapted to many situations. Late in the quarter each student applied those principles to a separate building problem.

Clark's students chose sites in downtown Des Moines, on the edge of West Des Moines and around Big Creek Lake near Saylorville Dam. Each site was to be a population center for 20,000 people.

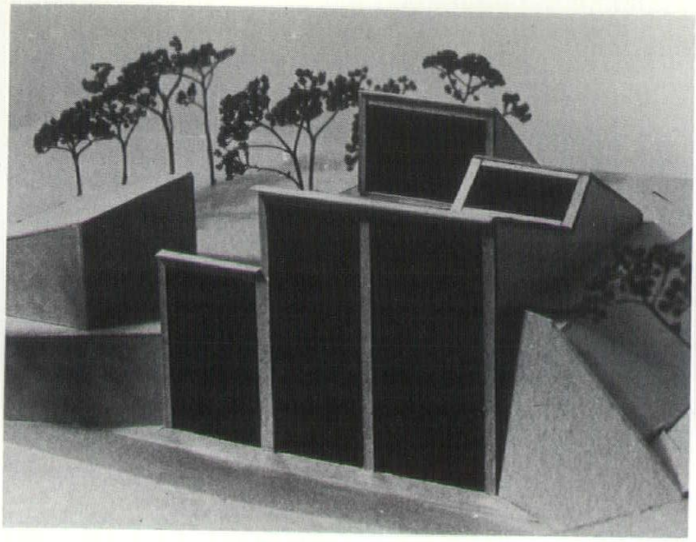
Students looked at the site's relationship to its surroundings. What transportation and communication links existed? What links would need to be built? How far was it to other population areas? How easy would it be to supply goods and services? How might people living nearby react to development?

When they finished with surroundings, the students analyzed the site. What were geological characteristics? What were soil features? How good would drainage be? How could designer and present owner square their wants and needs? What impact would development have on people in the project area? How could existing plant and animal life be preserved? How could usable existing buildings be retained, yet fit into a new development?

Clark's students examined heating, cooling, plumbing, waste disposal, transportation and communication systems for the overall site. Then they looked at interrelationships — to see how the required systems could interrelate with the natural site and other systems.



Floorplans, one section of Schoenfolder's energy-conserving "solar" house.



Extensive glass south walls absorb the sun's heat energy. Some heat circulates through the house, and the rest is stored for future use.

After all that analysis, the Big Creek Lake team decided not to develop their site. Putting 20,000 people in a new town there, they said, would spoil too much natural beauty and potential recreation area.

They joined the three students developing Des Moines' downtown Loop. That was a complex problem, and, as Clark explained, "They just needed more people to do the job." Six students zeroed in on the Loop, from McVicker Freeway on the north to the proposed industrial freeway on the south, between East 14th Street and Fleur Drive on the west. Students wanted to conserve energy used for transportation. To do that, they arranged population areas where residents could have easiest access to services they would need.

Students considered the Des Moines River's possible recreation uses and the influence of state government and other buildings on the Loop. And they came up with a long-range plan to develop downtown Des Moines.

Meanwhile, the West Des Moines team decided the key to developing their area would be to get right-of-way to Southwest Grand Avenue. Then they would build a mass transit system on that right-of-way to link West Des Moines and the Loop.

Their primary objective was to group people in ways that would cut energy use — paying special attention to transportation. They devised community "modules" — dwellings, schools, businesses, government units, entertainment, culture. These modules would plug into the "spine" of the development, Grand Avenue. Planners would decide which module went where according to existing natural characteristics and human factors.

The students felt such a modular approach would conserve energy and be acceptable to residents too. "It would be more convenient for people to use mass transportation. They wouldn't need cars," Clark commented. "Except for transportation, people could live pretty much as they do now."

Rice's students also contributed to the greater Des Moines development project. During the quarter they went to Minneapolis and photographed some features that showed ways to plan a development based on principles of energy conservation. Some ideas included building overhead pedestrian walkways, limiting downtown transportation to mass transit and blending new structures with old ones which were still usable. The students modified these ideas to apply to Des Moines situations.

Solutions were still coming as the quarter ended. In assessing the course's accomplishments, Rice commented, "This course has made students think about conserving energy as they design buildings."

"And as tomorrow's architects, they will influence the profession to consider energy consumption a key planning variable," Clark added.

Students Learn Through Design Competitions

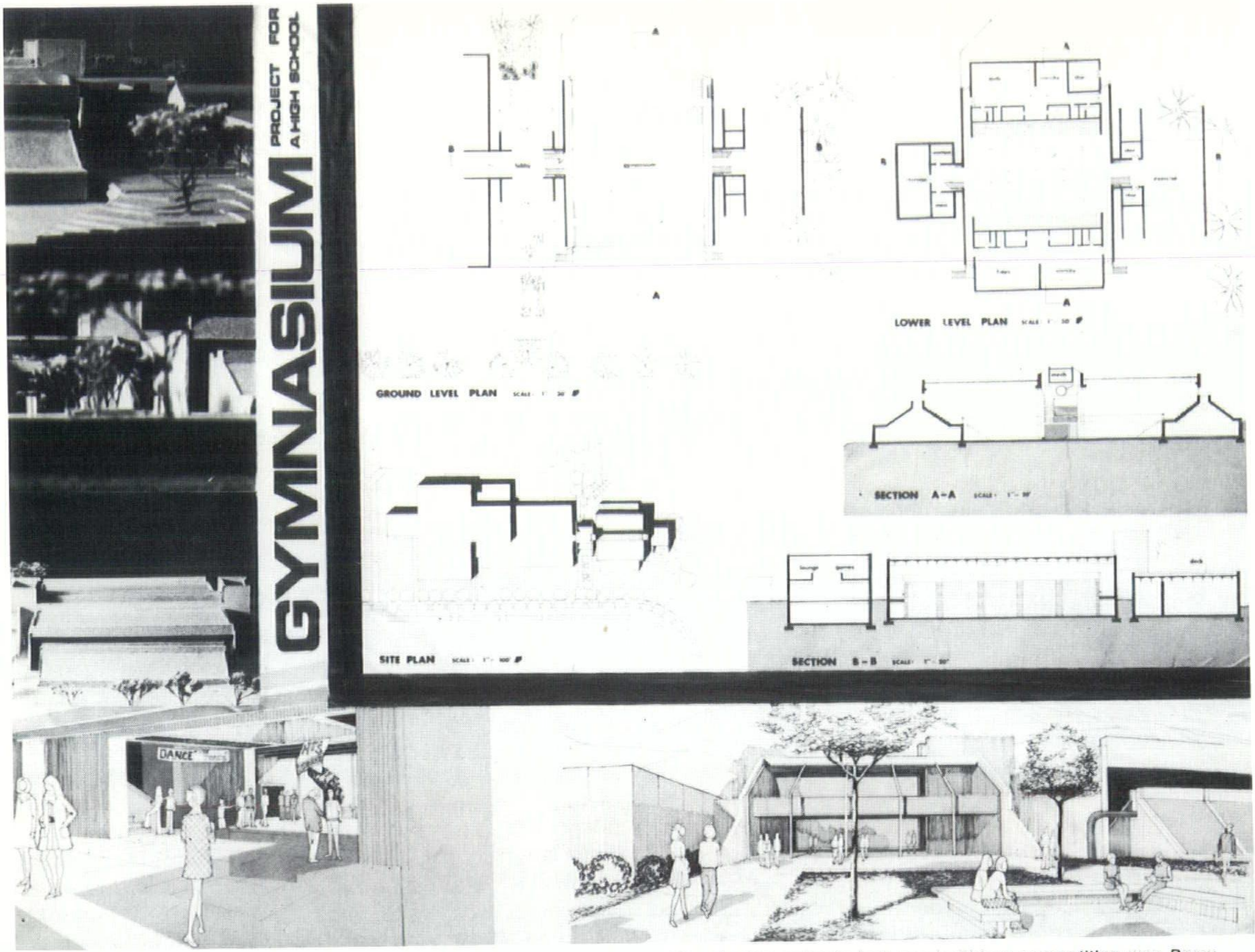
Design competitions can be important teaching devices. Assistant Professor Richard Young, coordinator of the Shirey competition for the Department of Architecture, says the competition environment offers students an invaluable supplement to the basic design curriculum.

"Some students respond to the challenge of a competition with more enthusiasm than they bring to the standard design projects. It is important that we provide both of these learning experiences," said Young.

The competitions force the student to work under the pressure of a limited amount of time and give him the experience of working independently. "The competition encourages those who are particularly conscious of graphic communications," said Young. "The student must learn to communicate because good ideas must be expressed well. The competition results often give the students an opportunity to see their work in comparison with that of students attending other schools."

Students in the department have the opportunity to participate in two basic types of competitions. The department sponsors an annual competition for fourth-year design students called the Shirey Tuition Scholarship Prize. And each year a few students are encouraged to enter national and international competitions with projects produced as supplements to the standard assignments.

The Shirey Tuition Scholarship Prize was established by Charles W. Shirey in 1955. Shirey, president of a Waterloo concrete company, donated money for the competition in order to stimulate student interest in structural concrete. Under the terms of the scholarship,



The winning entry in last year's Shirey competition was Barry Gryb's design for a high school gymnasium.

members of the faculty are completely free to choose the program to be used in the competition as long as it requires that structural concrete be incorporated by the students as their principle element of design.

In 1972-73 the project for the Shirey Competition was a high school gymnasium. The two-stage project was assigned to students as part of the winter quarter design program. In the first two-week stage all students developed a preliminary concept for the proposed gymnasium. Then, ten students' projects were selected, and they were given two weeks to refine the final competition entries. At the end of this second stage, a faculty jury chose the winning entries from among the ten completed designs.

The first prize of $200 was awarded to Barry Gryb. Ed Gilmore received the $100 second prize; and Alan Bornmueller, $50 for third place.

The Shirey Competition is a valuable experience for students at the fourth year level of design. It forces them to develop a building concept, a system and details and present the solution succinctly. The fact that winners are chosen from a small peer group, and get a tangible reward increases the students' incentive to produce. Tuition scholarships are valuable to each student.

During the past year, students have also entered several international competitions. Three students designed a community center for Charles City, Iowa, as a supplement to a fourth-year design course. This project was subsequently entered in a competition sponsored by the Union of International Architects in Belgrade, Yugoslavia.

For the Bienal de Arquitetura urban design competition of Sao Paulo, Brazil, a group of four graduate students have recently submitted a housing project as an entry.

Last year, graduate student David A. Block entered a competition for the design of a modular space station sponsored by the National Aeronautics and Space Administration. There were 971 entries in this national competition administered by the California Chapter of the American Institute of Architects. Block's entry received the third place award and a $500 prize.

Block said the process of investigating and designing for "a totally unfamiliar, zero-gravity environment for human habitation" increased his knowledge of both "outer space and earth-bound habitation problems. The design of a communal facility without appreciable individual privacy loss within the space station may have applications on earth."

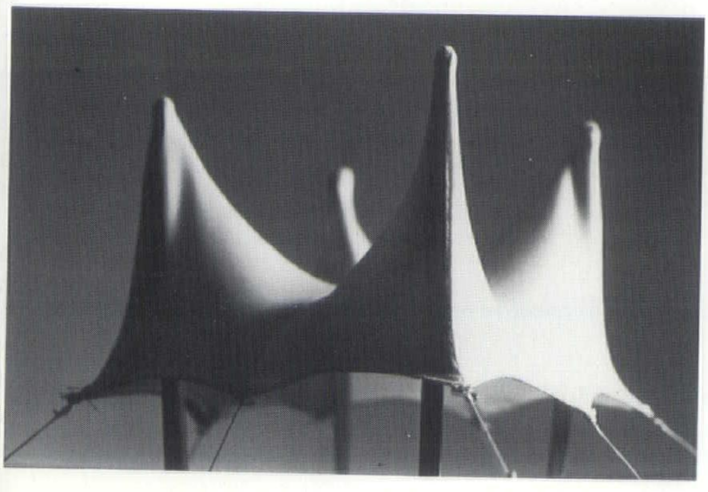
Individual competitions such as this one often provide the student an opportunity to work on a project which is specifically related to his interest. They allow the student to participate in a broad range of projects in addition to or as part of the regular course work. And they enable the student to familiarize himself with a wide variety of diverse problems.

Whether a student's competition entry is an award winner or not, said Young, is probably not as important as the experience he receives from the involvement with the competition process. Many large architectural contracts are awarded through design competitions. It is desirable that students develop an understanding of their abilities as compared with other designers' within the framework of conceiving and presenting a successful design.

Construction Course Stresses Use of New Materials

For many years, civil engineers taught architecture students "all they needed to know" about building materials. They learned physical properties — stresses, strengths, coefficients of expansion. But that was about all they learned.

To illustrate "undulating surfaces" structural technology, student Ray Greco built a model of Hamburg, Germany's pavilion.



In recent years, however, Iowa State's architecture students have learned much more about building materials. Most emphasis is on how materials influence building design. But students also get healthy doses of "pragmatics of the business" — professional ethics, basic materials and systems, structural systems, and architectural services. And they learn physical properties, too.

"It's an introduction to how materials go together and what being an architect is all about," explains Norm Rudi. He and Ken Dunker, both assistant professors, teach the course, called "Architectural Technologies."

The course centers on eight basic materials — wood, stone, masonry, concrete, glass, plastic steel and other metals. The instructors show several thousand slides to illustrate how designers use these materials in building.

Students cover a brief history of each kind of material. Then they examine its permanence through the years.

With that background, students learn forms in which materials are available to them. And they find out best sources of those materials. Manufacturers supply brochures listing available sizes and shapes, weights, colors and structural specifications. Instructors select those brochures containing the best design information. As the course progresses, each student compiles notebooks of this information. "The notebooks are an educational tool," the instructors point out, "but they're also good reference for future class and professional use."

Next comes a look at specifics of applying each material. Students delve into the physics of each substance. When they finish, "they know how the material can be expected to behave when it is used in a building," Rudi says.

By this time, students know enough about the materials to examine their potentials for design. Students learn to use materials that convey the architectural effect they want. "We deal with what the designer can manipulate," explains Rudi. "He controls how materials affect space and light. Those in turn influence the people who will live in the buildings."

Once students are familiar with general design concepts as they apply to materials, they move into specific applications.

They examine basic systems. Students learn how to use the basic materials in designing walls, floors, windows, doors. Building on that knowledge of basic systems, they study materials in relation to acoustics, lighting, heat transfer and other considerations.

With the basic knowledge of materials in mind, Dunker and Rudi turn to other "pragmatics of the business."

An architect has obligations to his clients, to the contractor and to the architectural profession. They show students their future role in such relationships.

When selecting materials, the architect gives first priority to his design needs. What texture, color, size, shape achieve the feeling he wants to express? At the same time, he keeps the physical properties of the material in mind. "It's possible to misuse materials," the instructors explain. "You can ask them to perform beyond their physical capabilities, or not anticipate the way they will perform. For example, if an expansion joint isn't designed properly, a wall could warp. That doesn't necessarily mean the building might collapse. But it does mean that poor judgment about applying materials can keep a building from turning out as the architect intended."

Besides design needs, the architect has to keep several economic restraints in mind as he chooses materials.

He must "get the best deal he can" for all concerned, Dunker and Rudi explain. To do that, the architect uses the best materials his client can afford. That cost factor includes the per-unit price, and the cost of maintaining the structure after it is built.

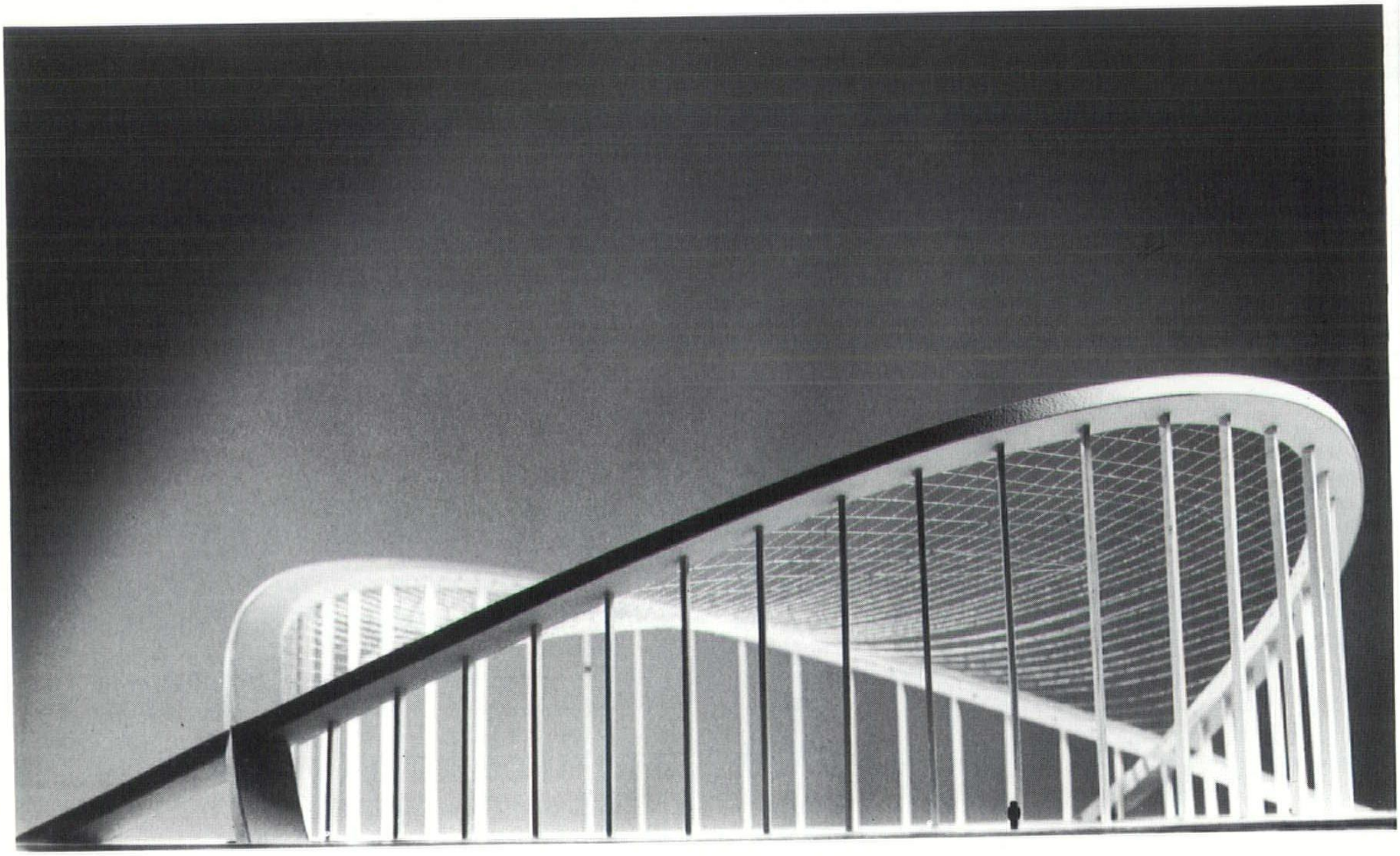
"Glass is a good example," they point out. "The Lever Brothers building in New York City is all glass. It costs $260,000 a year just to wash the windows. Lever Brothers make soap. So, they can demonstrate their products on their building. They can afford to buy and maintain a glass building. For another client, one who wanted to keep costs down, an architect would have to use some other material."

Another restraint on the architect is his city's system of building codes and zoning restrictions. He may design a beautiful structure. He may choose materials which convey the effect he wants — and do that for a reasonable price. But, beauty, effect and economy are not enough. Any plan must conform to building code and zoning restraints.

These are the factors an architect keeps in mind all the time he works for his client. While the course sequence emphasizes material-related considerations, it includes other factors that play a necessary part in planning a job. The students are made aware of the basic architectural services required and other special services a client may request.

After studying the basic traditional services, the instructors describe additional services an architect may provide if a client wants them. Students are exposed to the surveys, technologies of a building site, requirements for area development, and contract documents. The technology sequences of courses cover the basic knowledge of materials, systems, lighting, mechanical equipment and acoustics. The depth of each course in the sequences is being developed so that the architectural sciences become an integral part of the design courses.

The city arena, Raleigh, N.C., is an example of irregular cable structural technology. Sam Finch built this model.



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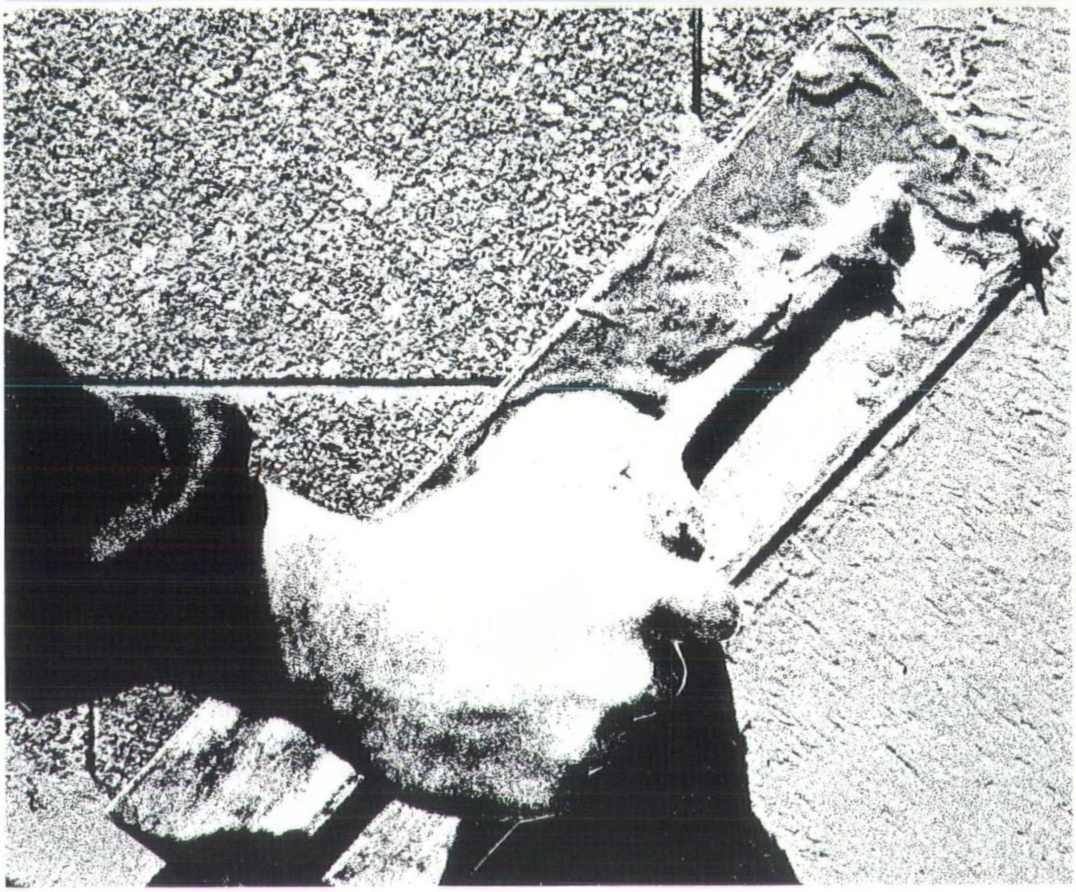

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Research Encompasses Past and Future

Research Projects Study Iowa's Architectural Past

How did the architecture profession in Iowa change and grow as the region progressed from frontier to modern society?

This historical process is now under study by Iowa State professor of architecture Wesley Shank. Under a research grant from the Iowa Arts Council, the Department of Architecture and others, Shank has been investigating this fall the process of design and building in Iowa during the 19th and early 20th centuries.

Shank's current research is now in the second phase of a broad study which began in July 1971. In the first phase, completed in June 1972, Shank studied ten historic Iowa buildings and wrote a monograph on each one.

These ten buildings, all built before 1915, were selected for variety in both architecture and geographical location. "I also tried to select ones that had not previously been investigated," Shank said.

The monographs, which include photographs and illustrations, are on: the Arthur L. Rule House, the second Franklin County Courthouse, the first Main Building for the Iowa Institute for the Education of the Deaf and Dumb in Council Bluffs, Iowa State College Building (Old Main), ISU Farmhouse, ISU Morrill Hall, James Frederic Clarke House, Madison County Courthouse, Swain-Vincent House, and Trinity Cathedral in Davenport.

Shank's concern with examples of historic architecture and with their preservation is shared by others on both a state and national level. The State Historic Preservation program has been set up to translate this concern into a concrete State Historic Preservation Plan. The program is financed by state funds, matched with federal grants from the National Parks Service who handles the National Register of Historic Sites.

As a first stage, the State Liaison Officer and an advisory committee have started an identification and "survey" of historic architecture in Iowa.

Shank directs the survey for western Iowa on assignment from the Department of Architecture, while others at Iowa City direct it for the rest of the state. Graduate student Steve Stimmel and Dave Peterson assist him. Equipped with cameras, notebooks and county road maps, the students drive along every county road, photographing all structures, including farm buildings and bridges, that may have historic or architectural interest.

The project began in the fall of 1972 with funding for one year. "Hopefully, funding will continue for the three or four years necessary to complete the survey," Shank said. An annotated catalog of the photographs will then have been compiled. "From this catalog, the State Liaison Officer, with the aid and advice of a committee, can identify buildings and structures of interest, to be included in the State Historic Preservation Plan," Shank explained. He is a member of this advisory committee, which includes practitioners and educators.

A third historical research project which Shank is conducting concerns urban design in central Iowa. This summer, he completed a first part of the study, which was funded by the Iowa State Design Center. The investigation of urban design was concentrated on the original plats of ten central Iowa towns. "Every town in Iowa was initially platted and the drawings and related data are on deposit in county seat headquarters," Shank explained. He studied the history of early town plans and the plats. "I wanted to see if they developed as planned by comparing the plan with the town's actual early development."

Shank hopes to continue this investigation with a parallel study on present-day urban design in Iowa.

Shank is chairman of the Division of History in Iowa State's Department of Architecture.

Computers Used as Tool in Designing

Intuition, spontaneity and sensitivity are recognized as essential qualities in the architect, artist and designer. These are the antitheses of characteristics expected in a good computer, which is rigidly precise, calculating and insensitive.

Thus, although the computer has in recent years revolutionized other branches of the building industry, such as structural engineering, it is only slowly and reluctantly being used by designers and architects.

Two professionals who have recognized the computer's applications in design are Iowa State faculty members Paul Shao and Ken Dunker. For two and one-half years, these two assistant professors have worked extensively with computer-aided design and have initiated an experimental course on the subject in the architecture department's curriculum.

Shao came here in 1970 and met Dunker the same year when Dunker enrolled in a sculpture class taught by Shao at the Octagon, Ames' Center for the Arts.

Both had worked with computers previously, and both were excited by the possibilities of using computers in designing everything from sculpture to complex buildings.

They admit that many others in their professions are less eager to apply computer principles to their work.

"Artists are reluctant to use computers or anything that sounds like a machine is doing the work," Shao said.

"The designer or architect doesn't want to think that a machine can do something he can't do," said Dunker.

However, the computer should be viewed merely as a tool, not something to replace man, Shao explained. The computer can do some things for man better than he can do them for himself, just as a hammer is a better tool for driving in a nail than is a man's hand, he said.

Shao listed three ways in which the computer can help the artist and designer: in visualizing form and space; in giving permutations, which are an important part of creation; and in making a work of art tangible.

"Art is essentially a problem-solving process," Shao said. "It is always the resolution of some conflict: between a man and his ego, man and other men, man and environment, or between one visual element and another."

The computer can generate a spectrum of all possible alternatives, but it is always the artist who must decide on the optimum solution, Shao continued. "The computer, at this stage, cannot express emotion or make intuitive aesthetic judgements." This limitation is crucial. "Without human warmth and sensitivity no work of art can be called a work of art.

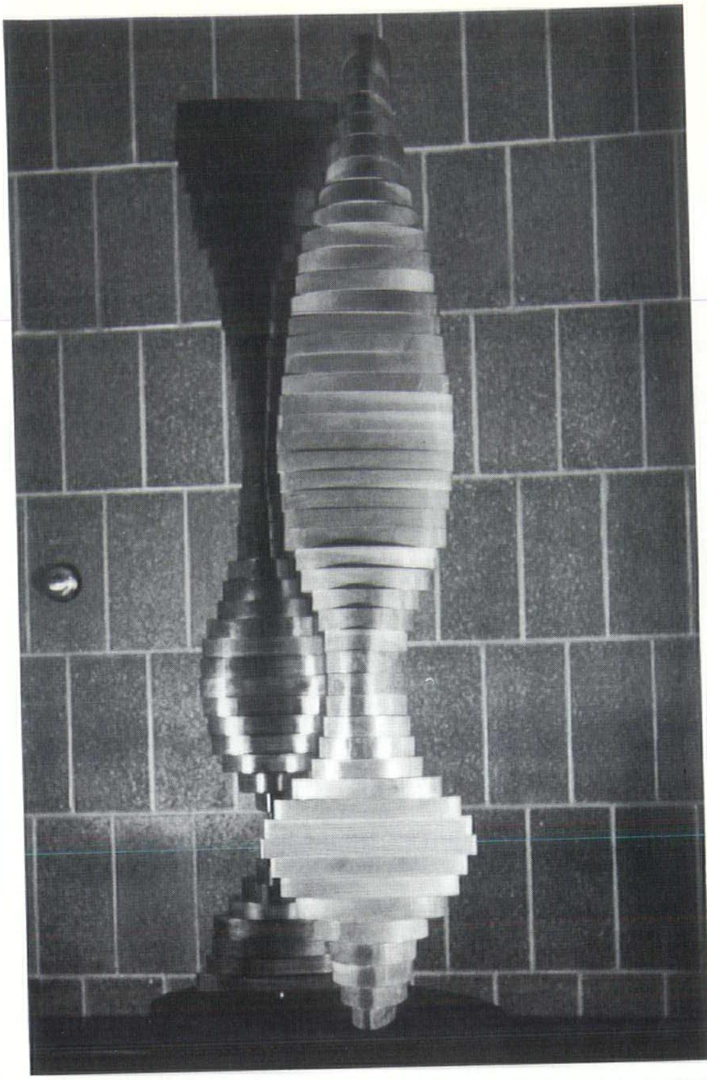
Before coming to Iowa State, Shao was associated with a group on the East Coast known as "E.A.T. — Experiments in Art and Technology, Inc.," which brought together artists and technicians to try to bridge the gap between humanity and technology.

"Historically, art reflects society in space and time in terms of imageries, materials and techniques," Shao said. Alienation typifies today's technological society, he continued. But interaction among engineers, technicians and artists might help ease some of this disorientation. "Artists will not be as far out and engineers will not be as stiff." One way Shao and others saw to initiate interaction was to use computers and to work with computer programmers in producing works of art.

In contrast, Dunker became interested in computer design through an earlier interest in structural engineering problems. He took a single course on FORTRAN, a universal computer language. Once he became familiar with how computers work, he said, he could see all kinds of applications for design. He learned how to construct complicated computer programs "just by jumping in and trying to do something."

The logic process involved in programming held great appeal to Dunker. "Programs can be laid out like road maps with little gates to open and close and side roads to follow," he said.

Dunker and Shao began their joint effort in computer applications in March 1971, and by the end of that summer they had developed a half-dozen programs for constructing computer-aided drawings and sculptures. An exhibition of their work went on display in the fall of 1971, and they then began teaching an experimental course in computer-aided design.



The two complementary elements of this eight-foot sculpture pivot slowly on their axes, powered by an electric motor in the base. It was designed and built by graduate student Christos A. Saccopoules, using the ELLIPSE and SCULPT computer programs.

Dunker's first program was for producing elliptical sections for linear-shaped sculptures. He said that he had certain ideas on what the program would be used for, but he also wrote many options into it. "Others who use this program have different approaches, and they see new ways to use the options — ways I did not have in mind when I wrote it," he said. Students using this program soon developed "donut" shapes and, later, rotated figure-eight shapes, in addition to the basic linear shapes.

With the programs now available at Iowa State, a wide range of functions can be performed for the designer, architect and artist. A brief description of the ones available follows:

CORAD plots random distortions of a linear figure. The computer is given one initial shape and a "seed number" for random number generation. The computer then repeats the shape, locating it over and over on a sheet of computer print-out paper, sizing it, twisting it and rotating it, all in a random fashion. The finished drawing would be completely different with a new seed number. This program has had limited success, Dunker said, because "real art is not done in a random fashion." However, the location, twisting and so on of the basic shape can be controlled independently in some areas of the drawings for better results, he said.

PATTERN reproduces tonal patterns, which can be revised and distorted to give alternative drawings. The size of the pattern can be altered, regions in the pattern can be expanded or compressed linearly, and tonal values can be reversed or grouped.

PICS plots perspective drawings. Basic data are fed into the machine and, from them, perspectives from any required angle or view can be generated. This is useful, Dunker said, for complex drawings or when many different perspectives of a building are required. The program plots perspectives on a flat picture surface, a cylindrical picture surface or a spherical picture surface projected onto a plane. Lines, polygons and solids can be generated, deleted and copied in various positions. One drawback, however, is that the computer cannot economically blot out hidden lines, such as those of the back corners of buildings, as they are a necessary part of the data stored.

COMSBUL arranges a single or multi-story building layout, based on the activities within and between different areas of the building. When data on transportation costs, patterns, space requirements and so on are given, the computer can select the most efficient arrangement of building spaces, based on minimum expenditure of energy in circulation among the spaces. This can help the architect or designer plan and lay out complicated structures, such as hospitals, airports and factories. This is the only program Dunker did not develop. He modified a program developed by K. Lee of Iowa State in 1969.

ELLIPSE and SCULPT are two programs for designing sculptures. When a front and profile view, in two dimensions, of any design are fed into the computer, it can, through the ELLIPSE program, plot elliptical sections for a laminated sculpture based on the input profiles. The SCULPT program plots perspective views of a sculpture made up of these laminated elliptical sections. In both programs, the central axis and height of the sculpture can be altered, and each profile can be altered by the addition or subtraction of a linear profile.

All of these programs are available for student use at Iowa State. Students do not develop programs themselves, mainly because of the great amount of time and effort required. The program on perspective drawings, for example, took Dunker more than 300 hours of working time to produce.

The experimental course initiated by Dunker and Shao is intended to let students explore the potential of the computer as a designing tool. Students are expected to solve problems using the existing computer programs, to evaluate resultant output and to develop new computerized solutions to design problems in art and architecture.

Students complete a perspective drawing project as an introduction to available programs. They read the available literature on computer art, and then are expected to produce one or two works on an individual or team basis, using an available program.

Several student projects have actually been executed, with the aid of grants from the FOCUS committee, a university committee which sponsors the annual spring FOCUS on the Arts program. Student work has included sculpture in linear elliptical shapes, donut and figure-eight shapes, kinetic sculpture, graphic drawings involving tonal patterns, random shapes and perception studies, perspective drawings concerned with the optimum angles and surface planes for the most accurate representations of architectural space, and even a design for a new chess set.

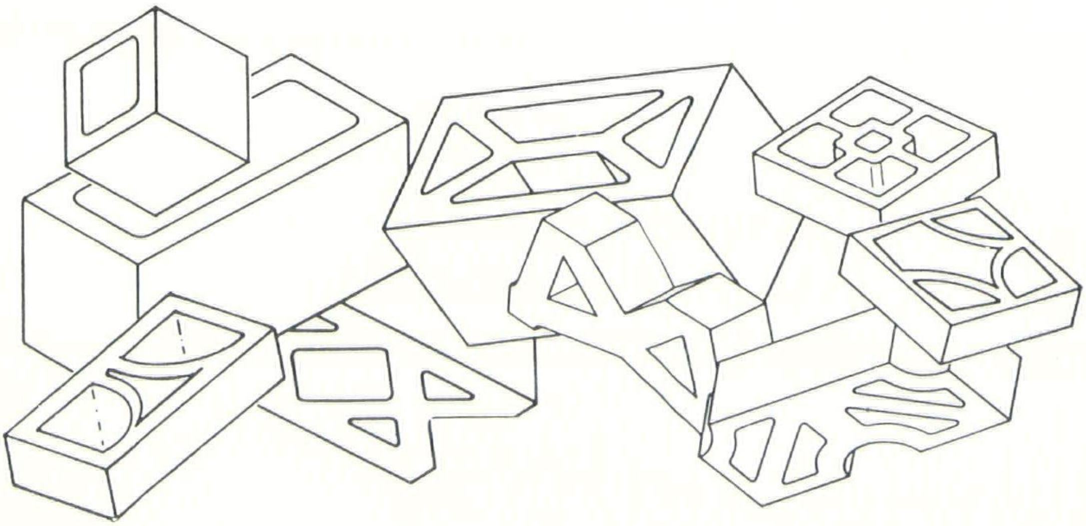
There are two main limitations on the work being done in computer-aided design at Iowa State. The first is financial. Computer time is expensive, and the experimental course has a quarterly allotment from a College of Engineering fund of only $400. The money must be closely budgeted so each student has a chance to do some computer work.

The other limitation is Iowa State's computer facility. The computer, an IBM 360-65, is large enough, but it has only a one-pen plotter. This type of plotter accepts a limited amount of data and, as it draws directly on computer print-out paper, the size of the paper is another problem. More advanced types of plotters are expensive, and thus far, demand at Iowa State for such equipment has not been high enough for the university to consider buying.

Despite limitations of money, equipment, and — perhaps most of all — time, Shao and Dunker are branching out into other projects, stretching their research budgets as far as they can. Some of their latest work involves studies of perception. They are investigating the phenomenon of visual distortion, the effects of direction on perception, the effects of optical density on perceptions of depth, the effects of figure-ground relationships, and many more aspects of this complex subject.

The contribution of the computer to such studies is the accuracy that can be attained through its use. The computer can generate stepped permutations too fine to be accomplished with drawings by hand. Thus, hypothesis can be formulated, tested with the precision required by scientific criteria, and accepted or rejected.

This past spring, Shao and Dunker had five pieces of their computer art on display at the CIRCUIT Computer Art Exhibition at the Bloomfield Art Association, Birmingham, Michigan. This exhibition was jointly sponsored by the Bloomfield Art Association, Cranbrook Academy of Art, Eastern Michigan University, University of Michigan and Computer Arts Society. Some of their work was also shown at the National Computer Conference and Exposition at the New York Coliseum in June.



J. IRWIN MILLER ON ARCHITECTURE

This is a portion of the response by J. Irwin Miller, at the time of his honorary degree at Ball State University. Mr. Miller's interest to Architecture is well known to all in the profession.

"President Pruis, Dean Burkhardt, Dean Sappenfield, ladies and gentlemen:

". . . In the year of the revolt and taxpayers' economy and everything, what in the world is the importance of good design? Is it merely an ornament and a fringe on the affluent society? Or is it anything else? Why should a manufacturer bother with good design if his product sells? Why should the consumer who buys a home or a sofa worry about good design if his friends think it is in good taste? Well, good design, I think, is rather easily defined: It's simply the very best that a man has in him to do.

The job of an architect is first and foremost to satisfy the true need of the client, but he doesn't quite stop there. He also has to satisfy the best that's in him. And if he's a good architect, even though he has pleased the client, if it isn't the best he can do, then it's back to the drawing board for him. The judge of the designer is always his own unforgiving conscience; and it is never same court of current fashion. So, in an age where product quality is suspect, when leaders are not credible, when in every public statement it is our habit to seek meanings within meanings, the presence in our midst of good design always reminds us of the honesty, the creativity, and the truthfulness with which each one of us was endowed at birth and which we must continuously try to recapture. This College can raise the standard, therefore, to a people who are all too easily tempted to confuse appearance with substance. May God prosper this venture."

J. IRWIN MILLER
December 2, 1972

*Reprinted with permission from the **INDIANA ARCHITECT,** March/April 1973.*

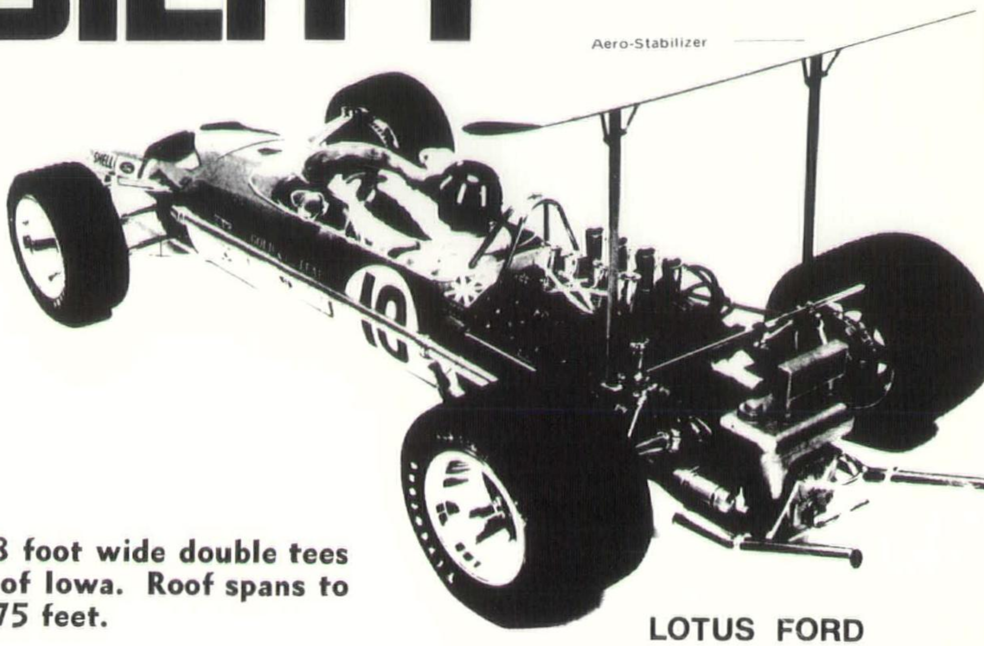
Editorial, cont'd.

The task is before us and requires a credible and comprehensive definition with realistic application through the process of design.

Learning is continuous, and indeed, contagious. This classroom is not limited to the confines of a University campus, but takes on the dimensions sometimes referred to as the everywhere classroom. This learning encompasses basic and applied research which has parallels in teaching. Even though these two forms of research are not mutually inclusive, the experience of many professions demonstrates that both forms of research are of benefit to every learner, young and old. The results of the research can intentionally be a significant public service. The test of application, in practice, is a very necessary activity to measure the effectiveness of an idea by the consequences of its implementation. Indeed, concern with the consequences is the one way to improve the state of our knowledge and evaluate its worth in today's context. To give the student the opportunity to observe and participate in his profession is a highly valuable tool when affected early in his career.

The land-grant tradition of Iowa State University has an inherent commitment to serve our rural and urban societies. If the University has any faith, it must be in the human importance of knowledge. And, if it has any conviction of its own worth, the University must be an instrument of discovering knowledge and putting it to work, the changing profession of Architecture included. We must develop the capability to project beyond our current associative limits and to responsibly and creatively seek our roles as members of our contemporary society. The Architecture program here at Iowa State University is dedicated to the development of human resources which will give young men and women an opportunity to develop as individuals as well as professionals.

DESIGNED STABILITY



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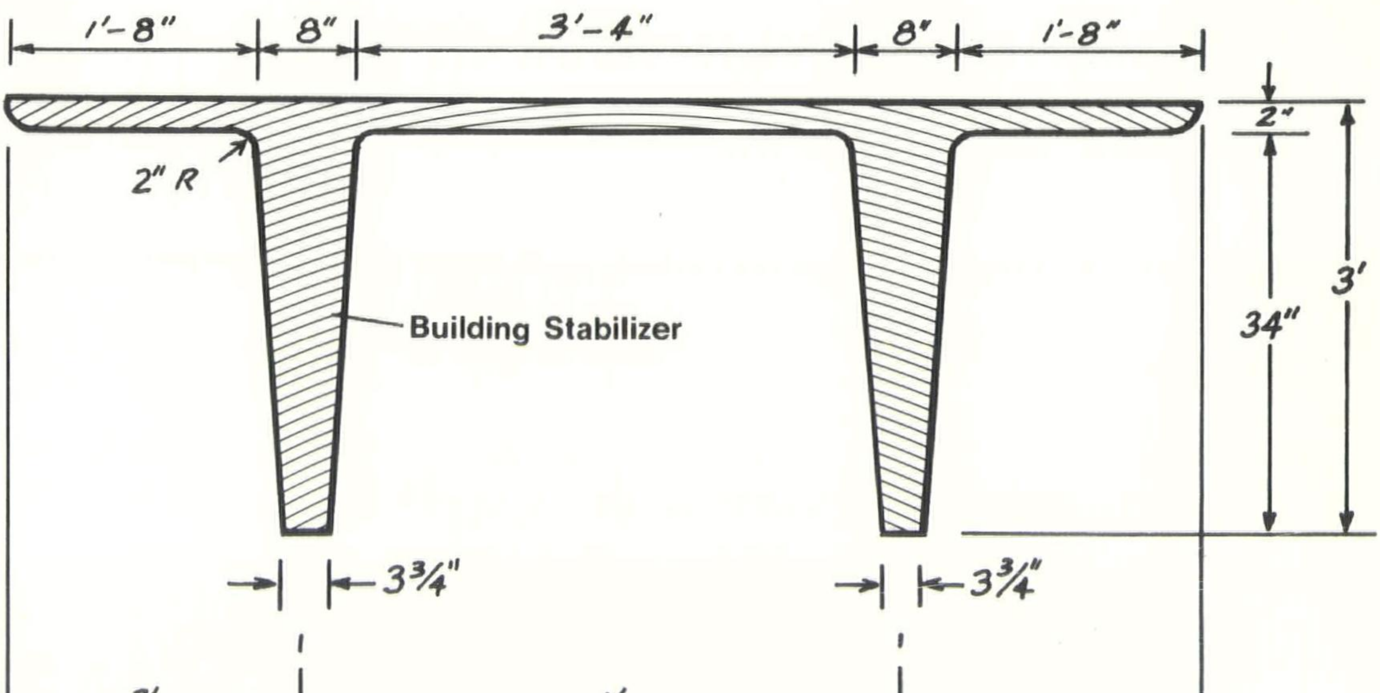

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