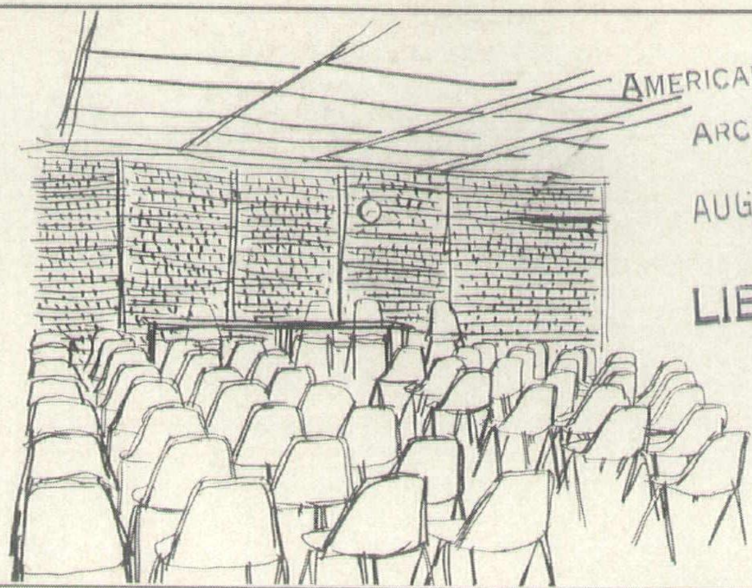
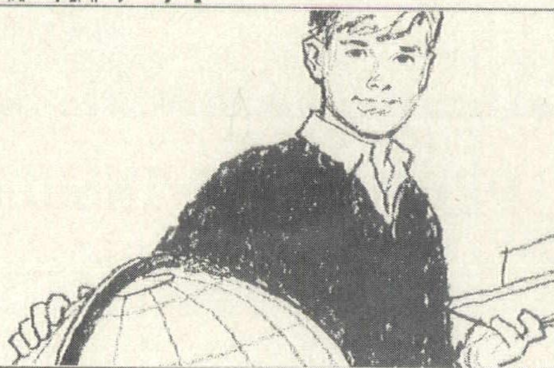
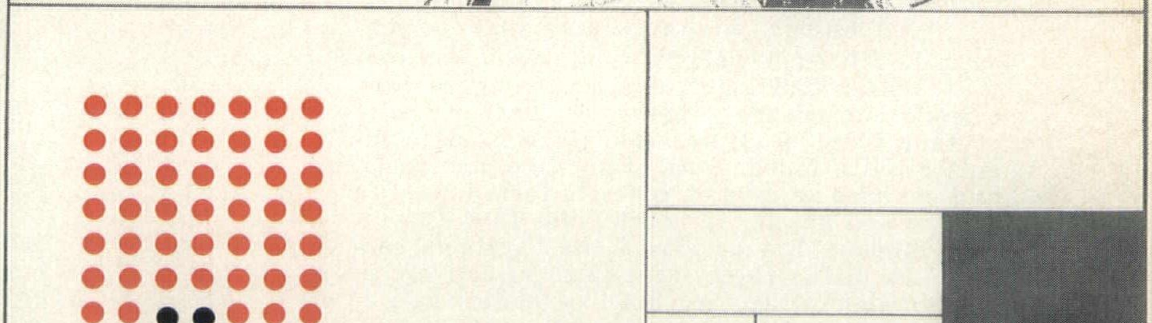
indiana architect.

JULY 1969

SYSTEMS







SYSTEMS

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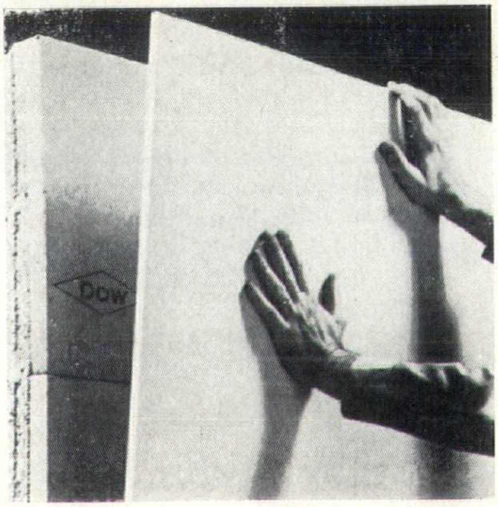

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Reason and economy dictate that the separation of the air handling specifications is the better practice. For instance, the mechanical contractor, like the electrical contractor, bids directly to the owner, architect or prime contractor; and since his bid includes the air handling portion of the work, **three to fifteen percent is added to that portion to compensate the mechanical contractor for assuming the responsibility of overseeing the air handling installation.** The success of an air handling installation, however, depends largely on the degree of co-ordination between the air handling contractor and the architectural trades; and **these trades are supervised not by the mechanical contractor but by the general contractor.**

Furthermore, because of the mechanical "middle man," bid auctioning (composed of equal parts of bid shopping and bid peddling) often results. This practice has been a constant plague in the construction industry and ultimately leads to a reduction in the quality of the work performed.

With separate and distinct specifications, **the architect and/or engineer can readily check the thoroughness of the specifications** and also be assured that each contractor's bid will include all of those items specified. The use of separate specifications will minimize the possibility of misunderstandings, duplications and overlapping.

In view of the foregoing, it is the hope of the Indiana Sheet Metal Council that air handling contractors will ultimately achieve a position comparable to the mechanical and electrical contractors; and to this end, the Council is pledged to the active promotion of separate specifications and separate bids. **The benefits derived by the entire construction industry from separate specifications and separate bids are becoming increasingly obvious,** and it is our conviction that they will more than compensate for the time involved in changing outmoded policies and ideas.

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Indiana Sheet Metal Council

indiana architect/ Official Journal, The Indiana Society of Architects, The Northern Indiana Chapter, The Central-Southern Indiana Chapter, and the Indianapolis Chapter of the American Institute of Architects.

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COVER BY LARRY ROESLER

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1970 EDUCATION FACILITIES 2000

1969 ISA-KSA-EAST CENTRAL REGION CONVENTION
Evansville, Indiana — October 2, 3, 4

PROGRAM

Thursday, October 2

10:00 A.M.	Registration, Exhibit Area.
1:30 P.M.	Opening Theme Session, Exhibit Area:
	"EDUCATIONAL PROGRAMMING:" To investigate possible combinations of people, spaces and resources needed to make a viable school system, to determine the educational objectives of an effective school program.
	FOREST WILSON, Editor, "Progressive Architecture."
	STEWARD SYNNESTVEDT, Co-Founder, Nova Complex.
	DR. MARY ENDRES, Professor, Early Childhood Education.
	SOL KASIMER, Student, Purdue University Graduate School of Human Development.
5:30 P.M.	Cocktails, Exhibit Area.
6:30 P.M.	Dinner, Ramada Inn. DAVE HOY, "ESP by HOY"

Friday, October 3

8:30 A.M.	Registration, Exhibit Area
9:30 A.M.	Second Theme Session, Exhibit Area:
	"SYSTEMS TECHNIQUES": Methods and approaches to communications technology, space, and enclosures patterns in developing adequate physical facilities with specific emphasis on environment, media, and a kinetic structure.
	CHRISTOPHER ARNOLD, Building Systems Development.
	DR. PHILLIP LEWIS, President, Instructional Dynamics, Inc.
	DR. WILLIAM CUK, Professor, of Civil Engineering, University of Virginia.

(Continued on Page 8)

Convention Program

(Continued from Page 7)

12:30 P.M.	Chapter Lunches, Ramada Inn.
2:00 P.M.	Bus Trip to New Harmony, tour of New Harmony.
6:00 P.M.	Cocktails and Dinner, Red Geranium, New Harmony.
8:00 P.M.	Brief program, Opera House, New Harmony.

Saturday, October 4

8:30 A.M.	Registration, Exhibit Area.
9:00 A.M.	ISA and KSA Business Sessions, Mezzanine, Exhibit Area.
10:30 A.M.	Coffee, Exhibit Area.
11:00 A.M.	East Central Region Membership Meeting, Exhibit Area.
12:00 Noon	Informal Lunch, Exhibit Area.
1:30 P.M.	Third Theme Session, Exhibit Area. "SCHOOL DESIGN CASE STUDIES:" Presentation and evaluation of school facilities recently designed as a result of the new criteria. Specifically, an investigation into the urban school, the suburban school, and the rural school. LEWIS DAVIS, Partner, Davis and Brody, New York. LINN SMITH, Partner, Linn Smith-Deminene Associates, Detroit. WILLIAM PENA, Partner, Caudill, Rowlett and Scott, Houston.
6:00 P.M.	Cocktails, Exhibit Area.
7:00 P.M.	Annual Banquet and Dance, Ramada Inn.

LADIES PROGRAM

Saturday, October 4

9:30 N.M.	Bus outing to Newburgh, including visit to the County Store Art Gallery and antique shops.
1:00 P.M.	Luncheon, Ramada Inn.
2:00 P.M.	"INTERIOR DECORATING," Ramada Inn. MRS. RITA WRIGHT, Hironimus-Knapp-Given Associates.


EXIT

HONORS

Indianapolis Architect DAVID O. MEEKER AIA, a principal in James Associates, Inc., and director of the Indianapolis Model Cities' program, has been named acting director of the Metropolitan Development Department under Unigov. One of the six departments in the Marion County unified government plan approved by the 1969 Indiana General Assembly, the Department has six divisions: Planning and Zoning, Urban Renewal, Housing, Buildings, Code Enforcement, and Boards of Zoning Appeal.

Mr. Meeker's appointment, the first of the six new "cabinet level" posts, was announced by Metropolitan Plan Commission President Charles Whistler earlier this month; Mr. Meeker also has been a member of the Plan Commission for two years. His appointment as permanent director is anticipated when the full nine-member Metropolitan Development Commission is appointed after the first of the year.

Mr. Meeker is a Yale graduate and a former Fulbright scholar to Denmark. He is a member of the Boards of Directors of the Indianapolis Chapter, AIA, and the Indiana Society of Architects, and will continue as director of Model Cities through this year in addition to his new responsibilities.

WALTER SCHOLER, Sr., FAIA, of Lafayette, was honored by Franklin College last month with the conferring of an honorary Doctor of Fine Arts degree, one of four honorary degrees bestowed at the college's commencement exercises.

Mr. Scholer began his architectural career in Indianapolis in 1908 as a draftsman and formed his own practice in 1918. He was a member of the Indiana State Board of Registration for Architects from 1945 to 1968, and was elected to Fellow in the American Institute of Architects in 1960 for service to the profession and the public.

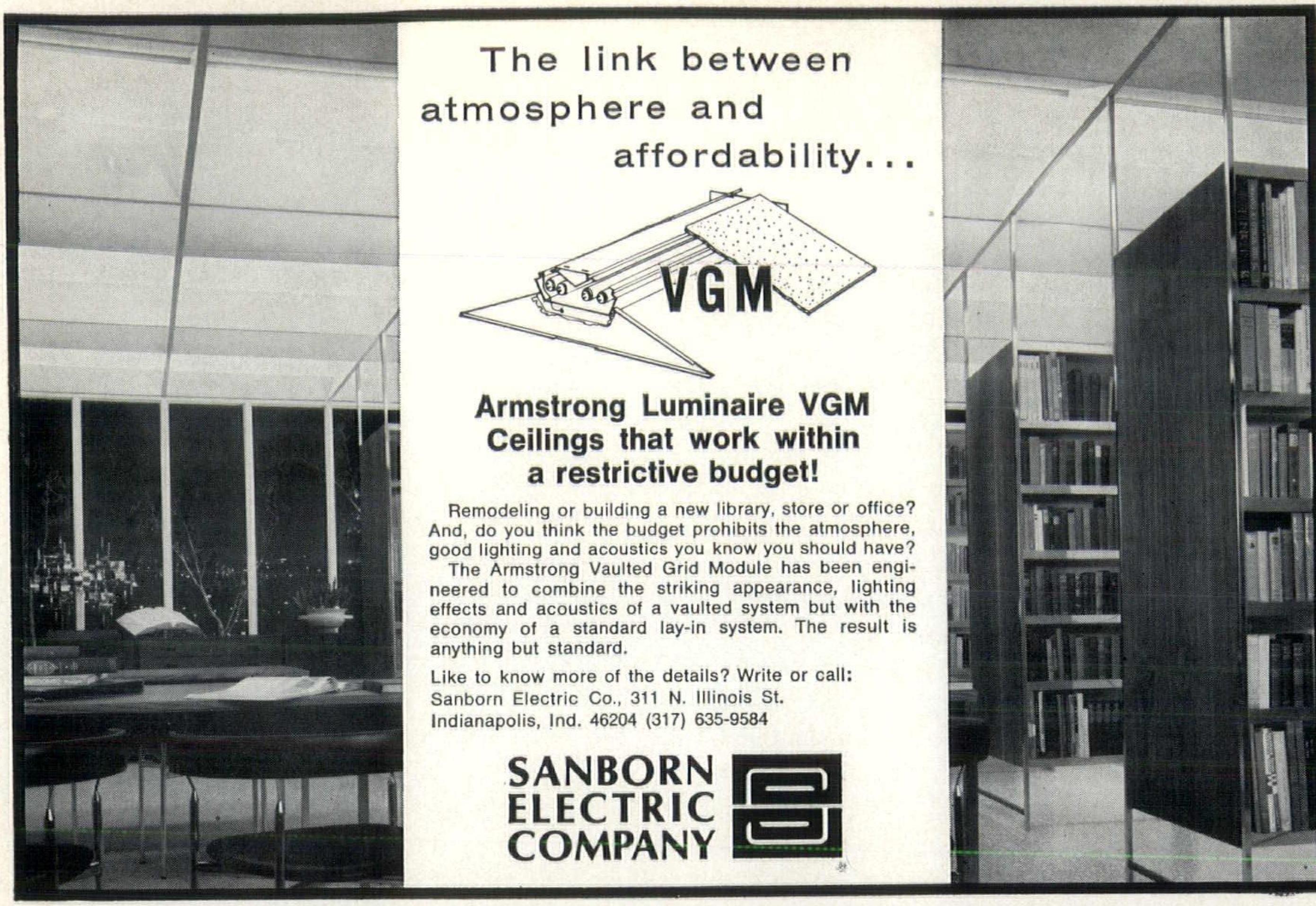
Mr. Scholer retired from active participation in his firm, Walter Scholer and Associates, one year ago after fifty years of practice, but remains associated as consultant and director.

The three other honorary degrees were awarded, to Dr. Hans Rosenhauph, director of the Woodrow Wilson National Fellowship Foundation (Letters), Rear Admiral David F. Welch, USN (Laws), and Rev. Albert E. Lacy of Bloomington (Divinity).

Indianapolis Architect DAVID F. SNYDER AIA, principal in the firm Snyder/Blackburn & Associates, has been elected president of the Indianapolis Community Action Program. Funded by the Federal Office of Economic Opportunity, CAP's purpose is to establish dialogue between the politically and economically deprived sector of the population and the business-political leadership, transmitting the virtually undefined aspirations of the "have-nots" to the "haves."

The Indianapolis CAP operates ten neighborhood help centers, an on-the-job training program, a summer youth program, and the Headstart program.

Architect Snyder has served for two years on the 51-member CAP Board of Directors, and also is a member of both the Indianapolis Chapter AIA and Indiana Society of Architects Boards of Directors. He is a graduate of the University of Illinois, chairman of the Indianapolis Chapter's Minority Employment Task Force, and consulting architect for Flanner House's multi-family housing program.



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SYSTEMS INTRODUCTION

Writing in the August, 1968, AIA JOURNAL ("Contrary to the Sound of Battelle"), University of Michigan Professor C. Theodore Larson headlined: "For building, industrialization is inevitable."

In California, ENGINEERING NEWS RECORD Man of the Year, 36-year-old Architect Ezra Ehrenkrantz, observed, "The construction industry is sleeping; it is Victorian in its work habits and building procedures."

And in Indianapolis, Penn State Architectural-Engineering Professor and "Emerging Techniques" authority, C. Herb Wheeler, commented, "Architects must stop thinking in terms of thousands of little pieces of buildings and start thinking in terms of a few major systems."

The architectural profession, the construction industry, even the Federal government are alive with references to "systems," "industrialization of the construction industry," "components," "assemblies," — terms often mis-used.

Confusing as all this talk must be to the public, the ultimate user of the products of the construction industry be they individual homes, schools, public housing or what have you, significant interest is aroused when the talk swings around to saving money, one legitimate goal of the industrial evolution in construction. But interest is not understanding, nor conception fulfillment, and true economy in construction can be as illusive as it is desirable.

Much less is said, or at least heard, regarding quality as a goal of this industrialization — quality both in the physical structure and in program fulfillment. Quality denotes additional costs, stimulating little tax-payer interest, but quality is a prime product of the building system technology.

Now everyone knows what a system is; from high school biology on, "systems" has been a part of our vocabulary: circulatory system, nervous system, solar system, political system, ad infinitum. The construction industry for years has spoken about the structural system, electrical system, heating system, plumbing system, and these are systems in that each component part is designed to work with the others in the same system to perform a function, e.g., to control the flow of water. However, there was little correlation of one system with another, and even the components in a given system were treated usually as individual items. An electrical system, for example, has not been viewed as a totality, controlling and directing energy, but rather as so many light switches, so many outlets, light fixtures, circuit breakers and lots of wire.

But the increasing complexity of modern buildings requires a high degree of co-ordination in the use and installation of building products. The building system concept recognizes the need for initial co-ordination at the building product design state, so that a comprehensive attack can be made on all the problems of user requirements, production, appearance, installation, operation, maintenance and cost.

The concept also has enabled the owner to utilize the volume of his building construction program to procure directly from industry significant innovation in answer to his needs.

The process involves the translation of the owner's requirements into technical performance terms. When the performance requirements relate to the needs of a sufficiently large market, industry is willing to undertake substantial research and development. The efficiency of modern industrial mass production can be harnessed, yet the owner is not saddled with standardized plans or monotonous repetition of either rooms or exterior appearance.

The building system concept involves the development of a selected group of separate 'components' or 'sub-systems' to work together as a 'building system.' The components are selected on the basis of functional requirements and economic practicability. Any one component is comprised of a related group of building products, e.q., the heating-ventilating-cooling component includes the fuel or energy source, the processing machinery for conversion, the distribution network, terminal devices and controls.

Since components are related, these relationships are studied from the initial stage of building product design in the building system concept. By so doing, criteria may be achievable which would otherwise be too costly to attain with components acting in isolation.

The building system concept cannot be applied dogmatically; it must be related to a careful study of all requirements, for there are many alternatives in the selection of components and in the processes by which they are developed. A comprehensive evaluation of every alternative is part of the systems approach.

The building system procedure involves five basic steps:

1. Analyzing User Requirements and translating these into Performance Specification.

2. Soliciting design proposals, based on the Performance Specifications.

3. Competitive bidding procedure and the subsequent evaluation of bids.

4. Final development and testing of the components.

5. Construction of buildings, using the approved components.

This, then, is the building system concept. In the next few pages, some of the facets of this concept are examined, including its history, its first application in the California School Constructon Systems Development, the second generation Florida Schoolhouse Systems Project, the University of California University Residential Building System, the Indiana University-University of California Academic Building Systems, and finally, the future of systems in America.

Awareness and understanding of this new concept are essential, whether or not there is accord on Professor Larson's prediction: "For architecture, the future is radiant with hope. For mankind, the promised blessings are countless."

SYSTEMS EVOLUTION

Industrialization is not new to the construction industry, although today many critics of the industry point to the vast gulf which separates the manufacture of automobiles, for example, from the construction of buildings. Anyone who remembers World War II remembers the Quonset hut or the wave of cheap pre-fab homes which attacked our cities and our country-sides in the immediate post-War period. Similarly most of the grain storage facilities which dotted our farms during the height of government farm subsidies came from assembly lines. But generally unrealized is the fact that building industrialization goes way, way back, well over three hundred years.

Although pre-fabrication cannot be equated with systems techniques, it does represent the primitive approach to industrialization. Prefabrication generally does not produce a better product, nor is it intended to. Its single purpose has been to attempt to reduce costs through minimization of quality standards coupled with off-site pre-assembly of standardized elements, with little concern for fulfillment of user requirements or long-term maintenance or operating costs. It is far from a new concept.

Architectural Historian Charles E. Peterson related (June, 1967, ENR) that a prefabricated building was brought over to Baffin Land and then taken back to England, and in 1624, Edward Winslow brought "Great House" to Cape Ann, Massachusetts. By 1727, the American colonists were exporting houses to the West Indies.

Missionaries took along a house to Hawaii in 1819, and in 1862 a sales catalog was published featuring "portable sectional buildings." During the 1849 Gold Rush, an estimated 5,000 houses were shipped from New York to California, along with some from Maine, Massachusetts, Philadelphia and Baltimore. A 62 by 100 ft. hotel, 4½ stories high, was shipped from Baltimore.

Many of these buildings were iron, as were those shipped from England and Belgium, and some were shipped with decorations and furniture. However, iron houses did not fare well under intense summer sun, and they began to disappear as soon as timber from the Northwest could be shipped down the coast.

The Union Army had its portable buildings during the Civil War, and the scarcity of timber in the great prairie states created a demand for prefabricated, take-along structures.

Easiform, Britain's first true method of system building, was developed by John Laing and Son, Ltd., just after World War I to help solve the British national housing shortage. Today, more than 10,000 new dwelling units every year are produced by the Laing systems.

Gerhard Blanchere, director Centre Scientifique at Technique Du Batiment in Paris, told delegates to the Construction Specifications Institute annual convention last month that the post-World War II advancement of building industrialization in western Europe primarily resulted from the disappearance or the numerical insufficiency of skilled traditional labor. Industrial systems of construction make it possible to build with quickly trained labor, using machines which are very simply designed. The devastation of war had created a demand which could not be satisfied by traditional construction technology.

Arkansas Architect Marvin Maune, writing in DIMENSIONS (Jan., 1969), notes that Europe's building systems largely were developed in Denmark, primarily the result of two major economic factors: the very high cost of steel and absence of a timber industry, coupled with the high cost of on-the-job labor. The early systems incorporated a bearing wall principle with heavily interdependent elements, characterized by the centralized production of large components requiring heavy machinery for transport and assembly. These large box-like elements tended to result in stereotyped planning solutions, with the largest practical element dictating the size of the largest space built with the system. System flexibility was non-existent.

A more recent trend, however, has been towards the more open building systems, characterized by the least possible interdependence of components, meaning that one component may be altered to satisfy new requirements without introducing any change or complication into the total system. In this advanced system, few and light components, simple assembly and extreme flexibility in the system and related sub-systems are factors of ultimate importance.

John W. Davidson of the Greater London Council Architect's Department, speaking at the CSI convention, reported that industrialized building in Britain received its impetus after World War II in the school field, but now is used primarily in the housing field. And it was in England, of course, that American systems advocate Ezra Ehrenkrantz became involved in construction industrialization. From his experiences at the national Building Research Station, near London, grew the now famous SCSD concept.

But for many Americans, the most astounding product of industrialized construction was Expo's Habitat, conceived and created by Montreal Architect Moshe Safdi as a dramatic solution to the critical housing shortage. Although an extremely expensive prototype, the pre-cast concrete living units, stacked on top of each other in an almost random fashion, captured the hearts of the architectural press with their most vivid statement of industrialization in construction wthout sacrifice of human needs.

SYSTEMS

SCSD

California's School Construction Systems Development started as a search for more economical schools, a product of Architect Ezra Ehrenkrantz's tenure in England where he worked with the British school construction systems in action. Upon his return, the Educational Facilities Laboratories commissioned him to prepare a report on the British program.

Three years later, in 1961, a national seminar on school construction problems furnished the catalyst to create SCSD by bringing together the head of California's Bureau of School Planning, Ehrenkrantz and representatives of EFL.

Originally five school districts in California were convinced to pool their construction programs in an effort to interest industry to mass-produce components for their use while permitting individual architects to utilize these components to fulfill the specific requirements for each school. Ultimately 13 districts participated in the program, forming the First California Commisson on School Construction Systems.

With financial aid from EFL, Ehrenkrantz led a team of specialists in a comprehensive educational analysis of the schools, then translated these educational specifications into the sort of specifications from which manufacturers could design components and bid them.

Perhaps the most important discovery during this educational analysis was the realization that what schools really needed was optimum flexibility. School buildings should adapt to changing educational philosophy and techniques, not strangle them within fixed confines. This realization resulted in a concept of long-span (up to 75 feet) structural systems which would permit moveable partitions beneath to be relocated with ease. In turn, this concept mandated easily relocatable lighting fixtures and flexible ventilating facilities.

The bidding specifications were unique to construction in this country (although not to the aerospace endeavors), merely specifying the problem to be solved with the solution left to the manufacturer — "performance specifications." Four initial sub-systems were outlined: structure, ceiling and lighting, mechanical, and interior partitions, with all but partitions contained in a 36-inch space between the roof deck and the ceiling. Exterior walls were not included due to the fact that little economy could be achieved and individual design would be inhibited.

Six successful bidders were selected, and the first 3,600 sq. ft. trial building constructed on the Stanford campus in 1964. As a demonstration of its flexibility, overnight a new room was produced by removing 120 feet of interior partition, installing 25 feet, and changing the surface of 80 feet of partition. The lighting was rearranged by moving 300 square feet of ceiling panels, seven air-conditioning zones were reduced to five. Two thermostats were removed and one changed in position. Only 59 man-hours of work were required.

Thirteen California schools were built in the original SCSD program, and all differ widely. One consists of separate buildings placed around a large central open area, one surrounds a roofed "great court", and while originally conceived as a program for high schools, one elementary school was designed. Exterior treatment also varies greatly, and each school is designed to the exact requirements of the school district.

The original four SCSD components (structural, mechanical, lighting-ceiling, and partitions) represent approximately one-half of the total cost of a building. At the time of the SCSD experiment, these elements cost about $8.39 a square foot in the conventional California school. The SCSD cost for the same elements was about $6.85 a square foot, but more importantly, it provided a better package than ever available before.

Schools throughout the country, including Indiana, have utilized the SCSD concept, and several manufacturers are now active in each area of systems, thereby assuring wider competition. Several systems originally created for SCSD also are widely used in non-SCSD projects, further extending the manufacturer's base.

SYSTEMS

SSP

The Florida Schools Systems Project involved initially the simultaneous construction of six schools in a second generation SCSD endeavor, with a second phase adding an additional nine projects for a total cost of $13 million. Conceivably, the final dollar volume of schools built under SSP might exceed $40 million.

Formally created by the Florida Department of Education in 1965, after several years' preliminary study, the program provided a complete evaluation of existing Florida educational requirements and programs, determined the interest and support of local schools, industry and others, determined the applicability of the building systems approach to differing schools, developed cost estimates, elicited bids, awarded contracts, and finally produced school buildings. The administrative costs were shared equally by Educational Facilities Laboratories and the State of Florida, and Tallahassee Architect James Yates Bruce served as consultant.

Three major systems components were selected: Structure, ceiling-lighting, and air conditioning. In the second phase, partitions were added. Performance specifications were developed from the educational specifications, but unlike the California forerunner, emphasis was on adapting existing products for integration in systems rather than on creation of entirely new products. Naturally, SSP benefited materially from the development work involved in the original SCSD program.

Bids on the performance specifications were received from manufacturers late in 1967, with the costs of erection (based on bids from local sub-contractors) included. Separate contracts were established with the successful component contractors, which were assigned to the general contractors on each project. Other bids were received in normal fashion.

The individual projects were designed by local architects and their consulting engineers, using the component systems. Two high schools, two middle schools and two elementary schools were involved.

The average total square foot costs for these two schools were significantly below the SCSD figures from three years previous, averaging between $11.22 and $14.62 as compared to $15.50 and $21.54 for the SCSD projects. Costs included site work, carpeting, air-conditioning and furnishings.

The component costs for structure averaged $1.67, for the ceiling-lighting, $1.39, and for air-conditioning, $1.93 per square foot.

As developed in SCSD, flexibility of the facility to accomodate changes in educational techniques, or even changes in educational levels, is a prime consideration of SSP. The structural system permits clear spans up to 60 feet for maximum flexibility, matched with completely flexibile ceiling-lighting system and ventilating system.

The success of the first phase SSP generated the momentum for the next nine projects in phase 2, even though the departure from the usual prestressed concrete school to steel structure with roof-mounted mechanical equipment was highly unusual in Florida.

SYSTEMS

URBS

The University of California's University Residential Building System was founded in 1965 as a follow-up of the California SCSD program, again with Ezra Ehrenkrantz as consultant. URBS' primary objective was the achievement of significant gains in environmental qualities concurrent with reductions in the costs for construction, maintenance and alteration of student housing facilities. Another important objective was added adaptability of the building to changes in the physical environment and in the use of space over a period of many years as programs and requirements change.

Five components are involved, structure-ceiling, heating-ventilating-cooling, partitions, bathroom, and furnishings, and the first three had to be compatible functionally, dimensionally and economically. The structure-ceiling specifications required a structure with finished ceilings specifically designed to meet the needs for variety and flexibility in future student housing — allowing the architect maximum freedom in planning and in exterior architectural expression. A structure of constant depth (finished ceiling to floor surface above) and ability to span up to thirty-five feet was specified, providing for buildings one to thirteen stories in height.

The HVC performance specification required consideration of the maintenance and operation costs, as well as initial construction cost, and provided for possible add-on cooling. The components were to be installed in both single student residence halls and married student apartments, with no recirculation of return air from one apratment to another.

Partitions were required to be extremely versatile, providing for both fixed and demountable, one-hour fire rated partitions with a range of heights and surface finishes and provision for hanging pictures. Extremely high acoustical requirements were specified, along with strong emphasis on ease of maintenance.

Bathroom components were to be residential in scale, rather than the traditional gang bath, and furnished as a complete entity similar to Habitat.

Furnishings were to be aesthetically pleasing, exceptionally sturdy, with interchangeable shelves, drawers and counters. One bolster bed and a bunkable bed and special tilt and swivel arm chair were encluded.

Bidding by the manufacturers included installation costs, with responsibility for the entire product design, development, supply, installation and guarantee resting with the manufacturer. The bidding procedure required a preliminary design proposal, a final design proposal, and the final priced proposal with multipliers to allow for differences in costs at the various campuses.

Each housing project was to be individually designed by an architect retained by the university and constructed by a general contractor selected by competitive bidding for all work not furnished by component contractor.

Three structure-ceiling components were represented in the final bidding, involving both concrete and steel, and one each heating-ventilating-cooling component, partitions component, and bathroom component, and two furnishing component.

Bids were received in mid-1968 in the form of lump sum proposals based on a hypothetical set of conditions encompassing the full range of component capabilities for a student housing program of 1,600,000 square feet of floor area for 4,500 students. Additional lump sum bids covered prices for 5 years' full maintenance of the HVC component (renewable at the same price for three additional 5 year periods) and for relocating all demountable partitions through 1979.

Evaluation of the bids indicated that the URBS components do offer increased performance and lower cost in the structure-ceiling and partitions components, and increased performance but at greater cost in the heating-ventilating-air conditioning, bathroom and furniture components. The structure-ceiling component represented an 18.7% savings over conventional construction used at four recent university residence hall projects, and partitions represented a 26.1% savings.

Heating-ventilating-cooling, conversely, represented a 42% increase compared with the same conventionally built projects, although this figure is somewhat misleading in that existing projects did not include the air-conditioning feature. Bathrooms represented a 22% increase, and furnishings less than 1% increase. As a result of these bids, the systems consultant recommended that all be accepted except the bathroom component, which is being restudied.

Although no buildings yet have emerged from the URBS program (contruction on the first pilot project originally was scheduled for late Fall of this year), it would appear that a net savings in cost of some 11% could be achieved through this systems process. But this savings is coupled with substantial gains in environmental qualities and unparalled adaptability to meet future needs. As in SCSD, first emphasis was on reducing costs, but as the program developed, greater emphasis emerged on producing a better building — for less or at least no more than the costs for conventional construction.

Of equal importance with initial construction cost is the continuing cost of maintenance and operations. A savings of $1.00 per student per year in operation and maintenance is equivalent to $20.00 more in first cost for the same annual student cost. Including maintenance contracts in initial bidding can demonstrate these costs and the relevant savings most dramatically.

It should also be noted that URBS is patterned more after the SCSD concept of extremely large, open, flexible areas divided as needed by relocatable paritions than after Habitat or the standard European housing system using small, enclosed boxes stacked together.

EDUCATIONAL FACILITIES

1970 — 2000

The 1969 joint convention of the Indiana Society of Architects, Kentucky Society of Architects, and East Central Region AIA, will focus on the changing demands of education and the resulting new technology in architectural design and construction.

The convention will be held October 2-4, at the Convention Center in Evansville. A limited amount of excellent exhibit space for building products manufacturers and representatives is available. For information, contact the

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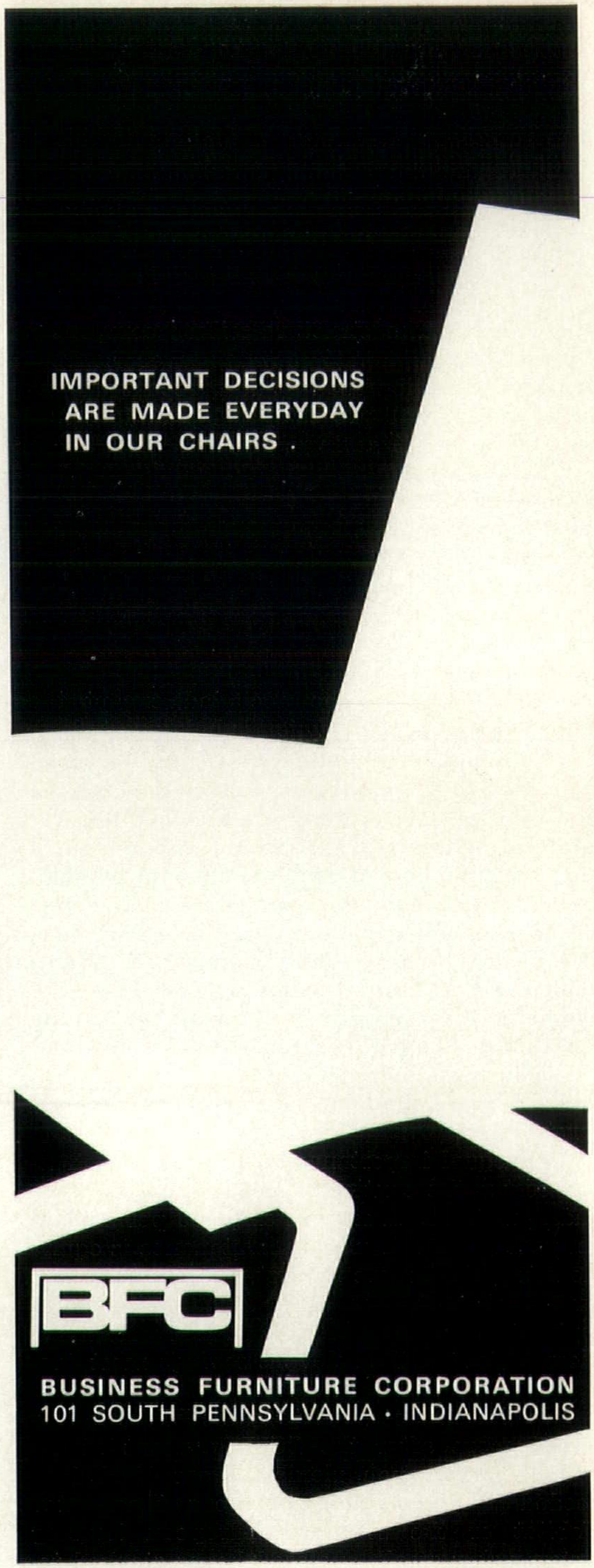

SYSTEMS ABS

Yet another direct descendant of SCSD is the Academic Building Systems program for Indiana University and the University of California. Officially sanctioned by the Indiana General Assembly's budgeting of $200,000 in 1967, as part of a $1,200,000 program shared equally by Indiana, California and Educational Facilities Laboratories and a $600,000 grant from the U. S. Department of Health, Education and Welfare, the study received final approval only recently from Indiana Governor Edgar Whitcomb. James Associates, Inc., Indianapolis-based architects, and Ezria Ehrenkrantz' Building Systems Development, Inc., jointly are the systems consultants for ABS.

ABS is to be applied in three major areas of educational buildings: classroom type space, faculty office type space, and laboratory type space. Medical laboratory and hospital type facilities are not included in the study presently, although they may be included later if appropriate.

Again, the process involves the translation of the university's educational requirements into technical performance terms, theoretically enabling the university to utilize the volume of its building program to procure directly from industry significant innovation to answer its needs. In a competitive bidding process, products are developed in parallel so that all parts are co-ordinated.

Similarly, the emphasis again will be on flexibility, an essential aim of the system for growth and change are inevitable within all areas of the university. With adaptable components, a large classroom can quickly be turned to use for seminars; with a little more time, room sizes can be changed to meet shifts in scheduled class enrollment. Over a somewhat longer period, entire department space allocations can be adjusted to provide appropriate areas and services. This flexibility is dependent on components which perform these functions, and which can be allotted within the building budget.

These concepts may also be relatively simply incorporated into the rehabilitation of existing buildings where, for example, a new operable or demountable partition in a large classroom can increase space utilization in relation to new conditions.

The university has a responsibility not only to create an environment in which today's students can learn, but also to increase the efficiency of the learning process so that the student may keep up with the very rapid expansion of the body of knowledge. Experimentation in teaching methods and philosophy are intrinsic to the idea of a university. In this respect the physical facilities should act as a vehicle to make these changes effective and easy to accomplish rather than as a constraint to the educational change. The capacity for change is crucial if the university is not only to maintain its current place in society, but also play an ever-increasing and more active role.

Both Indiana and California are committed to expanding the system of higher education to make it available to all who might benefit from it . The resulting growth in college and university building programs is intensifying the concern that the best value be obtained for the building dollar. This concern is creating pressures which compel the investigation of ways to achieve greater efficiency in the whole build-process.

The four state-supported universities in Indiana anticipate an enrollment of 141,000 by 1972, an increase of 44,000 over 1967, which will entail the expenditures of approximately $420 million for construction, rehabilitation and repairs. The University of California, with

88,000 students in 1967, expects 120,000 students by 1972, with a capital improvement program of $450 million over the same period.

These large building programs offer a major opportunity to marshal the resources of industry to answer public needs. It becomes possible to initiate a more systematic approach to programming design distribution, construction and erection than when projects are built on an individual custom basis, although each building will continue to be designed and constructed on an individual basis.

The project objectives are generally summarized as follows (not in order of priority or importance):

1. Cost and Programming
   a) reduce first cost of buildings;
   b) reduce operations and maintenance cost;
   c) provide a better means of predicting costs of future projects;
   d) reduce the time required between building program initiation and occupancy;
   e) improve programming techniques.
2. Flexibility
   Provide a range of co-ordinated, adaptable components which will enable buildings better to:
   a) respond to change in academic programs;
   b) respond to change in university policy;
   c) utilize available space.
3. Respond to human needs. Improve the quality of physical environment for education.

One of the most ambitious systems projects yet undertaken, ABS should result in significant research and development by industry, for systems applicable both in California and in Indiana should be applicable in almost every area and the immediate two-university market is large enough to warrant research and development investment.

Development of the ABS program is now underway, and it is anticipated that by 1975, between $200 and $300 million worth of university construction will be realized under this building system.

SYSTEMS FUTURE

Without doubt, building systems technology is here to stay. In addition to those projects discussed on the preceding pages, systems programs have been initiated in Montreal and Toronto, Canda (for metropolitan schools in both cities), and Pittsburgh, Pennsylvania (for five large comprehensive high schools located in éducational parks). At the Federal level, the General Services Administration, Post Office Department and the Veterans' Administration all are initiating systems studies along with HEW's participation in the ABS program. Most recently, Housing and Urban Development has been examining the building systems techniques for application to the low income housing shortage problem.

Several manufacturing firms not successful in the SCSD program, and others not even involved at that time, have put together their own systems packages. Concrete (standard for systems in Europe) has re-appeared in systems consideration, broadening the structural possibilities, and an ever growing segment of the construction industry and the architectural profession are becoming conversant in the field.

The urgent need for mass housing, considerably higher in quality than much of the instant slums being produced today with Federal funds but without greatly increased costs, would appear as a natural application for systems building. The staggering volume, with development costs picked up by the government, would be of interest to any industry — including those not now directly involved in the construction picture.

But not all the view is rosy. Program development costs for closed building systems are high, and in every case in this country, have been picked up by foundation money and not assigned as costs of the projects. These funds are not available to every interested group, and a closed system cannot be developed in answer to a specific user need with considerable research.

Industry has spent well over $10 million in research and development in the SCSD and URBS programs, and there are indications that industry is losing some of its taste for expenditures of this nature. URBS was unable to attract and hold a sufficient number of bidder companies for truly competitive bidding, and a few manufacturers have gotten out of the systems business.

Very probably some union difficulties will arise. The right of a union to strike to preserve construction work "historically" theirs was upheld by the Supreme Court in the now famous Philadelphia Door Case, and if they will strike over factory pre-hung doors and demand pay for hanging the doors in the field anyway, there's a good chance they won't accept much in the way of systems construction either.

There have been questions raised as to whether or not it is possible to carry the close factory-allowable tolerances on interfaces out into on site construction.

There is also the danger of equating building systems with prefabrication. The systems approach utilizes a team which analyzes all aspects of building construction in the development of a system. Cost, flexibility and environment are all related, and after the various components have been conceived, they are used in individual applications to fulfill specific needs. Pre-fabrication, basically, only partially transfers the construction process from field to factory, and the requirements of the individual project must be expressed strictly in accordance with the limits of the product.

As in Europe, the crucial demand for housing, particularly low-cost mass housing, should generate the greatest momentum for the systems approach. Habitat demonstrated that individual privacy and good architecture can go hand in hand with industrialized techniques, but unfortunately, the individual units cost an estimated $100,000 each. More recent systems, however, appear to be overcoming this cost factor and certainly a mass program of housing directed by HUD, perhaps upwards of $500 billion worth of construction, should assist materially the quest for better building design and construction techniques.

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