



BUILDING TYPES STUDY

SCHOOLS

236

# SPECTACULAR ROOF DESIGN—

## St. Louis Air Terminal Building



Airport Terminal Building, St. Louis, Mo. Architects: Hellmuth, Yamasaki & Leinweber; Structural Engineer: William C. E. Becker; Consultants on Dome Design: Roberts and Schaefer of Chicago; Chief Engineer City of St. Louis: W. R. Creelius; General Contractor: L. & R. Construction Co.; Design of Concrete Mix: Robert W. Hunt Co.; Pozzolith Ready-Mixed Concrete—used throughout—produced by Majestic Materials Corp. All of St. Louis, Missouri, except as noted.

### **POZZOLITH** employed for improved Concrete Control

Concrete with minimum shrinkage and high flexural strength was needed for the thin shell roof construction of this strikingly modern air terminal.

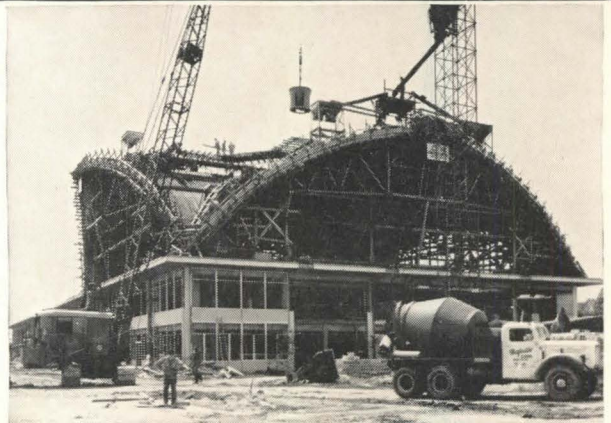
Another important requirement was control of the rate of hardening—to provide normal set for moderate weather and a retarded set for the 100 degree temperatures which prevailed during part of the construction. These results were obtained with Pozzolith.

Pozzolith with its adaptations is key to control of:

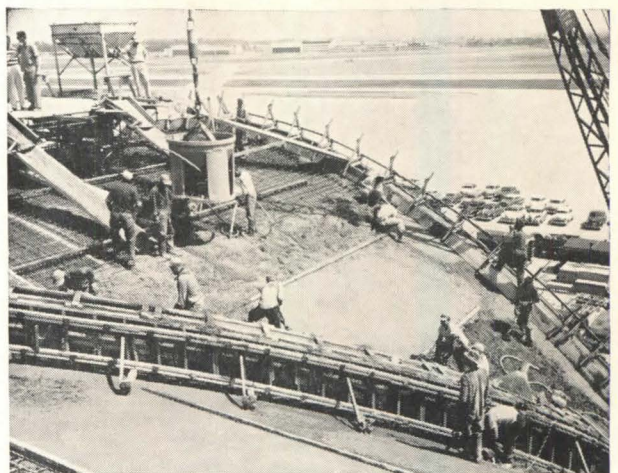
1. *water content*...makes possible lowest unit water content for a given workability.
2. *entrained air*...provides optimum air content without sacrificing other desired qualities.
3. *rate of hardening*...gives desired handling and finishing time under widely varying job conditions.

Over 115 million cubic yards of concrete have been produced with Pozzolith—evidence of the fact that its performance has proved dependable over the years.

Any of our more than 75 field technical men will be glad to demonstrate the full advantages of Pozzolith for your project.



Upper View: Shows roof construction. Lower View: Shows placing and finishing concrete. Each dome contains about 400 cu. yds. of concrete and 60 tons of reinforcing steel, and was poured in one continuous operation.



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# ARCHITECTURAL RECORD

July 1956 Vol. 120 No. 1

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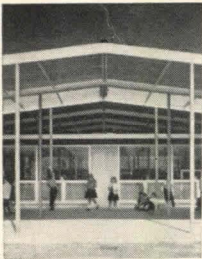


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## TABLE OF CONTENTS

### The Record Reports

Perspectives	9
Buildings in the News. National Council Group Selects "Outstanding" Modern Churches	10
Murphy & Mackey Design Wins Washington University Competition	16
Pennsylvania Builds a New Kind of Rehabilitation Center	16B
Meetings and Miscellany	21
A Washington Report. Advance Planning Bulwarks Military Construction Programs. <i>By Ernest Mickel</i>	32
News from Canada. <i>By John Caulfield Smith</i>	36
Washington Topics. <i>By Ernest Mickel</i>	48
Construction Cost Indexes	52
Required Reading	56
Current Trends in Construction	360



COVER: San Jacinto Elementary School, Liberty, Texas; Caudill, Rowlett, Scott & Associates, Architects; Ulric Meisel photo

### Building Types Study Number 236 — Schools

The process of perfecting design architecturally reflects current improvement in educational theories and techniques: four schools demonstrate the interaction of educational and architectural concepts as well as technical developments.

The Individual School and the Delightful, Never-ending Progress to Perfection. <i>By Frank G. Lopez, A.I.A.</i>	149
San Jacinto Elementary School, Liberty, Texas; Caudill, Rowlett, Scott & Associates, Architects	151
North Hagerstown High School, Hagerstown, Md.; McLeod & Ferrara, Architects; Stewart E. Duval, John M. Woodside, Associates	161
Techniques Differ for Adjacent, Unlike Situations: Whiting Lane Elementary School, West Hartford, Conn.; Moore & Salisbury, Architects	173
Wilbert Snow Elementary School, Middletown, Conn.; Warren H. Ashley, Architect	173

### Residential Courts

181

Continued on next page

# ARCHITECTURAL RECORD

Continued from page 5

<b>The Place of Structure in Architecture</b> <i>An article by Pier Luigi Nervi</i>	189
--	-----

<b>Final Schematics for Air Force Academy</b> Proposed Academy, Colorado Springs, Colo.; Skidmore, Owings & Merrill, Architects-Engineers	192
---	-----

<b>"Architecture for the Good Life"</b> Two of the addresses at the 88th Annual Convention of the A.I.A. in Los Angeles. The third, by Clarence S. Stein, will be published next month.	
1. The Keynote Address: Architecture for the Good Life. <i>By John Ely Burchard</i>	197
2. Architecture for the Complete Man. <i>By John Knox Shear</i>	201

<b>One Hundred Years of Significant Building</b> The second in a series of monthly presentations of the most significant buildings of the past century of American Architecture as nominated by a panel of architects and scholars.	
2. Administration and Research Buildings	203

<b>Hartford, Connecticut, in 2056</b> Rhode Island School of Design broadens its educational horizon by having students replan a city for a hundred years hence	207
--	-----

<b>Architectural Engineering</b>	
Electrical Distribution in the Home	211
Air Conditioning Costs in Large Shopping Centers. <i>By Francis A. Welch</i>	215
Technical Roundup	219
Product Reports	221
Literature	222
Time-Saver Standards — Residential Electrical Systems: I, II, & III	225

<b>Index to Advertising</b>	362
-----------------------------	-----

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# THE RECORD REPORTS

## P E R S P E C T I V E S

ARCHITECTURAL RECORD is 65 years old this month — or, at any rate, its first issue is dated “For Quarter ending September 30, 1891,” and its oldest bound volume is stamped “July–Dec. 1891,” giving it a right, perhaps, to a July birthday of choice. Actually, the first issue was put on sale Aug. 15, 1891 — its publisher, Clinton W. Sweet, who had been since 1868 publisher of the *Real Estate Record and Builders Guide*, hoped his new quarterly would “keep architects and the general public in touch with progress in architecture, building and decorations at home and abroad.” Over the years, as the RECORD became a monthly (1902) and developed its now familiar character as the professional journal for architects and engineers (from 1914 or so), it has survived (and occasionally encompassed) many a competitive venture; partly, perhaps, because of its good fortune in early becoming part of the developing F. W. Dodge family of services to the construction industry; but also, it seems likely, because it enjoyed a certain continuity of editorial direction (it has had only five chief editors) and a degree of editorial perspicacity which makes an inheritance both proud and humbling for its present editors. Among the early milestones, it may be timely just now to recall that the work of Frank Lloyd Wright (who celebrated a birthday himself last month — his 87th) was first published in the RECORD (that was in 1905) and that Louis Sullivan (whose centennial is this year) was frequently represented both as architect and author from 1892 to his death in 1924. At 65, however, there are many milestones to remember, and a good many laurels too; as it looks to the future, certainly the RECORD’s most cherished accolade lies in the testimony of its healthy circulation and advertising figures that it honors a long tradition by leading its field today.

THE ARCHITECTURAL CHALLENGE in-

herent in providing for the developing needs of an aging population finds a ready response from architects, if the initial interest in the current competition for a Home for the Aged is any indication. Six weeks before the scheduled August 1 closing date for receipt of entry forms, nearly 700 applications had been received. They came not only from this country but from England, France, Switzerland and (more than 100 of them) Canada as well. The competition (AR, May 1956, pages 326–327) is sponsored by the National Committee on Aging of the National Social Welfare Assembly, under a grant from the Frederick and Amelia Schimper Foundation, in conjunction with ARCHITECTURAL RECORD and *The Modern Hospital*. It offers \$10,000 in awards in an effort “to stimulate imaginative planning for a type of building rapidly increasing in volume and importance but relatively new to architects, and about which there is practically no reference material in the literature of architecture.”

HOUSING FOR THE AGED got attention too at last month’s Federal-State Conference on Aging, held in Washington under the joint sponsorship of the Federal Council on Aging, an interdepartmental government group recently created by the President to explore housing among other needs of older people, and the Council of State Governments. The emphasis in the discussions of housing, which had a single session in a crowded two-day agenda, was on the role that private enterprise could play in providing both individual and group housing for the aging, especially those who do not require institutional care. Emerson Goble, managing editor of ARCHITECTURAL RECORD, addressing the housing panel, suggested that the facts of community life today tend to segregate older people, and that a part of the problem is housing — “for the

lack of housing is the first physical fact in the feeling of rejection.” The summary statement issued by the special discussion group on housing and living arrangements suggested that “we ought not to be building homes for older people as such, but well-designed, more flexible homes which would include special features . . . essential for the aging and also practical and useful for younger people just starting their families. They would, in effect, be small homes that would be attractive and saleable to any small family seeking a modest-sized home.” The group also urged that statewide meetings of representatives of public, private and voluntary organizations be called by the governors of the states to study housing problems and needs of the aging. Only 14 states were reported to have active formal organizations for dealing with these problems.

PUBLIC RELATIONS, ANOTHER VIEW: That admittedly rather feeble family joke about the architect whose \$50,000 retirement fund represents the architectural profits of 30 years plus a \$49,999.50 inheritance got a brisk reaction from West Virginia’s Cy Silling when the RECORD (weakly) picked it up (April 1956, page 9). “The poorest kind of public relations, ought to be suppressed,” wrote Mr. Silling. “In our office we insist on making money, call our clients’ attention to that fact, tell them we think we can help them make some too. This is an early lesson in earning their respect. Being business men, it is talk they understand. Esthetics we give ’em for free, but later.”

TOPPED: Philip Johnson amiably proffered a sequel to that story about his house and Perret’s reaction to it (AR, May 1956, page 9) — “He finally did come into the house and sat down, remarking, ‘It is more comfortable here than in a railroad station.’”

## THE RECORD REPORTS

### BUILDINGS IN THE NEWS

#### NATIONAL COUNCIL GROUP SELECTS "OUTSTANDING" MODERN CHURCHES

A group of 18 American churches, all of contemporary design, were selected as "outstanding" in a recent poll of members of the Commission on Architecture of the Department of Worship and the Arts in the National Council of Churches of Christ in the U.S.A. Eliel Saarinen's Christ Evangelical Lutheran Church at Minneapolis took first place on the list, which was compiled by asking each member to nominate 10 to 25 churches that were in his opinion the best examples of the type; the 18 chosen were the churches receiving the most nominations.

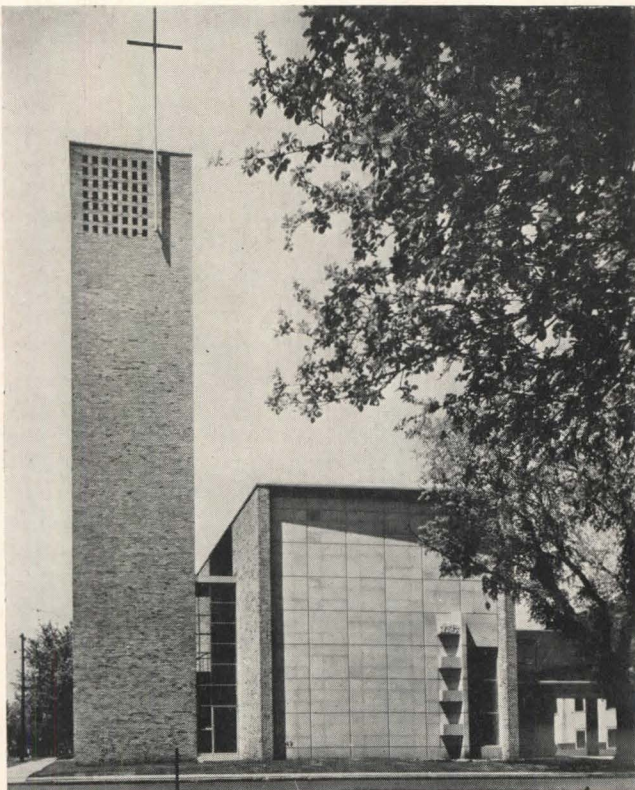
Although any church built since 1930

was eligible, only two of the churches in the final 18 — Bruce Goff's San Lorenzo Church in California and Eliel Saarinen's Tabernacle Church of Christ in Indiana — were built before the end of the war; most of them, in fact, have been completed since 1950. Rev. Marvin P. Halverson, director of the department of worship and the arts, took the relative newness of these churches as an encouraging sign of "growing maturity" in church design.

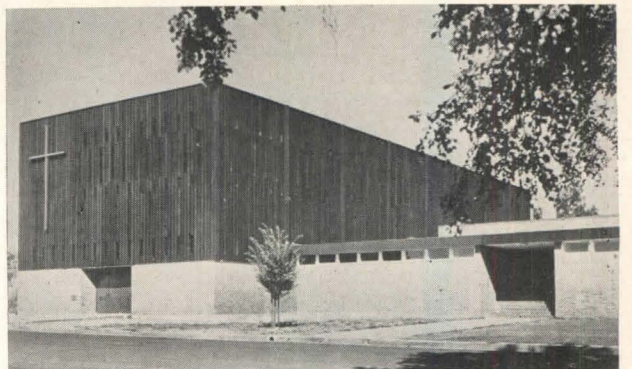
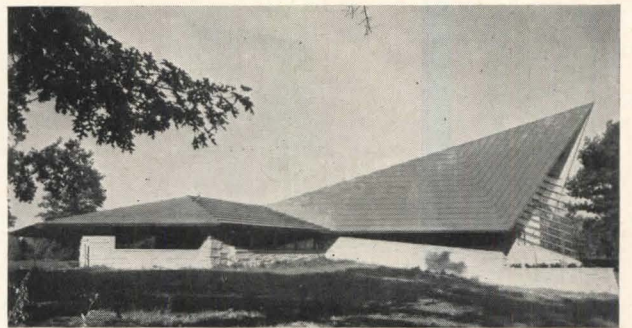
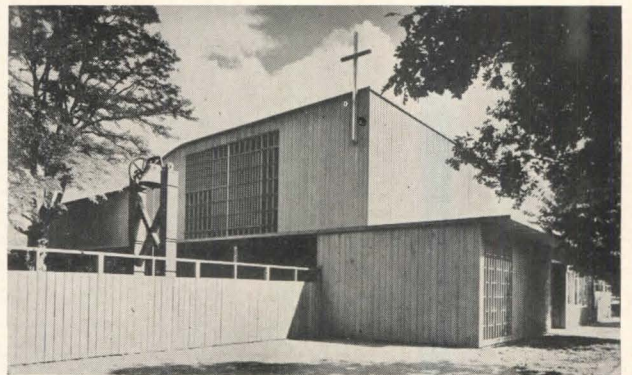
"These churches," he said, "are examples of good design because they represent a high level of architectural expression of each church's ethos and

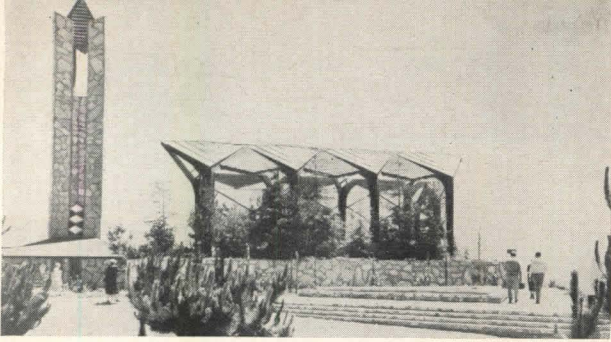
way of worship. This points the possibility of increasingly good design as congregations begin to understand their nature, tradition and way of worship. For it is only out of this self-understanding that a church will be prepared to enter into a dialogue with the architect which is basic to enduring architectural achievement."

Chairman of the commission is Walter A. Taylor, director of education and research for the American Institute of Architects. Other members include architects, architectural educators, editors, clergymen and "specialists in the field of church design."



*Above: the Christ Evangelical Lutheran Church, in Minneapolis, took first place in the National Council of Churches' poll to select outstanding new churches; it was designed by architects Saarinen, Saarinen and Associates, and completed in 1949. Other churches listed in the poll included, at right, top: First Presbyterian Church at Collage Grove, Ore., completed in 1951, Pietro Belluschi, architect; center: Meeting House of the First Unitarian Society, Madison, Wis., completed in 1951, Frank Lloyd Wright, architect; and bottom: Central Lutheran Church, Eugene, Ore., completed in 1955, Pietro Belluschi and Skidmore, Owings and Merrill, architects*

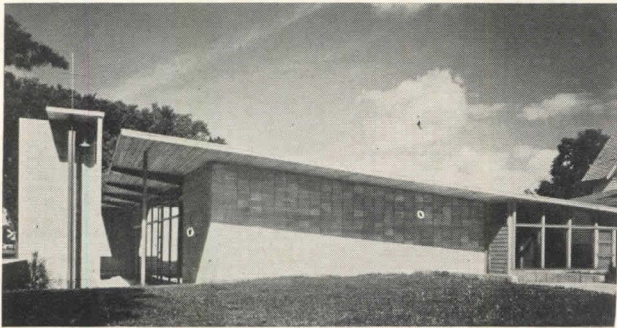




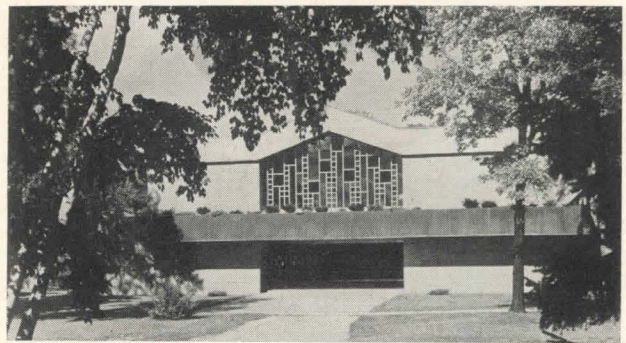
*Wayfarer's Chapel (Church of the New Jerusalem), Palos Verdes, Cal., 1952, John Lloyd Wright, architect*



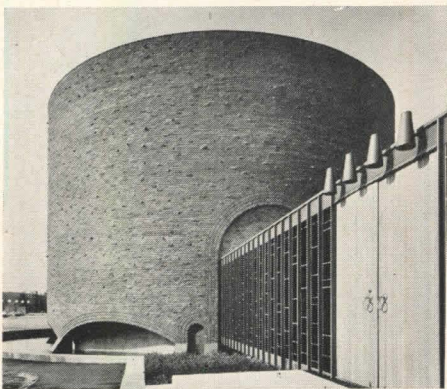
*St. Stephen's Episcopal Church, Columbus, Ohio, completed in 1953, Brooks and Coddington, architects*



*First Methodist Church, Plainfield, Iowa, completed in 1951, Schweikher & Elting, architects*



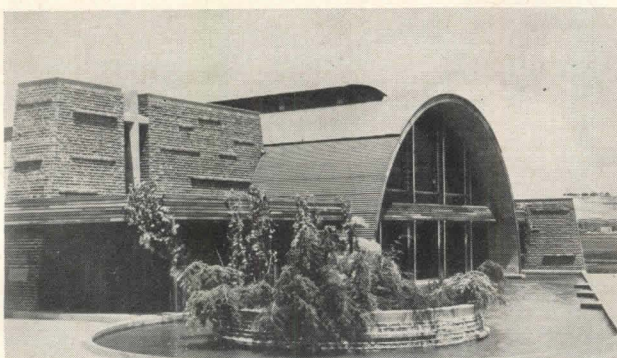
*First Methodist Church at Midland, Mich., completed in 1952, Alden B. Dow, architect*



*Chapel, Massachusetts Institute of Technology, Cambridge, Mass., 1955, Eero Saarinen and Associates, architects*



*Zion Lutheran Church, Portland, Ore., completed in 1950, Pietro Belluschi, architect*

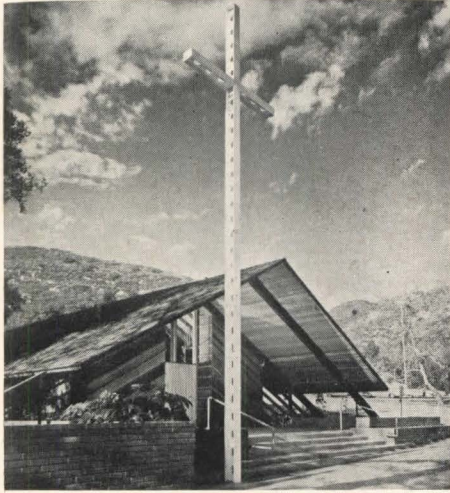


*San Lorenzo Community Church (U.S. Navy Seabee Chapel), San Lorenzo, Cal., 1941, Bruce Goff, architect*

*(Continued on page 12)*

**THE RECORD REPORTS**  
**BUILDINGS IN THE NEWS**

*(Continued from page 11)*



*St. Matthew's Episcopal Church, Pacific Palisades, Cal., 1953,  
 A. Quincy Johnes and Frederick E. Emmons, architects*



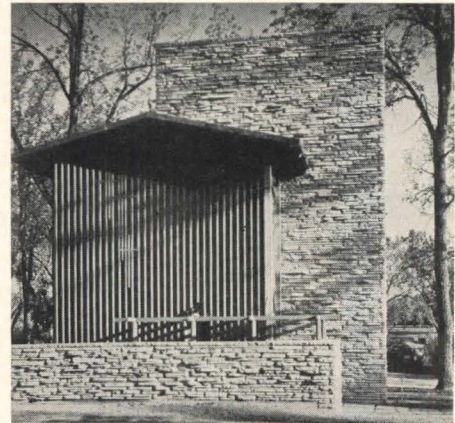
*Central Lutheran Church, Portland, Ore., completed in 1951,  
 Pietro Belluschi, architect*



*Church of Saint Clement (Episcopal), Alexandria, Va., completed in 1948,  
 Joseph H. Saunders Jr., architect*



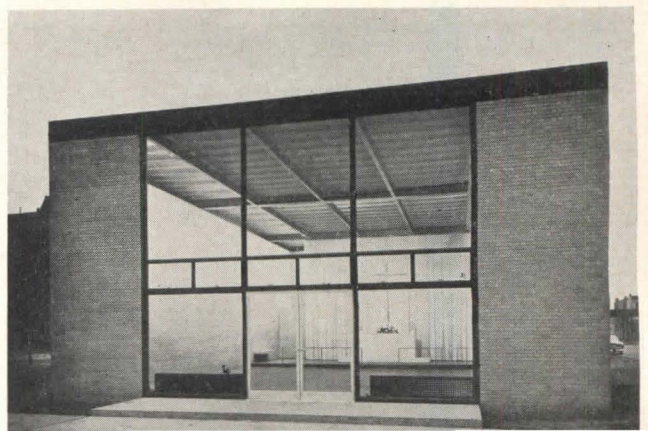
*St. George's Episcopal Church, Durham, N. H., completed in 1954,  
 John A. Carler, architect*



*Danforth Chapel, Colorado A & M College, Fort Collins, Colo.,  
 completed in 1954, James M. Hunter, architect*

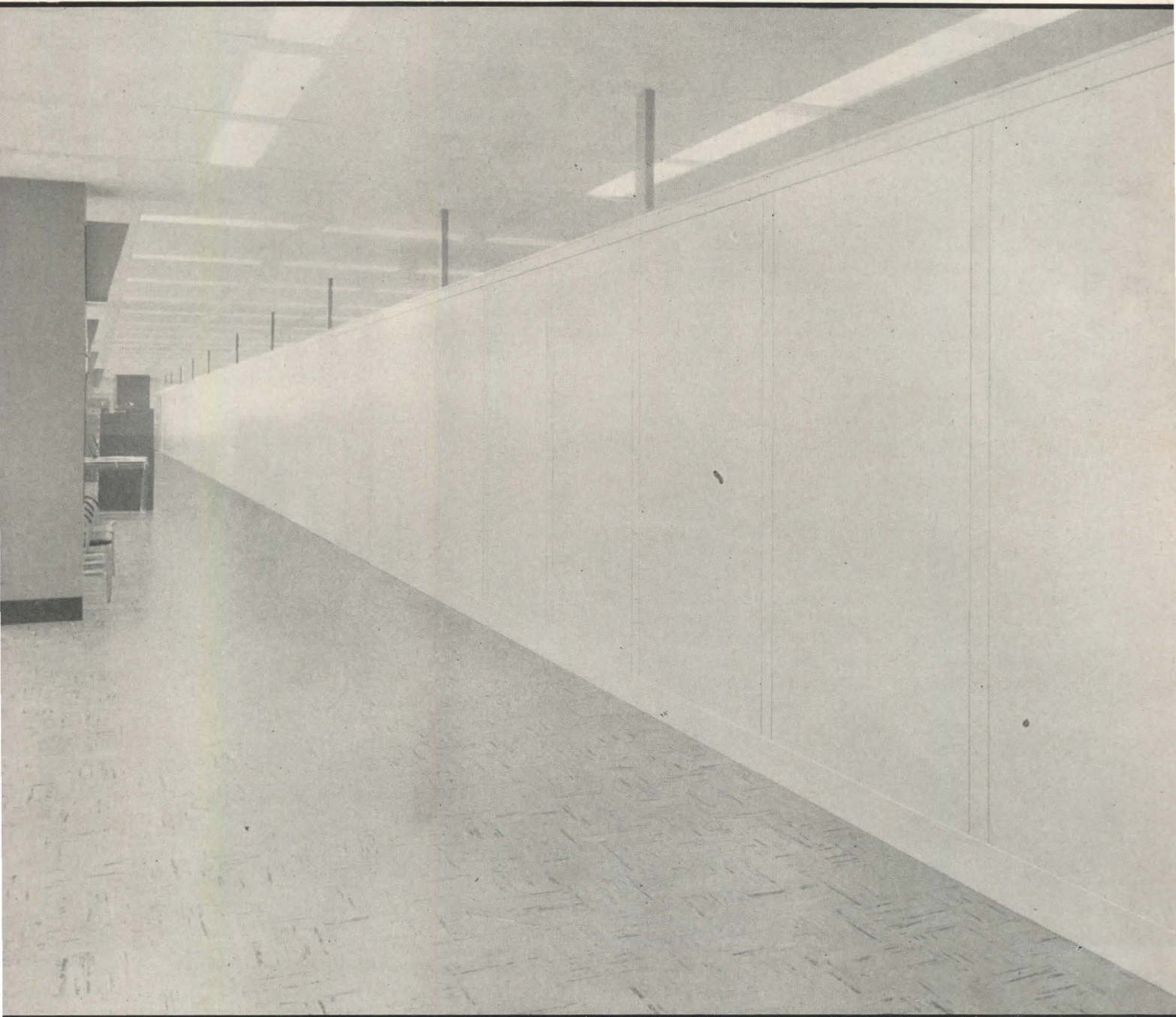


*Tabernacle Church of Christ, Columbus, Ind., completed in 1942,  
 Eliel Saarinen and Eero Saarinen, architects*

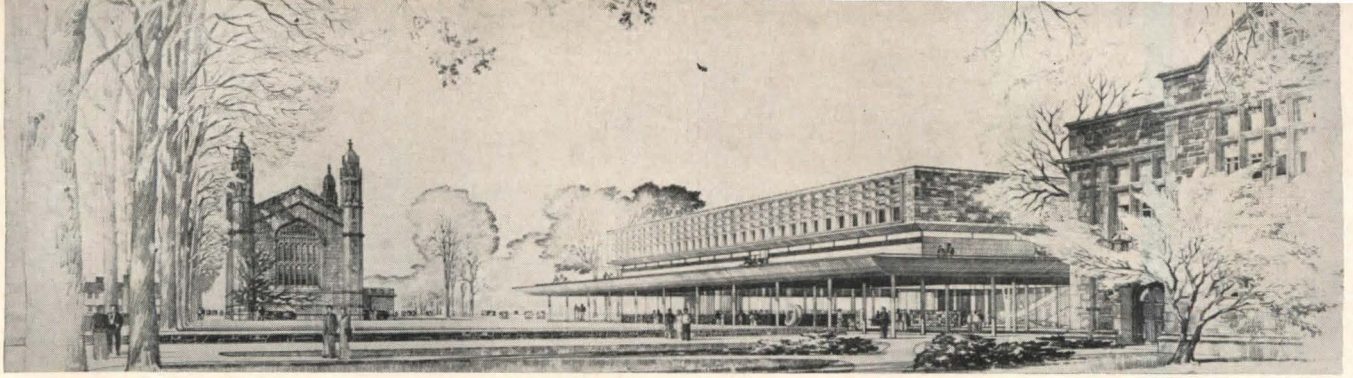


*Chapel, Illinois Institute of Technology, Chicago, completed in 1952,  
 Ludwig Mies van der Rohe, architect*





(Continued from page 12)



**MURPHY & MACKEY DESIGN WINS WASHINGTON UNIVERSITY COMPETITION**

Integration of a contemporary and highly functional building with a fine old environment was the heart of the problem faced by the six invited participants in the recent competition for a \$3.5 million central library to be the first unit in the ten-year "Second Century Development Program" of Washington University in St. Louis.

The winning scheme, submitted by Murphy & Mackey of St. Louis (photo of rendering above) puts the entrance on the ground floor with two stack levels above and two below, was considered by the jury to offer "the greatest accessibility of readers to books," "the great advantage of reducing the bulk of

the building above ground," and an arrangement of the main floor "superior to any other submitted."

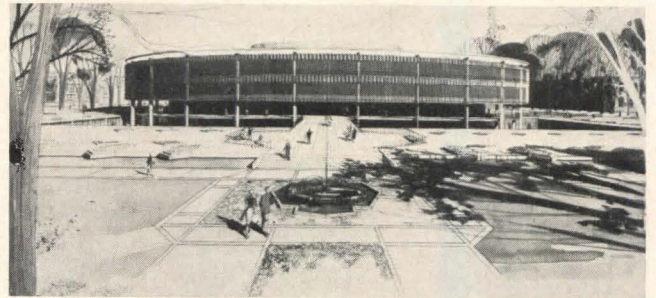
Other submissions are shown in small photographs of renderings below, with jury comments deliberately excerpted to indicate the major criticism.

"The fine scale of the campus" which the jury — and the program — were so concerned with preserving owes its origin to an overall campus plan developed by landscape architects Olmstead, Olmstead and Eliot 56 years ago when the University moved to its present location; its first buildings, designed by Cope and Stewardson as the winners of a limited competition, and the many

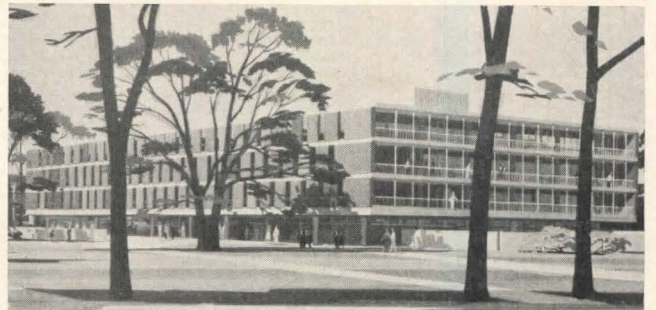
added since have all adhered to the original plan. The result, the program asserted, is "spatial unity, harmony and beauty unusual in the architecture of American higher education."

Members of the Jury were Dean William Wurster of the University of California School of Architecture; Charles W. David, former director of libraries at the University of Pennsylvania; and Henry R. Shepley of the Boston architectural firm of Shepley, Bulfinch, Richardson & Abbott. Buford Pickens, dean of the University's School of Architecture since 1953 and now architectural adviser for the development program, was professional adviser.

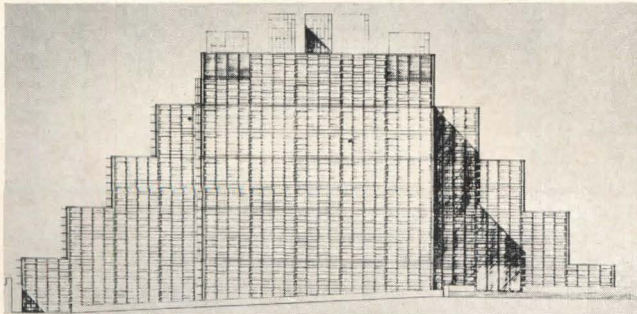
1. CAUDILL, ROWLETT, SCOTT & ASSOCIATES — "Exciting, graceful and imaginative as this project appears, there are many drawbacks. The principal one is the disruption of the campus by the vast surrounding terrace. . . ." 2. HELLMUTH, OBATA & KASSABAUM — ". . . a formidable bulk above ground which would overpower present structures. . . ." 3. JAMIESON, SPEARL, HAMMOND & GROLOCK — "An awkward site plan and tremendous bulk above ground. . . ." 4. LOUIS I. KAHN — "Tremendous bulk above ground and aggressive pyramid shape . . . incongruous with the grace of the old campus buildings. . . ." 5. EDWARD STONE — "The exterior of the building, although of considerable mass . . . was handled with distinction and taste. . . . If the stacks had been extended . . . under the covered walkway and the height of the building reduced, both workability of the library and relationship with the existing buildings would have been improved. . . ."



1



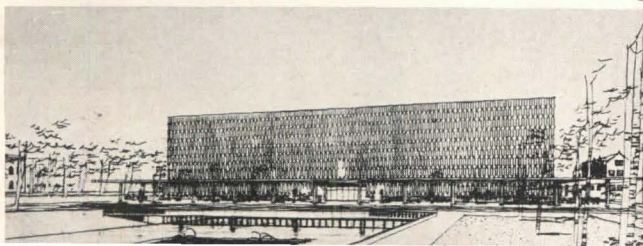
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## Dimensional stability in floor tile

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ness and clarity of controlled color; built-in durability; surface smoothness; ease of cleaning and maintenance, have helped to make all Kentile, Inc. floors the world's most popular line of resilient tile. The tile illustrated above is Kerry Green, one of the many beautiful colors available in the line of KenRoyal vinyl floor tile.

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PENNSYLVANIA BUILDS A NEW KIND OF REHABILITATION CENTER

A pioneer project in the field of rehabilitation facilities is under way in Johnstown, Pa., where the Pennsylvania General State Authority is erecting a Rehabilitation Center for the Physically Handicapped whose primary mission is to train the physically handicapped for gainful employment. Architects are the Buchar Engineering Corporation, York, Pa. Contract cost is \$7,464,809; completion is scheduled for the end of next year.

The Center is designed to accommodate 348 trainees, with provision for expansion to 400. (It is the present policy of the state that if requirements exceed 400, another center will be built.) It is important in the concept of the project that its people are trainees and not patients; it is not a hospital. It does have an infirmary, but the initial stage of recovery for a person disabled by accident will generally have taken place before he is admitted to the Center. It is also anticipated that the physically disabled person will be admitted to the Center before he has received any other rehabilitation, the idea being for him to have the full benefit of an integrated program from the very beginning. Elementary training — self feeding, toilet training, etc. — will be provided for the severely handicapped when required.

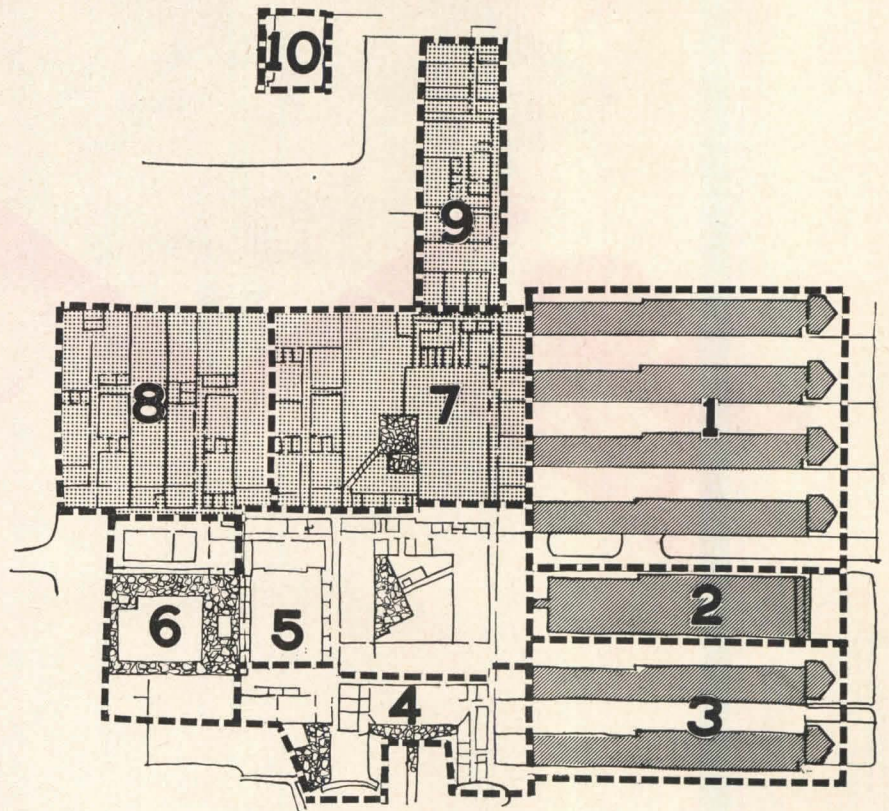
The basic principle underlying the design was to make it possible for the trainees to accomplish their daily routines of eating, therapy, counseling and shop training with as little movement as possible. Thus a one-story complex, with the therapy section as the center, easily accessible from living quarters, dining section, shop training sections and recreation section. In the course of a day's activity, the trainee will leave his living quarters in the morning and not return to them until after the evening meal. The effort has been to locate

everything required during a normal day of training and rehabilitation for the easiest possible accessibility.

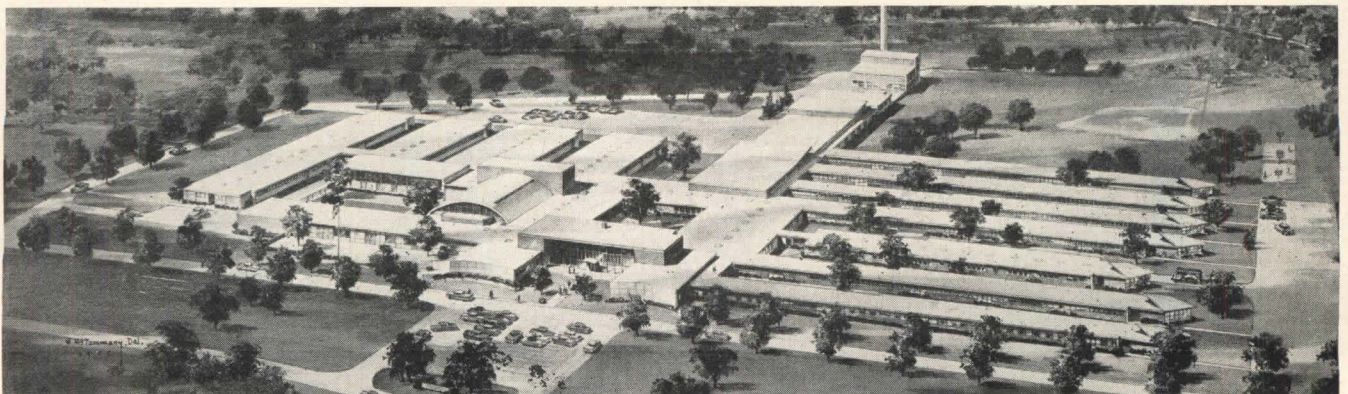
The site of the Center is two miles from an airport and well located in relation to rail and highway routes; so that trainees arriving either by rail or plane can be brought quickly by ambulance to the Center.

The architects report that an "incalculable" amount of research was required to develop their design of what they believe to be the first center in this country specifically planned and

built for its particular purpose. No complete criteria existed for this type of building, and in the process of developing their own, the architects studied all the available material from the Office of Vocational Rehabilitation of the U. S. Department of Health, Education and Welfare; interviewed dozens of rehabilitation authorities; and visited existing facilities of a related type at the Woodrow Wilson Rehabilitation Center in Virginia, the New York Institute of Physical Medicine and the Kessler Institute at East Orange, N. J.



SKETCH OF THE PLAN shows: 1. Men's dormitories. 2. Infirmary. 3. Women's dormitories. 4. Administration. 5. Therapy. 6. Social and recreation. 7. Vocational training and eating. 8. Vocational training. 9. Vocational training and service. 10. Boiler room



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Since 1917 Nesbitt has led the field in the creation of heating and ventilating equipment that has raised ever new and higher standards of classroom comfort.



MEETINGS AND MISCELLANY

(Continued from page 21)

sion, the annual awards made by the American Standards Association to the three men considered to have done the most to promote the use of modular measure in building were presented to Leonard G. Haeger, technical director of Levitt & Sons, Levittown, Pa., Fred M. Hauserman, president of E. F. Hauserman Company, Cleveland, and H. B. Zachrison, Chief of the Engineering Department, Army Corps of Engineers. Discussing — as he has before — “This Business of Architecture,” Charles Luckman of the Los Angeles and New York architectural firm of Pereira and Luckman, chief speaker at the luncheon, had this to say: “We must recognize the fact that, more and more today, the corporate client is the buyer of most of the architecture, not the individual client. And through the economic realities of life, architects are learning, I believe, to make a wider distribution of their services, and therefore, a greater impact on our civilization. I know, of course, I will be criticized for saying this, but I believe with all my heart that while this process may have been done at the expense of the highest or idealistic design standards, it is resulting in an obvious raising of the lowest standards in a greater sense of what is appropriate and important and a greater logic of structure, and in better and more thoughtful planning. And for those of us who are not geniuses, I think this is a very soul-rewarding platform on which to stand.” At a morning session, there was a panel discussion on “The Challenge Facing Manufacturers,” with Mr. Hauserman as moderator and as speakers John Knox Shear, editor-in-chief of



Herbert Dallinger

*CHARLES LUCKMAN addressing the spring meeting of the Producers' Council in Los Angeles; looking on, C. W. Kraftile of the Kraftile Co., Niles, Cal., and Thomas S. Holden, F. W. Dodge Corp.*

ARCHITECTURAL RECORD, Mr. Zachrison, George M. Pardee Jr. of Pardee & Phillips and Henry E. North Jr., president of Arcadia Metal Products.

**Honors**

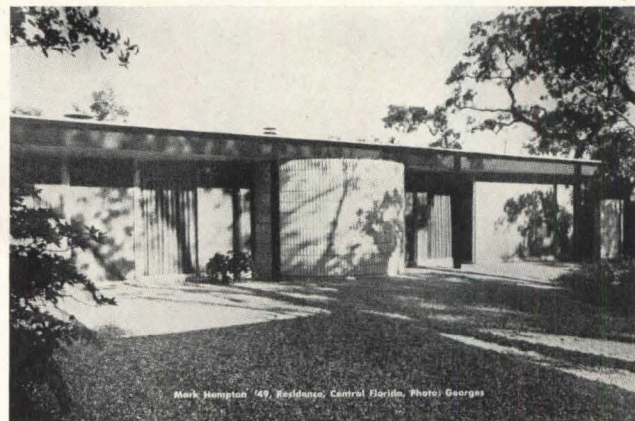
Talbot F. Hamlin's “Benjamin Henry Latrobe” (AR, Dec. 1955, page 56) has won the **1956 Pulitzer Prize for biography**. Mr. Hamlin, who retired last year from his post as professor of architecture at Columbia, had already received, for the same work, the **1956 Alice Davis Hitchcock Award** of the Society of Architectural Historians for “the outstanding contribution to architectural history by an American architectural historian on an American subject published in the Americas” . . . Architect John Yeon of Portland, Ore., has been awarded the second annual **Arnold W. Brunner Memorial Prize in Architecture** of the National In-

stitute of Arts and Letters. The award, of \$1,000, was first given last year to Gordon Bunshaft of Skidmore, Owings & Merrill. . . . Three architects have been elected to associate membership in the **National Academy of Design** — Robert Bellows of Boston, Gardner A. Dailey of San Francisco and Alfred Easton Poore of New York. . . . Charles B. Bennett, director of planning for the architectural and engineering firm of Pereira & Luckman, New York and Los Angeles, has been presented the annual **Distinguished Service Award of the American Institute of Planners**. . . . An honorary degree of Doctor of Laws was conferred on **Ludwig Mies van der Rohe** at North Carolina State College. . . . The Grand Architectural Award of the **1956 Boston Arts Festival** went to the M.I.T. Chapel designed by Eero Saarinen & Associates, with Anderson, Beckwith & Haible associated (AR, Jan. 1956). Other Festival awards in architecture: Special Commendation and Citation — Coletti Brothers, for Beach Pavilion, Salisbury, Mass. (AR, Oct. 1955), and The Architects Collaborative, for Northeast Elementary School, Waltham, Mass.; Awards of Merit — The Architects Collaborative, for Overholt Thoracic Clinic, Boston; Warren H. Ashley, for Wilbert Snow Elementary School, Middletown, Conn.; George W. Brewster, for Henry S. Chafee Residence, West Barrington, R. I.; Gates & Ford, for a residence in New Canaan; John Johansen, for residence in Fairfield County, Conn. (AR, Dec. 1955); Irving Salsberg and Ralph LeBlanc, for North Shore Music Theater, Beverly, Mass.; Shepley, Bulfinch, Richardson & Abbott, for

(Continued on page 28)



Gottscho



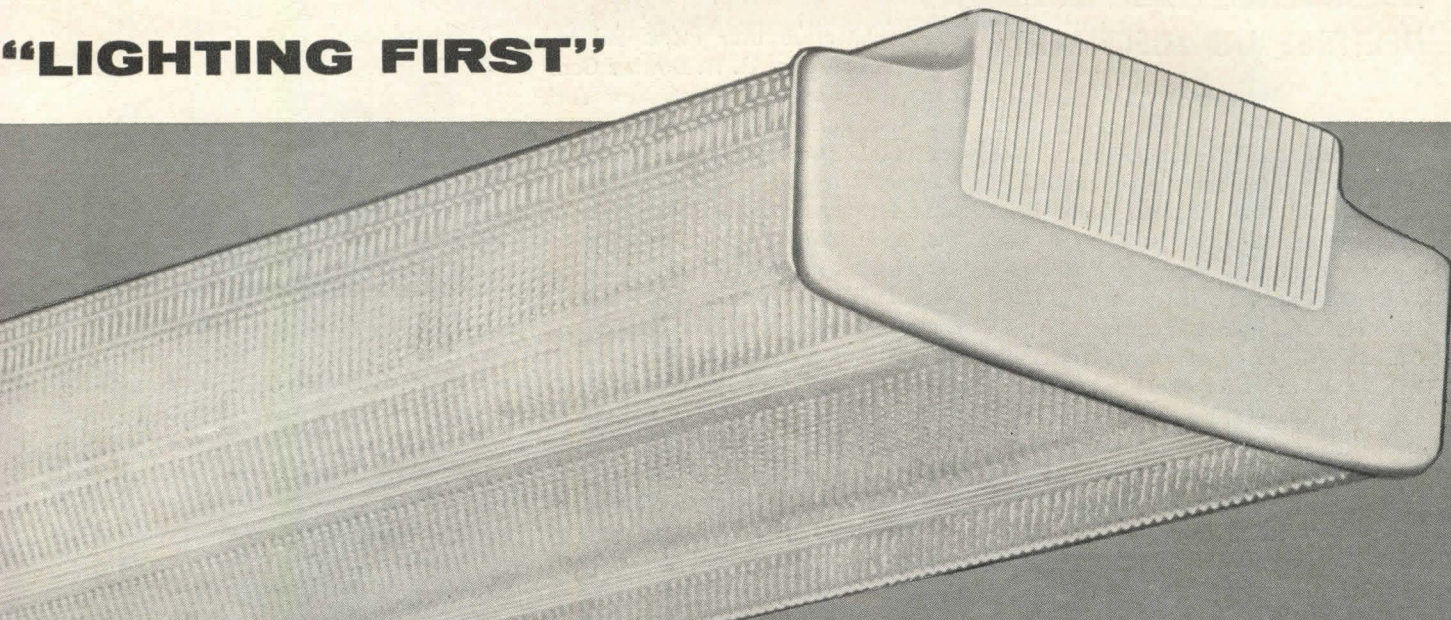
Georges

*A HALF CENTURY OF ARCHITECTURAL EDUCATION — Two of the 71 buildings by 56 former students of the School of Architecture, Georgia Institute of Technology, which make up an unusual retrospective exhibition inaugurated at the*

*School and soon to be circulated by the Smithsonian Institution's Traveling Exhibition Service — (left) Abreu Summer Home, Sea Island, Ga., Philip T. Shutze '12, architect; (right) Residence, Central Florida, Mark Hampton '49, architect*

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MEETINGS AND MISCELLANY

(Continued from page 24)

Bates and Freeman Dormitories, Wellesley College. Jury for the competition, for work in New England completed within the last five years, were G. Holmes Perkins, Joseph Hudnut and Vincent Kling. . . . Top awards in the **1956 Honor Awards Program of the Chicago Chapter of the American Institute of Architects and the Chicago Association of Commerce and Industry** were as follows: Elliott Chapel of the Presbyterian Home, Evanston, Ill., Schmidt, Garden & Erikson, architects; Highland Park, Ill., High School, Loeb, Schlossman & Bennett, architects; Hubbard Woods Fashion Center, Cone & Dornbusch, architects; National Congress of Parents and Teachers Headquarters, Holabird & Root & Burgee, architects; Prudential Building, Naess & Murphy, architects; American National Bank and Trust Company of Chicago (alterations), Skidmore, Owings & Merrill, architects. In addition to the six honor awards in architecture, there were three in "Craftsmanship and Related Fine Arts" and 11 Citations of Merit. . . . Alan H. Rider of Bloomfield Hills, Mich., a graduate of Carnegie Institute of Technology and Cranbrook Academy of Fine Arts, has been awarded the Lloyd Warren Scholarship, the **43rd Paris Prize in Architecture**, by the Beaux Arts Institute of Design. Mr. Rider, a designer with Eero Saarinen & Associates, receives \$5000 for 18 months of study and travel. . . . Twelve **Rome Prize Fellowships** for \$3000 each for a year of study at the American Academy in Rome beginning Oct. 1, 1956 include one in architecture, awarded to David J. Jacob, Alexandria, Va., a graduate of Syracuse University and Cranbrook, a Naval Reserve officer currently on active duty. . . . The **LeBrun Traveling Fellowship** of the New York Chapter, A.I.A., has been awarded this year to John Pawlikowski of Chicago. The award is \$3000 for six months' travel and study in Europe. . . . Another New York Chapter award, the **1956 Arnold W. Brunner Scholarship** of \$2400, has been made to Caleb Hornbostel, New York architect, for a book to be entitled "Materials in Architecture."

Who's Who

The most elaborate compendium of information about who's who in Ameri-

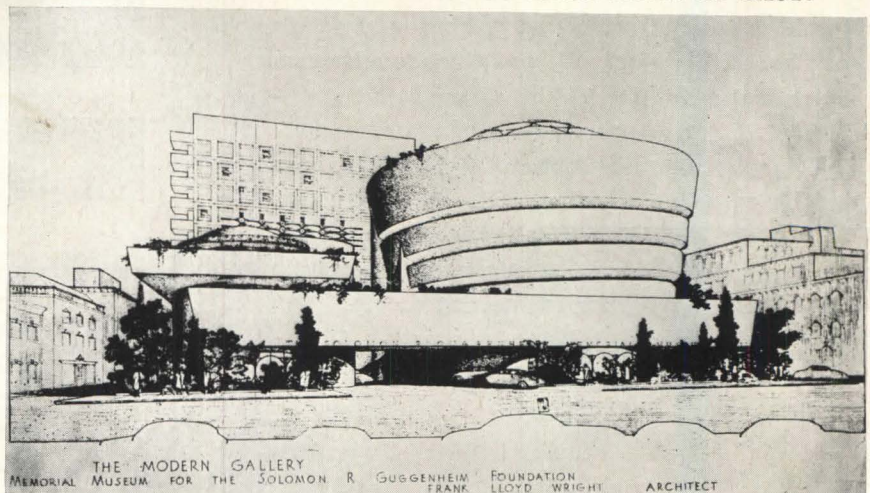
can architecture ever attempted has been published by R. R. Bowker Company (62 West 45th Street, New York 36, New York) in the **American Architects' Directory**. The 748-page volume, providing biographical data on some 11,000 active American architects, was sponsored by the American Institute of Architects under the editorship of Dr. George S. Koyle, F.A.I.A., emeritus professor of architecture and former dean of the School of Fine Arts of the University of Pennsylvania. Included are all members of the A.I.A. and "certain non-members deemed likely to be inquired about" (Frank Lloyd Wright, for instance). Appendices provide lists of architectural schools and their deans; of architectural examining boards and their secretaries; of A.I.A. documents. There are also articles on the selection of an architect, the value of an architect and other themes equally salutary for public consumption. Available from Bowker for \$20, and worth every penny. . . . In the **A.I.A.** (a roundup of items submitted over the last few months) — **Arkansas Chapter** has elected Ralph O. Mott as president, Gordon H. Wittenberg vice president, Noland Blass Jr. secretary, Burnice S. Conway treasurer. . . . **California Council of Architects** has John Lyon Reid as its 1956 president, with William Glenn Balch as vice president, Lee Kline secretary, Al Thomas treasurer. . . . **Oregon Chapter** officers for 1956 are Donald W. Edmundson, president; Walter Gordon, vice president; Earl P. Newberry, secretary; Charles Gilman Davis, treasurer. . . . **Virginia Chapter** elected Richard L. Meagher president, Thomas K. Fitz Patrick vice president, Fred P. Parris secretary and Thomas R. Leachman treasurer. . . . **Northern Illinois Chapter** officers for



**ARCHITECTURAL JOURNALISM AWARDS** ceremony at the annual luncheon of the New York Chapter, A.I.A. — retiring secretary Harmon Goldstone, retiring president Robert Hutchins, senior editor Frank Lopez of ARCHITECTURAL RECORD, and the new chapter president, Robert Culler of Skidmore, Owings & Merrill. The only two awards open to professional architectural magazines in the A.I.A.'s third annual competition went to Pietro Belluschi's "The Meaning of Regionalism in Architecture" (best article) and a photograph of Le Corbusier's Chapel of Notre Dame du Haut by Rene Burri of Magnum Inc. (best architectural photograph), both published in ARCHITECTURAL RECORD.

1956-57 are Donald Patton, president; Charles M. Bradley, vice president; Richard F. Wolfley, secretary; Donald Lippincott, treasurer. . . . **New York Chapter** has Robert S. Cutler of Skidmore, Owings & Merrill as president; Harold C. Bernhard of Shreve, Lamb & Harmon Associates vice president; L. Bancel LaFarge secretary; Aaron N. Kiff of York & Sawyer treasurer. . . . The **National Academy of Design** has elected Eliot Candee Clark, painter, as its new president, succeeding architect Lawrence Grant White of McKim, Mead & White, who resigned, owing to the pressure of his firm's work, after five years in the post.

THE BIG NEWS IS — IT'S UNDER CONSTRUCTION AT LAST!



THE MODERN GALLERY MEMORIAL MUSEUM FOR THE SOLOMON R. GUGGENHEIM FOUNDATION FRANK LLOYD WRIGHT ARCHITECT

(More news on page 32)

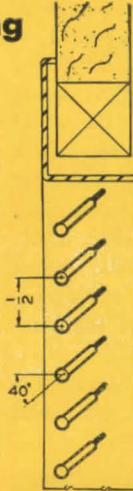
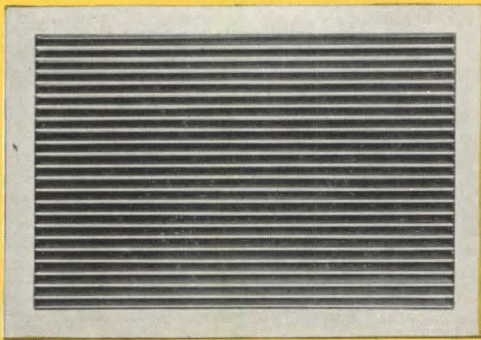


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and registers  
with 1/2-inch bar spacing**

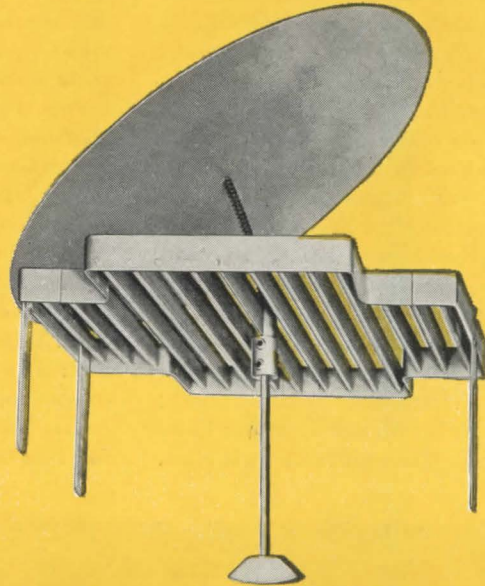


Vertical Cross Section  
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This new design for the Aerovane line features horizontal bars set at an angle of 40° on 1/2-inch centers . . . a modern, streamlined appearance that virtually eliminates objectionable see-through. Aerovane T110D Grille is illustrated above . . . Aerovane T117D Register combines grille and adjustable opposed blade damper unit.

For full information, write for Bulletin 201.

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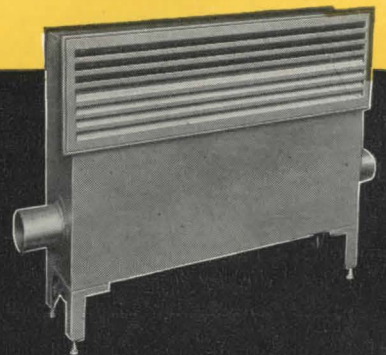
Designed for use with T&B AEROFUSE Ceiling Diffusers where short coupled connections are required. Unit consists of a single blade damper hinged to an adjustable bar grid. Damper setting is regulated through the face of the diffuser by means of an operator handle and rod which may be kept permanently in place or used as a removable key.

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**R.A.I.C. ELEVATES FIFTEEN TO COLLEGE OF FELLOWS**

The Royal Architectural Institute of Canada has announced the elevation of 15 of its members to Fellowship in the institute. Geographically, the new Fellows cover the nation from coast to coast: three are from Vancouver, two from Victoria, two from Edmonton, two from Toronto, two from Montreal and one each from Hamilton, Ont., Windsor, Ont., Quebec and Halifax.

The new members of the College of Fellows, who were to be installed at the annual assembly of the R.A.I.C. in June, include: Thomas Gordon Aberdeen, Vancouver; Patrick Birley, Victoria; Richard Ernest Bolton, Montreal; Allan Ferguson Duffus, Halifax; George Norris Evans, Vancouver; Edouard Fiset, Quebec; J. Albert Larue, Montreal; Charles Lenz, Hamilton, Ont.; George Y. Masson, Windsor, Ont.; Douglas G. W. McRae, Toronto; Earle C. Morgan, Toronto; John Ulric Rule,

Edmonton; Percy C. Underwood, Vancouver; and John Howard Wade, Victoria.

At the same time that it announced its list of new Fellows, the R.A.I.C. announced that it had awarded its 1956 Allied Arts Medal to Lionel A. J. Thomas. Mr. Thomas, who is on the faculty of the School of Architecture at the University of British Columbia, works in a variety of mediums; some of his works have included a mural on canvas for the Mercantile Bank of Montreal at Vancouver; copper doors for the Church of Our Lady of Perpetual Help, Calgary; furnishings of the aviary at the Vancouver Zoo; a large figure for the Church of Our Lady of Assumption, Edmonton; doors, murals, altar fronts and Stations of the Cross for the Chapel of St. Thomas More College, Saskatchewan; and a large mural for the Vancouver Public Library.

The College of Fellows Scholarship for 1956 has been awarded to David

Ernest Horne of Toronto. The scholarship, which is awarded every other year to a graduate of a Canadian school of architecture, is to be used for travel, study or research; its value was increased this year to \$2000. Mr. Horne, who graduated in 1955 from the School of Architecture at the University of British Columbia, will use the scholarship for work on his Master's degree in architecture.

**GOVERNMENT ESTABLISHES HOUSE DESIGN COUNCIL**

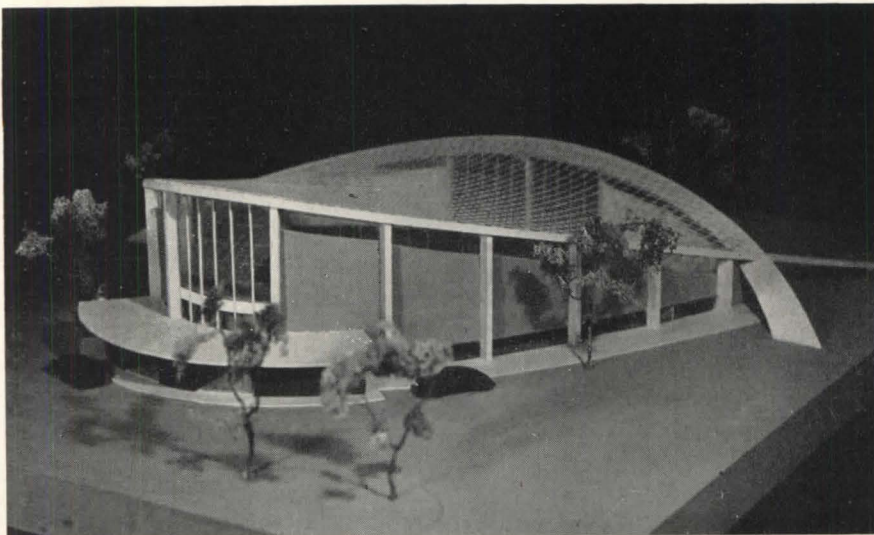
The Federal Department of Public Works has formed a Housing Design Council, it was announced recently by Hon. Robert H. Winter, Minister of Public Works. Discussing this action, Mr. Winter said, "Economic competition alone will make it necessary for house builders to widen their market through improvement in the design of housing. . . . The industry may have difficulty in making full use of its present capacity without that stimulus to demand that would be afforded by some distinguished improvement in the design of new housing."

Chairman of the council will be R. C. Berkinshaw, Toronto industrialist. Other members will include Frank Nicolls of Victoria, Prof. J. A. Murray of Toronto, and Prof. John Bland of Montreal, all architects. Andrew Hazeland, Central Mortgage & Housing Corporation's advisor on house design, will be secretary-treasurer.

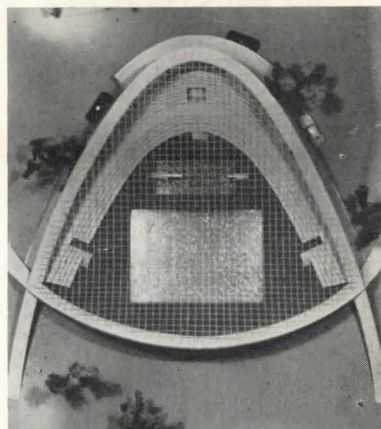
This move on the government's part is perhaps part of a more wide-spread desire to raise the standard of house design. J. S. Hodgson, director of C.M.H.C.'s development division, in a recent address before a federal-provincial conference of housing authorities, suggested that "over the next five years those who do not provide the best quality of house will find themselves against the wall. Stereotyped housing divisions are out. Housing design will make major forward strides in the next five to 10 years."

On a provincial level, the Ontario Association of Architects has established a Small House Design Committee under the chairmanship of R. Stirling Ferguson of Ottawa. The expressed aim of the committee is "to study the quality of design of small houses built in Ontario since World War II and all influences affecting that quality. Specifi-

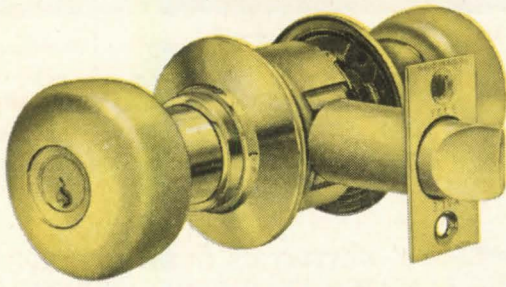
(Continued on page 40)



**MEMORIAL SWIMMING POOL**, designed for North York Township, Ont., by architects Venchiarulli and Venchiarulli, will have a structure of concrete parabolic arches forming compression rings from which will be hung a network of lightweight steel tension cables. The frame will support a corrugated steel roof. About 1100 people will be seated in the stand around the swimming pool, and an additional 500 seats could be provided by removable chairs. Other facilities will include a therapeutic pool, which can be entered directly from the outside, a committee room and a manager's office



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# THE RECORD REPORTS NEWS FROM CANADA

(Continued from page 36)

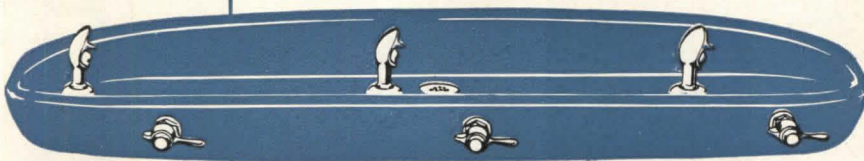
cally: (a) the processes and administrative procedures by which design is carried out; (b) design of small houses in other parts of the world; (c) the community as well as the individual aspects of designs; (d) the economics of design; and (e) building regulations and other standards which affect design. . . .'



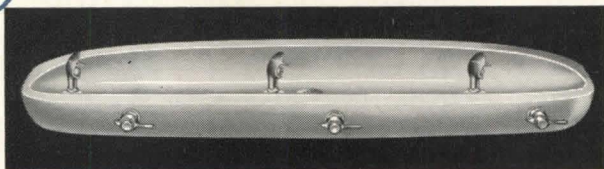
A \$2 million library for Vancouver, for which Semmens & Simpson are the architects, will be built on a three ft module, the width of standard bookcases; louvers will be controlled by photoelectric cells

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## STATISTICS BUREAU TAKES MID-YEAR LOOK AT BUILDING

In a recent report, the Bureau of Statistics has estimated that the value of Canada's 1956 construction program will rise to a record \$6271 million. This would be an increase of 19 per cent over the 1955 total of \$5286 million. It is expected that nearly all the increase will be in industrial building and engineering construction, such as the St. Lawrence Seaway and the gas pipeline from Alberta to the west coast. Residential building will probably remain at about the 1955 level.

Increases in value of construction are  
(Continued on page 44)



Office building proposed for Calgary will have parking facilities on the open ground floor and in the basement. J. Stevenson & Associates are the architects

# ollar with **DRAFT|STOP!**\*

## Controls drafts without added heat load

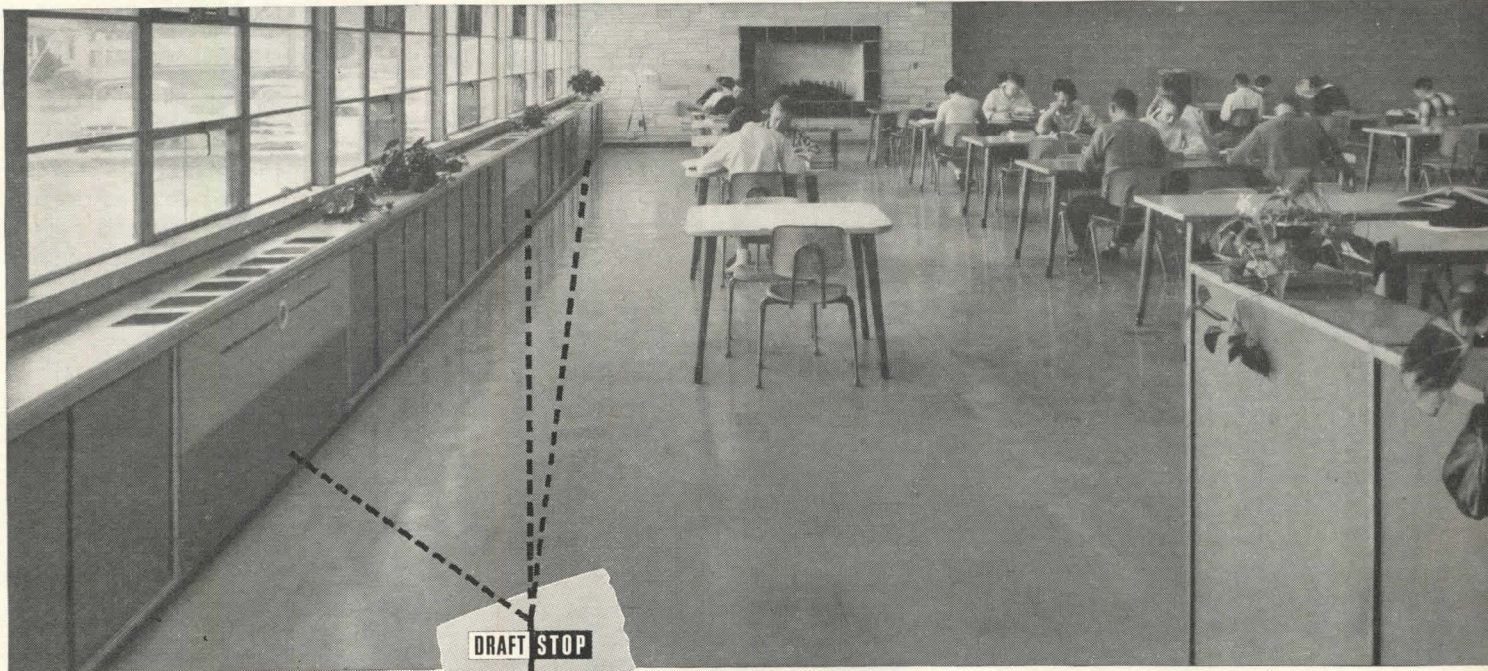
The new Senior High School at Grand Island, Nebraska is recognized as an architectural and engineering "jewel". The finest, most modern equipment combines with excellent planning to create the last word in educational facilities.

It was natural that DRAFT|STOP was selected for the all-important job of cooling, heating and ventilating the classrooms. DRAFT|STOP heats only when heat is necessary . . . *saves* fuel when it is not. It controls downdrafts without added heat load. Its unique design provides a constant supply of properly *heated* or *cool* fresh air . . . automatically

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Spacious, attractive classrooms have "just right" temperatures and plenty of draft-free fresh air thanks to Herman Nelson DRAFT|STOP unit ventilators. Note how the unit ventilators and matching cabinets harmonize with the interior design.

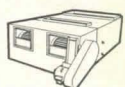
**AAF**

*herman nelson*

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*System of Classroom Cooling, Heating and Ventilating*



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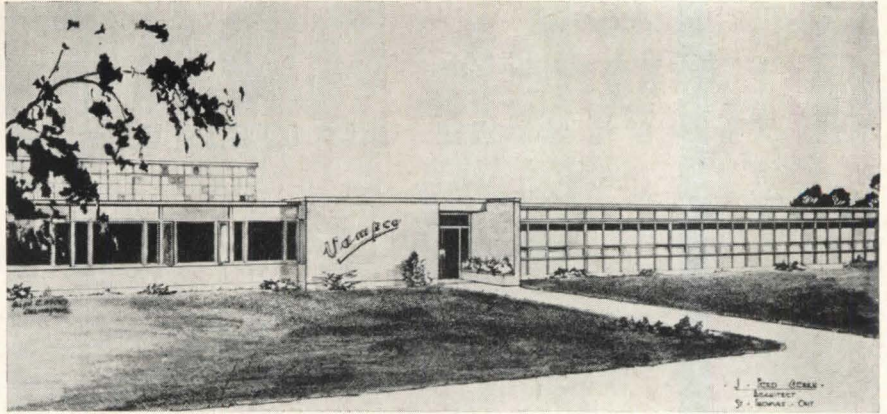
# THE RECORD REPORTS

## NEWS FROM CANADA

(Continued from page 40)

anticipated in all provinces and all industries, with the exception of the construction industry, where value is expected to decline 11.2 per cent.

Value of new construction is estimated at \$5161 million, up from \$4273 million in 1955. Repair construction is expected to rise in value to \$1110 million from



*New plant for Vampco Aluminum Products Inc. is nearing completion at Strathroy, Ont. The architect is J. Fred Green of St. Thomas*



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\$1012 million. New construction by contract, it is estimated, will increase to \$4359 million from \$3598 million, and repair construction to \$439 million from \$409 million. Construction by firms not primarily engaged in building is expected to rise to \$1473 million from \$1279 million.

### SCHOOLS OF ARCHITECTURE MAKE THEIR ANNUAL AWARDS

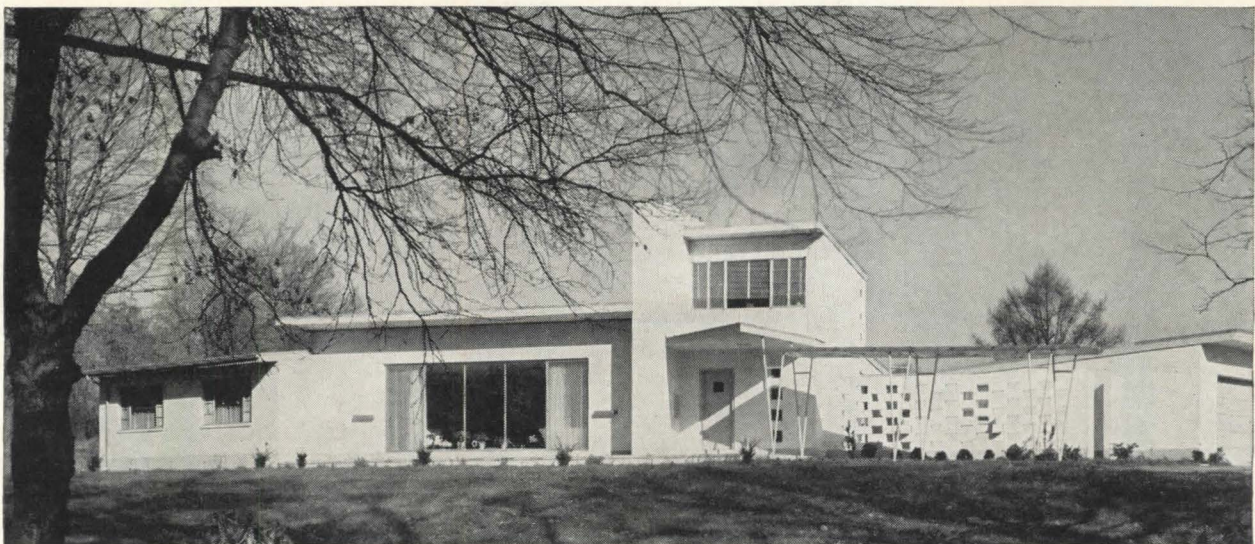
At the École des Beaux-Arts in Montreal, the School of Architecture announced that in the final judging of the work of graduate students, two were tied for first prize — Romeo Savoie for "An Artistic and Cultural Center for the University of St. Joseph," and Jacques Carriere for "An Athletic House and Park." Second prize went to Guy Legault for "A Kindergarten," and honorable mentions were awarded to Pierre Cantin, Denis Lamarre and Guy Blain.

At the School of Architecture, University of Toronto, prizes for the 1955-56 sessions also have been awarded. In the fifth year: R.A.I.C. medal — C. E. Meek; Anaconda American Brass Ltd. Scholarship — J. W. Ridpath; Toronto Architectural Guild gold medal — R. L. Craig; Connolly Marble, Mosaic & Tile Co., Ltd., scholarship — J. W. Ridpath. In the fourth year: Canadian Pittsburgh Industries Ltd. scholarship — first, C. A. Corneil and tied for second, A. G. Zimmerman and J. F. Gallop; Argo Block Ltd. scholarship — C. S. Corneil. In the third year: Toronto Brick Ltd. prize — first, V. Petruis and second, J. J. Nowski; Ontario Association of Architects prize — J. J. Nowski. In the second year: Booth Brick Co. Ltd. prize — G. A. MacInnis; O. A. A.

(Continued on page 46)

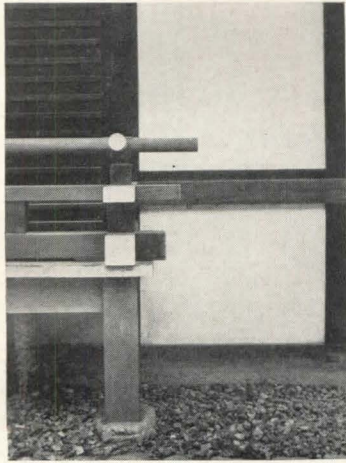


Faculty Residence, Lawrenceville, N. J. Architect: Livingston Smith, Phila., Pa. Contractor: William Musson, Lawrenceville, N. J.  
Windows: Lupton Aluminum Casements, Double-Hung and picture windows.



The Lichty Residence, Bryn Mawr, Pa. Architect: S. Kendrick Lichty, Bryn Mawr, Pa. Windows: Lupton Residential Aluminum Casements.

## REQUIRED READING



All photographs by Norman F. Carver Jr.



## DETAILS OF JAPANESE ARCHITECTURE

*Form and Space in Japanese Architecture.* By Norman F. Carver Jr. Shokokusha Publishing Company (Tokyo, Japan) 1956. 200 pp, illus. \$12. American distributor: George Wittenborn & Co., N. Y. C.

THIS VOLUME PRESENTS the fundamental principles to be found in ancient Japanese architecture and illustrates their usefulness to the architect of today.

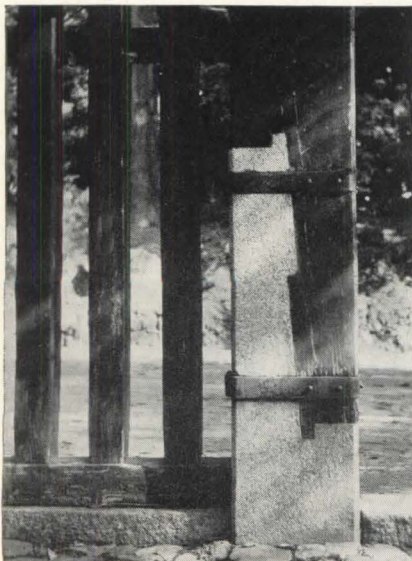
It is primarily an album of photographs, all reproduced at nearly full plate size. The photographs, taken by the author, are excellent in every way: technically, artistically, and reproduced with commensurate quality on coated paper. What text there is in both English and Japanese; were the text in Japanese only, the value of the book would not be diminished.

For the architect this book fills a gap in the published literature on Japanese architecture since the

photographs are concerned mainly with well chosen details. Various textures, patterns, joints, connections, groupings and the like are examined closely in conjunction with many excellent exterior and interior photographs, bearing little or no resemblance to the stereotype illustrations so often presented in books of this type. For once, here is a book that is neither an introduction nor an exhaustive history of the subject; it assumes a certain knowledge of Japanese architecture on the part of the reader, and then proceeds to move in closer with an artistic and architectural frame of reference, with no attempt to be exhaustive in the scholarly sense.

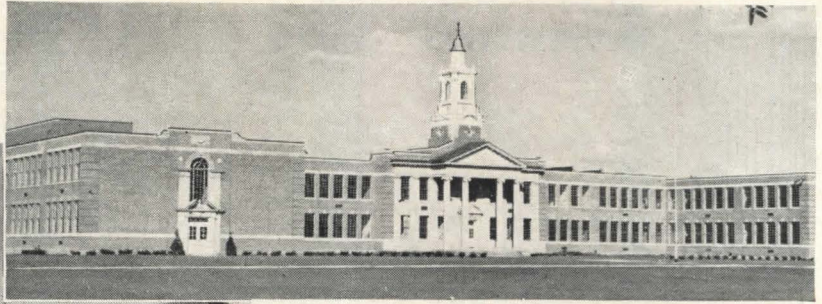
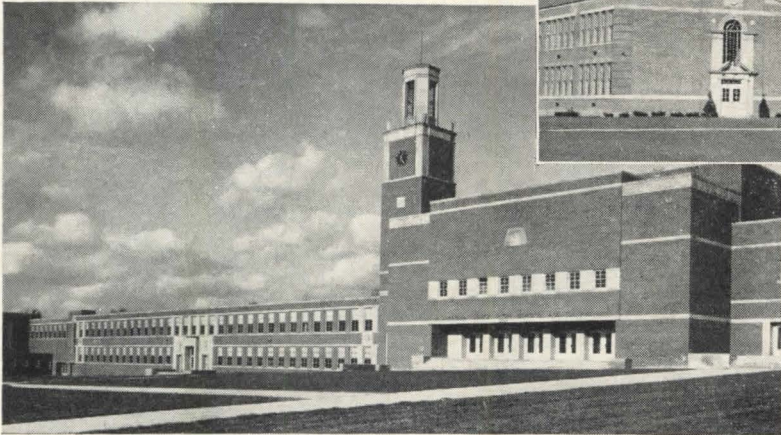
For all interested in Japanese architecture, a highly recommended book. **Richard B. McCurdy**

(Continued on page 60)

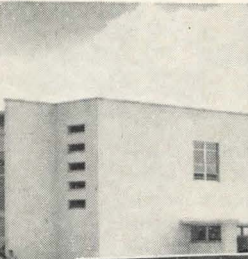




Williamsville Junior High School, New York



Parma Ohio Senior High School



Alexander Graham Bell Junior and Senior High School, Tulsa, Okla.

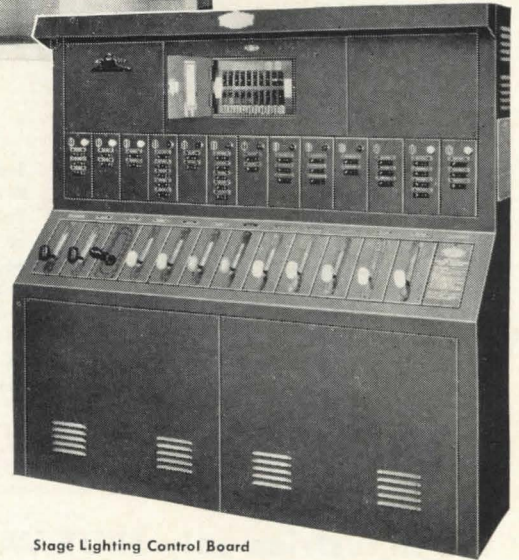


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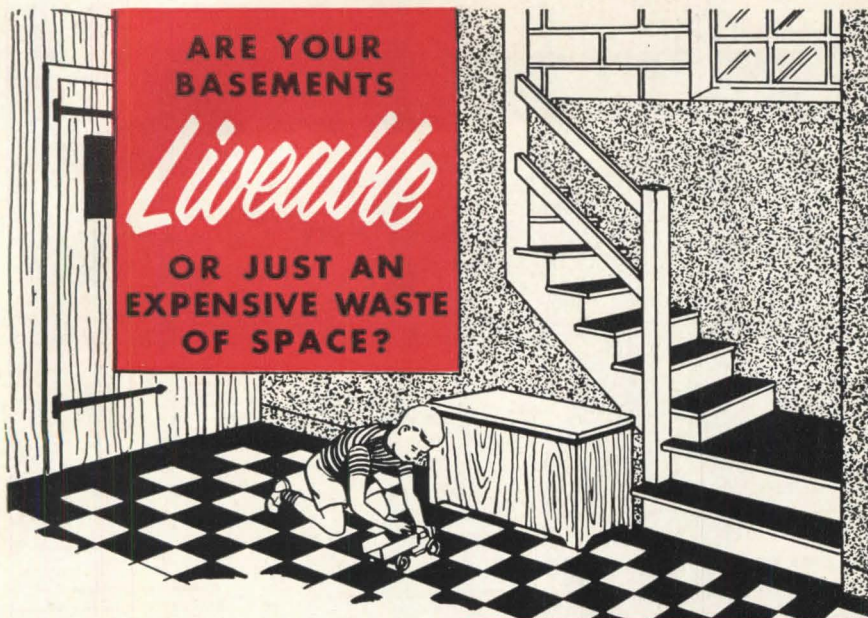
Dimming Control Equipment . . . resistor type . . . auto transformer type . . . reactor type.



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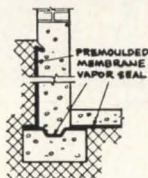
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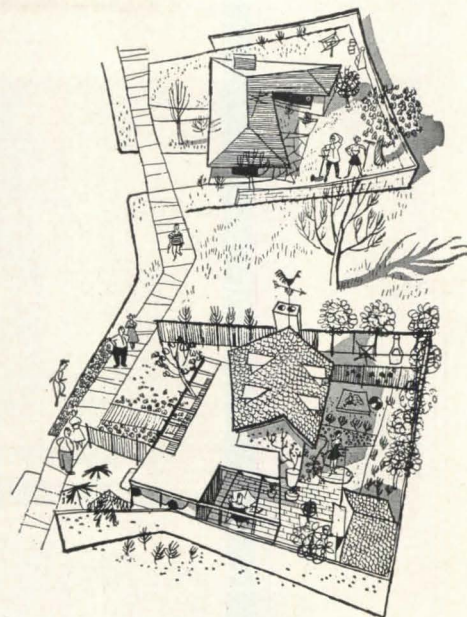
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### REQUIRED READING

(Continued from page 56)



### Why PLAN a Garden?

*The Art of Home Landscaping.* By Garrett Eckbo. F. W. Dodge Corp. (119 W. 40th St., New York City) 1956. 278 pp, illus. \$5.95

LET'S TAKE THE NEIGHBORS ABOVE for example. Both are young moderns who have read the *home and garden* variety of magazine and know almost just exactly what they want in the way of "indoor-outdoor" living.

The Newfields who live in the new ranch style house went forth impetuously and gathered by hook or by crook a dozen azuratum, a few shrubs and trees and some flagstone. Within a few days of hard labor had a fine hodgepodge, good for nothing.

The Overbees, in their new-old house, curbed their impetuosity and after several studious weekends of making graphs, planning budgets and consulting the "how-to-do-its" started slowly but surely to get the most for their labor and money.

Needless to say Mr. Eckbo strongly recommends the latter approach and to strengthen his point proceeds to give the best step-by-step instructions to the amateur landscaper to be published to date. His "instructions" include such highly technical matters as foundations and surfacing as well as information on walks, fences and of course, plants. They are written in a style that is easy as well as enlightening.

One of the most rewarding chapters  
(Continued on page 352)

# The Individual School and the Delightful, Never-ending Progress to Perfection

by Frank G. Lopez, A.I.A.

*Development of architectural theory and techniques, to accommodate improved educational concepts and teaching methods based on a better understanding of the learning process, is producing architecture for public education of a uniquely high quality*

WHEN HAZLITT coined the phrase we now use for a sub-title, he could scarcely have been thinking of the direction American educational philosophy or school building architecture might take. The date was about 1800, when the American concept of free public education was just getting ready to be born.

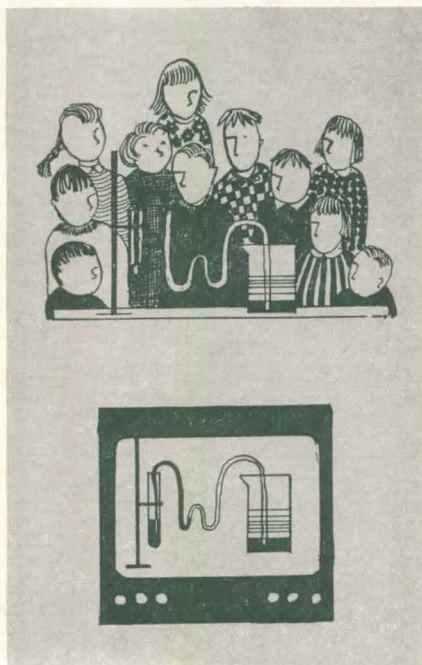
We have been told many times that the days of physical pioneering in this country are over; we have turned our exploratory and exploitive talents not toward geographical colonialism but to-

ward the physical well-being of nearly all its citizens are sure of an important niche. One wonders, however, if the principles of modern democratic republicanism in government — which postulates general and (since some citizens may lack the means) free public education to insure that the electorate, which is all adults, be informed and hence responsible — may eventually rank even higher. Certainly their importance cannot be minimized, and the American public school as an institution essential to our civilization has an assured position.

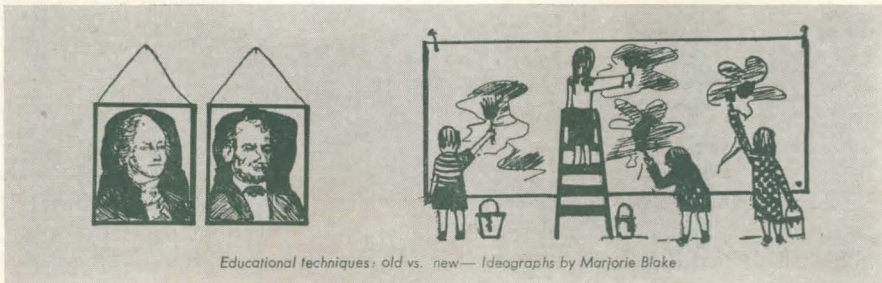
Our schools have been growing for many years without any more than superficial changes in their underlying educational philosophy. This has been particularly true of secondary schools which for a good many people remain educational terminals; a high school diploma was until recently a pretty good star to hitch a wagon to. But now searching investigation of both principles and practice is under way and examples of new concepts in action are being built, taking the form not only of buildings but also of the faculties to man them and the statements of philosophy which give them life. Those school buildings that accommodate and express educational theories and processes well will become architectural monuments of the future, personifications of an important aspect of our times.

Which adds incentive to the architectural urge to take full advantage of today's technological potentialities. We are progressing on all fronts. Our general scientific advance is at the identical time providing new educational instruments — e.g. television — and constructional means — thin concrete structures as one example — and environmental controls — lighting or air conditioning techniques — which are all approaching essential status. Less easily definable yet recognizable and equally essential are the multiplicity of architectural design expressions ("planning" is too limited a word for such three-dimensional concepts or for their multiple attacks on the human senses) which bring within our grasp a whole succession of perfections each fitted to its conditions of time and place and function and — yes — idiosyncrasy.

The school buildings that follow were selected to demonstrate not only variety in their individual conception educationally and architecturally, but also the interplay of the two professions' theories and talents as well as the technical virtuosity at their command. At the moment the use of TV for educational ends excites great interest. In Hagerstown and soon in all of Washington County, Md., extensive research into educational TV is being undertaken with the backing of the Fund for the Advancement of Education and the



ward the perfection of democratic self-government, of huge commercial mechanisms and of scientific developments. When scholars of a future generation come to assess our part in civilization, to evaluate our achievements against the landmarks in the history of the increasing dignity of man, the material improvements America has contributed



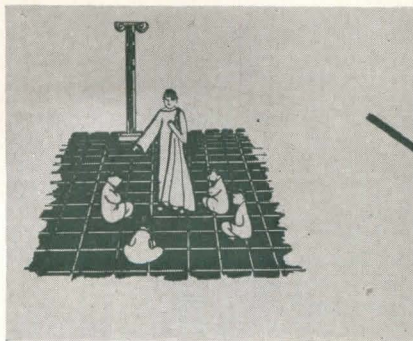
Educational techniques, old vs. new — Ideographs by Marjorie Blake



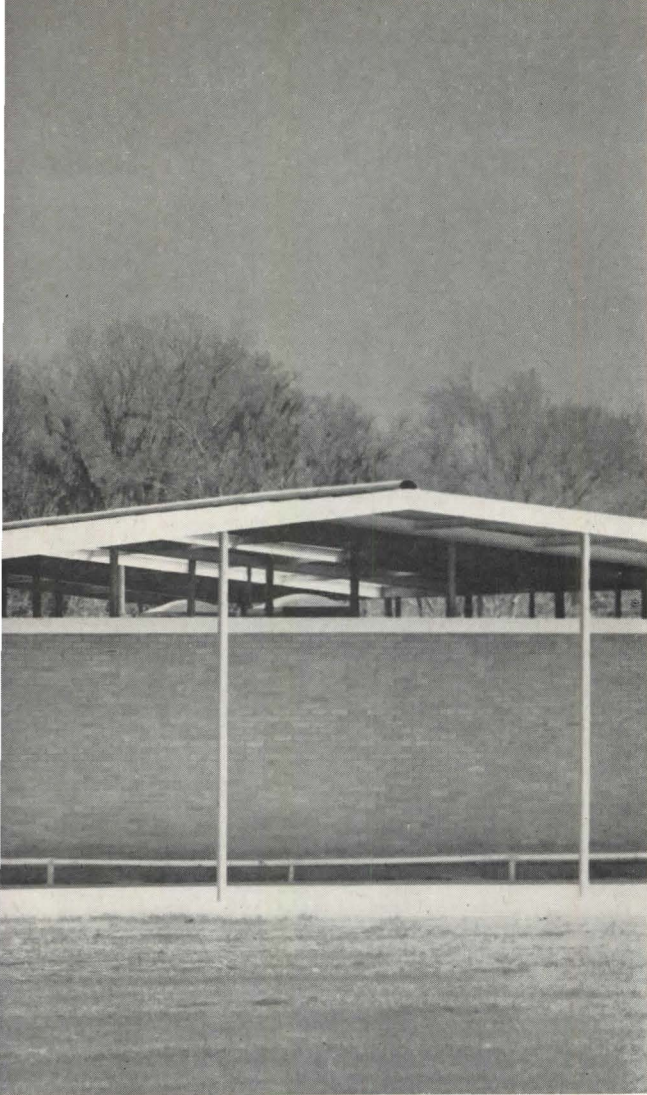
Radio-Electronics-Television Manufacturers' Association, yet completely under the control of the local school board and administration.

The board intends to make a thorough, five-year study of the ways closed-circuit TV may be used by a typical public school system as an integral part of the regular program: in direct instruction of pupils in basic subject-matter areas; as supplemental motivation and enrichment of the program; to extend in-service teacher-training programs; to interpret the school program to the lay public; to improve the quality of the school program. In so doing it expects to gather data on and to evaluate the effectiveness of TV in meeting certain current problems: the teacher shortage; continually increasing enrollments; lack of classrooms; enhancing the status of the teaching profession; the pupil-teacher ratio as related to instructional quality; school system organization as it affects personnel; distribution of school moneys. The educational implications are profound; for instance, what happens to tenure and

wage rates when a teacher exceptionally capable in the use of this new medium takes on 500 rather than 30 pupils? The architectural problems seem, in contrast, quite easy to solve at present. However, it is far from inconceivable that, under the impact of both such technical advance as TV represents and evolving educational theory in general, instruc-

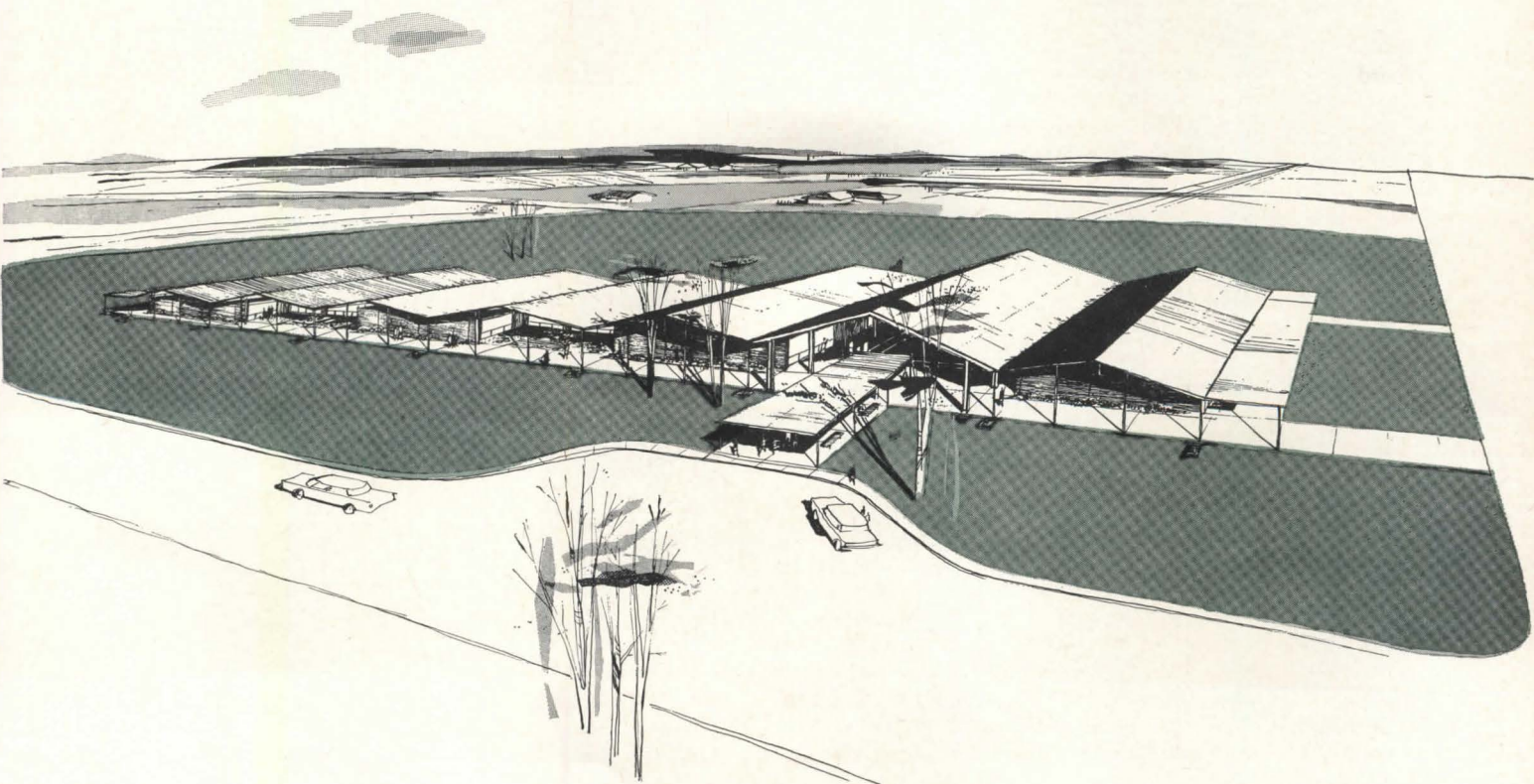


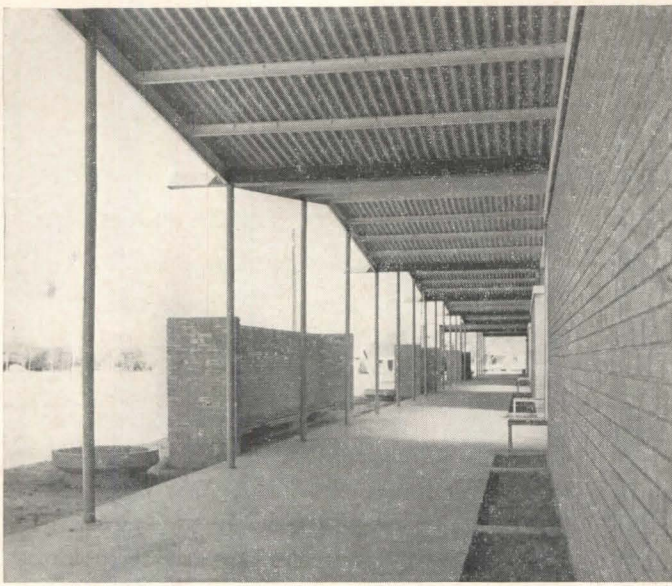
tional spaces in the future may be quite different from our current conception of a classroom. There are indications of changes of this nature in the Texas school herewith and in the Connecticut schools that follow.



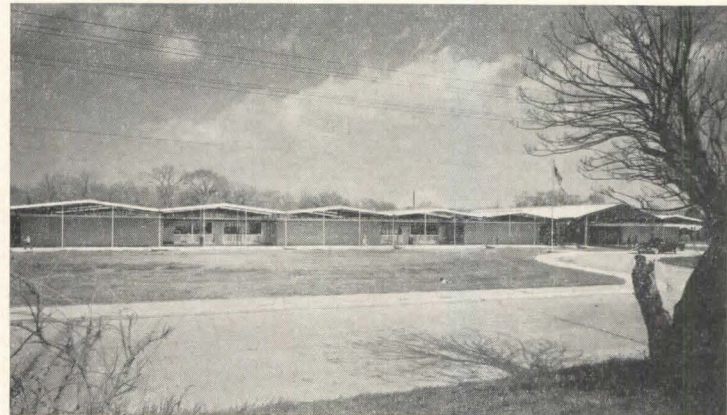
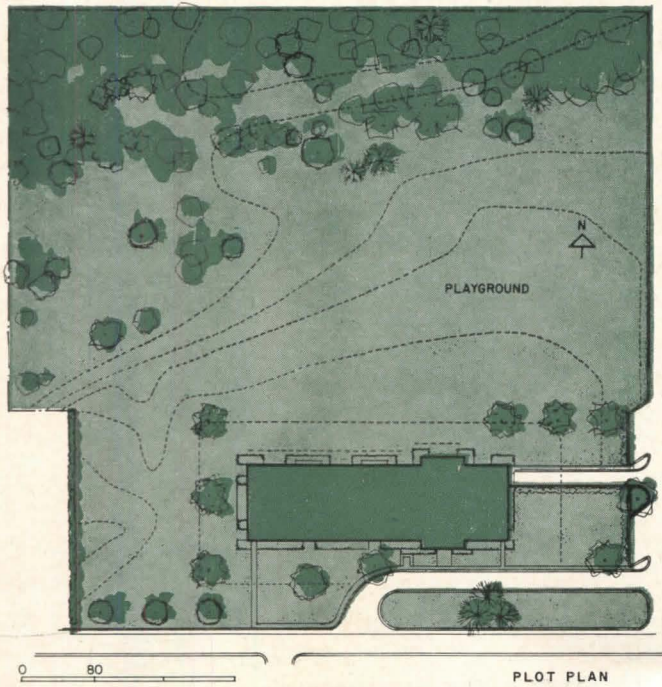
Ulric Meisel

THE ARCHITECTURAL CONCEPT fulfills and enlarges the educational purpose: San Jacinto Elementary School, Liberty, Texas. So long after its design one cannot say who initiated the concept of this school's umbrella roof that shelters both open and independently enclosed spaces: the architects (*Caudill, Rowlett, Scott & Associates*), the superintendent (*W. G. Barber*) or one of the laymen on the Board of Education. All participated in what the architects call a "dream" session shortly after the need for a small, expandable school had been recognized. The idea came into being then. The dreamers had worked together before, but instead of repeating past performance they used their experience to progress toward more satisfactory protection against a warm, humid climate, and to augment educational possibilities as well as to satisfy known needs.



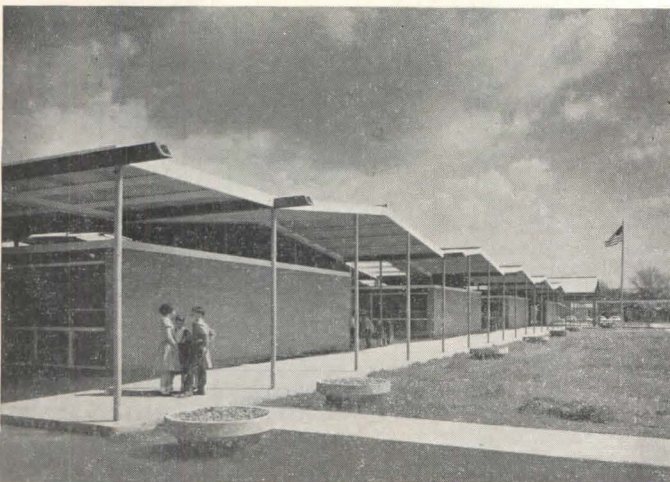


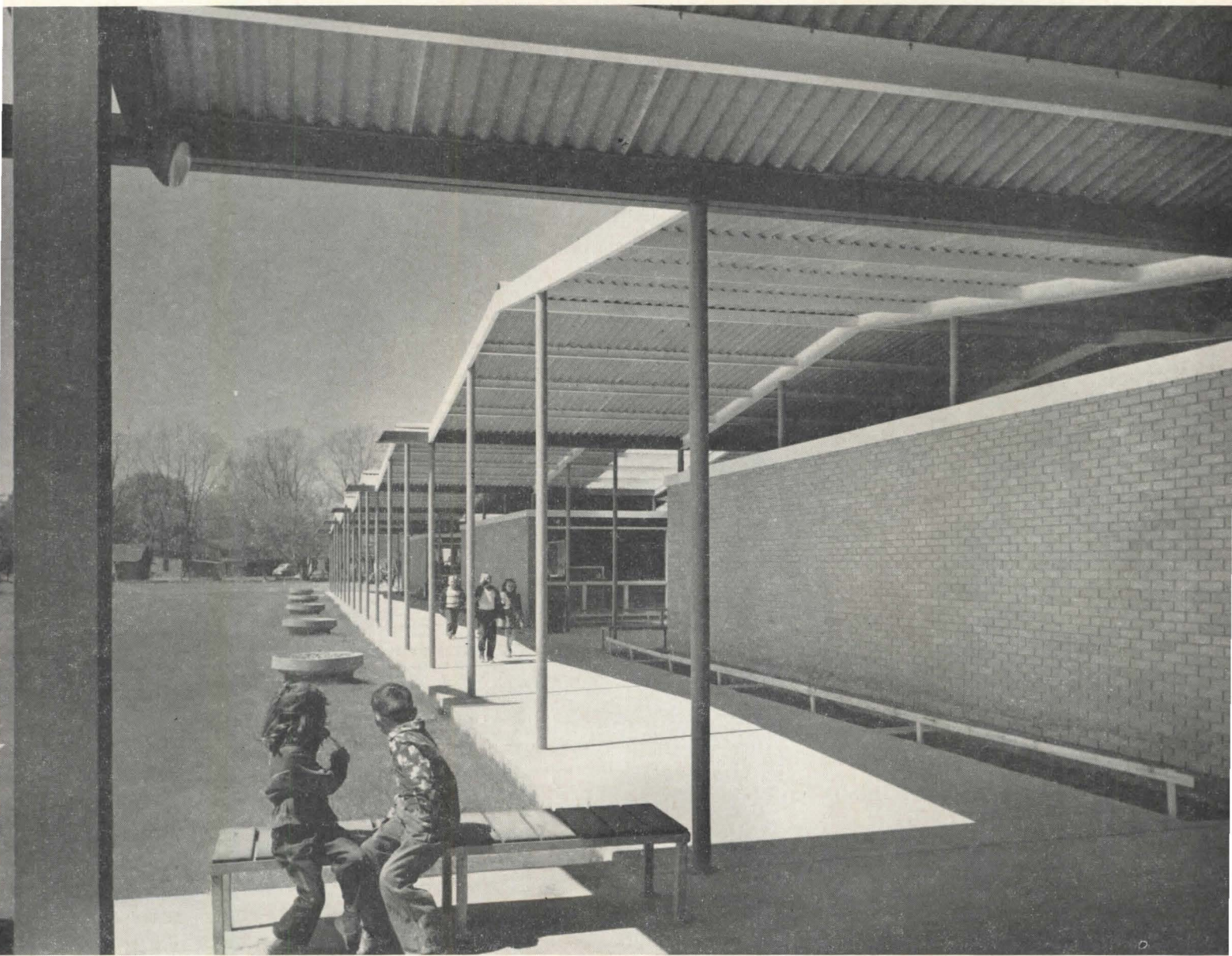
Liberty, Texas, is on the Gulf Coast. The normal January temperature is 54; July, 83. Of course, the mercury sometimes climbs to 108 and occasionally drops to 8; generally though, it's warm. Normal yearly rainfall is 51 inches, with no distinct wet or dry season. To some this average precipitation may not



seem much; but compared to 8 inches at El Paso or 19 at Laredo, to a Texan Liberty is decidedly humid. In fact, there are low, swampy areas on three sides of the community.

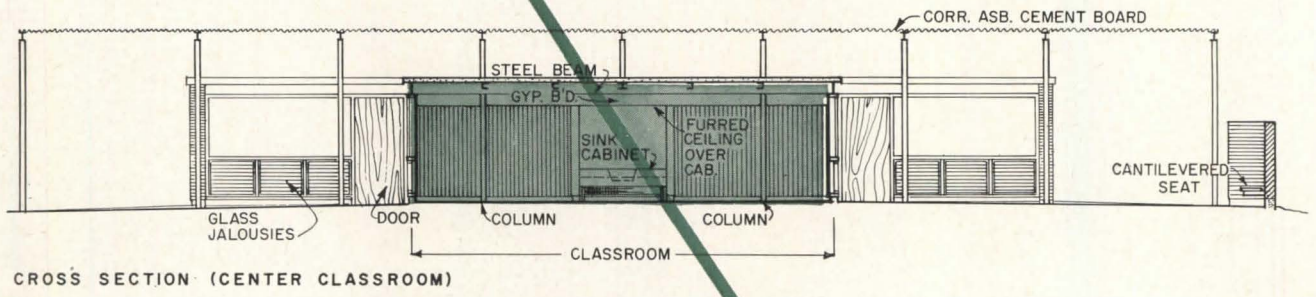
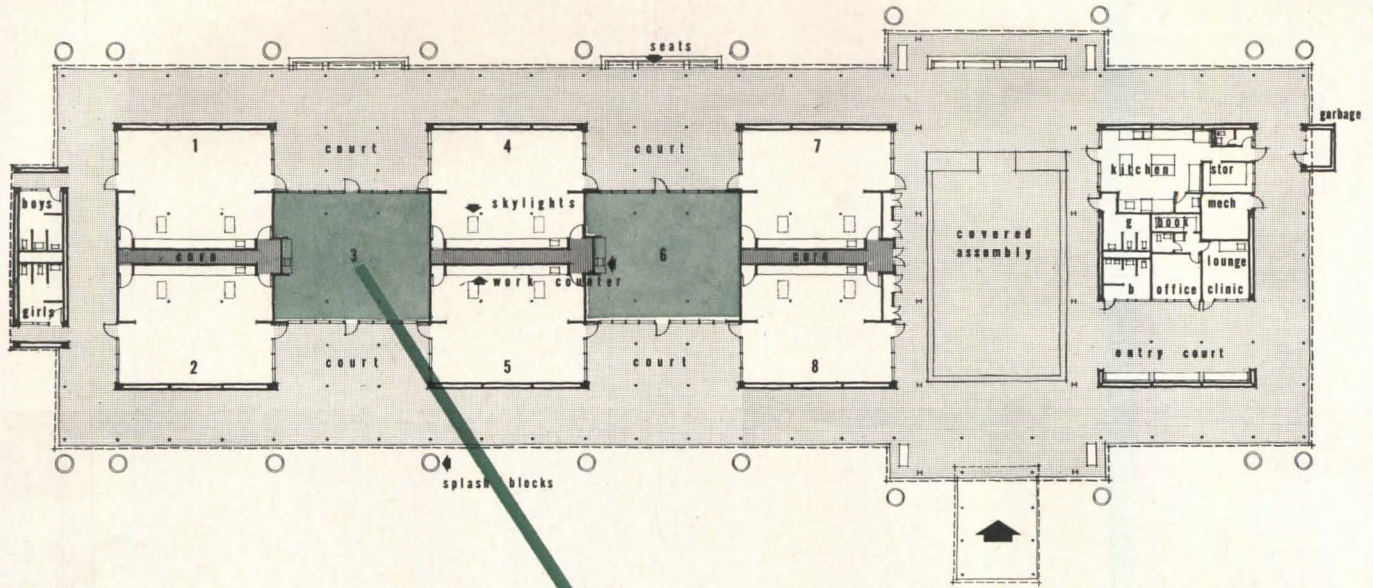
Hence the San Jacinto school's wide, overhanging umbrella roof, with free air space between it and the classroom roofs below, to keep the lower roof cool; hence the windows which can remain open on hot, rainy days because they face sheltered courts; hence the covered assembly area, so there will be plenty of room for play when it's sunny and hot as well as when it rains.



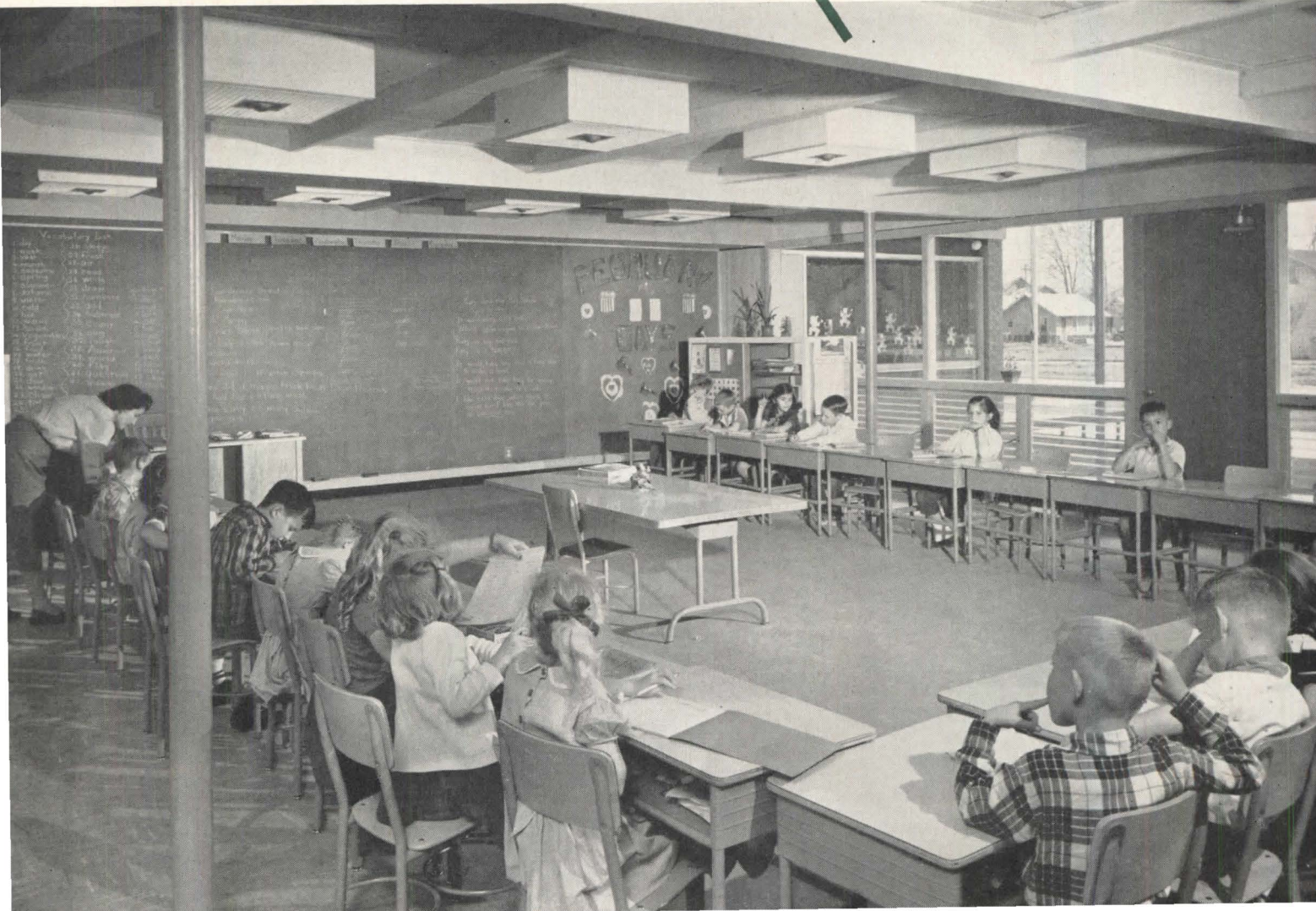


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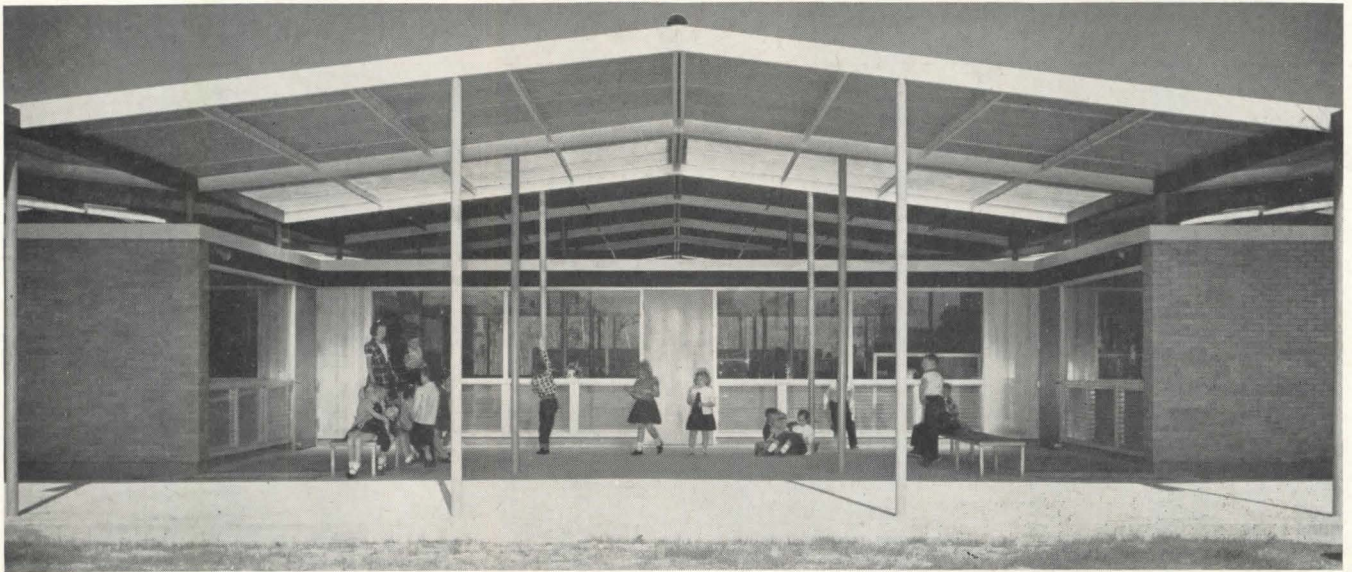
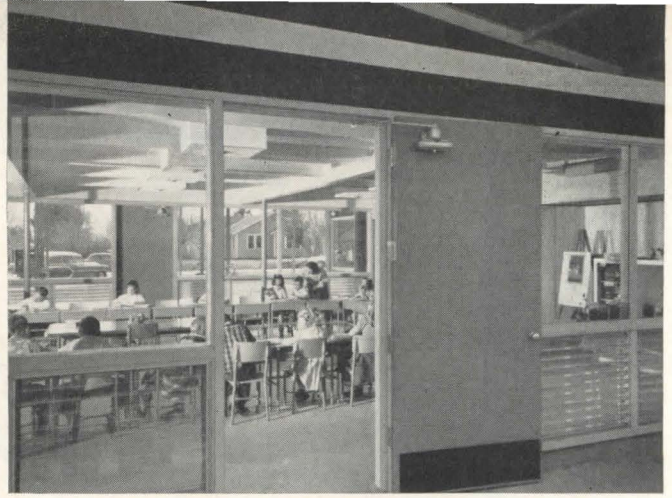
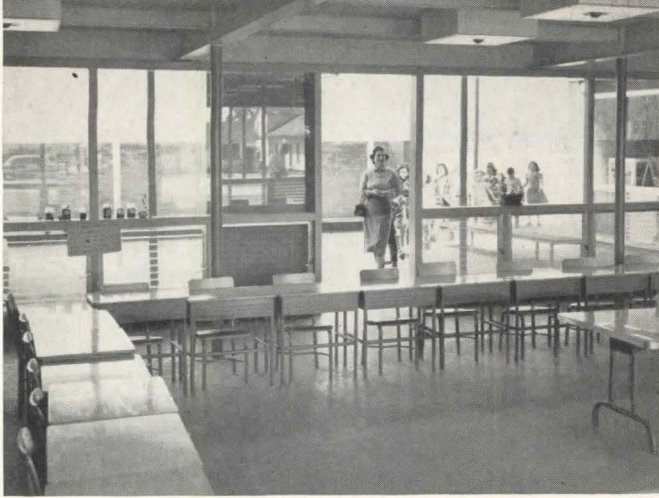
ARCHITECTURAL CONCEPT: LIBERTY, TEXAS



CROSS SECTION (CENTER CLASSROOM)







Ulric Meisel

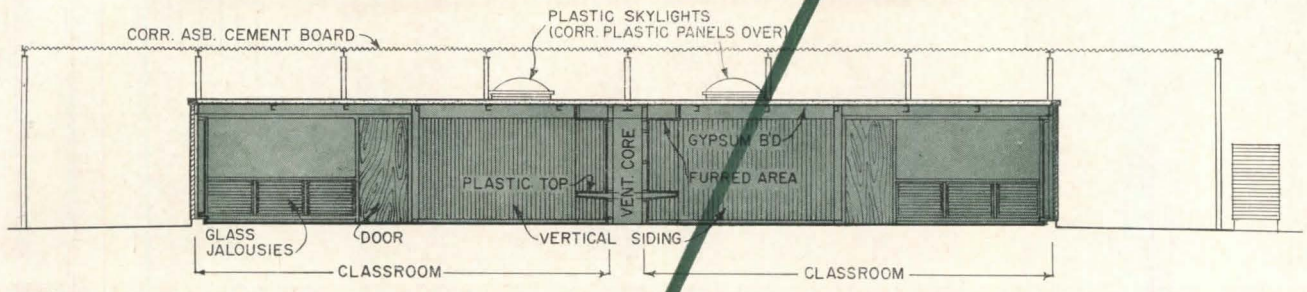
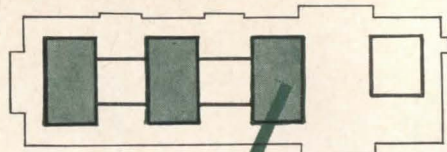
The initial enrollment in the San Jacinto Elementary School required eight classrooms, and an increase was foreseen (the addition, by the way, is in progress, and in even the short time since the school was first occupied, enough has been learned so that the added classrooms will probably be superior to the originals). There were to be eating and assembly facilities, administrative and service areas. At first the idea was to have a multi-purpose room plus a kitchen. However, during the dream session to which we have referred, it was agreed that eating in the classrooms would have educational advantages and would prove economical; and that an outdoor assembly area was not only feasible in this climate but could also be used as a covered play area.

Since the architects had worked with this superintendent before, they were familiar

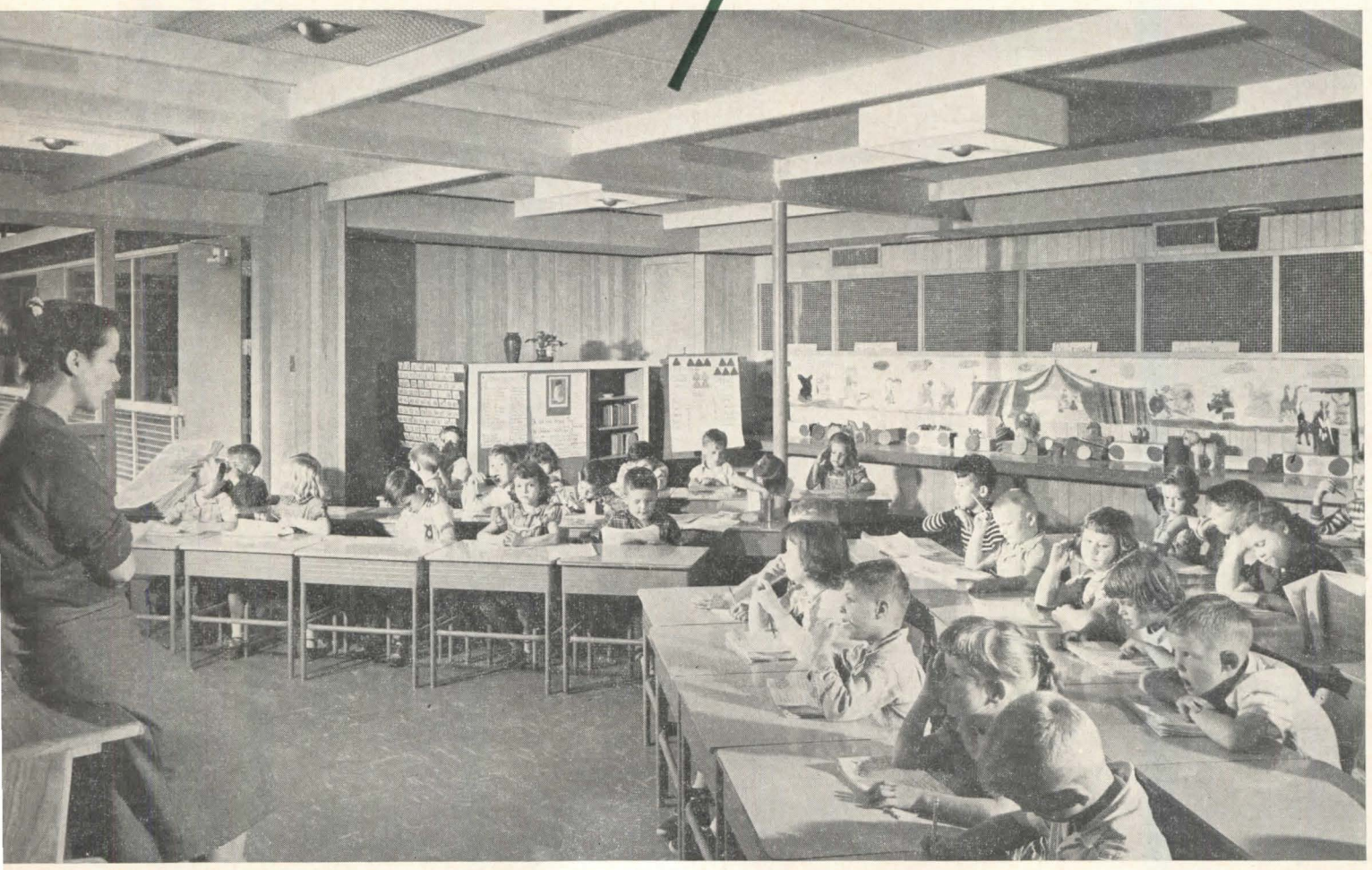
with his educational philosophy and with his wish that the school be a friendly place for children. At some time during the preliminary discussion of size, purpose, arrangement and type of building, an idea tacitly held gained expression: that children learn wherever they may be, indoors and out; that the "school" was more than the space enclosed by walls.

From contemplating these considerations, some dealing with the weather and some educational, came the decision to spread a roof like an umbrella — or more accurately, like a tent fly — and under it to enclose only certain specific areas. The recessed courts, with roofs partly translucent, with areas for growing plants and with benches pleasantly arranged, developed naturally.

On these two pages the single classrooms appear; back-to-back rooms are on the next page.

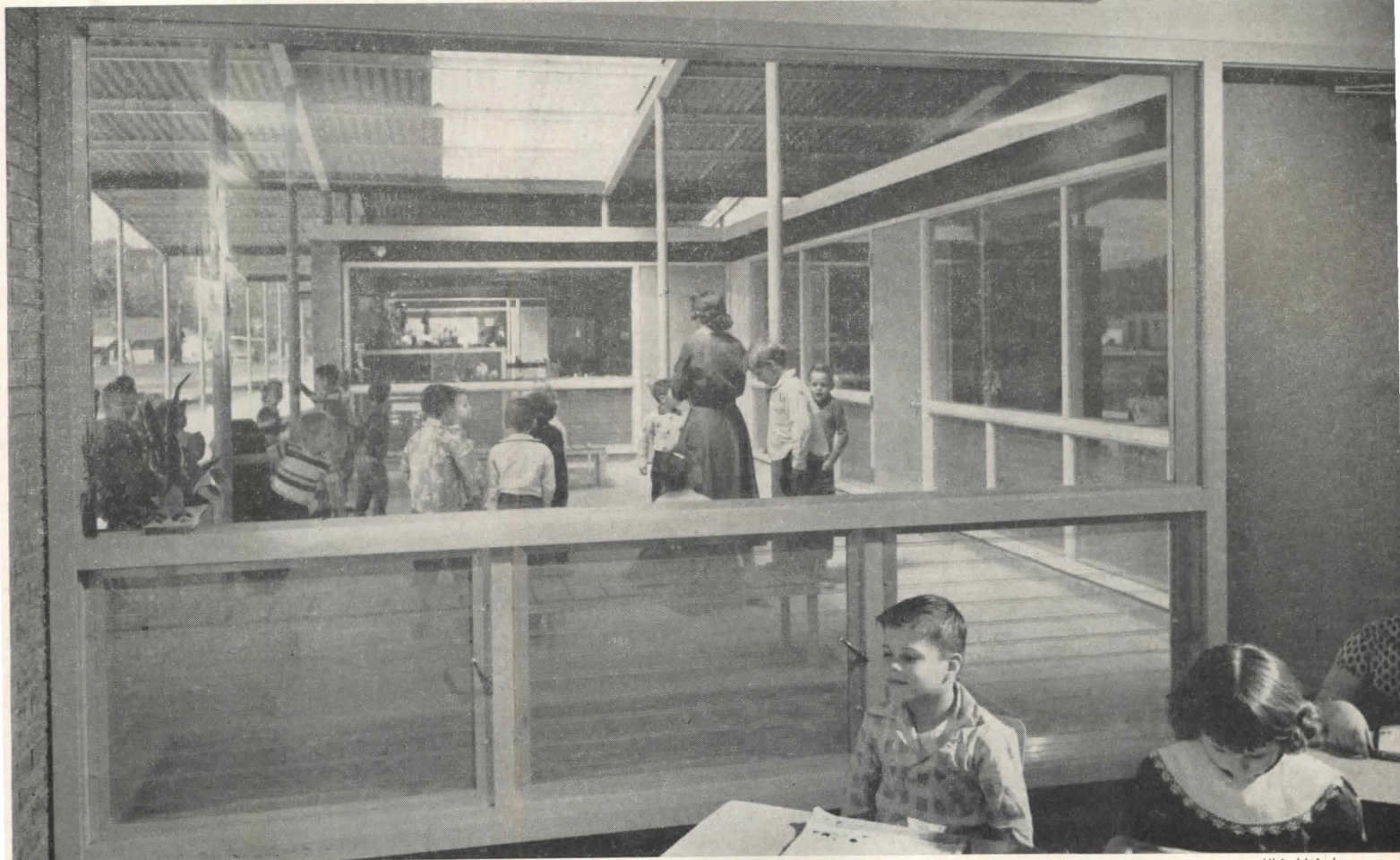
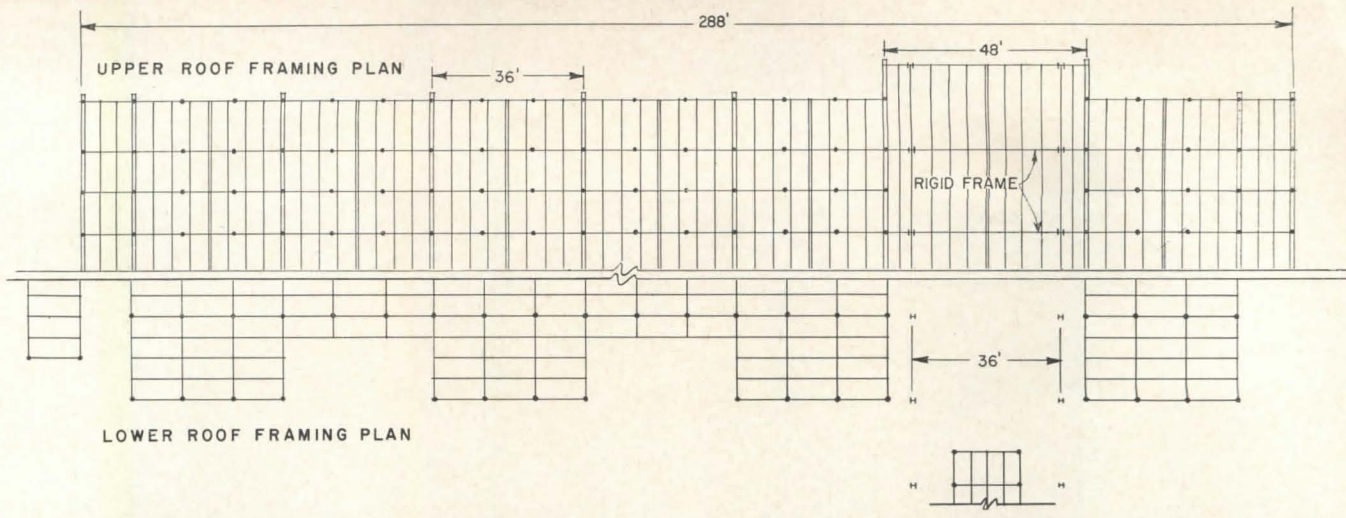


CROSS SECTION (BACK-TO-BACK CLASSROOMS)

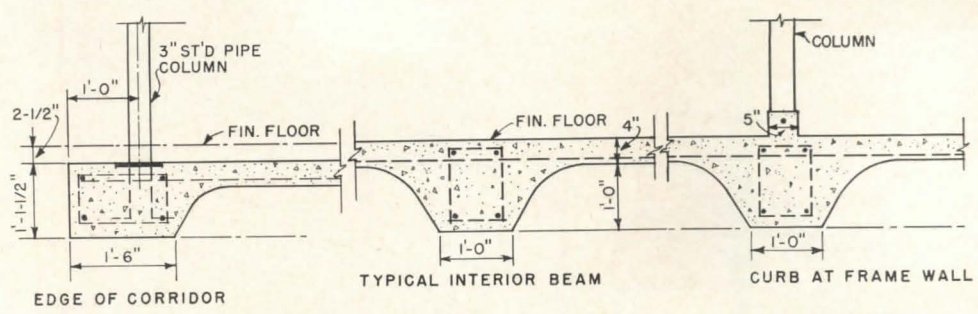
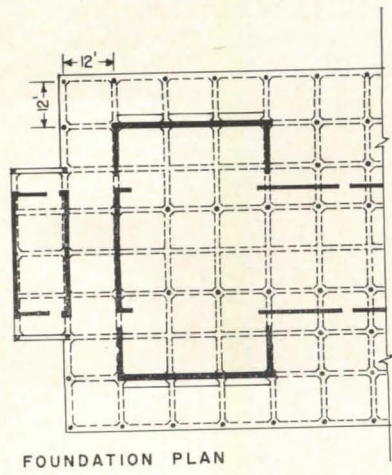


All the San Jacinto classrooms — the single ones on preceding pages as well as the back-to-back rooms that appear here — are cross-ventilated through glass jalousies and have large areas of fixed glass shaded against sun and sky glare by the tent-fly upper roof. Ceilings are quite low, as the sections and photographs show, which means that the usual pendant schoolroom lighting fixtures could not be used. The square light boxes, large in

area and louvered to avoid a multiplicity of small "hot spots", will probably outrage the proponents of certain aseptically perfect and quite dull lighting theories. Let it be said, however valid general lighting theory may be, that this lighting works well indeed in this particular school. For a different over-all concept, with higher ceiling, lesser overhangs, less natural light and less concern for economy, different equipment would be needed.



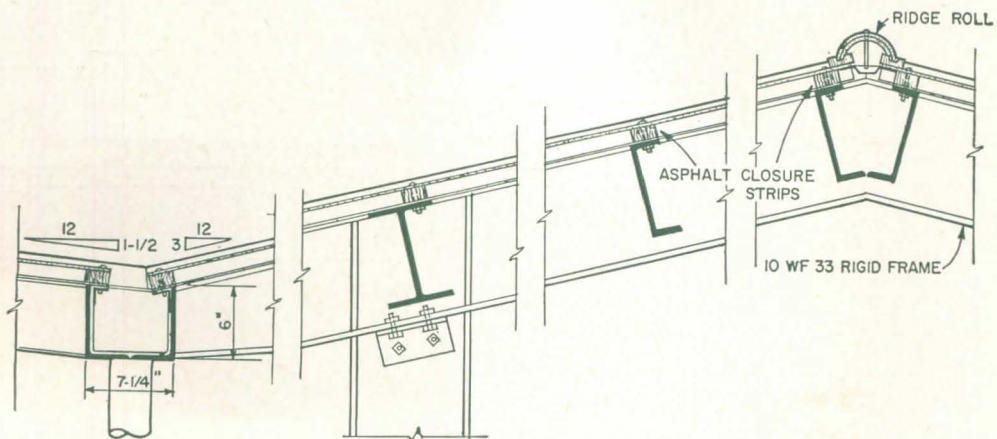
Ulric Meisel



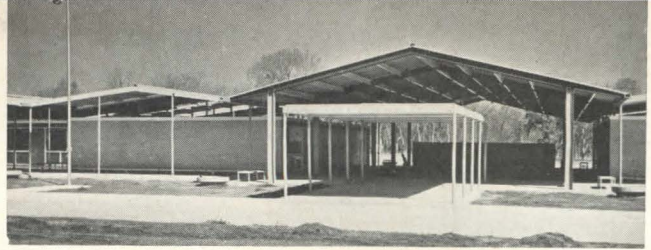
Sections show simple, identically formed grade beams



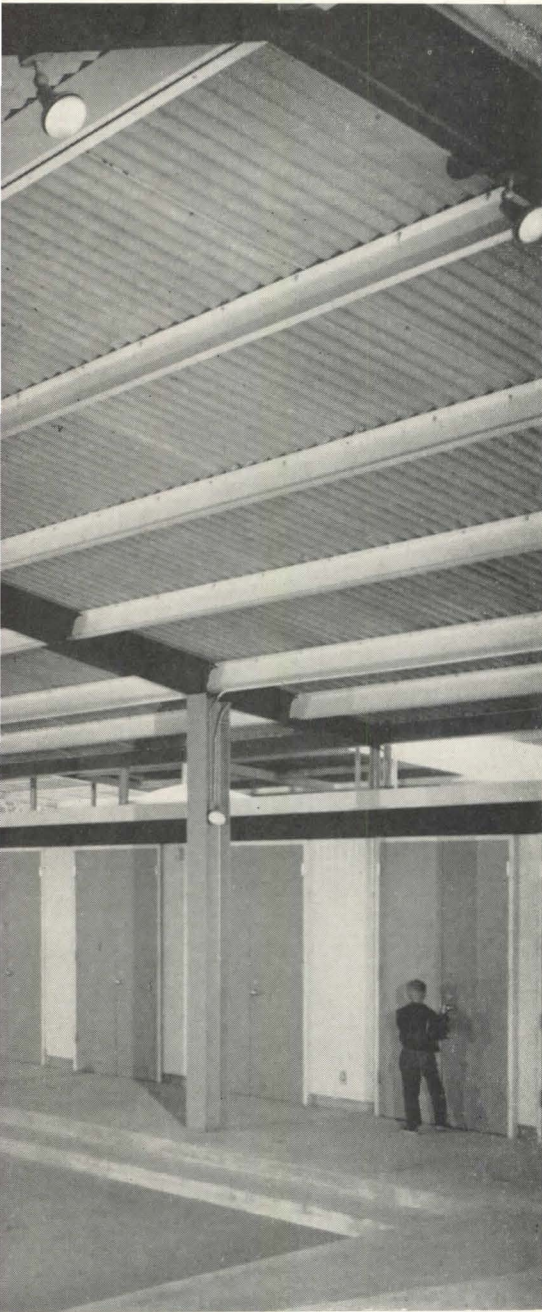
Ulric Meisel



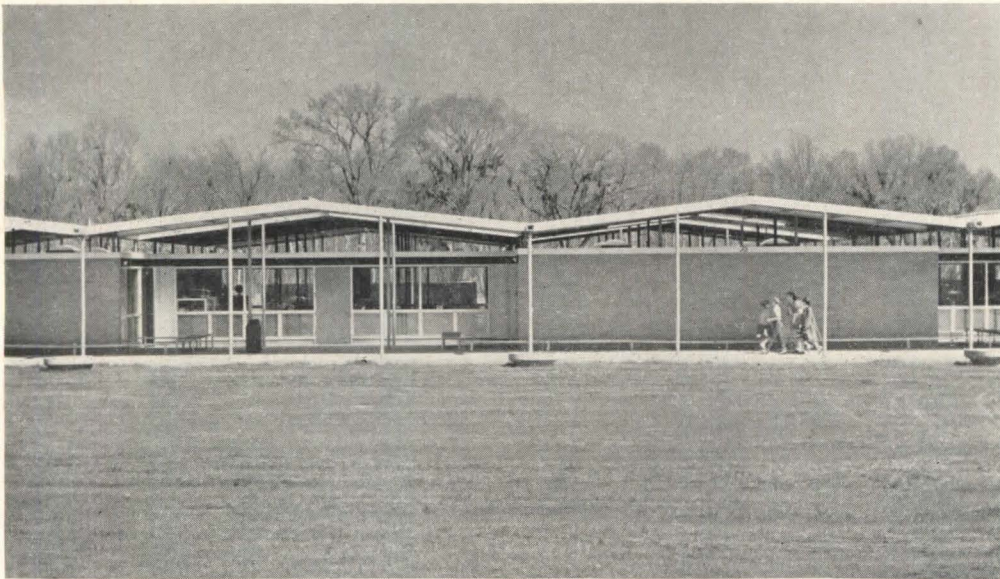
Simple construction of the tent-fly roof



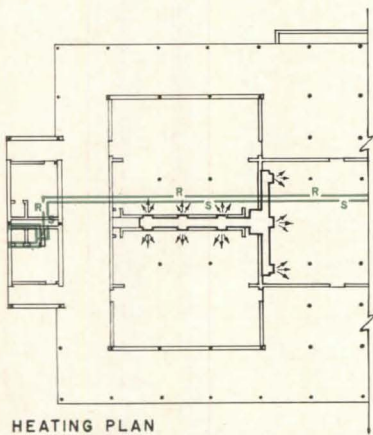
San Jacinto's roofed, open assembly area is reminiscent of the portico, the stoa, or the temple courtyard in which ancient scholars pursued their studies. Its simple construction is an example of what the esthete calls economy of means, and to the taxpayer it spells economy of dollars. The structural system employed was perfected for this individual school; the architects tell us that time and again they have started on sets of standard details, but that for each new job better details seem to evolve and the preceding "standards" are shelved. The architects do adhere to a set of principles, however, and one of these is the use of repetitive structural elements. With materials cut to a minimum, only labor cost remains to be further reduced; routine labor operations resulting from repetitive details accomplish this end. Engineer J. N. Heard of the Van Cleve Construction Co. says that three to four cents a pound were saved on the steel in this school by limiting the variety of shapes and connections, savings that started in the steel company's detailing, were evident in fabrication, and cut erection time. Steel bids reflected these savings. Again, the corrugated asbestos-cement roofing is used in full-sized, stock-sized sheets.



ARCHITECTURAL CONCEPT: LIBERTY, TEXAS



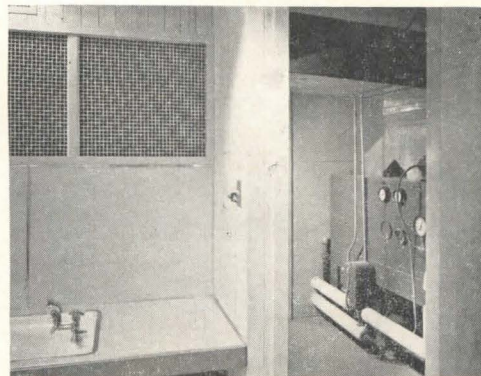
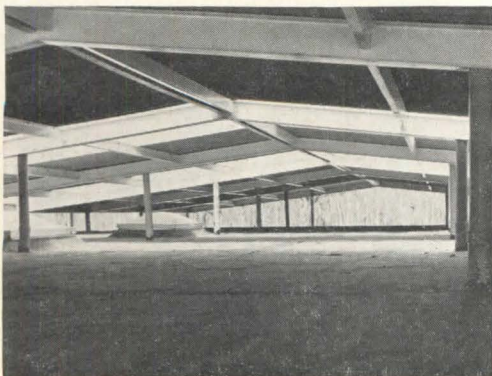
Ulric Meisel

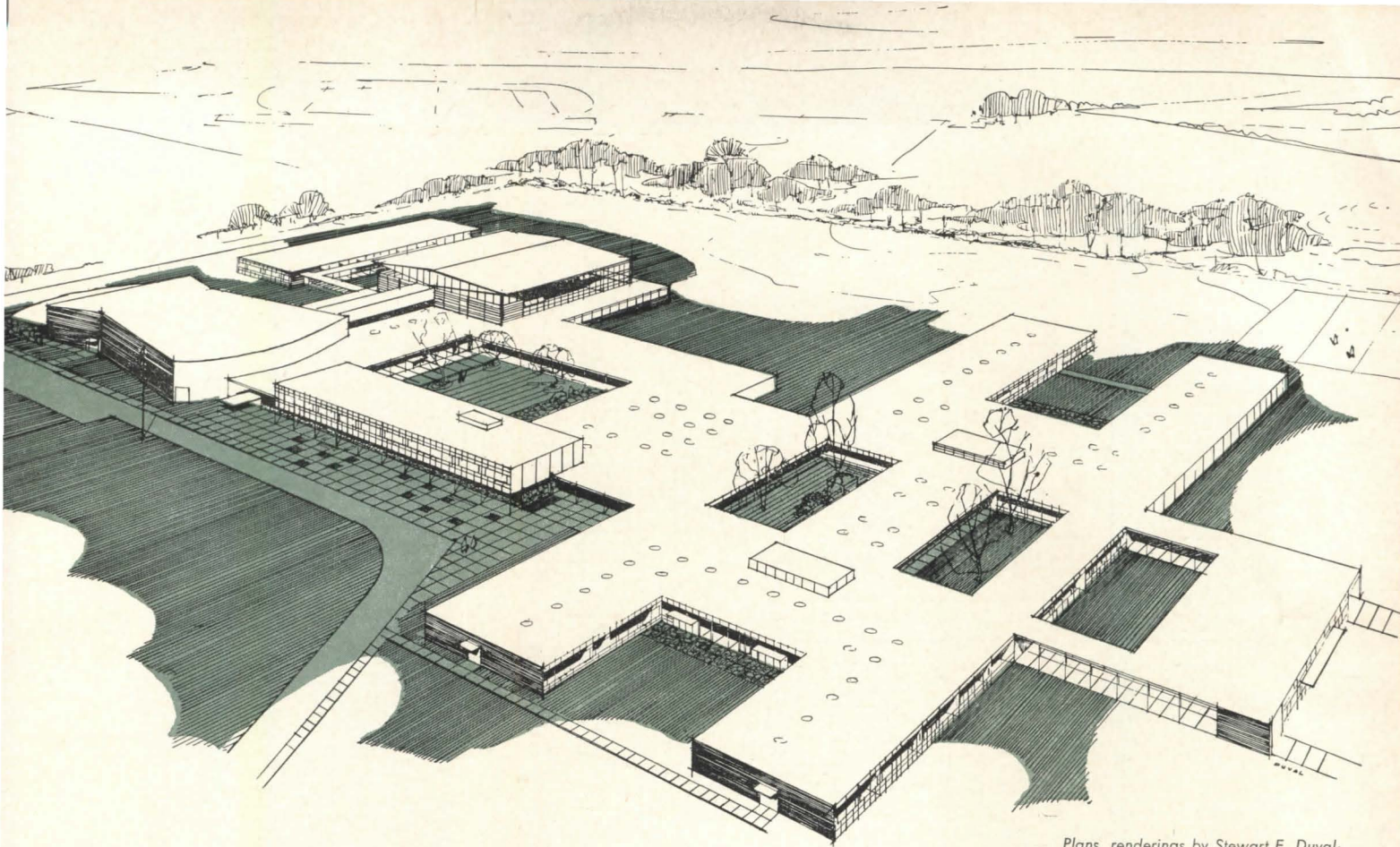


HEATING PLAN

*Typical mechanical core*

Between San Jacinto's back-to-back classrooms run utility cores containing ventilation, heat and service lines. Classroom sinks and work counters back up to the core. Some of the modularly spaced lally columns are exposed in the classrooms; this has apparently not interfered with use of the rooms. The sub-roofs of enclosed areas are built-up and waterproof. Rain is discharged from the cricketed upper roof into sunken sections of concrete sewer pipe filled with stones.



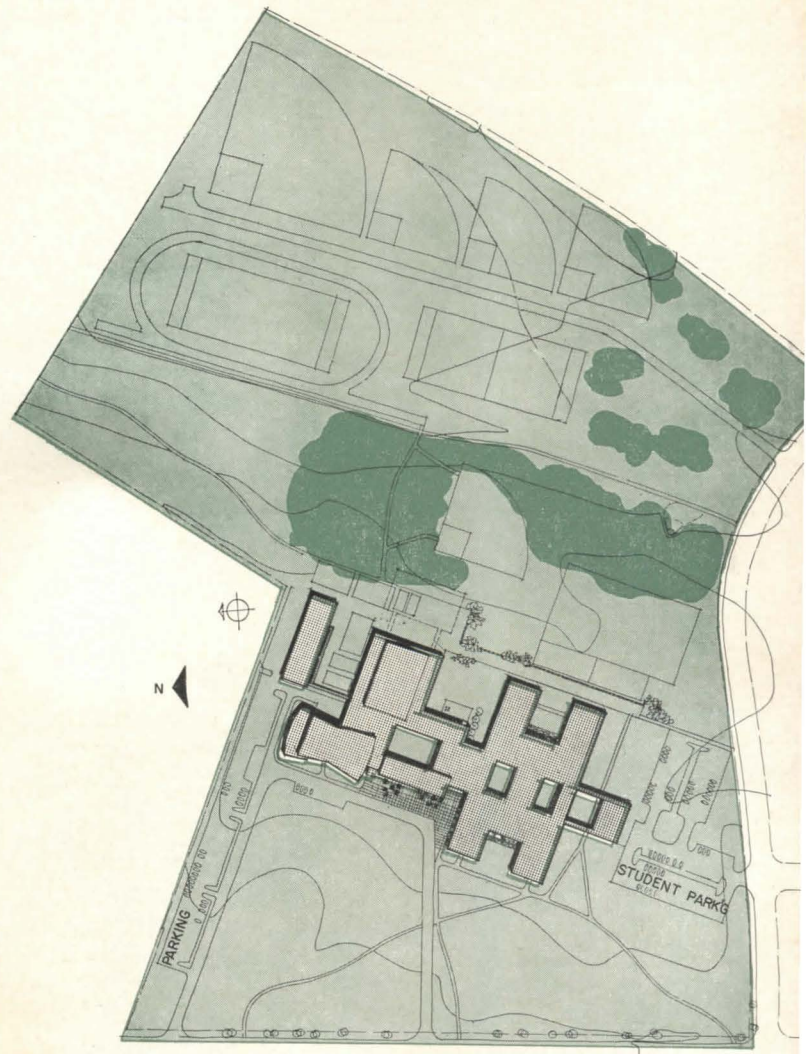


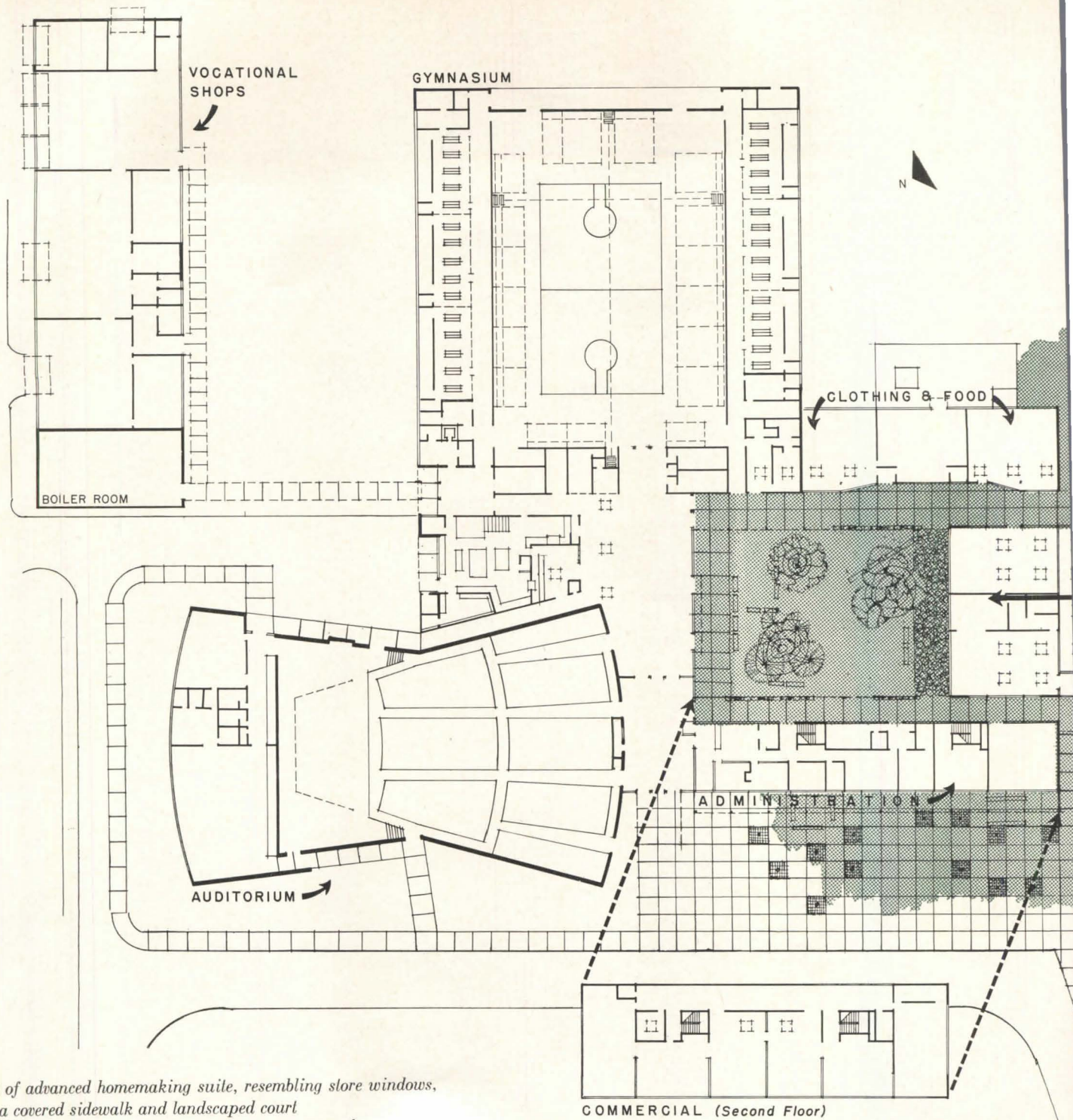
Plans, renderings by Stewart E. Duval;  
diagrams by Marjorie Blake

EDUCATIONAL CONCEPTS stimulate and modify the architectural expression: North Hagerstown High School, Hagerstown, Md. Architects, *McLeod & Ferrara; Stewart E. Duval, John M. Woodside, Associates.* Landscape Architects: *Collins, Simonds & Simonds.* Structural Engineer: *J. Gibson Wilson, Jr.* Mechanical, Electrical Engineers: *Kluckhuhn, Cobb & McDavid.* Acoustical Consultants: *Bolt, Beranek & Newman.* Superintendent of Schools: *William Brish.* Educational Consultants: *Engelhardt, Engelhardt & Leggett.*

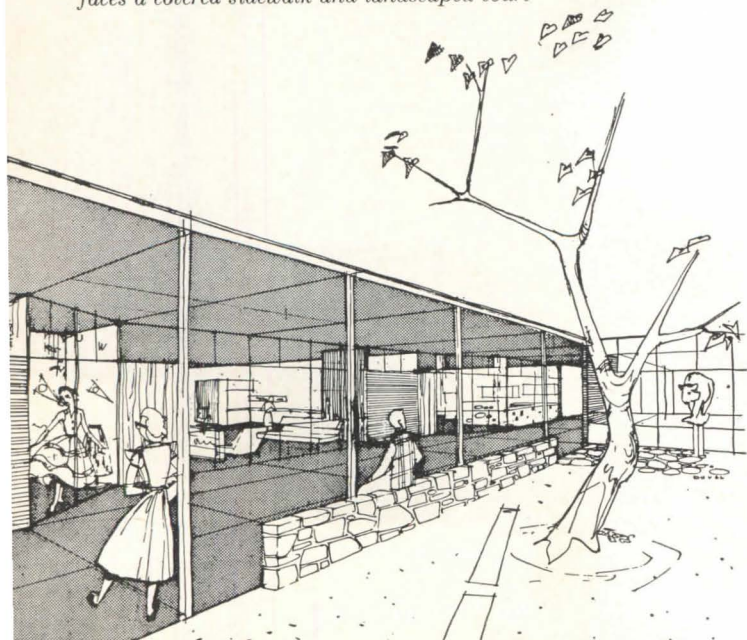
The site of North Hagerstown High has about 80 acres; it contains features both restricting and rewarding. The fields are interrupted by swales and rock outcroppings. There is a natural amphitheater with rocks for seats. The trees are Osage oranges, excellent scraggly clumps left undisturbed by the Maryland farmers because too many rocks were involved.

The Washington County Board of Education, says the superintendent, initiated the school program by determining with lay and professional groups the basic purposes to be



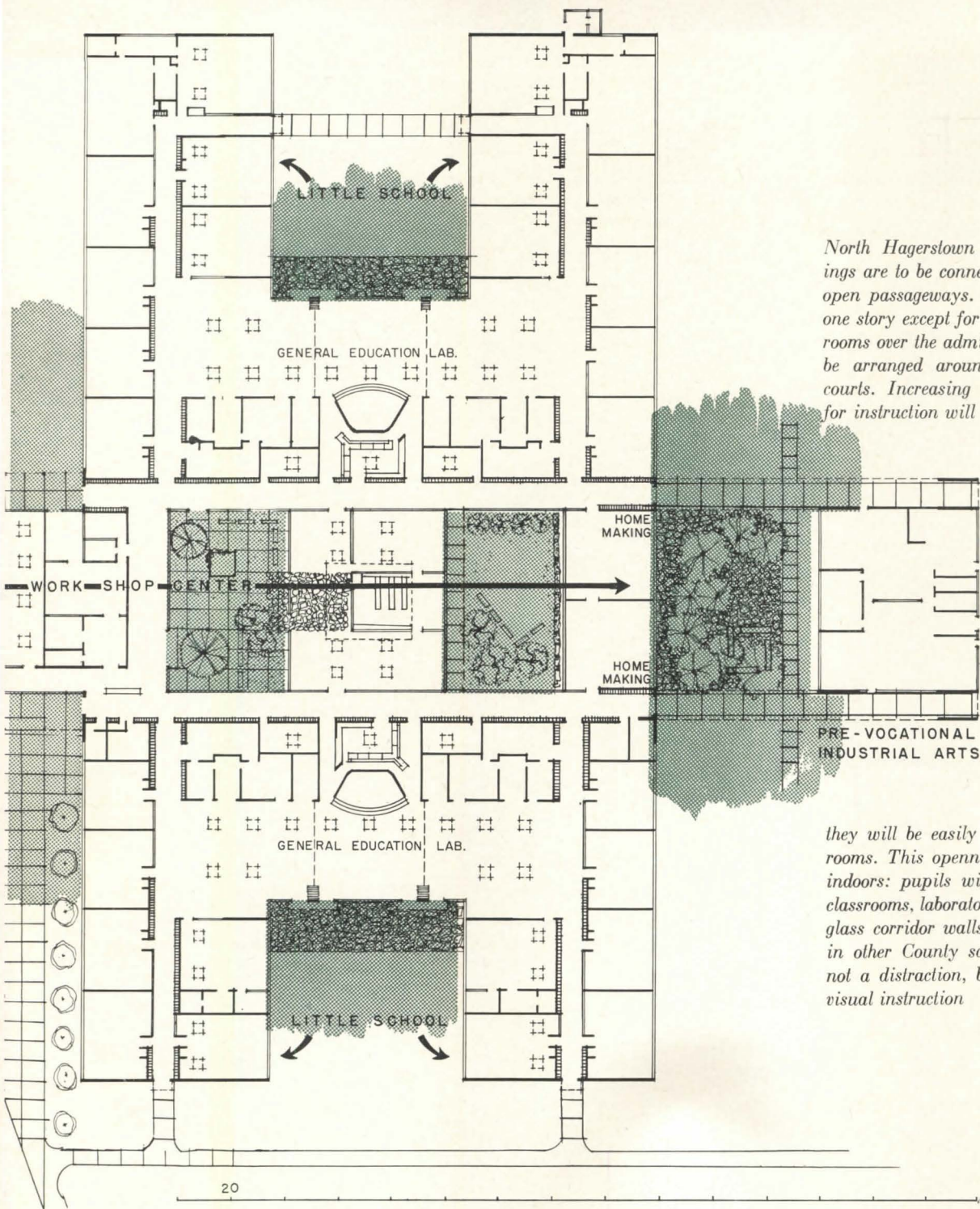


*Front of advanced homemaking suite, resembling store windows, faces a covered sidewalk and landscaped court*



served. Detailed development of the educational program and preliminary architectural design went along hand-in-hand; the technical and educational consultants participated freely and fully from the beginning. Changes major and minor were frequent as the job progressed to working drawings (at which stage it now stands). The most recent metamorphosis was due to the opportunity afforded by the Fund





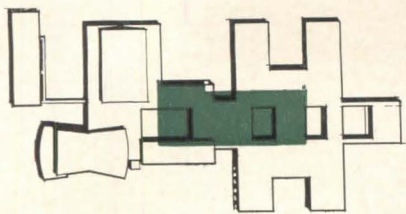
*North Hagerstown High School's buildings are to be connected by short, covered, open passageways. The simple units, all one story except for commercial education rooms over the administrative suite, are to be arranged around a series of inner courts. Increasing use of outdoor areas for instruction will be encouraged because*

*they will be easily accessible from classrooms. This openness is to be paralleled indoors: pupils will be able to see into classrooms, laboratories and shops through glass corridor walls — a technique which in other County schools has been found not a distraction, but rather a means of visual instruction*

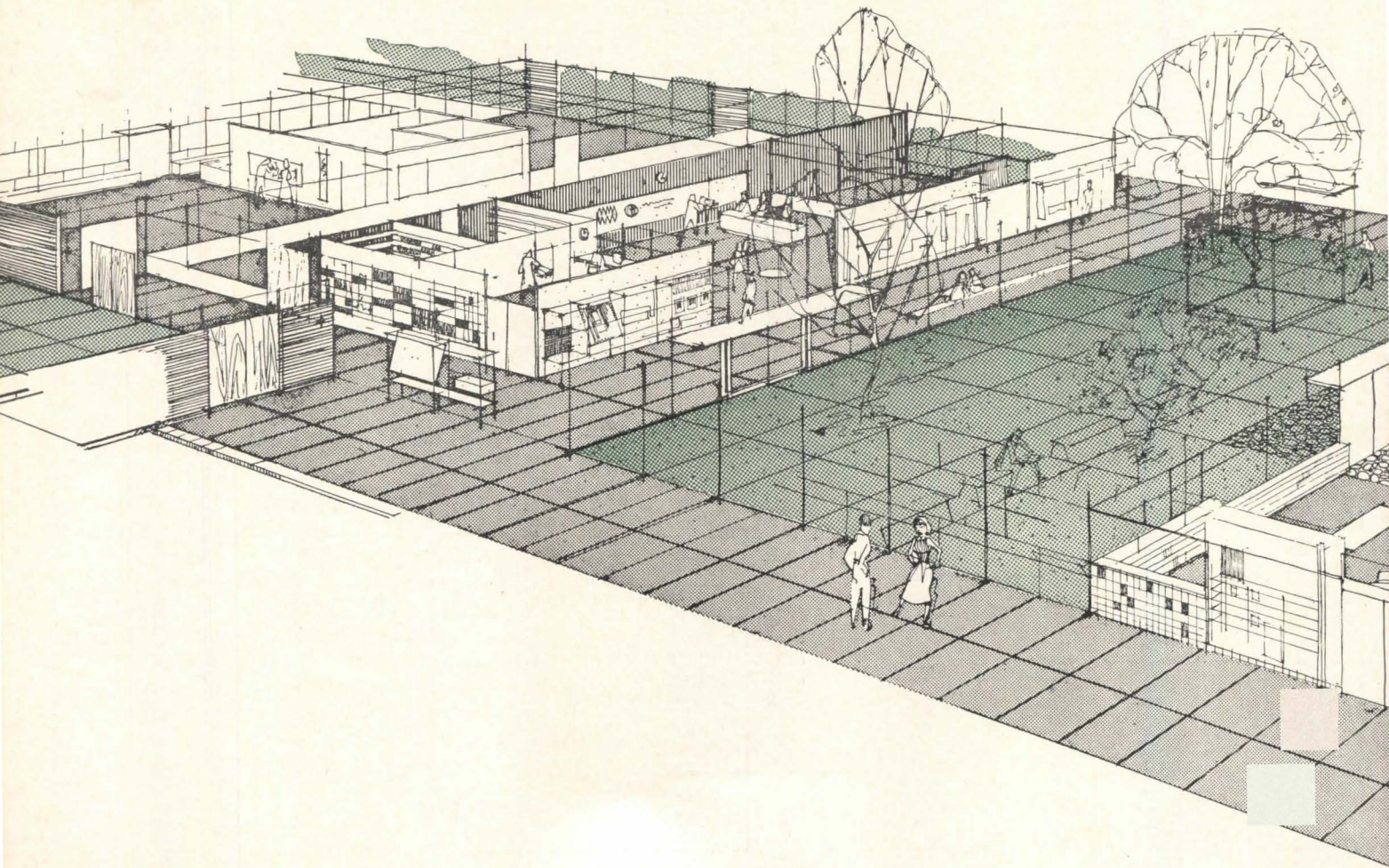
for the Advancement of Education and the Radio-Electronics-Television Mfrs. Assn. to Hagerstown and Washington County to conduct a five-year, experimental, closed-circuit educational TV project. Behind every decision, directing the design as it was refined, there was always the educational philosophy, which is so well expressed in a long letter from the educational consultants that we quote it in full:

“Here are some thoughts on some of the educational reasons for the North Hagerstown plan.

“*Communication Media:* We are reasonably certain that, in any given learning situation, the utilization of all the senses is more effective than utilizing one. This is pretty well borne out by the effect of mass communication media such as television, motion pictures,



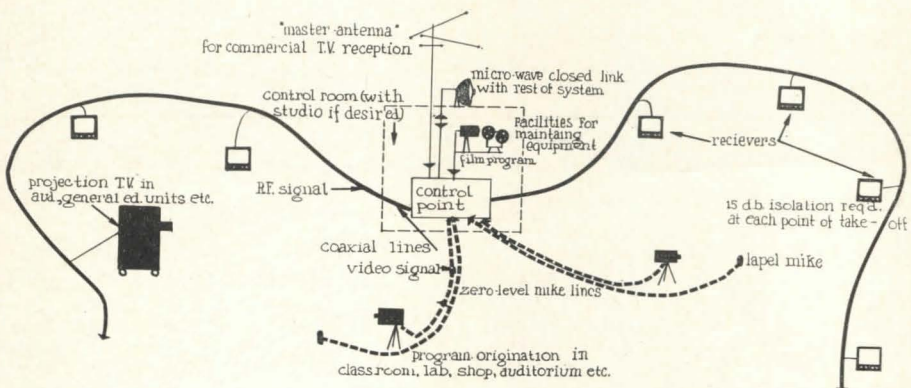
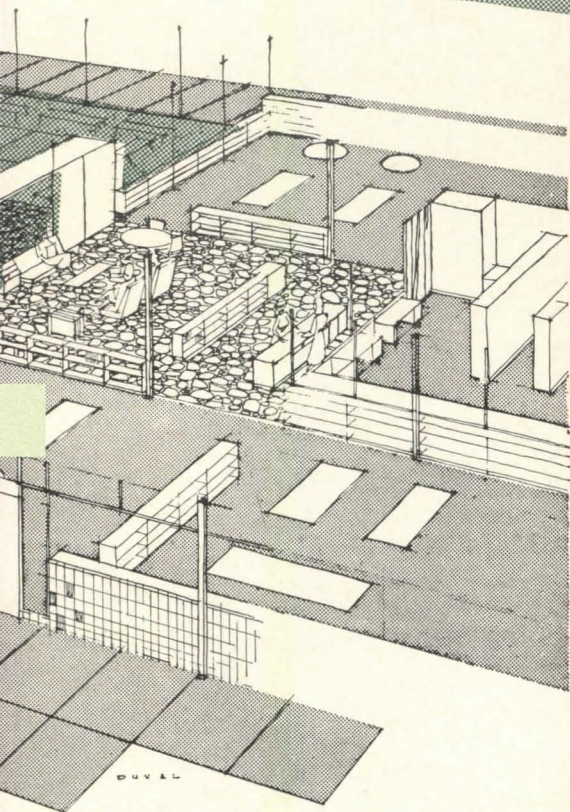
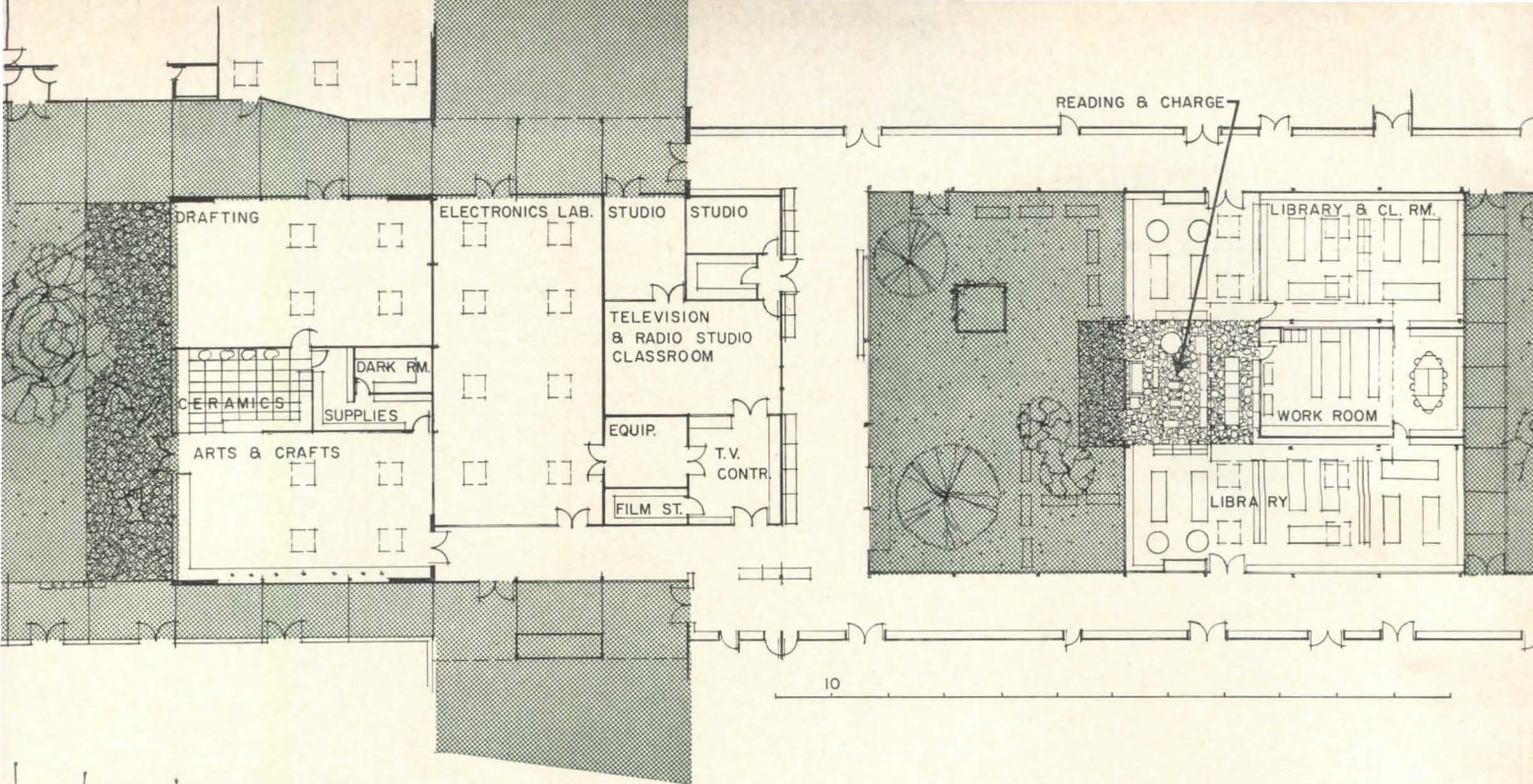
*At the heart of North Hagerstown High will be the shops — TV — museum — courtyard — library core connecting all four of the little schools. The TV studio is planned as the eventual center of the experimental program; electronics and arts shops serve both the studio and the little schools; the library court, like the others, is to be mostly graveled or paved, to have comfortable benches and Japanese maples, Russian olive or dwarf fruit trees asymmetrically disposed. Between this court and the studio a wide corridor will be also a museum-exhibition area, with displays on space-frames*



pictorial magazines which utilize art, drawing, color, word and sound to develop a total impact. In formal education, we have continued to utilize a gadget, the book, as the principal learning tool and have been slow to develop other tools affecting other senses. Undoubtedly as we progress we will develop communication procedures which will be more effective in both speeding the process and

increasing retention of the matter to be learned.

“Formal learning is moving away from the simple process of going through the textbook page by page and memorizing the words, moving toward enrichment of subject matter and application of knowledges and skills required from actual experiences. Already we have used slide films, motion pictures, record



*Educational television research and experiments to determine worth of various methods of TV instruction and teacher training, of increasing teachers' usefulness and coping with teacher shortage will be undertaken at North Hagerstown High and, eventually, all 47 schools in the county*

players and recording machines to supplement the book. Perhaps we must do more.

"It seems clear that there is even more of a need than we have hitherto recognized for coordinating the visual arts with the learning process. Perhaps you will see something of this in the central core of North Hagerstown High School which is really a center of communication arts. It includes the library, electronics

laboratory, television studio, motion picture equipment, art studio, and mechanical drawing laboratory. Also, you will note that across the corridors are audio-visual rooms which serve as recording and viewing rooms for individuals and small groups. Bringing all these communication media physically together may help teachers and students to coordinate them and improve their use and impact.

**BOARD OF EDUCATION OF WASHINGTON COUNTY, MARYLAND  
PLAN FOR EXTENSION OF CLOSED-CIRCUIT TELEVISION FACILITIES**

Laboratory training center at Board of Education Office to be in operation by July 1955						
SEPTEMBER 1956: 8 SCHOOLS	SEPTEMBER 1957: 23 SCHOOLS	SEPTEMBER 1958: 47 SCHOOLS				
<b>HAGERSTOWN AREA</b>		<b>HAGERSTOWN AREA and WASHINGTON COUNTY</b>				
<p><b>HIGH SCHOOLS</b> South North</p> <p><b>ELEMENTARY-JUNIOR HIGH</b> Washington</p> <p><b>ELEMENTARY</b> Antietam Broadway Howard Pangborn Boulevard Surrey</p>	<p><b>HIGH SCHOOLS</b> New North</p> <p><b>ELEMENTARY-JUNIOR HIGH</b> South Potomac</p> <p><b>ELEMENTARY</b> Chewsville Fountaindale Funkstown Halfway Huyetts Lincolnshire Maugansville North Street Paramount Salem Avenue White Oak Forest Winter Street Woodland Way</p>	<table border="0"> <tr> <td><b>HIGH SCHOOLS</b></td> <td><b>ELEMENTARY</b></td> </tr> <tr> <td>Boonsboro Clear Spring Hancock Smithsburg Williamsport</td> <td>Boonsboro Beaver Creek Cascade Clear Spring Dargan Downsville Fairplay Greensburg Hancock Indian Springs Keedysville Leitersburg Mt. Lena Pinesville Rohersville Sandy Hook Sharpsburg Williamsport Yarrowsburg</td> </tr> </table>	<b>HIGH SCHOOLS</b>	<b>ELEMENTARY</b>	Boonsboro Clear Spring Hancock Smithsburg Williamsport	Boonsboro Beaver Creek Cascade Clear Spring Dargan Downsville Fairplay Greensburg Hancock Indian Springs Keedysville Leitersburg Mt. Lena Pinesville Rohersville Sandy Hook Sharpsburg Williamsport Yarrowsburg
<b>HIGH SCHOOLS</b>	<b>ELEMENTARY</b>					
Boonsboro Clear Spring Hancock Smithsburg Williamsport	Boonsboro Beaver Creek Cascade Clear Spring Dargan Downsville Fairplay Greensburg Hancock Indian Springs Keedysville Leitersburg Mt. Lena Pinesville Rohersville Sandy Hook Sharpsburg Williamsport Yarrowsburg					
6,000 pupils participating in closed-circuit T. V. instruction	12,210 pupils participating in closed-circuit T. V. instruction	18,000 pupils participating in closed-circuit T. V. instruction				

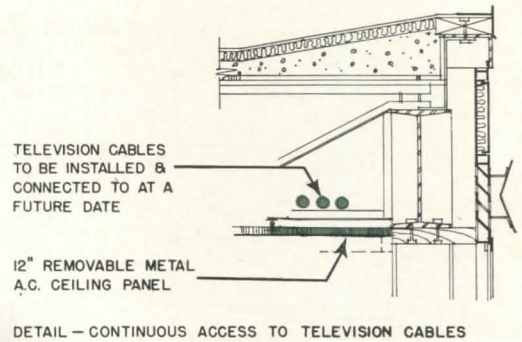
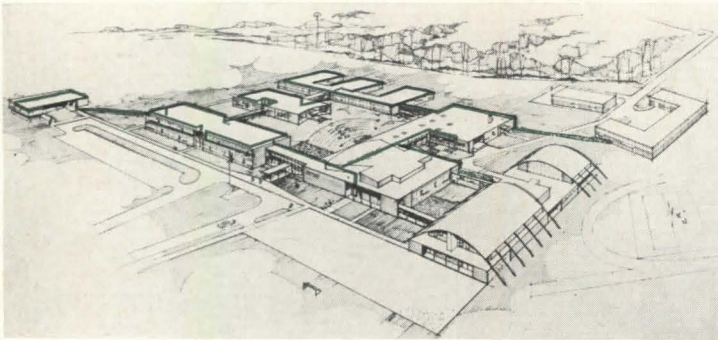
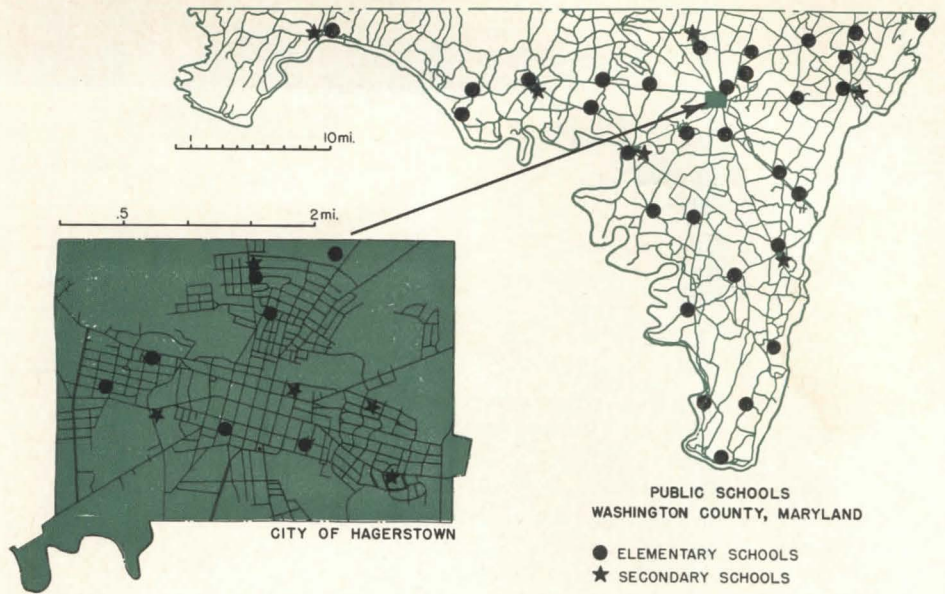
*“Guidance:* At North Hagerstown the guidance program does not follow the usual practice; it is not associated with the administration offices. Guidance grew up as a segment of administration largely because it was superimposed upon subject-matter departments. It is clear, now, that more satisfactory guidance results when it is associated with daily activities of boys and girls in classrooms and in their normal social environment. Certainly guidance should be an activity pursued in the classroom, where the teacher does more of the work and specialized personnel assist. To accomplish this we have provided for a guidance counsellor in each little school, with his own facilities immediately available to all boys, girls and teachers in that area. No longer does a boy or girl have to ‘go to the office’ for guidance. At North Hagerstown guidance can be somewhat less formal, more freely de-

veloped, immediately available, and coordinated with all other activities.

*“Coordination of Subject Matter:* This long story begins with the Latin grammar schools, which were extant from 1635 to 1800. They were college preparatory institutions offering approximately six subjects: Latin, ethics, literature, religion, Greek, Hebrew. They trained for college entrance for the professions.

“Then during the first half of the 19th century, academies arose. These had broader scope and increased subject matter to meet the demand for scientists, navigators, teachers, lawyers and businessmen. They were tuition schools. With their development came the demand for free schools; and from this developed public high schools: first in 1821, with the unique ambition to train youth for ‘life’s needs’, still carrying on the college preparatory idea but adding more subjects.

The experimental closed-circuit TV program supported jointly by the Washington County Board of Education, the Fund for the Advancement of Education and the Radio-Electronics-Television Mfrs. will eventually include all county schools. For maximum flexibility, co-axial cables are to be installed in buildings so they can be tapped at many points. At South Hagerstown High (sketch below), now under construction, cables will run along exterior walls with access through removable ceiling panels



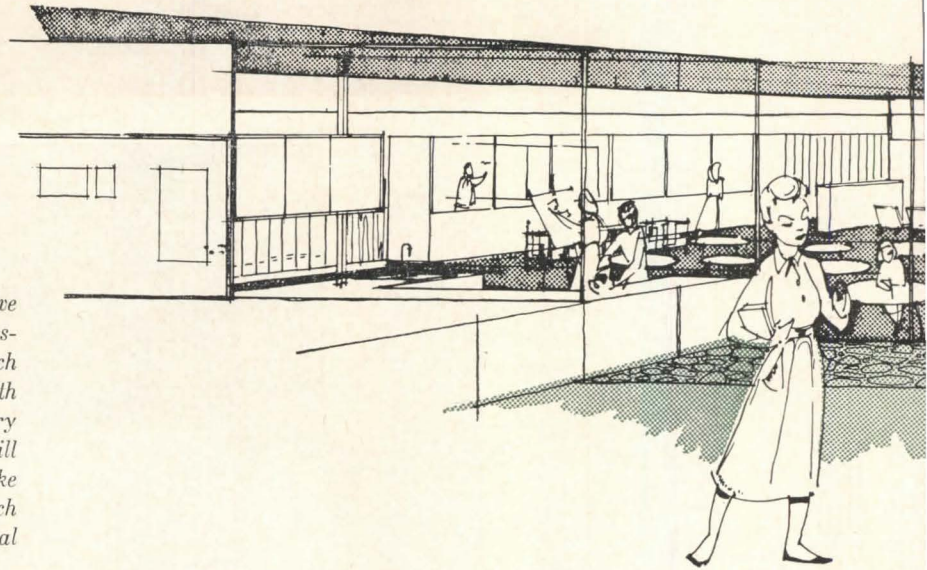
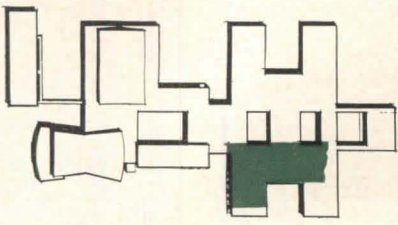
Such schools had about 75 subjects in 1850; 156 in 1928; 274 in 1949. Thus the practice has grown of requiring boys and girls to choose among an increasingly wide range of opportunities without experience on which to base choice. Subject-matter departmentalization came into being with resulting isolation of each subject field. Each teacher believed in the importance of his particular subject; there developed competition for students' time and energies; competition to get boys and girls into the subject field, competition in giving homework, competition for extra-curricular time.

"The school became a subject-matter school, not a boys' and girls' school. This was accentuated in building design, where often the art department was on the third floor north, the English department on the second near the library, the science department on

the third in the southwest corner, isolated to let fumes out.

"Today we are trying to transform the subject-matter curriculum into a coordinated whole more meaningful to the student, to eliminate useless content and take on new that may have bearing on life's activities. We hope to do this in North Hagerstown by bringing together many of the teachers and breaking up the traditional departmental lines. The curriculum workroom in each of the little schools is a place for coordination of effort among teachers, a place where each can see the others' problems and perhaps plan to share those things which are mutually valuable.

"*Focus on the Individual:* Secondary education in the United States is a unique social phenomenon. This is the only country in the world where education is offered to all teen-



To obtain the advantages of both the large school's extensive program and the small school's intimacy, North Hagerstown High is to be composed of four little schools, each complete with its own faculty and student body, each with a series of rooms around a general education laboratory (sketch at right). The general education laboratories will serve two little schools each; folding partitions will make it possible to expand or contract the area used by each school; here the pupils may eat (food carts from the central kitchen will fit into the serving counter)

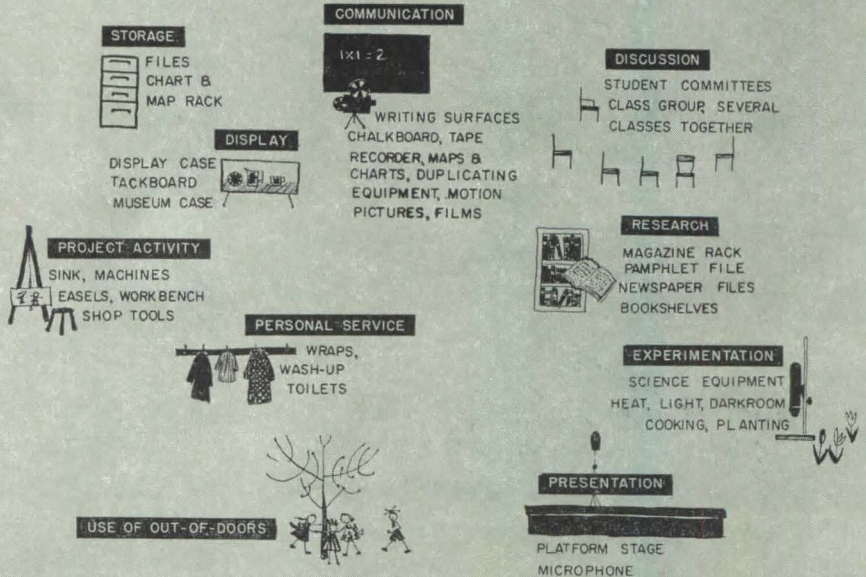
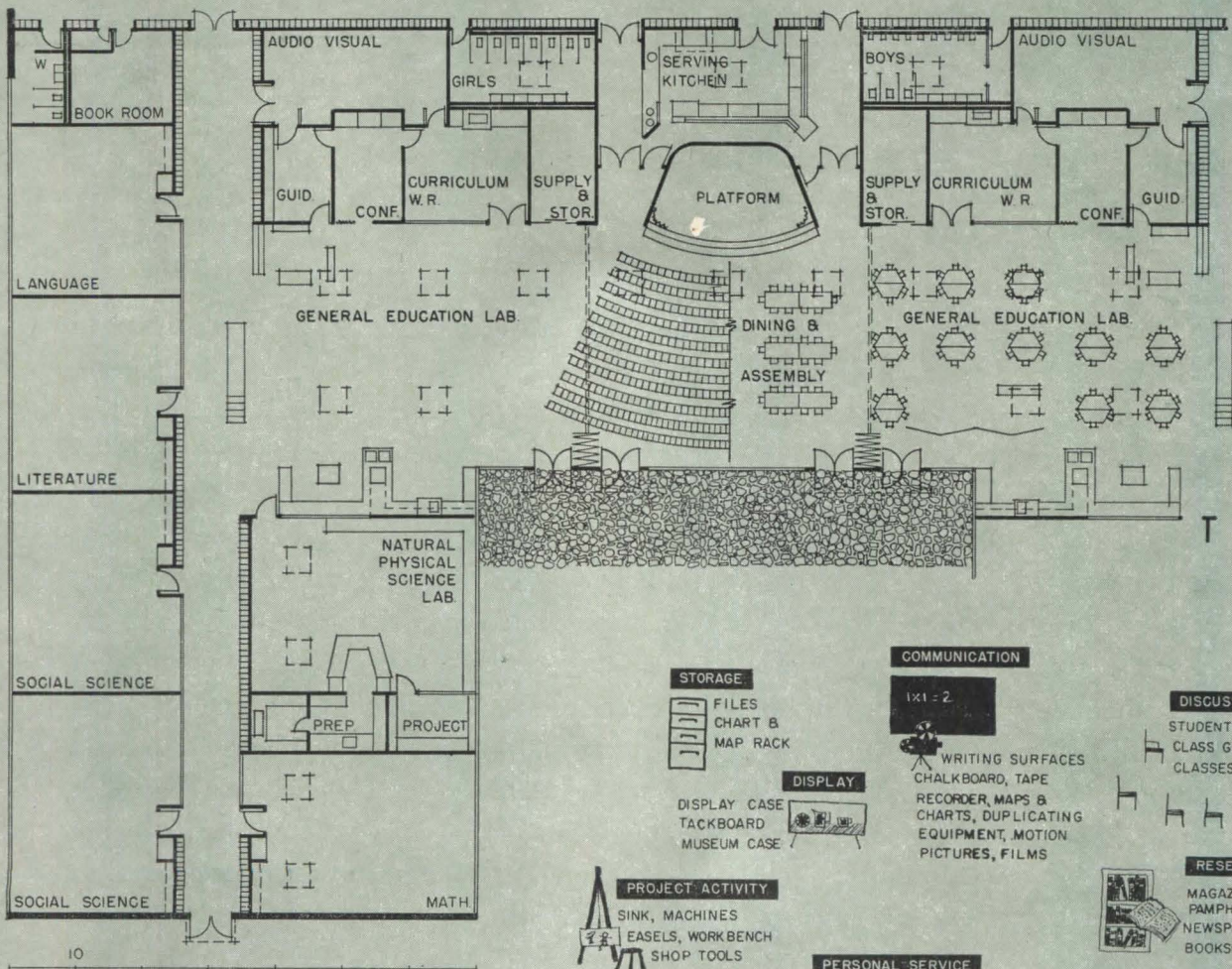
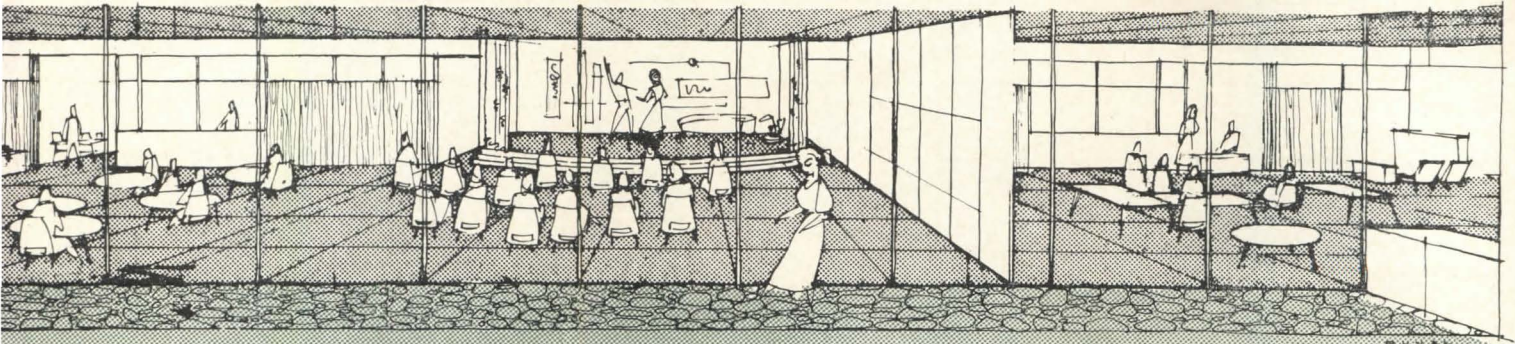


Diagram at right shows activities to be pursued within the General Education Laboratory



agers. The growth of enrollment in United States high schools goes like this:

1900 — 520,000;

1930 — 4,400,000;

1955 — 6,600,000;

and is estimated for 1970 — 9,350,000.

In order to take care of all these young people we have had to devise unheard-of techniques for mass education. Up to this point, education, by and large, depended on a relationship of scholar to disciple or teacher to student. Nobody has really had any background for dealing with a situation composed of 1000 students, a few teachers, and 274 subjects. Consequently we have had to improvise techniques, some of which are:

1. Standard class size.
2. Six, seven or eight periods per day.
3. Standard length of day.
4. Standard number of days in a year.
5. Standard curriculum content and to a great extent standard method.

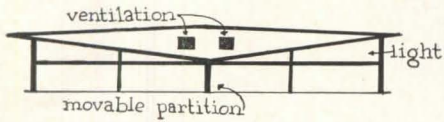
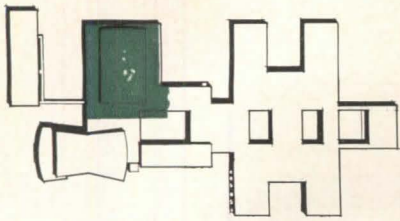
Match these against the psychological needs in the learning situation, which may be in part:

1. Each individual varies in speed of learning and in interest in those things to be learned; therefore the program must be tailored to the individual rather than to the group.
2. We need to extend content for the gifted and to slow the pace for the slow-to-learn.

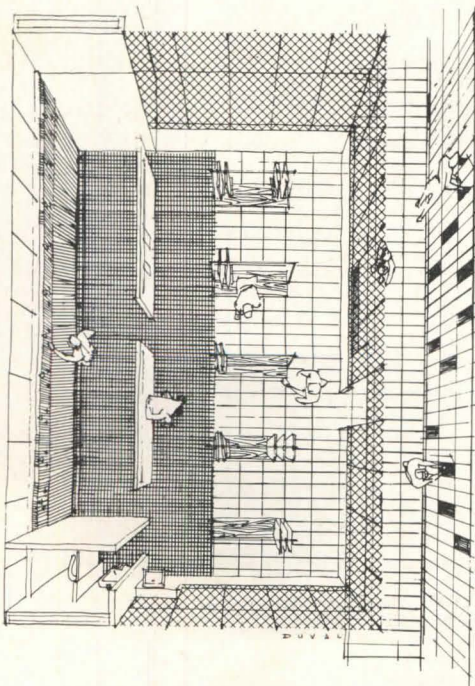
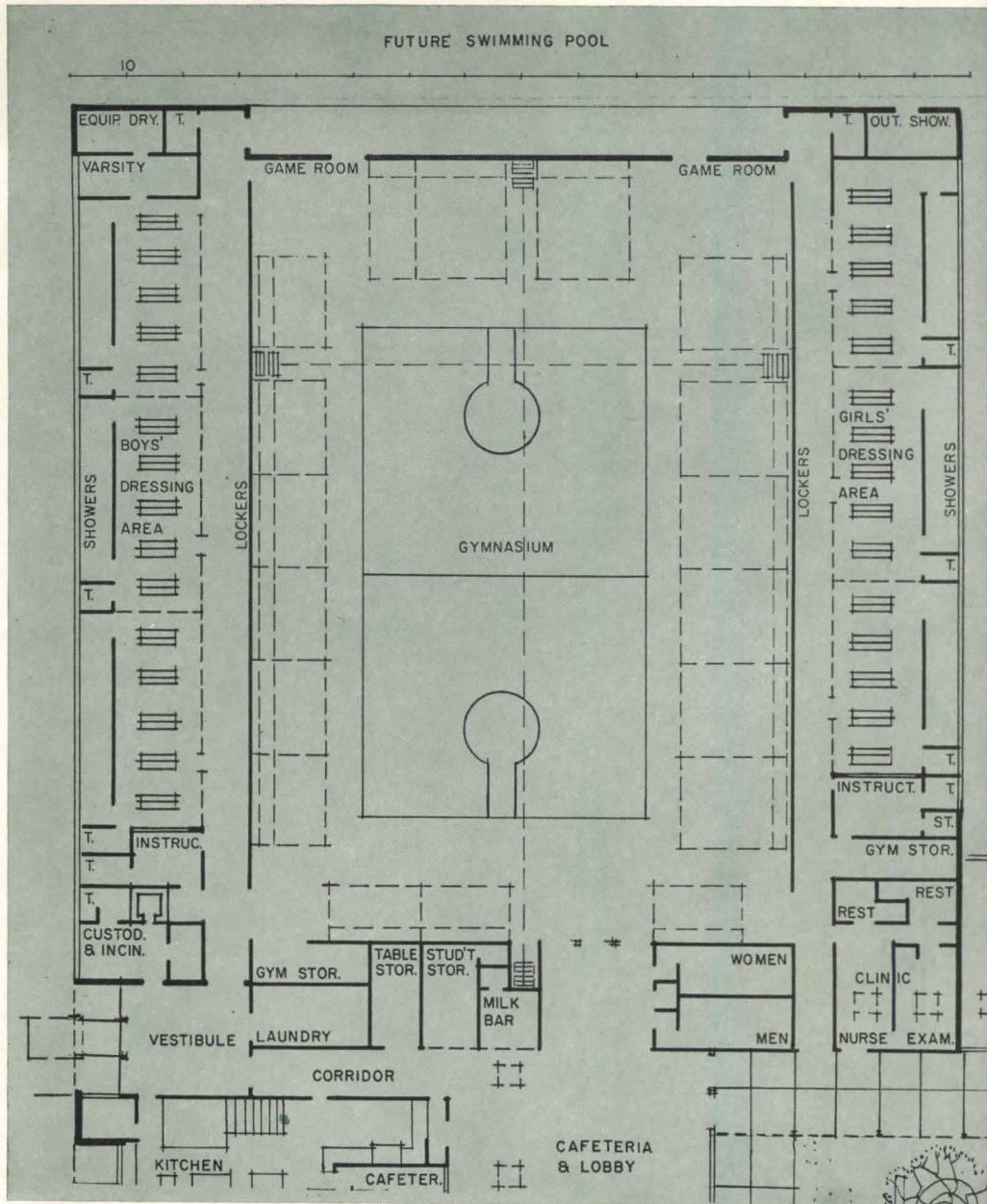
3. We know that interest and motivation are vital to learning; yet in high schools we do little to create interest before we hand the student a textbook.
4. Teachers need time to pay individual attention to pupils.
5. There is need for adjustment and readjustment of programs throughout the school year to fit the needs of those who are learning.

“Perhaps television can help by providing diversification of opportunities and by releasing teachers’ time for more individual attention where needed. The General Education Laboratory is planned to have at least one teacher in charge at all times. It is not a traditional study hall; it will afford opportunity for developing individual interest, experimentation and activities in many fields.

“*Enriched Content:* The holding power of our high schools is still not too good. In 1949, we graduated 481 out of every 1000 boys and girls who had been in fifth grade seven years before — a terrific loss. This was costly too, considered as loss of potential manpower in our economy. We also know that subject-matter content has often been mired in details of considerable unimportance. We are slow to discard unimportant content. For example, the first chapter in the physics book may be on



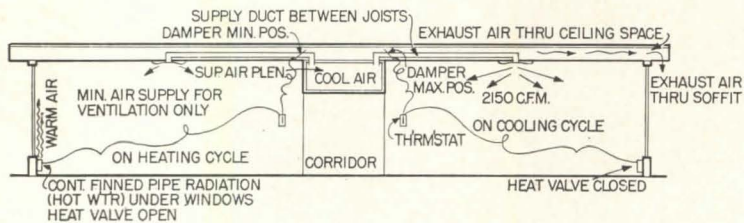
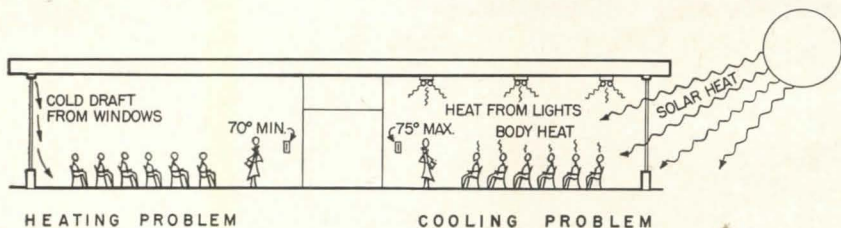
*Innovations in physical education unit: diamond-shaped roof trusses with folding partition suspended from low point to reduce its height; inclusion of health suite here, not in administration; wire enclosed dressing rooms, showers behind dwarf walls, lockers along corridor wall—all to ease supervision and multiply use*



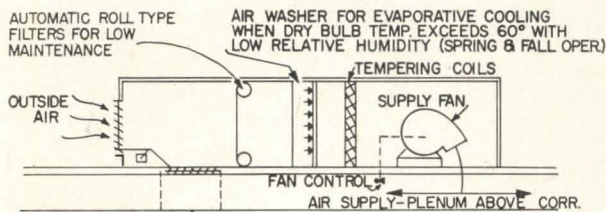
Newtonian mechanics although we live in a day of nuclear energy. We still use the Mercator projection in an age of space satellites. We hope that by coordinating teachers' efforts and by planning in these little schools, it will be possible to determine for each area of subject matter a rightful content and place in the educational program for each child.

*"Applying Our Growing Knowledge of Basic Techniques of Learning:* We must create interest and excitement for the majority in any learning situation. Relatively few students



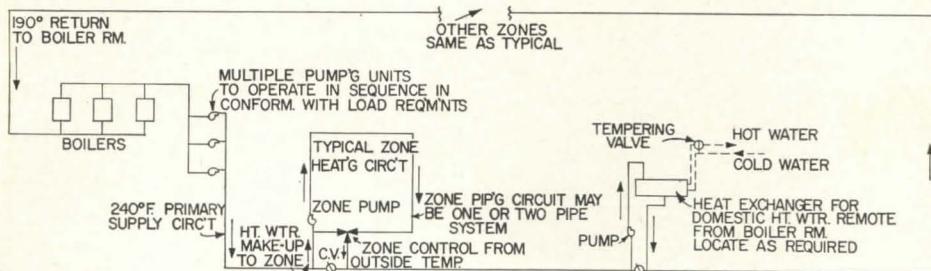


THE SOLUTION



TYPICAL AIR SUPPLY UNIT

Mechanical systems are of advanced design: boiler room supplies high-temperature, high-pressure water in a continuous circuit to entire plant through a small-diameter main; this is tapped whenever necessary to heat exchangers serving local circuits for room heating, domestic hot water, etc., and the high-temperature water is returned to the main. As in other aspects of the school's design, efficiency, good performance, inexpensive installation and maintenance were the objectives

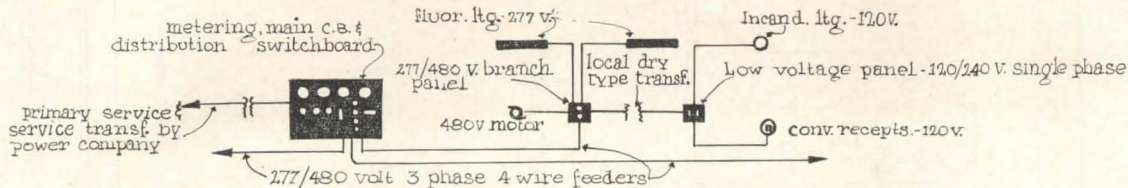


DISTRIBUTION SYSTEM - HEATING

find themselves intellectually curious without such a catalytic agent. Success is sometimes associated with belonging to a group. We hope to be able to bring this feeling of 'belonging' into the little school area as well as into the social programs which will develop in the school in areas such as the social court and the cafeteria-commons. We also want to provide for the interplay of thought and action; this is one of the basic purposes of the General Education Laboratory. We hope also that we can adjust to the varying time requirements

of boys and girls, allowing the gifted to move ahead and the slow to adopt a slower pace, by individual attention of all the teachers working together as a team in the smaller school units.

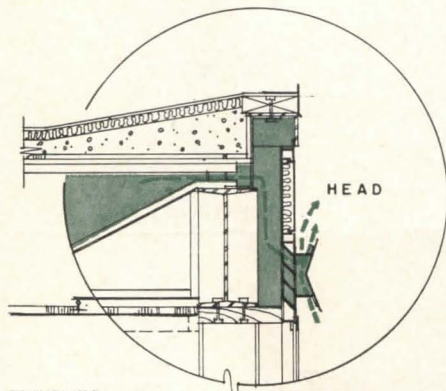
"These concepts of education underlie an educational program out of which grew the North Hagerstown plan. Of course, there is much more that could be said, and facets of these generalities have entered into our thinking and determined the organization of facilities. For example, the shops have always



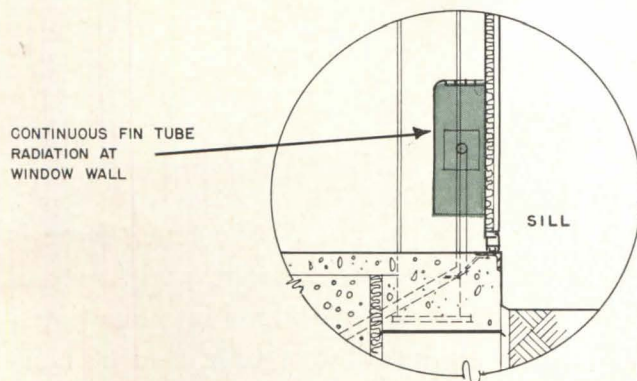
ELECTRIC POWER DISTRIBUTION AND UTILIZATION

SOUTH HAGERSTOWN HIGH SCHOOL COMPARISON OF ELECTRIC DISTRIBUTION COSTS											
UNIT	LENGTH OF FEEDER STANDARD UNIT	ACTUAL 480V FEEDERS				ALTERNATE 120/208V FEEDERS				480:120/208V TRANSF. BANKS	
		Wire Size	Sets Of 3	Cost	Voltage Drop	Wire Size	Sets Of 4	Cost	Voltage Drop	KVA	Cost
A1B	20'	1/0	1	\$19.00	-	350MCM	1	\$79.00	-	112%	\$2,055.00
C	240'	1/0	1	229.-	1.4%	500MCM	2	2,530.-	1.1%	112%	2,055.-
D	170'	350MCM	1	505.-	.7%	500MCM	4	3,580.-	1.1%	225	3,324.-
DD	390'	500MCM	1	1,540.-	1.3%	500MCM	7	14,400.-	1.0%	300	4,500.-
E	420'	500MCM	1	1,659.-	1.3%	500MCM	5	10,500.-	0.9%	225	3,324.-
F&G	620'	500MCM	1	2,485.-	1.3%	500MCM	5	16,600.-	0.9%	150	2,475.-
H	380'	1/0	1	362.-	1.4%	500MCM	2	4,030.-	0.9%	75	1,608.-
Cost Totals		\$6,799.00				\$51,719.00				\$19,341.00	
		Cost Of Wire, 120/208V System				\$51,719.00					
		Cost Of Wire & Transfs. 480V System				26,140.00					
		INDICATED SAVINGS *				\$25,579.00					
* COSTS SHOWN ARE LIST PRICES (NO DISCOUNT APPLIED) FROM G.E. CATALOG AS OF SUMMER, 1955. NO ALLOWANCE FOR LABOR, OVERHEAD, ETC. HAS BEEN MADE. THESE FIGURES REPRESENT COST OF INDICATED MATERIAL ONLY.											

Expected savings, comparable electrical system at South Hagerstown High; see text



DETAIL - EXHAUST AIR TRAVELING FROM CLASSROOMS THROUGH CEILING SPACE TO OUTSIDE



DETAIL - PORCELAIN PANEL WALL CONSTRUCTION

been thought of as being a unit separate from the rest of the school; here we have brought mechanical drawing and electronics and other shops into the academic heart.

"Where do we go from here? All we can say is that the possibilities in secondary education are inspiring and exciting. The need for creative thinking is great."

ELECTRICAL DESIGN

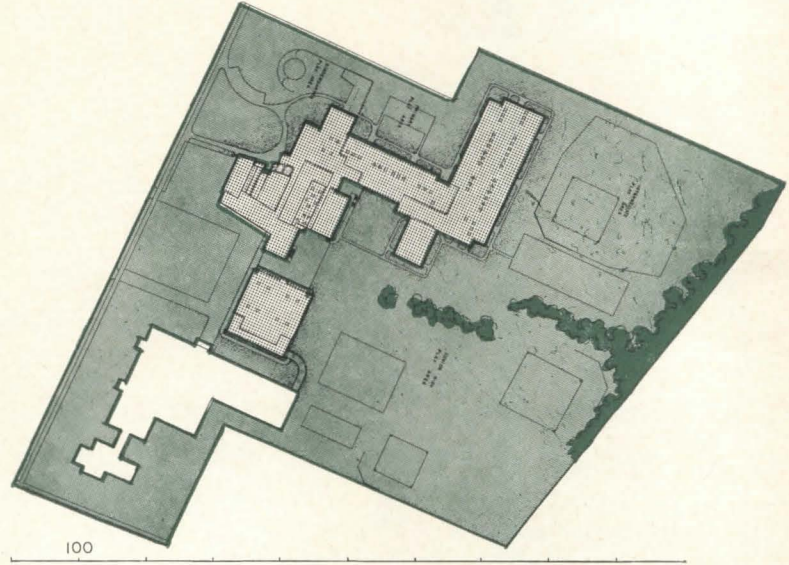
The electrical system is to be one of the comparatively few high-voltage installations in schools. After much study, and upon obtaining the local power company's agreement to supply high-voltage current, a 480/277-volt, 3-phase, 4-wire system was decided upon. Heavy feeders will supply high voltage to panelboards serving fluorescent lighting and motors of 3/4 hp and larger. To small motors, convenience receptacles, etc., small, dry-type transformers will supply 120 volts. The high distribution voltage and proportional reduction of current permit substantial economies.

Bids have not been let on North Hagerstown High as this is written. However, a similar system is installed at South Hagerstown High, now under construction, with reduced installation costs of a magnitude indicated in the accompanying table. It should be noted that sizes and quantities shown in the table are accurate; that prices are list, subject to discount; that only the cost of wire is shown, ignoring a further slight reduction in cost of raceways; that labor has not been included though here, too, some additional saving can be expected; and that some small liberties have been taken with voltage drop in order to maintain a single feeder size.



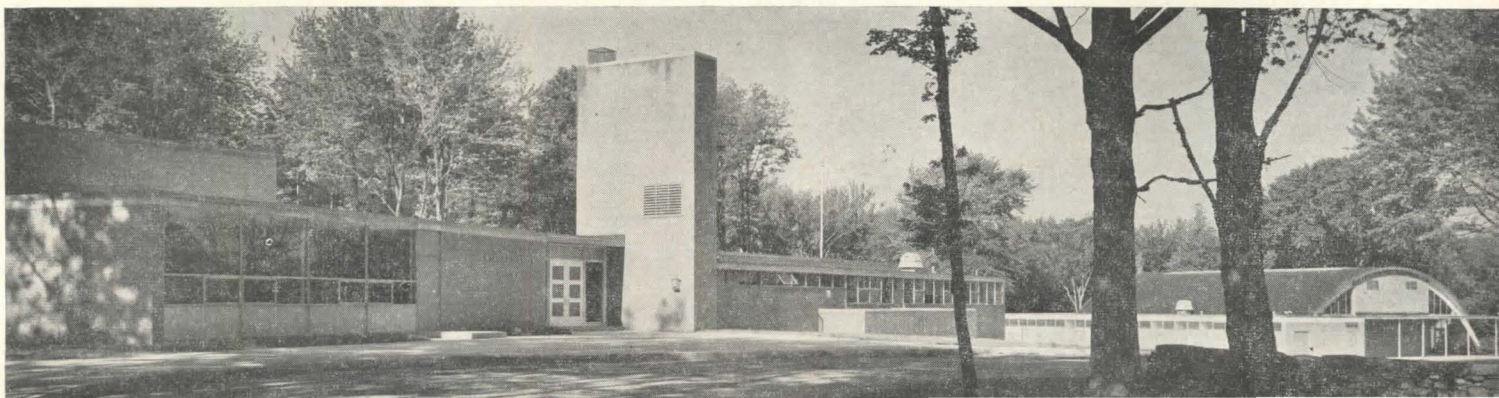
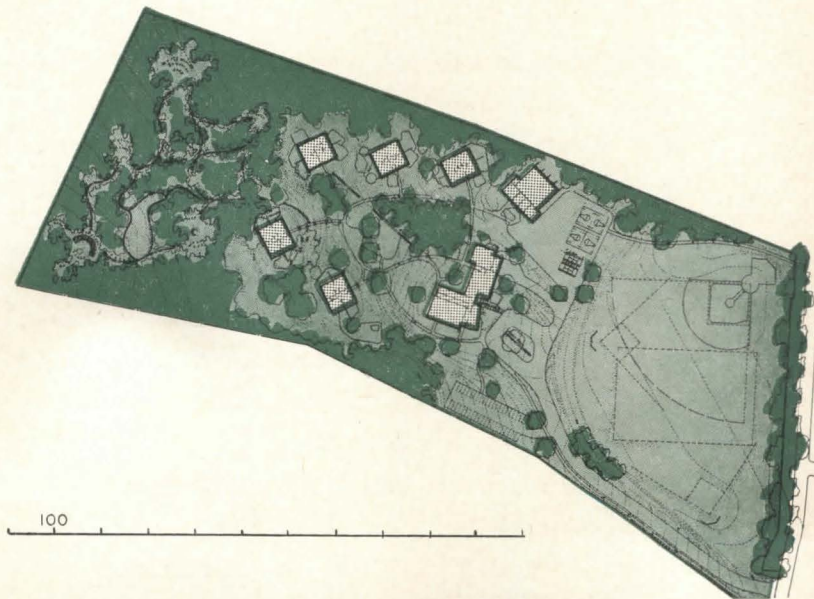
Joseph W. Malitor

**RESTRICTED URBAN SITE:** Whiting Lane Elementary School, West Hartford, Conn. On this limited site there already existed a junior high school. Besides the 530-pupil elementary school, the junior high needed a gymnasium. The elementary building therefore had to be quite compact. The architects (*Moore & Salsbury*) and the superintendent (*Edmund Thorne*) wanted a school both humanly pleasing and more than adequate educationally. Besides a functional, pleasing building, a mural and sculpture were integral necessities.



## Techniques Differ for Adjacent, Unlike Situations

**PARKLIKE URBAN SITE:** Wilbert Snow Elementary School, Middletown, Conn. This prize-winning 600-pupil school, only about 16 miles from West Hartford, has quite a different situation. There are 25 acres of wooded, sloping land. The architect (*Warren H. Ashley*), superintendent (*Creighton F. Magoun*) and land planners (*Charles Currier & Assoc.*) agreed after considerable study on a series of 4-room cottages, to make best use of the site and to keep costs low so gym, cafeteria, auditorium and library facilities could be built.

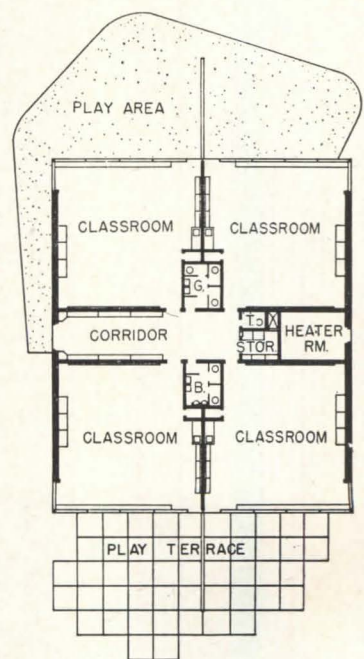


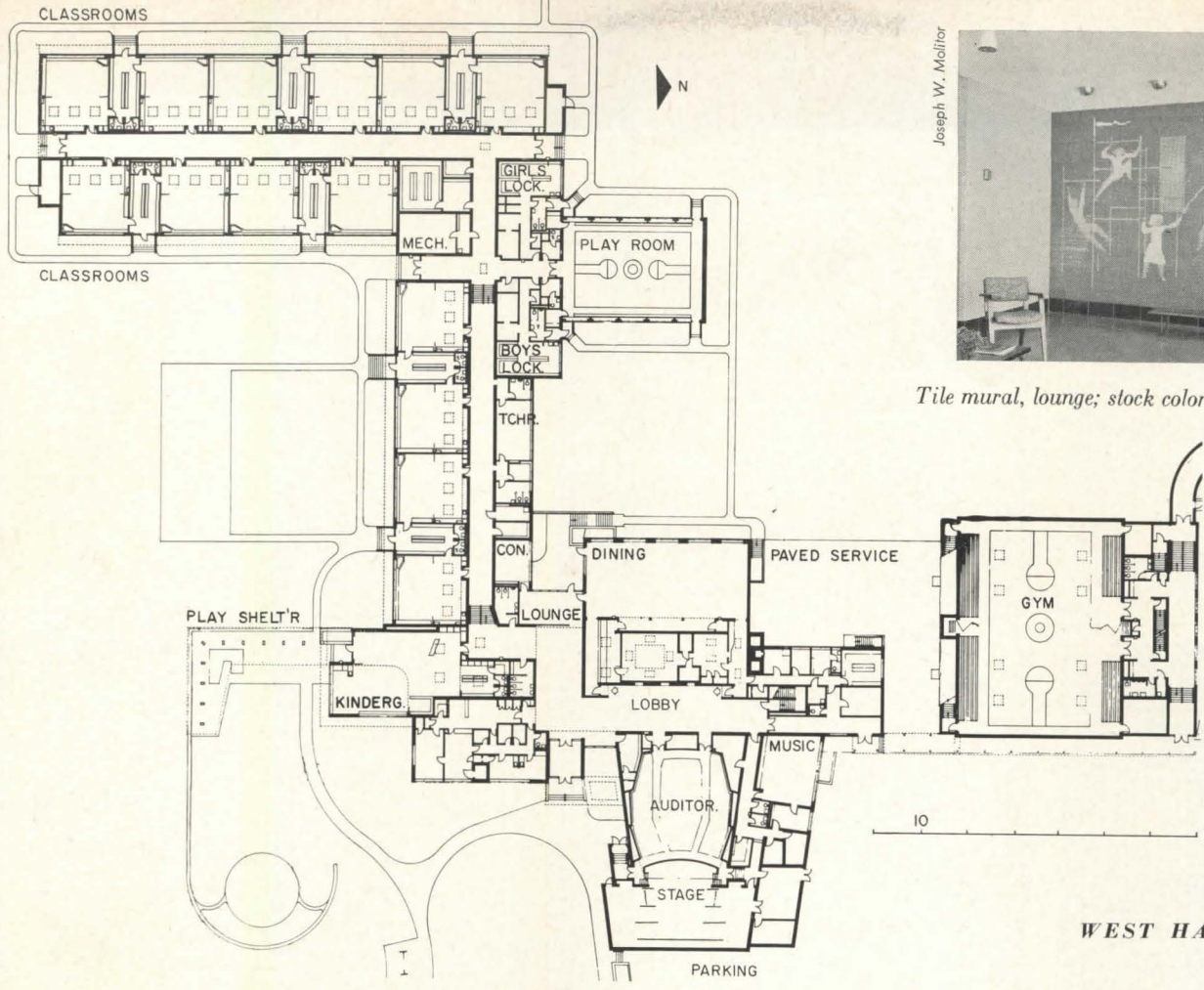


DIFFERING TECHNIQUES

Considerable research preceded design of both the schools here contrasted. In the case of the West Hartford building, trips to investigate lighting techniques and building materials led to decisions to install incandescent fixtures providing 20 footcandles at desk height, because ample daylighting was expected to minimize the importance of artificial light (this was justified by results); and to employ porcelain enamel extensively because of its light weight, easy maintenance and the opportunity it offered to introduce good color, and also because a manufacturer was willing to help develop many new applications. Lift-slab construction was employed for the Middletown cottages to reduce insurance and maintenance costs, to provide high quality construction at low cost, to save time and to permit fluorescent light troffers to be cast into the ceiling slab. *Marchant & Mingos* were engineers for both schools.

MIDDLETOWN, CONN.





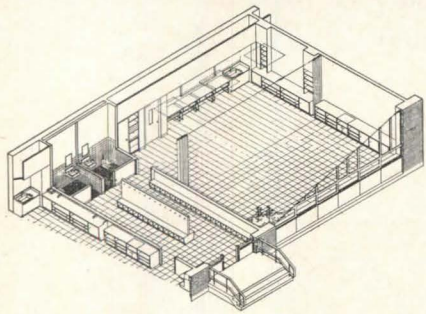
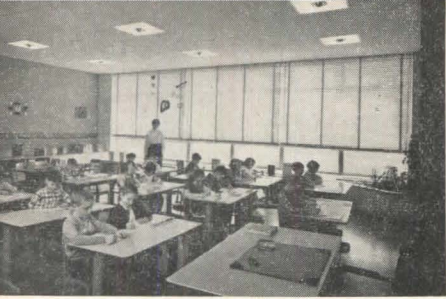
Joseph W. Mallory



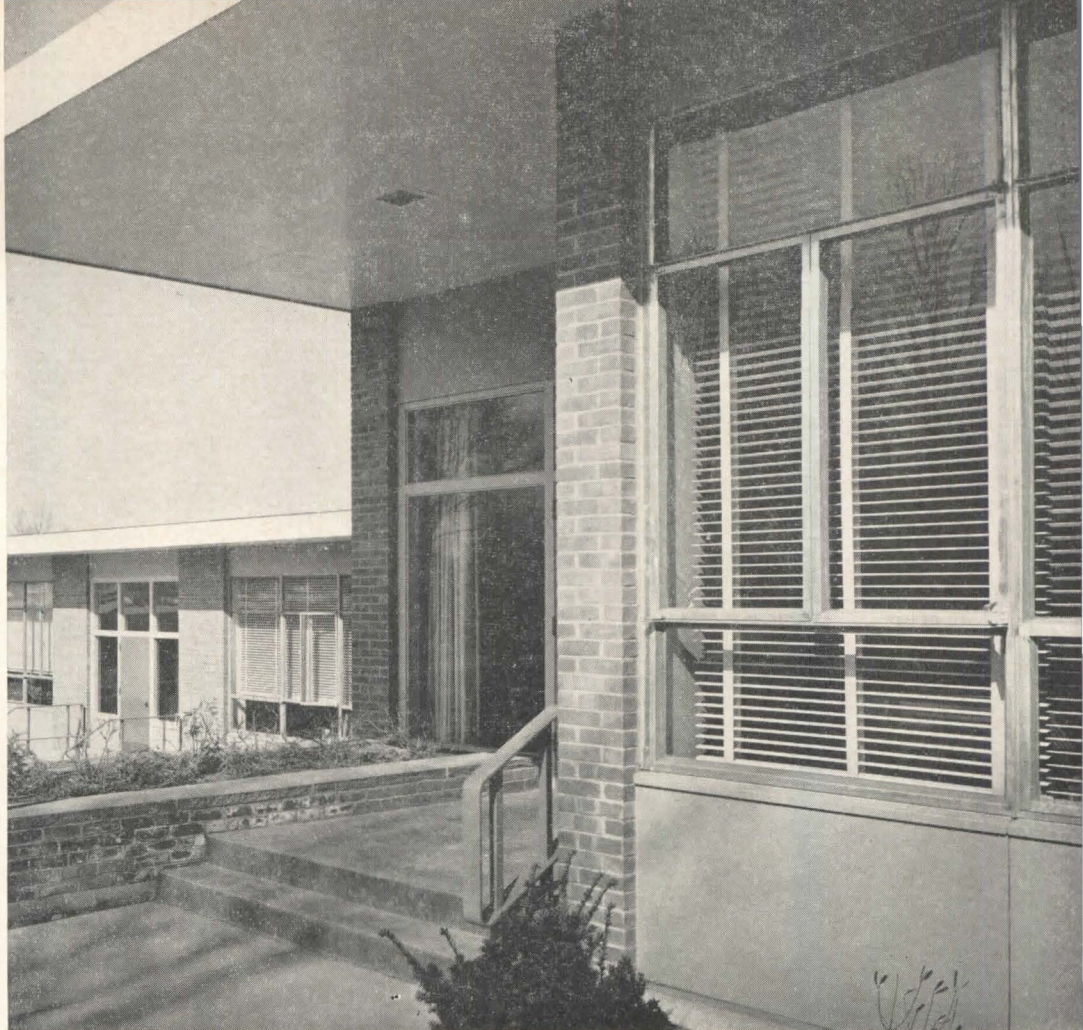
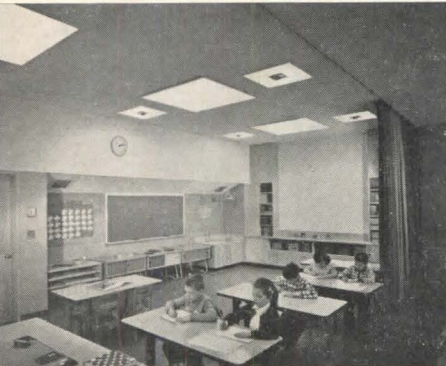
*Tile mural, lounge; stock colors except for special red*

**WEST HARTFORD, CONN.**





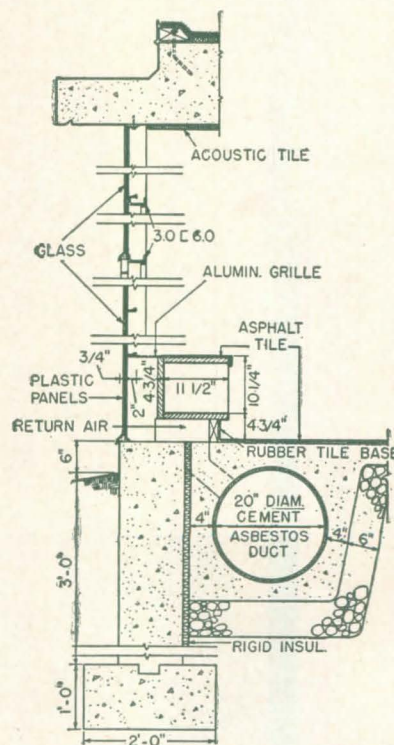
Joseph W. Molitor



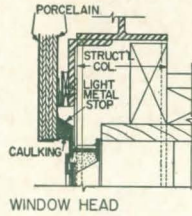
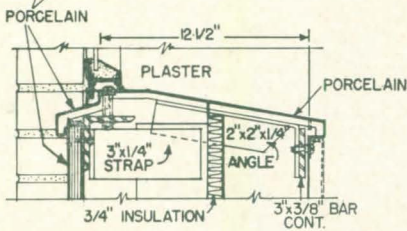
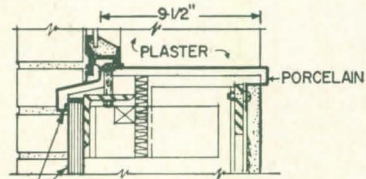
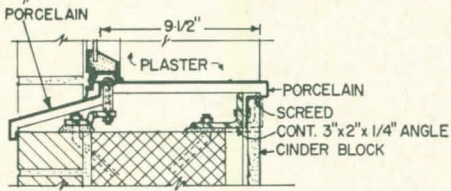
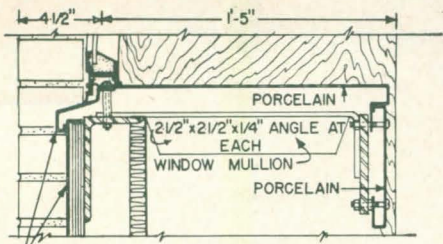
DIFFERING TECHNIQUES

MIDDLETOWN, CONN.

The 4-classroom units at Middletown solve several problems simultaneously. The district has a rural heritage. Although its one-room schools have disappeared, the 4-room school has not; in fact, this plant replaces a 3-room building. Further, "the high morale of teachers and pupils in smaller buildings has made us doubt the virtues of bigness," says the superintendent. The outdoors is being used educationally to study wildlife and by moving entire classes outdoors, in spring and fall, to the screened, paved play areas. Each classroom has a full window wall and one wall high-windowed. There are two small oil burners per cottage, each serving a tempered-air system supplying two classrooms (adding cooling would be simple). Building additional cottages would not disrupt the school.



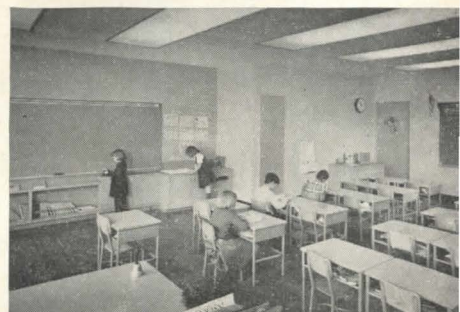
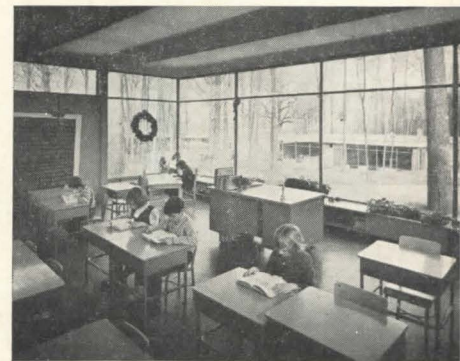
Lift-slab details



PORCELAIN STEEL SILL & STOOL DETAILS

The architects say: "We decided that young children are far more sensitive to line, color and form than is usually believed . . . (that) architectural environment is satisfactory only when spaces are sized and arranged to fulfill their use comfortably (and pleasingly) . . . we made no attempt to force the scale down to so-called child size nor did we attempt any cute detailing." Each classroom can be divided to form a work alcove or stage, or to set apart an area for audio-visual uses. Classroom equipment includes specially designed movable storage tables, plant-growing boxes, etc. Details at left show a few exterior uses of porcelain enamel; it is also employed for fascias, sculpture and playroom roofing; and, on the interior, both perforated for acoustical purposes and plain.

WEST HARTFORD, CONN.





DIFFERING TECHNIQUES

MIDDLETOWN, CONN.

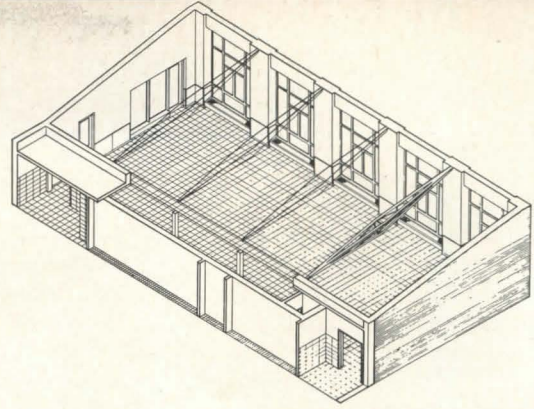


Low cost of Middletown's cottage school made possible the much-wanted separate gymnasium, library, auditorium and cafeteria, all now fully used by adults. Library and park boards cooperated; a branch library was opened before the school was occupied; park authorities helped provide extensive playing fields. Gym has lockers and showers for adult use. Auditorium (325 seats, large stage) is much used as a "Little Theater."



Joseph W. Mallory





Care was lavished on both the esthetic and the technical aspects of design of the West Hartford school. The kindergarten (opposite page) was planned for both group and individual activities. The dining room (boat-shaped trusses and sloping ceiling, sketch above), auditorium, music and practice rooms are all shaped to provide optimum acoustical conditions. Heating is vacuum steam with fin radiation. The framing is light steel with bearing walls at corridors; floor slabs are concrete.

*WEST HARTFORD, CONN.*



## SCHOOL DESIGN: PROGRESS TOWARD PERFECTION

Another American characteristic, our satisfaction with nothing short of perfection, is quite evident in our contemporary school buildings. Its attainment is indeed a never-ending progress, to recall the quotation from Hazlitt with which this brief study began; there is always a better way to do things, a better building to design; and our satisfaction (that is, our delight) lies at least as much in the continual effort to improve on past performance as in the performance itself. It is important that this continue to be so for many reasons, of which one is the state of flux of American educational theory.

The hazards are many. The urge to experiment may lead to mistaken concepts. There is a pressure, to provide space, space and more space for teaching, to do this at the lowest possible cost, to satisfy the idiosyncrasies to which we have referred; and the experimenter under pressure may compound his errors. To cut costs we lower ceilings, saving the cost of unused cubage and perimeter walls and relying upon artificial rather than natural lighting — and incidentally compounding the technicalities of the lighting problem.

But we tackle such difficulties with enthusiasm. For instance, North Hagerstown High School, whose design is so largely dictated by educational demands, had to have low ceilings if the mere area the educators needed was not to be excessively expensive. At the same time, low-brightness lighting was required for physical comfort; a 30-foot-candle minimum illumination was desired so that little additional lighting would be needed for originating TV programs in any teaching area; and conventional fixtures designed as pendants had been found not to work well with low ceilings. Pendant fixtures depend upon an upward distribution of light and use of the ceiling as an indirect source for effective reduction of glare and contrast. When such a fixture is mounted close to the ceiling the entrapped light immediately above the unit tends to increase contrast, not to reduce it.

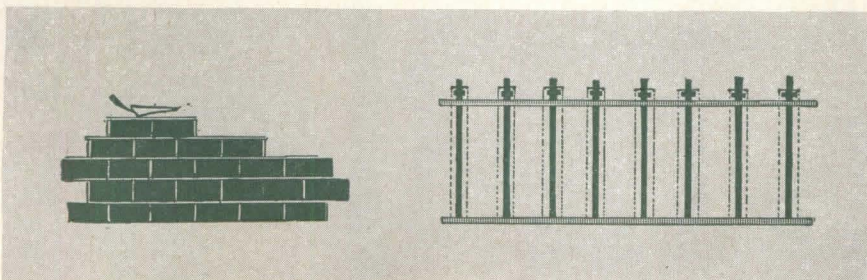
At North Hagerstown the problem is

approached by decreasing the brightness of the fixture, and by using direct lighting units, utilizing the reflection from light-colored floor and furniture finishes to illumine the ceiling satisfactorily. The direct, downward illumination is relied upon to light the pupils' tasks in the most efficient manner.

The fixtures chosen are 2-tube, rapid-start fluorescents with each tube mounted in its own parabolic alzak aluminum reflector. These afford 45-degree shielding crosswise and present the lowest possible brightness to the viewer. In order to save the extra cost of recessing the fixtures it is planned to mount them in a plain, white-enamelled steel box,  $5\frac{1}{2}$  or 6 inches deep, set on the ceiling surface. The standard troffer described is already offered by some companies in this type of housing.

There are many more such technical innovations in prospect in these and many other schools, all devised as the best current practice to meet the needs of individual situations. All have their merits; and without them what progress would we be making?

Nor is the experimentation generally costly; usually it is motivated in part by the absolute necessity of staying within a budget that is never large enough. The Wilbert Snow School in Middletown, Conn., cost \$1,396.83 per pupil, \$67.26 less than the average in its state for a period ending two years before the Snow School was occupied. Its total cost, including site, equipment and fees as well as construction costs, was \$838,100; its classrooms are larger than the state's minimum requirements. The North Hagerstown High School is not sufficiently far along to predict costs — bids have not been taken — but it looks as if it will cost about \$1700 per pupil, which is less than the Maryland average, roughly \$2000, estimated for contemplated construction in the future (source: *Report of the Long-Range Planning Phase, School Facilities Survey*, U. S. Office of Education.) The Liberty, Texas school is also inexpensive. In every case the low cost is the result of savings inherent in design, not of shoddy materials or cheap finishes.





# RESIDENTIAL COURTS

*Shreveport, La., William B. Wiener, Architect; Frank Lotz Miller photo*



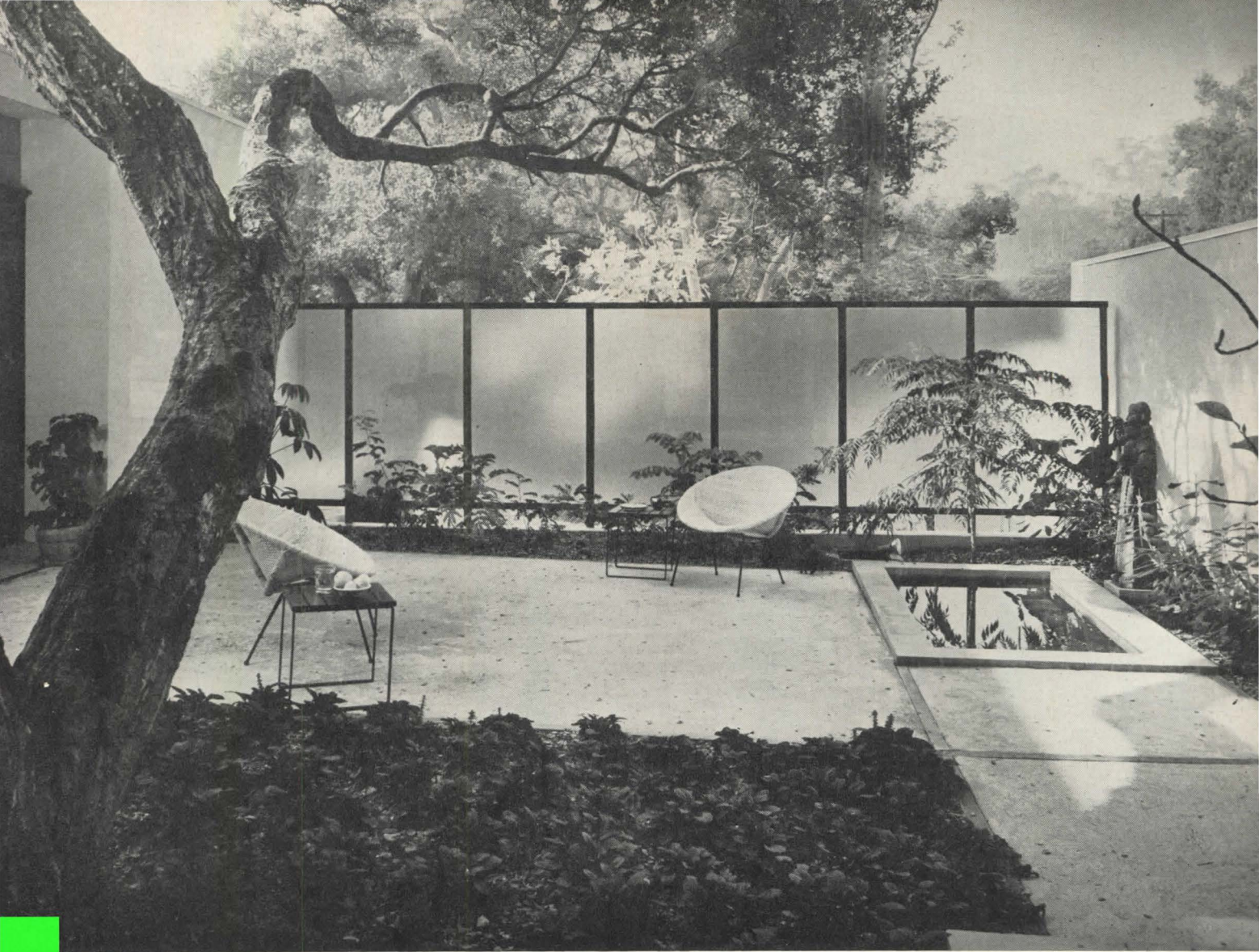
*New Orleans, La.*

*Curtis & Davis, Architects & Engineers*

*Ulric Meisel photos*

## RESIDENTIAL COURTS



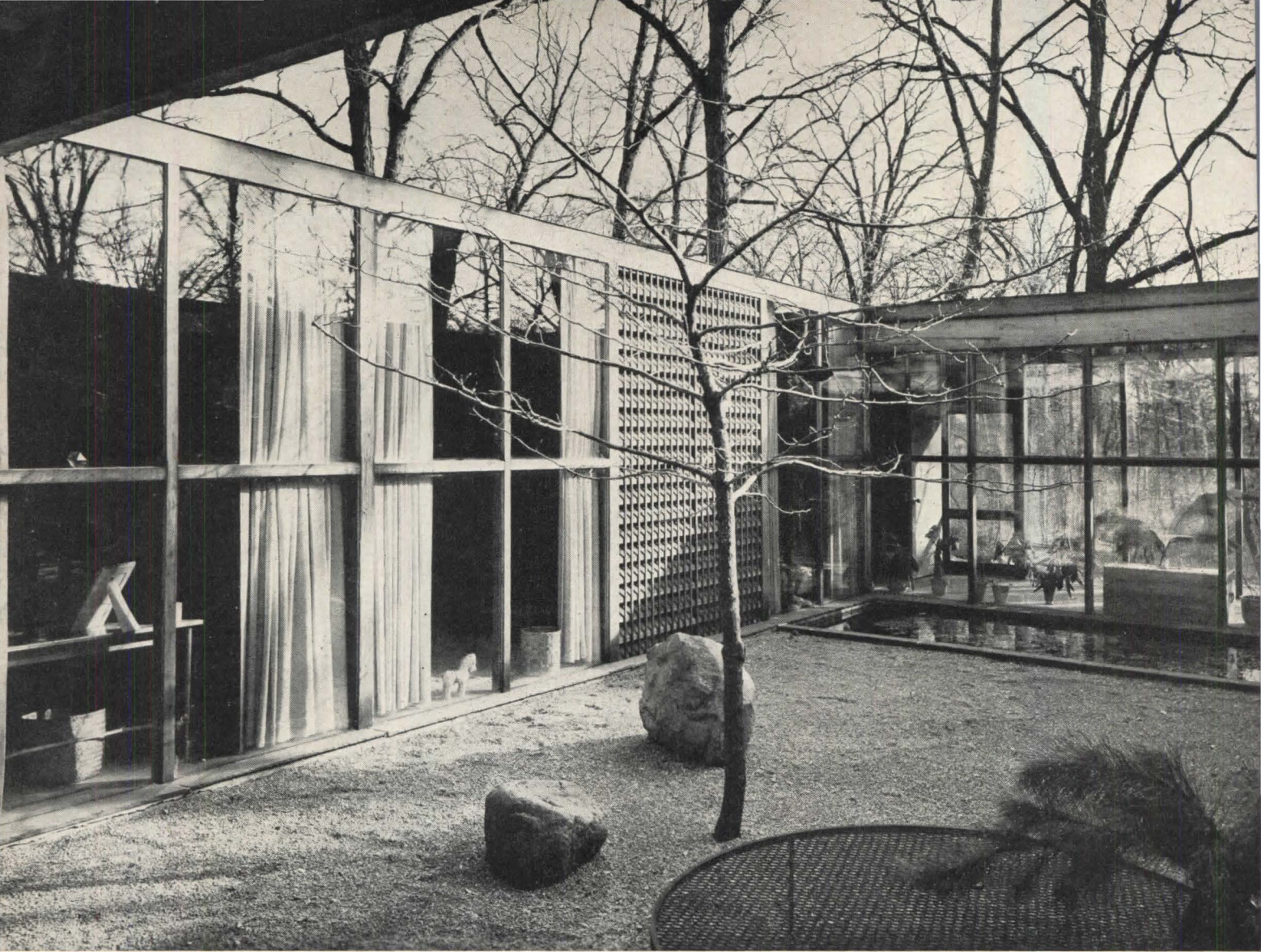


*Pacific Palisades, Calif.*

*A. Quincy Jones & Frederick E. Emmons, Architects*

*Julius Shulman photos*



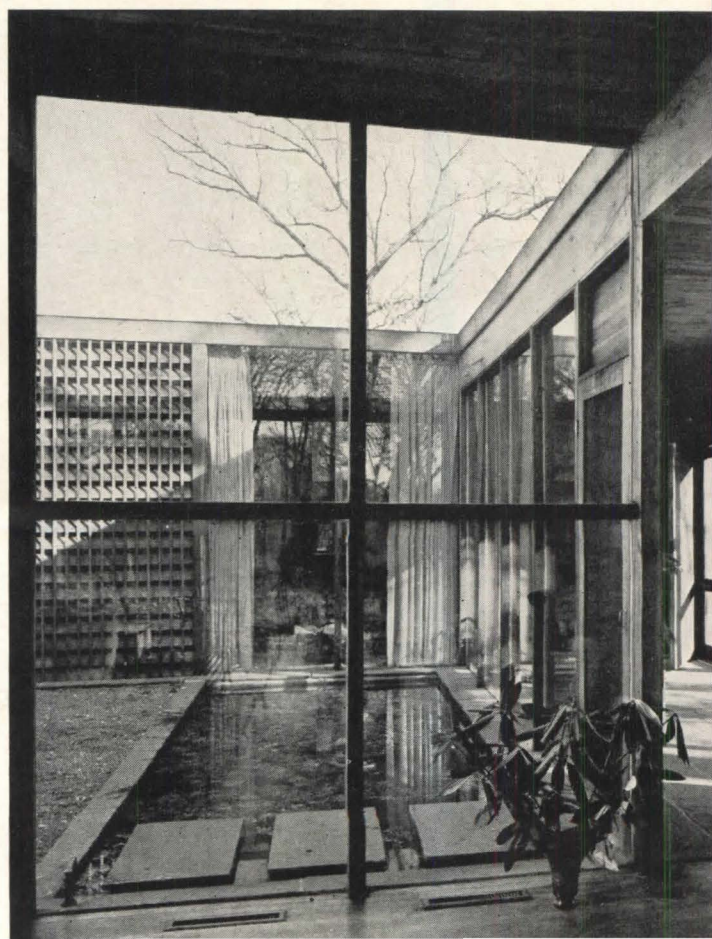


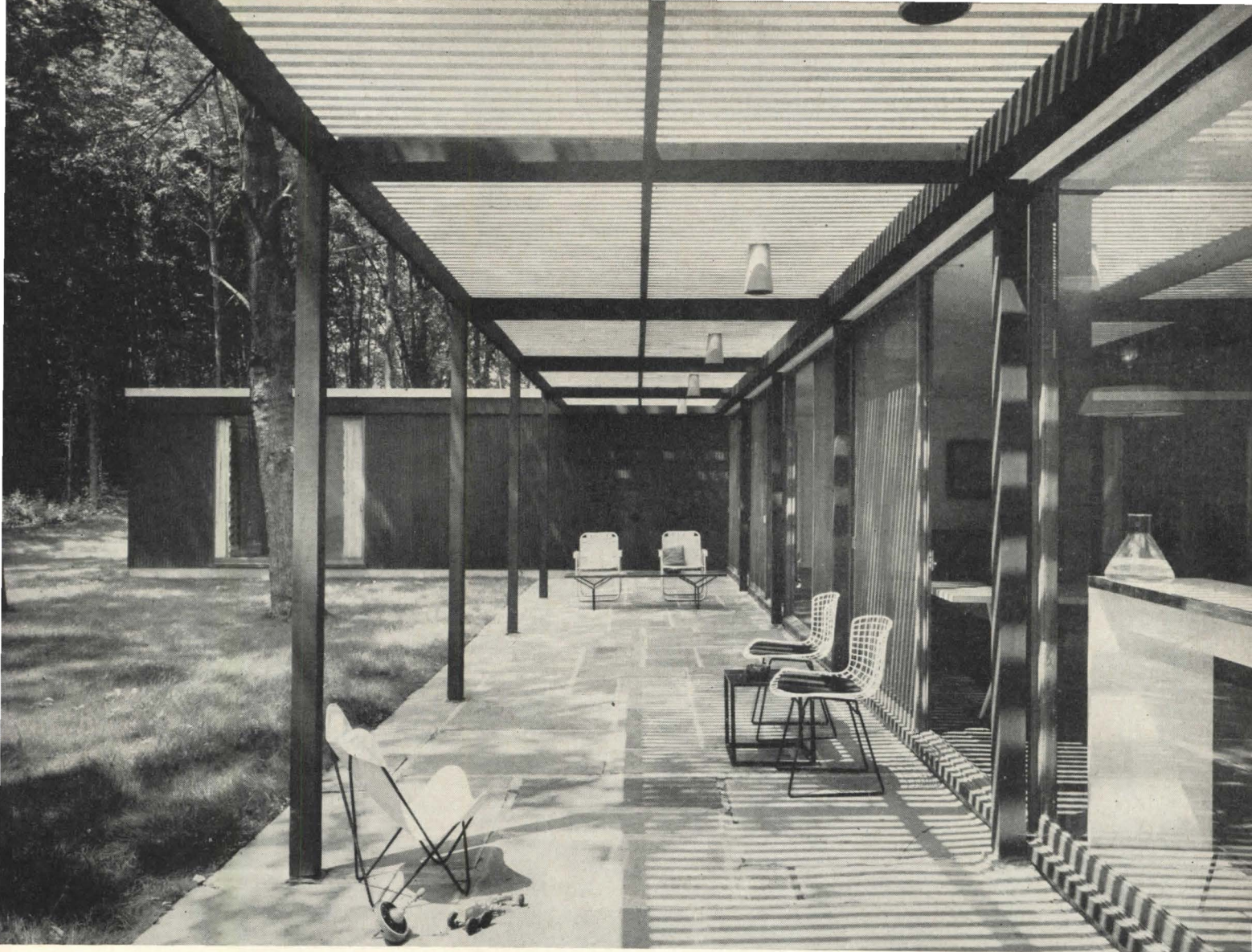
*Flossmoor, Ill.*

*Schweikher and Elting, Architects*

*Hedrich-Blessing photos*

## RESIDENTIAL COURTS

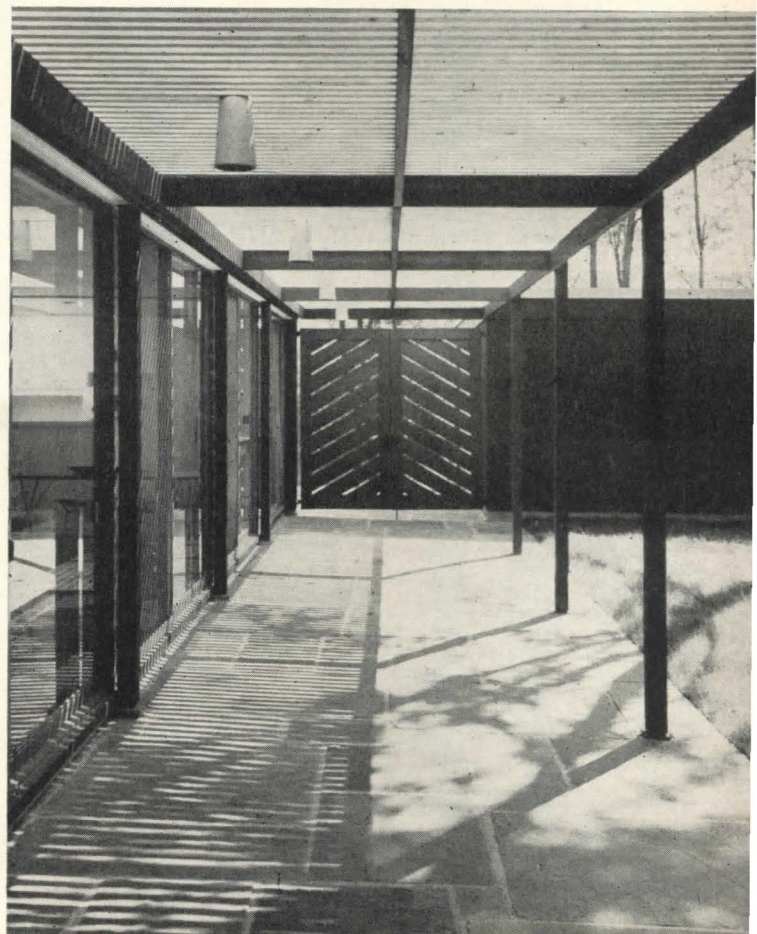




*New Canaan, Conn.*

*Philip Johnson, Architect*

*© Ezra Stoller photos*



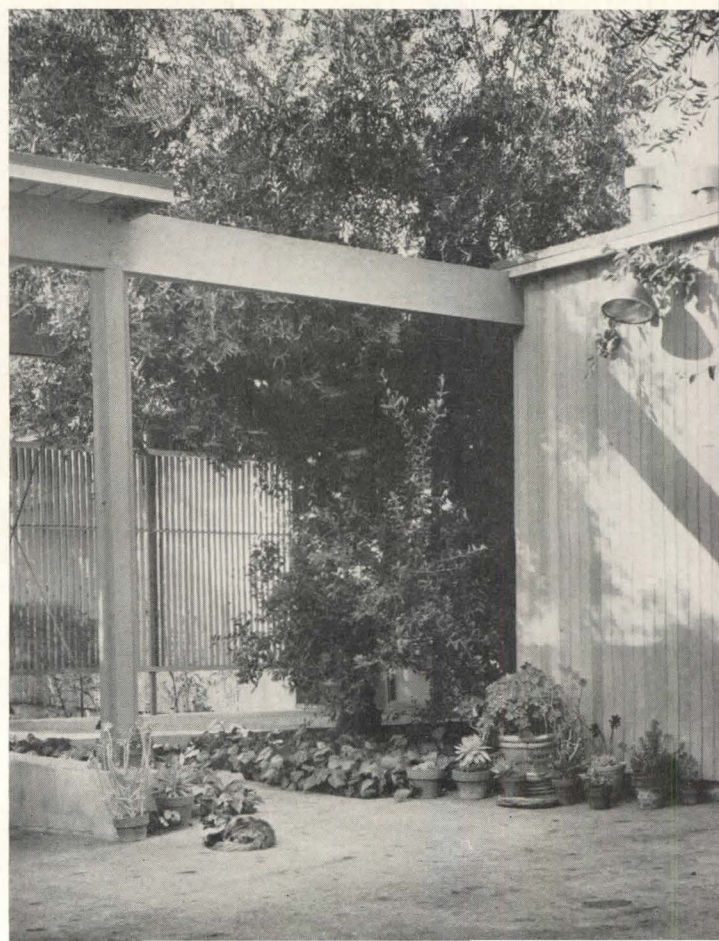


*Altadena, Calif.*

*Calvin C. Straub, Designer*

*Hank Hoag photos*

## RESIDENTIAL COURTS



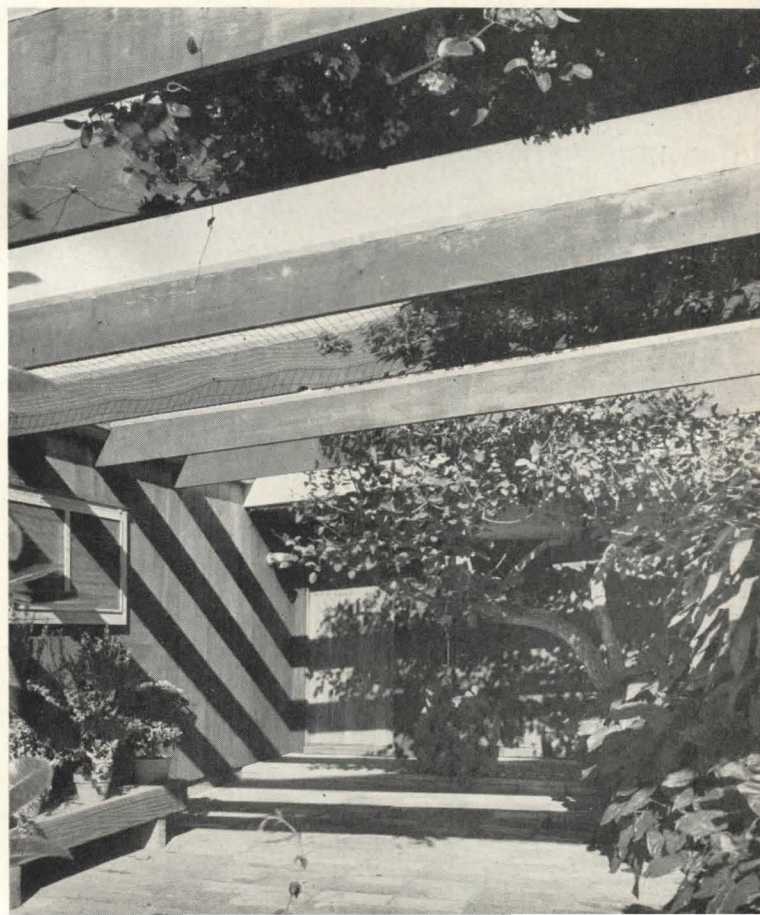




*Honolulu, Hawaii*

*Vladimir Ossipoff, Architect*

*R. Wenkam photos*





*Dobbs Ferry, N. Y.*

*George Cooper Rudolph, Architect*

*Ben Schnall photos*

## RESIDENTIAL COURTS



# the place of STRUCTURE IN ARCHITECTURE

by Pier Luigi Nervi

IT IS OF THE greatest importance, at the present stage of architectural development, to try to clarify the complex relations between the esthetic aspects and the structural and constructional requirements of a building.

It is obvious that engineering and the mental make-up produced by engineering training do not suffice to create architecture. But it is just as obvious that without the techniques of engineering, any architectural conception is as nonexistent as an unwritten poem in the mind of the poet.

Engineering offers an almost unlimited source of static, constructional and functional possibilities, which, even if incapable of architectural expression, may be transformed into expressive architectural realizations when vivified by a sense of composition, harmony of proportion and care of details.

I believe it is possible to establish an analogy between architecture and music which helps clarify the relations between engineering and architecture.

It is true that the most complete musical ensemble with the best instruments and the best players cannot create a musical masterpiece, but it is also true that without the power and the sound complexity of the instruments of a modern orchestra, and without a corresponding capable performance, the most gifted musical genius will appear dumb or at least incapable of expression.

It is easy to imagine the new levels of composition reached by the composers of the past because of the invention and successive improvements of the string instruments, and what new fields could be opened today if new sound producing means were suddenly discovered.

Architecture today finds itself in the same situation in which music was when it abandoned old-fashioned and limited musical instruments for the actual orchestral ensembles.

Steel, reinforced concrete and the structural theories which allow their rational use are the new instruments at the disposal of the architect, who will be able to compose architectural symphonies with them, more complex than any built from the origins of time to date.

The many aspects of the radical changes in construction techniques which have taken place in the last one hundred years can be attributed to the following:

1. The birth and development of the theory of structures which allows one to design the greatest variety of structures with sufficient accuracy and ample safety.
2. The abundance of materials with high strength,

such as steel and concrete, due to fundamental developments in the field of materials.

3. The novelty and magnificence of the new architectural themes advanced by our industrial development and our new and fast means of transportation, and required by social progress.

4. The increasing importance of economy.

Perhaps the most important among these points is the first: a widespread knowledge of theory of structure has popularized and democratized the essence of the structural problem and freed the architect from schemes and solutions which could be achieved only by a slow evolutionary process.

It would be quite difficult to reconstruct today the long series of thoughts, observations and unsuccessful trials which guided the builders of the past, and to re-create the mental processes that brought to them so many genial intuitive solutions.

Try to compare the height of genius, the power of intuition, the unending meditations, and the courage required by Brunelleschi to conceive and to supervise the construction of the dome of S. Maria del Fiore in Florence with the ease with which we may verify the stability of much more complex structures today. The great freedom of structural invention available to us today will then be quite obvious.

Even in the recent past the discovery of a new structural system was a slow process due to the work of a few builders and of a few exceptionally gifted architects. Today, instead, any modest designer may tackle a structural problem of unprecedented nature and may solve it with relative ease and safety.

At the same time, we cannot help but notice the negative aspects of this democratization of structural knowledge, which is so valuable from a practical standpoint.

The great structures of the past, and among them the Gothic cathedral more than any other, express in their details and in their unity the superior intelligence, the almost miraculous structural sensitivity, the almost unimaginable sum of experience and of executive ability of their creators and builders.

In these masterpieces all the structural and constructional problems are joined in a perfect synthesis. In these realizations it is impossible to separate artistic inspiration from technical ideas: these matured through the intuitions and meditations of exceptional minds and reached the nobility of art.

The facility with which we can now tackle a large number of structural problems and the cold objectivity

This article is based on one of the lectures Nervi gave during his recent tour of American architectural schools.

of the methods of analysis, as compared with intuitive mental processes, have unavoidably lowered the level of our realizations.

I am afraid that humanity will not be able to repeat the technical and architectural miracle of the great Gothic cathedrals.

But forgetting the point I have just made, it is doubtful that the possibility of theoretical analysis of a variety of structural systems has enriched during the last few decades the instruments of our architectural expressions much more than the construction experience and the superior intelligence of generations of builders have done during the last few centuries. Although it may be difficult to establish the reasons for the coinci-

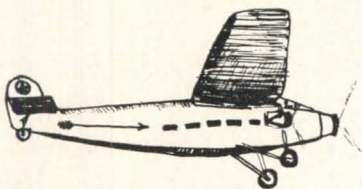


dence, it is important to notice that the birth of theory of structures, fruit of purely mathematical speculations, took place at a time when our industrial development gave us new materials well adapted to daring structural schemes, and at a time when our technical and social progress proposed new structural themes requiring that theoretical knowledge and those materials.

It is difficult to imagine what realizations would have been produced by means of the same materials in a medieval society in which the only themes of structural importance were the church and the castle.

During the last one hundred years all the factors which directly or indirectly influenced construction have been harmoniously directed towards a new architecture which has no real connection with the past.

Nothing is more absurd or sterile than to try to



maintain, artificially, structural schemes and architectural forms of a past which have nothing in common with the present or with the foreseeable future.

On the basis of these considerations, it may be well to ask ourselves what will be the direction of this new architecture.

It is easy to observe that the increasing importance of the structural aspects of the new themes (like long-span bridges, great halls, stadiums, railroads, maritime and air terminals, large factories and large office and storage buildings) require a strict adherence to what I like to call "statical truth" in order to obtain eco-

nomical and constructionally possible solutions.

It is obvious that any structure of large dimensions is strictly limited by structural requirements, both in its form and in its resisting skeleton.

The freedom to select structural forms, such as the head of a window or the arch of a cloister — the structural elements of the architecture of the past — no longer exists when we are confronted with large dimensions or exceptionally heavy loads. A bridge more than 100 ft in span has already a limited number of solutions; if the span is over 150 ft, the number of possible solutions decreases; and there may be only one or two solutions left when the span is over 300 ft. The profile of an arch-bridge of more than 300 or 400 ft span cannot differ much from the curve of the resultant pressures of the permanent load. Therefore its shape will be very near the shape of a parabola.

Every important piece of construction will therefore have a tendency to express, more and more, the structural scheme which determines it. Actually an honest expression of such a scheme will be architecturally eloquent.

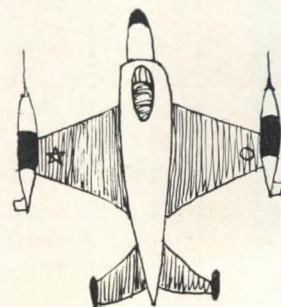
Numerous realizations in other technical fields help us in the creation of a new esthetic sentiment which necessarily is deeply felt in architecture. Airplanes, ships, automobiles and machines cannot help obeying the strictest functional truths and the rigorous laws of statics and dynamics which leave us little room for fantastic creations.

In the eighteenth century a complete freedom of form and of decorative detail allowed the builder of sailing ships and of horse-drawn carriages the creation of beautiful looking vessels and magnificent berlines. These products were in complete esthetic accord with the architecture, the interior decoration and the fashions of the time.

The shapes of our airplanes, our ships and our automobiles are rapidly approaching standard shapes of minimum resistance. In a few years they will have to adhere to theoretical aerodynamic hydrodynamic shapes, whatever the esthetic feelings of their builders.

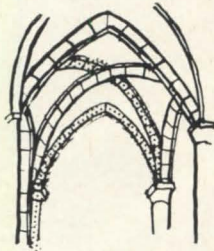
I believe that such functional results will influence in the long run even those smaller buildings which otherwise could still conserve, because of their limited dimensions, a certain amount of freedom.

It is therefore foreseeable that both because of the direct influence of the structural problems of large structures and because of the direct influence of other technical and mechanical realizations, and finally because of the ever-increasing influence of economic



factors, the entire architecture of the future will be directed towards truth; that is, towards a more truthful style.

This new direction which tomorrow's architecture must inevitably take (unless all the fundamental technical aspects of our new culture should suddenly be

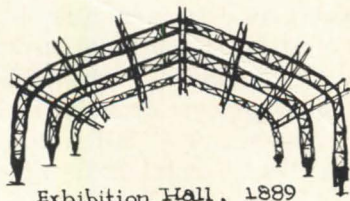


revolutionized) will not lead us necessarily to cold and standard architectural expressions. First of all, the structural forms of great works are in themselves rich and beautiful; but, moreover, we must create architectural expressions of minor importance which are at the same time functionally and economically correct, free of useless and often vulgar decorations, made interesting by harmonious relations of volumes and surfaces and enriched by color and by the refinement of details.

Then there are entire fields of architecture which always will be free from the cold and purely technical requirements of structuralism. For example, the solution of urban problems in the residential sections of our cities can still be quite free and may express in the serene joy of their green areas the need for romanticism and poetry which, I hope, will still be felt by future generations.

After so many changes due to the varying sensibilities and to the social conditions of humanity in the past, we now see the birth of this new "style of truth" which is imposed by the techniques of mechanics and of large structures and which will invade all other fields of human activity.

All over the world, new structures are being built today which more or less consciously express this style of truth. I believe that in the near future this style will flourish consciously everywhere.



Exhibition Hall, 1889

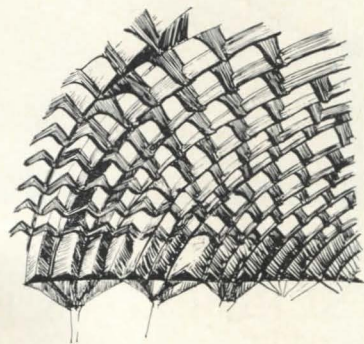
Because of this, it is most necessary to point out a danger which menaces the field of architecture during this transitional period and whose gravity is evidenced by numerous architectural realizations of the recent past. I have in mind the danger of fake structuralism; that is, of a structuralism which instead of being born of the natural materialization of structural and con-

struction requirements, originates in a presumed formal structuralism which may not correspond at all to the statical reality of the problem. In other words, I am referring to the danger of structures being generated by the exterior appearance rather than by the inner essence of the statical problem.

The change-over from the traditional construction themes and their solutions to those of today has been too fast and has taken place during an interval of time shorter than the professional life of a designer. The substance of the new structural and architectural possibilities did not have time to mature and to become deeply understood. Hence, some new solutions show an absence of deep conviction, and, because of this, are often inexpressive and anti-architectural. We must denounce the danger of an academic "structuralism" which may be even more damnable than the old academic "decorativism."

The answer to this question lies in the preparation of the designer and in his understanding of the statical problem. Therefore the problem is essentially an educational one and must be solved by the faculties of architecture.

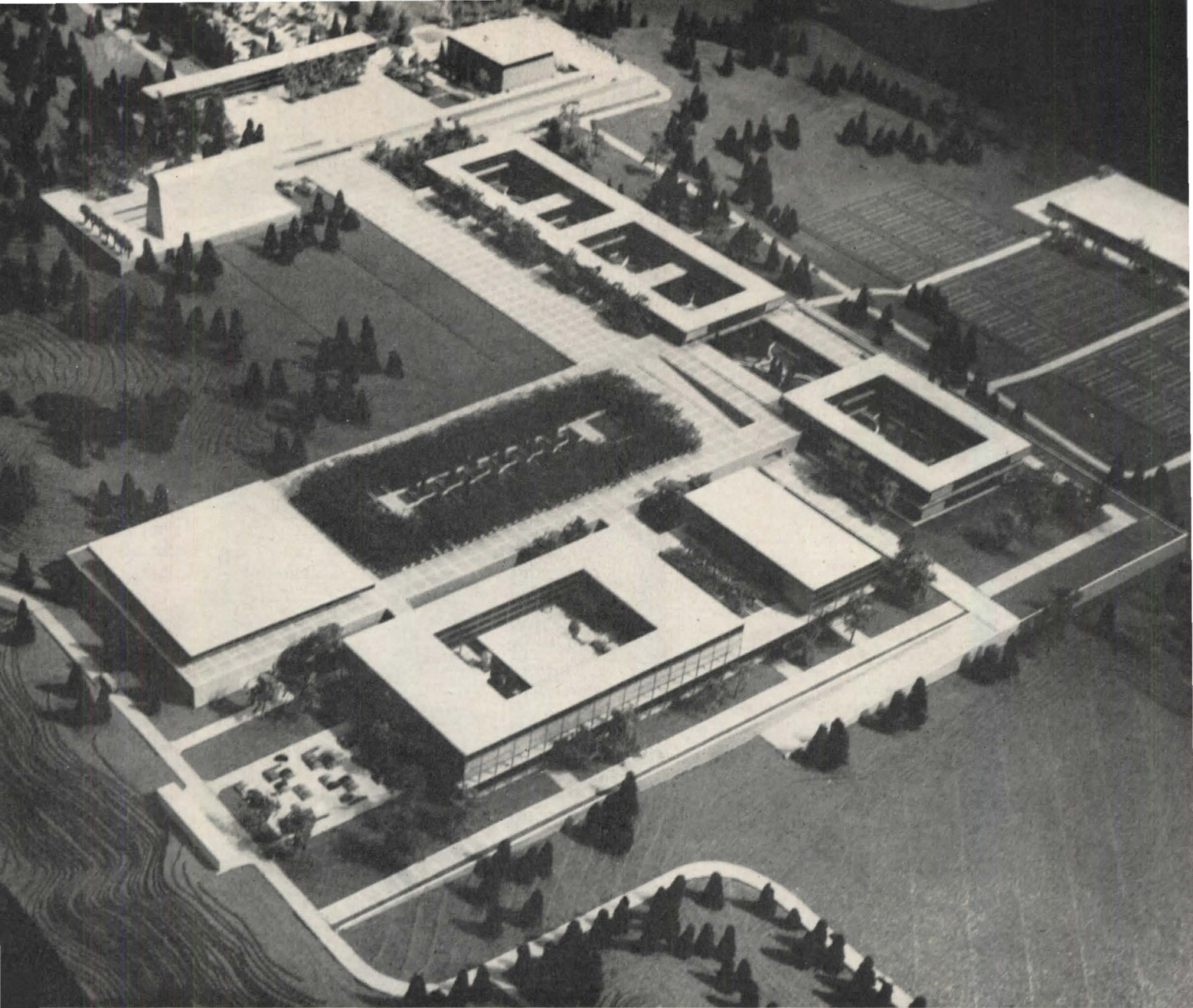
One of the worst mistakes we can make is to assume that the architect may get by with a knowledge of structures which is inferior to the knowledge of a structural engineer. To be able to invent and proportion, even approximately, the new and grandiose structural schemes required by the architectural themes of today, the architect must have an understanding of the struc-



tural concepts which is so deep and well integrated as to transform these concepts, originally based on physical premises, mathematical theorems and experimental data, into a unique synthesis and into an intuitive and spontaneous sensibility.

A complex structure cannot be designed starting from the formulas and mathematical developments of the theory of structures. These formulas and developments will become necessary during the second phase of design in order to proportion the elements of the structure. It is the capacity to feel a structure in an intuitive way, as one feels a ratio of volumes or a color relation, which represents the indispensable basis for structural design.

A serious structural training of the new architect is fundamental for the development of the architecture of tomorrow.



## FINAL SCHEMATICS FOR AIR FORCE ACADEMY

*Architects-Engineers, Skidmore, Owings & Merrill*

WHAT ARE CALLED "final" plans for the academic area of the Air Force Academy were announced recently by Air Force Secretary Donald A. Quarles. The word "final" means that the general scheme for this area has been accepted, the site plan is set, locations of the several buildings are established, and their overall design. Many details are still being studied, but the schedule calls for first construction contracts being let this summer.

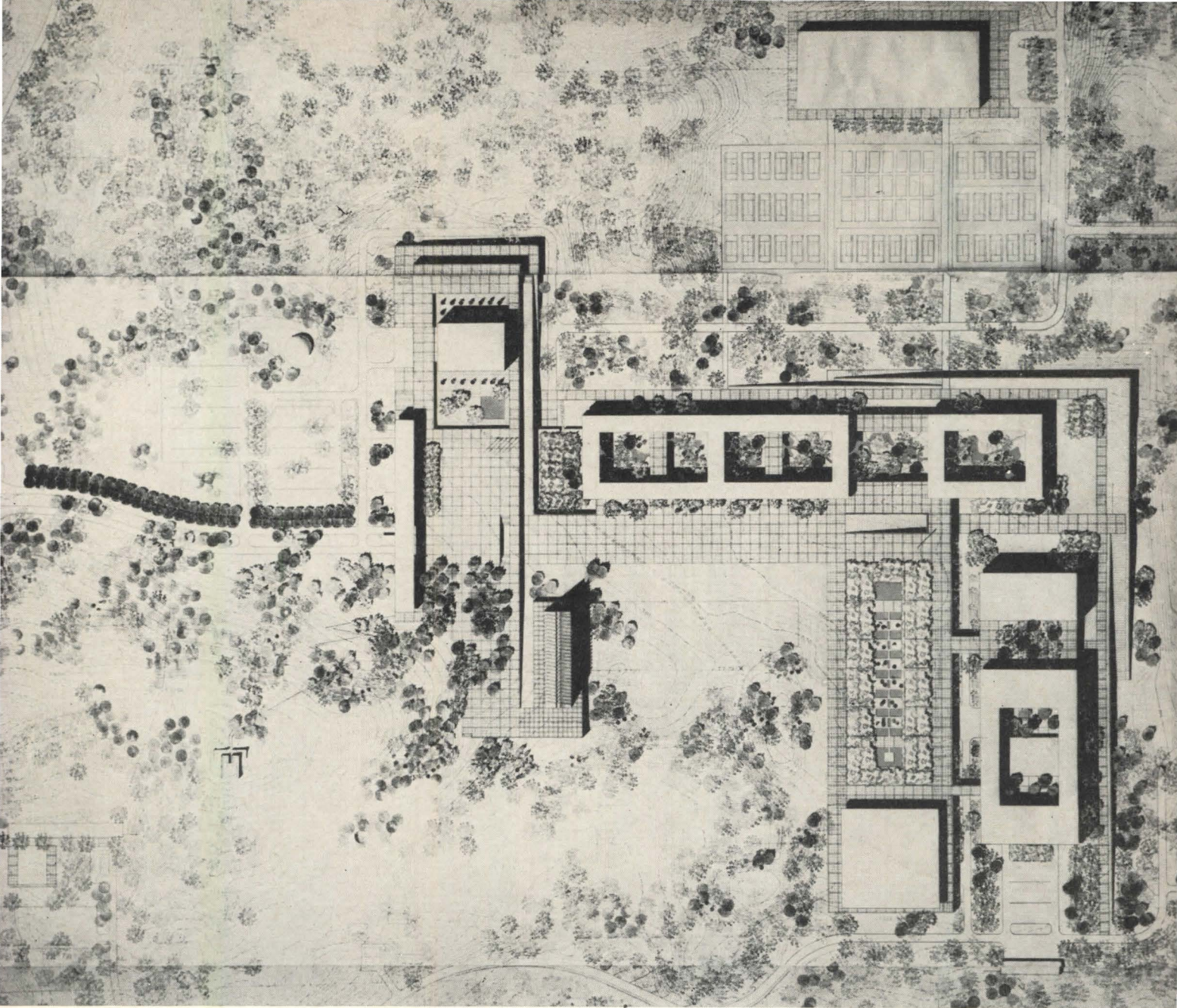
The much-argued chapel has been established as to size and location, but has yet to be redesigned. It has been moved, from earlier schemes, into closer relationship with the academic area, to make it more accessible to cadets' quarters, more closely associated with their daily life.

It is shown in the model photograph above as merely

blocked into the base of the T with the social group, close to the cadets' quarters in the stem of the T. This position, the Secretary pointed out, tends toward a village quality for this part of the campus.

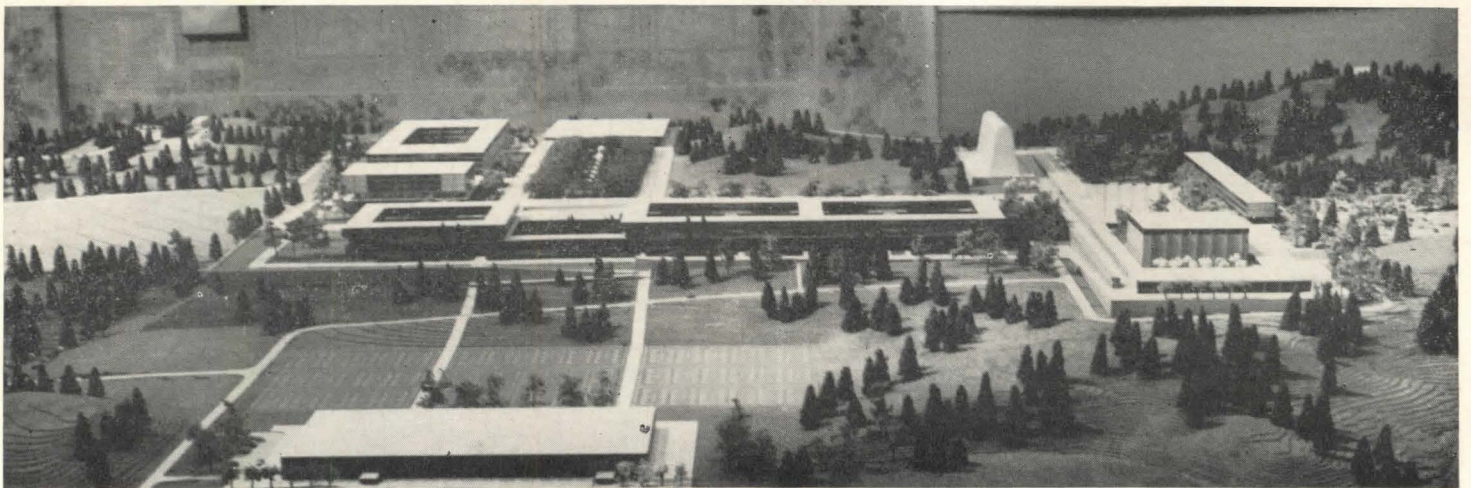
The larger building in the foreground, above, is the main academic building, with library to its right. At the far left is the dining hall; at the far right, the physical education building. Cadets' quarters run down the center of the site for this area.

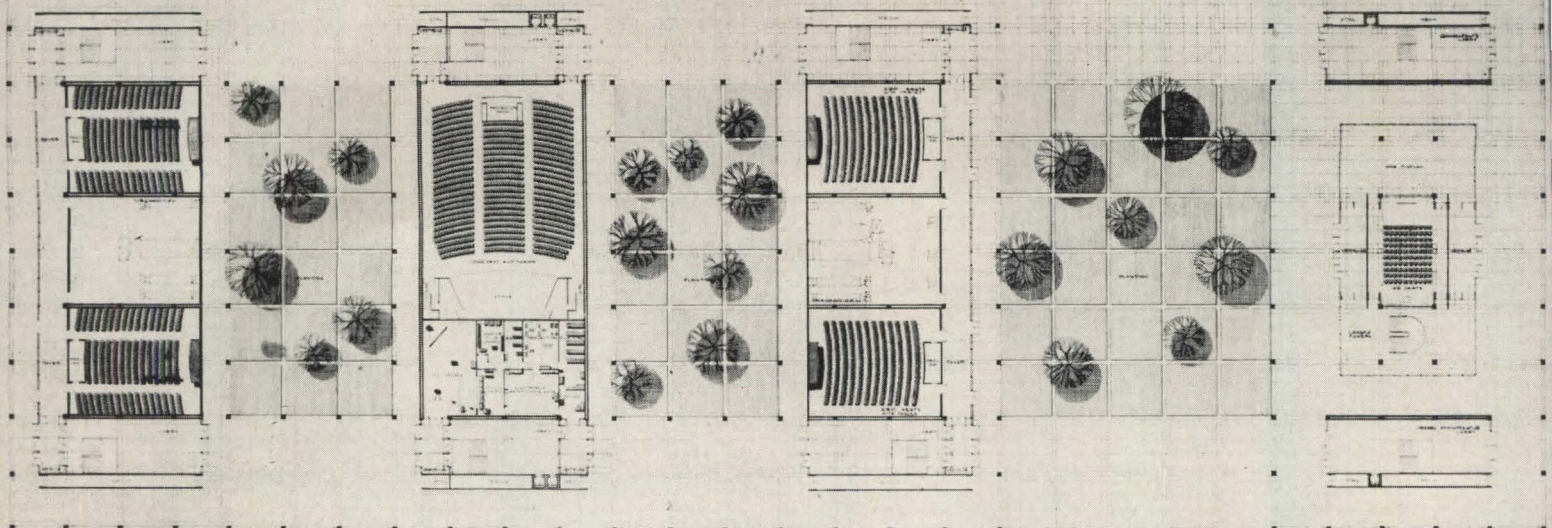
White marble has been chosen as the principal material for the exterior, though glass will still be important. Interior materials and finishes are yet to be selected. Rooms in the cadets' quarters are now being intensively tested in full-scale mock-up rooms being lived in by Air Force personnel who are studying lighting, heating, furnishing, in fact all factors in comfortable living.



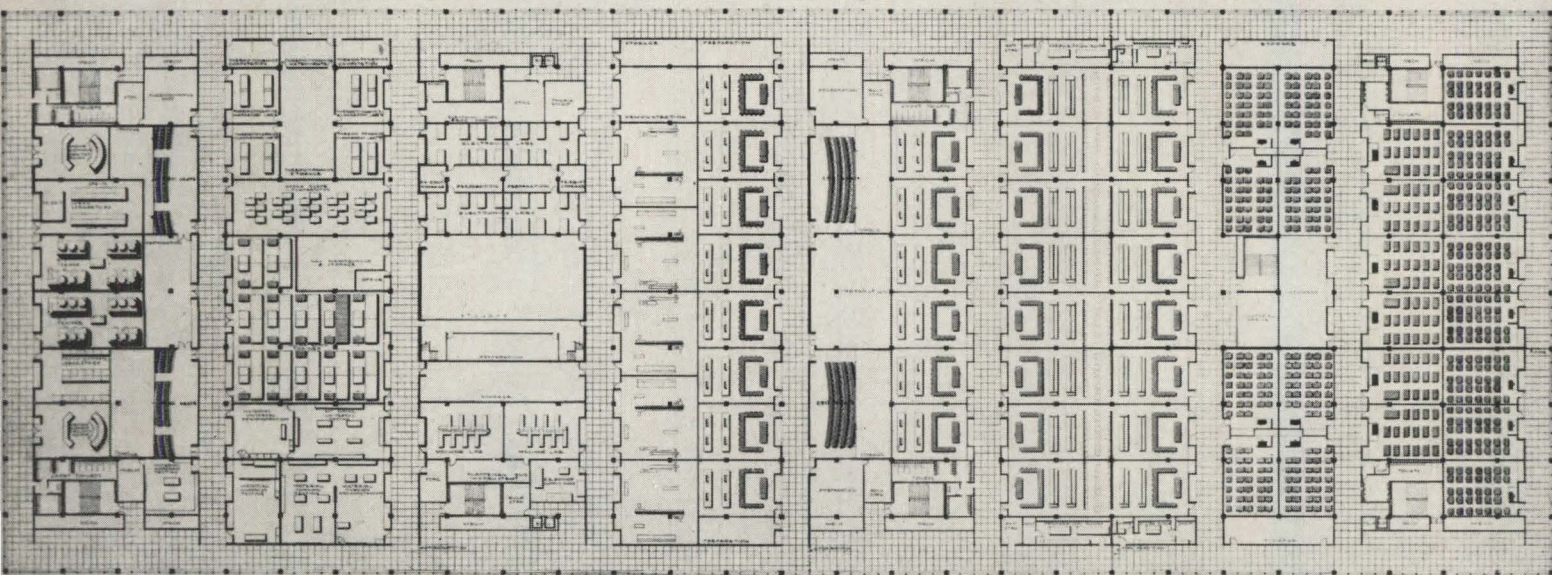
*Architectural Consultants:*

*Welton D. Becket  
Pietro Belluschi  
Roy F. Larsen  
Eero Saarinen  
Dan Kiley (landscaping)*





MAIN FLOOR



LABORATORY FLOOR

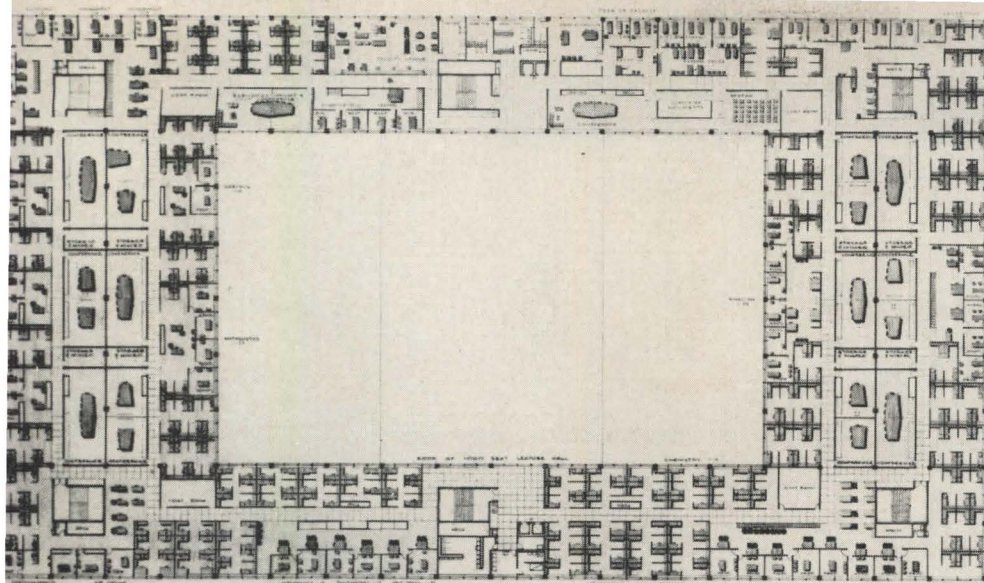
## ACADEMIC BUILDING AND LIBRARY

Main academic building has in effect two ground floor levels, with landscaped courts on the upper of the two. Lower of these levels is the laboratory group, with shops, laboratories and drafting rooms. At this level the area is fully utilized, extending under the court between main building and library and on under the library itself. The main floor plan with its enclosed courts comprises a series of auditoriums and demonstration rooms, the largest one seating 1000. Main floor of library houses a small lecture room surrounded by display areas.

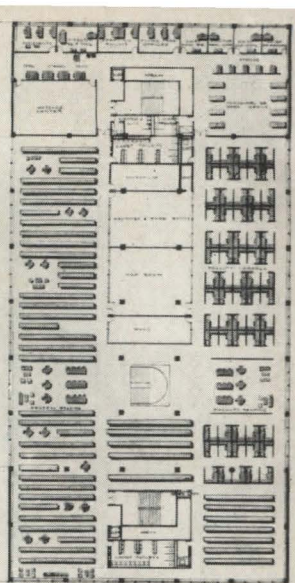
Upper floors (opposite page) are the principal classroom and faculty levels. A typical cluster of classrooms is shown in the enlarged plan. The round forms in the open space are coat racks serving the five classrooms in the cluster. The various furniture arrangements show different classroom activities: lower left, film viewing; upper left, television work; center, boardwork; upper right, examinations; lower right, recitation.

Faculty floor houses offices, conference rooms, study carrels and faculty lounge rooms.

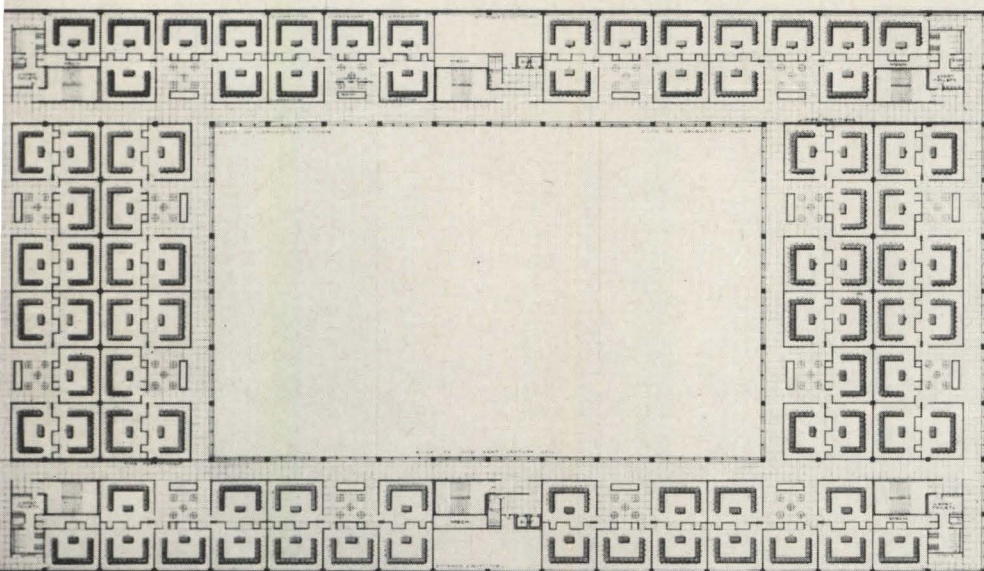




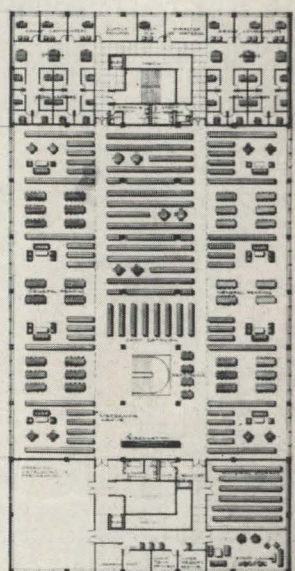
FACULTY FLOOR  
FACULTY



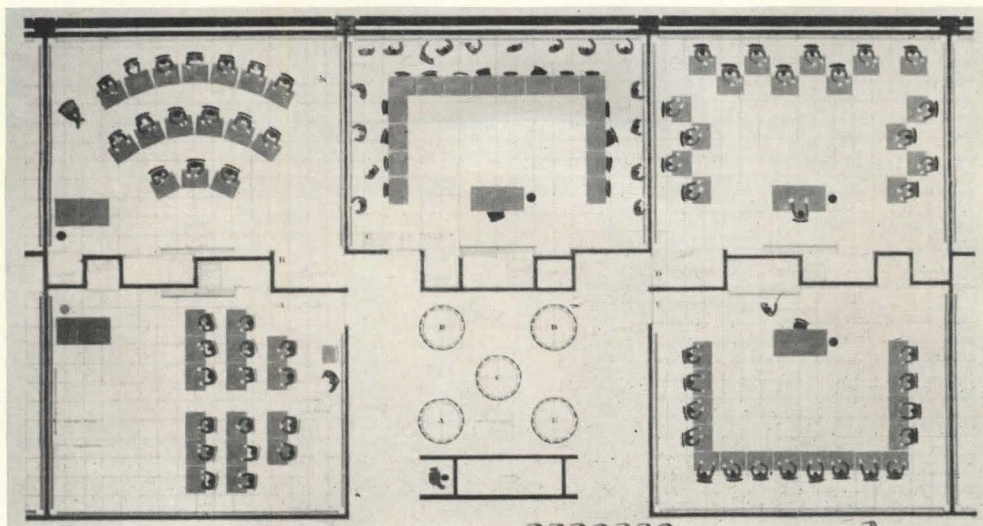
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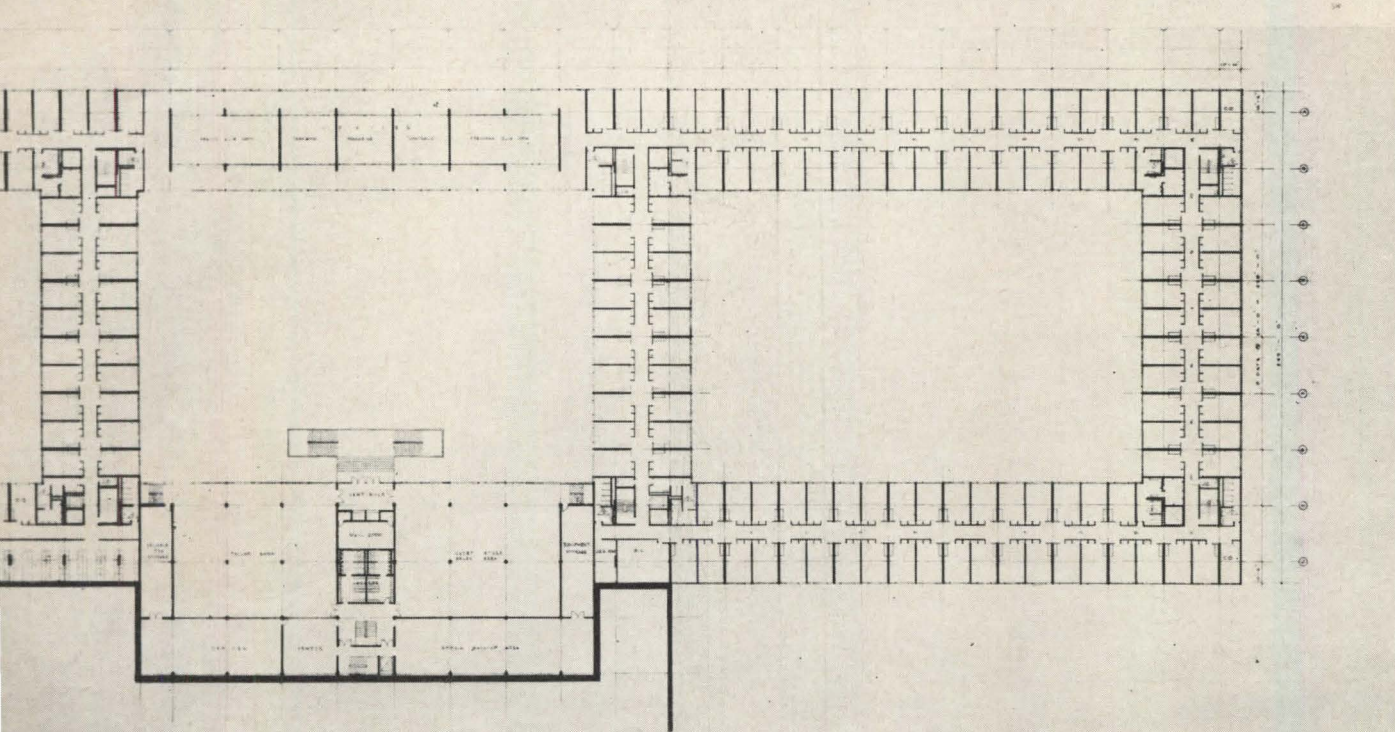
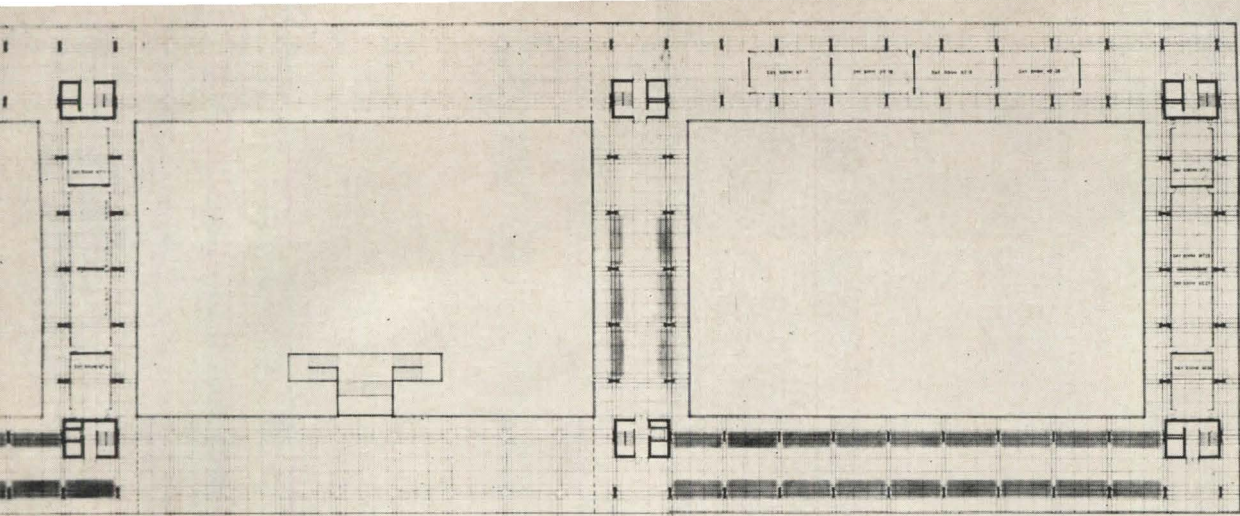


GENERAL CLASSROOMS - SECOND FLOOR  
GENERAL CLASSROOMS



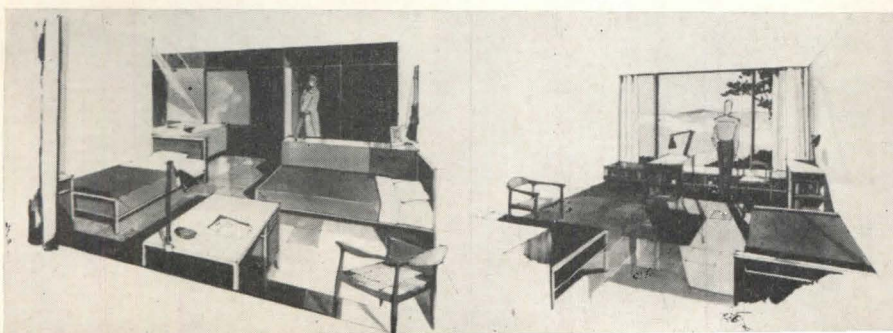
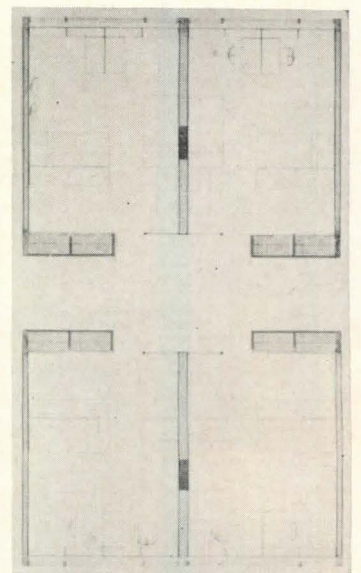
LIBRARY  
MAIN READING ROOM





**CADETS' QUARTERS**

MAIN FLOOR of cadet building is largely open except for a series of day-rooms. Upper floors are a series of identical two-man rooms in three quadrangle forms. Each room has lavatory but no toilet or bathing facilities. Between the separate quadrangles are clubrooms, officers' lounges, storerooms, tailor shops, and so on. Cadets' rooms are being tested for all manner of considerations in actual full-scale mock-up rooms now being lived in.



# "ARCHITECTURE FOR THE GOOD LIFE"

*Theme of the 88th Annual Convention of the American Institute of Architects, this topic managed to draw the best attendances. Two of the principal addresses are here presented in condensed versions; a third, by Clarence S. Stein, will appear next month.*



Herbert Dallinger

## 1. THE KEYNOTE ADDRESS: ARCHITECTURE FOR THE GOOD LIFE

**By John Ely Burchard**

*Dean of the School of Humanities and Social Studies, Massachusetts Institute of Technology*

ONLY A FEW DAYS AGO a group of distinguished Asians came to Cambridge to talk with Americans about almost everything. At one point President Tan of the University of the Philippines asked a devastating question. Were Americans, he inquired, happier today than they were fifty years ago? He asked this because he was seeking guidance as to whether the people of his land would in fact profit by the same acceleration of industrialization as had occurred in our country in this half century. He got, as you might suspect, no consensus of answer, not even a fair definition of what the answerers meant by happiness. But there were people with doubts and this is the important thing for us to remember as we seek the clue to the good life that may be offered by Architecture.

No one denied, for example, that the average man worked less hard now; had many devices at his disposal which were then absent; had more economic security. What some hesitated at was whether a spirit of optimism had not gone out of our people which was inherent in the American Dream of 50 years ago; whether despite our realizations at the level of material comfort, our anticipations were not somehow less than in a time when everyone seemed to be confident of progress and expecting only the best from the future. This confidence did not, they seemed to say, find an adequate replacement in the amusements of the Ed Sullivan show or by the homely victories won on the \$64,000 question or by the products thus purveyed.

Thus if we think that the Greeks had on the whole a good life it will become easier for us to remember what is relevant to the good life and what is irrelevant. Mechanical conveniences become irrelevant if the time they save us and the fatigue they spare us do not result in our spending some of the time and some of the energy on significant matters; in, for example, being greater participants in the democratic political process; or in becoming much better educated, participating for example in the kind of discussions the Greeks adored; or in becoming better participants in making and better

viewers of the products of the arts. If the freedoms are not used this way they can have little to do with the good life; we can see some gains in female life in these respects, less in male.

In the same way the mere fact that we can now live longer becomes irrelevant, even adverse to the good life, if the scene is merely to be strewn with the post-retirement superannuated. Despite the insurance company exhortations, not every one can live satisfactorily for years on a sunny park bench at \$200 a month. Unless the new longevity is accompanied by some firm understanding in the society of a constructive and dignified role for its aged, it can even be a bane and not a blessing. The Greeks and Romans understood this well enough and assumed that the aged were the wise; but in America of 1956 we assume almost the converse; we do not trust them with important affairs; never in business; almost never in education; and hardly ever even in politics. This is because we confuse the ability to be perpetually busy and on the go with the ability to be productive, which is not at all the same thing; and ceaseless activity, important or not important, is what is demanded of the successful man of our time.

So I am asserting here as flagrantly as I can that the good life is not a matter of good gimmicks or of physical ease; it is a matter of things that uplift the spirit. High averages will not define it. The Arch of the Etoile and the tree-lined streets that come to it and depart are more important to the good life of the poorest Parisian than a tenth of one per cent improvement in his sub-standard dwelling. I mean this rejection of the high average to apply to all elements of the good life — to the poetic life, to the political life, to the visual life, to the spiritual life. It is a life which occasionally though not too often must reach to ecstasy. Not too often because ecstasy can not be prolonged, as the readers of Dante's *Paradiso* can discover. But a life without these high points is not the good life. Once you have accepted this definition of the good life it is not hard to imagine

how I am going to define *architecture*.

Architecture, then, is obviously more than a building; it must be more than a high average of convenience and amenity in the provision of places to sleep, eat and work; it must contain something that lifts up the spirit when it is beheld or experienced; something indeed that lifts up many spirits. It must not be too personal or must, if personal, be open to a multiplicity of uplifting interpretations. That at least must be so in a society which does not have a single unifying theme as we sometimes, for example, imagine the western thirteenth century to have had.

Architecture need not be the creation of an architect. By the same token, and at least by this definition, not everything created by an architect is necessarily architecture. Architecture may be anonymous, it may be regional, or it may be universal in a society; it is likely to be more effective if it is the latter; it may be a dwelling house for an individual but will not usually be so; it can be a great housing project and has occasionally been so. The cards are stacked against this, not because housing projects are not suitable for architecture but rather because the methods by which they are usually produced are not conducive to the production of architecture. But it is most likely to be realized when the building which becomes architecture is one which can serve some large common purpose, a purpose which is commonly understood.

This raises some problems for our times; for there is very little agreement about what is commonly understood or desired. In the history of architecture the buildings which most commonly are recalled have almost always served religion. They have been greatest in Greece and the Middle Ages of Western Europe, Egypt and India, and not in those places like Rome and the United States where almost any religion would do. In the next order we would probably find public buildings, those which served the purposes of government, not only the practical operations of the government but the symbolic representation of the state. These have been effective in such institutions as the fora and tribunals of Rome or in the great regal buildings of the late Bourbons. They have been inspiring in the early days of our own country when the courthouses of the Southern colonies and the village greens of the North combined church and state in a dignified and elevating way; they have been less effective since then because as a people we have faltered between the desire to have symbolic architecture in a democratic society and the intuition that perhaps there should be none, at least none symbolic of the state; and this has been complicated for us by the fact that we have not yet found a way to invent new symbols and have had to fall back on those which were most precisely associated in history not with democracy but with totalitarianism, with imperialism, with colonialism and indeed with all the isms including communism which we instinctively oppose.

I do not mean that we can or should expect many great buildings to emerge from our architecture. This has

never happened; and it has hardly happened at all since the fifteenth or sixteenth century; on the level I am now seeking I find nothing yet in the twentieth century; what we may have found are ways to create such inspirations in our own language and by our own methods, if a cause can be found which is worthy of this much effort. Meanwhile we dissipate the opportunity in good average work on matters of good average importance. The mountain peaks are not there.

We do, I suppose, have to ask ourselves whether we are talking about architecture for history or architecture for our own times. I doubt that anyone ever built great architecture or did any other great deed because he was eager to gain the applause of history. You realize that some important historians have asserted that the judgment of posterity did control men's acts; in particular that men of evil intentions might be deterred from evil deeds for fear of the scolding they would get from history. This seems dubious doctrine to me and I would expect the same to be so of good deeds.

But there are societies which have left us monuments of their architecture and societies which have not; and the suspicion remains that those which have, have done so because they built durably; in turn the expectation is that they built durably not because they did not know how to build ephemerally but because they expected that things in which they believed had some probability of permanence. The first temple of Apollo at Delphi was of wood and legend follows it with one of feathers and beeswax and one of brass but it ended in stone. It did not end in stone because the Greeks who built it cared only about what their successors would think; but because they expected both to gain current enjoyment and profit from its use and to leave it to a posterity which would enjoy it and for the same reasons.

Now it is pretty evident that our current building materials will not survive for our descendants to study, much less to admire. The glass and the metals will go; if anything remains it will be those buildings of Washington like the Mellon Gallery or the Jefferson or Lincoln Memorials which are least typical of our culture. We are right of course to build buildings that serve our current needs well and not to inhibit this service by demanding an unnecessary permanence. But permanent building and building for contemporary needs are not necessarily antithetical. The basic truth is in the inference from our building and from our architecture, that we do not believe in permanence . . .

The general disorder and squalor of most of our towns west of the Alleghenies and many east of the same range is so discouraging that one likes to find defenses. One of these I am sure, and an important one, is our sense of the transiency, not so much of our life-spans as of the ways we will live within that span. Now that the physical frontier may be gone for Americans some of this urgency of change may disappear but I doubt it; for there is a new frontier whose boundaries can not so easily be stated; and this is the frontier of technological change. The opportunities this offers for real architecture will

be boundless; that they can be much realized in the absence of some convictions of ours that some things anyway are here to stay, I very much doubt.

■ ■ ■  
Closely related to this consciousness of the ephemeral is the fact that Americans are enormous consumers, one might even say scandalous consumers. It is well known that we use such a large quantity of almost any natural resource per capita as compared with that available to peoples in other parts of the world that we are subjects not of admiration but of suspicion and resentment. This suspicion, resentment, envy would exist anyway but it is augmented by our patent waste of these resources; our entire history has been one of a people finding lavish means and destroying them quite as lavishly, whether they were forests, mines, topsoil, or water. The kitchen middens we might leave to posterity should be a cause for acute embarrassment if we cared about the judgment of posterity. You well know that at this very moment there is something resembling a gray market in steel for buildings; but this is not really because of the enormous consumption of the military program though that is bad enough. No, the plain fact is that it is still the automobile industry which is the avid consumer; that this industry is built upon a process of artificial, unnecessary, and in the light of other world standards even immoral obsolescence; it is a little risky to go further because the relation of the automobile industry to the entire prosperity of the country is probably very sensitive but one can hazard the guess that what is good for the automobile industry may not be good for the architecture of America. It is this same spirit of throw-away-before-used-up which leads ultimately as well to the plethora of unsightly automobile dumps which adorn so many highways. We pay a high price for our comfortable transportation; some of it we pay in the steady deterioration of our city traffic, a gradual flow toward the condition of the nether circle of hell, the realm of Cocytus where everything is ice and stationary and silent; but we also pay for it in aesthetic terms. The plain fact is that it seems the average American would rather have a new automobile than a distinguished architecture.

■ ■ ■  
There are two or three other things about the American environment that bear investigating. We rest comfortably with the impression that we are about the most ingenious people in the world and speak of Yankee inventors as though they had existed in every hamlet of early America. This is a kindly myth. Some myths are true. This one may not be. It would be very hard to make a case that even on the scale of pure invention this country had consistently produced more important inventions per capita than others. Indeed we would be likely to find to our shame that this was not so. Clearly we have not, per capita, produced as many creative ideas in science, philosophy, literature or the arts as several other parts of the world. Indeed in many of these areas of the higher artistry we have produced scandalously few. In architecture perhaps our only significant

native innovators up to now have been William Le Baron Jenney, Frank Lloyd Wright, Buckminster Fuller and one other whom I will not name so that each of you can tuck in a name that suits him and be less resentful of this assertion. Of these the most imaginative has hardly built a building at all; the greatest was never really accepted in this country until long after it mattered; and such effects as we have felt from his innovations have largely come to us through the hands of German and Swiss translators and translations.

But we do have a different quality which has stood us in good stead. Once we recognize the general merit of an innovation we are not afraid to go for it hard. So once the meaning of the cavity magnetron got into the American consciousness we produced not only a larger but also a more varied set of radars than the British conceivers might have been expected to do; the atomic bomb emerged in America from European-born concepts; once we really grasped the principles of Le Corbusier and Mies van der Rohe we began to exploit them in profusion and with some, though perhaps not enough, variety.

■ ■ ■  
It is common of course for Europeans to speak of us as a violent people; and we probably like to think of ourselves so. But the fact probably is, as Ruth Benedict has I think suggested, that we are more like Zunis who avoid excess than like the Kwakiutls who shoot the works at a potlatch dinner. This shows itself in the reluctance with which we have adopted the brilliant engineering schemes suggested by the works of Freyssinet or Maillart or Nervi or even of our own Buckminster Fuller and in the enormous restraint we have shown both in the use of sculpture and in the use of texture in buildings; even most of all I suppose in the extent to which we exclude sculpture and painting from our buildings. Restraint is even too kind a word; reluctance and disdain may not be too harsh. For this there are several reasons.

For the moment I wish to speak only of the Zuni aspect. With respect to any of these excesses we ordinarily proclaim in virtuous terms that they are too expensive. It may well be that a Nervi system is better economics in Italy than it is in America but to apply economic determinism to art is the last refuge of the unaesthetic mind. We are incomparably the richest nation in the world. That is what the Athenians were after they moved the Treasury of Delos to Athens in the name of safety; but they were not afraid to spend this wealth on the architectural and sculptural embellishment of Athens; and so it was with the Romans; and so it was even in the poor villages of the Ile de France in the thirteenth century; and even with the prudent English Victorians. But now in the richest land the world has perhaps ever known we say over and over again that we cannot afford these aesthetic extras; the national government cannot afford them; the richest industrial firms cannot afford them; the universities cannot afford them. So our campuses have no sculpture save a few aging and desultory portrait statues of long-gone presi-

dents sitting in armed chairs; and college presidents say that their constituents, that is the donors, big and little, who are already pressed to the breaking point, would resent such extravagances. No doubt they would, but what more pressing job could there be than to educate the donors that this was not extravagance? You learn about art and architecture by being with it and seeing it and not by talking about it; one good contemporary statue on a college campus would have more educative value than many kodachrome slides of Mona Lisa and Moses. Architects have no right to feel virtuous in this matter. Most of you refrain from suggesting such embellishments; when you do you almost never put them in as indispensable; they are rather budgeted separately. Under these circumstances surely no architect is so naive as to believe they will not be the first thing to be cut when the budget runs over as it almost always does. Indeed it is all too often the architect himself who acts as executioner at this point of crisis.

We can not really plead this economic excuse for our omission of art because of course we can afford it. The plain fact is that we do not want it very much. We do not mind the used car dumps very much. We even learn not to see them. But on the positive side which is more important we do not labor very hard to produce this larger and common, non-museum, art environment which has characterized every previous high culture. That is bad enough. It becomes sickening when we talk in hypocritical terms of economic barriers almost as though it were a matter of morality to build a building cheaper. If there is any morality at all in great architecture on the economic side it probably rests in wasting money for elegance, not in saving it by leaving the sculpture out of the final budget. But I am not one who wants to say much about morality and architecture.

However if I may wander for a moment let me say that morality has not much to do with architecture. Ruskin of course was full of morality; architecture was immoral if it served an immoral purpose and so the Colosseum and the Renaissance Palace had to go; it was immoral if it employed cast iron for this was a material which *seemed* to have required more hand labor than it really did. Viollet le Duc put in his oar when he talked about the morality of structure in the Gothic cathedrals, a morality which was by no means always there and would always be scuttled in favor of the more important thing that the Cathedral must be a reflection in stone of the major principles of the Summa of Aquinas stated in words.

Now the very modern people who reject most fully the canons of Ruskin can be found also to be talking of morality. It has somehow become honest and natural and organic to display the structure as blatantly as possible and anything else is dishonest and even unnatural. These are harsh words and used inconsistently. There are no animals in nature for example, except a few exoskeletal ones like turtles and lobsters, who betray their skeletons clearly. Often even the musculature is not clear. The structural system of a tree is not apparent to the eye of common sense. The animal which

is thin enough to show its bones, we look upon as an undesirable and ugly animal whether it is an old horse or man-eating tiger. It may well be that from expressions of structure behind hung walls, transparent or not, we have achieved a certain desirable and appealing aesthetic. But let us be content with that for it is a great achievement. Let us not go around calling our predecessors or their work dishonest, any more.

I have painted this picture of American traits in strong colors deliberately to overemphasize the soil on which American architecture has had to grow. That it has grown so well almost in opposition to the soil seems to me a tribute to the persistence of American architects. It is a persistence which was manifested long ago, which began indeed with the efforts of such men as Jefferson and Mills and Thornton, not always sophisticated or even refined in proportion but always with a certain simple effort towards elegance; with the more sophisticated talents of Manigault and Latrobe; which blossomed once in the Greek revival which has left buildings of dignity throughout our landscape, buildings which we need not repeat but which have been little tarnished by time. It appeared in renewed form in the work of men to whom we are ungenerous today, men like Hunt and McKim and Stanford White; in the towering and robust and not quite so derivative Richardson; in the brave poetry of Sullivan fortified by the earthy realism of Adler; in the wide dreams of Burnham made true so long as he was allied with the sensitive Root; in the undoubted and unfettered but not always appreciated talent of our one sure native genius, Frank Lloyd Wright; in the sentimental medieval aspirations of Cram and the more imaginative adaptations of Goodhue; in the original work of men like Maybeck and Gill and the brothers Greene on the West Coast. And all this was not in vain though not all the men were original and though not all the works were suited for the tasks of today or even always for their own day. But Boston would be the meaner without its Public Library and its Trinity Church. In all this there was a surge towards a future, a future which is now with us; a future which was anticipated by the evolution in the work of Raymond Hood; a future which built on the welcome this country finally gave to great visitors, men like Neutra and Mendelsohn and the elder Saarinen and Gropius and Mies van der Rohe. All this was a long time coming. Innovations perhaps continue to pour in more from abroad than from our native soil. Yet in the last analysis if one were required to name the nation in which the highest average of architecture was now being maintained he must and without chauvinism name our own land. In this country architecture, so far as what architects do, has finally come of age. We have a past of which we need not be ashamed and a future which we need not fear; and this has come about despite our will to the transient, our enormous and wasteful consumption, our Puritanical rejection of the opulent, the colorful, even the elegant, our native tendency toward disorder. On all of this we can look with some pride, but also humbly for we have not reached the stars.

## 2. ARCHITECTURE FOR THE COMPLETE MAN

By John Knox Shear

*Editor-in-Chief, Architectural Record*



Herbert Dallinger

IT IS A PARTICULAR privilege, and one which is much too unique, to share this platform with these three representatives of our sister arts. Since architecture is also styled the mother of the arts we have, to say the least, a curious situation: a mother who is sister to her own children. Perhaps this will serve to indicate, in a small way, the confusion and lack of coordination between our arts. . . .

Since these men are not, of course, complete strangers to what some are calling the arena of limited achievement, they are aware, as you are, that architecture today is much criticized; from within as well as outside the profession.

It has been charged in certain quarters with poverty of imagination; in others with a too paramount preoccupation with being original. Many of our efforts are accused of over-concern with economy; elsewhere we are criticized for wantonly overrunning our budgets. Some find in architecture mere exhibitions of structural ingenuity; others deplore our structural naivete. Here it is called bizarre and there — banal.

. . . It is the nature of architectural criticism today — be it formal or casual — to deal only with portions of the whole; to examine a limited pre-selection of phenomena.

In this the criticism is like the architecture which is itself partial — only partly satisfying the man it is intended to serve. Out of our bountiful technology we have fashioned many wonderful answers to needs never answered before; but to date we have seldom assembled these answers all in one place at one time. . . .

The complete man asks of architecture many things; asks, of course, that his buildings provide him with the means of carrying on his activities . . . asks, too, for the sensations of space and form and their modulation through color in light which were significant to him even as a child: the sensation of caves, of coming into or out of tunnels, of islands, of open glades in the trees, of craters, of high smooth mounds in flat pastures, of bridges, of the space and texture in the floor of a tall pine woods and the light there, and the light and the space under a great tent or in old barns; and the sensation he used to get in crouching under tables or on top of roofs; and even the invigorating spatial sensations of peering through knotholes.

The complete man has known and knows all these and he asks that his architecture afford him something akin to them; not all of them at once, of course, nor all in a short sequence; but enough in any architectural

environment that his senses be rewarded as he performs his activities. For he is a creature of senses and demands a rich diet of sensation. And he demands still more, for he is a creature of intellect as well; and because he is he asks his architecture for more than usefulness and for more than sensation.

The complete man asks also that his architecture have meaning; that all its parts speak to him and to others. He asks that his buildings say where they are — in space and in time, and he asks that they speak of their purpose and abilities and the means of their forming. . . .

The complete man, then, asks for a rich assortment of utility, of sensation, and of meaning in his architecture. He is aware, of course, that they are interdependent and as such, each has the power of strengthening the effect of the others, and that taken together they constitute the whole architecture which he needs but which he does not have. The architecture which has the ability to speak to his spirit. In its stead he has today some brilliant and beautiful parts with a necessarily partial ability to satisfy the whole man. . . .

When we are making an intellectual point we seem to have nothing left over with which to stimulate sensation or even afford utility. And when we are being utilitarian there is so often so little energy left for satisfying the senses and the mind and seemingly little conviction that these satisfactions are necessary. We work with shifting enthusiasms, with fragmental fascinations. . . .

With all our technology and with all our talents how can our failure to satisfy man's total architectural needs be explained? The explanation would not be simple. Certainly it would have to point to the fact that we haven't had for very long our present materials and techniques. Certainly, too, some part of the explanation would lie in our extraordinarily complex procedures in designing and erecting buildings. Procedures made necessary in part by the enormous speed with which we have had to match the immigration and westward expansion and industrial growth of our past one hundred years. A century of the most violent evolution and one in which architecture was deeply affected. For out of the turmoil of reaction and counter-reaction too many of our architects have inherited the polar isolations and the extreme attitudes which were necessarily called into being during the revolt against eclecticism. We have grown up under the influence of the leaders of that revolt. Our heroes came to fame with deliberately exagger-

ated manifestoes and with exaggerated buildings to illustrate those manifestoes. But we have come to love their over-simplified, emphatic forms not, unfortunately, for what they meant in the endless evolution of architectural form, but for the forms themselves. And these forms suited our economy, and could be easily reproduced, and in reproducing them we could directly identify ourselves with our heroes.

We have inherited both their forms and their attitudes and without having added appreciably, as *they did*, to either the facts or the philosophy of building, we find ourselves still defending the same polar points of view; being against many things with more intensity than we are for anything . . . belittling each other's work; making distinctions in mediocracy; fretful in our efforts to establish an identifiable style — on which, if fortune smiles, *some* magazine will bestow a name (nothing is genuine without a name.) Bickering about the proper roles of history, and of the region, and of function. And in our vain preoccupation neglecting the man for whom we are building; neglecting that thoughtful and thorough study of his needs and his attitudes which reveal the proper point of departure and the proper goals of architecture.

That study will reveal at the outset that man is a creature of opposites; that he is attracted to many apparently disparate phenomena; that he doesn't feel he has to be against yesterday in order to be for today — doesn't have to turn his back on history in order to look forward; that the genius of a particular place and its people is still a desirable source of influence on form even in a day when he readily acknowledges the interdependence and cross influences of all places and all people, that function has a more inclusive meaning than we have been ascribing to it. . . .

It is in the recognition and understanding and transcendent resolution of man's basically dual nature and the dual interests it manifests that a wholly satisfying architecture can come into being. Ignoring man and his polarized nature and turning our backs on half the factors which *should* generate form makes architecture easier but does not make it better; does not make it whole. . . .

But really knowing man is enormously difficult and becoming daily more so as science broadens our collective knowledge of him while our individual capacity for understanding and acting does not much increase. . . .

The total of what we should know about man — which is knowing ourselves, after all — is staggering. We must surely recognize our need — as architects — for help. We need all the help we can get from the fields of science and from the humanities. But where they have not gone or cannot yet go we must depend on intuition; on our own and on that of any who can help us; on the intuition of the truly gifted men from the related arts, who, as sensitive artists, are responsive to the emotions of the complete man and whose natural domain is spatial organization and spatial expression. . . .

This sort of collaboration demands a kind of mutual

respect and awareness of common interests and sympathetic understanding which very few architects and their fellow artists possess today.

On the contrary, many architects either mistrust or feel superior to the painter and the sculptor and even the landscape architect. . . . Among architects there are few Michelangelos but many Michelangelo complexes. . . .

But our failure to get a rewarding collaboration cannot be traced to the architect alone. Our fellow artists have too often been equally unyielding. Principally obstructive to collaborative achievement is their very evident concern that their contributions to a building be readily identifiable in the currently conventional terms of their particular art forms. They want to be displayed. . . . Too often their efforts produce simply artistic objects in a building rather than making art *of* the building. Architects, compliant, seem to wish for little more. . . .

With architects reluctant to seek advice and reluctant to relinquish even the slightest prerogative and with their fellow artists insistent on a limited assortment of conventionally identifiable objects it appears we will not soon get the kind of resonance we need between these artists before a really transcendent architecture can be achieved.

For the architect cannot do it alone. He must trade in the visual and spatial expression of his own emotions. But the number and the range and the quality and the significance of his emotions are directly dependent on his responsiveness to the emotions of others. . . . Rich invention and the careful, precise forming of a building have always been achieved only when the emotional stimuli were abundant and pressing and recognized. The architect can broaden his recognition of stimuli only if he is willing to open himself to the emotions of others. The architect who draws only on himself soon draws from a dry well. . . .

The search for significant causes — for the forces which should determine our forms — is generally beyond the individual architect's largest capacities. We are asked to do so much and have so little time in which to do it, and we have blind spots, and preoccupations and a natural quota of sloth. And all these obscure the search for the stimuli to significant form. And on top of all this, our vanity, which is not as necessary as it is a frequent attribute of ability, prevents our seeking help from the very men — these fellow artists — whose sensitivity to emotion and sensitivity to form can help us stretch our vocabularies to the point where once again we may speak to people and be understood.

But if, in some future, this collaboration ever develops in something more than isolated instances, we may be nearly sure of this: the whole fabric of our buildings and their spaces will be affected — their profiles, their lighting, their approaches, their changes of direction, their sequence of vistas, their textures and colors. The whole of architecture . . . an arena of achievement which should be limited only by man's still unfulfilled capacity to enjoy organized space.



WINWRIGHT BUILDING, St. Louis  
Louis Sullivan

CARSON PIRIE SCOTT STORE, Chicago  
Louis Sullivan

ROCKEFELLER CENTER BUILDINGS, New York  
Reinhard & Hofmeister; Corbett, Harrison  
& MacMurray; Hood & Foulhoux

LEVER HOUSE, New York  
Skidmore, Owings & Merrill

TRINITY CHURCH, Boston  
H. H. Richardson

PHILADELPHIA SAVINGS FUND SOCIETY  
BUILDING, Philadelphia  
Howe & Lescaze

GENERAL MOTORS TECHNICAL CENTER, Detroit  
Saarinen & Saarinen

LAKE SHORE DRIVE APARTMENTS, Chicago  
Mies van der Rohe

S. C. JOHNSON & SON, INC., ADMIN. BLDG., Racine  
Frank Lloyd Wright

MONADNOCK BLOCK, Chicago  
Burnham & Root

DAILY NEWS BUILDING, New York  
Hood & Howells

TVA NORRIS DAM & POWER HOUSE, Tennessee  
Roland Wank, Architect-in-charge

BOSTON PUBLIC LIBRARY, Boston  
McKim, Mead & White

STOCK PAVILION, Raleigh  
Nowicki & Detrick

CHRISTIAN SCIENCE CHURCH, Berkeley  
Bernard Maybeck

WOOLWORTH BUILDING, New York  
Cass Gilbert

CROW ISLAND SCHOOL, Illinois  
Saarinen & Saarinen,  
with Perkins, Wheeler & Will

MANUFACTURERS TRUST BUILDING, New York  
Skidmore, Owings & Merrill

UNITY CHURCH, Oak Park  
Frank Lloyd Wright

NEBRASKA STATE CAPITOL, Lincoln  
Bertram G. Goodhue

S. C. JOHNSON & SON, INC., LABORATORY, Racine  
Frank Lloyd Wright

UNITED NATIONS SECRETARIAT, New York  
Wallace K. Harrison & Consultants

LINCOLN MEMORIAL, Washington  
Henry Bacon

M.I.T. AUDITORIUM, Cambridge  
Eero Saarinen

EQUITABLE BUILDING, Portland  
Pietro Belluschi

ALLEGHENY COUNTY BUILDINGS, Pittsburgh  
H. H. Richardson

UNIVERSITY CLUB, New York  
McKim, Mead & White

CRANBROOK SCHOOLS, Michigan  
Eiel Saarinen

MINERALS & METALS RESEARCH BLDG., I.I.T., Chicago  
Mies van der Rohe

ALCOA BUILDING, Pittsburgh  
Harrison & Abramovitz

MUSEUM OF MODERN ART, New York  
Goodwin & Stone

PENNSYLVANIA STATION, New York  
McKim, Mead & White

EXPERIMENTAL SCHOOL, Los Angeles  
Richard Neutra

DODGE TRUCK PLANT, Detroit  
Albert Kahn

100 MEMORIAL DRIVE APARTMENTS, Cambridge  
Kennedy, Koch, DeMars, Rapson & Brown

CENTRAL LUTHERAN CHURCH, Portland  
Pietro Belluschi

## HOUSES

F. C. ROBIE, Chicago  
Frank Lloyd Wright

E. J. KAUFMANN, Pennsylvania  
Frank Lloyd Wright

TALIESIN WEST, Arizona  
Frank Lloyd Wright

HENRY VILLARD, New York  
McKim, Mead & White

WATTS SHERMAN, Newport  
H. H. Richardson

EVERY COONLEY, Illinois  
Frank Lloyd Wright

W. W. WILLITTS, Illinois  
Frank Lloyd Wright

D. R. GAMBLE, Pasadena  
Greene and Greene

PHILIP JOHNSON, New Canaan  
Philip Johnson

WALKER GUEST HOUSE, Florida  
Paul Rudolph

ELLEN SCRIPPS, La Jolla  
Irving Gill

WESTON HAVENS, Berkeley  
Harwell Hamilton Harris

LOVELL "HEALTH HOUSE", Los Angeles  
Richard Neutra

EDITH FARNSWORTH, Chicago  
Mies van der Rohe

# ONE HUNDRED YEARS OF SIGNIFICANT BUILDING

## 2: ADMINISTRATION AND RESEARCH BUILDINGS

OF THE FIFTY BUILDINGS and building groups nominated by a panel of fifty architects and scholars as the most significant in the past 100 years of architecture in America, the four shown here (constituting the second installment of a 12-month series which began in the June 1956 issue with a presentation of the eleven office buildings most frequently nominated) are relatively recent accomplishments and as such are very much within the awareness of even our youngest students.

These have been published widely, appraised enthusiastically and visited out of all proportion to their accessibility. The site and the space, the fabric and the finish, of each of these buildings is actually known to a multitude of American and foreign architects and students in a way beyond all ability of photographs to inform.

Few will be surprised at their selection and perhaps fewer yet will be in serious disagreement. Certain it is that all who know them carry still the recollection of the emotions these buildings first induced. For this is architecture with many important things to say and with the ability to address and to stimulate the senses and the mind as well.

The formulation and expression in language of emotional reactions to such complex stimuli is always difficult and grows more so when restricted to the few words allowed to the panel members who below and in the following pages have each indicated something of his reaction to one or another of these significant buildings.

Of the General Motors Technical Center, Architect Max Abramovitz writes:

"The General Motors Group is one of the great 20th Century compositions born out of the sense of civic responsibility of a great corporation.

"Eero Saarinen's grasp of his opportunity and his masterly solution in plan, form, color and detail rightly permit this group to be called the Industrial "Versailles" of this period. Architecturally it will be a great landmark, and should, I hope, encourage other institutions. Rarely does a designer succeed in creating a structure that has a sense of belonging to the times, a sense of rhythm and counterpoint that is in tune with the personality of industry and the spirit of today."

*General Motors Technical Center, Detroit, 1951-1956,  
Eero Saarinen & Associates. (Sixth)*

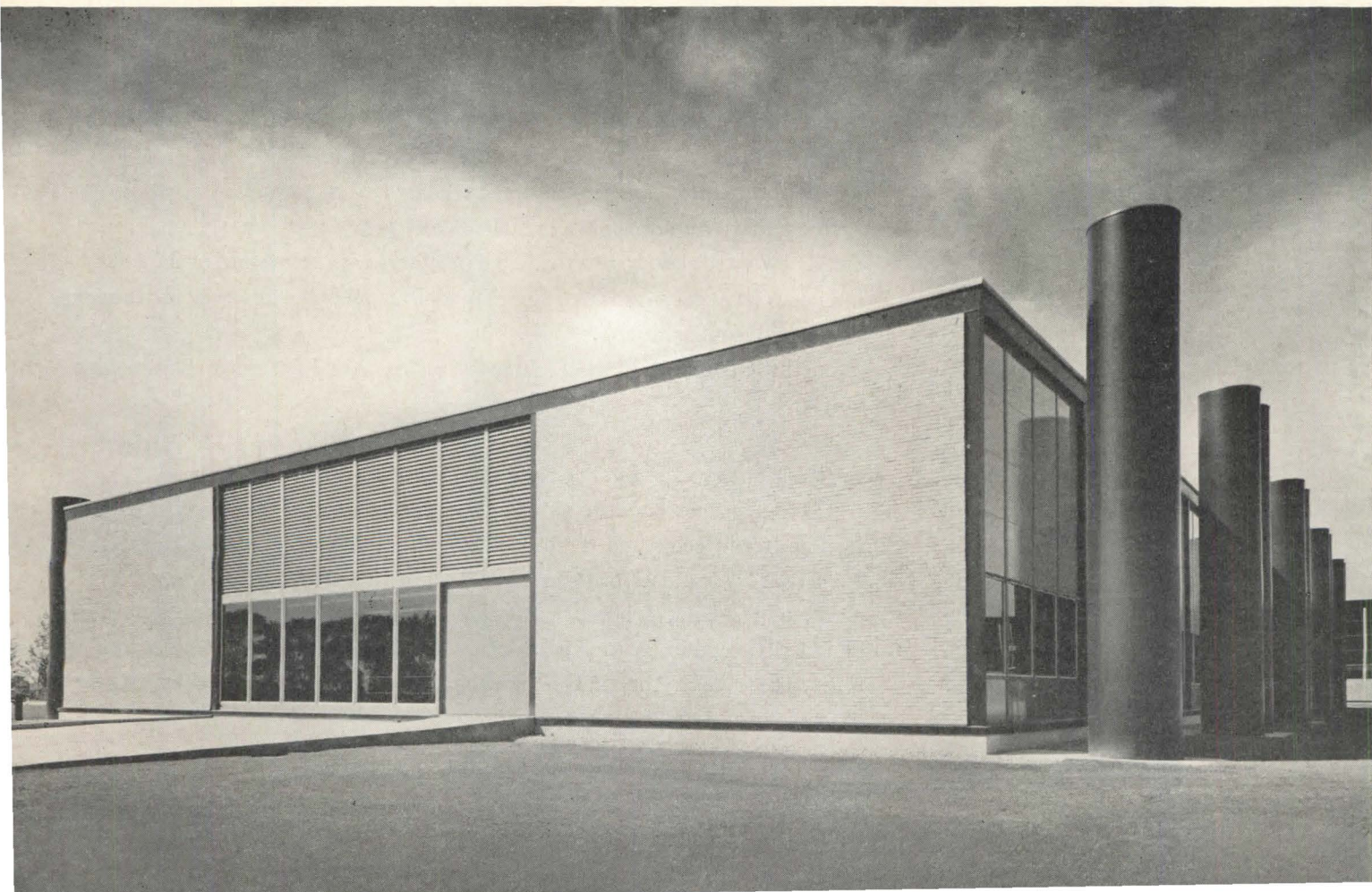
"The General Motors Technical Center is the first and best complete collaboration of industry, architects and landscape architect. It is a truly American melding of the best from Europe, with native American feeling; a much-needed demonstration that these sources can be improved for our consumption. Withal it is a magnificent example of architecture which will be a yardstick for future work of this type. To my mind it is a milestone of the stature of the Barcelona Pavilion and a healthy use of Mies' influence too rarely seen. Though it is an unrealized dream to have such an opportunity myself, I am glad to have lived to see it."

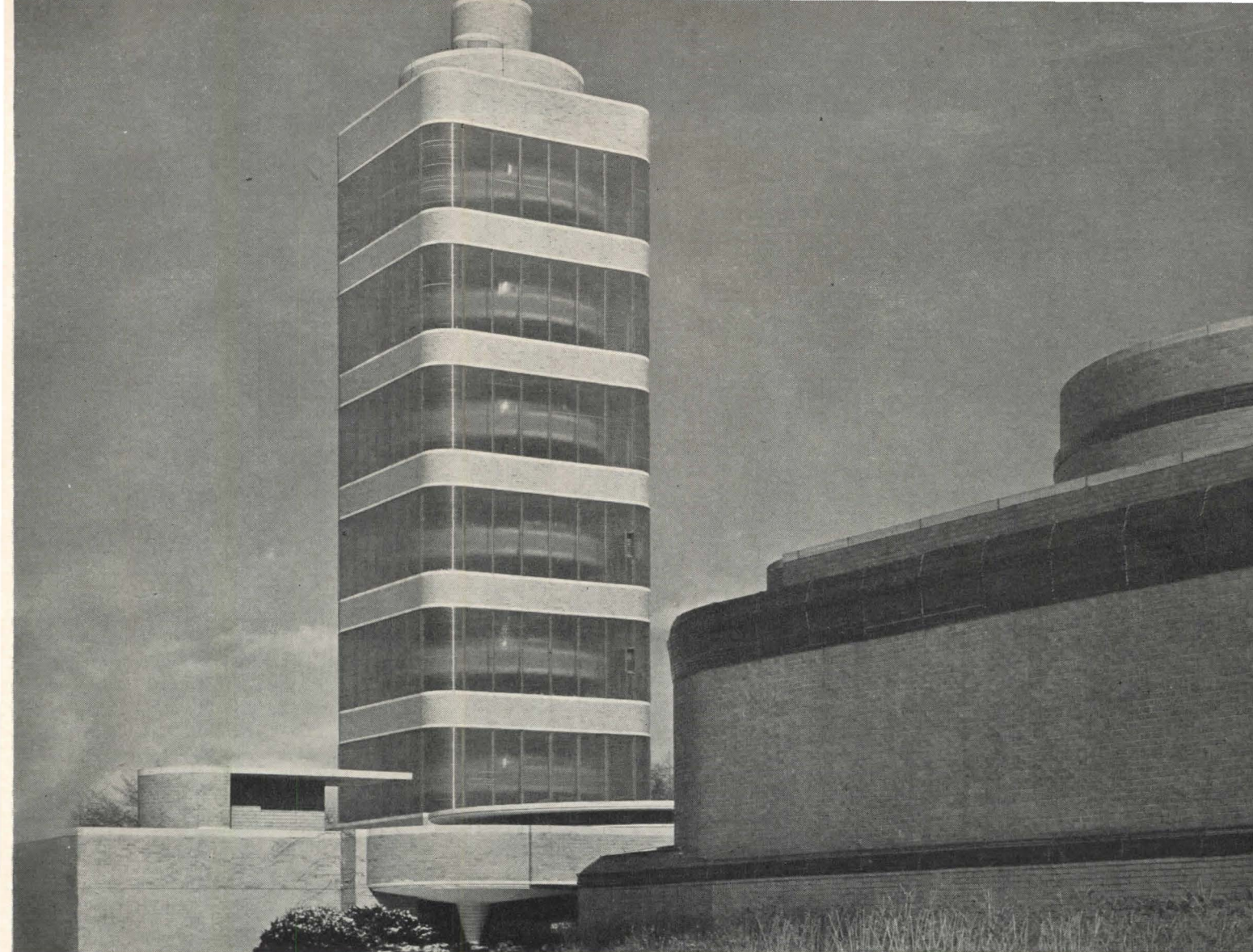
*John Dinwiddie*

"The General Motors Technical Center is a magnificent architectural statement of the power and glory of American indus-

try — far more impressive than any skyscraper set down by itself in an urban jungle. Here in a vast controlled environment created out of flat and empty farmland, precisely and beautifully interrelated buildings are served by appropriate routes for motor and pedestrian traffic, and linked to outdoor spaces for pools, gardens, parking and service areas. This overall integration successfully extends, indoors and out, to structure, materials, furniture, landscaping, equipment that is sculpture and sculpture that is equipment. This huge project sums up all the current aims and current progress of American architecture — its technical achievements, its re-integration of all the building arts and its ability to handle both single buildings and building groups. As such, it is a milestone to be recognized and remembered."

*Morris Ketchum, Jr.*





Photographic Dept., S. C. Johnson & Son, Inc.

*S. C. Johnson & Son, Inc. Buildings, Racine, 1937-39; 1949, Frank Lloyd Wright, Administration. (Eighth) Laboratory. (Tied for fourteenth)*

"It is not easy to be coldly critical of any work by Frank Lloyd Wright. So much praise has been laid at this man's feet that one wishes it were possible to look upon this work again with a simple, unbiased mind. One might then ask, 'Is this a mere tour-de-force, or a romantic interpretation of what a factory in our time and country could be? Is it an example of the American power of advertising, or a pioneering effort to create the poetic symbols of our industrial age?' Yet one feels that none of these questions need be answered. Frank Lloyd Wright has shown here how to soar above the practical demands of his clients, above the thinking habits of his age, above the nagging compromises of mediocrities. These buildings shine in uncompromising purity and deliver all that the spirit may wish. To see them in the flesh is to forgive their author for not being what our rational age demands an architect to be — a forgiveness reserved only for the great."

*Pietro Belluschi*

"These may be considered more important and prescient even than Frank Lloyd Wright's most famous residences. Here are

six directions in which they surpass present standards. (1) Independent centrally-structured units, gracefully linked, permit great liberty in planning each unit according to need. Where used, repeated bays are grouped centrally, not in boring series either horizontally or vertically. (2) Centrally-structured units readily express total enclosed volumes, achieving grand scale regardless of size, impossible to flat by-the-yard façades, whose corners also do not compare in strength, eloquence or diversity with those shown here. (3) Different masses are not merely picturesque, they identify functions of the buildings to visitors and workers. (4) Opening large, low structure directly to the sky allows sealed, controlled clerical environment to incorporate invigorating variety of natural light without eye-level distraction. (5) Dispersed, diversified parking humanizes work-center relationship to transportation, allows expressive architectural modulations. (6) Enclosed courts, terraces and surrounds are planted, not to prettify; they lift monotonous terrain typical of industrial sites into integral participation, enriching architecture."

*Edgar Kaufmann*

*Minerals & Metals Research Building, I.I.T., Chicago, 1942-43, Mies van der Rohe. (Tied for seventeenth)*

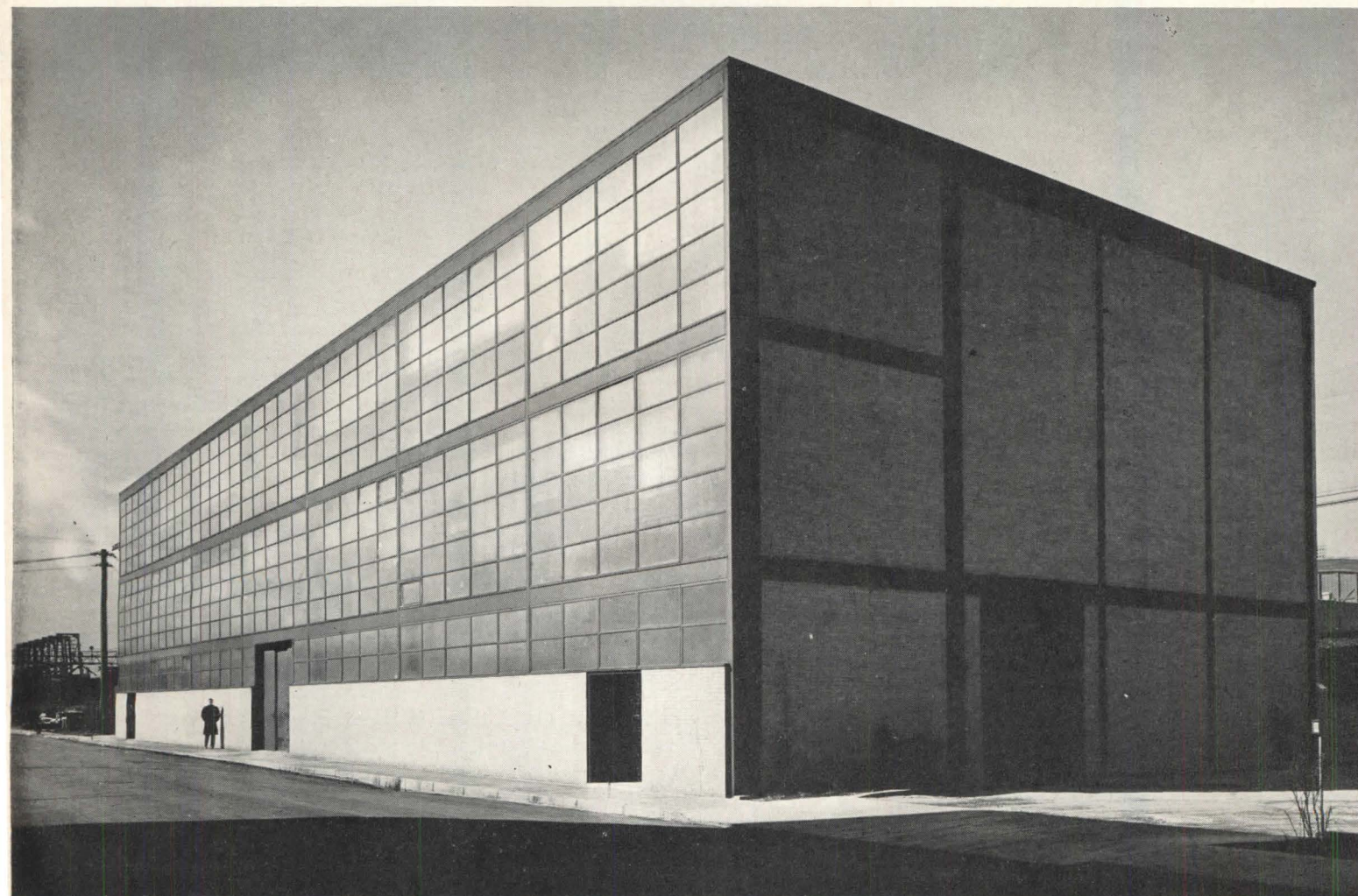
"Of all the many buildings on the campus of I.I.T., this, Mies' first pure statement of steel skeleton with brick and glass infill, has had the most influence; the first building off the drawing board in modern architecture which expressed the logic, now become so familiar, of a trabeated system seen from inside and outside at once, of the infill of glass and brick seen from both inside and out. Not since the Gothic has there been such clarity of expression. In subsequent buildings on the campus, Mies' expression has become richer and richer until this spring the Architecture Building, the greatest by far of the group, is now complete. Mies' logic has now become part of the grammar of American architecture." **Philip Johnson**

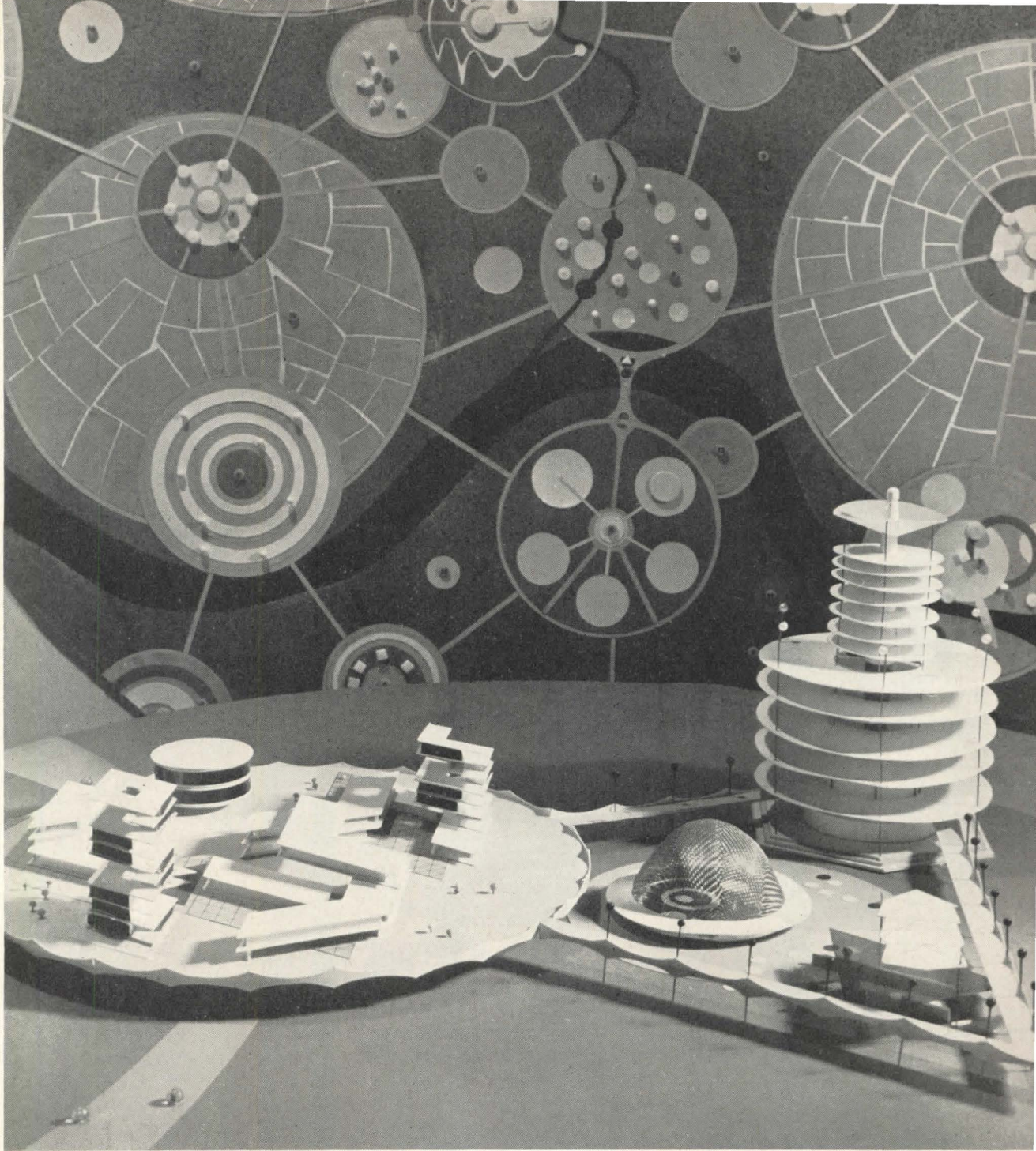
"The architecture of this building is compounded simply of skeleton and casing; of bones and flesh. It has an unexagger-

ated simplicity; it is terse and honest. Mies van der Rohe is not an architect with frequent changes of mood or manner. He has no assortment of design tricks. In glancing over his accomplished work for a period of thirty years, we discover, as here, a consistent and continuous structural frankness, with use made of modern materials. An early instance of his awareness that steel and concrete framework has a structural dignity and esthetic merit, is shown in his 1928 proposal for the remodeling of Alexanderplatz, Berlin, where a skeleton pattern of concrete columns and lintels dominate exterior design. He has held to the same formula ever since. In doing this he carried on the tradition of Auguste Perret, of France. It has been said that no architect of our day has exercised so wide an influence on architectural education and on American architecture, as has Mies van der Rohe."

**A. Lawrence Kocher**

Hedrich-Blessing





## HARTFORD, CONNECTICUT, IN 2056

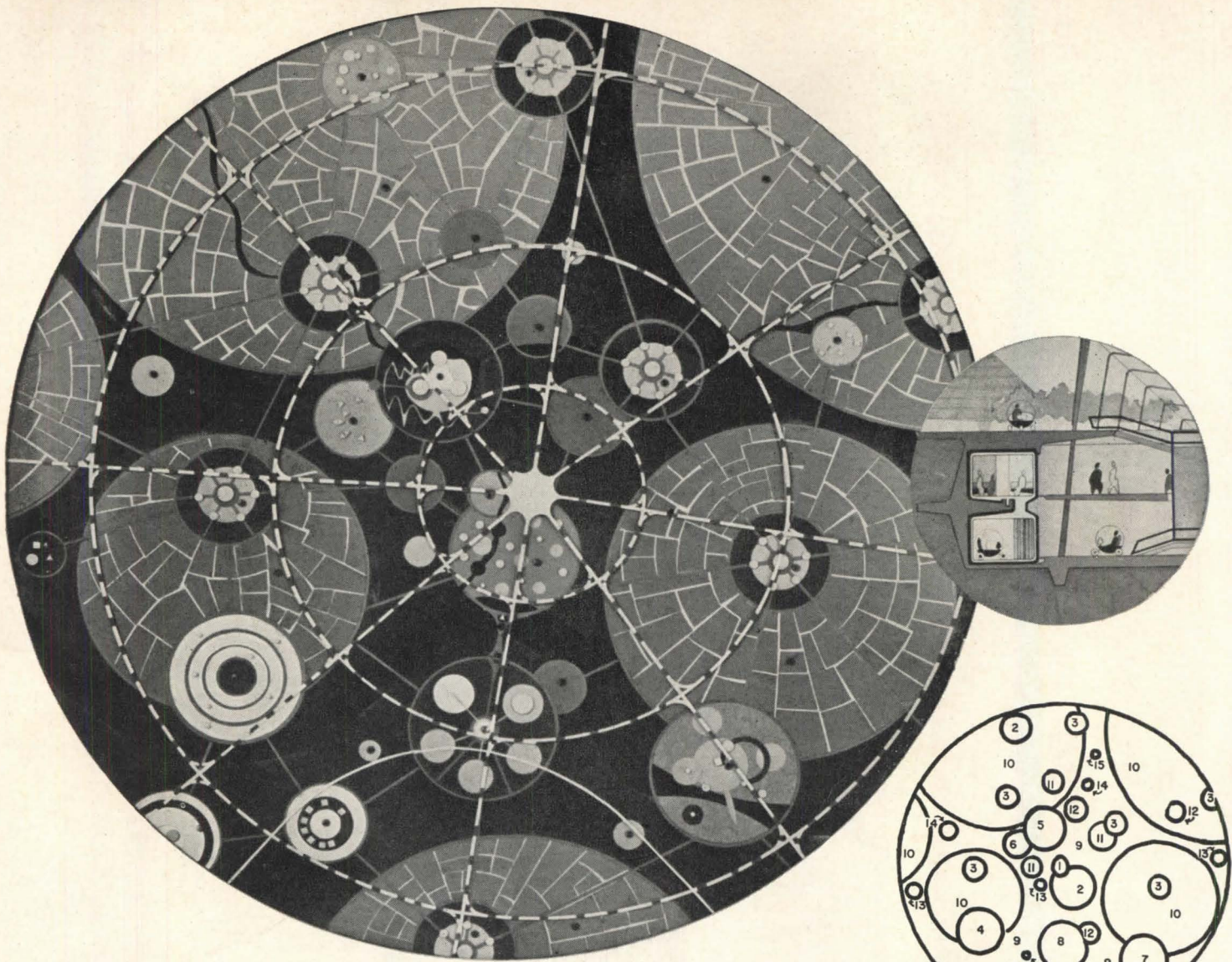
*Rhode Island School of Design broadens its educational horizon by having students replan a city for a hundred years hence*

WHAT SHOULD our cities be like in a hundred years, and how can their growth, change and development be visualized and planned? This stimulating problem was presented to the senior students in the Division of Architecture at the Rhode Island School of Design this last school year. The plans and models shown here are some of the intriguing results.

The city of Hartford, Connecticut, was selected as the site for the problem because of readily available

data which would allow a reasonable predictability on future change. Architecture and Landscape Architecture students were divided into seven teams to create independent solutions. Despite the originality, each solution is soundly based on existing Hartford and its expected growth patterns.

Perhaps the most important aspect of the problem, though, is its use as an educational device to foster a better analysis and understanding of the basic needs of



The master plan of one of the Rhode Island School of Design concepts of Hartford, Connecticut, in 2056 is shown above, overlaid with routes for an underground rapid transit system. The city is visualized as self contained units for varying activities, separated by forested park areas. Larger details of some of these units are shown on the opposite page. The inset is a section of a two-level subway scheme — passengers ride the upper level, "bubble" cars ride below. The different units in the city include: 1. Government; 2. Business (see model on preceding page); 3. Community Center; 4. Industry; 5. Cultural Center; 6. University; 7. Recreation; 8. Transportation Terminal; 9. Forest areas; 10. Housing (general); 11. Apartments; 12. Hotel-Motel; 13. Health Center; 14. Private Institutions; 15. Sensation Center

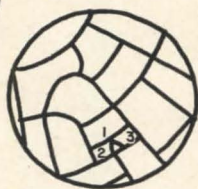
#### HARTFORD, CONNECTICUT, IN 2056

man, and the creation of a more suitable environment. To aid this goal, many types of specialists trained in professions concerned with the human being were called in to lecture — sociologists, biologists, doctors, economists and psychologists.

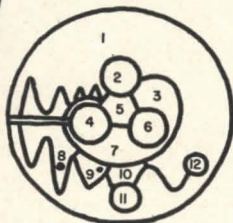
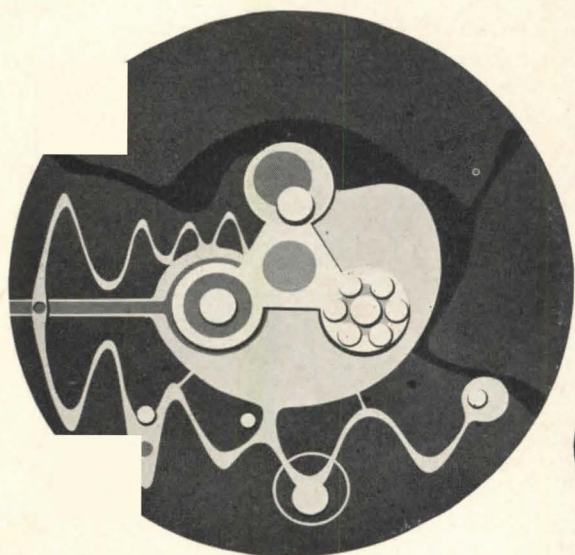
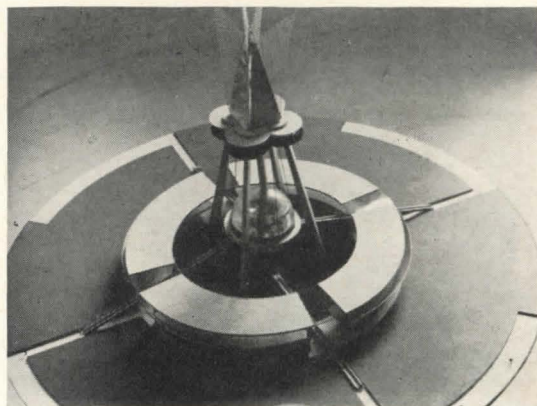
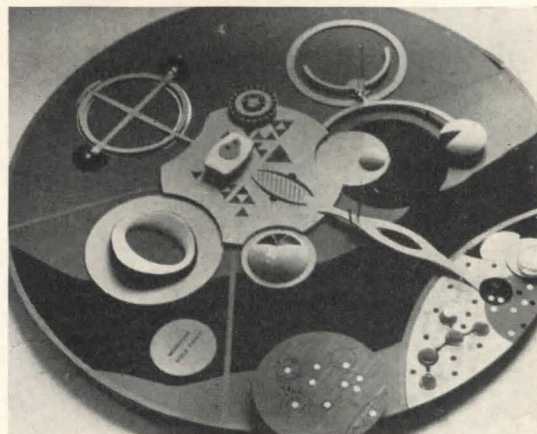
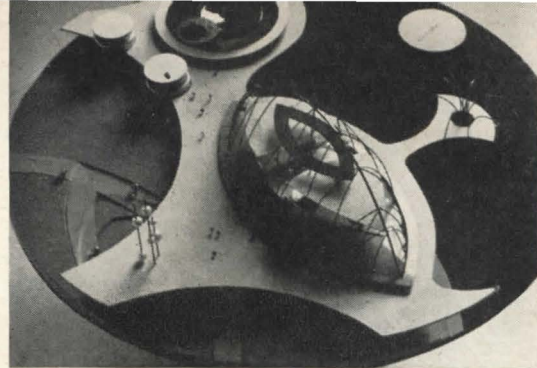
With our increase in professional specialization, it is extremely encouraging to see far-sighted educators reinforce training in a single technique by a program designed to relate diverse specialties.

This is especially true in architectural education. Often, in the enthusiasm of designing an individual building, the effect of such a unit on the total environment is ignored. This limited view can be carried through into actual architectural practice — with results that we all know. And the fact that planning deals with emotions and social habits, as well as physical needs is sometimes sadly neglected.

Granted that a single student problem will not solve

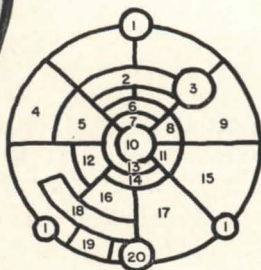
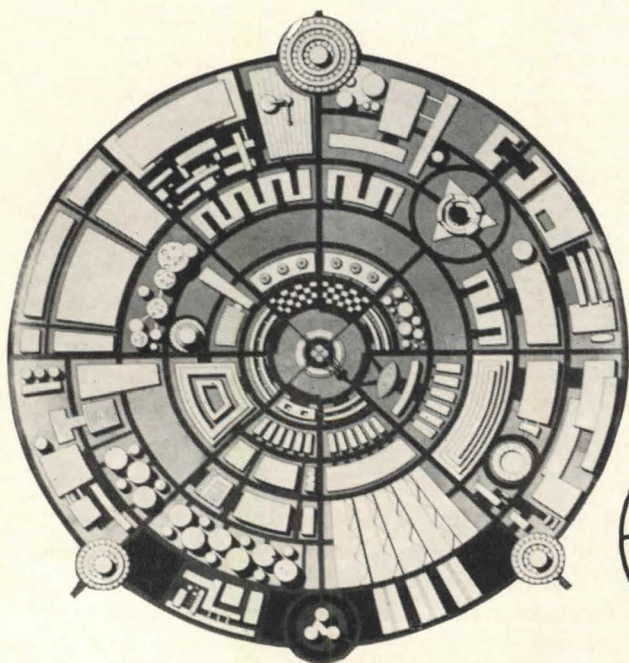


HOUSING 1. Church; 2. Shop; 3. Theater

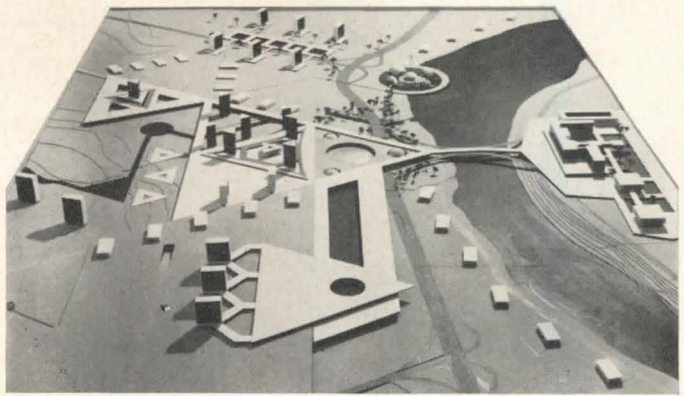
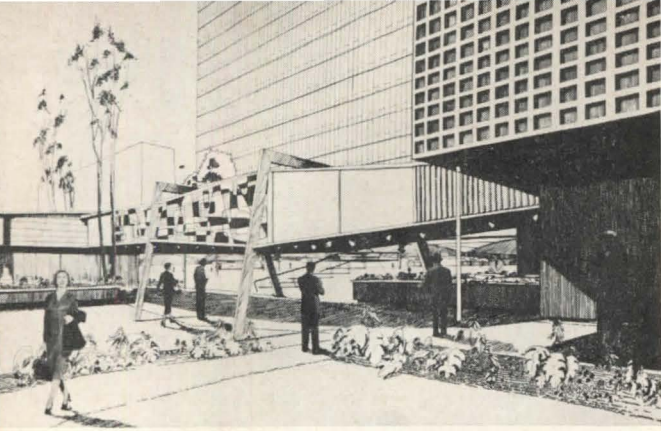


CULTURAL CENTER 1. Apartments; 2. Amphitheater, Civic Center; 3. Balloon Landing; 4. Museum; 5. Terrace, parking under; 6. Theater, Dining; 7. Terrace; 8. Institute for living; 9. Dining; 10. Observatory; 11. Zoo; 12. Dining, Light Opera

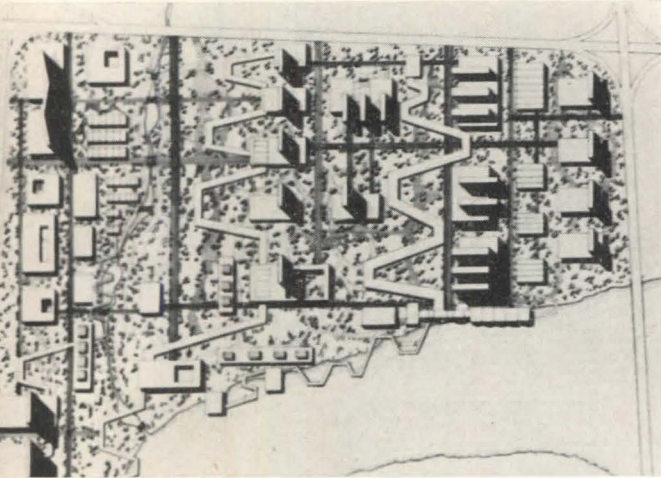
Top: Government center includes capitol building, law courts, state office buildings—all on raised terrace overlooking river. Center: Recreation Center, with various spectator sport stadia, amusement park, Bottom: Industrial Exhibition Building, the hub of the industrial center (below left) to display objects made in the area, coupled with a restaurant



INDUSTRY 1. Heliport; 2. Dry Storage; 3. Employee Center; 4. Heavy Industry; 5. Communications and Materials; 6. Chemistry; 7. Sales Offices; 8. Physics; 9. Light and Local Industry; 10. Exhibition; 11. Union Headquarters; 12. Testing; 13. Professional Offices; 14. Electronics; 15. Transportation; 16. Manufacture; 17. Food Processes; 18. Liquid Storage; 19. Power; 20. Restaurant



*Above: another student team evolved a city idea, also based on activity units, with a somewhat more monumental approach. The model shows the insurance and business center, with an industrial and labor relations center across the river at the right. The scheme places tall office buildings in a setting of great terraces, pools and esplanades. In all the problems, activity areas are located in approximately the same position as in the present-day city of Hartford*



*Left: these three sketches show a portion of a scheme with a slightly stronger ring of familiarity. They cover the business area, which includes large insurance buildings, department stores, small shops and restaurants. But buildings of any height are widely spaced, and all are carefully linked by separated routes for pedestrian, passenger car and service traffic. The result, to the pedestrian, is a pleasant, plaza-like atmosphere, free of all automotive traffic*

## HARTFORD, CONNECTICUT, IN 2056

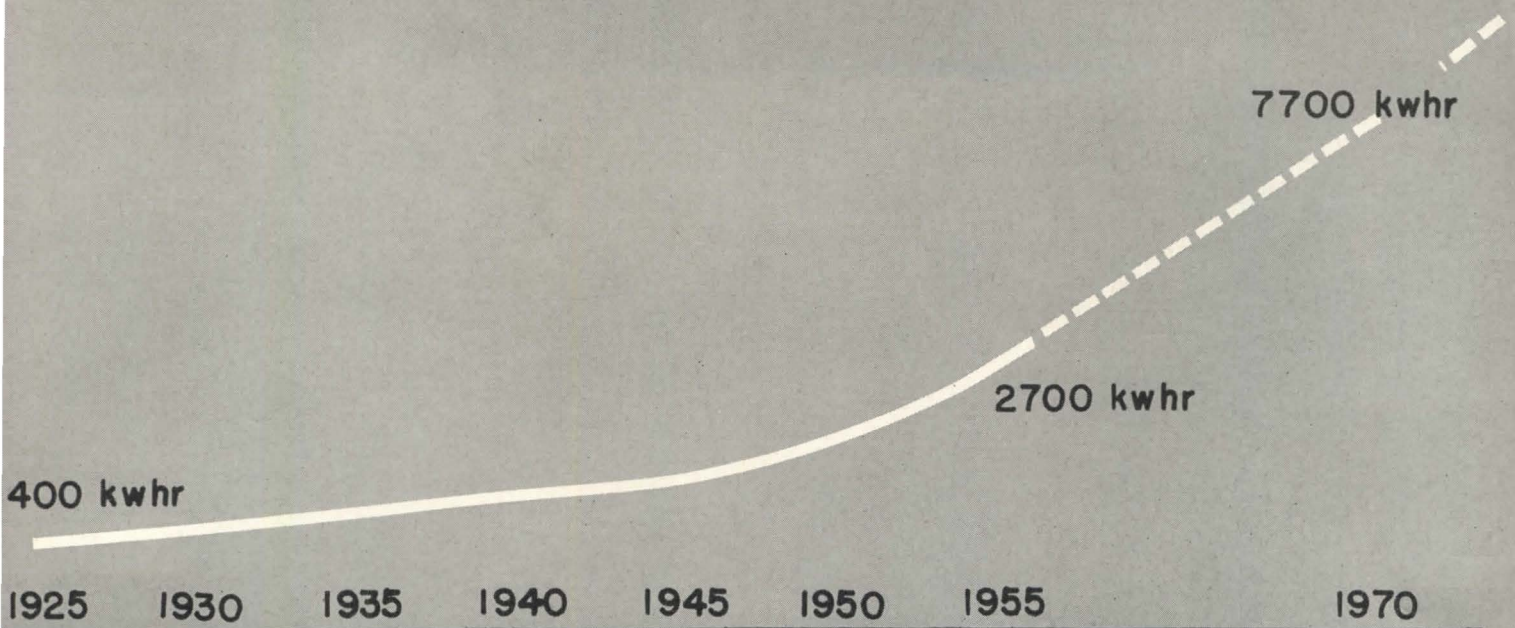
all the myriad stumbling blocks involved in ultimately creating an "ideal" environment, it is nevertheless a solid step in the right direction.

The students came up with some quite challenging ideas. To relate city areas more closely to the individual, various "nuclei" separated by forested areas were conceived. Each nuclei being, in effect, a small complete village. Larger commercial, industrial and recreational areas would be centers to themselves. Such nuclei,

linked by integrated and efficient transportation systems, were also conceived as permitting the expansion of city limits without breaking down the city plan as it continues to grow. Slums would have less chance of developing.

The entire program was a very broadened approach toward one of its stated aims . . . that "a city should be a tool serving man—a functional, pleasurable experience for its residents."





## ELECTRICAL DISTRIBUTION IN THE HOME

It continues to add more and more to the "comfort factor" of a house, and at only a fraction of the total building cost — if it's planned carefully!

IF THE ARCHITECTS of the first few decades of the 1900's could have predicted the extent to which electricity would be used in the home, many of the expensive rewiring jobs being done today would not be necessary. Architects of today's houses know better, though, and they incorporate this knowledge in their house designs by planning an adequate wiring system not only for today but also for tomorrow.

The average residential electrical customer of 1970 will use three times as much electric current as he does today! As shown in the graph above, his annual electric consumption has jumped, in the thirty years since 1925, from 400 to over 2700 kilowatt-hours — and predictions show that it will catapult to 7700 kilowatt-hours by 1970! But these figures are just for the average homeowner. The consumption factor of the "above-average" customer — and into this category fall a majority of the architect's clients — may reach an annual level of 30,000 kwhr before 1970!

The "degree" of electrical living that can be planned into a house is limited by two factors. First is the actual number of electrical appliances and other electricity-consuming elements which can be designed into the house. This factor is responsible for the phenomenal rise in electrical consumption and for the predicted increase for the future, especially in the categories of appliances, lighting and sound.

The second factor is the amount of electricity that can be supplied to the elements which make possible this degree of electrical living. And here is where pre-planning of the wiring system becomes so obviously essential. The larger the service conductors to the house, the more current will flow into the house, and therefore the more electrical elements can be planned into it. Power is delivered to a house, as can be seen in the chart on the next two pages, from the main utility circuit through three power lines. These lines run through a metering device and thence to the actual service entrance equipment, which consists of either circuit breakers or a switch and fuses to regulate the amount of current flowing through the lines. The service entrance shown on the chart is simply a representation and does not attempt to be consistent with the circuits indicated.

Service entrance conductors and equipment should be selected to serve adequately and safely all present and anticipated loads. The standard entrance is a three-wire, single-phase, 120/240-volt line which will deliver a maximum amount of current depending on the size and capacity specified by the architect. The maximum power supplied could vary from 24,000 (100 amperes times 240 volts) to 48,000 watts (200 times 240).

Service entrance equipment can be located in almost any part of the house. Although it used to be strictly basement

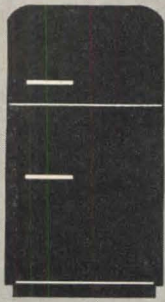
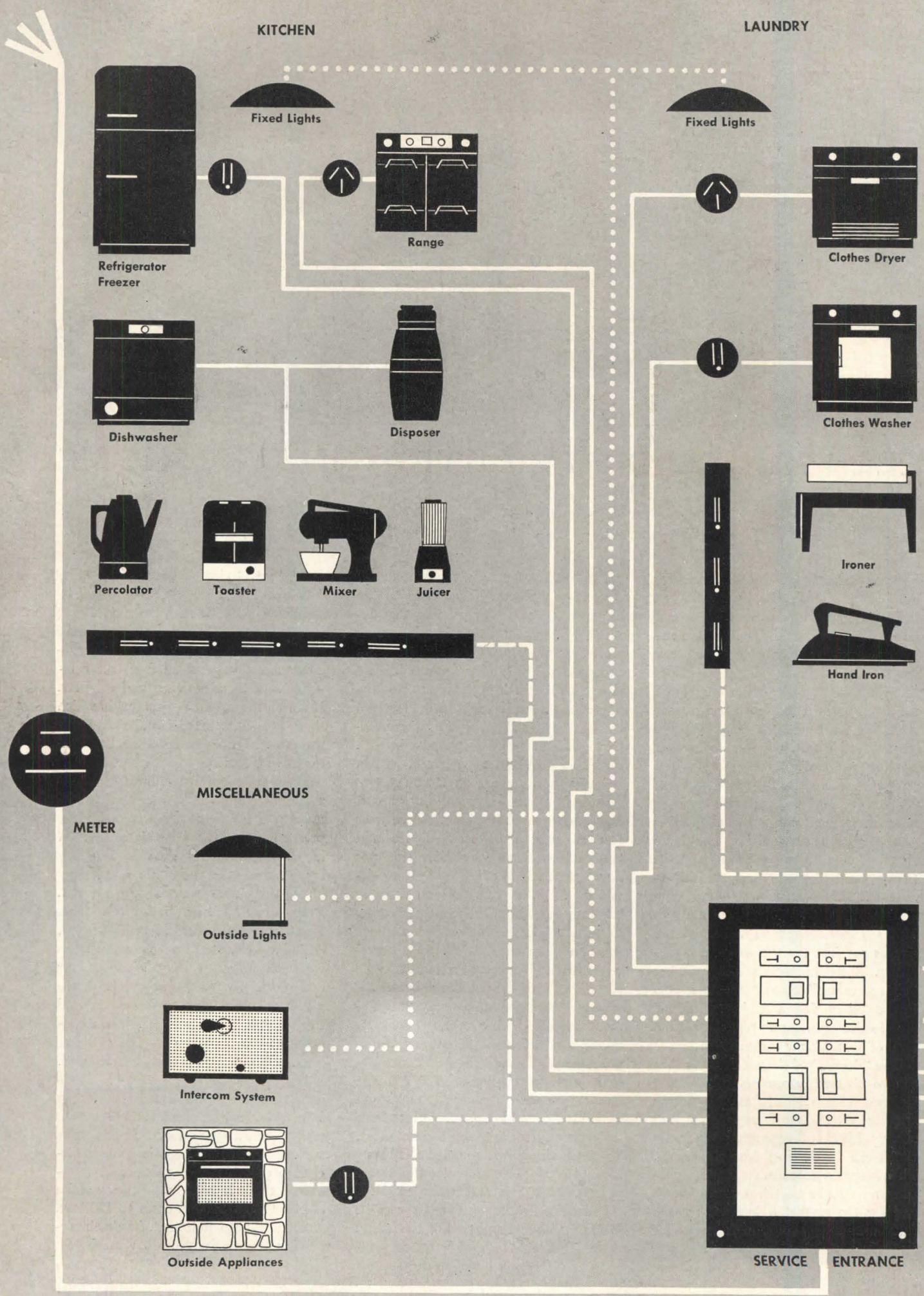
equipment, today's standardized cabinets are styled so that they can be installed in the kitchen, laundry, utility room or front hall, where they are more accessible. Almost any circuit arrangement can be assembled from the components of these standardized cabinets. It is well to provide for a panel in which there are some extra circuits available which can be activated when the need for them arises.

From the load center, branch circuits snake through the house servicing its multitude of electrical elements. More pressure is required to force current into some elements than is necessary for others — and here the advantages of a three-wire service are evident. From it can be drawn both low voltages for standard components such as lights, clocks, radios, etc., and higher voltages for such units as electric ranges, air conditioners, etc. Actually the three wires include only two live lines, and the third is a ground line. When connections are made across the two live lines, the full 240 volts are supplied. However, when connection is made across one live line and ground, only 120 volts are available. Voltage is never absolutely uniform. It has some variation, and so there is some interchange of ratings. For example, reference is made in some cases to a voltage of 115/230 and in other cases to 120/240.

An adequate number of branch circuits planned into the house saves

KITCHEN

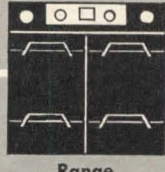
LAUNDRY



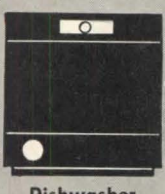
Refrigerator Freezer



Fixed Lights



Range



Dishwasher



Disposer



Percolator



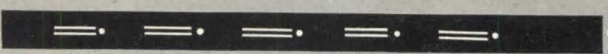
Toaster



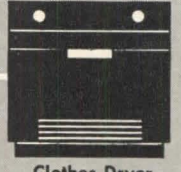
Mixer



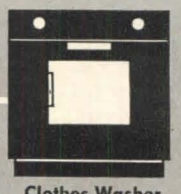
Juicer



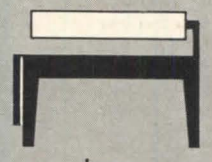
Fixed Lights



Clothes Dryer



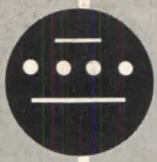
Clothes Washer



Ironer



Hand Iron

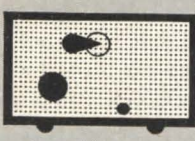


METER

MISCELLANEOUS



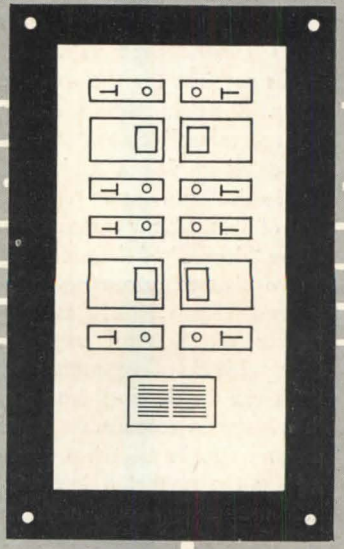
Outside Lights



Intercom System



Outside Appliances



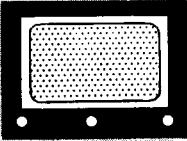
SERVICE ENTRANCE

# WIRING CIRCUITS

## LIVING-DINING



Fixed Lights



TV



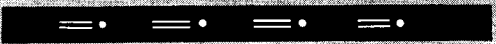
Clock



Lamps



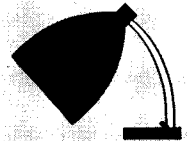
Vacuum Cleaner



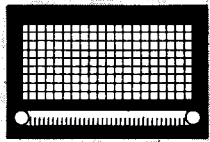
## BEDROOMS



Fixed Lights



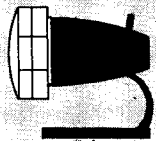
Heat Lamp



Radio



Electric Blanket



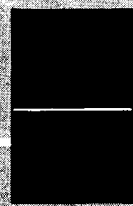
Fan



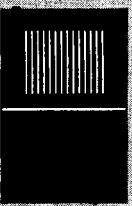
## UTILITY ROOM



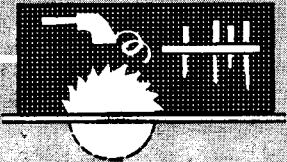
Water Heater



Heating Plant



Air Conditioner



Home Workshop

## BATHROOMS



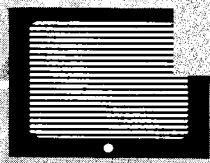
Lights



Electric Shaver



Hair Dryer



Heater

..... General Purpose Circuits  
 ..... General Purpose Circuits  
 ..... General Purpose Circuits

money for the homeowner in the long run because he thus avoids running the risk of overloading fewer circuits. The more appliances there are on a line — or, for that matter, the longer the line — the more "voltage drop" there is in the line. Voltage drop is actually loss of the energy which supplies the appliances operating on the circuit. It is much like too many faucets drawing water from one pipe, in which case there is a lowering of the pressure in the pipe. As an example of the seriousness of voltage drop, with only a 10 per cent reduction in voltage a 100-watt bulb gives less light than a 75-watt bulb operating at normal voltage.

It will be noted on the diagram on the preceding pages that there are three major types of branch circuits:

*General Purpose Circuits* serve small plug-in appliances plus lighting and operate on 120 volts.

*Small Appliance Circuits* serve convenience outlets in the kitchen, laundry, dining area, utility room and other areas where appliances are used frequently. They can operate on 120 volts.

*Fixed Appliance Circuits* serve only one appliance, or two at the most, because the load requirements and operating characteristics of most fixed appliances are such that only one line can supply enough power to service them without interfering with the home's continuing electrical activity. If a fixed appliance with a rating of over 1000 watts were placed on a small appliance circuit, there would always be the chance that the high-rated appliance might be turned on at some time when enough of the other appliances were operating that the circuit would be overloaded, thus either lowering the efficiency of the line or causing the fuse or circuit breaker to open and so stop the flow of current.

Most branch circuits can use No. 12 wire, although on some fixed appliance circuits it may be necessary to use No. 10 or No. 6 wire. Each wire size has an ampere rating, listed below, and so it is easy to determine what size should be used. Each circuit should be protected with a fuse or circuit breaker with the same rating.

Wire Size	Ampere Rating
14	15
12	20
10	30
8	40
6	55
4	70
2	95

Nos. 1, 0 and 00 have even higher ratings. The standard branch circuit using

No. 12 wire, with a 20-amp rating and 120 volts applied, has a capacity of 2400 watts. The same circuit using No. 14 wire would have a capacity of only 1800 watts, and the wiring cost would be very little less.

In planning the branch circuits of any house, there are five major characteristics which should be considered:

1. *Accessibility.* Convenience outlets should be just that — convenient. They should be provided in sufficient quantity and at convenient enough locations so that any portable electrical element can be plugged in and used wherever desired without the need for extension cords. It has been recommended that plug receptacles be so placed that no point along the floor line in any usable wall space is more than 6 ft from an outlet in that space. This recommendation is modified even further for kitchens to provision for one outlet in every 4 ft of work surface, with a minimum of one at each work surface. This does not include outlets for fixed appliances, which should be placed in the location at which the appliance is to be used.

2. *Capacity.* There should be ample provision for branch circuits so that all parts of the system can deliver rated voltage at full-load current. Overloads on branch circuits are unnecessary, especially today, when additional circuit capacity can be designed into the system so easily. As a matter of fact, each circuit should be planned so that it has a capacity of at least 20 per cent more than its maximum load.

*Future branch circuit capacity* should also be provided in the initial design of a house. With the inevitability of increased electrical load, there should not have to be any worry that future load will be an undue burden to the house. When provision is made in the initial design for inevitable "expansions" of the house electrical needs, there is a minimum expenditure involved in adding the branch circuits when the time comes.

3. *Isolation.* As mentioned before, separate circuits are needed for those appliances and pieces of equipment which operate automatically and shouldn't be subject to the overloads of other parts of the system. Even if the appliance is not automatic or motor-driven, it should have a separate circuit if it is rated at 1.65 kw or more.

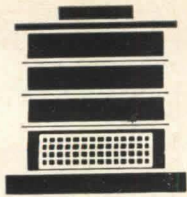
4. *Safety.* Every circuit should be planned for maximum safety. Properly rated circuit protective devices should be installed to check any hazard to the line. A safety factor built into the line makes it possible for additional appli-

ances to be added without danger of overloading.

5. *Control.* This is one of the most important features of an electrical system which the architect can design. Control means convenience, and this should be offered to every house client. In many cases it also means safety. This is particularly true in positioning light switches so that the homeowner never has to walk through a dark area before illuminating it.

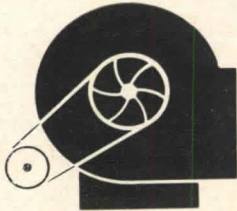
Control is applicable to thermostats, timers and other electrical devices, of course — but it has most pertinence to lighting, since most switches govern lights. Wall switches are usually mounted at a height of about 48 in. above the floor line. Enough control of these lights should be built in so that maximum operating convenience is attained. Further control is possible with remote control systems, by which lights and appliances all over the house can be operated from a distance.

Houses should be wired, of course, in conformance with the National Electrical Code. However, wiring plans should not stop there. The Code contains just the barest minimum standards, designed to keep a house safe from the hazards of electrical shock and fire. It is a standard for safety only and cannot be considered as a design specification for an *adequately* wired house. In planning for adequate wiring, an important consideration should be that wire itself costs very little. A substantial part of the wiring budget is the actual installation of the wire, not the wire itself. Therefore, it is most economical to plan for the future needs of the occupants and to provide in the initial design as many branch circuits and "spare" circuits as are feasible. It's far less expensive to plan for expansion that way than to pay for the labor involved in re-wiring years later. It has been estimated that future wiring installed in an existing house will cost 80 per cent more than the cost of activating "extra" branch circuits which were planned into the house when it was built. Estimates are also available which show that the wiring costs of a house designed to *minimum standards* are from 2 to 3.5 per cent of the total cost of the house, whereas the cost of wiring a house *adequately* amounts to from 2.5 to 5 per cent of the total house cost. Therefore, it costs only about 1 per cent more to wire a house adequately than to wire it to minimum standards. Considering the 80 per cent figure mentioned above for rewiring, it's hardly economical *not* to wire adequately.

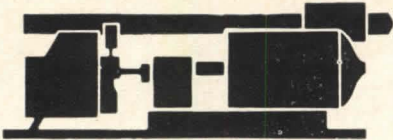


# AIR CONDITIONING COSTS IN LARGE SHOPPING CENTERS

By Francis A. Welch



IN THE LONG RUN, the most economical type of air conditioning for a large, regional shopping center uses a single central refrigeration and air handling plant. This was the conclusion of a previous article\* by the author which dealt, in a general way, with the maximum economies to be achieved. The article also pointed out that if the owner's requirements lend themselves to a compact, centralized group of buildings, central air distribution of high velocity air was most economical. For an architectural concept of a group of closely related but separate buildings, chilled water distribution serving each building would result in the second best economy. The features responsible for overall economy in both systems were the low operating cost of utilities and maintenance, together with no loss of rental space. The following article takes a slightly different approach. The emphasis here is not on maximum economy as a goal, but on how yearly costs vary as less money is spent initially for the air conditioning system. It gives specific cost analyses for the various types of systems possible in a 300,000 sq ft hypothetical shopping center.



## How Economy Varies

All shopping center air conditioning systems are not designed — and sometimes cannot be — on the basis of best overall economy. This, of necessity, requires a larger initial investment in equipment in order to have a low operating cost, thus providing a low total cost spread over the investment life of the shopping center. There are many instances where the necessary funds for such a design may not be available. The amount of financing available can vary, and as this amount is reduced, a less expensive system will have to be bought.

Thus as initial costs must be scaled down, less and less total economy is realized. This phase of the economics was touched on briefly in the table and

sketches in the previous article. To expand this phase of shopping center air conditioning economics, it is the purpose here to break away from the theme of maximum economy of shopping center air conditioning systems and indicate the range of economics possible for a 300,000 sq ft shopping center. This is given to the architect so that he and the client can be fully aware of the financial boundaries of what can be bought, how much it will cost for the life of the building, what impact it has on the building design, what the tenant will be faced with in the way of charges, and what economies can be expected.

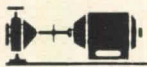
## Comparison of Designs

In order to make the cost comparisons manageable, we have chosen an average type of shopping center consisting of a co-related group of buildings of about 300,000 sq ft of rentable area. A cost analysis for each of the basic types of air conditioning systems is given, followed by a general discussion of merits, disadvantages, general comments and observations of these systems. Omitted is the high velocity system from a single point in which the initial and operating cost per year will total \$0.50 per sq ft with no rental loss. This system is feasible if all building units are grouped under one roof.

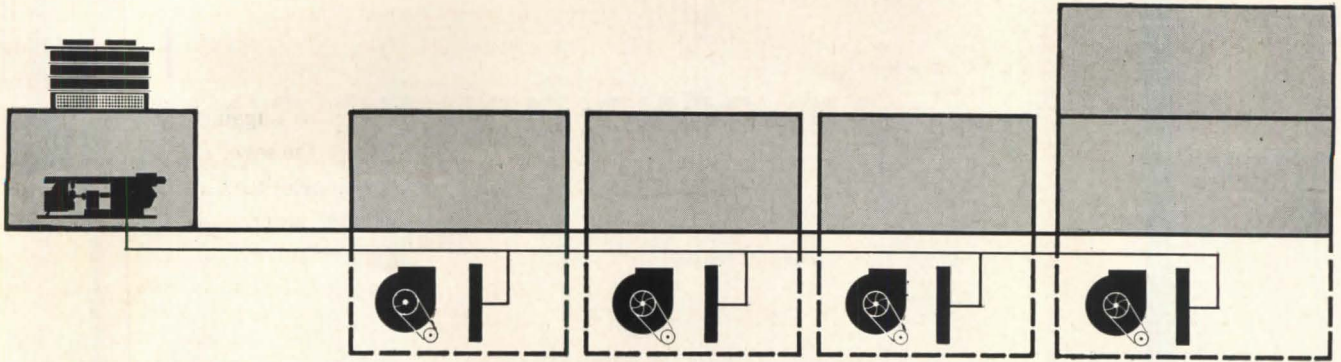
In order that these possibilities may be evaluated without becoming tedious, only the essential factors, and how they affect economy, are spelled out. The figures are average and are intended to serve as a general indication of the relative values of the different systems. Costs include air conditioning and heating in all schemes.

Initial costs are on a yearly basis in terms of sq ft of rentable area and are based on an amortized rate of 4 per cent interest for 20 years.

Operating costs are estimated from fuel, electric power, water, labor and lost rental space costs where they occur. Rental loss costs are due to rentable area given over to apparatus. Total annual cost is the sum of all costs.



\*"Economies in Air Conditioning for Shopping Centers," ARCHITECTURAL RECORD, October 1953.



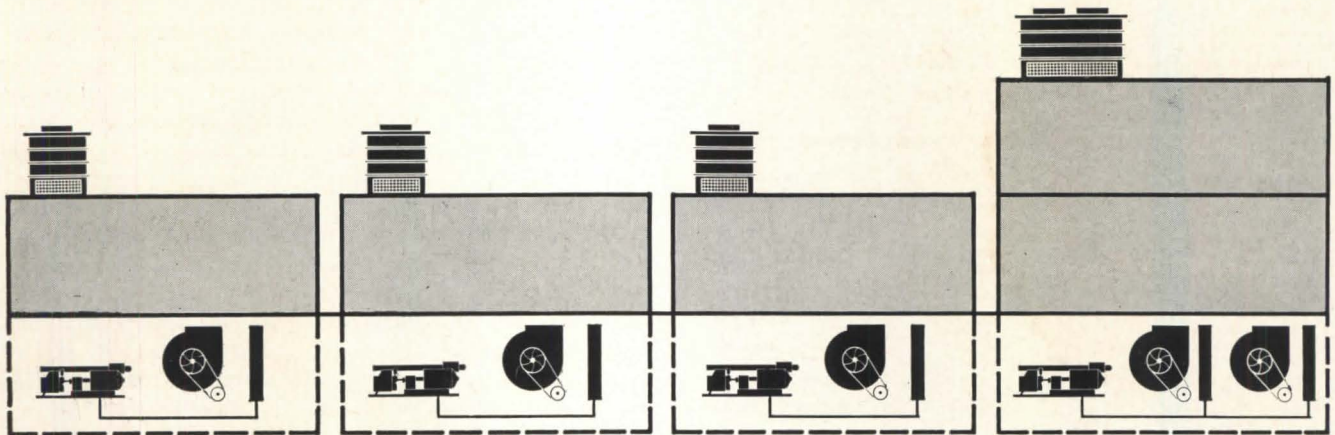
**SYSTEM 1: Central Refrigeration Plant, Air Handling Systems in Each Building**

<b>INSTALLATION COST PER SQ FT OF RENTAL AREA</b>		<b>\$3.38</b>
<b>ANNUAL COST PER SQ FT OF RENTAL AREA</b>		
Initial cost (amortized)	\$ .270	
Operating cost	\$ .190	
Rental loss cost	.070	
<b>Total operating cost</b>	<b>\$ .260</b>	<b>.260</b>
<b>TOTAL ANNUAL COST</b>		<b>\$ .530</b>
<b>ANNUAL COST FOR 300,000 SQ FT SHOPPING CENTER</b>		
Initial cost (amortized)	\$81,000	
Operating cost	\$57,000	
Rental loss cost	21,000	
<b>Total operating cost</b>	<b>\$78,000</b>	<b>78,000</b>
<b>TOTAL ANNUAL COST</b>		<b>\$159,000</b>

Let us start with the most economical system. This would be a single, central station refrigeration plant serving chilled water to a group of buildings, each with its central station air handling plant.

This type of system places refrigeration machinery and cooling towers remote from the selling areas — highly desirable for best appearance.

This system shows the highest initial cost but its annual costs over a 20-year period are lowest due to its favorable low operating cost, resulting from lower maintenance cost and a smaller loss of rental area.



**SYSTEM 2: Central Refrigeration and Air Handling Systems in Each Building**

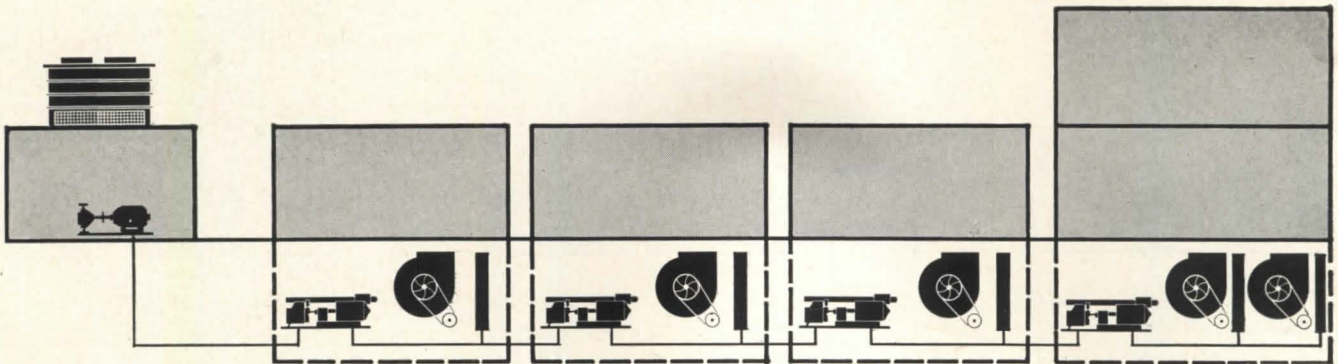
<b>INSTALLATION COST PER SQ FT OF RENTAL AREA</b>		<b>\$3.27</b>
<b>ANNUAL COST PER SQ FT OF RENTAL AREA</b>		
Initial cost (amortized)	\$ .260	
Operating cost	\$ .220	
Rental loss cost	.090	
<b>Total operating cost</b>	<b>\$ .310</b>	<b>.310</b>
<b>TOTAL ANNUAL COST</b>		<b>\$ .570</b>

The next logical system to analyze would be a complete central station refrigeration and air handling plant in each building. Here we have transferred the remote refrigeration and cooling tower equipment to each building — a less desirable location.

(System 2 continued)

ANNUAL COST FOR 300,000 SQ FT SHOPPING CENTER		
Initial cost (amortized)	\$78,000	
Operating cost	\$66,000	
Rental loss cost	27,000	
<b>Total operating cost</b>	<b>\$93,000</b>	<b>93,000</b>
<b>TOTAL ANNUAL COST</b>		<b>\$171,000</b>

This system shows a slightly lower initial cost than system No. 1. However, sometimes the balance in cost between these two systems will vary due to the relation of the length of chilled water lines in system No. 1 against the shorter chilled water lines but greater cost of the several scattered refrigeration plants within the buildings in System 2. Operating cost is up a little and the greater space required by the many refrigeration plants over the single plant shows up in a higher rental loss cost. This design also requires unsightly cooling towers on the roof of each building.



SYSTEMS 3 and 4: Central Station Condenser Water to Refrigeration and Air Handling Systems in Each Building

INSTALLATION COST PER SQ FT OF RENTAL AREA		\$3.27
ANNUAL COST PER SQ FT OF RENTAL AREA		
Initial cost (amortized)	\$ .260	
Operating cost	\$ .220	
Rental loss cost	.085	
<b>Total operating cost</b>	<b>\$ .305</b>	<b>.305</b>
<b>TOTAL ANNUAL COST</b>		<b>\$ .565</b>

ANNUAL COST FOR 300,000 SQ FT SHOPPING CENTER		
Initial cost (amortized)	\$78,000	
Operating cost	\$66,000	
Rental loss cost	25,500	
<b>Total operating cost</b>	<b>\$91,500</b>	<b>91,500</b>
<b>TOTAL ANNUAL COST</b>		<b>\$169,500</b>

INSTALLATION COST PER SQ FT OF RENTAL AREA		\$3.27
ANNUAL COST PER SQ FT OF RENTAL AREA		
	Owner	Tenant
Initial cost (amortized)	\$ .018	\$ .242
Operating cost	\$ .050	\$ .170
Rental loss cost	None	.085
<b>Total operating cost</b>	<b>\$ .050</b>	<b>\$ .255</b>
<b>TOTAL ANNUAL COST (each)</b>	<b>\$ .068</b>	<b>\$ .497</b>
<b>TOTAL ANNUAL COST</b>		<b>\$ .565</b>

### System 3

Here condenser water is distributed from a remote but centrally located station having a single central cooling tower which serves individual refrigeration and air handling plants in each building. This is essentially a variation of Systems 1 and 2.

The initial cost for this system is about the same as in System 2 due to cost of the long condenser water lines (offsetting the savings achieved with a single central cooling tower) as compared with short condenser water lines from a cooling tower on the roof of each building. Operating cost is also about the same. Here, as in the previous system, the cost balance can vary due to the length of the condenser water lines, in the same way that the cost of the chilled water lines varies in Systems 1 and 2.

Rental loss cost shows a slight improvement. When the costs break favorably, this system has the advantage over System 2 by getting the cooling towers off the roofs of the individual buildings.

### System 4

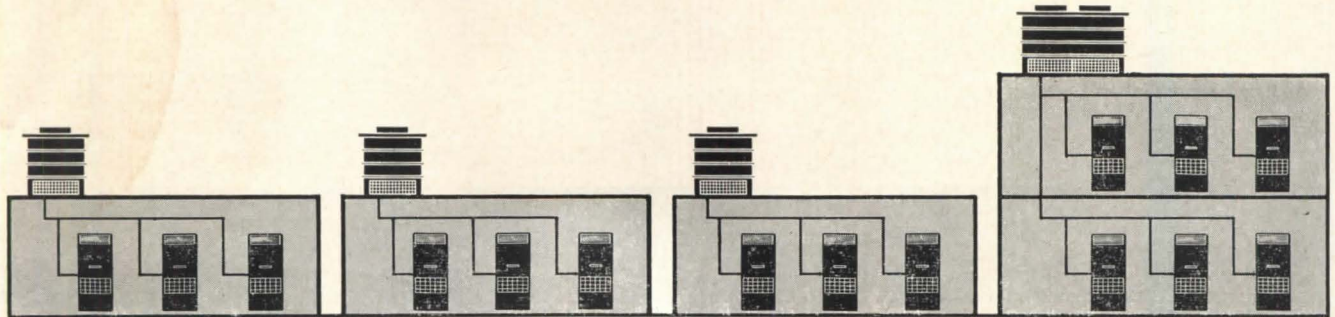
This system is essentially the same as System 3. The owner shaves his first costs by splitting costs with the tenant. Thus the owner furnishes the single central cooling tower and condenser water lines. The balance of the equipment, such as the

(System 4 continued)

ANNUAL COST PER 300,000 SQ FT SHOPPING CENTER	Owner		Tenant	
	Initial cost (amortized)		\$5,400	
Operating cost	\$15,000		\$51,000	
Rental loss cost	None		25,500	
<b>Total operating cost</b>	<b>\$15,000</b>	<b>15,000</b>	<b>\$76,500</b>	<b>76,500</b>
<b>TOTAL ANNUAL COST (each)</b>		<b>\$20,400</b>		<b>\$149,100</b>
<b>TOTAL ANNUAL COST</b>				<b>\$169,500</b>

refrigeration and air handling units, are furnished by the tenant.

Rental area occupied by the air handling apparatus, ducts and piping costs are about the same as System 3. The main features are the splitting of central costs and the possibility of adding the air conditioning at any later date.



SYSTEM 5: Package Units for Individual Tenants

INSTALLATION COST PER SQ FT OF RENTAL AREA	\$2.78
ANNUAL COST PER SQ FT OF RENTAL AREA	
Initial cost (amortized)	\$.220
Operating cost	\$.285
Rental loss cost	.087
<b>Total operating cost</b>	<b>\$.372</b>
<b>TOTAL ANNUAL COST</b>	<b>\$.592</b>

ANNUAL COST FOR 300,000 SQ FT SHOPPING CENTER	
Initial cost (amortized)	\$66,000
Operating cost	\$85,500
Rental loss cost	26,200
<b>Total operating cost</b>	<b>\$111,700</b>
<b>TOTAL ANNUAL COST</b>	<b>\$177,700</b>

This last system consists of package units for individual tenants in the various buildings, with individual evaporative condenser or cooling tower for each tenant.

The multiplicity of individual systems here shows the highest total annual cost per square foot of rental area, due to the higher operating and maintenance cost. Heating costs are added in order to make an equal comparison. It has been assumed that all package systems were installed for the complete shopping center, at the start by the owner; therefore the amortization has been calculated on the same basis as for the other systems.

### Conclusions

A broad general conclusion can be drawn from these figures. High initial cost yields maximum overall economy; low initial cost gives the least. And in between are designs varying accordingly in first cost and economy.

The high initial cost of a well-designed central station type of system, which confines maintenance to a single or few locations and reduces to a minimum or eliminates altogether a loss of rental area, can come up with a low enough operating cost to yield an attractively low total annual cost. This type of system will have many desirable features to appeal to the architect and owner, such

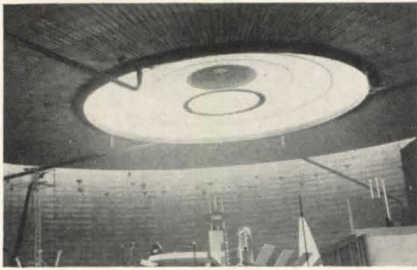
as concealed cooling towers, maintenance out of merchandising areas and in only a few locations, lower cost of electrical power and electric service to fewer locations, and a better appearance, in keeping with the magnitude of the initial outlay of capital.

Since the initial capital cost is great in large shopping centers, it is not too surprising to observe that some air conditioning systems are being installed as indicated in our systems 3 and 4. System 3 is a modification of System 2 by making the cooling tower, a single central plant. System 4 is the same as 3 with the owner splitting the cost with the

tenant. This system has the architectural advantage of no cooling towers on the various roofs. If the tenant can be persuaded to bear the cost of his refrigeration plant and air handling systems, under owner restrictions perhaps, the owner's initial capital outlay can be reduced considerably.

Thus it can be seen that economy in air conditioning systems for shopping centers does vary. On one end of the range of possibilities it can be seen that good long-range economy is feasible. On the other hand, where funds are only available for a lower cost system, a more expensive system to operate will result.





Lone Star Cement Company

## PRESTRESSED CABLED ROOF HANGS FROM THIN CONCRETE STADIUM WALL

A "HANGING" ROOF, gently arching down from the upper perimeter of a 4-in.-thick concrete cylinder, encloses a simple yet functional arena in Montevideo, Uruguay. The new stadium is 310 ft in diameter and 83 ft high and enjoys the advantages of completely uncluttered display because of the absence of columns or other interior supports.

The unique 850-ton roof system comprises a series of 256 radial, high-strength, seven-strand cables anchored and supported at the periphery of the stadium and sloping downward, with a drop of about one-tenth of the diameter, to a central tension ring 18 ft in diameter. The peripheral support of the cables is a reinforced concrete ring 6 ft 6 in. wide and 1 ft 5 $\frac{3}{4}$  in. thick. Working outward from a point 65 ft from the center, 9000 trapezoidal-shaped, precast concrete slabs, about 2 in. thick, were fastened to the cables by means of hooks shaped into the projecting ends of the reinforcing rods. After all the slabs were in place, a temporary overload of bricks was applied. With this load in place, the joints between slabs were filled with mortar, which was allowed to gain strength sufficient to bond the strands effectively before the overload was removed. This prestressing of the cables was effected so that the roof will not crack when the cables stretch and so that it will absorb the stresses of wind and rain.

The central part of the roof, 65 ft in diameter, was covered not with concrete but with glass to serve as a light source. Additional light and ventilation are provided by an open strip around the periphery. Drainage from the roof is carried off by four iron pipes leading from a central gutter to the cylinder walls, where they connect with the general drainage system.

The entire roof system was erected in seven weeks. This economy of time

was due in part to the fact that no false-work was necessary, except to support the center tension ring during construction.

The 4-in.-thick concrete wall of the cylinder was erected by the slip-form method. It is supported on 64 pairs of cast-in-place concrete piles on 15-ft centers, with extra reinforcing at the bottom of the wall to support dead and

live loads. It bears the load of the roof, and wind stresses, without any other support, its strength and stiffness being inherent in its curved shape.

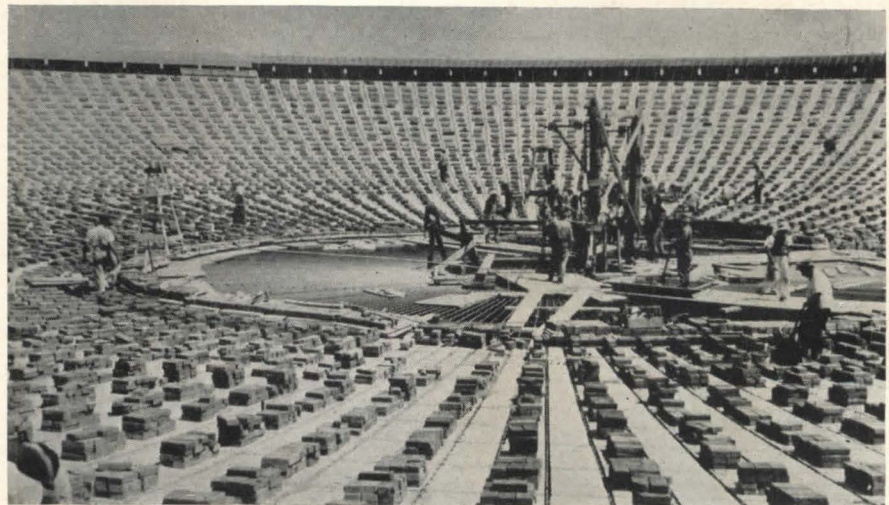
Engineers Luis Alberto Mondino and Leonel Viera of Montevideo created the design, with the help of Alberto S. Miller, C. E., and Lucas Rios, architect, of Montevideo, and The Preload Co. of New York.



Lone Star Cement Company

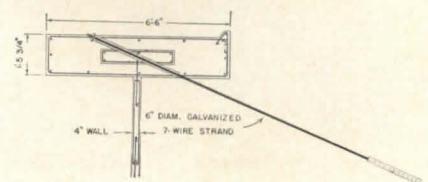


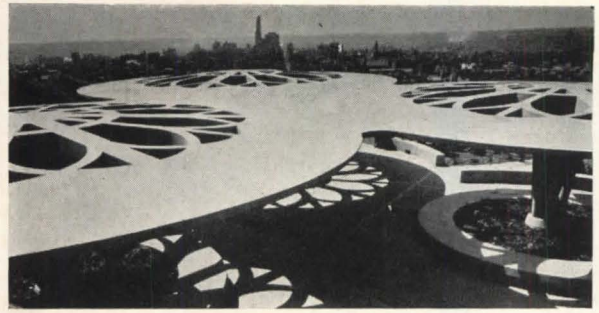
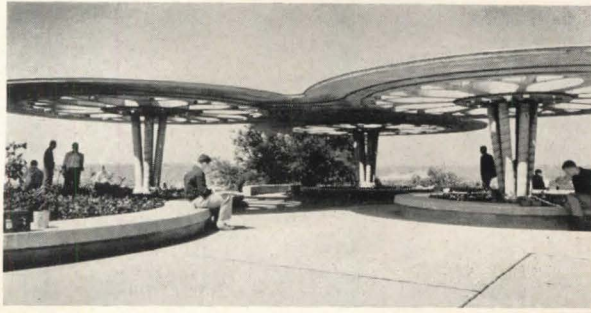
Lone Star Cement Company



The Preload Company

*Concrete slabs are suspended on cables by hooks. Lipped edges dovetail with slabs in preceding rows (above left). Only false-work necessary was at center tension ring (above right). Roof was prestressed by temporary brick superload which was laid on slabs during grouting of slab joints*





## CONCRETE CANOPIES OVERLOOK CITY OF CINCINNATI

DESIGNED AS PART of the Bellevue Hill restoration program in Cincinnati, the concrete "pergolas" shown above were described in the *Ohio Architect* as "a new landmark" which "demonstrates how a design based on local requirements and site, with freedom of thought and a keen sense of proportion and form, can be fitted with good taste into surroundings rooted in tradition."

The shelter consists of three canopies, each supported by six round columns that rise from the middle of round planting beds and slant outward at the up-

per ends. The columns are 8 in. in diameter and were cast in hollow tube forms which, after stripping, gave them a spiral effect. Each canopy is 30 ft in diameter and ranges in thickness from 3½ in. at the rim to 21 in. at the center.

Concrete in the canopies was air-entrained and was cast against fiberboard liners placed on a wood deck. It was hoisted to roof level, wheeled on runways to forms, and spaded and vibrated in the forms to give a smooth surface and prevent honeycombing. Form liners for the curved grillwork were bent and

braced with wood ribs. Beams that form the spokes in the wheels are alternately 6 and 12 in. wide, reinforced with No. 6 and No. 10 bars, respectively. Some of the reinforcement is approximately 60 ft long, serving two adjacent canopies. Fins at form joints were removed with a carborundum stone and all surfaces given a grout clean-down. Vines will climb the columns and twine through the grillwork.

R. Carl Freund, AIA, of Cincinnati, was the architect, and Hixson, Tarter & Associates the structural engineers.

## JACKS TILT PREFAB HOUSE SECTIONS INTO PLACE

ANOTHER technique of mechanization has been introduced to the residential construction field. Mechanical wall lifters — actually jacks — attach to the tops of prefabricated wall sections and facilitate tilting the heavy sections into place.

The mechanism is fairly simple, consisting of a gyn pole, steel shoes for the base, a cable anchor and a winch. The steel shoes are temporarily nailed to

the floor to secure the gyn pole, thus forming a hinge which permits the pole to follow the edge of the wall during lifting. This arrangement also prevents the wall from falling outward once it is erected. The cable anchor is attached to the top plate of the wall, while it is still in a horizontal position, by temporary (double-headed) nailing. The anchor mounts two rollers, and those rollers follow upward along a track on

the underside of the pole. The anchor also carries a spring-actuated safety dog which engages fixed stations built into the pole. Thus there is assurance that the wall will rest securely on the pole even if the cable should break.

To lift the wall, the handle of the geared winch is turned easily to wind the cable and thus move the cable anchor rollers along the pole tracks. The winch has a built-in ratchet which prevents backward movement of the spool. It can be detached from the pole by unscrewing the nuts on the underside and is equipped with a special base which can be nailed to the subfloor for such uses as warping walls into line. It can also be used for setting prefabricated stairs and trusses.

The mechanical wall lifting technique, created by Marvin W. Coleman of Dearborn, Mich., makes possible an effortless lifting of heavy wall sections including porch overhangs and cornice, as shown in the illustration at left. Mr. Coleman assures a saving of both time and money, since little or no scaffold work is involved.



(More Roundup on page 230)

## THIN, INSULATING CURTAIN WALL OF PORCELAIN-ENAMELED METAL

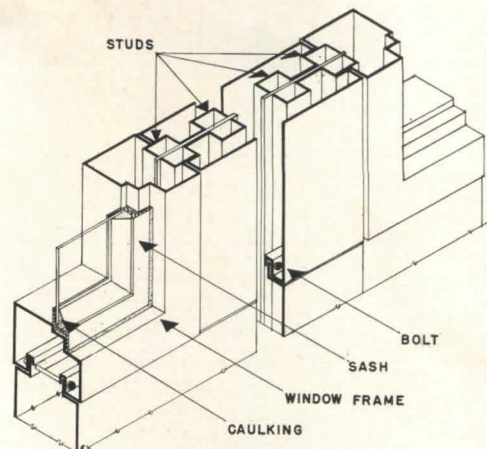
A THIN, PORCELAIN-ENAMELED metal curtain wall which offers insulating and acoustical properties and which is said to meet a 2-hr fire code requirement has been developed by the Erie Enameling Company of Erie, Pa. — and is waiting for its first application in a building.

The adaptable wall system, shown in isometric form at right, consists of box panels mechanically joined to an internal skeleton grid. There is no external framework, and so the exterior of the building, and the interior, are completely smooth. The internal skeleton is composed of formed-steel, porcelain-enameled studs fastened to discontinuous risers of asbestos board. The face pans are equipped with interlocking flanges which fit together to provide a weatherproof joint whether or not it is caulked — although it usually is for appearance and extra rigidity. A nut

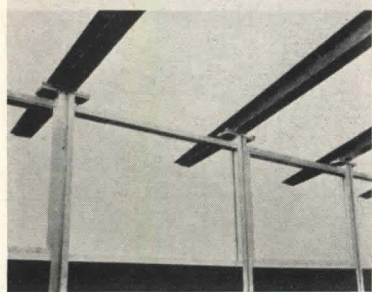
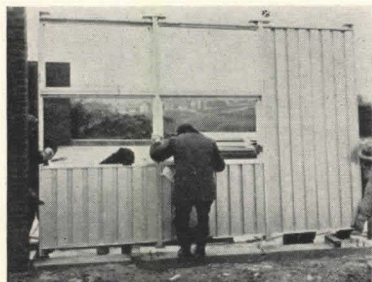
and bolt assembly, as shown in the drawing, secures the panel. Erection can be accomplished from the inside, thus eliminating the need for scaffolding.

The completed wall, providing both exterior and interior finish, is only 5¼ in. thick, but is said to have an insulation value equivalent to 12 in. or more of masonry. This is because the spaces in the wall are filled with a granular-type insulation during erection. Also, there is practically no metal-to-metal contact, since even the studs are porcelain-enameled. The U factor of the wall is said to be 0.78. The minimum metal contact — amounting to only about 0.1 per cent, where the nuts and bolts are located — also improves the acoustical properties of the wall.

The panels are said to have a calculated wind load capacity of 30 psf, which can be increased. Openings for doors and



windows can be located wherever specified, and the panels can be removed after installation for replacement should the occasion arise. *The Erie Enameling Co., Erie, Pa.*



## LOAD-BEARING ALUMINUM WALL SYSTEM

AN ALUMINUM CURTAIN WALL system in which the 4-in.-thick panels are load-bearing and insulating is prefabricated to the architect's specifications for speedy erection on the job site. Called the "W-A-E System" (Weather-Anchor-Expansion), it consists of panels which include integral structural framing, windows, doors and insulation and which are engineered to carry roof loads without additional supporting members. The panels, which sandwich 1½ in. of Fiberglas insulation between finished exterior and interior walls, are bolted directly to slab flooring, as shown in the photo above left. Special roof trusses for flat,

shed and ridge roofs rest on and are fastened to the panels, as shown in the lower photo. Clear roof spans up to 60 ft are said to be possible in one-story buildings.

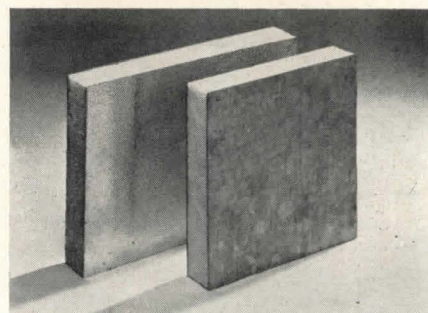
The system has been used recently in Sts. Simon and Jude Church and Parish Hall designed by Schell, Deeter & Stott, Pittsburgh architects. The exterior of the church is extruded aluminum and of the parish hall flat aluminum sheet. Both interiors are ¼-in. hardboard. The shell of the church was finished in only four days, and the building costs were reported to be \$11.77 per sq ft. *Aluminum Structures, Inc., Pittsburgh.*

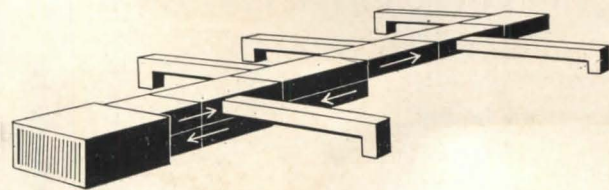
## LIGHTWEIGHT POLYSTYRENE SANDWICH PANELS

LIGHTWEIGHT SANDWICH PANELS are possible with *Uni-Crest*, an expanded and expandable polystyrene which is said to be adaptable to molding into any shape or form with controllable density. With facings of wood, steel, aluminum, plastic or fibers, it provides a panel which ranges in weight from 1 to 20 pcf and is

said to have a low rate of heat transfer and moisture absorption and a small coefficient of expansion. It is produced in molded slab, brick or block form in lengths up to 12 ft, widths to 4 ft and thicknesses to 8 in. *United Cork Co., Kearny, N. J.*

(More Products on page 244)



**CENTRAL-SYSTEM AIR CONDITIONING**

(AIA 30-F-1) This 24-page manual presents installation facts about the new Amana self-contained, air-cooled systems, available in 2- and 3½-hp sizes. A variety of home installation possibilities — in attics, basements, utility rooms and crawl spaces — are illustrated, in addition to commercial and custom installations. The manual also describes installation kits which are available as optional equipment and which include lightweight, prefabricated Fiberglas air ducts with aluminum foil vapor barrier, shown at left. *Amana Refrigeration, Inc., Amana, Iowa.*

**Lightweight Construction Systems**

(AIA 3-D-3) Describes lightweight roof, floor, ceiling and wall construction with insulating concrete. Also gives product specifications and lists technical bulletins. 16 pp. *Acoustical Plastic for Sound-Conditioning and Fire-Safety* (4 pp) and *Vermiculite Plaster Fireproofing* (16 pp) also available from *Zonolite Co., 135 So. LaSalle St., Chicago 3, Ill.\**

**Ainsworth Lighting (AIA 31-F)**

Catalog A-7 presents dimensions and installation data about the *Spacialite* for diffuse illumination, the *Budgetlite*, the *Magna*, the *Executive* and the *Radiant* luminaires. 8 pp. *Ainsworth Lighting, Inc., 38-10 29th St., Long Island City 1, N. Y.*

**Private and Public Pools**

(AIA 35-F-2) Catalog 506 includes diving boards and equipment, diving stands, filter tanks, ladders, lifeguard chairs, railings, underwater lights and other equipment for swimming pools. 52 pp. *Modern Swimming Pool Co., Inc., 1 Holland Ave., White Plains, N. Y.*

**“Wet Back” Scotch Type Boilers**

(AIA 30-C-1) Catalog AP-294 presents 13 sizes of Pacific 800 Series boilers. 8 pp. *Pacific Steel Boiler Div., National-U. S. Radiator Corp., Johnstown, Pa.\**

**Lead Building Construction**

(AIA 29-B-7) Bulletin 1 provides specifications for the use of lead connections for water closets and similar fixtures. 4 pp. *Lead Industries Assn., Architectural Dept., 420 Lexington Ave., New York 17.*

**Plastics in Home Building**

This colorful booklet is divided into sections on foundations, framing, finishing, built-in equipment and mechanical equipment. 16 pp. *Bakelite Co., Room 1502, Dept. RM, 300 Madison Ave., New York 17, N. Y.*

**Stillwater Steam Conduit**

Engineering Manual contains blueprints, drawings, tables of soil conditions and other technical data about steam conduit. *The Stillwater Clay Products Co., 3334 Prospect Ave., Cleveland 15.*

**Multi-Purpose Classroom Units**

Specification and data file folder includes data sheets on 24 units that compose the complete line of classroom cabinets produced by *National School Furniture Co., Public Relations Director, Odenton, Md.*

**Durable Process, Flameproofs Fabrics**

Describes *Pyroset* guaranteed custom flameproofing of textiles. *Perma Dry Co., Inc., c/o Jack Taylor, Dept. R., 3 West 17th St., New York 11, N. Y.*

**Mississippi Glass**

. . . for School, Commercial, Residential, Industrial Use (AIA 26-A). Catalog 56G covers figured, wire, Coolite and glare-reducing glass for the types of construction specified. 20 pp. *Mississippi Glass Co., Dept. 7, 88 Angelica St., St. Louis 7, Mo.\**

**Schools with Flexicore Slabs**

Includes plans and detail drawings of recent projects by school architects in which steel-reinforced, hollow-cast *Flexicore* floors and roofs are used. 16 pp. *The Flexicore Co., Inc., 1932 E. Monument Ave., Dayton 1, Ohio.\**

**Convenience Outlets Unlimited**

Form 589 describes five sizes of *Plugmold* raceways with capacities up to the No. 6 conductors for industry, stores, offices and homes. 12 pp. *The Wiremold Co., Hartford 10, Conn.*

**Education Is a Physical Process, Too**

Describes Fiberglas products for construction and maintenance of schools. 28 pp. *Owens-Corning Fiberglas Corp., Toledo 1, Ohio.\**

**Air Conditioning Equipment**

Two brochures describe Janitrol commercial and industrial air conditioning equipment: one covers air-cooled and the other water-cooled installations. *Janitrol Heating and Air Conditioning Div., Surface Combustion Corp., Columbus 16, Ohio.\**

**Wilson Midget Slat Closures**

Brochure shows two plans and includes a number of photographs of installations of Midget Slat closures for small apertures. 8 pp. *The J. G. Wilson Corp., 370 Lexington Ave., New York 17.\**

**Metalab Classroom Equipment**

Catalog 56-CE features a new group of tables and desks offering a tapered leg design to harmonize with modern classrooms. 8 pp. *Metalab Equipment Co., Div. of Norbute Corp., Adv. Dept., 214 Duffy Ave., Hicksville, L. I., N. Y.*

**Aluminum Windows and Doors**

Catalog 567-WD illustrates ribbon windows, architectural projected windows, curtain walls, custom windows, aluminum “full weld” doors and monumental entrances for schools. 4 pp. *Marmet Corp., Wausau, Wis.\**

**Sound Control Consoles**

Catalog S.132 covers, in non-technical language, a new line of dual channel consoles for central sound distribution of two separate program sources simultaneously. 6 pp. *Radio Corp. of America, Bldg. 15-1, Camden, N. J.\**

**School Cabinets, Under Window**

(AIA 19-E) Brochure 9 presents suggestions for designing under-window school cabinets; includes eight installations. 14 pp. *Architectural Woodwork Inst., 332 So. Michigan Ave., Chicago 4, Ill.*

\*Other product information in *Sweet's Architectural File, 1956.*

(More Literature on page 304)

**RESIDENTIAL ELECTRICAL SYSTEMS—1: Load and Circuit Chart**

	Typical Connected Watts	Preferred Circuit	Volts	Wires	Circuit Breaker or Fuse	Outlets on Circuit	Type of Outlet	Notes
<b>Kitchen</b>								
Range	12000	10 kw	120/240	3 #6	50A	1	Special Purpose	Use of more than one outlet is not recommended.
Oven (built-in)	4500	6 kw	120/240	3 #10	30A	1	Special Purpose	
Range Top	6000	6 kw	120/240	3 #10	30A	1	Special Purpose	May be direct-connected.
Range Top	3300	4 kw	120/240	3 #12	20A	1	Special Purpose	
Dishwasher	1200	2 kw	120	2 #12	20A	1	Parallel Grounding	These appliances may be direct-connected on a single circuit. Grounded receptacles required, otherwise.
Waste Disposer	300	2 kw	120	2 #12	20A	1	Parallel Grounding	
Broiler	1500	2 kw	120	2 #12	20A	1 or more	Parallel Grounding or Parallel	Heavy-duty appliances regularly used at one location should have a separate circuit. Only one such unit should be attached to a single circuit at one time.
Fryer	1300	2 kw	120	2 #12	20A	1 or more	Parallel Grounding or Parallel	
Coffeemaker	1000	2 kw	120	2 #12	20A	1 or more	Parallel Grounding or Parallel	
Refrigerator	300	2 kw	120	2 #12	20A	1 or more	Parallel Grounding or Parallel	Separate circuit serving only refrigerator and freezer is recommended.
Freezer	350	2 kw	120	2 #12	20A	1 or more	Parallel Grounding or Parallel	
<b>Laundry</b>								
Washing Machine	1200	2 kw	120	2 #12	20A	1 or more	Parallel Grounding	Grounding type receptacle required. Separate circuit is recommended.
Dryer	5000	6 kw	120/240	3 #10	30A	1	Special Purpose	
Ironer	1650	2 kw	120	2 #12	20A	1 or more	Parallel Grounding	Appliance may be direct-connected — must be grounded.
Hand Iron	1000	2 kw	120	2 #12	20A	1 or more	Parallel	
Water Heater	3000						Special Purpose	Consider possible use in other locations. Consult utility company for load requirements.
<b>Living Areas</b>								
Workshop	1500	2 kw	120	2 #12	20A	1 or more	Parallel Grounding	Separate circuit recommended.
Portable Heater	1300	2 kw	120	2 #12	20A	1	Parallel	Should not be connected to circuit serving other heavy duty loads. Should not be connected to circuit serving appliances.
Television	300	2 kw	120	2 #12	20A	1 or more	Parallel	
Portable Lighting	1200	2 kw	120	2 #12	20A	1 or more	Parallel	Provide one circuit for each 500 sq ft. Divided receptacle may be switch-controlled.
<b>Fixed Utilities</b>								
Fixed Lighting	1200	2 kw	120	2 #12	20A	1 or more		Provide at least one circuit for each 1200 watts of fixed lighting. Consider 4-kw 3-wire circuits to all window or console type air conditioners. Outlets may then be adapted to individual 120- or 240-volt machines. Connection to general purpose or appliance circuits is not recommended.
Air Conditioner (¾ hp)	1200	2 kw	120	2 #12	20A	1	Parallel Grounding	
Air Conditioner (1½ hp)	2400	4 kw	120/240	3 #12	20A	1	Tandem Grounding	Consult manufacturer for recommended connections. May be direct-connected.
Central Air Conditioner	5000	6 kw	120/240				Special Purpose	
Sump Pump	300	2 kw	120	2 #12	20A	1 or more	Parallel Grounding	Direct-connected. Individual circuit is recommended. Direct-connected.
Heating Plant	600	2 kw	120	2 #12	20A	1		
Fixed Bathroom Heater	1500	2 kw	120	2 #12	20A	1		May be direct-connected. Individual circuit is recommended.
Attic Fan	300	2 kw	120	2 #12	20A	1 or more	Parallel Grounding	

From *Electrical Construction and Maintenance*, Copyright 1955.

# WEIS INSTALLED IN WORLD'S BIGGEST!



ARCHITECT: *Maurer & Maurer, Architects & Engineers*  
CONTRACTOR: *Black & Anderson Construction Co., Inc.*

**T**HE NORTH SIDE Gymnasium at Elkhart, Indiana, is the world's largest high school gymnasium... with a seating capacity of nearly 9,000. And in keeping with this modern building's excellent furnishings, *Weisart* ceiling-hung toilet compartments were installed. These toilet compartments are proving themselves in appearance and easy maintenance to be a most economical installation... as they have in thousands of buildings throughout the nation. Send coupon below for further information about the complete line of Weis toilet compartments.



**WEISART** ceiling-hung style combines modern appearance with sanitation. No dirt-catching corners, no posts to interfere with floor maintenance. Completely rigid. Made to withstand use and abuse. Choice of 24 oven-baked enamel colors. Brass hardware is chrome plated.

**SEND FOR FREE CATALOG :**

HENRY WEIS MANUFACTURING COMPANY, INC.  
7556 Weisway Building, Elkhart, Indiana

Please send free descriptive catalog of Weis  
 toilet compartments    cabinet showers

NAME \_\_\_\_\_  
 FIRM \_\_\_\_\_  
 ADDRESS \_\_\_\_\_  
 CITY, STATE \_\_\_\_\_

Please send name of representative.



*toilet compartments and cabinet showers for schools, institutions, industry and home*

**RESIDENTIAL ELECTRICAL SYSTEMS—2: Service Entrances**

Calculation of a service entrance which has adequate capacity to supply the load requirements of a house is a straightforward procedure. A sample calculation is shown below based on the diagram on pages 212 and 213 and the ratings given on page 225.

First the loads are figured for the branch circuits, which, as stated on page 214, are divided into three categories:

**General Purpose Circuits:** They serve lights throughout the house and convenience outlets everywhere except in kitchen, laundry, dining and utility areas. Generally, circuit capacity can be figured on the basis of 3 or 4 watts per sq ft. Using the higher value of 4:

$$4 \text{ watts per sq ft} \times 1500 \text{ sq ft} = 6000 \text{ watts}$$

**Small Appliance Circuits:** They serve convenience outlets in the kitchen, laundry, dining area and utility room. The load on each circuit can be assumed to be 1500 or 2000 watts. Using the higher figure of 2000, the two circuits shown in the diagram will have a capacity of:

$$2 \text{ circuits} \times 2000 \text{ watts} = 4000 \text{ watts}$$

However, it can be assumed that not all of the load on these two types of branch circuits will be used at any one time. So, in order to determine the service requirements for them, it can be assumed arbitrarily that the first 3000 watts will be operated at 100 per cent capacity and the remainder at only 35 per cent.

$$\begin{aligned} 3000 \text{ watts} \times 100 \text{ per cent} &= 3000 \text{ watts} \\ 7000 \text{ watts} \times 35 \text{ per cent} &= 2450 \text{ watts} \end{aligned}$$

Total service requirements of General Purpose and Small Appliance Circuits = 5450 watts

**Fixed Appliance Circuits:** They serve the heavy-duty appliances, each of which requires a separate circuit. Capacities taken from the chart on page 225 are listed above right. The typical household range is calculated at only two-thirds of its rated capacity, since it is assumed that not all of its elements will be operating at full load at any one time:

Range . . . . . 8000 watts

The other fixed appliances except for the heating and cooling system, are calculated at an assumed 75 per cent demand factor:

Refrigerator-Freezer . . . . . 650 watts  
Dishwasher and Disposer . . . . . 1500 watts  
Clothes Washer . . . . . 1200 watts  
Clothes Dryer . . . . . 5000 watts  
Water Heater . . . . . 3000 watts  
Workshop . . . . . 1500 watts  

---

12,850 watts

$$12,850 \text{ watts} \times 75 \text{ per cent} = 9637.5 \text{ watts}$$

In calculating the heating-cooling load, the higher value of the two systems is used, since it is assumed that they will not be operating at the same time. It is recommended that the architect consult the local utility for information about central air conditioning systems. However, for purposes of this calculation a value of 5000 watts is assumed. Since this is higher than the total of 600 watts for the heating plant and 1500 watts for the bathroom heater, this will be the value used.

Central Air Conditioning . . . . . 5000 watts  
Total Capacity of  
Fixed Appliance Circuits = 22,637.5 watts

$$\begin{aligned} \text{Total watts of service capacity} &= 5450 + 22,637.5 \\ &= 28,087.5 \text{ watts} \end{aligned}$$

Thus, the required current-carrying capacity of the service entrance conductors for a 120/240-volt, 3-wire, single-phase service is:

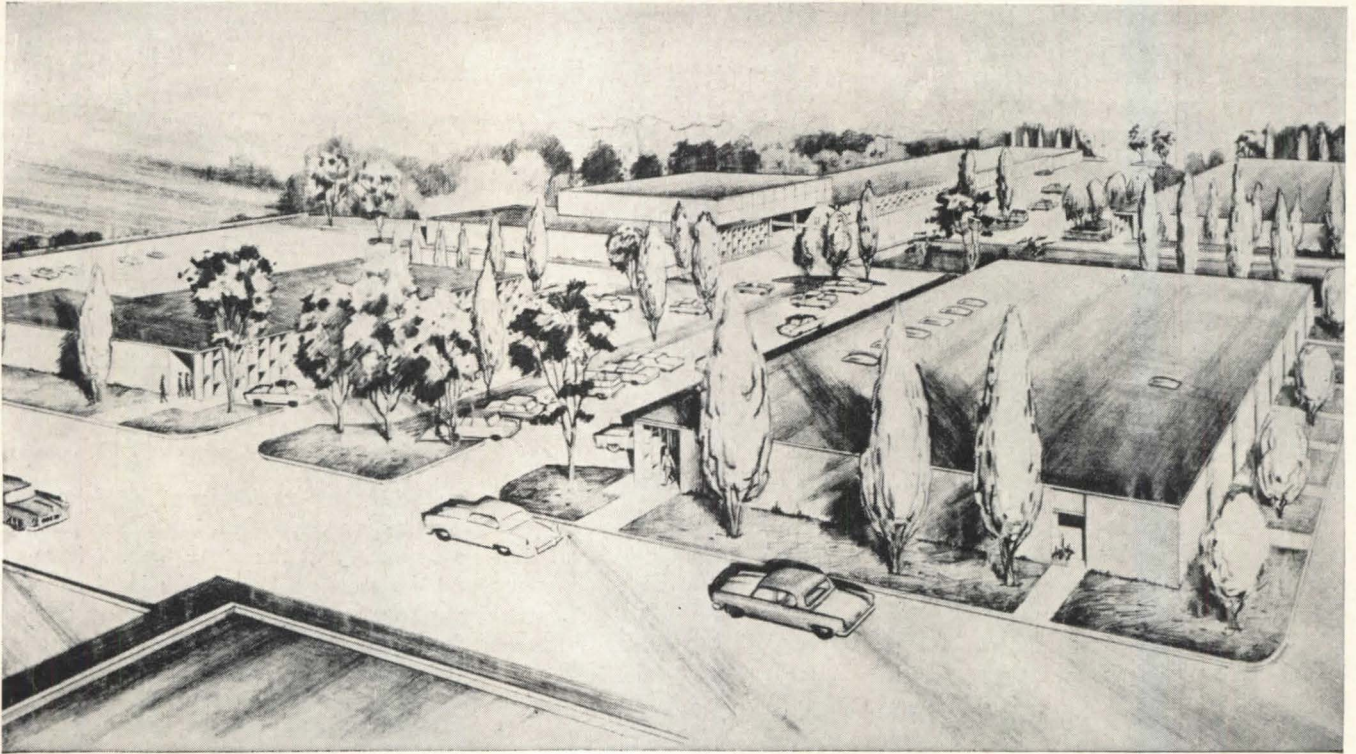
$$I = \frac{P}{V} = \frac{28,087.5}{240} = 115 \text{ amp}$$

Knowing the current requirements for the service entrance, the proper combination of switches, control center units and wire sizes can be determined easily, as in the typical service entrance schedule shown below.

**Typical Service Entrance Schedules for Various Levels of Utilization  
(120/240 Volts, 3-Wire, Single-Phase)**

Nominal Rating, Amperes	Maximum Capacity, Watts	Main Switch	Main Control Center Units	Size of Service Wire	Size of Conduit	Utilization Circuits
100	24,000	100A Sw. or 100A Cir. Bkr.	2-50A 1-20A (Water heater)	2 #2 1 #4	1 1/4"	General Purpose Electric Cooking Electric Laundry Water Heater Air Conditioning
150	36,000	200A Sw. (150A Fuses) or 150A Cir. Bkr.	3-50A 1-20A (Water heater)	2 #2/0 2 #2	2"	Same as for 100 amp plus electric heating for small homes
200	48,000	200A Sw. (200A Fuses) or 200A Cir. Bkr.	4-50A 1-20A (Water heater)	2 #4/0 1 #2/0	2"	Same as for 150 amp in temperate climates

From "Live Better . . . Electrically."



Dallas' new Decorative Center. Owner: Mr. Trammell Crow. Architect: Mr. Jacob Anderson. Builders and General Contractors: McFadden & Miller. G-E Distributor: Texas Distributors, Inc.

## NEW DECORATIVE CENTER IN DALLAS SELECTS GENERAL ELECTRIC AIR CONDITIONERS

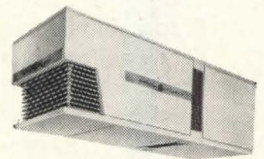
New proof that the merchandising-minded look to General Electric for the best in air conditioning! Now, it's the Decorative Center in Dallas, Texas—one of that progressive city's most important new business additions.

Designed and built to reflect the increasing significance of Dallas in American commercial life, this new center is "comfort serviced" by 22 G-E Packaged Air Conditioners, in various sizes amounting to 180 tons. In making the installation, Texas Distributors, Inc., General Electric distributors in Dallas, located units to give each tenant individual control of temperature and humidity. Total area serviced: 56,000 square feet.

An especially important feature of the

G-E installation is its flexibility in meeting future air conditioning needs. The center has been planned to accommodate up to 100,000 more square feet, in which additional air conditioning units can be placed without any rearrangement of existing equipment.

Low-cost, dependable G-E Packaged Units provide maximum design freedom in new construction and modernization. All models may be used singly or in multiple to meet any air conditioning need. General Electric's famous 5-year warranty assures protection against service problems. For complete details, write: General Electric Co., Commercial & Industrial Air Conditioning Dept., Bloomfield, N. J.



Self-contained ceiling models  
3 and 5 ton air-cooled  
3, 5 and 7½ ton water-cooled.



Self-contained floor models—3, 5,  
7½, 10 and 15 ton water-cooled.

**packaged AIR CONDITIONERS**

*Progress Is Our Most Important Product*

**GENERAL  ELECTRIC**



RESIDENTIAL ELECTRICAL SYSTEMS—3: Wires and Cables

Type	Description	Applications
R	Single conductor with rubber insulation and braided cotton covering.	General wiring where moisture is not present. Temperature rating 60 C.
RH	Similar to Type R except rubber insulation has higher resistivity to heat.	General wiring where moisture is not present; has higher current carrying capacity than Type R. Temperature rating 75 C.
RW	Similar to Type R except with moisture-resistant rubber insulation.	In all areas including damp conditions. Temperature rating and current-carrying capacity same as Type R.
RH-RW	Rubber insulation has heat- and moisture-resistant properties of Types RH and RW.	For damp locations, the temperature rating and current-carrying capacity of Type RW are used; otherwise the higher ratings of Type RH apply.
RHW	Similar to Type RH-RW.	Similar to Type RH-RW except ratings of Type RH apply for all installations.
TW	Polyvinyl chloride insulation is highly resistant to moisture, heat and corrosion. Rated at 60 C. Current capacity of Type R.	General use and use in damp areas. While allowable conduit occupancy is the same as Type R in new installations, the smaller dimensions of Type TW are used in calculating the number of conductors allowed in existing conduit or rewiring; this permits substantially higher capacities than other types of wire.
NM (non-metallic sheathed cable)	Rubber or thermoplastic-insulated conductors, with or without separate grounding conductor, covered by heavy paper wrapping and a strong braid.	Interior wiring—exposed or concealed in dry locations. Not allowed where exposed to corrosive fumes or vapors, nor embedded in masonry, concrete, fill or plaster. Use non-metallic boxes or surface devices unless grounding wire is in NM cable.
NMC (moisture- and corrosion-resistant)	Same as NM except with corrosion-resistant outer covering of impregnated braid or other material.	Same as NM except may be embedded in plaster or run in chase provided protection is afforded from nails by 1/16-in. steel plate. Neither NM or NMC may be embedded in concrete or used for service entrances.
UF (under-ground feeder)	Thermoplastic-insulated and jacketed conductors in single or multiple conductor styles.	Single conductor for direct burial feeders (all legs in one trench). Multi-conductor UF may be used as NMC.
AC and ACT (called armored cable)	Rubber (AC)- or thermoplastic (ACT)-insulated conductors enclosed in wound and interlocked steel armor; bonding strip under armor.	All interior wiring except in moist areas embedded in masonry, or in block walls below grade.
ACL	Same as Type AC except with lead sheath.	Moist areas, underground and embedded in concrete.
SE Style U (un-armored)	2 rubber-insulated conductors and bare neutral strands (usually spiraled around insulated conductors) covered by protective layers of rubber tape and impregnated braid. Also available with insulated neutral.	For service entrances; interior wiring of range, dryer or water heater providing heater is not fed by uninsulated conductor. With insulated neutral, use is governed by code provisions on NMC.
SE Style A (armored)	Same as Style U except with bonded steel tape under outer layer of rubber tape. Interlocked armor (not bonded) sometimes used in place of steel tape.	Same as Style U except interior applications governed by code provisions on armored cable. For interior use, tape or armor must be grounded.
SD (service drop)	Similar to SE Style U.	Primarily for drop from pole to service mast.
USE Style RR	Rubber-insulated conductors encased in neoprene jacket single or multiple conductor. (All RR conductors are not UL-approved for USE applications.)	Underground service entrances and runs in conduit or direct burial. Also used for aerial runs.
MI (mineral insulated—metal sheathed)	Conductors insulated by highly compressed refractory mineral material and enclosed in a liquid- and gas-tight flexible metallic tube.	All normal residential applications including underground, embedded in concrete and service entrance. Approved connectors required.

From "Live Better . . . Electrically."

(Continued from page 220)

**why  
Architects  
and Engineers**  
—as well as Contractors and Owners—  
**prefer**

**ALLENCO**

INTERIOR  
**FIRE PROTECTION**  
EQUIPMENT

*designed to suit your design*

**because:**

**it's easier to specify just what is best  
for each individual project;\***

**you know you'll get all that you specify;**

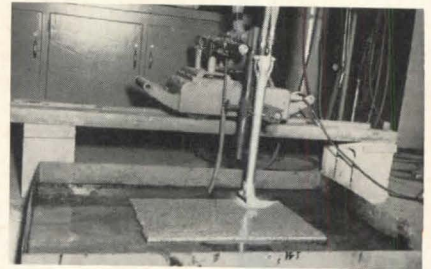
**Allenco serves better, looks better,  
avoids waste of cost, time, space.**



★ A.I.A. file 29e2 gives most thorough easy-to-find data on components, custom-size cabinets, complete systems ... includes ready-to-use standard and alternate specs. Write for your copy; meanwhile check Sweets.

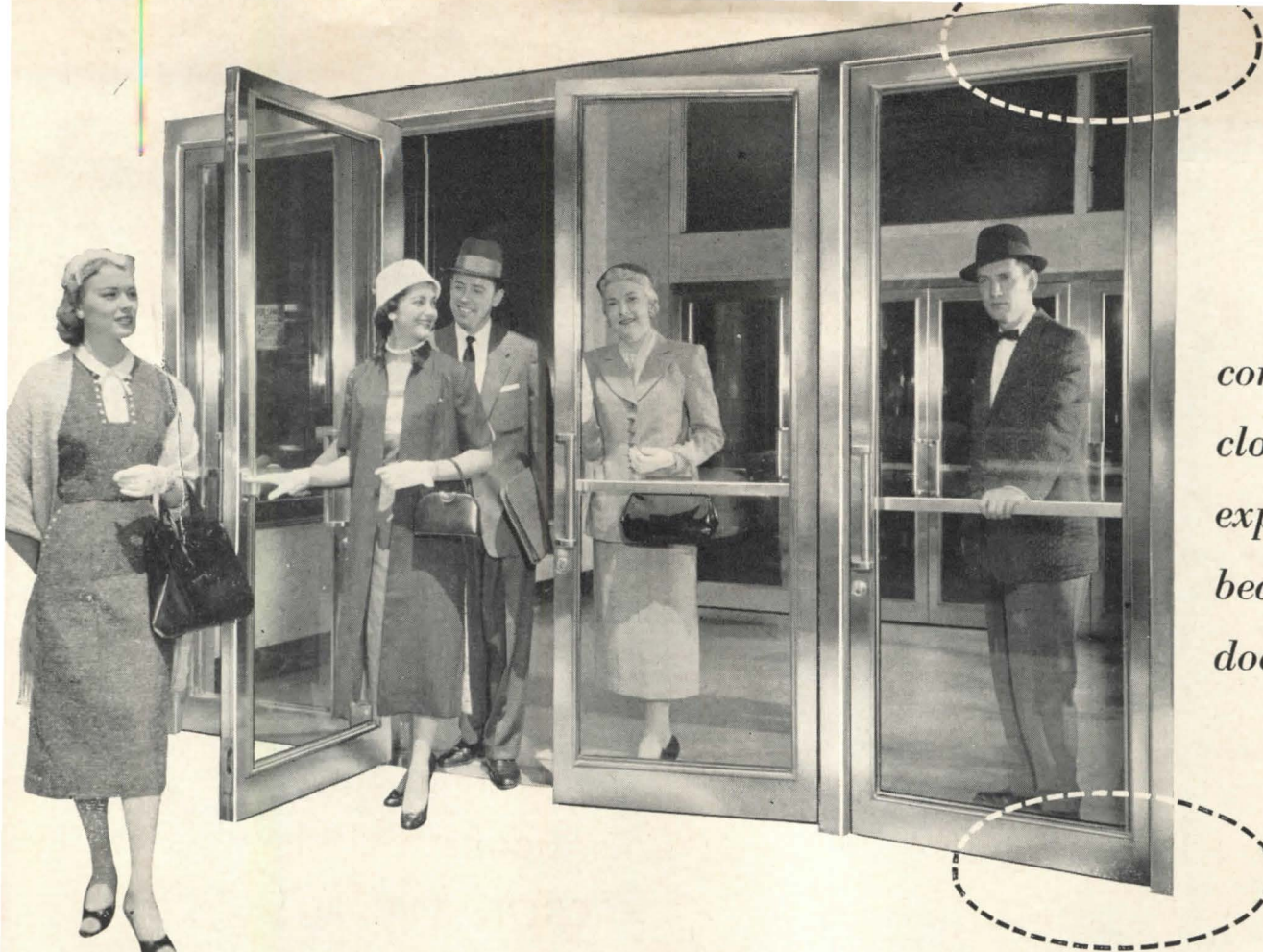
**NEW TECHNIQUE DEVELOPED  
FOR FASHIONING GRANITE**

Flame, which flakes and spalls certain rocks and cracks and breaks others, is being put to use on the positive side in a new method of thermal texturing granite. Texturing by this method is brought about by the action of flame heat on the stone, causing it to spall off in controlled amounts.



The materials used in the thermal texturing process are pure oxygen, a fuel gas (which may be acetylene or propane) and water. The oxygen and gas are combined to produce a controlled flame, which passes over the stone to be textured either through a machine-driven or a manual thermal texturing blowpipe. Water used in combination with the flame conducts heat better than the granite, and so a slab can undergo repeated passes of the flame and be just as cool at the end of the operation as before it started. The use of water is also expected to make possible applications otherwise believed to be impractical. For example, oftentimes slabs must be of sufficient thickness to withstand the stress of a mechanical texturing process. Thick slabs are not necessary with thermal texturing, because the flame exerts no bearing force on the stone mass. A 3- or 4-in.-thick slab can be wire-sawn into thinner pieces and the rough surface produced textured by flame. Thus the same weight of stone would have two or three times the useful surface for veneer work.

Flame angle, speed of passing and direction of traverse produce distinct differences in texture. The greater the speed, the smoother will be the surface and the lower the cost. With mechanized texturing setups such as the one shown above, with an effective flame width of about 4 in. and speeds up to 110 in. per min, coverage rates up to 180 sq ft per hr are possible. Knot and



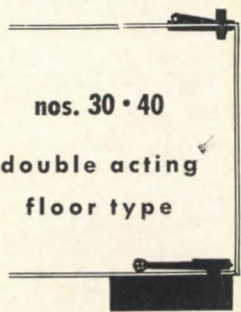
*conceal the closer and expose the beauty of the door*

**center hung**

**center hung**

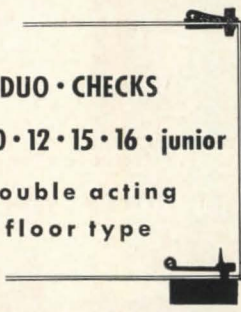
**butt or center hung**

**offset and center hung**



**nos. 30 • 40**

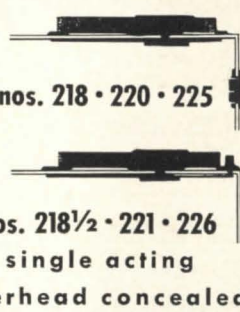
**double acting floor type**



**DUO • CHECKS**

**nos. 10 • 12 • 15 • 16 • junior**

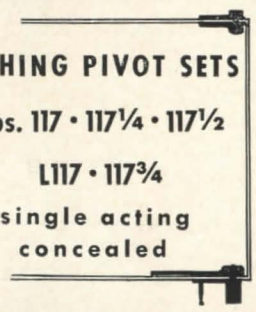
**double acting floor type**



**nos. 218 • 220 • 225**

**nos. 218½ • 221 • 226**  
**single acting**

**overhead concealed**



**MATCHING PIVOT SETS**

**nos. 117 • 117¼ • 117½**

**L117 • 117¾**

**single acting concealed**

**for entrance, vestibule and interior doors** that swing both in and out with each swing separately adjustable to local wind and draft conditions. Both the closer and door hanging hardware are completely concealed.

**for interior room doors**—where double door swing and complete concealment of door hanging and closer hardware are desirable. These closers are ideal for hospital and restaurant doors where people pass through with hands occupied.

**for entrance, vestibule and interior doors**—where it is desirable to conceal closer in jamb above door. Compact size, 2⅞" x 2⅞" x 17", makes closer ideal for modern, narrow trim installations. RIXSON adjustable ball hinges are recommended for use with No. 218 series.

**for pivotal door hanging only.** Match the hanging style and general appearance of doors with RIXSON offset or center hung closers. Widely used on inactive doors such as on closets and wardrobes. Styles available for all doors from the lightest to the heaviest.

write for full information on any RIXSON device

**THE OSCAR C. RIXSON COMPANY**

9100 west belmont avenue • franklin park, illinois

# THE RECORD REPORTS

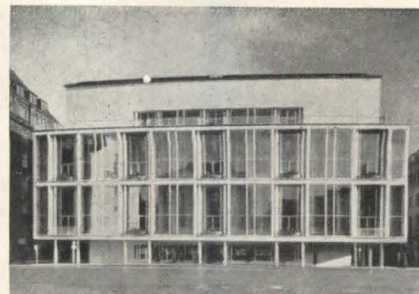
## CURRENT PERIODICALS

(Continued from page 322)

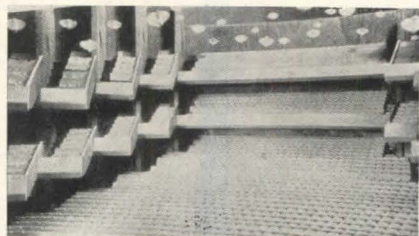
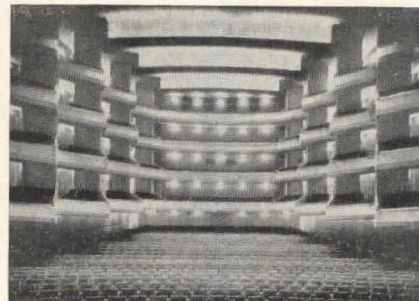
**BAUWELT**, February 27, 1956 (German), indicated in its special issue, playfully titled "Opernhäuser, Opernhäuser . . .", that the Germans have not forgotten their opera in the rush of postwar reconstruction. So far opera houses have been rebuilt or built anew

in Vienna, Hamburg and East Berlin, and more are either in plan or under construction in West Berlin, Dresden, Leipzig, Munich, Mannheim, Cologne, Düsseldorf and "many other cities."

In spite of the opera's being, said *Bauwelt*, a "Baroque art form," few of the opera houses are designed in an historical style. The Vienna Opera was left a shell after it was hit by an incendiary bomb in 1945 and the Viennese simply built a new interior along the lines of the old, though far less "Baroque." The East Berlin opera house



*Bauwelt* called the Hamburg Staatsoper (above and below) "the new form in opera houses"; Gerhard Weber was the architect



Above: first prize winner in West Berlin's competition for a new opera house was a design by Fritz Bornemann. Below: the East Berlin Staatsoper Unter den Linden, by architect Richard Paulick



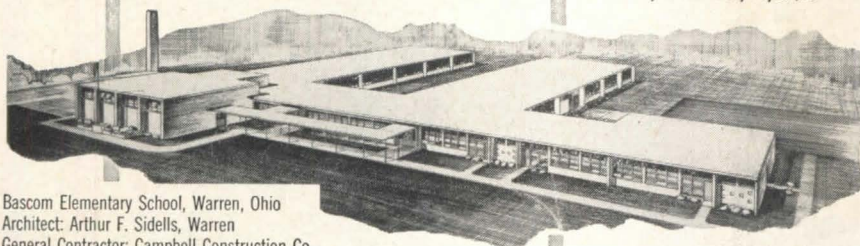
is a postwar design reflecting the policies of an organization with the unwieldy title of the Society for the Preservation of the Cultural Heritage of the German Past.

*Bauwelt* rather ruefully commented, however, that the operas chosen to open the completed buildings, whether Baroque or un-Baroque, were anything but 20th century — the Vienna Opera opened with *Fidelio*, the East Berlin Opera with *The Meistersinger*, and the Hamburg Opera with *The Magic Flute*.

(Continued on page 328)

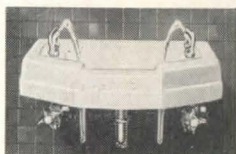
# Schools

## demand them!

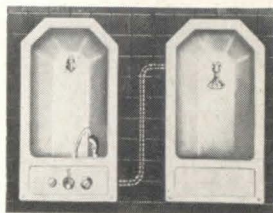


Bascom Elementary School, Warren, Ohio  
Architect: Arthur F. Sidells, Warren  
General Contractor: Campbell Construction Co.

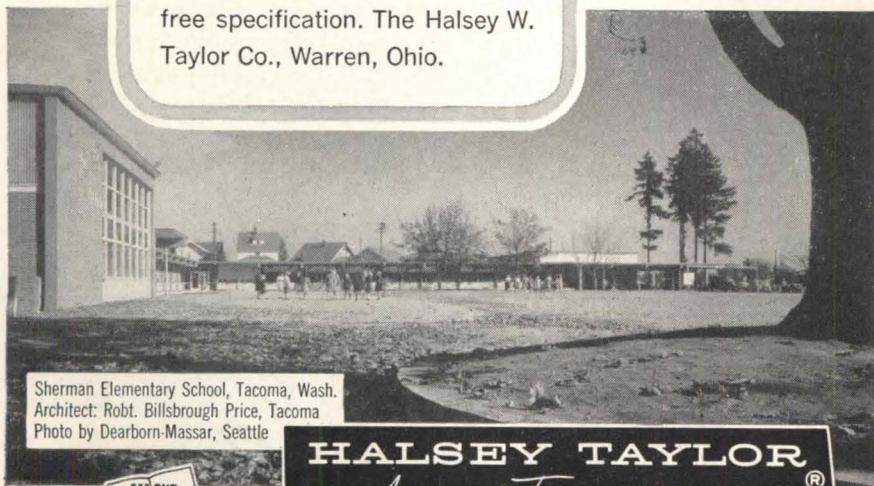
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Sherman Elementary School, Tacoma, Wash.  
Architect: Robt. Billsbrough Price, Tacoma  
Photo by Dearborn-Massar, Seattle



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A-63



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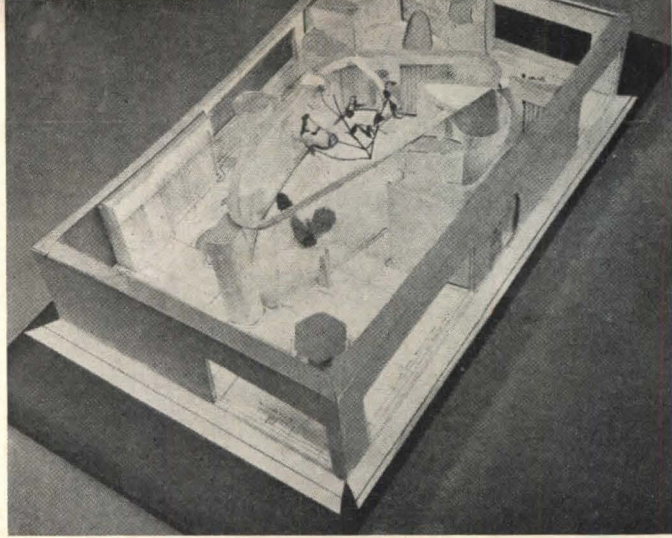
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## THE RECORD REPORTS


### CURRENT PERIODICALS

(Continued from page 326)

**ARCHITECTURAL DESIGN**, March 1956, **THE ARCHITECTS' JOURNAL**, March 1, 1956, and **DESIGN**, March 1956 (all British), came up with a "house of the future" designed by New Brutalists Alison and Peter Smithson which is likely to make the rounds of other European journals before the end of the year.

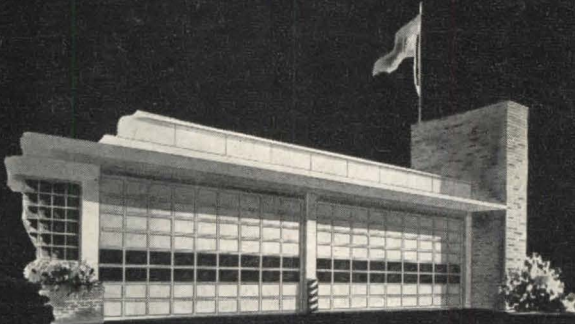


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Designed for a London homes exhibition, the building has an exterior wall of molded plastic, which was planned to be windowless but which had sections cut out for viewing. A central garden is enclosed by a clear plastic wall. The roof is "warped" to allow the sun to fall into the interior, and is covered with aluminum foil on a waterproof base to reflect the sun. The rooms are "cave"-like compartments, connected by passages twisted to lend privacy to each area.

**CRAFT HORIZONS**, May-June 1956 (United States), devoted a special issue to "art and craft in architecture today." The picture that the magazine gave was one of utter lack of sympathy between contemporary architecture, arts and crafts. Lest the picture be too hastily dismissed as one drawn by an interested party, it might be pointed out that contributors to the issue included architects Herbert Hannum, Ladislav Rado, Mario Corbett, Ely Jacques Kahn and George Nakashima, city planning critic Christopher Tunnard and, the only representative of the crafts, metalsmith Hudson Roysner. Mr. Roysner, furthermore, was the only one of the contributors to put the greater blame on the artist, who, he said, is apt to disdain business matters.

Harshest of all the critics was Mr. Nakashima: "I have never seen such a dishonest use of materials as by American architects in a house under construction — the way it's put together before the skin is on. These people talk well, write reasonably well, but what they say and what they do are entirely different."

Mr. Tunnard, less harsh, said that ". . . no creative person who is familiar with great art can be content with the current separation of architecture, painting and sculpture. The reintegration is the sublime responsibility of today's artist — the rest is fun and games."

(More news on page 346)