

ARCHITECTURAL RECORD



OCTOBER 1957

BUILDING TYPES STUDY : HIGH SCHOOLS

GRINNELL SPRINKLER PROTECTION

*in two new units
of Jordan Marsh
Department Store,
Boston, Mass.*



Grinnell Ceiling Sprinklers, which extend but a scant inch and a quarter from the ceiling, provide all but invisible fire protection in attractive display areas, foyers, and executive offices.



Fire poses a constant threat to life and property. In a few moments of time, it can reduce to a tragic, smoldering ash the most modern edifice in the world. That's why so many buildings today include Grinnell Sprinkler Protection.

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Make sure the buildings you are planning include Grinnell Sprinkler Protection. Consult a Grinnell engineer. Let him give you cost figures on the best Grinnell System for you. And remember, Grinnell Sprinklers usually pay for themselves in a few years through reduced insurance premiums. Call or write Grinnell Company, Inc. 269 West Exchange Street, Providence 1, Rhode Island.



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GRINNELL PROTECTION AGAINST EVERY FIRE HAZARD



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ARCHITECTURAL RECORD

October 1957 Vol. 122 No. 4

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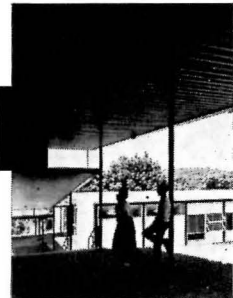


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COVER: John Jay High School, Cross River, N. Y.; Ketchum, Giná & Sharp, Architects; Joseph W. Molitor photo

Building Types Study 251 — Schools

A group of five high schools with quite extensive facilities, too extensive, according to recent critics of school architects. Here, however, the costs are given in detail, so that anybody can judge such questions for himself, and so that architects cannot be falsely charged.

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A quick look at the International Building Exhibit in Berlin. *By Robin Boyd* 205

Hillside Bi-Nuclear

A large house which reverses the traditional idea of making a house as pretentious as possible; this one works out the classic two-part idea to become as unostentatious and as informal as possible.
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THE RECORD REPORTS

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

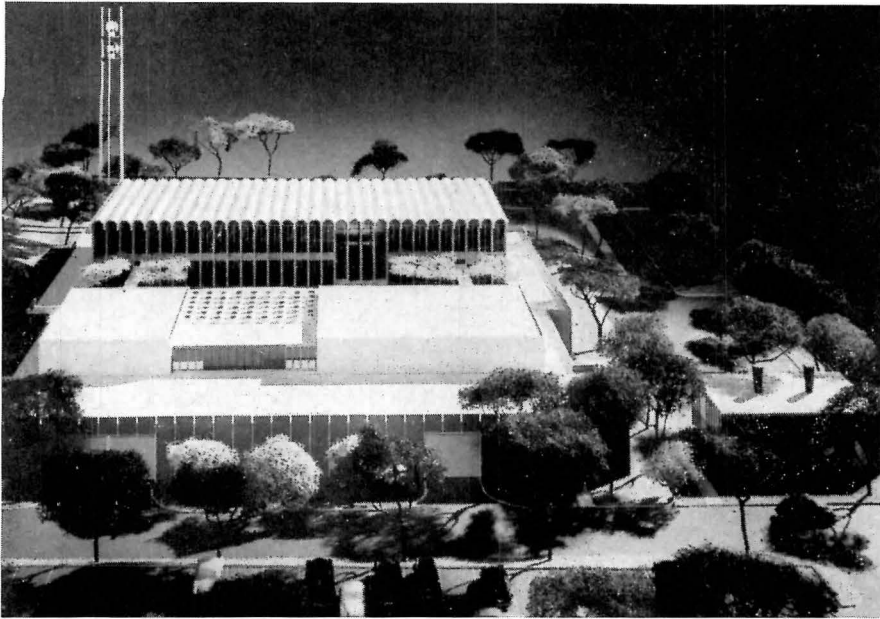
GIVE ME ENOUGH ARCHITECTS and I will give you Utopia," said Australian visitor Robin Boyd, writing in the English *Architects' Journal*, was the unofficial theme of the Centennial Convention of the American Institute of Architects last May. This was definitely *not* the theme of last month's symposium (see page 28) "The New Highways: Challenge to the Metropolitan Region" sponsored by the Connecticut General Life Insurance Company in connection with the dedication of their new office building in suburban Bloomfield, Conn. The most specific reference to the potential contribution of architects to the solution of the problems under discussion was made in the opening address by Connecticut General President Frazar B. Wilde, when he listed the varied professions whose coordinated cooperation would be required: architects came sixth among 11 groups mentioned — tucked between geographers and lawyers in a list that started with engineers.

LETTER FROM A MAYOR: Jules A. Schweig, the Mayor of Clayton, Mo., writing to express his interest in John Knox Shear's talk at the Centennial Convention, was *very* conscious of architects. "I was very favorably impressed not only by Mr. Shear's talk but by the many major discussions held at this meeting during which so much was said about the problems concerning both our urban and suburban developments around the metropolitan centers of the country. This is particularly true because, as Mayor of the City of Clayton, which as you no doubt know is one of the major smaller cities contiguous to St. Louis, we have a great deal of urban rather than suburban development. I also have been connected with the building industry for the last fifty years. I have observed what effect the lack of proper planning has had on the deterioration of many areas. I think it very essential that the architects in general become

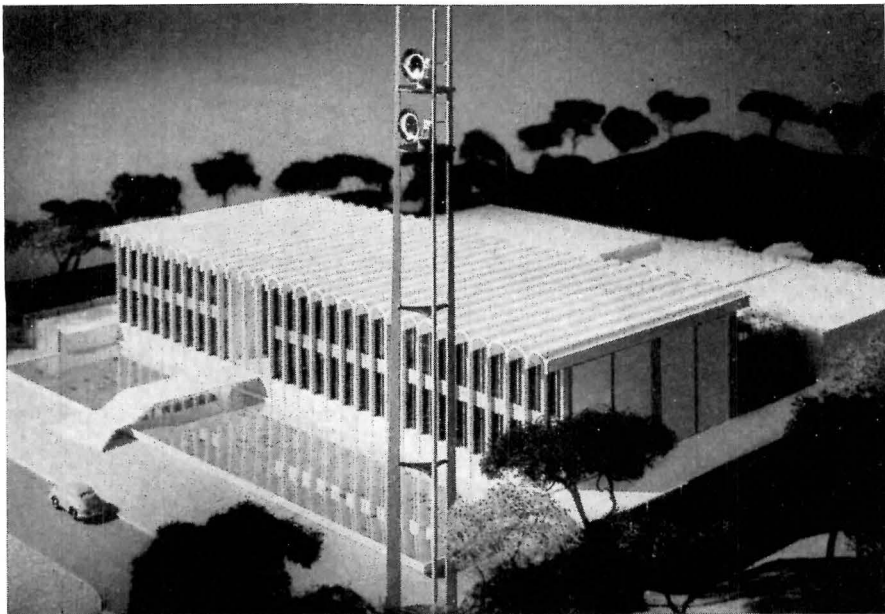
aware of many of the problems that they are helping create. In their desire to meet the wishes of their clients or the owners they too often add to our traffic problems, they too often do too little about the parking problems they are creating. They also often design buildings that are entirely out of keeping with the area in which the building is being erected. How much they can do to prevent many of the home builders from building the future slums it is difficult to say because in many instances the builder controls the layouts of many of these new sections rather than the architect. It is always difficult to get all segments in the industry to agree to what is the proper planning for the future. Although much has been said about careless or unintelligent planning by many groups, including the American Municipal Association, it seems difficult to convince many who have not lived long enough in one area to note the changes that have taken place that have caused such a tremendous economic loss and deterioration in many of our communities. Everything that is done to make the architect more aware of his importance in the future planning for our metropolitan centers will help to avoid repeating many of the errors of the past."

THE BIG QUESTION: *The Journal of Housing*, official publication of the National Association of Housing and Redevelopment Officials, had an editorial a while ago which might have been addressed to architects — although, in fact, architects were not mentioned. It was a short editorial, titled "The Esthetics of City Rebuilding," and it ran as follows: "Great gaps in the skyline are opening up in cities all over the country as the urban renewal program gathers momentum. Old landmark buildings are coming down in city centers. Old residential neighborhoods, heavy with the memory of several generations of family living, are being

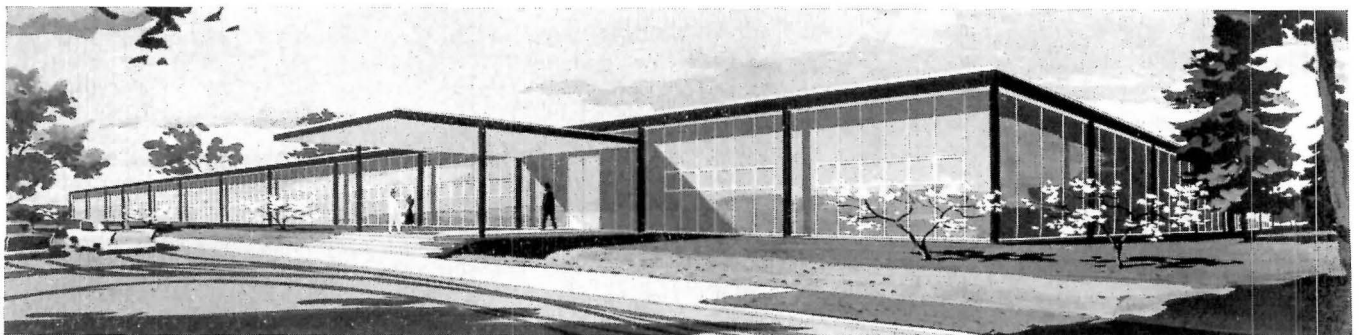
ripped open — and sometimes emptied. Churches, stores, restaurants, small businesses, all types of institutions with links to the past are falling under the demolition boom. To achieve this leveling operation, the men and women behind the urban renewal movement have spent years developing the needed laws, financing formulas, and administrative machinery. Now the big question is — are we prepared to rebuild the skyline; rebuild the neighborhoods; rebuild the shopping centers, church squares, parks and playfields — and do it up to high esthetic standards? Do we have the artistry, the imagination, the understanding of people, the perception of urban values that will make our rebuilt cities real tributes to this era? In short, is there an art of city building that should be applied to the *re-building* job? Cities of the past have been able to stir all kinds of creative effort — by painters, poets, philosophers, political leaders. In spite of their noise, confusion, dirt and desolation, cities have captured the love and loyalty of millions of people. What are the spiritual qualities of a city, what are its physical characteristics that appeal to the emotions, give delight to the eye, develop great creative movements? The men and women who are concerned with today's urban renewal drive — having worked through the legal, the financing, the operating phases of the program, must face these new questions of philosophy and esthetics. The real test is still ahead . . . and we have only begun to question whether there is an art of urban design and, if so, how we can apply it to the day-to-day decisions that are being made in urban renewal. If we do not find the answers soon, all of the millions of dollars that are going into the current program and all of the deep disruptions that are being created by today's demolition will stand as monuments of waste and failure." . . . Do architects have any answers?



Radio and television facilities for the Columbia Broadcasting System's St. Louis outlet, KMOX-AM-FM-TV, have been designed by Minoru Yamasaki of the firm of Yamasaki, Leinweber and Associates. The building, to be ready for occupancy early in 1959, will be located on a three and a half-acre Oakland Avenue site overlooking Forest Park. There will be two studios each for radio and television, a total of 52,000 sq ft



**FOR CITY AND COUNTRY:
TWO PROJECTS FOR CBS**

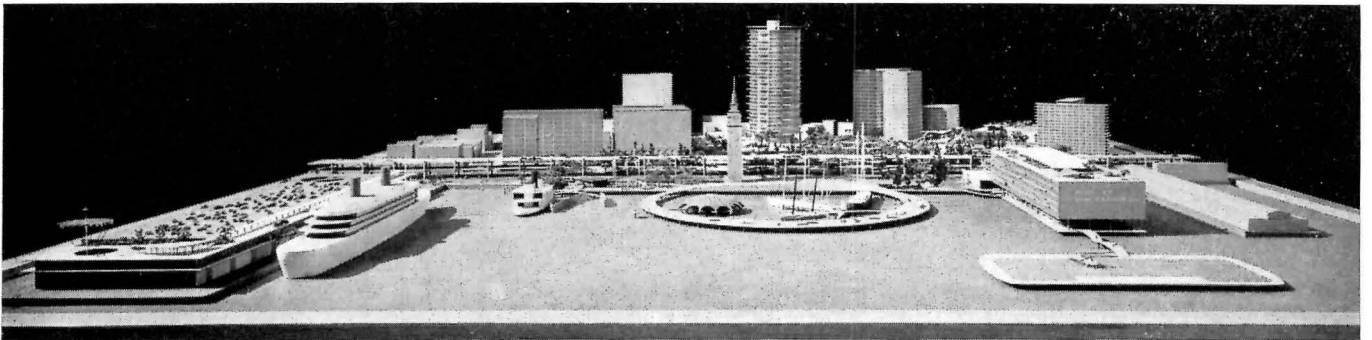
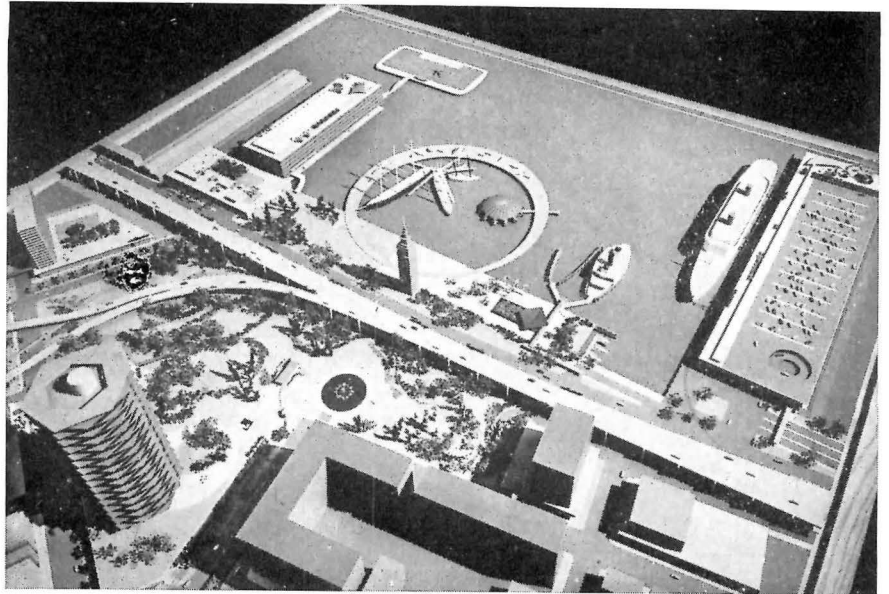


This new research center on an 11-acre site in Stamford, Conn., initiates plans of the Columbia Broadcasting System for expansion of its electronic research operations. The Stamford Laboratories, to be

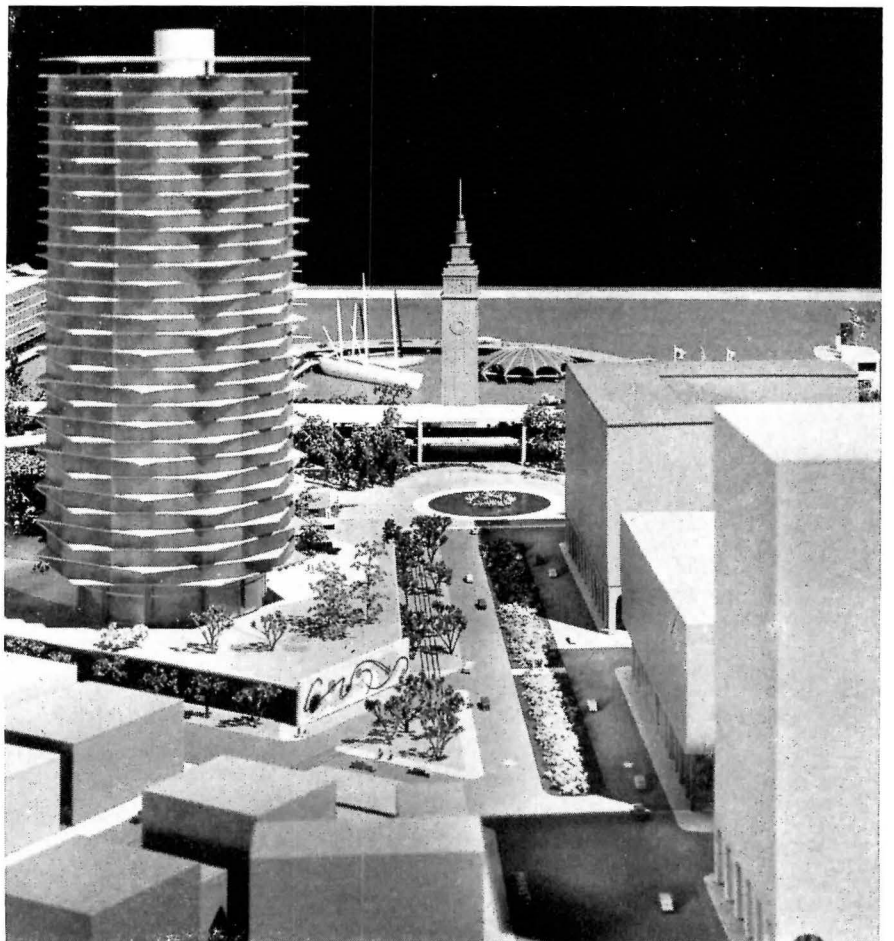
ready for occupancy next summer, have been designed by Gordon Bunshaft of Skidmore, Owings and Merrill. The one-story air conditioned structure of aluminum, steel and glass will provide research

and development facilities for a scientific and administrative staff of 150 persons in an area of 33,000 sq ft. There will be an open-air court in the center of the building. Estimated cost is "in excess of \$1,000,000"

**A PROPOSED DESIGN FOR
CREATIVE PRESERVATION**

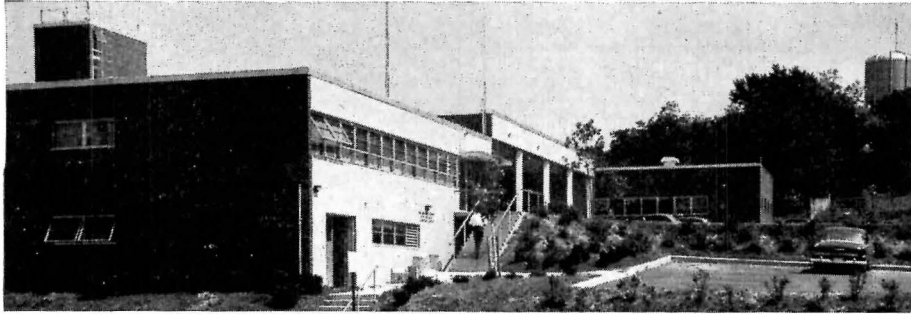


To provide for San Francisco's beloved old Ferry Building a setting appropriate for such a civic landmark despite the construction of a two-deck state freeway directly in front of it, architect Mario Ciampi and his associate Allyn Martyn have proposed this development. It was designed to be complementary to the already projected Golden Gateway redevelopment area (slightly to the north) designed by Skidmore, Owings and Merrill. The proposal is to remove both wings of the Ferry building, leaving the familiar tower as the landmark, and putting a park on either side of it — one a marine park with a pier for passenger liners at one end and a World Trade Center Building at the other and between them a circular pier where historic ships would be moored, a ferry slip, a small-boat landing pier, and a heliport; the other a landscaped area at the foot of Market Street between access ramps for the freeway and the Golden Gateway project. Cost is estimated at \$100 million, most of which would come from private developers who would acquire property in the area and build apartment and office buildings. Cost of the Golden Gateway project, to redevelop San Francisco's Produce District, is estimated at \$180,000,000



THE RECORD REPORTS
BUILDINGS IN THE NEWS

(Continued from page 11)

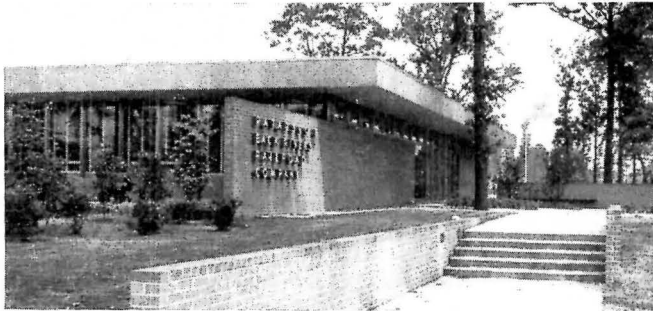


WILSON & CHRISTIE, Architects. The firm's four prizewinners — above (left) Fire Department Facilities, Towson,

Baltimore County, Md., (right) Mischanlon's Restaurant in Eastpoint Shopping Center, Baltimore; below, (left) Patapsco



& Back River Railroad Company Offices, Sparrows Point, near Baltimore, (right) Stable at Goucher College, Maryland

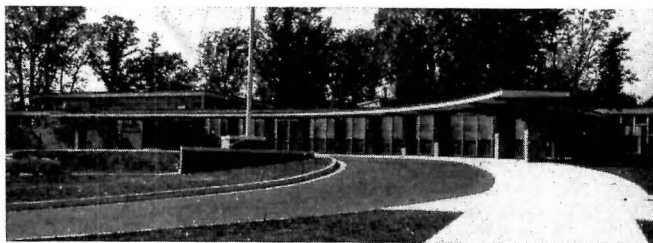


JURY (seated) were Alfred Clauss, A.I.A., Philadelphia; John Scarff, Baltimore; John Stenhouse, A.I.A., Washington, D. C. Standing: Association officials Clark S. Hobbs and (president) Harrison Garrett

FOUR AWARDS TO ONE FIRM FOR FOUR TYPES

The Seventh Biennial Baltimore Association of Commerce Architectural Awards Contest derives a special interest from the fact that of eight award winners (all shown on this page) four were the work of one architectural firm and furthermore all four represented building types new to that firm with the premiated projects. Entries in the

competition, more than 60 in number, included industrial and residential as well as commercial and public buildings. All, according to the rules of the contest, were constructed in 1955 and 1956. They were judged on "exterior design, suitability of exterior design to use, artistic and practical use of materials, adaptability to site and neighborhood."



SMITH & VEALE, Architects — Dumbarton Junior High School, Baltimore County, Maryland



FISHER — Auditorium, Gilman School. Right: COCHRAN, STEPHENSON & WING—Flag House Courts (all Baltimore)

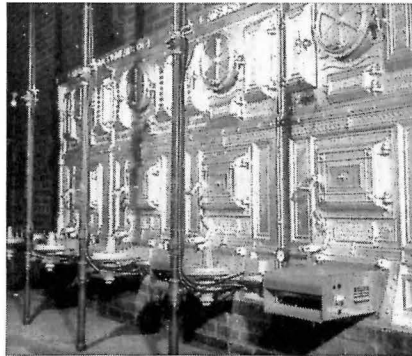
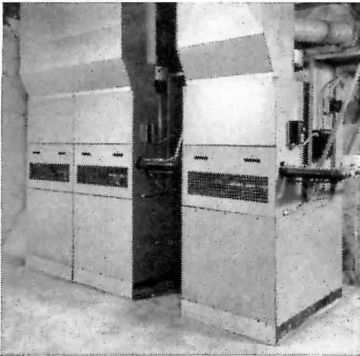


Left: FISHER, NES, CAMPBELL & ASSOCIATES — The Mall, Mondawmin Shopping Center. Center: TAYLOR &



(More news on page 16)

Building and Modernization Heating and Air Conditioning



Separate central systems to heat upstairs and downstairs rooms were installed in this church modernization job. The ultimate in a compact, efficient, automatic installation was achieved with Janitrol gas heating equipment.

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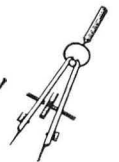
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DANISH ARCHITECTURE: MODERN RESPECTING ITS HERITAGE

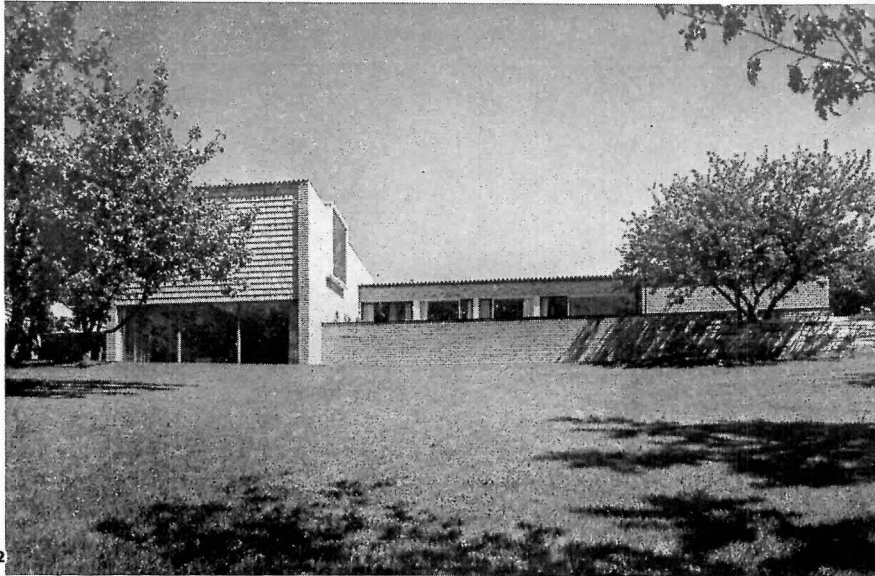
A new exhibit of contemporary Danish architecture has been organized by Prof. Kay Fisker of the Royal Academy of Copenhagen for a tour of the United States sponsored by the Danish Embassy and arranged by the Traveling Exhibi-

tion Service of the Smithsonian Institution. The exhibition includes drawings and photographs of 36 recent projects by 27 Danish architects as well as an introduction providing a glimpse of the historical background of Danish archi-

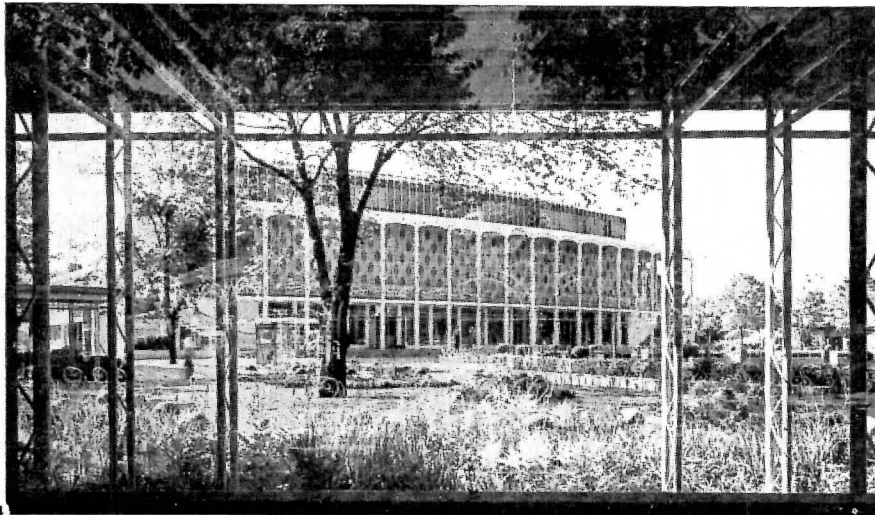
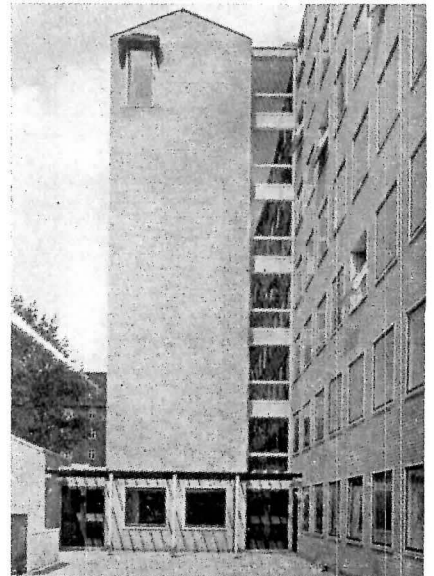
ture. For the illustrated catalog published in connection with the exhibition, Professor Fisker has written a thoughtful introductory essay:

"Denmark is a small and simple country and the Danes are a rather

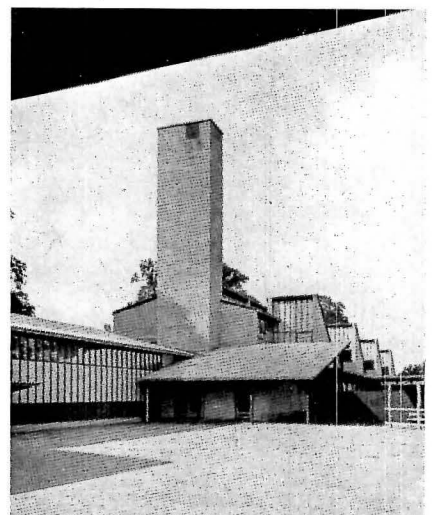
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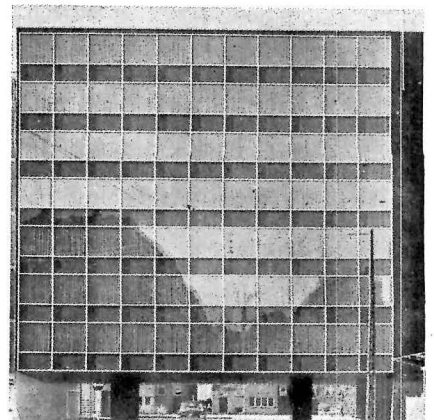


AMONG PROJECTS IN EXHIBIT:

1. One-family house, Jaegersborg; Eva and Nils Koppel, architects.
2. Maternity Aid Institution, Copenhagen; Kay Fisker, architect.
3. Concert Hall in Tivoli, Copenhagen; Hans Hansen and Frits Schlegel, architects.
4. Grade School, Copenhagen; F. C. Lund and Hans Chr. Hansen, architects.
5. Row Houses, Bagsvaerd; Jorgen Bo and Knud Hallberg, architects.
6. Office Building, Copenhagen; Arne Jacobsen, architect



5,6



(More news on page 16B)

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rich, lustrous

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wood paneling!

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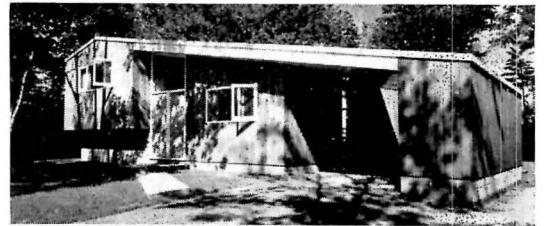
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Please send me your Designer's Idea and Fact File
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City _____ State _____

EXAMPLES OF CURRENT ARCHITECTURE ACROSS THE NATION



HOTEL FOR TORONTO — E. I. Richmond of Toronto is architect of the \$10 million Hotel Carlton; Kahn & Jacobs of New York are consultants. Façade is white brick



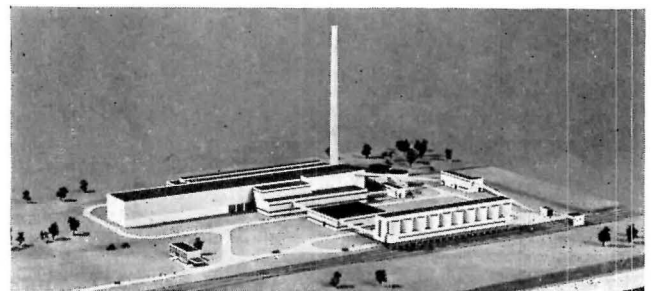
HOUSE FOR SAULT STE. MARIE, ONT. — Richard H. Beaumont, owner; John B. Parkin Associates, Architects



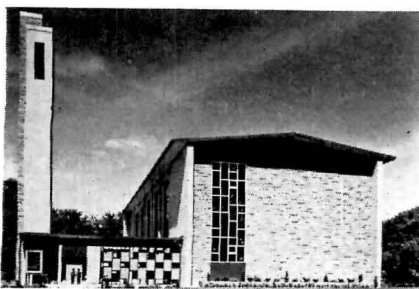
MONTREAL STAR PLANT — Barott, Marshall, Merrell & Barott, Architects; Ballard, Todd & Snibbe, consultants



MILITARY HOSPITAL FOR BARRIEFIELD — 125-bed hospital for army base near Kingston, Ont.; Shore and Moffat, Architects



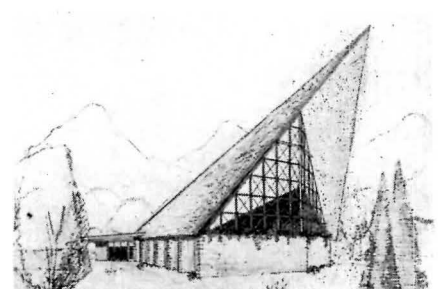
INDUSTRIAL PLANT for St. Lawrence Cement Company Clarkson, Ont., now in operation. Architects: Pentland and Baker



UNITED CHURCH IN ONTARIO — Empress United Church in London, Ont.; shown in a recent exhibit; Watt & Tillman were the architects

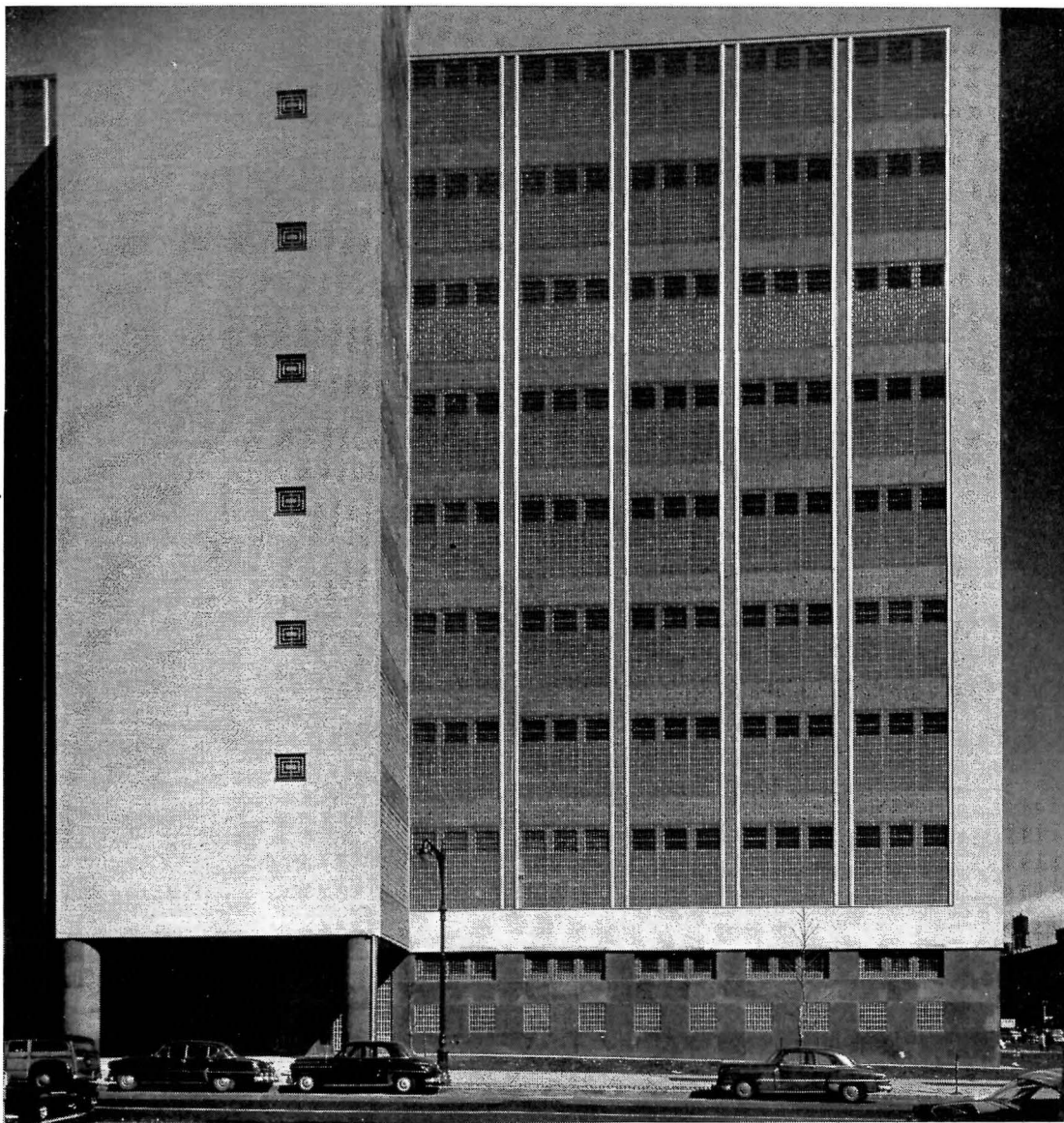


UNITED CHURCH IN NEW BRUNSWICK — \$60,000 200-seat church, River-view Heights, N. B.; John L. Darby, Bedford, N. S., Architect



UNITED CHURCH IN ALBERTA — \$30,000 100-seat chapel, Waterton Lakes Park; Meech, Mitchell, Robins & Associates, Architects

(Continued on page 40)



New look in prisons

CITY PRISON & REMAND SHELTER
BROOKLYN, NEW YORK

Architects—

Department of Public Works
LaPierre, Litchfield & Partners
(Alfred Hopkins & Associates)

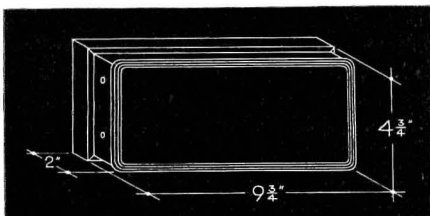
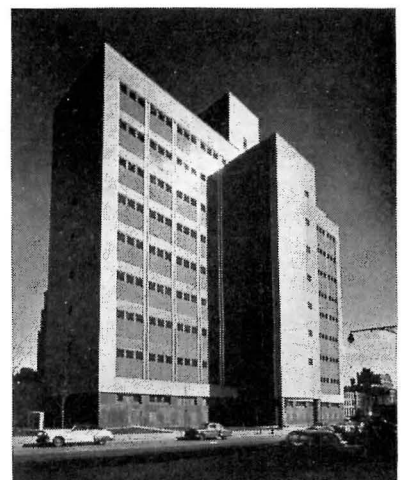
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THE RECORD REPORTS: CONSTRUCTION COST INDEXES

Labor and Materials

U. S. average 1926-1929=100

Presented by Clyde Shule, manager, Statistical and Research Division, F. W. Dodge Corp., from data compiled by E. H. Boeckh & Assocs., Inc.

NEW YORK

ATLANTA

Period	Residential		Apts., Hotels Office Bldgs. Brick and Concr.	Commercial and Factory Bldgs. Brick and Brick and Steel Concr.		Residential		Apts., Hotels Office Bldgs. Brick and Concr.	Commercial and Factory Bldgs. Brick and Brick and Steel Concr.	
	Brick	Frame				Brick	Frame			
1930	127.0	126.7	124.1	128.0	123.6	82.1	80.9	84.5	86.1	83.6
1935	93.8	91.3	104.7	108.5	105.5	72.3	67.9	84.0	87.1	85.1
1939	123.5	122.4	130.7	133.4	130.1	86.3	83.1	95.1	97.4	94.7
1946	181.8	182.4	177.2	179.0	174.8	148.1	149.2	136.8	136.4	135.1
1947	219.3	222.0	207.6	207.5	203.8	180.4	184.0	158.1	157.1	158.0
1948	250.1	251.6	239.4	242.2	235.6	199.2	202.5	178.8	178.8	178.8
1949	243.7	240.8	242.8	246.6	240.0	189.3	189.9	180.6	180.8	177.5
1950	256.2	254.5	249.5	251.5	248.0	194.3	196.2	185.4	183.7	185.0
1951	273.2	271.3	263.7	265.2	262.2	212.8	214.6	204.2	202.8	205.0
1952	278.2	274.8	271.9	274.9	271.8	218.8	221.0	212.8	210.1	214.3
1953	281.3	277.2	281.0	286.0	282.0	223.0	224.6	221.3	221.8	223.0
1954	285.0	278.2	293.0	300.6	295.4	219.6	219.1	233.5	225.2	225.4
1955	293.1	286.0	300.0	308.3	302.4	225.3	225.1	229.0	231.5	231.8
1956	310.8	302.2	320.1	328.6	324.5	237.2	235.7	241.7	244.4	246.4
May 1957	316.5	306.5	329.8	341.8	335.4	239.8	238.0	245.9	249.2	250.7
June 1957	316.5	306.5	329.8	341.8	335.4	239.8	238.0	246.1	249.4	251.6
July 1957	321.0	310.7	336.8	349.5	344.6	243.6	241.3	252.0	255.6	258.8
July 1957	% increase over 1939			% increase over 1939		% increase over 1939			% increase over 1939	
July 1957	159.9	153.8	157.7	162.0	164.9	182.3	190.4	165.0	162.4	173.3

ST. LOUIS

SAN FRANCISCO

1930	108.9	108.3	112.4	115.3	111.3	90.8	86.8	100.6	104.9	100.4
1935	95.1	90.1	104.1	108.3	105.4	89.5	84.5	96.4	103.7	99.7
1939	110.2	107.0	118.7	119.8	119.0	105.6	99.3	117.4	121.9	116.5
1946	167.1	167.4	159.1	161.1	158.1	159.7	157.5	157.9	159.3	160.0
1947	202.4	203.8	183.9	184.2	184.0	193.1	191.6	183.7	186.8	186.9
1948	227.9	231.2	207.7	210.0	208.1	218.9	216.6	208.3	214.7	211.1
1949	221.4	220.7	212.8	215.7	213.6	213.0	207.1	214.0	219.8	216.1
1950	232.8	230.7	221.9	225.3	222.8	227.0	223.1	222.4	224.5	222.6
1951	252.0	248.3	238.5	240.9	239.0	245.2	240.4	239.6	243.1	243.1
1952	259.1	253.2	249.7	255.0	249.6	250.2	245.0	245.6	248.7	249.6
1953	263.4	256.4	259.0	267.0	259.2	255.2	257.2	256.6	261.0	259.7
1954	266.6	260.2	263.7	273.3	266.2	257.4	249.2	264.1	272.5	267.2
1955	273.3	266.5	272.2	281.3	276.5	268.0	259.0	275.0	284.4	279.6
1956	288.7	280.3	287.9	299.2	293.3	279.0	270.0	288.9	298.6	295.8
May 1957	292.0	283.6	294.4	306.8	300.6	286.7	274.4	302.7	315.6	309.6
June 1957	292.6	284.2	295.9	307.8	303.4	287.3	275.0	303.5	316.2	310.2
July 1957	293.0	284.6	297.0	308.3	306.1	289.7	278.9	306.1	318.4	314.8
July 1957	% increase over 1939			% increase over 1939		% increase over 1939			% increase over 1939	
July 1957	165.9	166.0	150.2	157.3	157.2	174.3	180.9	160.7	161.2	170.2

Cost comparisons, as percentage differences for any particular type of construction, are possible between localities, or periods of time within the same city, by dividing the difference between the two index numbers by one of them; i.e.:

index for city A = 110
index for city B = 95

(both indexes must be for the same type of construction).

Then: costs in A are approximately 16 per cent higher than in B.

$$\frac{110-95}{95} = 0.158$$

Conversely: costs in B are approximately 14 per cent lower than in A.

$$\frac{110-95}{110} = 0.136$$

Cost comparisons cannot be made between different types of construction because the index numbers for each type relate to a different U. S. average for 1926-29.

Material prices and wage rates used in the current indexes make no allowance for payments in excess of published list prices, thus indexes reflect minimum costs and not necessarily actual costs.

ARCHITECTURE

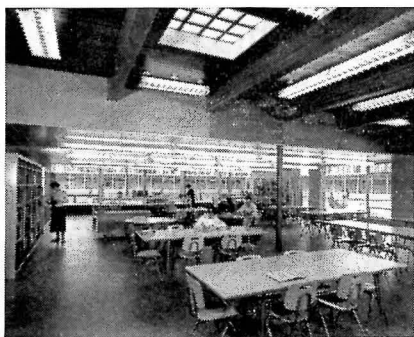
AND JOHNSON PNEUMATIC CONTROL

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Among the building's many modern facilities is a Johnson Pneumatic Temperature Control System that was designed to meet the special requirements resulting from the building's size, exposures and widely varied usage and occupancy factors. All rooms are individually comfort controlled by Johnson *Dual* Thermostats. For "after-hours" use, only the *occupied* rooms are heated to normal comfort levels, while the rest of the

building is maintained at lower, non-occupancy temperatures. Fuel savings are large, yet comfort provisions are complete.

Progressive school planners everywhere find that the diversified demands of today's schools are best answered with Johnson Pneumatic Control. A Johnson System pays off in lower heating costs... system-wide simplicity of operation and upkeep... and complete flexibility of control to meet every requirement. Let an engineer from a nearby branch office prove these Johnson advantages to you. Johnson Service Company, Milwaukee 1, Wisconsin. Direct Branch Offices in Principal Cities.



With *individual room control*, temperatures can be varied to meet usage requirements. The modern library typifies expertly planned facilities that stress comfort and ease of use.



Proper ventilation and optimum temperatures in gymnasiums protect student health and comfort. *Dual Thermostats* allow nighttime use without heating unoccupied rooms.



Special comfort requirements where students are physically active and heat producing equipment is used are easily met by strategically located *Dual Thermostats*.

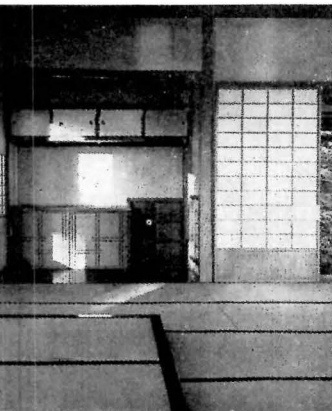
JOHNSON CONTROL

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TAPPING THE SPIRIT OF JAPANESE ARCHITECTURE

By MARCIA WURTH



Japanese Temples and Tea-Houses. By Werner Blaser. F. W. Dodge Corp. (N. Y.), 1957. 156 pp., illus. \$12.75

Left, Tana, a recess with wooden shelves. Below, the main buildings, Niijo Palace, graduated in harmony with the garden



Werner Blaser, in his new book *Japanese Temples and Tea-Houses*, finds a need in much contemporary architecture and seeks to inspire a solution to this by the example of Japanese architecture. He attempts neither a history nor a detailed analysis of construction. His primary concern is to give a comprehensive explanation of the spiritual and constructional elements, which he does through the interrelation of a succinct text and manifold illustrations. Although concise, the text presents the background material clearly for both architect and layman.

He shows the blending of Chinese Zen Buddhist tradition with native Shintoism which takes place from the 15th through the 18th centuries. Behind Japanese architecture lies Teism, originated by the Zen Buddhist priests.

Basic attitudes of Japanese architecture are emphasized: space should give significance to the structure which encloses it; in true architecture empty space can express personality and spiritual atmosphere; the Japanese find perfection of form in simplicity and the inconspicuous, and behind each form they seek for the

A REFRESHING GLANCE AT WESTERN FOLK DESIGN

By EDGAR KAUFMANN, JR.

Sibyl Moholy's new book is the most refreshing and enlightening view of architecture I've encountered for some time. It is a book about folk architecture in the western hemisphere, observed by a keen eye, a well-stocked mind, and a lively heart. Architecture here is understood to be a vigorous, constructive expression of the way people give themselves a better life. What a relief it is not to have to consider cosmological, technological and psychological factors bearing down on the broad forehead of some architectural Zeus, about to give birth to another Athena.

From the free distance of folk practice, the author is able to cast a glance now and then at some of the favorite clichés of modern architects and the professors of their art. The view she gets is a rude one, and one conveniently ignored as a rule. All those who think modern architecture is unhealthily pompous will rejoice to read her report, however. And all who like strong, simple architecture will enjoy her samplings from the Americas.

Mrs. Moholy has been in America for twenty years now, but she benefits from the enthusiasm of an addict

(Continued on page 62)

Native Genius in Anonymous Architecture. By Sibyl Moholy-Nagy. Horizon Press, Inc. (N. Y.) 1957. 223 pp., illus. \$7.50



Right, A vigorous expression of construction in the old style. Below, carved corner column, Chiapas, Mexico





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Architect: VICTOR GRUEN & ASSOCIATES, INC., Detroit, Michigan.

- 2** Sunshades of BORDEN pressure-locked aluminum grating permit passage of light and air while screening strong sunlight at Mooseheart High School, Mooseheart, Illinois.

Architect: L. COSBY BERNARD & COMPANY, Hammond, Indiana.

- 3** Large panels of BORDEN pressure-locked aluminum grating support company name over entrance of Lima, Ohio Ford Motor Company engine plant.

*Architect: F. A. FAIRBROTHER & GEORGE H. MIEHLS,
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ALBERT KAHN ASSOCIATED ARCHITECTS & ENGINEERS,
Consultants, Detroit, Michigan.*

- 4** BORDEN riveted aluminum grating provides strong, safe footing for cameramen atop this NBC color television truck.

- 5** Unusual door of BORDEN pressure-locked aluminum grating at service entrance to the Florsheim residence in Chicago, Illinois.

Architect: BERTRAND GOLDBERG ASSOCIATES, Chicago, Illinois.



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umbrella'd stadia

While it isn't always true, an interesting approach often results in a good design, as in these twin all-weather stadia designed by Harry Barone and Arnold Horn, Pratt architecture students. Each bowl would be umbrella'd by its own tentlike roof of translucent plastic, hung from the center of soaring arches. Accordion-pleated, these roofs are planned to fold together out of the way in fair weather, their lower edges riding along the rims of the bowls. Cables that guy the arches form a decorative pattern tying the two stadia together. The big football-baseball bowl would hold 65,000 spectators; the smaller, 20,000.

No matter which of today's bright ideas become tomorrow's reality, it will be as important then as it is now to use the best of tools when pencil and paper translate a dream into a project. And then, as now, there will be no finer tool than Mars—from sketch to working drawing.

Mars has long been the standard of professionals. To the famous line of Mars-Technico push-button holders and leads, Mars-Lumograph pencils, and Tradition-Aquarell painting pencils, have recently been added these new products: the Mars Pocket-Technico for field use; the efficient Mars lead sharpener and "Draftsman's" Pencil Sharpener with the adjustable point-length feature; and—last but not least—the Mars-Lumochrom, the new colored drafting pencil which offers revolutionary drafting advantages. The fact that it blueprints perfectly is just one of its many important features.

The 2886 Mars-Lumograph drawing pencil, 19 degrees, EXEB to 9H. The 1001 Mars-Technico push-button lead holder. 1904 Mars-Lumograph imported leads, 18 degrees, EXB to 9H. Mars-Lumochrom colored drafting pencil, 24 colors.



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REQUIRED READING

(Continued from page 58)

... Japan

"natural, organic, and self-evident." The interior of a Japanese house shapes the exterior and forms a "unified artistic expression in which the spirit of Zen has been made apparent to the senses."

Much attention is given to Mies van der Rohe, who exemplifies to the author a contemporary architect who does not create meaninglessly.

Aims of this book are to present the underlying inspiration of Japanese architecture and to indicate its significance for our contemporary architecture. Mr. Blaser attempts to convey the fundamental Japanese principles which we can use in our own spiritual context.

Many facets of Japanese character are delineated by the author despite limitations naturally imposed by the focus of the book.

Mr. Blaser makes evident the spiritual qualities of the Japanese way of life and their permeation of Japanese architecture. He speaks of some specific fundamentals used in our contemporary architecture. He does not call for an "objectification" of spirit of our time, but he advocates an architecture where the spiritual quality of a building can aid in the solution of the problems of life.

... Folk Design

who started late, with a mature approach toward her habit. Earlier training, however, will out, and it is not surprising to find the first fifty pages of her book Germanic to a degree. Too much is attempted in the way of generalizations and "background" to hold up under scrutiny; but after the fifty pages are over, real experience and real seeing take over.

Then Mrs. Moholy becomes a guide such as one never finds when visiting abroad; one full of unexpected insights and unhackneyed enjoyments. She indulges in xenologies, not without some reason; these are explained in the opening essay. Otherwise the reader might do well to read this section last. The photos, mostly taken by the author, are good enough to let the reader follow what is being observed; a few are excellent in their own right. A book of sweet and sour delights, well worth having.

(More reviews on page 396)

SCHOOLS AND ARCHITECTS COSTS AND VALUES

ARCHITECTURAL RECORD OCTOBER 1957 BUILDING TYPES STUDY 251

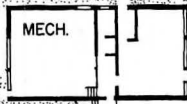
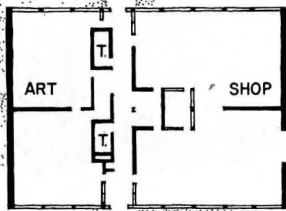
It has been a hard summer for architects. You could scarcely come away from a newsstand without a handful of unkind allegations about the profession. As early as May, an author in *Harper's* accused architects of willfully thwarting America's return to Classic building forms. June and July were humid and harrowing. August brought hot blasts at the new Air Force chapel and brought Dorothy Thompson in the *Ladies' Home Journal*. "Must Schools Be Palaces?" she asked. And not to be outdone, the *Reader's Digest* turned up in September with "Do School Pupils Need Costly Palaces?" Before frost there may be further palace bulletins.

Miss Thompson's argument — or DT's complaint — set forth that "communities are being taxed to support properties that often are out of all proportion to the community's needs — or the income of its people." In support of this she cites a New England high school which she feels didn't need the gymnasium it got; whose "glamorous home-ec rooms" are questionable for girls from modest homes (cook-outs for the poor?); and which has, among other alleged luxuries, "expensive science laboratories." She is nostalgic about cost savings she has known in two-story buildings.

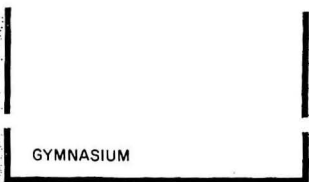
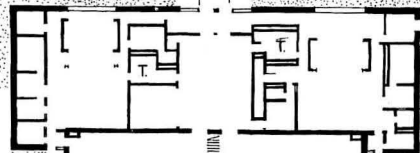
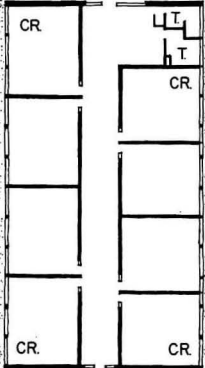
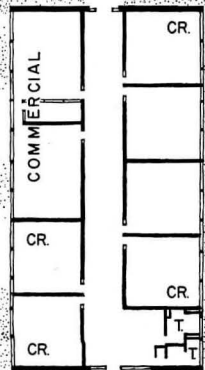
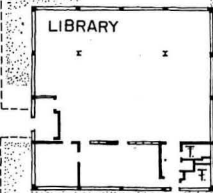
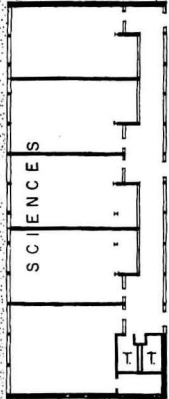
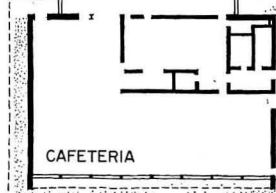
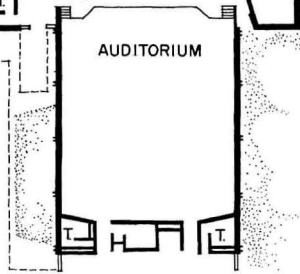
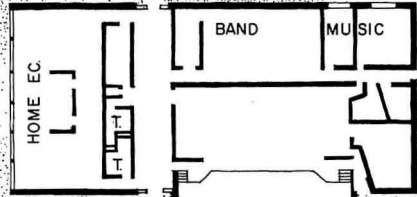
Who can quarrel with an appeal to the taxpayer to study his community's school needs? On the evidence we are given here, who will say that the voters in these New England places acted wisely? DT says their financially burdensome buildings are "their own fault because most of them never showed up at the meetings. . . ."

But she takes them off the hook immediately. "There are, of course, people who want such schools — architects and contractors first of all." And there the true nature of DT's complaint suggests itself: an unreasoning compulsion to transfer responsibility. This is highly contagious and, in the *Ladies' Home Journal*, potentially epidemic. For what will come through on those pages for too many of the women of America is the notion that inappropriate and wasteful buildings are the invention and the ambition of architects. It will not be enough simply to say it isn't so; to assert that the suggestion completely inverts the truth; not in the

(Continued on page 204)

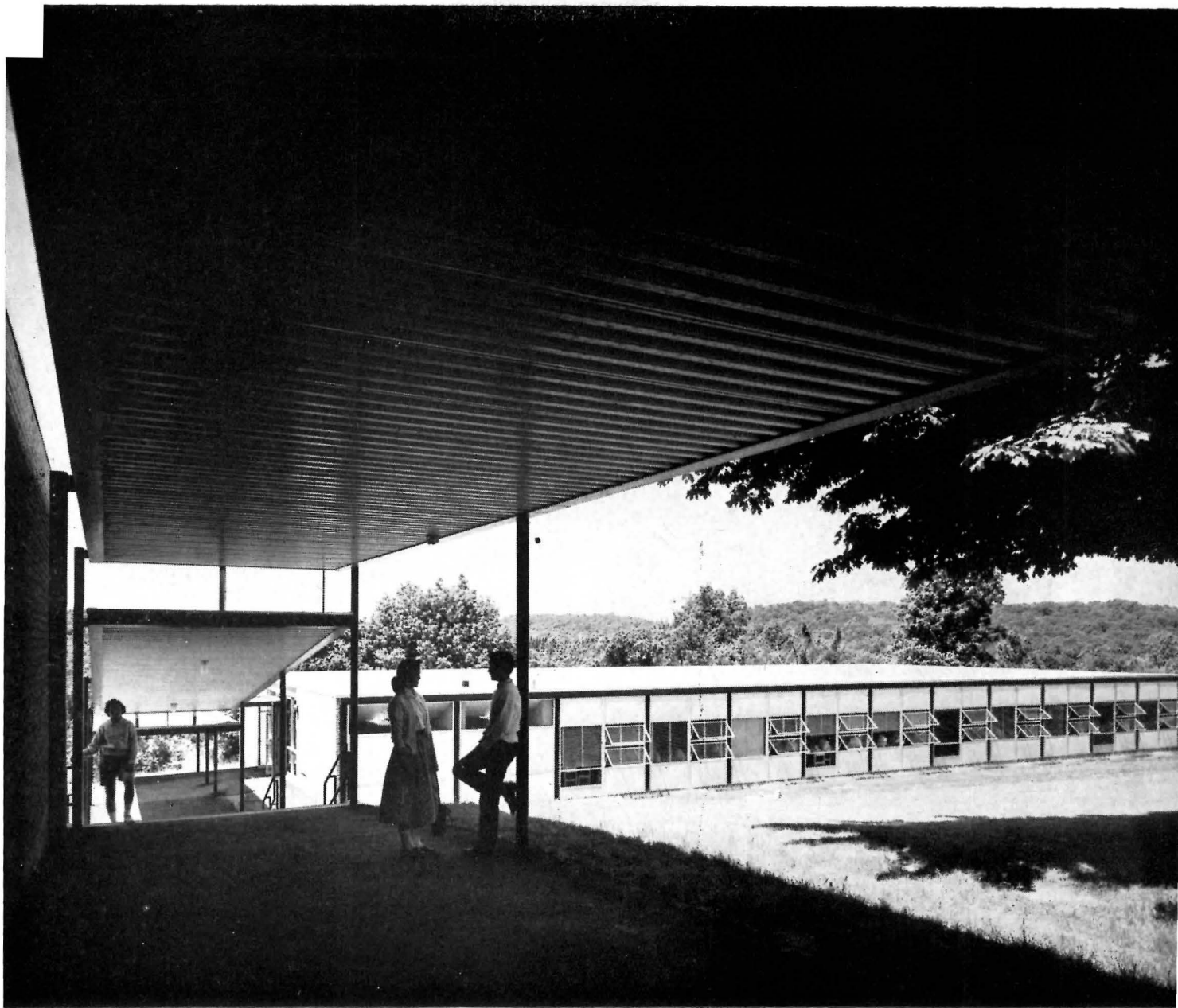


PARKING



PARKING





All photos by Joseph Molitor

MATURE MODEL OF THE CAMPUS PLAN CONCEPT

John Jay High School, Cross River, N. Y., Ketchum, Giná & Sharp, Architects

Above: steel decked walkways connect classroom buildings. Left: outdoor assembly area fits slope between auditorium and science building

CAMPUS-PLAN PUBLIC SCHOOLS have not developed overnight, and yet the few very sure, matured examples we have serve to remind that they are really a very recent phenomenon. To this group the John Jay School must be added.

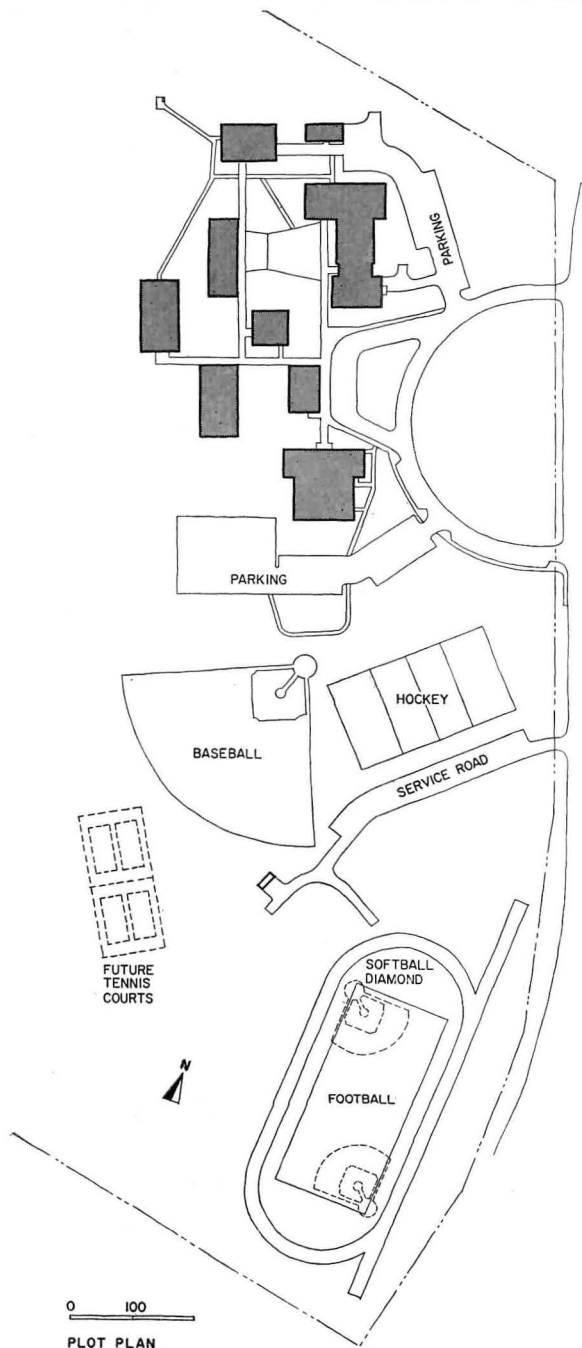
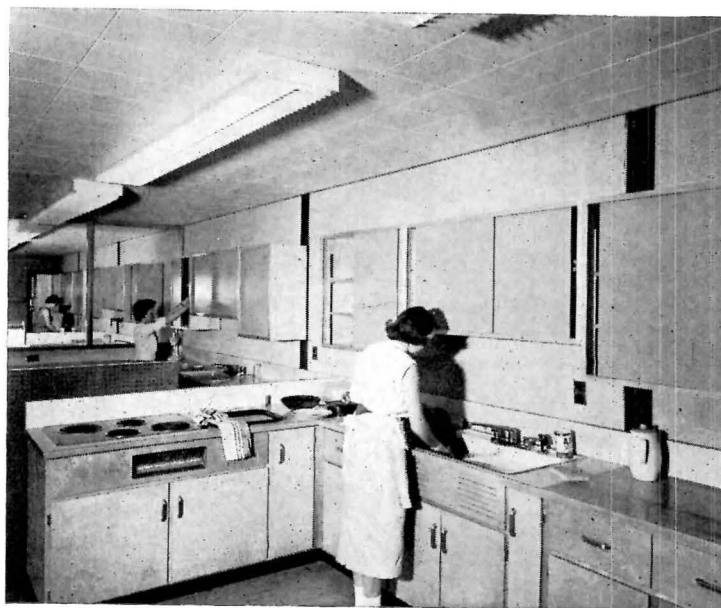
Every building in this plan is better for a somewhat richer program than many schools enjoy, and the care with which the whole has been developed suggests that the architects used their funds well but also that a leaner budget would not have limited the basic planning, the good scale, and the fine sense of fitness in the well-handled landscape of the site. From the studied choice of the site to the detailing of the boiler house it is apparent that this is one of our best new schools.

The campus plan is here to stay in one form or another, and this school should make that a fact.



Typical classroom faces north or south

Science rooms occupy one building unit



JOHN JAY HIGH SCHOOL

On 110 acres of tree-covered slopes this school for 800 pupils will eventually be expanded to accommodate 1000 with the addition only of classrooms. Auditorium, gymnasium, cafeteria, and all other common spaces and services have been built in the initial phase and are now in use.

Automobile approach to the campus arrives at the administration unit. The gymnasium flanks this at the east, and the cafeteria and auditorium at the west. The eight buildings which presently constitute the school are set at various levels down the slope with the library central to all.

Design study on this scheme started about four years ago (ARCHITECTURAL RECORD, July 1955), and evidence of its intensity and duration is everywhere. The siting of the buildings, their functional interrelationships, and the really fine detailing in the simple palette of materials are especially noteworthy.

Extraordinary care was taken in the planning and equipping of all spaces, and this very studied feeling must impress the most casually interested visitor.

Typical classrooms are light, clean, and precise. The cafeteria is an appetizing space with well-chosen furniture and fixtures, and the auditorium is unusually fine for a high-school — or any — building program.

Certainly the most recurring impression must be the disposition of the buildings on the site. The variety of vistas and the easy transitions from one level to another induce a special awareness of the qualities of the space and the buildings which organize it.

Throughout the campus the warm face brick repeats itself and extends the eye's reach. Broken here and there with simple areas of harmonizing color, the whole composition is a skillful exercise in color and texture as well as functional school planning and expert detailing.

Structural frame is steel on poured concrete foundations. Exterior walls are face brick, backed up with concrete block and on the window walls insulated porcelain enamel wall panels. Interior wall surfaces are painted. Roof is built up on a steel deck. Interior partitions are concrete block with ceramic tile in the toilet rooms. Floor surfaces are asphalt tile, Vinyl asbestos tile, wood block, and quarry tile. Ceilings are either exposed or finished with acoustic tile. All sash are aluminum projected. Gray glass is used above eye level in many rooms.

Entrance doors are aluminum, interior are flush plywood. Heating is by oil-fired boilers through perimeter ducts and radiant panels.

Ketchum, Giná & Sharp, Architects; Walter D. Cocking, Educational Consultant; Severud-Elstad-Krueger, Structural Engineers; Tectonic Associates, Mechanical Engineers; Joseph R. Gangemi, Associates, Landscape Architect and Site Planner; Bolt, Beranek & Newman, Acoustical Consultants



West through center of campus; cafeteria at right

Homemaking room with equipment chosen by architects



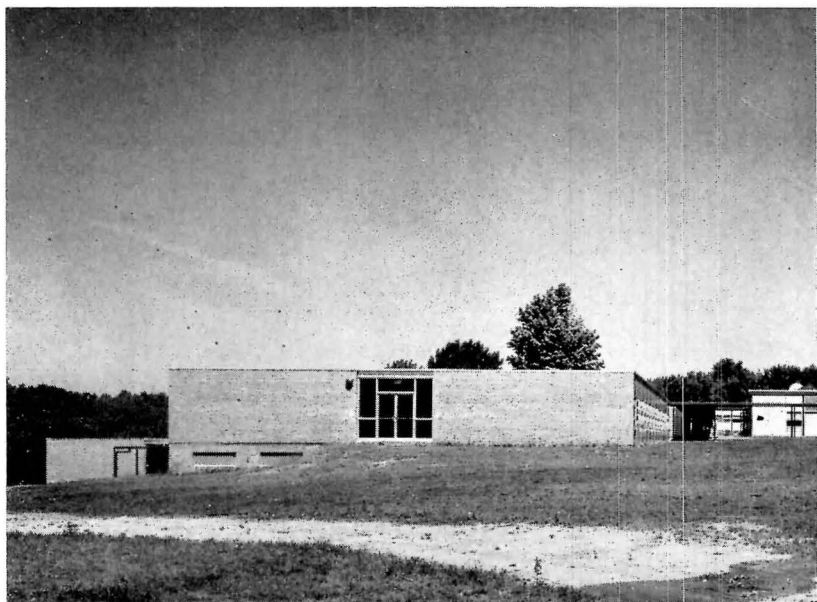
Library is in separate building at center of campus

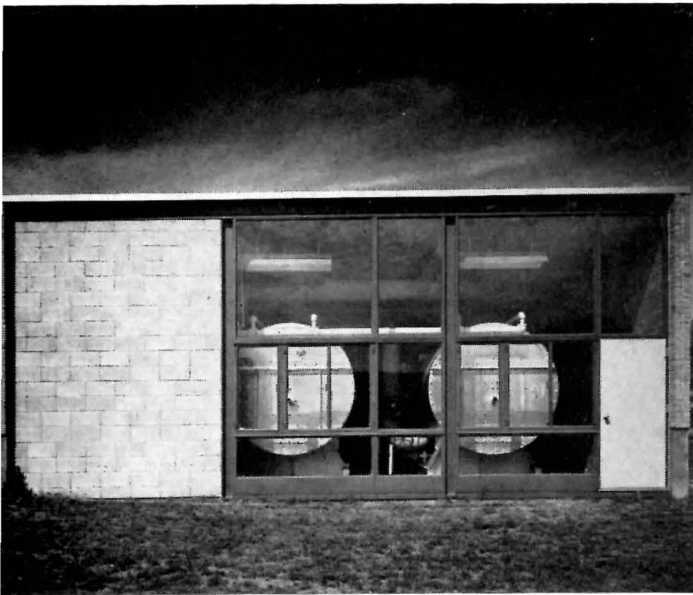
Cafeteria faces east; has dark glass sun screens



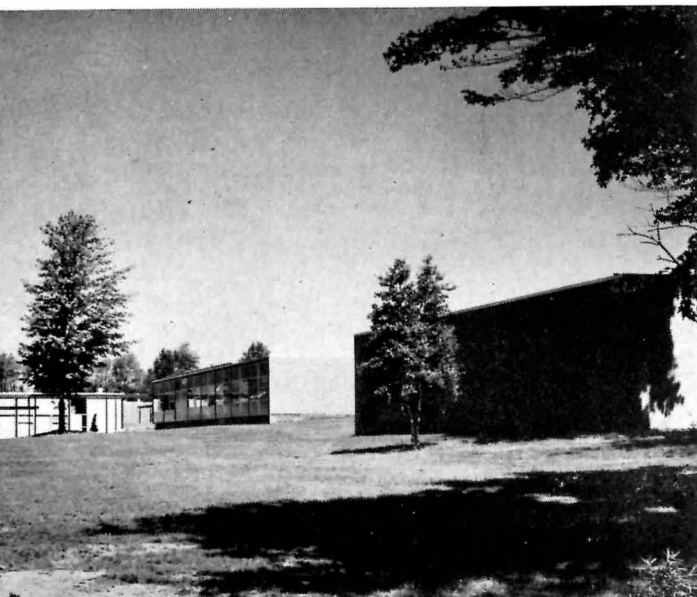
Auditorium is typical of beautifully finished rooms

Toward library with gymnasium at right, classroom unit at left





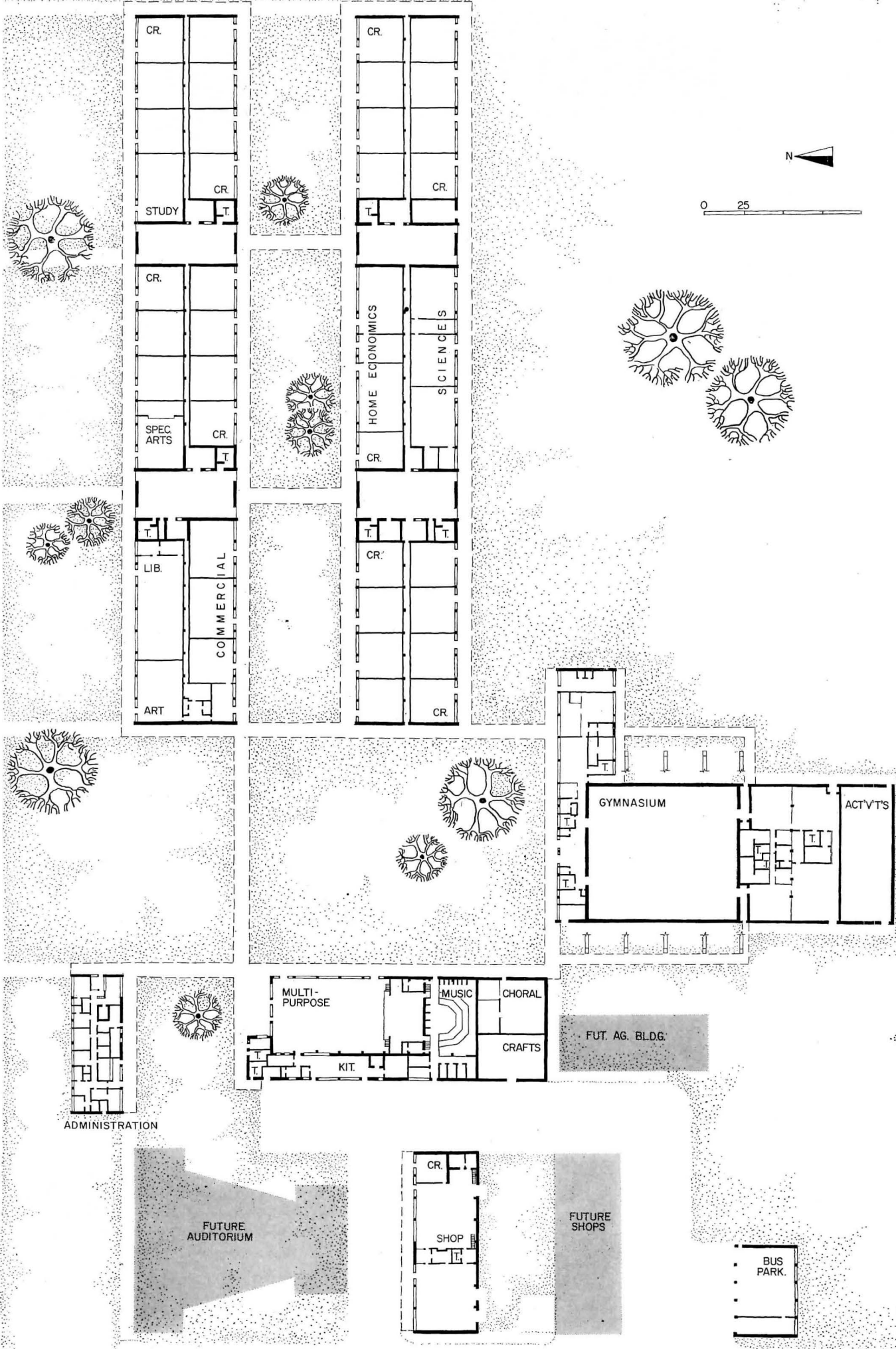
Boiler house is located at west end of campus



JOHN JAY HIGH SCHOOL

		800	77,590
		Pupils	Gross Sq Ft
		Per Pupil	Per Sq Ft
General	754,568		
H & V	168,062		
Plumb.	99,740		
Elec.	146,870		
Ext. Paving	*		
Wells	4,505		
Drainage & Sewage	18,556		
SUB-TOTAL	1,192,301	1,490	15.36
Fixed Equipment			
Kitchen	23,307		
Science	19,291		
Stage	6,922		
Lockers	17,764		
Cabinet work	75,655		
Blinds & Drapes	2,043		
SUB-TOTAL (Fixed Equip.)	144,982		
CUMULATIVE SUB-TOTAL	1,337,283	1,671	17.23
Site Development			
Clearing	*		
Grading	*		
Planting	*		
SUB-TOTAL (Site Dev.)	136,008		
CUMULATIVE SUB-TOTAL	1,473,291	1,841	18.98
Land			
	25,000		
CUMULATIVE SUB-TOTAL	1,498,291	1,872	19.31
Equipment (movable)			
	84,300		
CUMULATIVE SUB-TOTAL	1,582,591	1,978	20.39
Fees			
Arch.	*		
Educational Consultant	*		
Landscape	*		
Struc.	*		
Mech. & Elec.	*		
Civil			
Acoustical	*		
Color			
(Conc. Sup. & Test)			
SUB-TOTAL (Fees)	120,422		
GRAND TOTAL	\$1,703,013	\$2,128	\$21.94

* Included in sub-total immediately below



CR.
STUDY
CR.
SPEC ARTS
LIB.
COMMERCIAL
ART

CR.
CR.
HOME ECONOMICS
SCIENCES
CR.
CR.

GYMNASIUM
ACTV'TS

MULTI-PURPOSE
KIT.
MUSIC
CHORAL
CRAFTS

ADMINISTRATION

FUTURE AUDITORIUM

CR.
SHOP

FUT. AG. BLDG.

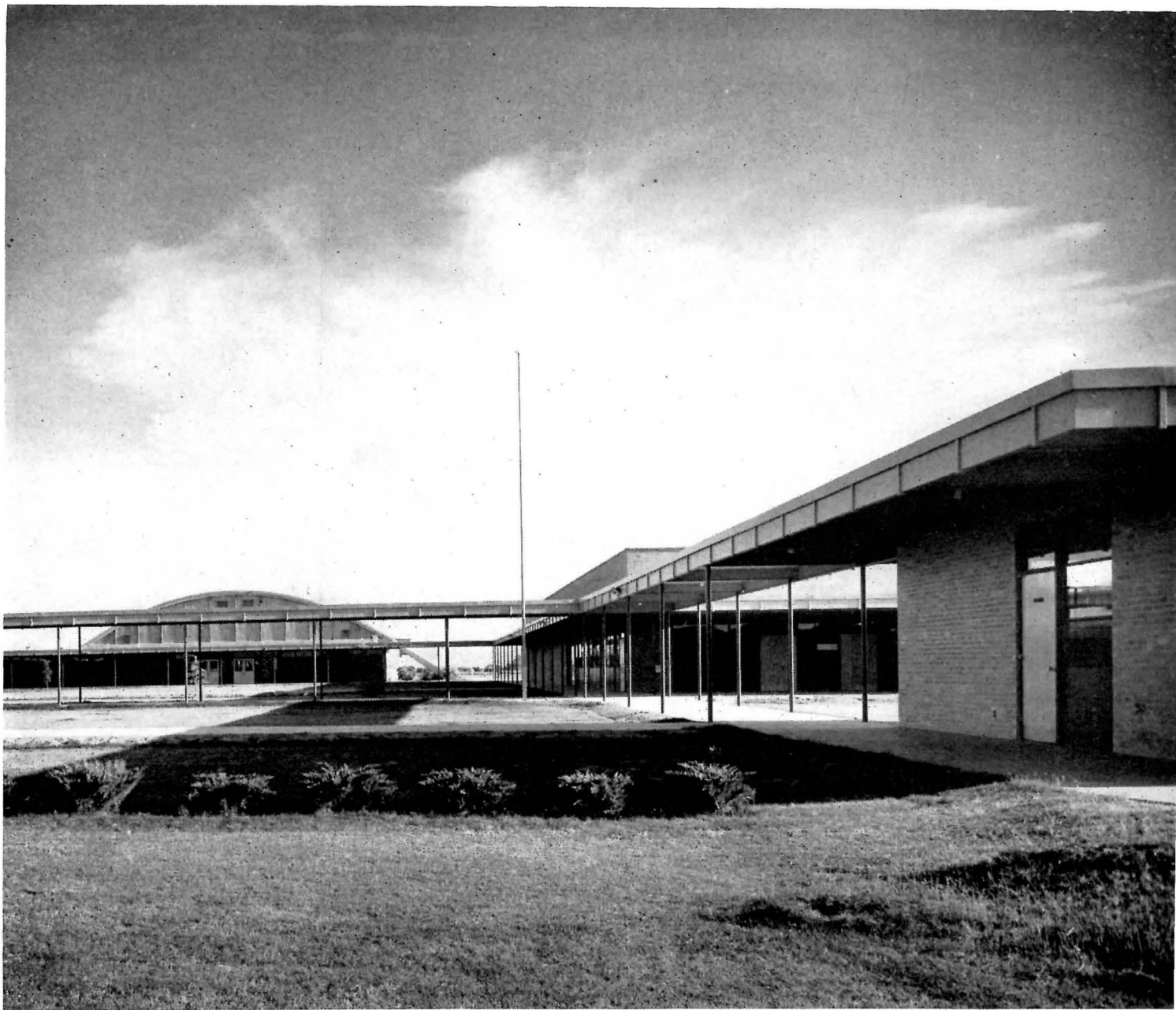
FUTURE SHOPS

BUS PARK.

PARKING



0 25



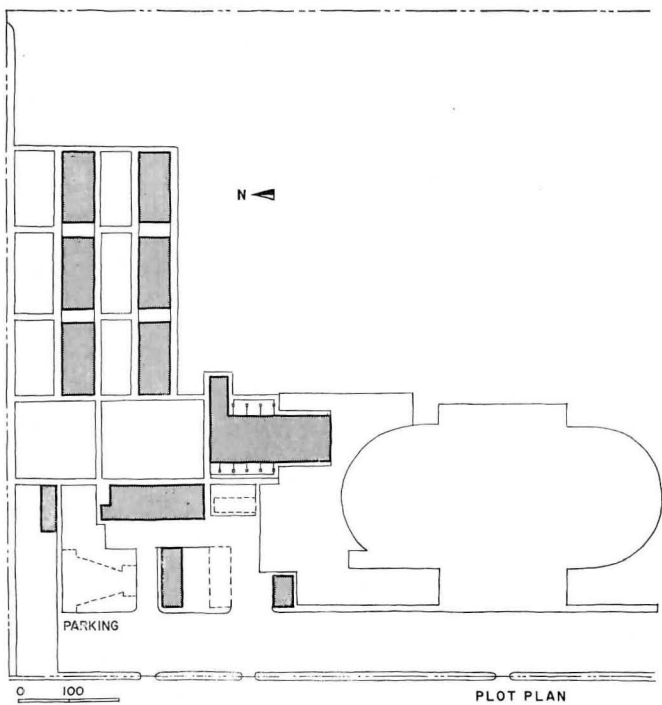
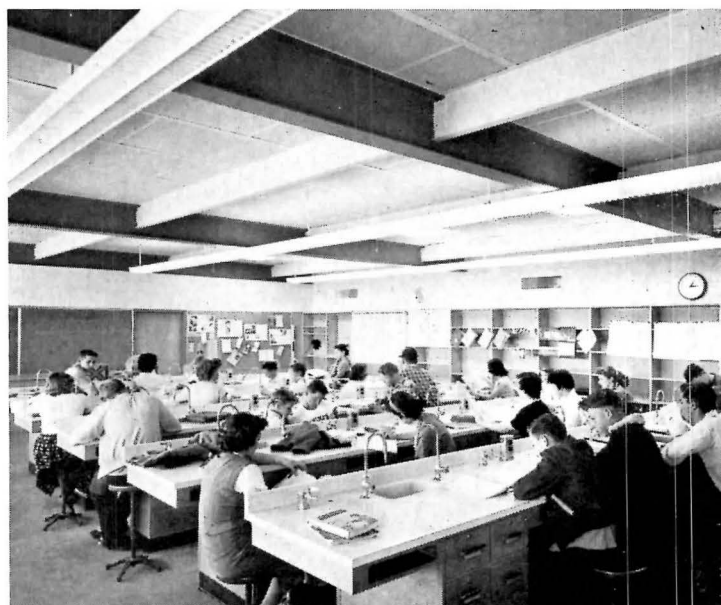
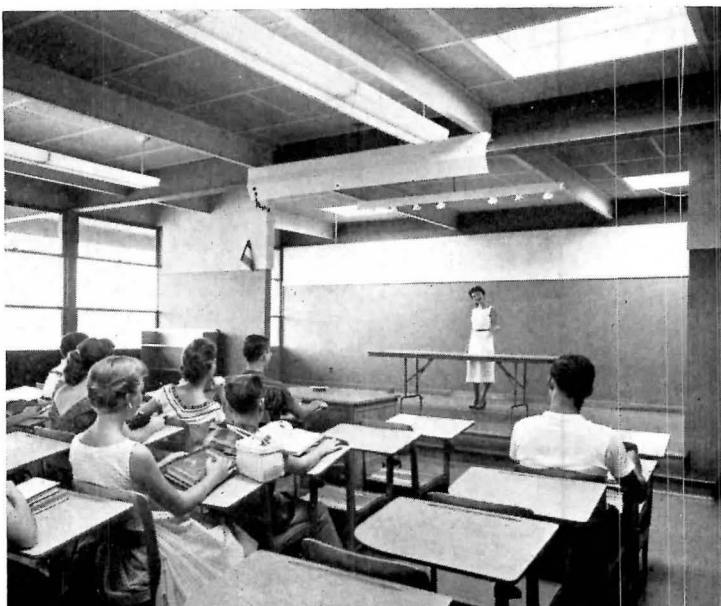
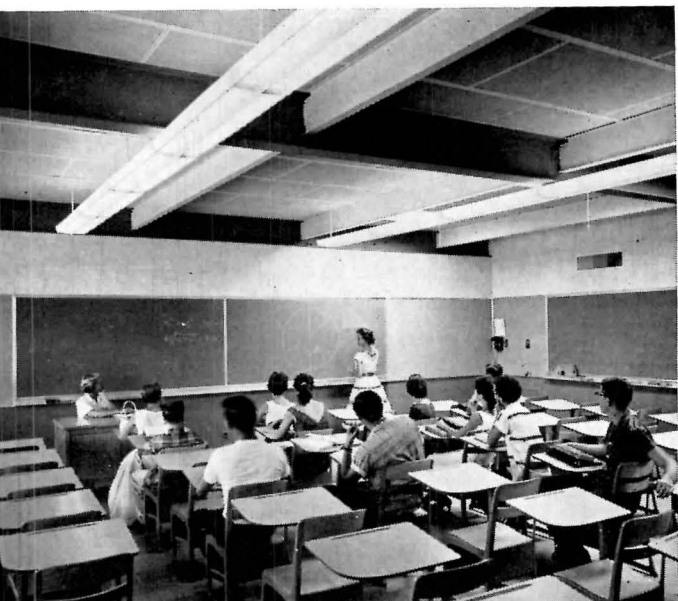
All photos by Stuart Weiner

UNIFIED CAMPUS PLANNING UNDER THE SUN

Washington High School, Phoenix, Ariz., Edward L. Varney, Associates, Architects & Engineers

Above: administration unit at right, multi-purpose building beyond and gymnasium at rear. Left: crisp courtyards are formed by interconnecting covered walks and corridors

THE QUALITY PERHAPS most frequently missing in architecture is stimulating unity. When unity is approached it becomes all too easily monotony. Repetition is not rhythm, and in a day of standard units it is increasingly difficult to bring similar elements together in an orderly way that is not deadly too. Here — and even against the limits of a school-building budget — the architect has used the few means available to pull together a fairly large plant into a pleasantly unified whole. He has interrupted the long classroom blocks with open-air penetrations, has varied the widths of the principal courts, has tied all together with a system of covered open-air corridors and crosswalks. And at the visual center of gravity he has placed the one curvilinear shape in the composition.



Left: typical classroom and speech arts room with presentation and rehearsal platform

WASHINGTON HIGH SCHOOL

In mushrooming Phoenix additions to schools are being started before the original units are finished. At present this school serves 800 pupils. Although it has been in use only a few months additional units are under construction. The auditorium, agriculture building, and second shop building — shown as future construction on plan and site plan — were part of the original scheme.

In this extensive campus plan the gymnasium closes the vista between the administration and multi-purpose buildings on the west and the twin classroom wings to the east. Each of these units has its rooms arranged back to back, and its length is divided into thirds by open-air lobbies. Thirty-two regular classrooms — opening north or south — together with homemaking, science, commercial, speech arts, art, music, and shop spaces add up to very nearly fifty teaching stations throughout the school.

Generously sited, this is an excellent example of the campus plan with open peripheral and cross-connecting corridors. The latter serve to divide the open spaces between the buildings in plots nicely related to human scale in what otherwise might seem a very large, undifferentiated expanse. In the hot Arizona sunlight the extension of the roofs over the surrounding walkways allows all walls to be in shade during the critical hours of the day and lends to buildings and to the campus generally an oasis-like quality. The buildings are simply stated modular organizations with admirably clean detailing and a complete freedom from pretension.

The arched roof of the gymnasium is a happy combination of economics and visual organization set in harmonizing contrast to the rectilinear discipline of the over-all composition. Its curves and the colored tiles which are being placed on the fascias of the corridor roof eaves are the two principal accents in the campus.

Structural frame is steel on concrete foundations. Exterior walls are face brick throughout, and in the gymnasium and certain other special areas face brick is used as the interior wall surface as well. Generally, the interior wall finishes are painted gypsum plaster-board or plaster.

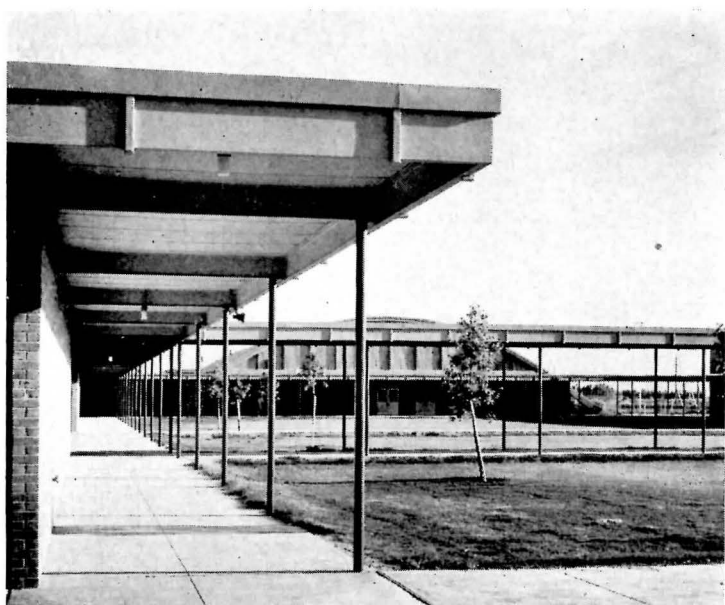
The roof is built up and topped with gravel. Glass fiber formboards are left exposed as the ceiling finish in all flat decked spaces.

Sash throughout the school are steel projected. Entrance and interior doors are flush panel plywood. Door hardware is wrought bronze. Thermal insulation is wood fiber and acoustical insulation is glass fiber. Floors are concrete slabs on grade. Interior partitions are steel stud, plastered.

In Arizona's heat provisions for ventilation and cooling add factors not common to most school-building programs in this country, and examination of costs on this school must allow that the remarkably low figures for this quality of construction include refrigerated cooling throughout except in gymnasium, cafeteria, and shop.

Edward L. Varney, Associates, Architects & Engineers

Science room (left center) with exposed beam and glass fiber ceiling



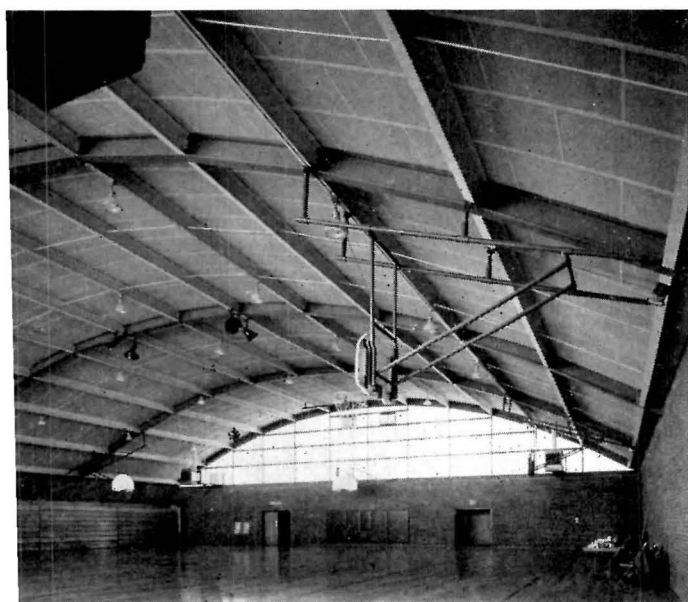
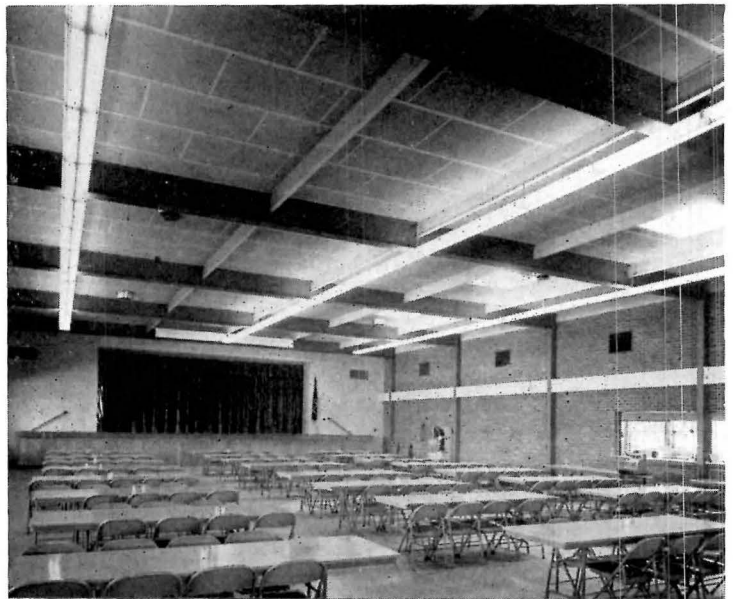
Looking south to gymnasium from northernmost classroom building

Homemaking room with regularly spaced skylights



*Library is located on north side
of one classroom building*

Multi-purpose room serves temporarily as cafeteria and auditorium



Gymnasium shows simple, uncluttered lines inside and out

WASHINGTON HIGH SCHOOL

800 Pupils
89,295 Gross Sq Ft
Per Pupil Per Sq Ft

General	746,549		
H & V	74,000		
Plumb.	78,000		
Elec.	54,500		
Ext. Paving	*		
Wells			
Drainage & Sewage	*		
SUB-TOTAL	953,049	1,191	10.67

Fixed Equipment

- Kitchen
- Science
- Stage
- Lockers
- Cabinet work
- Blinds & Drapes

SUB-TOTAL (Fixed Equip.)			
CUMULATIVE SUB-TOTAL	953,049	1,191	10.67

Site Development

- Clearing *
- Grading *
- Planting (by owner)

SUB-TOTAL (Site Dev.)	10,500		
CUMULATIVE SUB-TOTAL	963,549	1,204	10.79

Land 85,000

CUMULATIVE SUB-TOTAL	1,048,549	1,310	11.74
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Equipment (movable) 95,000

CUMULATIVE SUB-TOTAL	1,143,549	1,429	12.80
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Fees

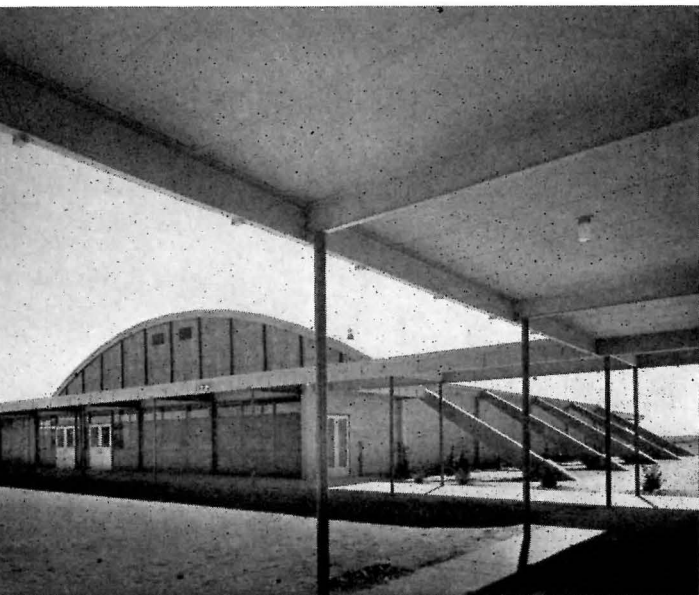
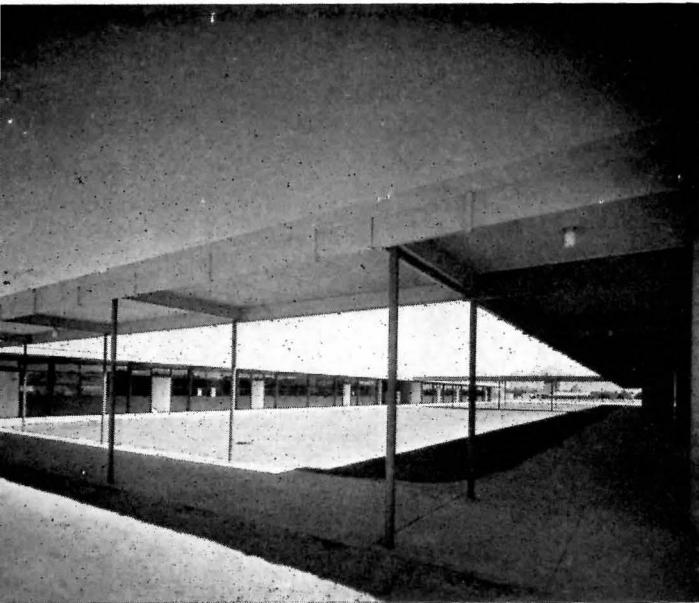
- Arch. *
- Educational Consultant
- Landscape
- Struc. *
- Mech. & Elec. *
- Civil
- Acoustical
- Color
- (Conc. Sup. & Test)

SUB-TOTAL (Fees)	45,752		
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GRAND TOTAL	\$1,189,301	\$1,486	\$13.31
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* Included in sub-total immediately below

Covered walkways will carry colored tiles on fascias



FUTURE PARKING

FUTURE CAFETERIA

SHOP

CR.

ART

FUTURE CLASSROOMS

HOME ECONOMICS

CR.

CR.

CR.

CR.

CR.

CR.

CR.

COMMERCIAL

SCIENCES

LIBRARY

CR.

CR.

CR.

T.

T.

T.

T.

ADMIN.

MECH.

FUTURE AUDITORIUM

MUSIC



GIRLS' PLAYFIELD

FUT. DRESSING RMS.

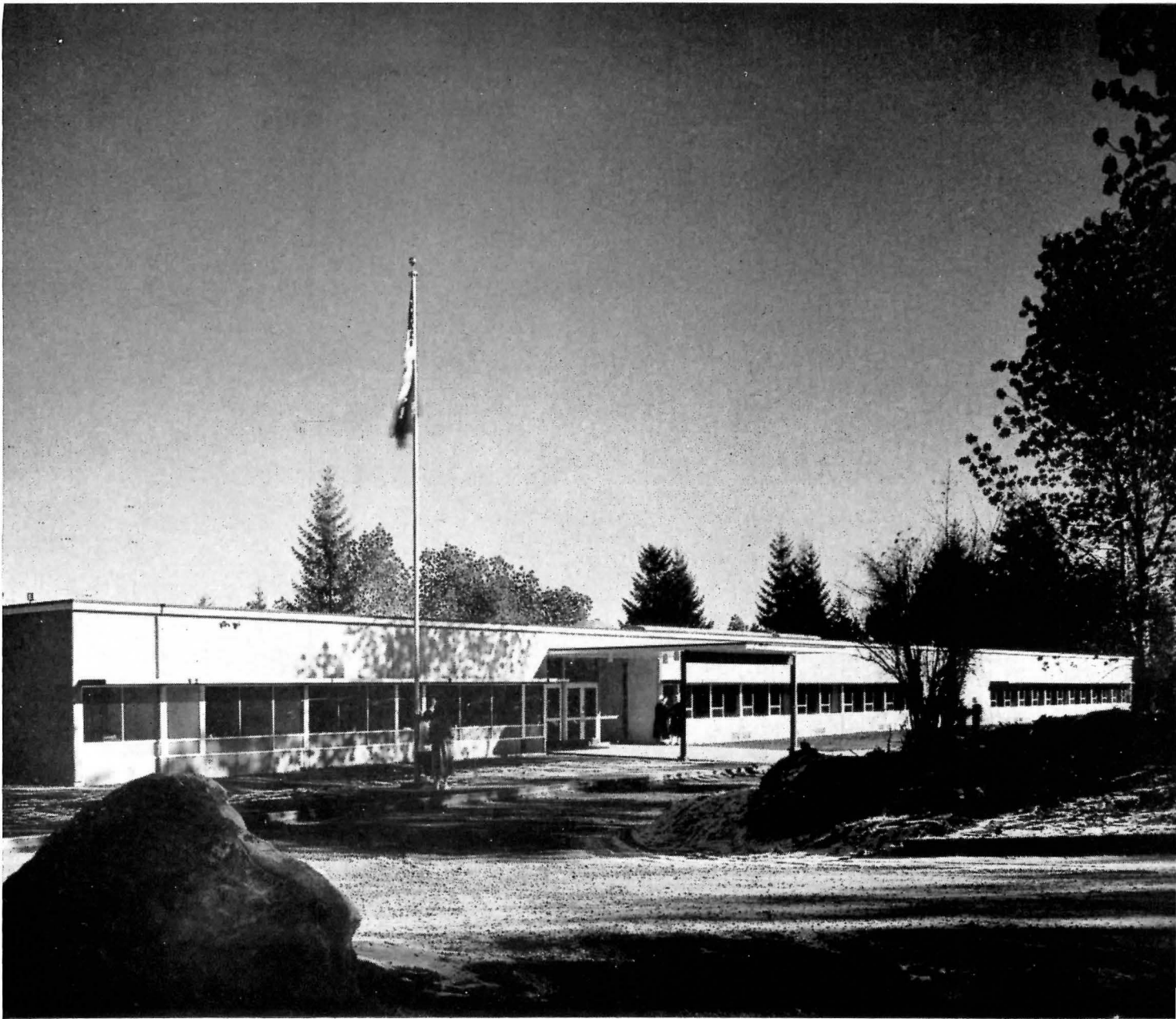
GYMNASIUM

FUT EXERCISE RMS.

PARKING

PARKING





All photos by Art Hupy

IN THE NORTHWEST — EXTRA CONCERN FOR LIGHT

Mercer Island High School, Mercer Island, Wash., Bassetti & Morse, Architects

A PLEASANT DISPOSITION of its buildings upon the sloping site; carefully studied color relationships; a consistently maintained scale; and a rewarding extra concern for lighting in the sometimes gray Northwest, all recommend this school.

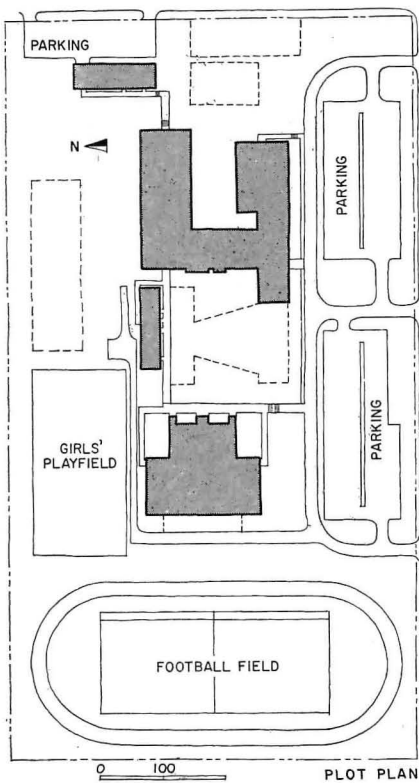
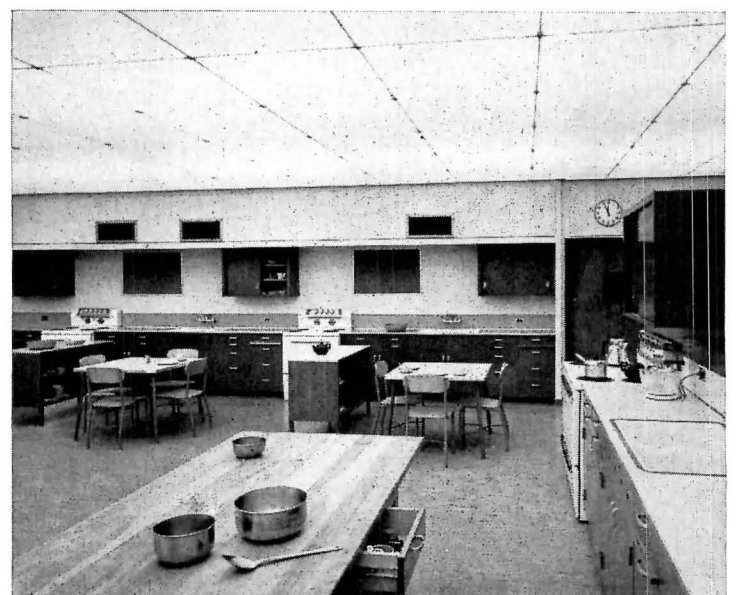
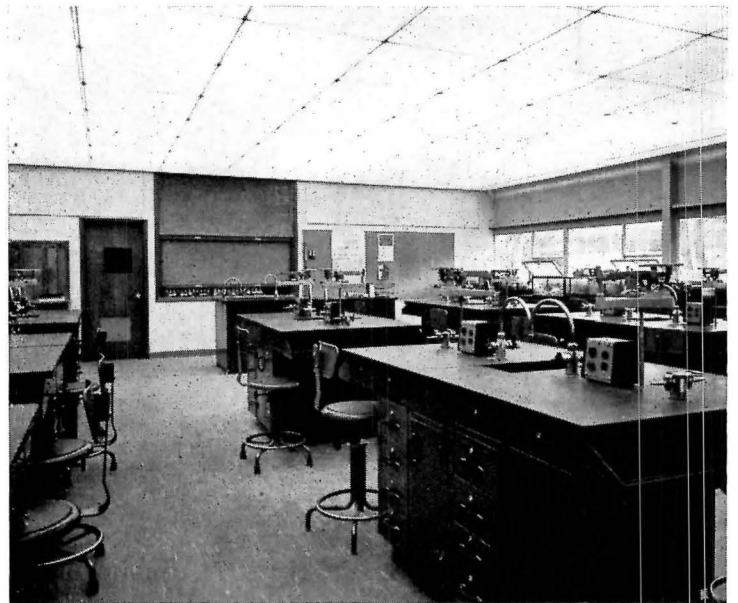
Perhaps the biggest change we have seen in the aspect of our schools in the past quarter century is their change in scale. Limitation to one story, expression of the structural bay, elemental profiling at the roof edge, and an almost complete avoidance of celebration at the entrances have all played their part in this and do so in this excellent example of school building art at mid-century in America. Most modest in the faces it turns to the world, its interiors are confidently and completely arranged for comfortable study.

Above: principal entrance to the main classroom building. Left: future construction will add auditorium, cafeteria, and more classrooms



Typical classroom overlooks courtyard to downhill wing

Luminous ceilings in science and homemaking rooms below



MERCER ISLAND HIGH SCHOOL



From the library a view into the principal court

At present 800 students are accommodated in thirty-two teacher stations distributed among four buildings. Still to come are a large auditorium, a cafeteria, and an additional classroom building.

All buildings are connected by covered walkways which move up and down the slope and along it. When all construction is complete a series of closed and partially closed courts will furnish that special sense of space which extended enclosure offers.

All administration is centered at the left of the principal entrance, with the high-ceilinged library nearby and central to the two main classroom wings. The library is expandable into two classrooms south of it. Corridors are double loaded, with classrooms opening to the north or south.

The music practice room is removed from the quiet study zones and grouped with the boiler room in a building at the approximate center of the eventual plan. Across the corridor from these a large auditorium with balcony and a generous stage and rehearsal space will be constructed in the near future. The auditorium entrance will open off the same entrance walk that serves the public approach to the ticket office in the gymnasium. This building is somewhat larger than is often found in plants of this size, and with an eventual doubling of the dressing rooms will provide complete and spacious facilities.

An art room, woodworking and machine shops occupy a fourth building also removed from the classroom zone. Except for that which is along the walls, there is no fixed equipment in the homemaking rooms in order to allow for variety in the curriculum and use of these rooms for other subjects.

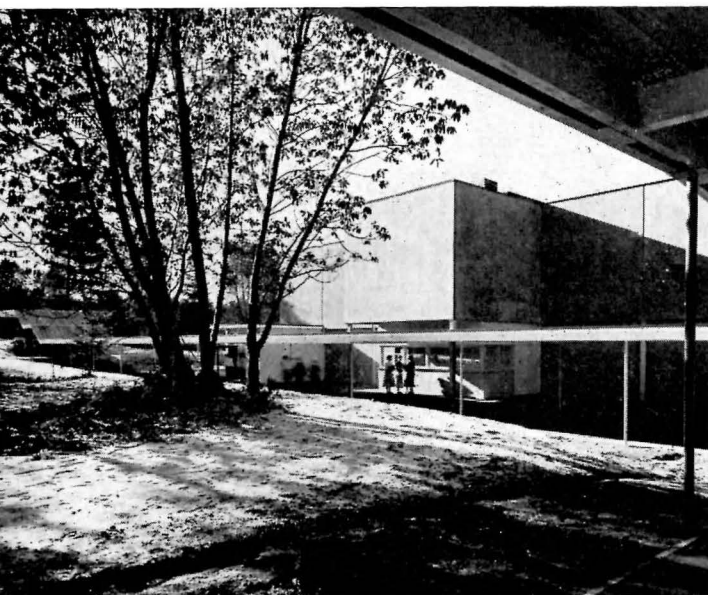
Structural frame is steel with open web joists. Exterior walls are concrete block and asbestos cement tiltup wall panels. These are painted, as are the plasterboard interior wall surfaces. Roof is built-up on wood plank decking. Interior partitions are wood stud with ceramic tile on plasterboard in the classroom building toilets and glazed blocks in the locker rooms.

Classroom floors are asphalt tile on concrete slabs. All sash and sunshades are aluminum. Entrance doors are glazed in wood frames, interior doors are flush panel plywood. Downspouting is through interior steel pipe; flashing is galvanized steel. Thermal insulation is provided in rigid roofdeck material and asbestos cement wall panels.

Heating is by oil-fired hot water boilers with unit ventilators in the classrooms, with volume heaters in gymnasium, music and shop spaces. Toplighting through unit skylights and luminous ceilings is an outstanding feature of the school.

Bassetti & Morse, Architects; Elizabeth Brazeau, Landscape Architect; Donald G. Radcliffe, Structural Engineer; George S. Traberg, Mechanical Engineer; Beverly A. Travis & Assoc., Electrical Engineers; Harold S. Merritt, Civil Engineer; Vern O. Knudsen, Acoustical Consultant; Mary Bassetti & Emily Morse, Color Consultants.

Covered walks and steps connect buildings on sloping site





Library has extra high ceiling



Music room without luminous panels shows unit skylights

MERCER HIGH SCHOOL

800 76.182
Pupils Gross Sq Ft
Per Pupil Per Sq Ft

General	*		
H & V	168,783		
Plumb.	in H & V		
Elec.	107,205		
Ext. Paving	*		
Wells			
Drainage & Sewage	*		
SUB-TOTAL	916,290	1,145	12.03

Courtyard is focus of classrooms and library



Fixed Equipment			
Kitchen			
Science			
Stage			
Lockers			
Cabinet work			
Blinds & Drapes			
SUB-TOTAL (Fixed Equip.)	916,290	1,145	12.03

CUMULATIVE SUB-TOTAL

Site Development			
Clearing	*		
Grading	*		
Planting	*		
SUB-TOTAL (Site Dev.)	9,835		
CUMULATIVE SUB-TOTAL	926,125	1,158	12.16

Land	15,000		
CUMULATIVE SUB-TOTAL	941,125	1,176	12.35

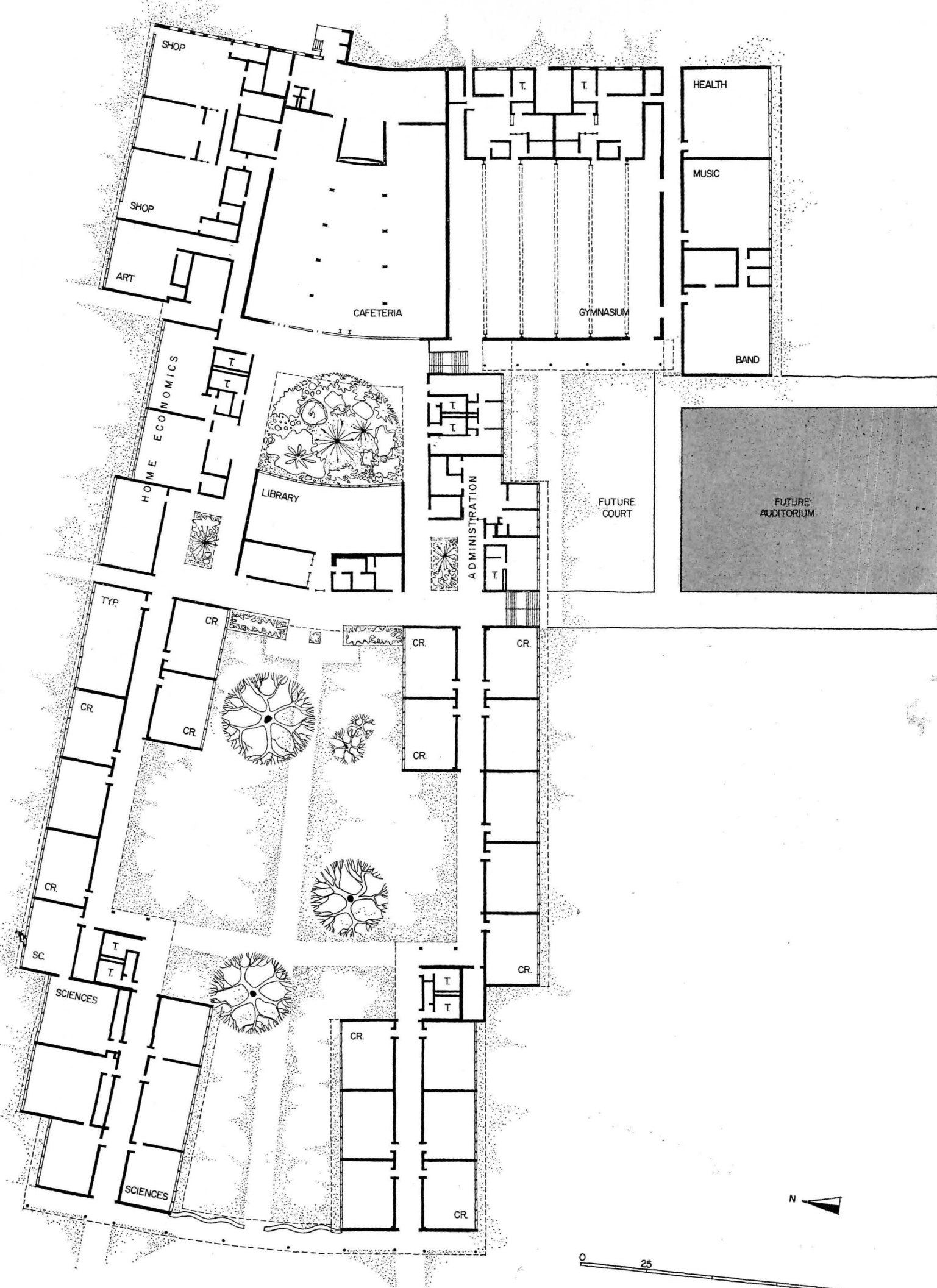
Equipment (movable)	90,000		
CUMULATIVE SUB-TOTAL	1,031,125	1,288	13.53

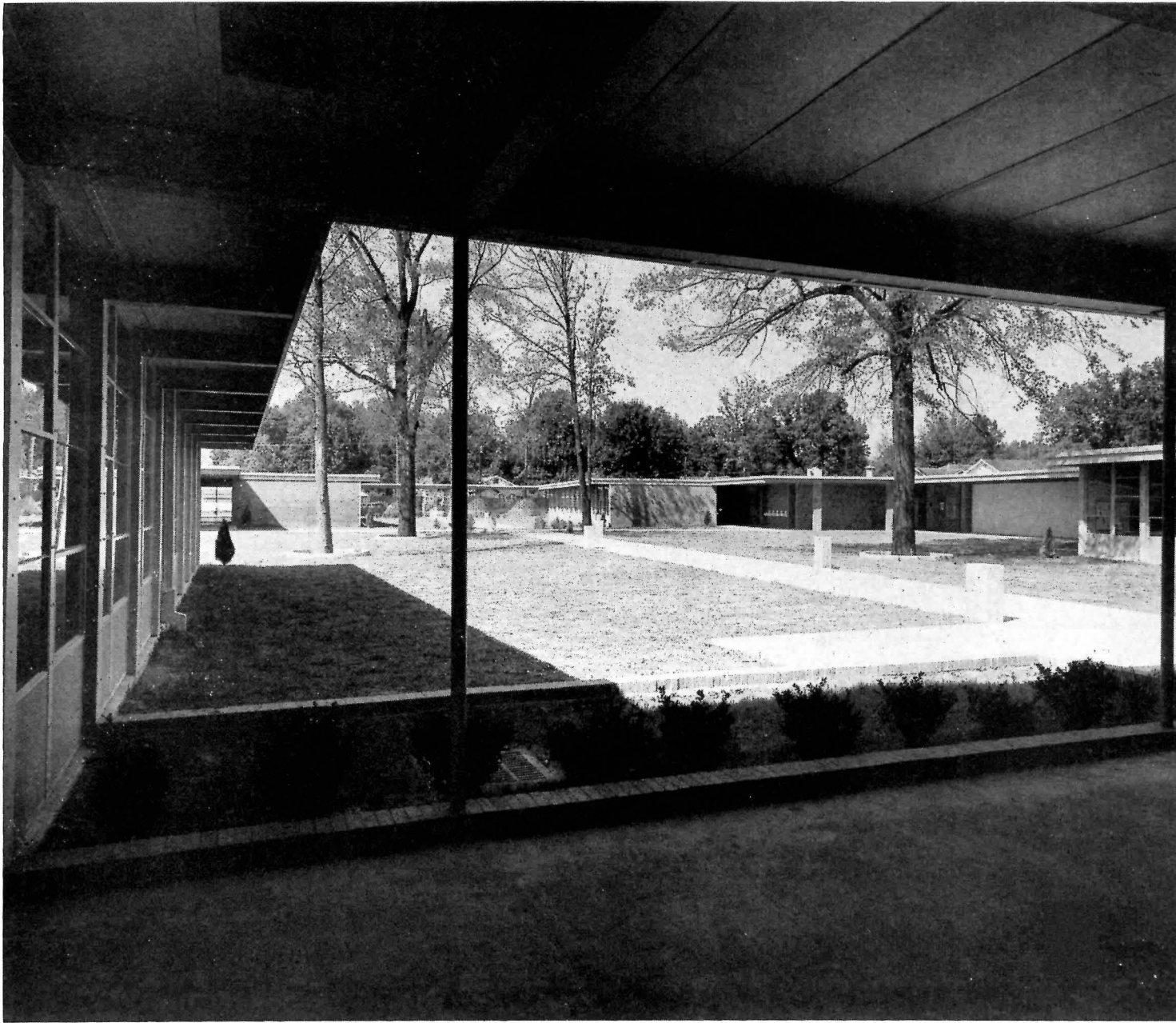
Fees			
Arch.	*		
Educational Consultant			
Landscape	*		
Struc.	*		
Mech. & Elec.	*		
Civil	*		
Acoustical	*		
Color	*		
(Conc. Sup. & Test)	*		
SUB-TOTAL (Fees)	56,243		

GRAND TOTAL	\$1,087,368	\$1,359	\$14.27
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* Included in sub-total immediately below

Extra large gym occupies separate building





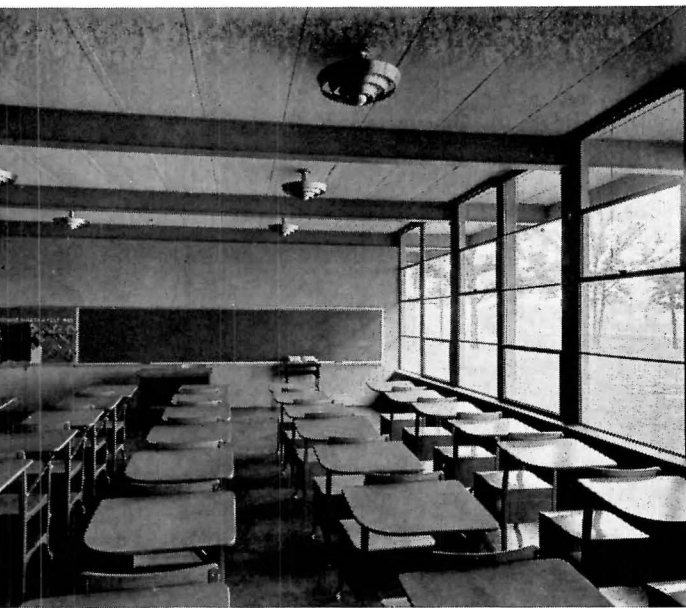
All photos by Earl Saunders

COURTYARDS INTEGRATE LOW-BUDGET SCHOOL

Horace Mann High School, Little Rock, Ark. Erhart, Eichenbaum, Rauch and Blass, Architects

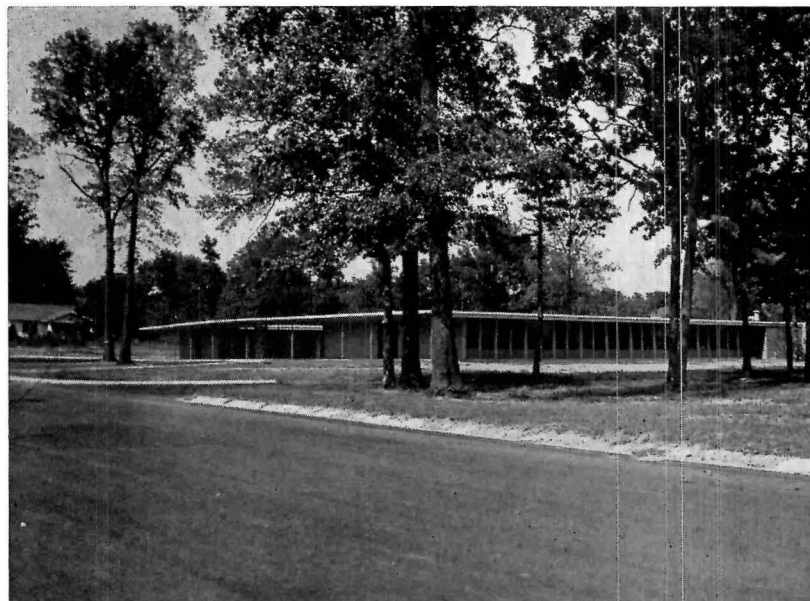
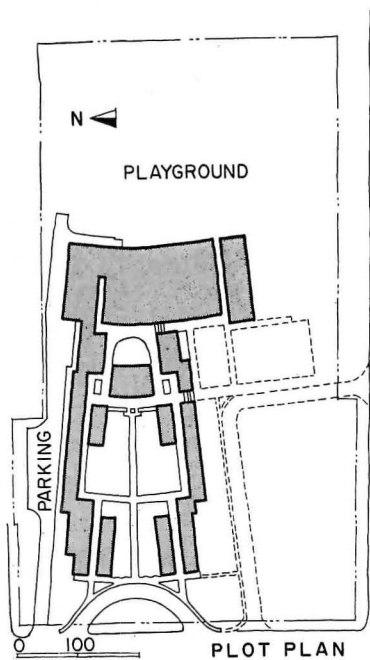
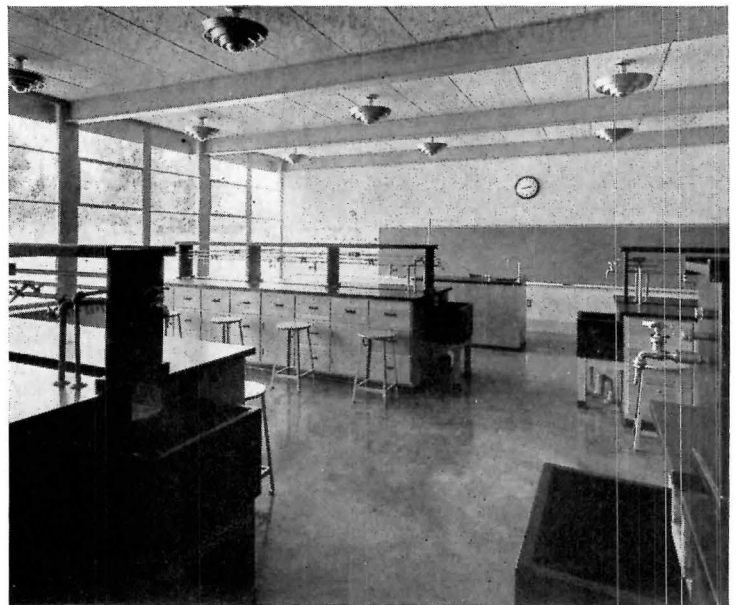
THE SIZE OF A BUILDING BUDGET — per classroom, per pupil, or per sq ft — is not necessarily an indicator of the quality of the architecture that will be achieved under it. A rich budget often assures little more than a rich variety of visual mistakes; a lean budget sometimes urges a restraint which is found most becoming. Blessed with a tree-filled site, but little money, the architects of this school happily spread their classrooms along a series of diminishing and enlarging courtyards and achieved a maximum effect with severely limited means. While it might be difficult to rationalize completely the wedge-shaped plan, it does afford a reversed perspective from the library end which helps overcome the length of the extended classroom wings and visually frees one wing from the other. This school won a First Honor Award in the Gulf States last year.

Above: the inner court looking toward main entrance gates. Left: 1000 pupils are accommodated in twin wing building



Typical classroom faces away from courtyard

Science room is oriented to north light



HORACE MANN HIGH SCHOOL

On a limited site and rigidly restricted budget these architects have arranged around a series of courts a high school low in cost and high in satisfactions, not the least of which is the effect of the low, extended building among the fine trees.

The addition of four classrooms along each side of the inner court will bring the pupil complement to 1120. An auditorium remains to be built, and although it will bring up unit costs somewhat, they will still be remarkably low, thanks to a fairly lean programming in terms of finishes and site development, open corridors, and a skillful organization of space and materials.

The series of courts along the principal axis provides a strong integrating element and pleasant vistas from the single- and double-loaded corridors. Noisier areas are grouped at the east end away from the classrooms and in such a way as to be easily available for community activities after school hours. Art, shops, home-making, typing, and science rooms are located in the north-lighted wing. The library links the two classroom wings and is the principal plan focus.

Twenty-two regular classrooms, three laboratories and eleven special activity rooms total thirty-six rooms which cost just under \$25,000 per room on a total project cost basis.

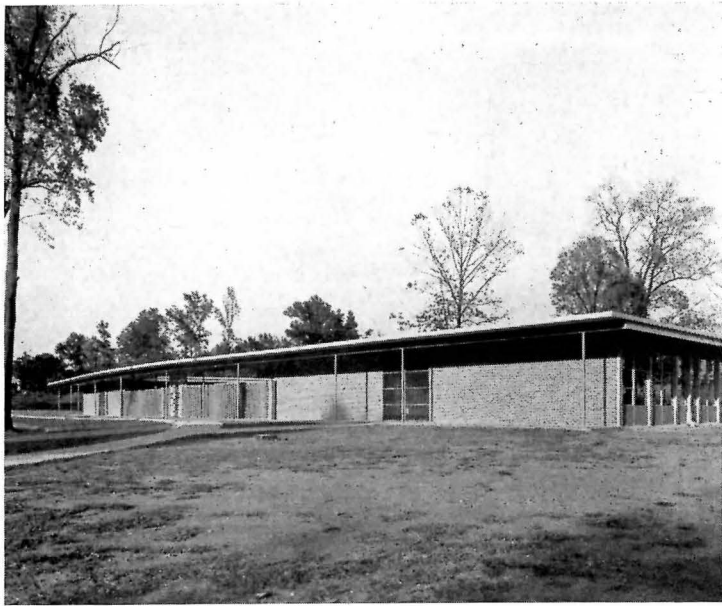
The building is laid out on an 8-ft module with pipe columns supporting steel beams which, in turn, carry 2-ft centered bulb tees and a glass fiber panel deck, covered with lightweight insulating concrete and built-up roofing. All structural elements are exposed and painted. Pink face brick alternates with steel window walls on the exterior. Corridor walls are generally load-bearing.

Kitchen, toilet, and locker rooms have structural glazed tile walls and ceramic or quarry tile floors. Classroom floors are concrete. Exterior steel panels are coral, turquoise, or yellow. Sash and structural steel are light gray. Doors are natural finish birch plywood, solid core for exterior, hollow core for interior; with satin finish aluminum hardware.

Heating is by hot water convectors and in the library, gymnasium, and cafeteria by hot water activated air handling units, where mechanical air movement was desired. Cross ventilation in classrooms is achieved through continuous louvers located within the depth of the beams at the top of the corridor walls. Kitchen, locker rooms, and toilets are mechanically ventilated.

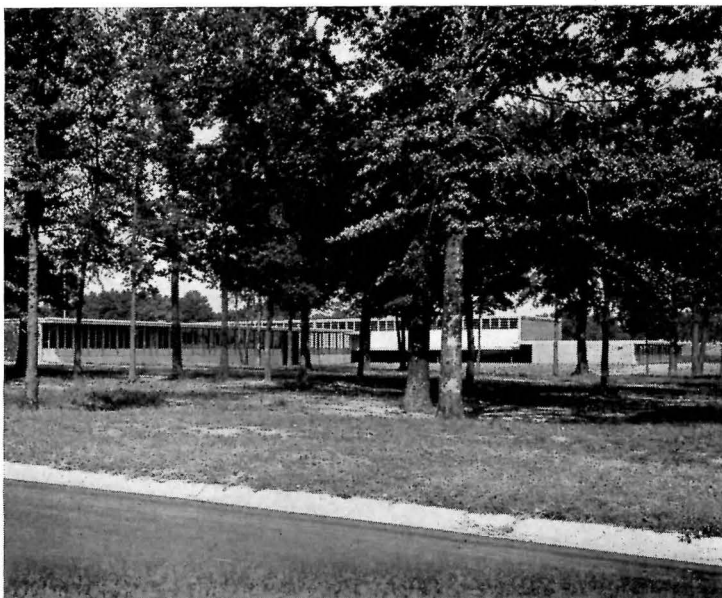
Interior color schemes use pink brick, natural brick, and turquoise painted steel bents in the gymnasium. The cafeteria has pink brick walls; the glazed tile panels are light gray to match the structural steel; dropped plaster ceiling is turquoise. Classrooms are either yellow or green with gray or dark green trim. A majority of the cabinet work is built in and finished naturally.

*Erhart, Eichenbaum, Rauch & Blass, Architects;
Landauer & Shafer, Mechanical and Electrical Engineers.*



Main entrance is at west end of restricted site

Courtyards and existing trees are invaluable assets





Library (left) links classroom wings; has own court

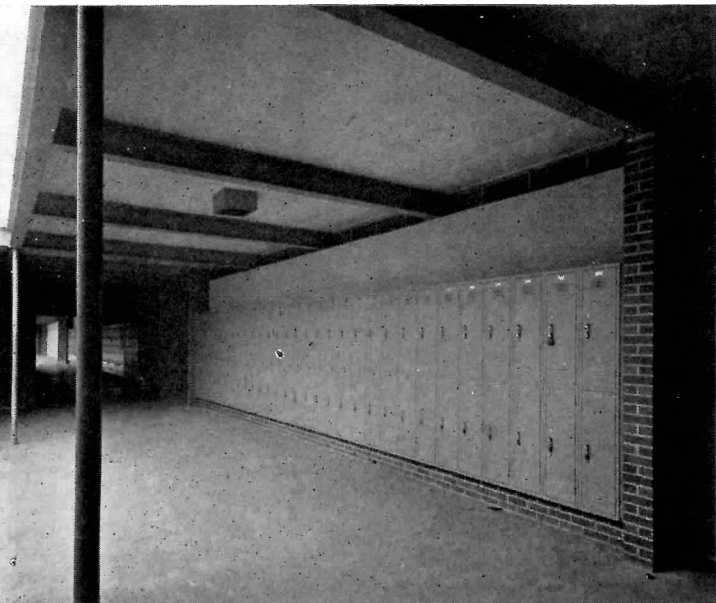
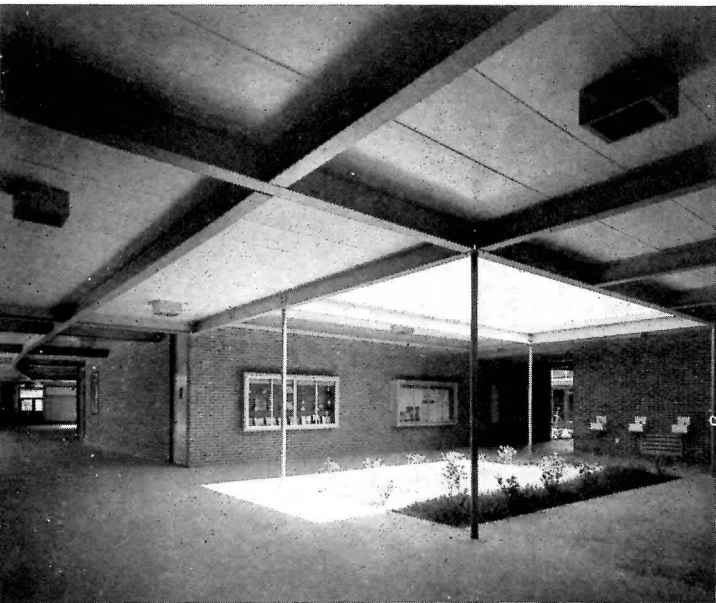
Open corridor vistas (right) are interrupted by light courts

Cafeteria is across court from library



Steel bents are turquoise; walls are pink brick

HORACE MANN HIGH SCHOOL

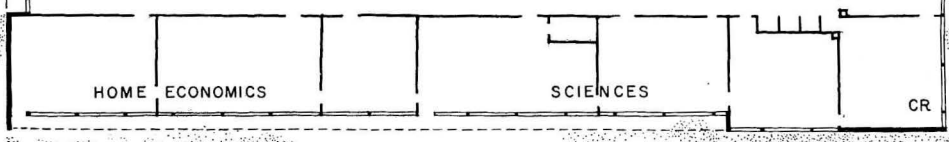
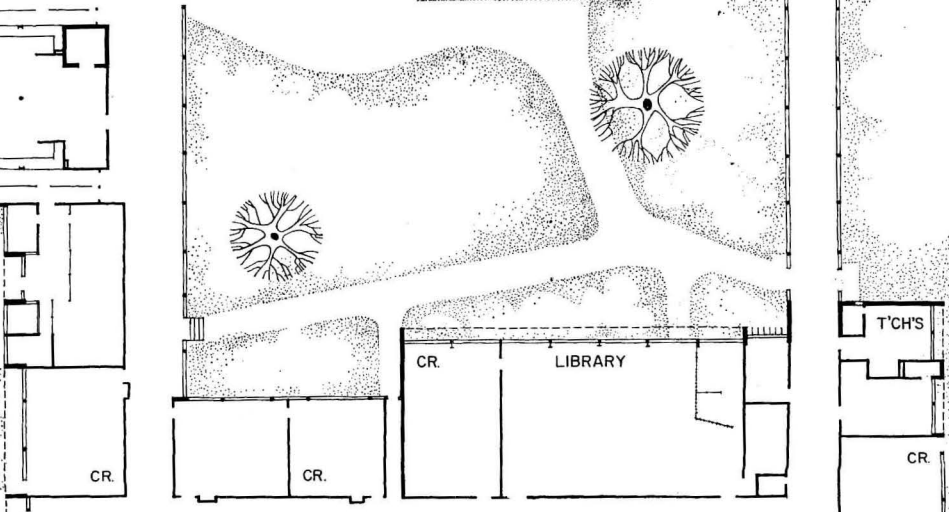
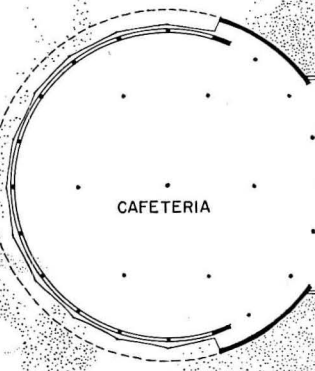
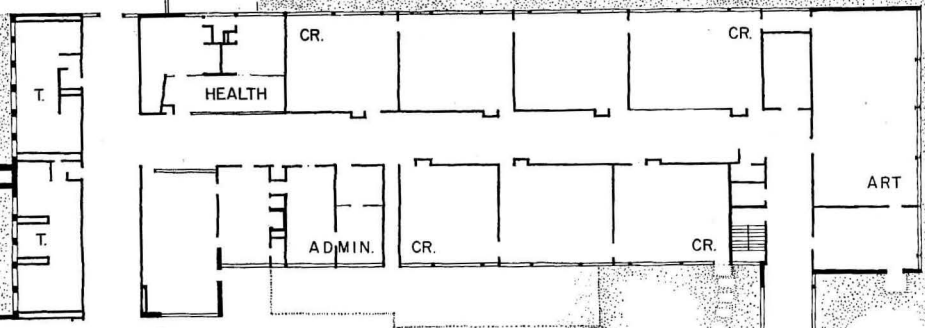
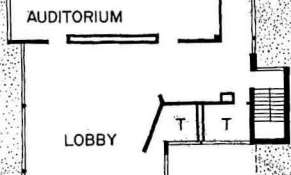
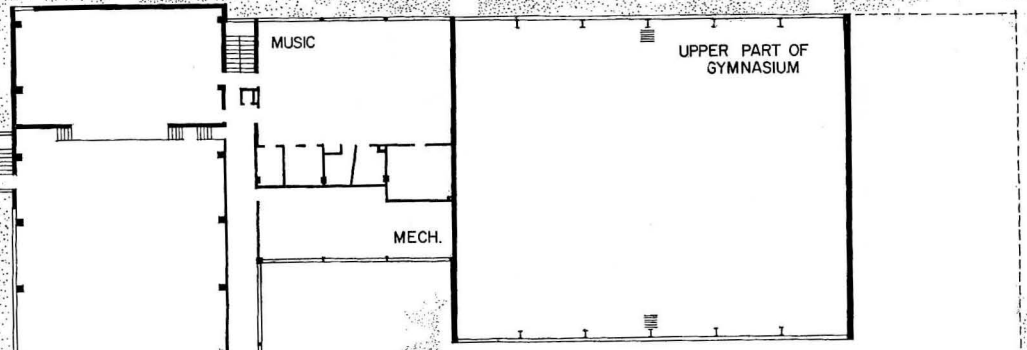


Bank of lockers in open air corridor

		1000 Pupils Per Pupil	81,300 Gross Sq Ft Per Sq Ft
General	462,307		
H & V	71,719		
Plumb.	74,858		
Elec.	52,397		
Ext. Paving	*		
Wells			
Drainage & Sewage	*		
SUB-TOTAL	661,281	661	8.13
Fixed Equipment			
Kitchen	25,252		
Science			
Stage			
Lockers			
Cabinet work			
Blinds & Drapes			
SUB-TOTAL (Fixed Equip.)	25,252		
CUMULATIVE SUB-TOTAL	686,533	686	8.44
Site Development			
Clearing	*		
Grading	*		
Planting			
SUB-TOTAL (Site Dev.)	31,202		
CUMULATIVE SUB-TOTAL	717,735	718	8.82
Land	74,500		
CUMULATIVE SUB-TOTAL	792,235	792	9.74
Equipment (movable)	59,500		
CUMULATIVE SUB-TOTAL	851,735		10.47
Fees			
Arch.	*		
Educational Consultant			
Landscape			
Struc.	*		
Mech. & Elec.	*		
Civil	*		
Acoustical			
Color			
(Conc. Sup. & Test)			
SUB-TOTAL (Fees)	43,064		
GRAND TOTAL	\$894,799	\$895	\$11.00

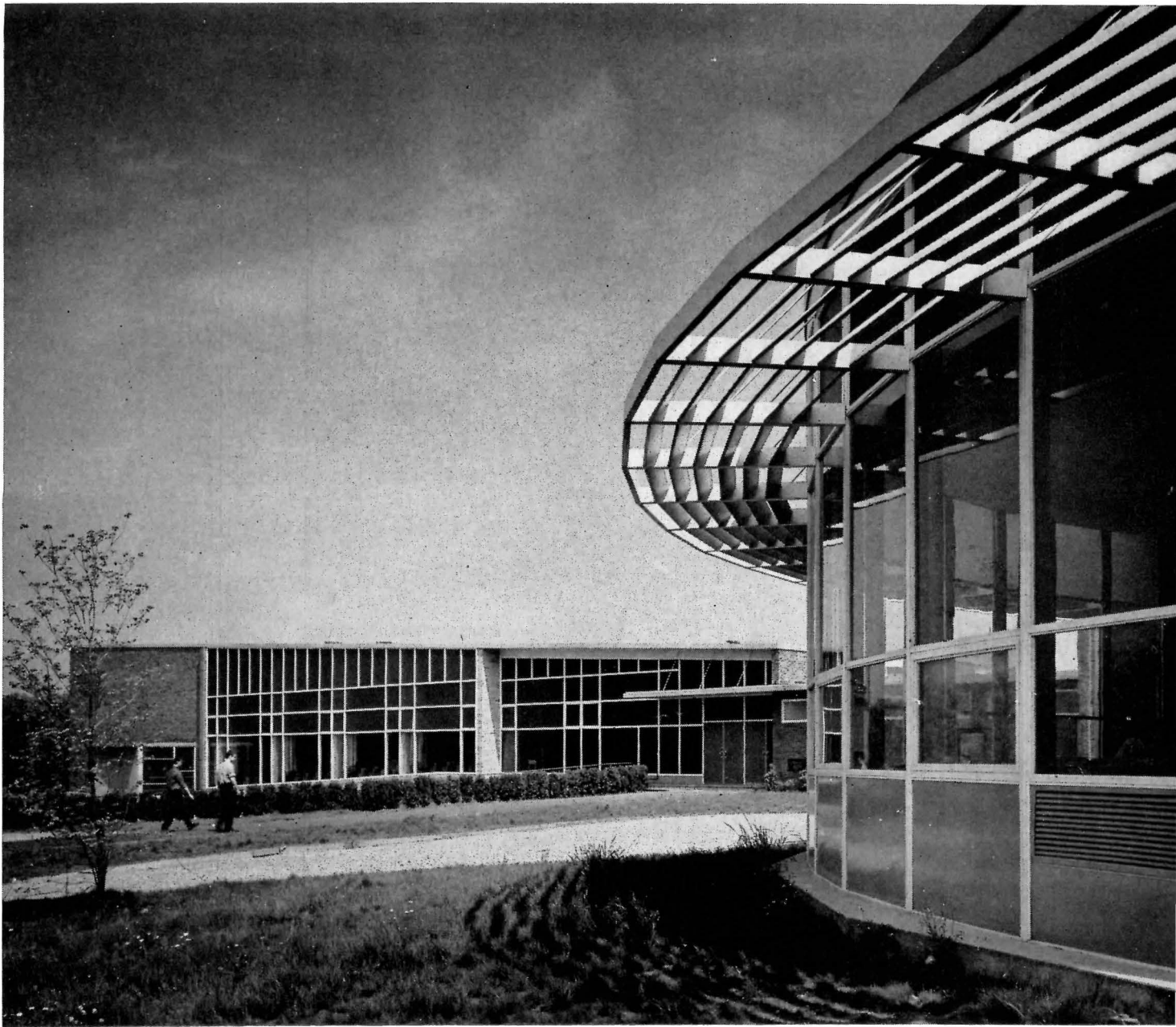
* Included in sub-total immediately below

PARKING



0 25

PARKING



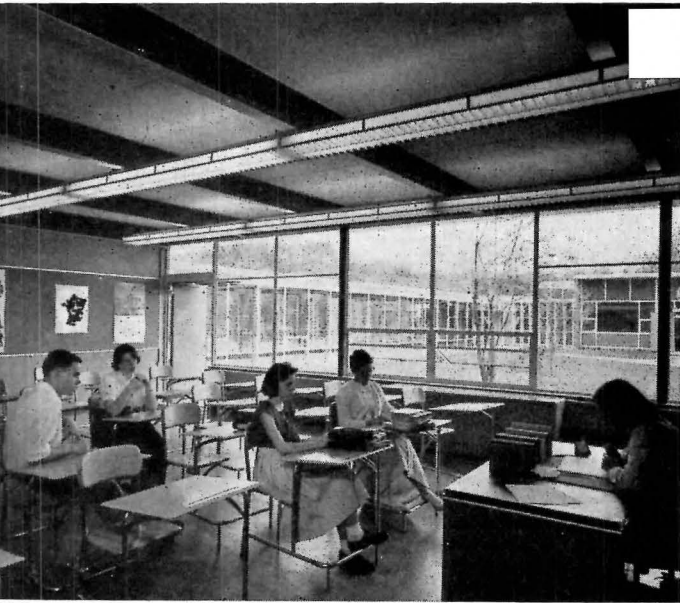
All photos by Joseph Molitor

PLAN AND PROFILE EXPRESS SCHOOL FUNCTIONS

Westwood High School, Westwood, Mass.; Coletti Brothers, architects

Above: Portion of cafeteria with auditorium and main entrance in background. Left: Existing building plan for 500 of eventual 900 pupils

IN A TIME OF STRINGENT building budgets it is often difficult to achieve an appreciable degree of individual character in a school. Generally this seems a blessing after decades of "expressive monsterism." The single story, widely dispersed building units which are today's high schools almost rule out either the contrived or unconsciously assertive gestures which we have come to deplore. A quietly negative quality is preferred to the unique if a happy balance can not be found. Here, in a school arranged pleasantly and conventionally around two courts, the architects have achieved a pleasant degree of individual expression through roofing the acoustical profile of the auditorium and urging a nicely articulated circular cafeteria. The two forms and their openings are well related on either side of the main entrance.

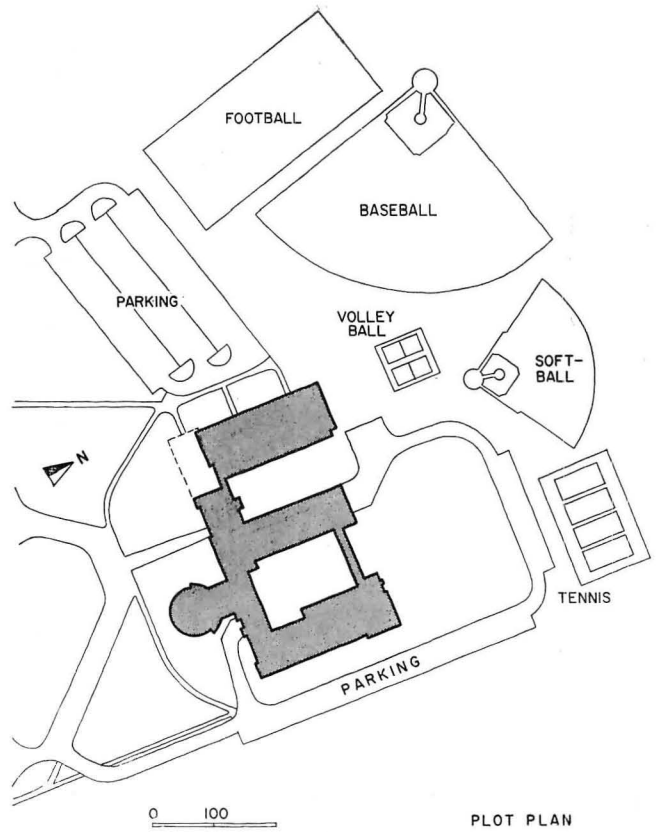
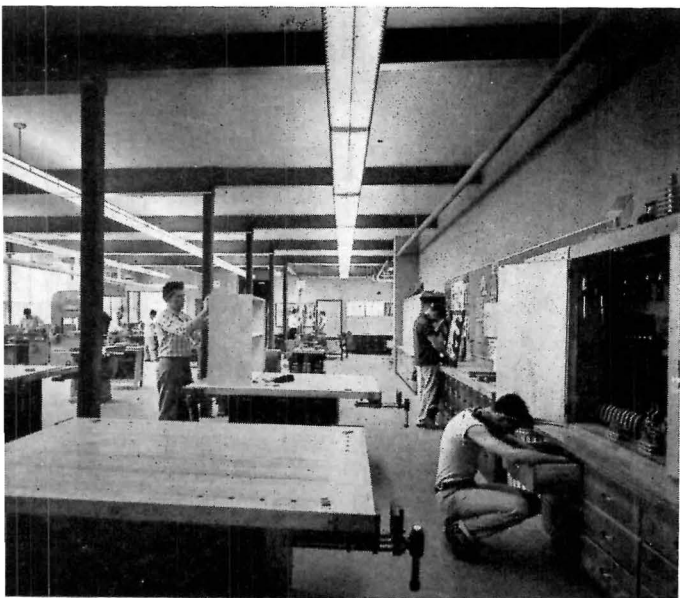


Typical classroom looking out upon courtyard



Art room with sloping glass wall facing north

Shop and other special rooms are scaled for 900 pupils



North elevation with art room at right

WESTWOOD HIGH SCHOOL

When completed this school will accommodate 400 pupils in addition to the 500 who are presently provided for. Only a classroom wing must be added, since the heating plant, auditorium, library, cafeteria and special classrooms have all been sized to allow for future expansion.

For the time being the square foot costs and particularly the per pupil costs are understandably high for this region. With the addition of the relatively inexpensive classrooms the final unit costs promise to be surprisingly low for a program which has asked for generous spaces and quality construction.

The circular cafeteria is perhaps the most apparent evidence of an approach which has sought to put pupil pleasure first. This glazed pavilion — held neatly away from the rest of the building — looks out onto the 23-acre campus and provides an effective interruption in the students' daily progression from one rectilinear space to another.

Almost all classrooms have east or west light and most of them, including the library, look out into one of the two landscaped courts.

Auditorium, gymnasium and music department are located in a separate wing at some remove from the quiet classroom areas. All of these spaces are especially well equipped. A careful adjustment to the site contours has provided a sheltered terrace underneath the auditorium.

Structural frame is steel. All exterior unit masonry is a deep red Harvard water-struck brick which is also used in the side and rear walls of the auditorium. Proscenium wall is plaster with colored tile inserts; toilet walls are structural glazed tile. All other interior walls are cinder block finished in two coats of rubber latex paint. Rooms are in a variety of two-tone combinations of yellow, turquoise, green, blue, gray and white. Webs of exposed steel beams are deep blue green, flange undersides are white.

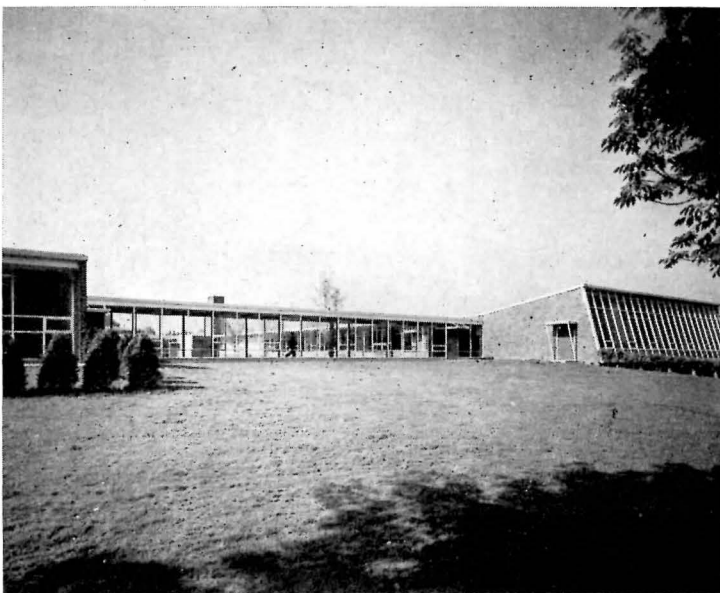
Floors are asphalt tile on concrete. Ceilings are acoustic tile and composition board. Windows are steel. Exterior doors are hollow metal; interiors are flush oak veneer solid core.

Roof is 4-ply built-up tar and gravel; flashing is copper; gravel steps are aluminum. Classroom wing spandrels are corrugated concrete; cafeteria spandrels are porcelain enamel. Thermal insulation is poured gypsum.

Heating system is low pressure steam; Scotch type steel fire tube boilers with integral oil burners; unit ventilators; mechanical exhaust; radiant heat in auditorium floor.

Coletti Brothers, Architects; Leo T. Doherty, Educational Consultant; Chambers & Moriece, Landscape Architects; Linenthal & Becker, Structural Engineers; Merrill Associates, Heating & Ventilating Engineers; Daniel J. Sullivan, Plumbing Engineer; C. W. Rickered, Electrical Engineer; Bolt, Beranek & Newman, Inc., Acoustical Consultants

Below: sheltered terrace under auditorium

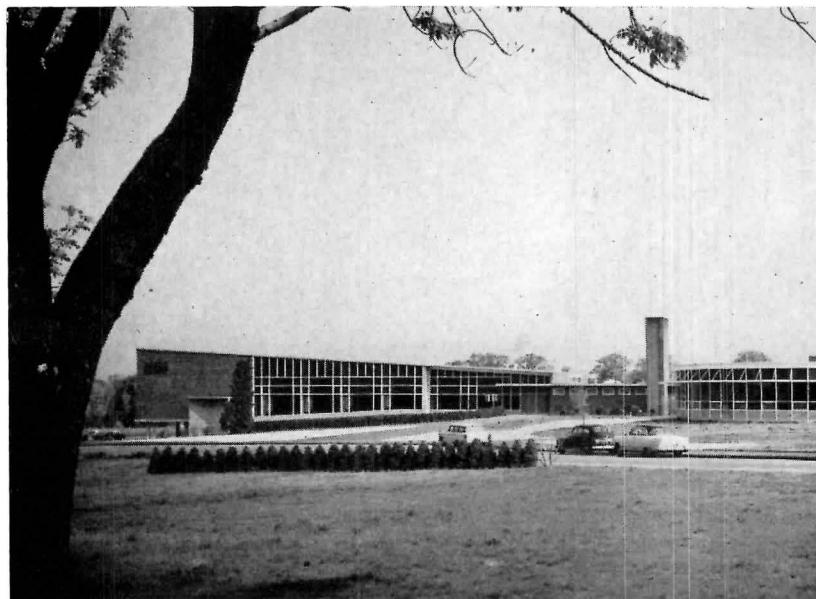




Large library faces west into courtyard



Auditorium reflects quality programming in school



WESTWOOD HIGH SCHOOL

500 Pupils
99,330 Gross Sq Ft
Per Pupil Per Sq Ft

General	759,409		
H & V	218,005		
Plumbing	67,087		
Electrical	110,020		
Ext. Paving			
Wells			
Drainage & Sewage			
SUB-TOTAL	1,154,521	2,309	11.62

Fixed Equipment

Kitchen	*
Science	*
Stage	*
Lockers	
Cabinet work	*
Blinds & Drapes	*

SUB-TOTAL (Fixed Equip.)

CUMULATIVE SUB-TOTAL	1,154,521	2,309	11.62
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Site Development

Clearing	*
Grading	*
Planting	*

SUB-TOTAL (Site Dev.) 125,548

CUMULATIVE SUB-TOTAL	1,280,069	2,560	12.88
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Land 20,100

CUMULATIVE SUB-TOTAL	1,300,169	2,600	13.08
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Equipment (movable) 130,000

CUMULATIVE SUB-TOTAL	1,430,169	2,860	14.39
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Fees

Arch.	*
Educational Consultant	*
Landscape	*
Struc.	*
Mech. & Elec.	*
Civil	
Acoustical	*
Color	
(Conc. Sup. & Test)	

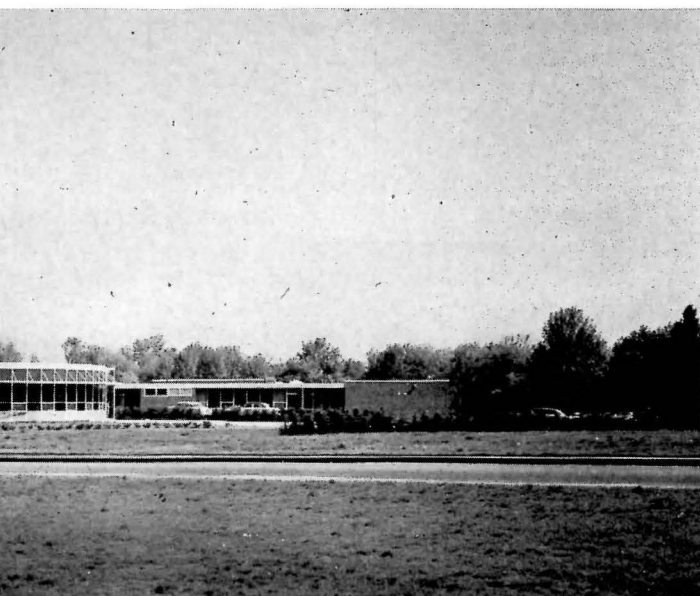
SUB-TOTAL (Fees) 87,619

GRAND TOTAL	\$1,517,788	\$3,035	\$15.28
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* Included in sub-total immediately below

Circular cafeteria is carefully relieved of clutter

Cafeteria and auditorium flank main entrance in south



face of these and other summer indictments.

Mr. Holman Harvey is the author of the *Digest* article. He seems to have prepared somewhat more for his job — traveled and got up some figures — but after bravely starting to distribute blame, he too winds up on the architect's back. The piece begins with an account of the wide variation in cost of two "not far distant" schools with identical enrollments. He neither documents the instance nor suggests its frequency. When he deplores spending funds on "facilities befitting an exclusive club" one recalls Miss Thompson's gymnasium which was "worthy of a fashionable athletic club." For people so preoccupied with the haunts of the rich their knowledge of those places appears almost as meager as their knowledge of today's typical school. This author goes on to connect in one sentence both lavish spending and "America's desperate plight for sheer lack of classrooms." Since one community's restraint cannot conceivably satisfy another's shortage, this association of ideas may be interpreted as (1) a moral judgment; (2) a non sequitur; or (3) a misleading presentation. On the subject of extravagant building he continues to generalize from some fantastic and surely unique instances. Six-figure clock towers, 60-ft false chimneys, and Grecian "pillars" are mentioned, along with reports of some average and some remarkably low sq ft construction costs. Most remarkable is a high school in "rural [sic] Youngstown, Ohio," costing \$7.24 per sq ft and built of "face brick, glass block, and heavy aluminum framing." If you can't tell what that aluminum is framing, reflect that you are probably one of the nine out of ten architects whom Mr. Harvey had earlier dismissed as knowing "next to nothing of the economies possible." Costs are quoted, but their basis never explained. Educational programs, planning, materials, construction, don't really get into the discussion. Prefabricated schools are suggested; and the voter is urged to "act on the knowledge that pupils don't ask for or need the palaces that architects dream up for them."

And with that Mr. Harvey joins Miss Thompson, and another great segment of reading America is furnished a false image of the architect, but one that can be too easily retained. When are we going to get a straight story in the public prints? How can all those who one day will have to help reach decisions learn what the architect's responsibility is and what it is not; learn the distinction between cost and value?

You get what you pay for. Do you know what you want? You can get schools at \$5 a sq ft or \$25. A recitation of isolated unit costs means almost nothing. Rarely do two communities need identical plants. It is the responsibility of town officials, school boards, and interested citizens to develop a picture of the total community needs against its predicted future and against its anticipated ability to meet those needs. Health and welfare, fire and police protection, streets and sewers, recreation and administration must be examined together with education in determining the share each shall have in the tax dollar. Is it really neces-

sary to point out that in this the architect plays only the role of an individual voter, and no role in deciding how educational funds will be distributed among new construction, salaries, equipment, maintenance, etc.? His advice and service are sought in the design of schools programmed by school boards, educators, and their consultants. It is not within his authority to decide what facilities the school shall provide, nor, in the final analysis, can he do more than *recommend* even the planning and construction details that constitute his design.

Countless factors operate to produce widely varying programs, buildings, and costs. At the outset, the very value placed on education differs widely. Where books are revered, libraries will be bigger; and where basketball, gymnasiums. Different values produce different educational programs and different buildings; and so do different climates, frost depths, topographies, subsoil conditions, vegetation, distances, land costs, labor costs, community incomes, and pupil population — present and projected. Even if it were possible to completely measure and compare costs, it would never be possible to compare values — because it is impossible to assess another's satisfaction, to put a price on another's values. A careful examination of the five schools presented here will show that to compare only their unit costs is as meaningless as to compare only their facilities or their finishes. It is possible to say that one is cheaper or that one is bigger or that one is better, but it would be very difficult to say objectively that one is cheaper *and* bigger *and* better.

And yet there are compelling reasons to find ways to compare costs more accurately than we generally do. Too often, unit costs do not include land costs or site development or equipment or fees or all of them. Observe on the preceding pages how significantly these can affect comparison. Observe, too, how necessary it is to furnish with the costs accurate information on enrollments — actual, designed, and projected; on facilities (provided in terms of similarly computed dimensions), on construction, finishes, and educational, mechanical, and electrical equipment; on landscaping and the provisions for playing fields and courts and parking. And we need more than unit costs. We need a consistent way of arriving at the net educational area — that area actually used for instruction. The difference between gross area and this kind of net can be truly significant. We need also to keep accounts in such a way as to arrive at the actual building costs. These divided by the net educational area yield the most significant figure of all: the construction cost per educational sq ft. From this kind of data all the important relationships can be developed for a given school and for the comparison of two or more.

If the barbs of this outrageous summer can serve to goad architects into a frank, full, and continuing explanation of their stewardship, the public may yet come to realize that in the design of buildings you do get what you pay for — and often a great deal more.

John Knox Shear



Karl E. Jacobs

Model of redevelopment scheme for the Hansa district of West Berlin; individual buildings by famous architects

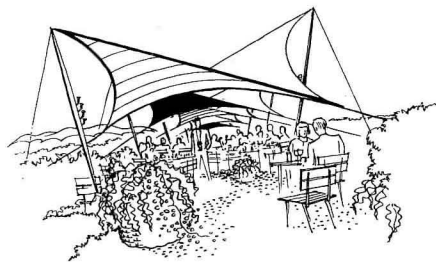
INTERBAU

A Quick Look at the International Building Exhibit in Berlin
by **ROBIN BOYD**

THERE IS ENOUGH in the park to detain a student of modern architecture for a week, but the organizers considerably have provided short cuts. You can travel the exhibition roads on a midget canvas-roofed train, overlook it all from a plastic bubble drawn to the top of a giant twin-armed crane, take a low-flying helicopter, or pay your 1.50 DM and ride the *Sessellift* for a kilometer cross-cutting the grounds. This is a tremulous and not un-alarming journey by cable hung at tree-top level. From it you gain a clear overall picture, which is wide and impressive, and later you can walk back to pick up the details, which are varied and lively.

The Interbau is a splendid idea: an exposition of modern architecture based on actual buildings and rounded out with photographs and models. It was originally devised as an object lesson for East Berlin, which its higher buildings overlook. It can also teach its Western visitors a good deal about modern architecture. Seldom if ever before have so many different personal styles been brought together. It is a sort of architectural *Around The World in 80 Days*, with Aalto, Gropius, Niemeyer, Taut, and more than forty others, not collaborating but each doing his piece within the flexible framework of the scheme. It is of course lacking in the homogeneity which any single architect would have created, but it is a successful architectural pleasure-ground and will be an historically important example of the unsettled state of architecture in the late 1950's.

First in sight from the chairlift are the permanent projects of the new town being built at the side of the Tiergarten: housing, ranging from single-story one-family units through walk-up flats to elevator apart-



Sketches by the author



"Oscar Niemeyer raised his block on stilts, not unexpectedly . . ."

ments, a church, a school, the beginnings of a shopping and cinema center. About a dozen big buildings are finished and furnished for exhibition, others are busily under construction and some are merely set out on the rubble-strewn ground. All have hoardings in front illustrating their plans and relating the previous highlights of their architects' careers. Restaurants, cafés, and numerous subsidiary temporary displays ("City of Tomorrow," etc.) constructed of spaceframes, ropes and color, are scattered among the trees and flowerbeds and ponds of the park. At the end of the chairlift in the far corner of the ground the foreign exhibits are housed in ingenious, hot, temporary canvas and scaffold-pipe pavilions. Beyond the grounds but still a major feature of the show is the American gift, The Congress Hall, standing on the banks of the Spree and the fringe of the city's Iron Curtain. Throughout West Berlin several famous historical and important new buildings, including Le Corbusier's latest *Unité d'Habitation* ("Type Berlin," and non-Modular), are drawn into the act by means of guide-booklets.

The meat of the show is, of course, the group of completed or nearly completed big apartment blocks by the various celebrities representing fourteen different countries. The plan of the district is aimless enough. It allows good breathing space around the units but adds no particularly distinguished quality to the spaces and vistas between them. Each architect had to work within the discipline of strictly conventional, economical apartment design. In other words, there was nothing to be done but to make each building a king-size pack of cigarettes resting on its narrow side. The plan of each

apartment was limited to some tight arrangement of the usual rooms, and nothing much in the way of communal interior space was required. Thus almost all interest centers on the various exterior treatments, and here each star architect managed to impress quite powerfully something of his own character on the package he handled. There is not a single all-over curtain wall, nor any evidence of the somewhat prim functional-classic of much new European work. The total effect is thoughtful and high-spirited.

Oscar Niemeyer raised his block on stilts, not unexpectedly, and then he gathered the column loads into pairs under the lowest floor, carrying the building on a series of concrete V's as if it were a party cake carried on the finger and thumb tips of a number of experienced waiters. Alvar Aalto creased the plan of his cigarette pack indecisively as if it were half empty. His is a bald building with no pretensions whatsoever and thus a certain detached dignity.

Pierre Vago, from Paris, contributed the most striking block. The seven stories of windows on the main façade he distributed in accordance with internal logic but to no apparent external scheme. Then he covered the wall space between them with glass in random rectangles of solid color — gray, white, pale blue, sharp mustard. Against this disruptive patterning the window openings lose identity and become merely darker gray elements of the biggest neo-Mondrian abstract in the world. Its bold effect may be classed as entirely successful if you are prepared to allow architecture to rely wholly on a surface treatment one centimeter thick.

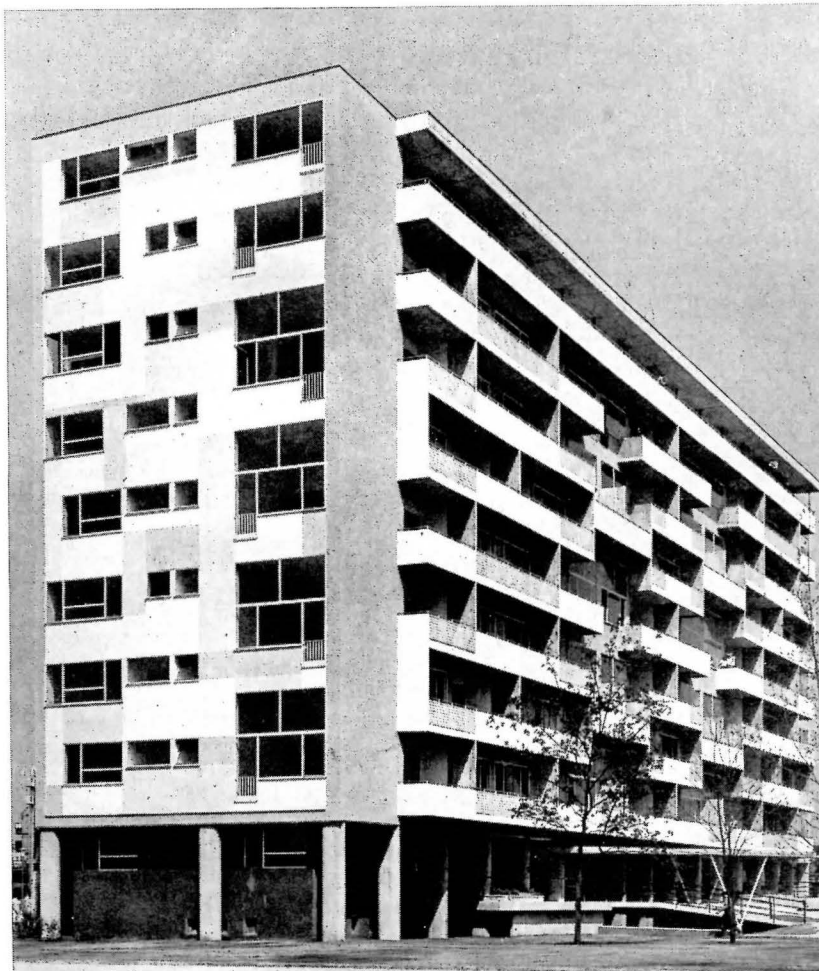
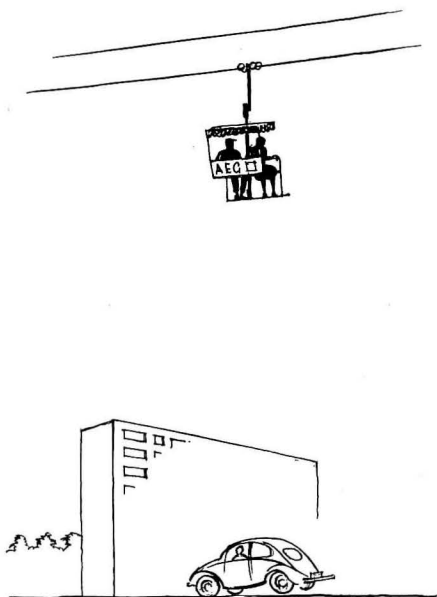
Fritz Jaenecke and Sten Samuelson of Sweden have

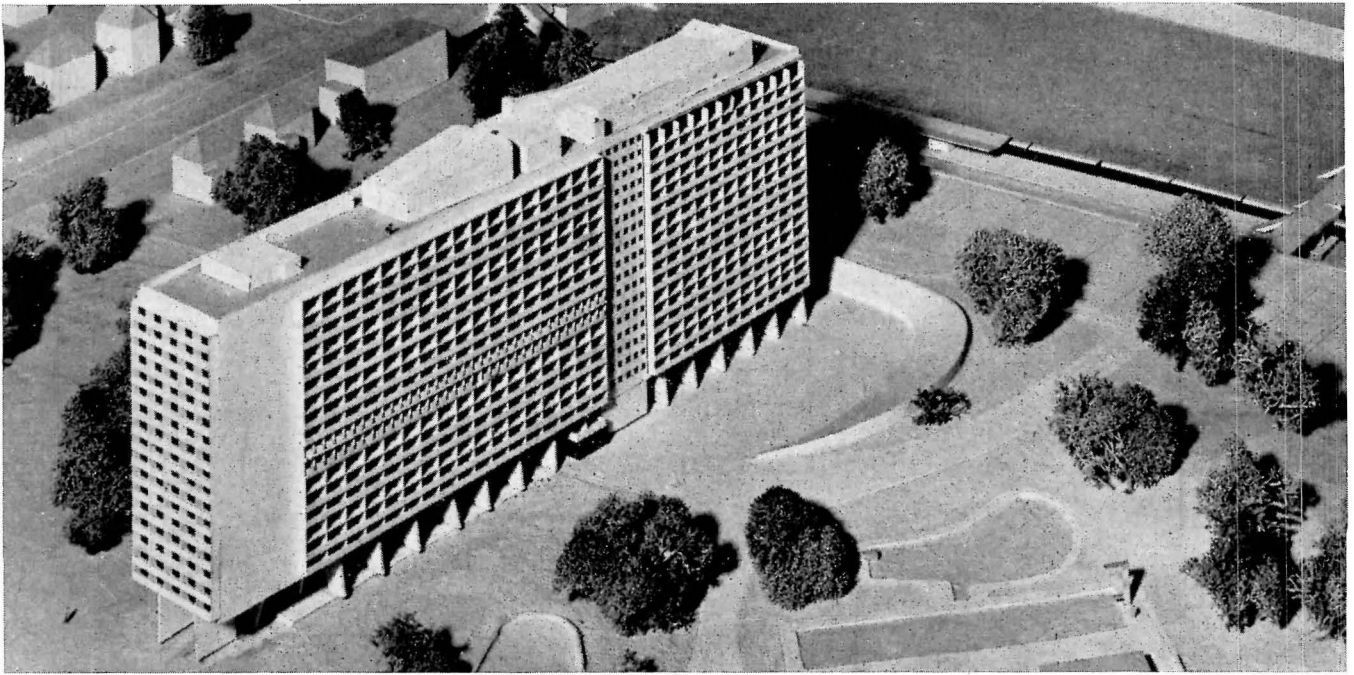


Alvar Aalto: "a bald building . . . and a certain detached dignity"

"Pierre Vago contributed the most striking block"

INTERBAU





Le Corbusier's latest Unite d'Habitation "Type Berlin"

built one of the biggest and most straightforward slabs: white, with powder-blue balconies on one side and tangerine on the other. An apartment displayed on the first floor is probably the most open, spacious and sophisticated in the *Interbau*. It features a copper fireplace whose chimney disappears into a ceiling over which are nine more stories of apartments.

The Gropius block is raised and curved, and its main elevation is almost as busy as the Vago abstract. But its pattern is made up of nothing but architectural and functioning elements: balconies, windows, projections, recesses. Not only the windows but to a certain extent the separate apartments retain identity on the exterior. It is the most mature and subtle building present, and an unmistakable descendant of the *Bauhhaus*.

In the exhibition pavilions the *Interbau* is consistently competent, gay and comprehensive. Among the multitude of photographs almost every well-known modern building or architectural dream since 1930 is represented. Frank Lloyd Wright's mile-high "Illinois" Tower is shown ("*das höchste bauwerk der welt*") with nothing to indicate that it is not already up and completed. The foreign displays are spotty, Canada probably being wisest by confining its attention to one splendidly presented model of one project, Don Mills in Toronto.

Some of the temporary amenities in the park are a canvas delight. In the shadow of the bullet holed walls of the Bellevue Palace one open-air café is shaded by a sail of white canvas, almost eighty feet square, guyed down at the edges and strained up above head height by eight internal props cushioned with plywood star-

shaped cups against the canvas. Each apex is thus rounded rather than pointed and the whole looks like a tight white sweater worn over some surrealist foundation garment. Another shelter consists of big squares of canvas each with two opposite corners propped up and two strained down. There are five of these, colored blue, yellow and tangerine on the underside, and as you watch them cavorting over the refreshment tables you realize that the hyperbolic paraboloid is essentially a playful, humorous, even skittish shape. With this in mind you leave the *Interbau* proper by a gate behind the café and approach the Russian sector. About a mile away, down a gray stretch of the River Spree, the hyperbolic parabolic *Kongresshalle* sits like a well fed butterfly on the green bank.

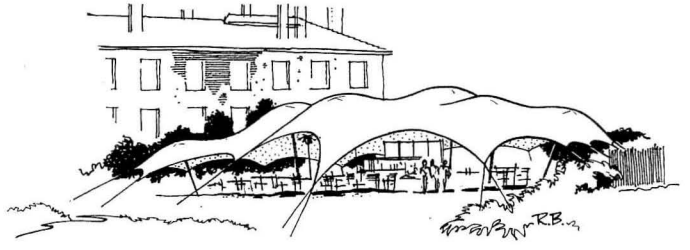
This congress hall (Hugh Stubbins Associates, architects, with W. Duttmann and F. Mocker, Berlin) measures up well against almost any rule of modern architecture one can think of applying to it. It has, unquestionably, a vital idea which is strong enough to carry the whole composition. Its parts are articulated so clearly that an approaching visitor, knowing nothing of its contents, can tell in a general sort of way what he should expect to find where. It also has confidence, strength, and an open, honest expression. The interior (which will house the U.S.A. *Interbau* exhibit) was not ready for the opening, and when I visited it, finishing touches were being applied with unhurried efficiency. Teams of middle-aged women shovelled at the surrounding landscaping, painters were touching up the concretors' work, and a few tourists with cameras dangling at the alert position picked their way between



Kessler

Architects Fritz Jaenecke and Sten Samuelson; "one of the most straight-forward slabs . . ."

INTERBAU



Walter Gropius and Prof. Wils Ebert (Berlin): "the most mature . . ."



Karl E. Jacobs



Kessler

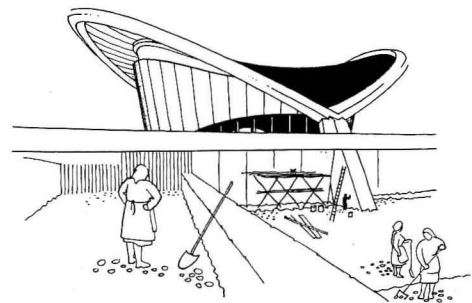
Hugh Stubbins' Congress Hall; "about a mile away . . . sits like a well-fed butterfly"

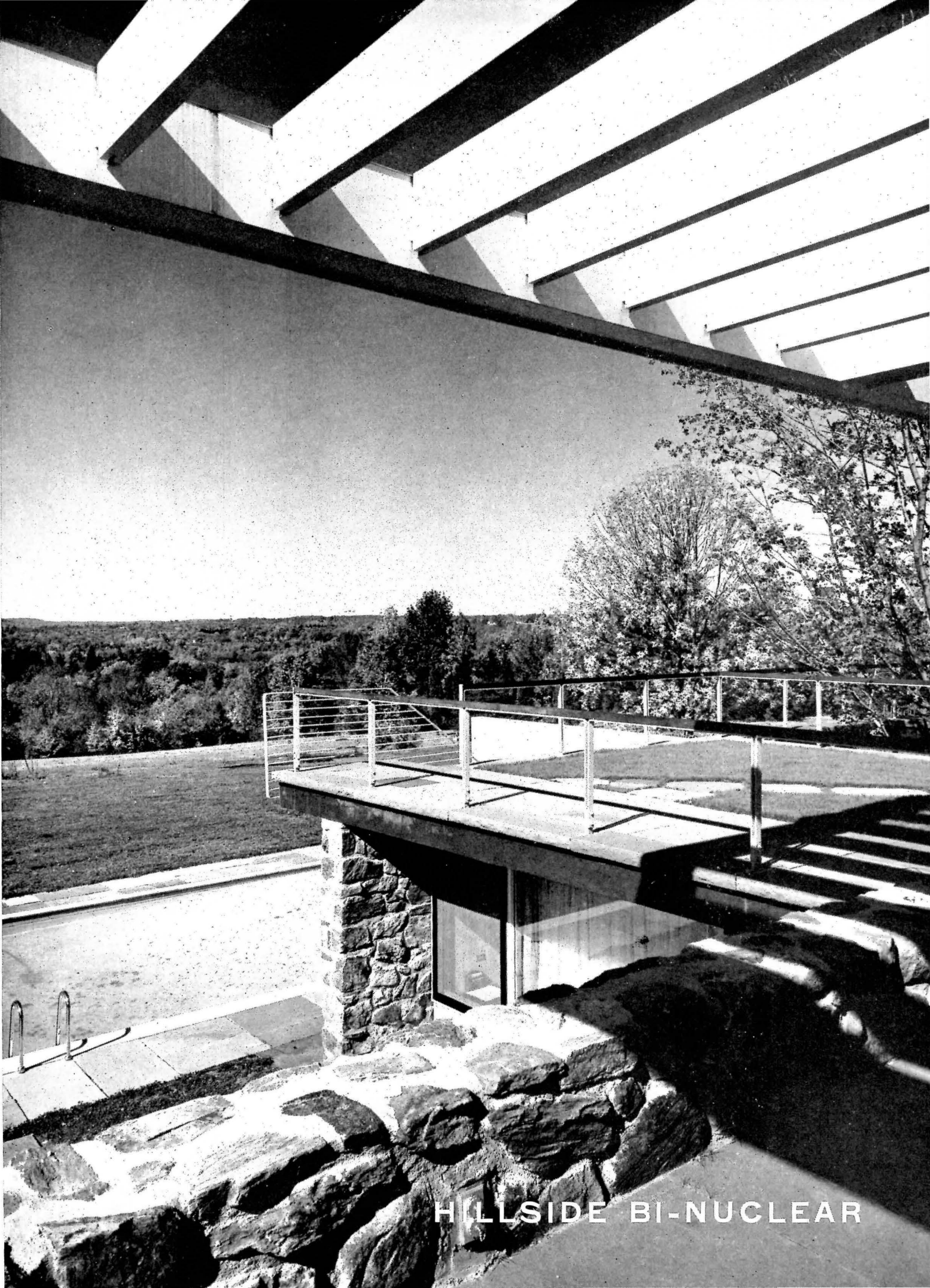
scaffolds. Under the circumstances it was impossible to examine this important propagandist American-German building in detail, but it was certainly not too early to study the shape. And whatever is done now with colour, granite, or slate facing, the effect on visitors — and on eyes staring from behind the Curtain, presumably starved for Western Culture — will depend entirely on the curling, swirling, dominating shapes above the firm rectilinear base. Ignoring for the moment the practical considerations of planning, structure or acoustics, I wanted to consider this building purely as external form, as the political monument which it is intended to be. What character will it communicate to those culture-starved eyes behind the curtain?

This very permanent-looking saddle stretched between hefty edge arches is not sprightly like the temporary canvas saddles over the garden café. It has not their movement or irresponsible beauty. It may be called exciting. It is not gay. Yet it is not solemn. Jaunty is the word, I decided finally; it reminded me of a dashing fellow in a Homberg hat.

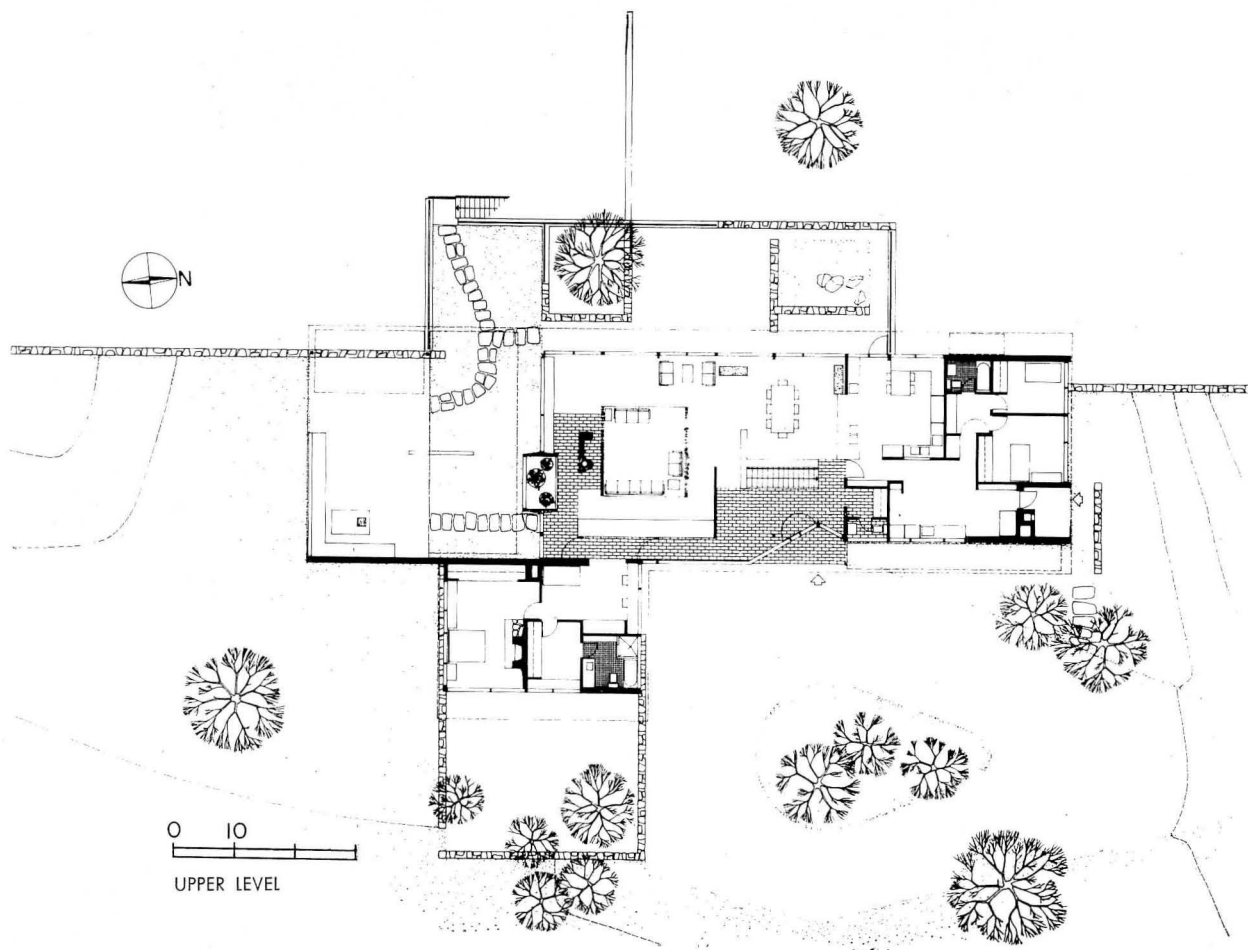
The conviction and vitality of the Hall's shapes are a pleasure to behold, especially after the formal boxes of so many of the apartment blocks. The hall brusquely points a way ahead while Vago's huge abstract elegantly points backward. But unless jauntness was the desired and calculated effect in this case, it should warn us that a strong expression in form, while welcome in this curtain-wall era, is not necessarily enough in itself even if it is efficient, economical, brilliant, beautiful and exciting. Ultimately we will want it also to be exactly fitting to the psychological situation.

INTERBAU

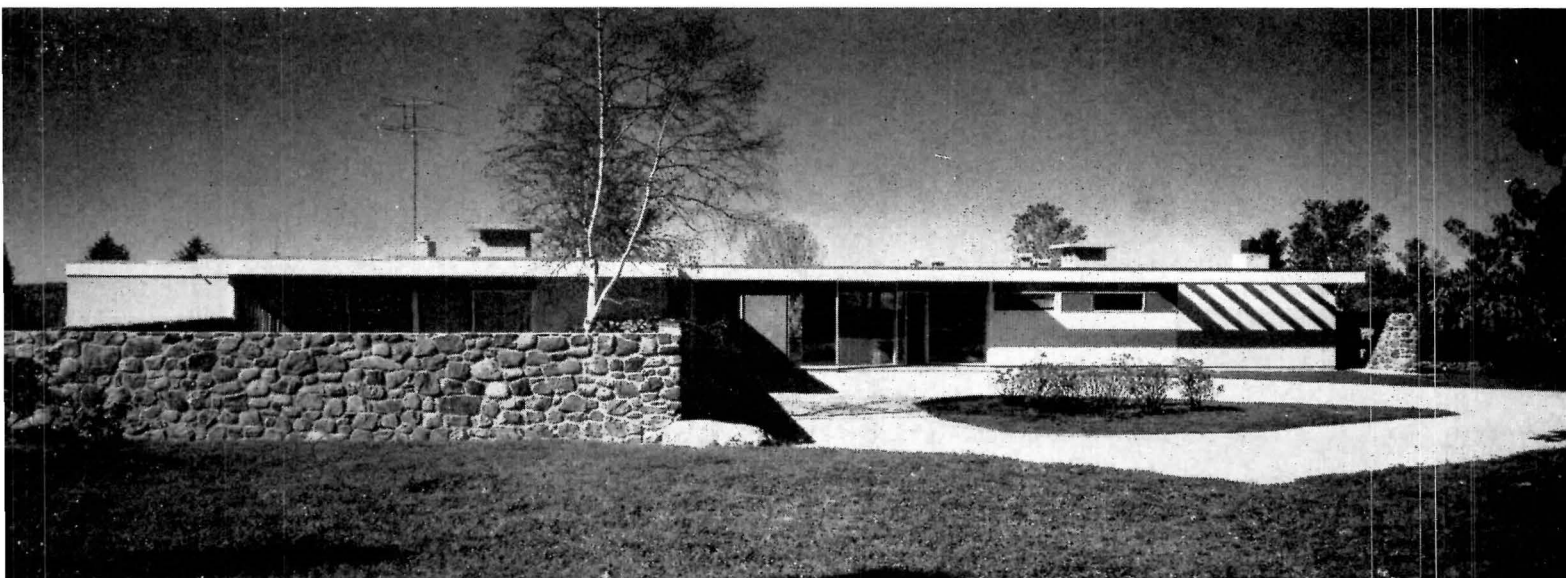




HILLSIDE BI-NUCLEAR

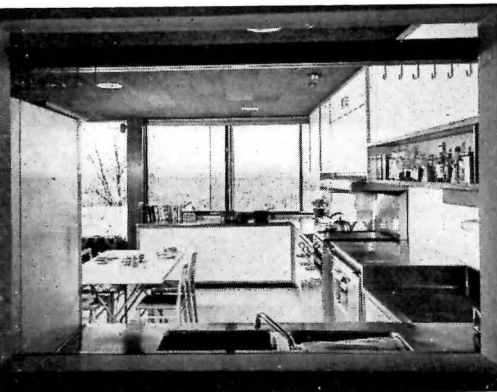


THIS VERSION of the bi-nuclear house plan (long associated with architect Breuer) is conditioned by its placement upon a slope. Separation of parents' and children's zones is accomplished here by placing one above the other. Master suite, living and dining areas are on the upper level; children's quarters, guest room, play room and garage are below. Since the owner's children are old enough not to require constant care and, indeed, often seek their own privacy, such an arrangement is peculiarly appropriate.



THE GAGARIN HOUSE, IN CONNECTICUT

Marcel Breuer, Architect; Herbert Beckhard, Associate; Fred Dubin Associates, Mechanical Engineers; Farkas & Barron, Structural Engineers

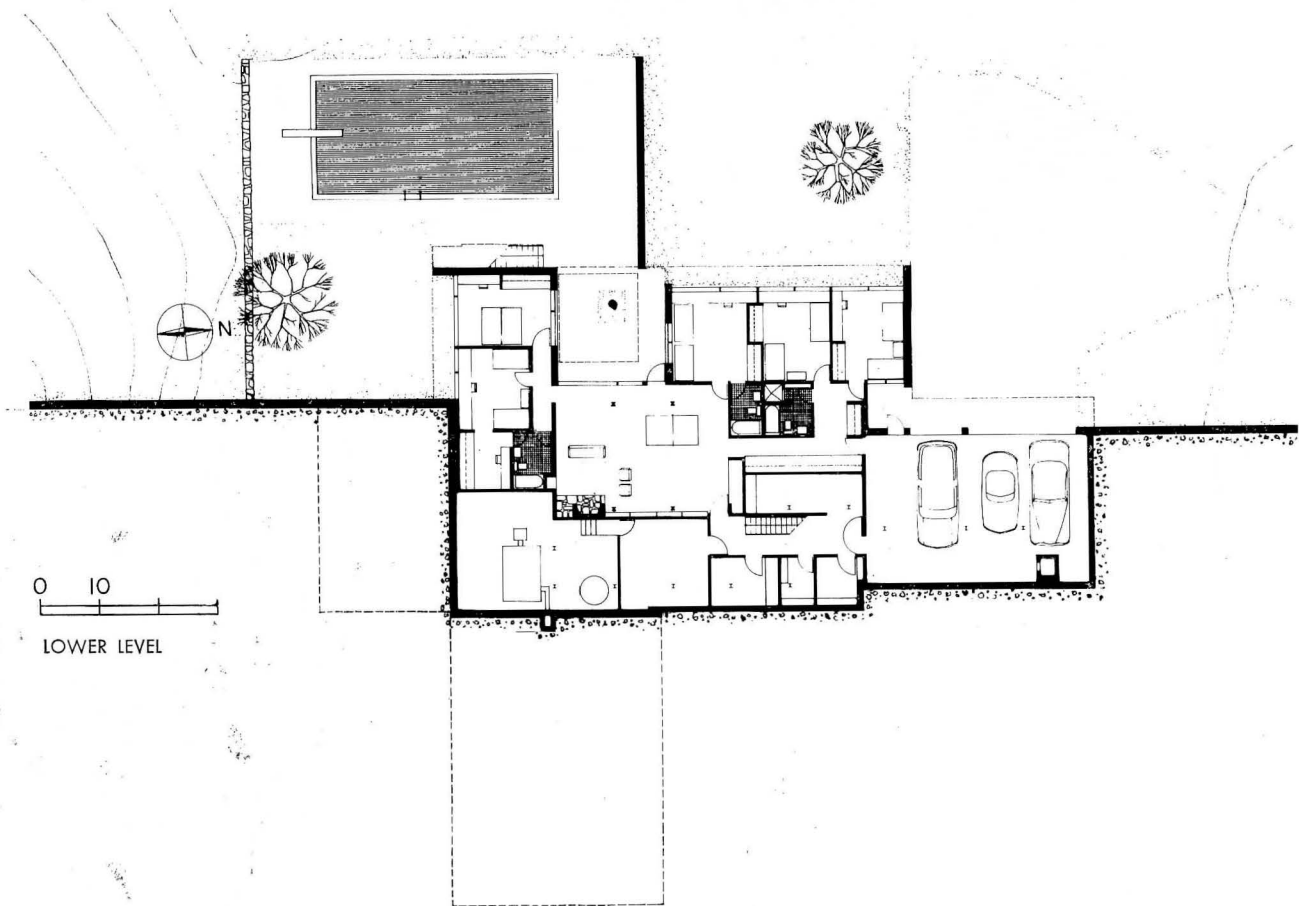


All photos by Ben Schnall (including page 211)



Photos at left and right show the entrance façade, oriented to the east. The detail at right is of interest for the manner in which materials, textures, colors, and light-and-shade are played against each other both for visual effect and to reduce apparent size.

Above, from top to bottom: the living area, dining space, and main kitchen



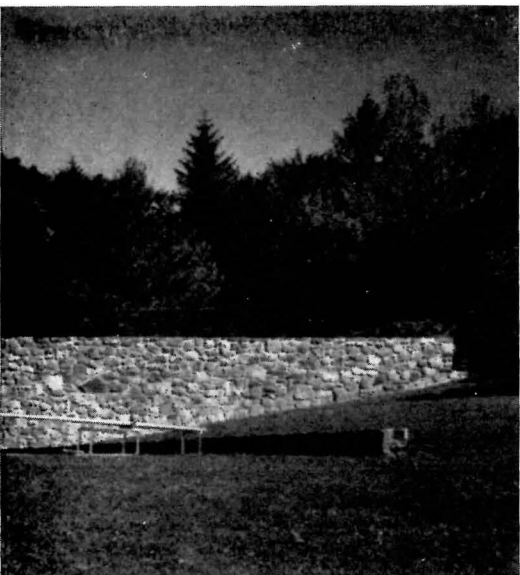
Although this is a large house — with ample room for entertaining sizable groups, plus master suite and six bedrooms—its size has been deliberately understated. The owner had no desire to impress his visitors; preferred instead an informal, friendly atmosphere. The architects attacked this problem not so much in terms of scale but rather as a matter requiring careful, knowing handling of material, detail and color — both exterior and interior. The result achieves a comforting sense of warmth, is pleasing to the eye, and is impressive for its lack of impressiveness.

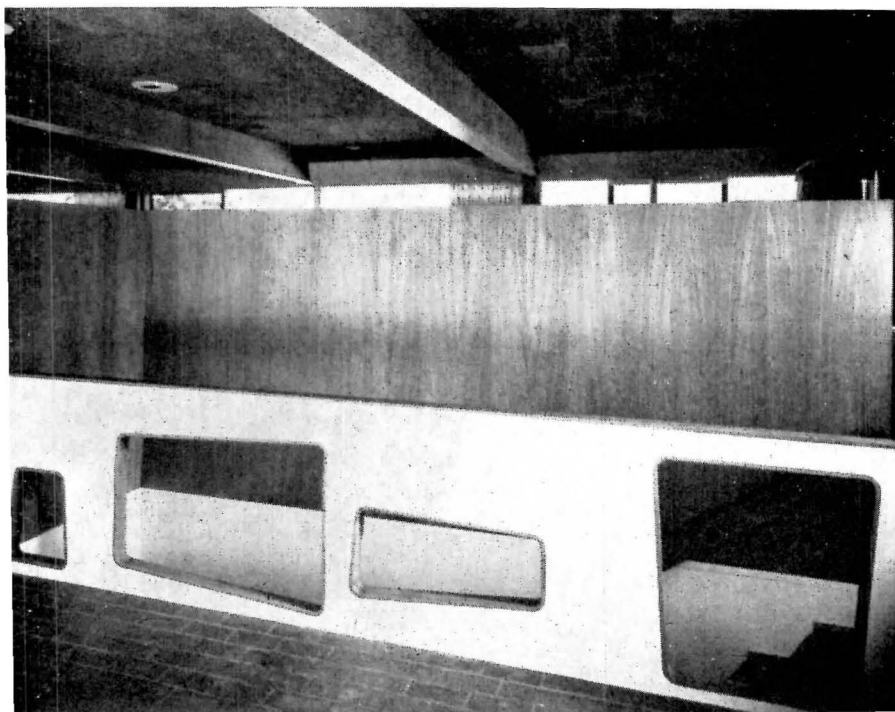
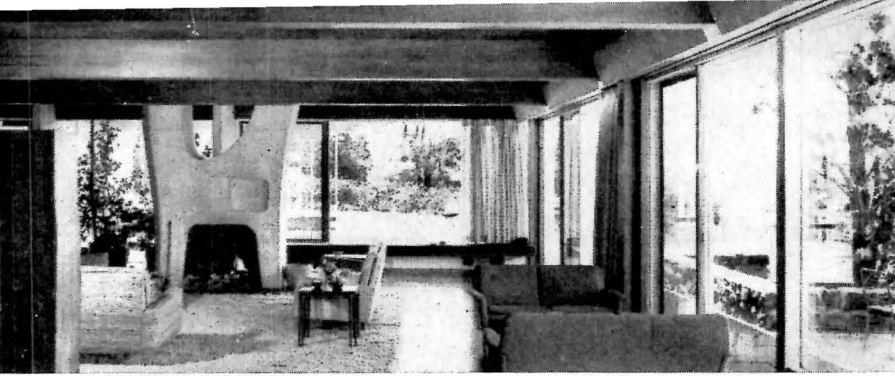


THE GAGARIN HOUSE

The photos on these two pages show the house from the lower level, which has access to the pool and rolling meadowland beyond. The pool is of sprayed white concrete, set in a terrace paved with blue-stone.

The construction generally follows a scheme of masonry retaining walls against the slope, with wood framing above. The sliding screens and double-glazed sash are architect-designed; the doors are flush wood panels; the floors are variously of brick, teak, rubber tile, and ceramic mosaic tile





THE GAGARIN HOUSE

The interestingly formed fireplace, which achieves the quality of free-standing sculpture, is of concrete, bush-hammered for texture and to expose the pebble aggregate.

The unusual stair railing is faced both sides with plywood, painted white, with edge-bindings for its openings and periphery of natural teakwood to match the enclosure paneling



*Palo Alto Hospital and Stanford Medical Center,
Palo Alto, California. Edward D. Stone, Architect*

**TWO APPROACHES TO HOSPITAL DESIGN:
THE HORIZONTAL SCHEME AND THE VERTICAL**

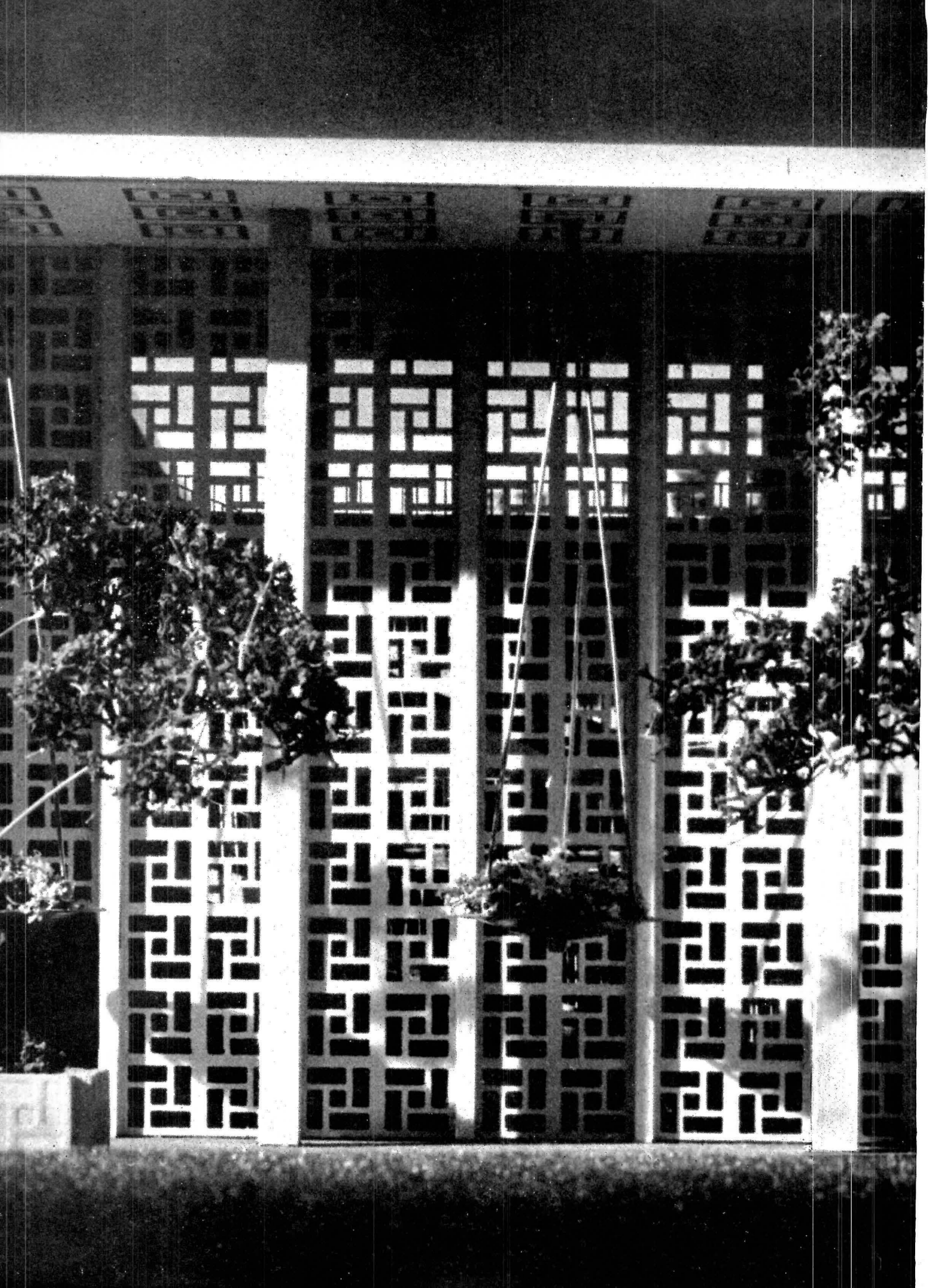
*Central Hospital of Social Security for Employes (S.S.E.) in Lima,
Peru. Edward D. Stone and A. L. Aydelott, Associated Architects*

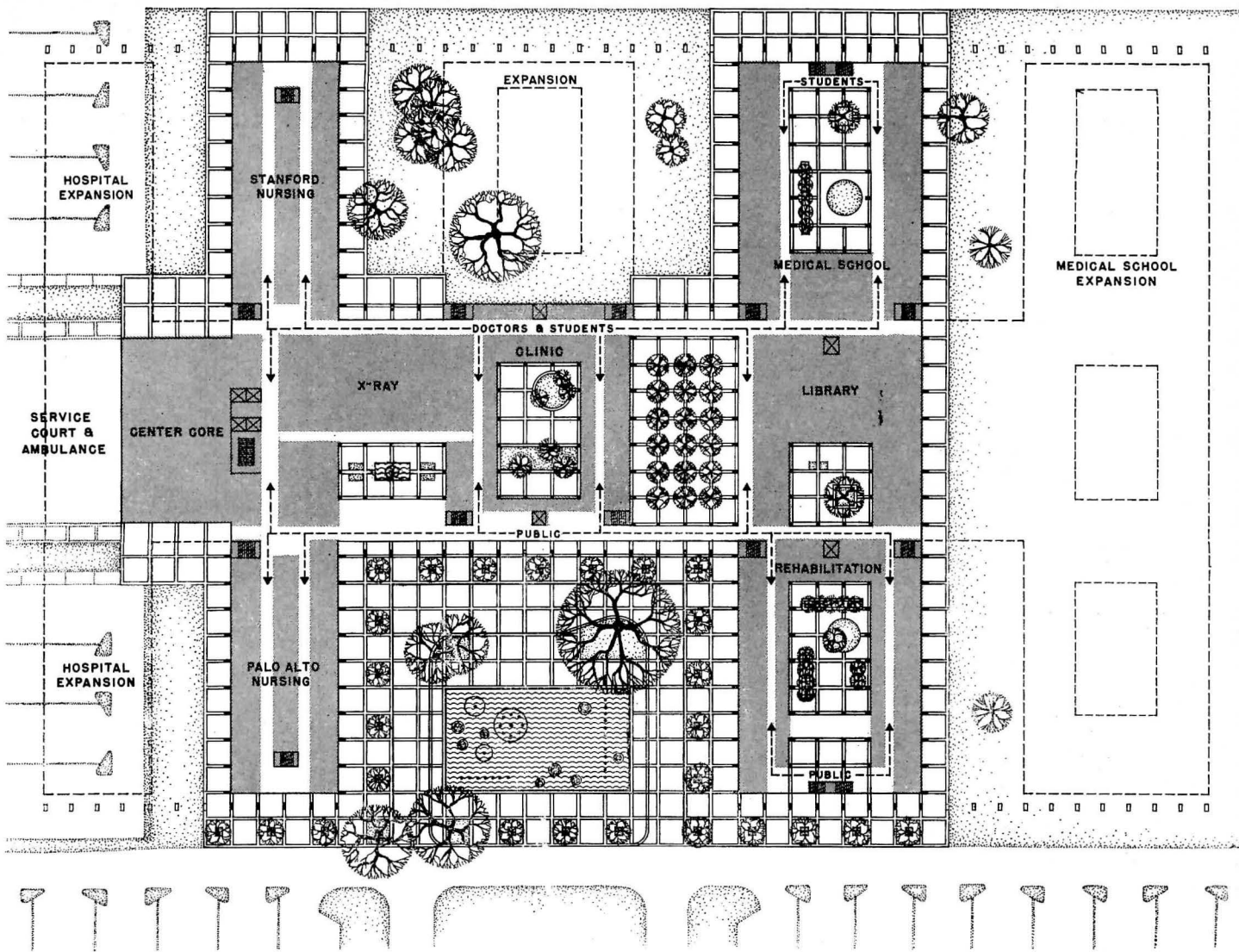




A HORIZONTAL HOSPITAL FOR PALO ALTO, CALIFORNIA

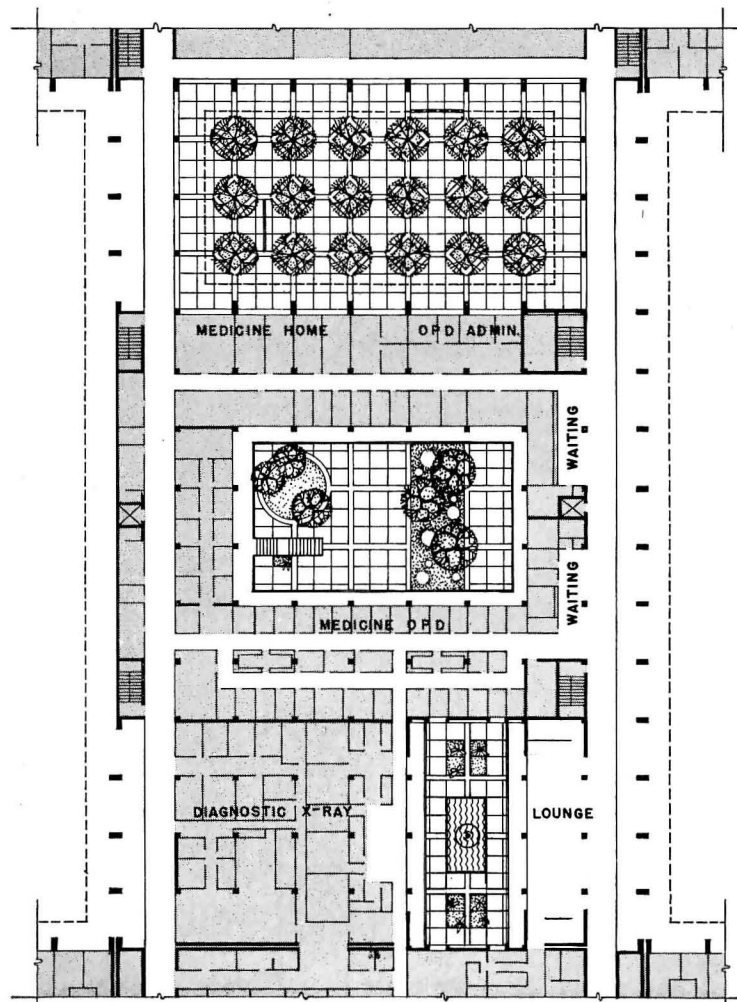
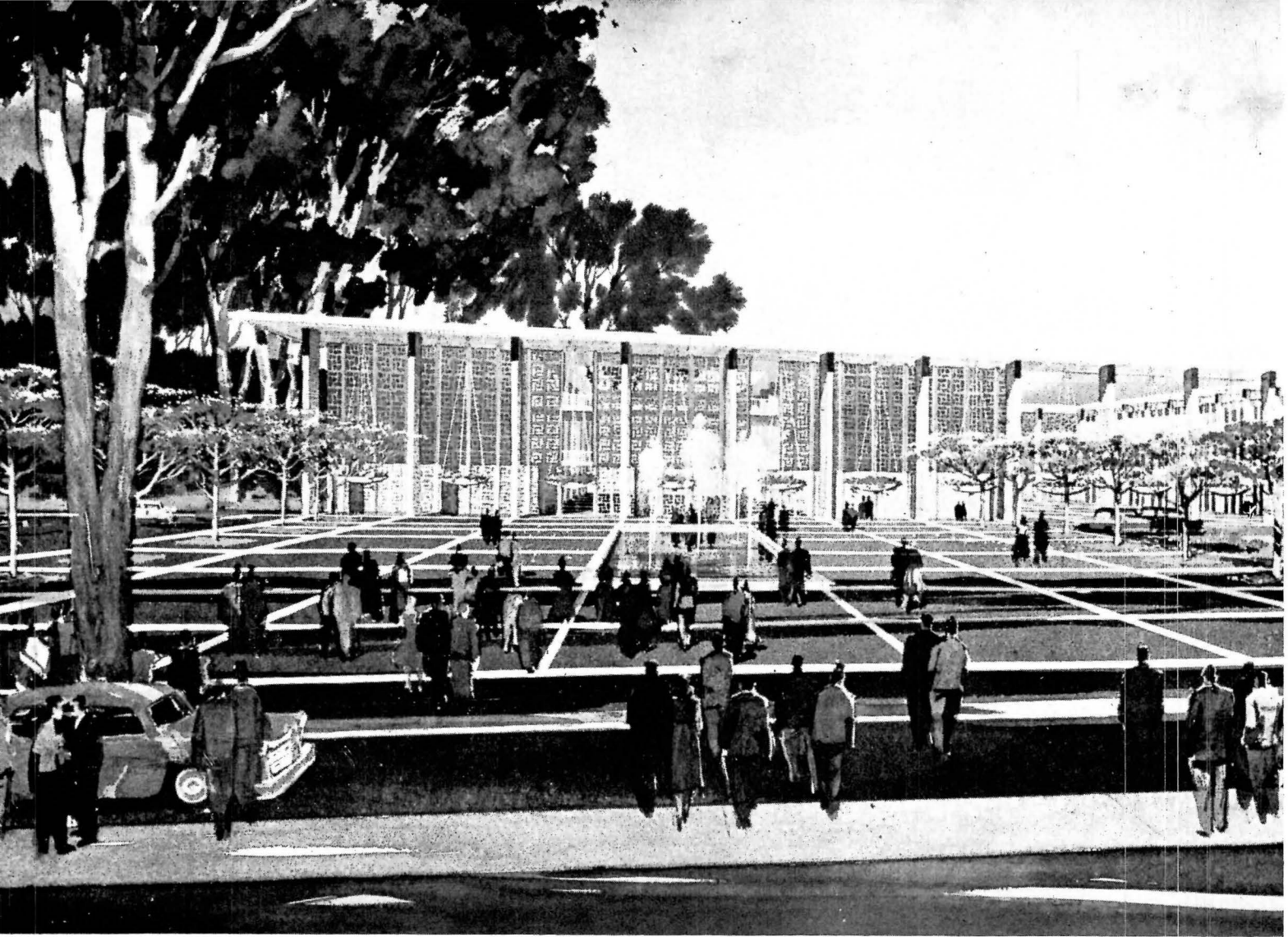






A HORIZONTAL HOSPITAL FOR PALO ALTO, CALIFORNIA

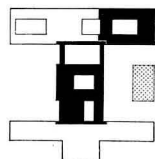
Edward D. Stone's tradition of patterned screens, courts, and pools here adds serene charm to a great medical center — a place where visual pleasure can vastly encourage the convalescent. It can well be described as a "garden hospital" with a strong aesthetic discipline. The patterned colonnades skillfully connect units of three stories and basement, to house an array of facilities for Stanford University and the city of Palo Alto. As indicated above, these include: the Stanford University medical school, a library, a rehabilitation center, clinics, and a medical and service core serving two hospital pavilions (one operated by Palo Alto, one by Stanford). Each unit can be expanded around successive courts as shown by dotted lines. The scheme now under way has 475 beds; when expanded there will be 1000. Clear circulation patterns — vertical and horizontal — have been established for students, staff, in- and out-patients. Thomas D. Church is Landscape Architect. Mr. Stone also wishes to credit the Trustees of Stanford University and president J. Wallace Sterling and the city council and City Manager, Jerome Keithley, of Palo Alto, for devoting the past two years to the planning of this outstanding medical facility.





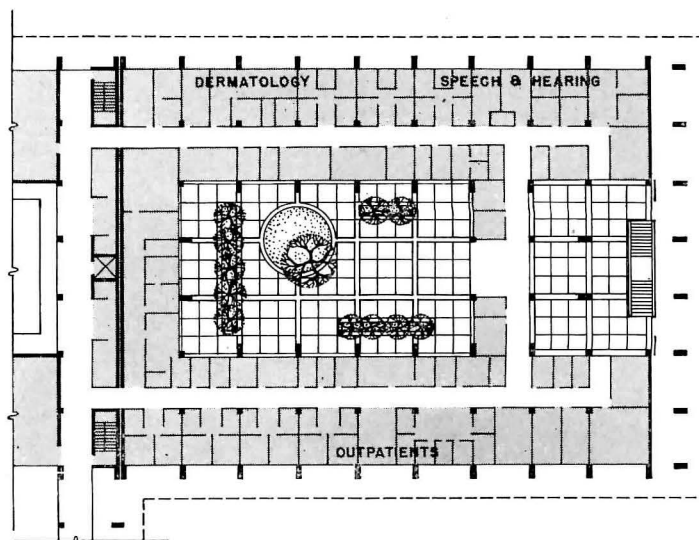
JACK FIN

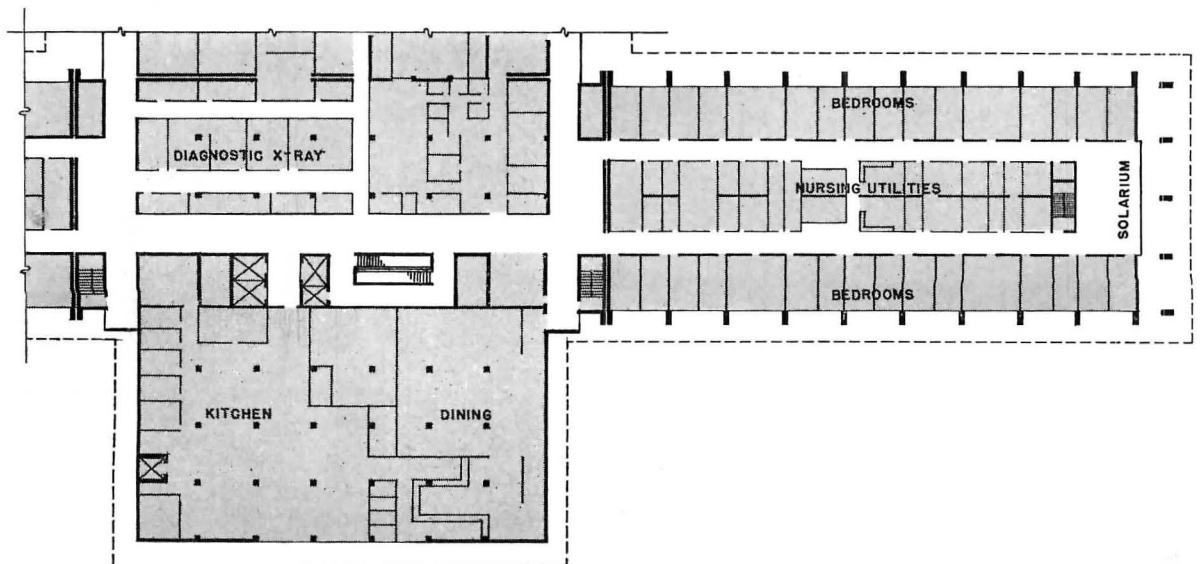
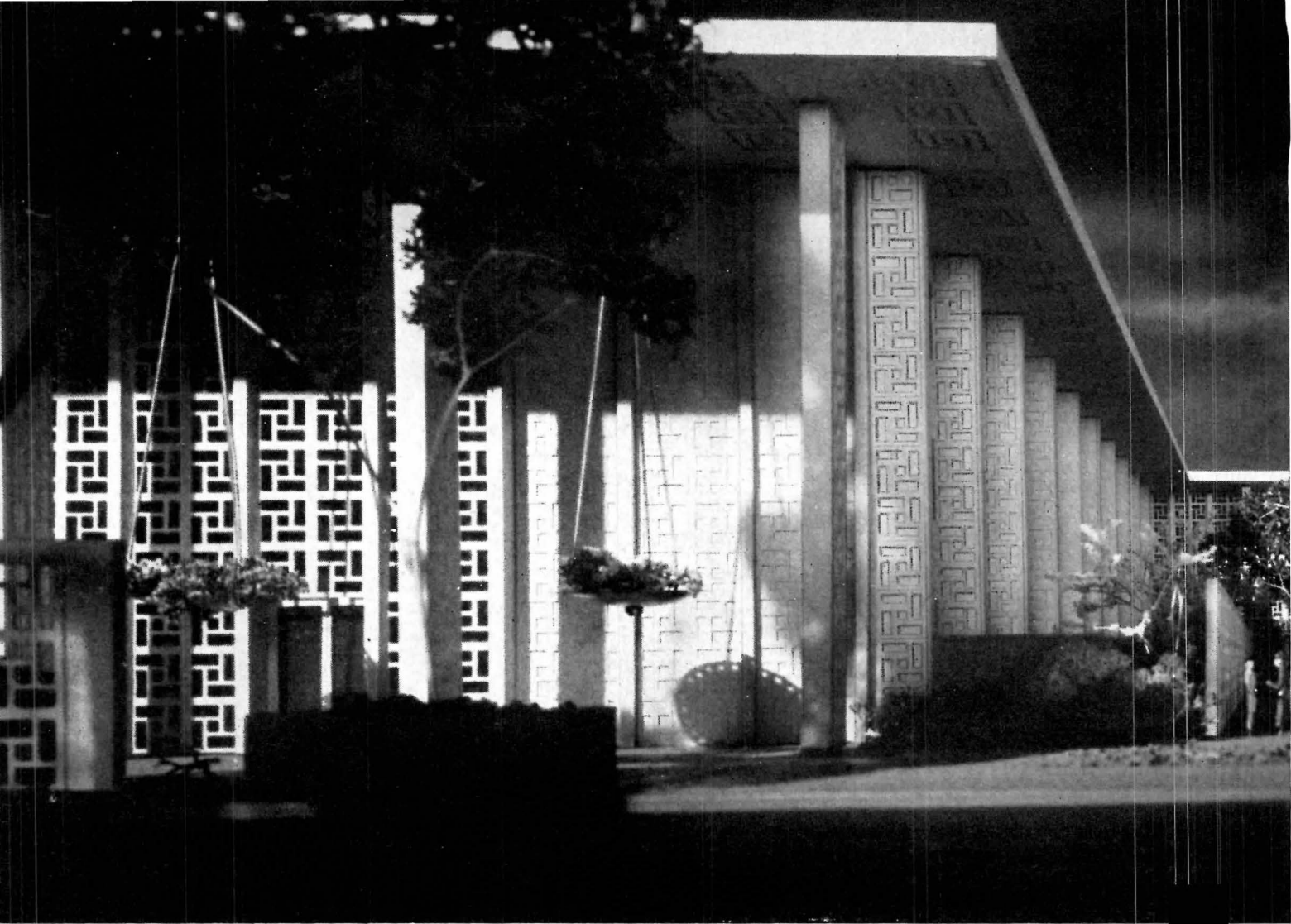
HORIZONTAL HOSPITAL FOR PALO ALTO



The sweeping colonnade shown above depicts the campus elevation as it will appear when a laboratory and research wing is added in the central back court. Occupying 56 acres of the Stanford Campus,

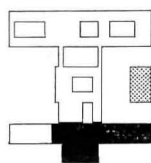
the rythmical patterns of the building are an echo of the arcades and courts of existing structures. Plan at left shows middle connecting unit (see inset plan) for clinics and administration. At right is the rehabilitation center plan, occupying the front, right wing. It is an experimental unit with social, vocational, psychological and medical rehabilitation facilities; physical therapy facilities on second floor are also for inpatients. The wings are part of Stanford Medical School



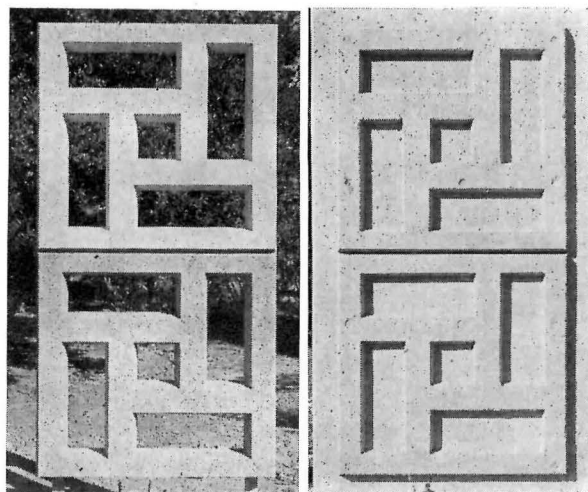


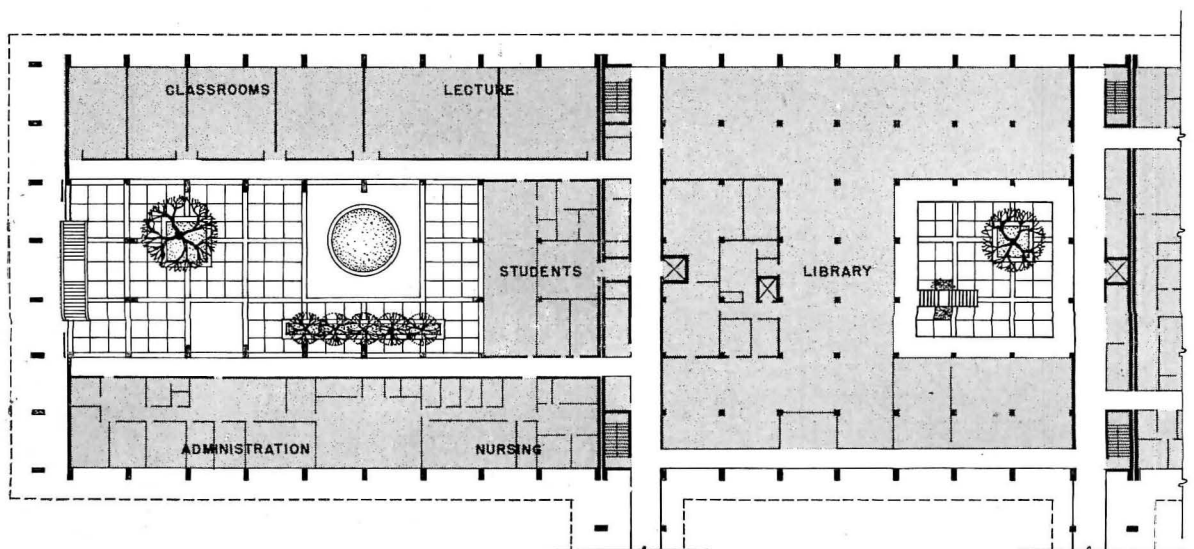
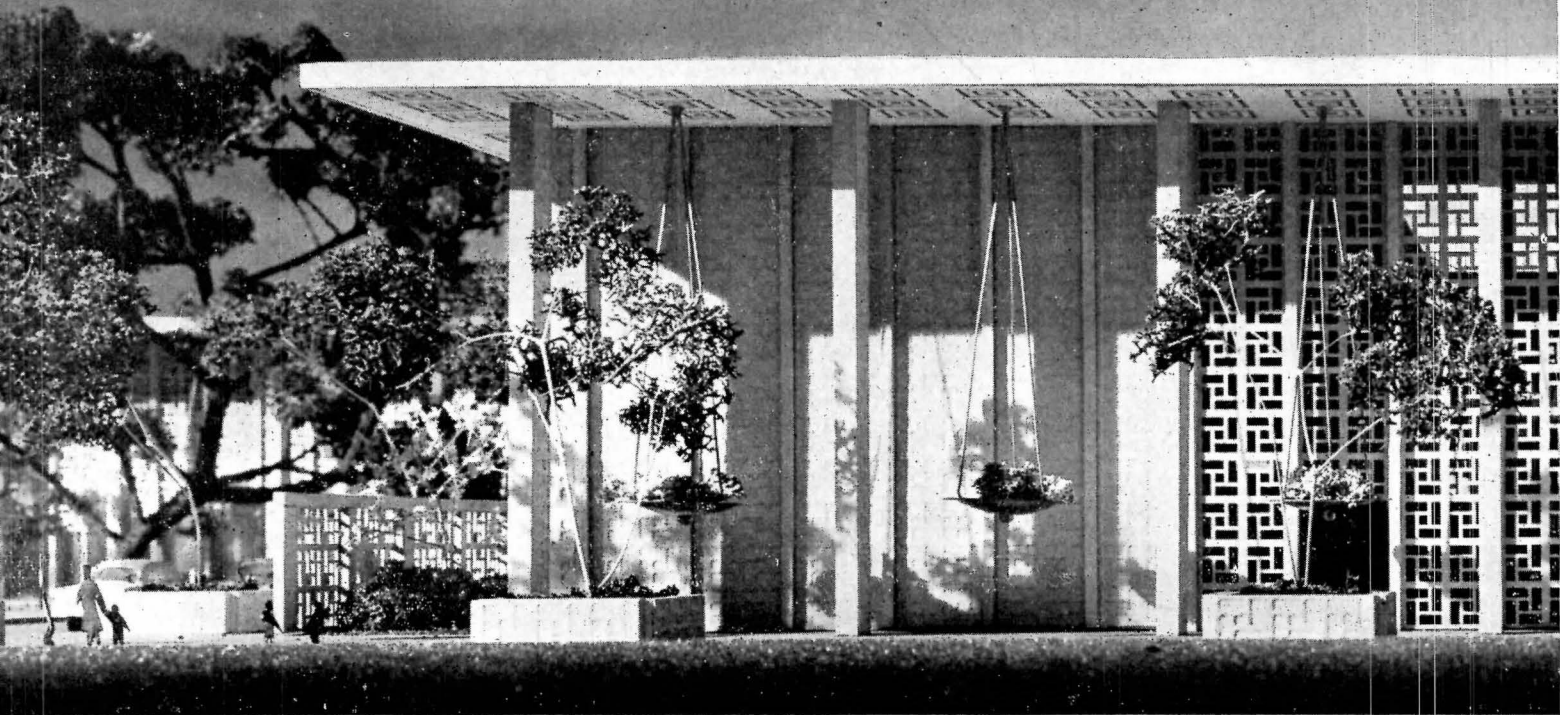


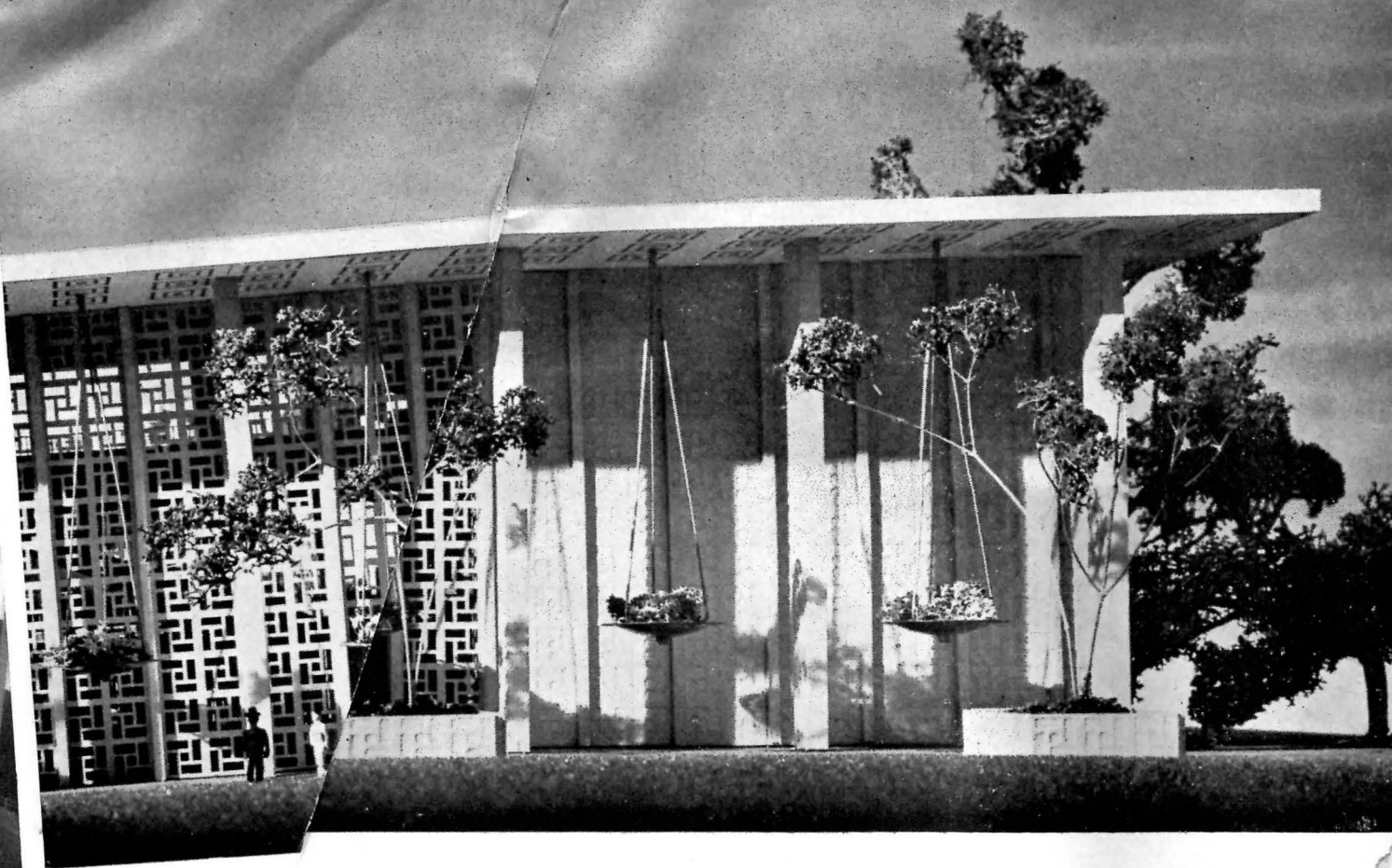
HORIZONTAL HOSPITAL FOR PALO ALTO




The main entrance of the medical center (above) has large motor court, pool, fountains. Details of 44-inch concrete blocks used for facing and grills are shown at right. The plan is of the main floor of the 225 bed Palo Alto hospital (a voluntary community facility) and of the medical and service core linking it with the Stanford hospital (which has teaching facilities). Hospital floors are similar, with service down the center. The second floor of the core houses surgery and related labs; the third floor has obstetrics and pediatrics. The basement under these wings houses emergency suite, records, supplies, etc. All central-core floors are connected by escalator.

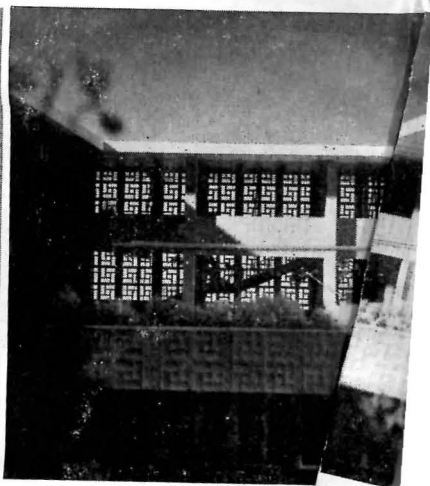
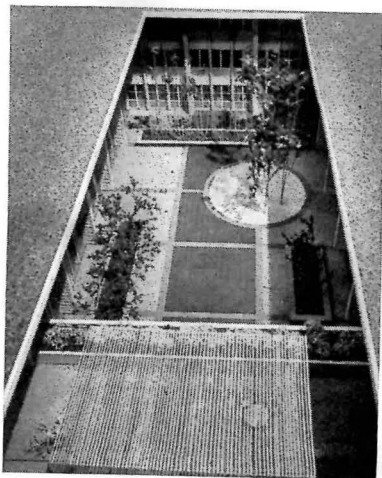


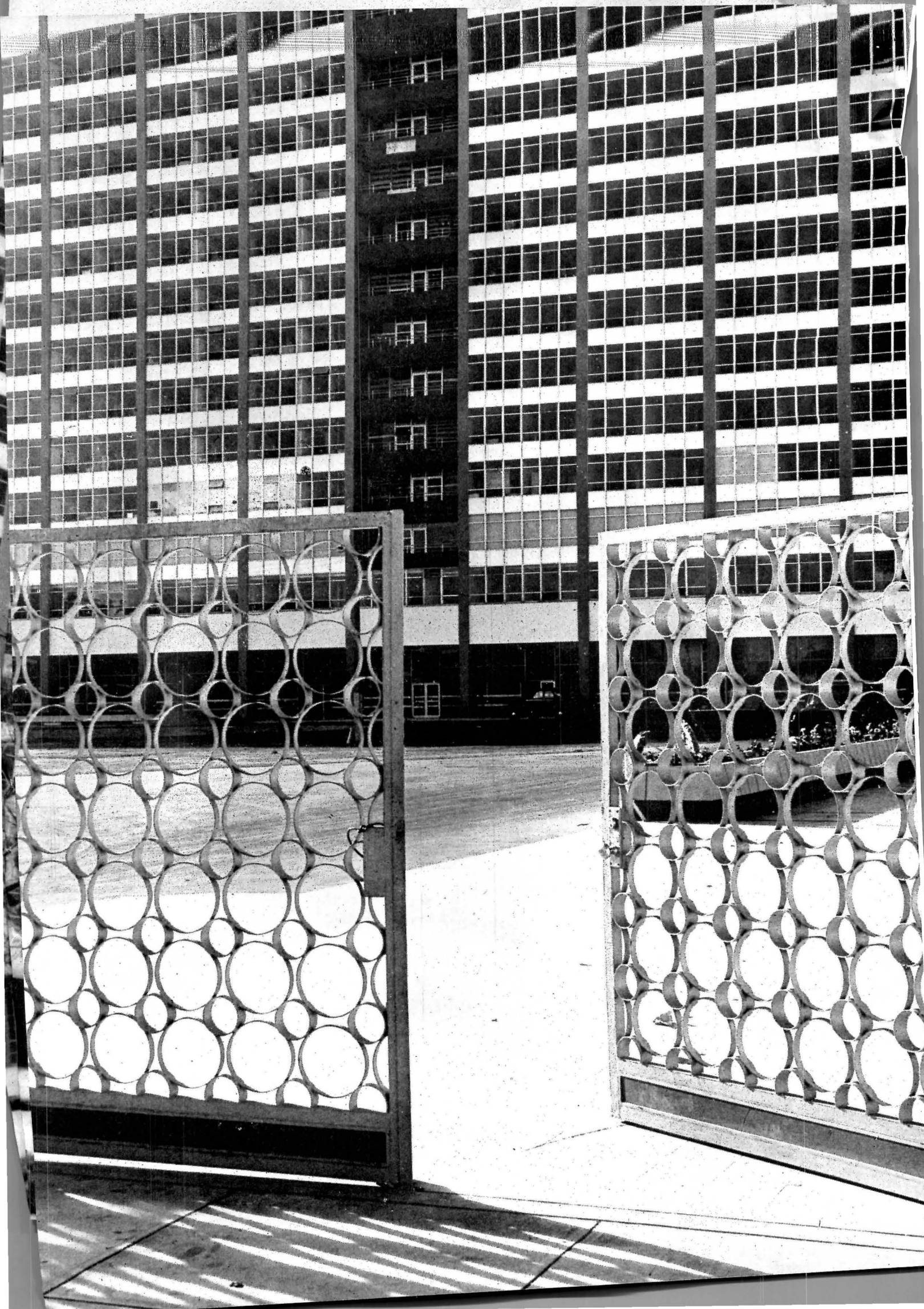


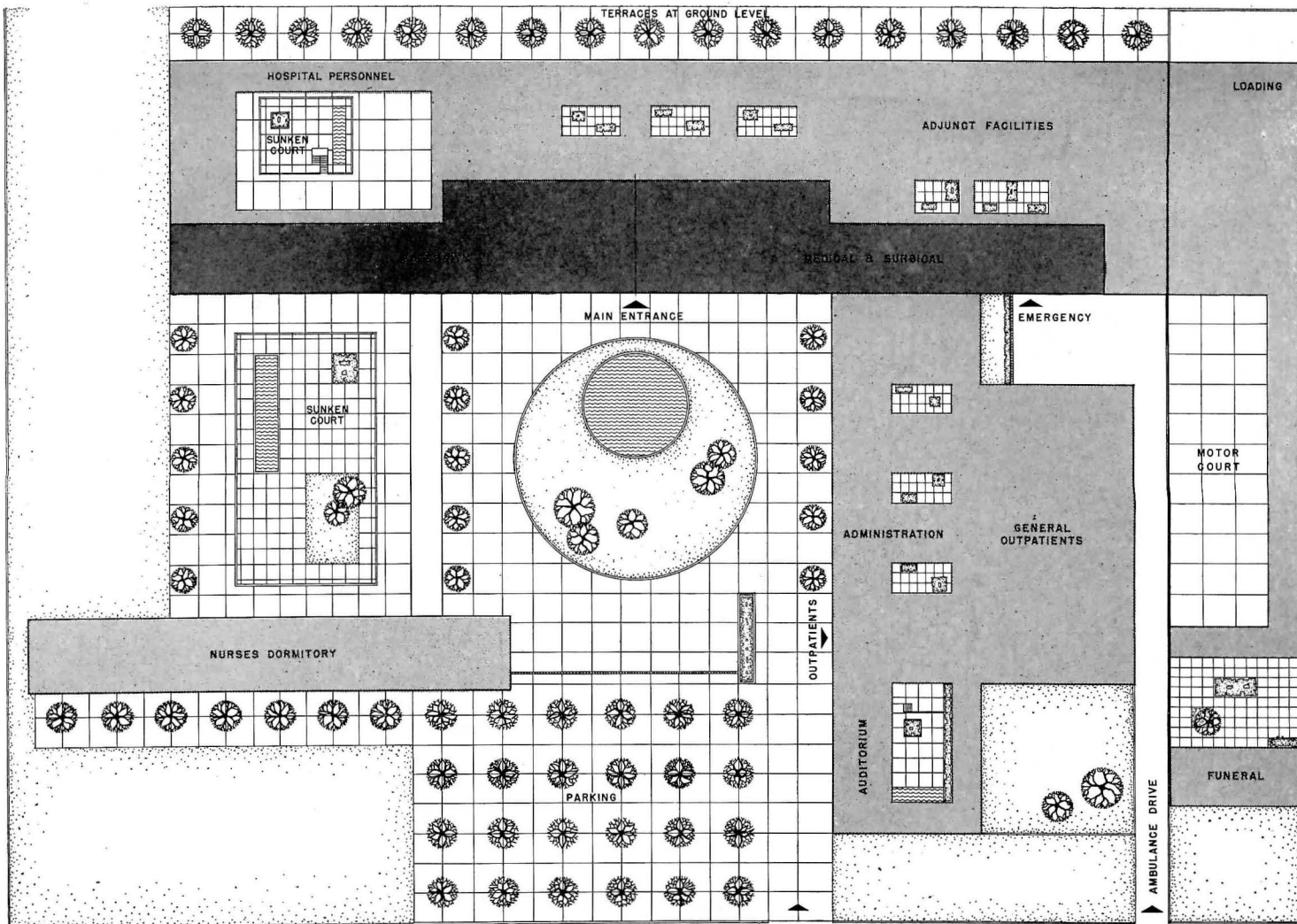


HORIZONTAL HOSPITAL FOR PALO ALTO


 Behind the rehabilitation center (above), and on its third floor, are the facilities for the Stanford University medical school. The plan shows ground floor classrooms and library. On the second floor pathology and student labs. On the third floor are facilities for physiology, biochemistry and pharmacology. The entire medical center is planned on a regular 22-foot bay spacing. The great profusion of attractively planted courts throughout the building (note detail photos at right) flood all areas with light. When the building is expanded in the future, new courts would be placed between new and old units to avoid interference with existing fenestration and room layouts.

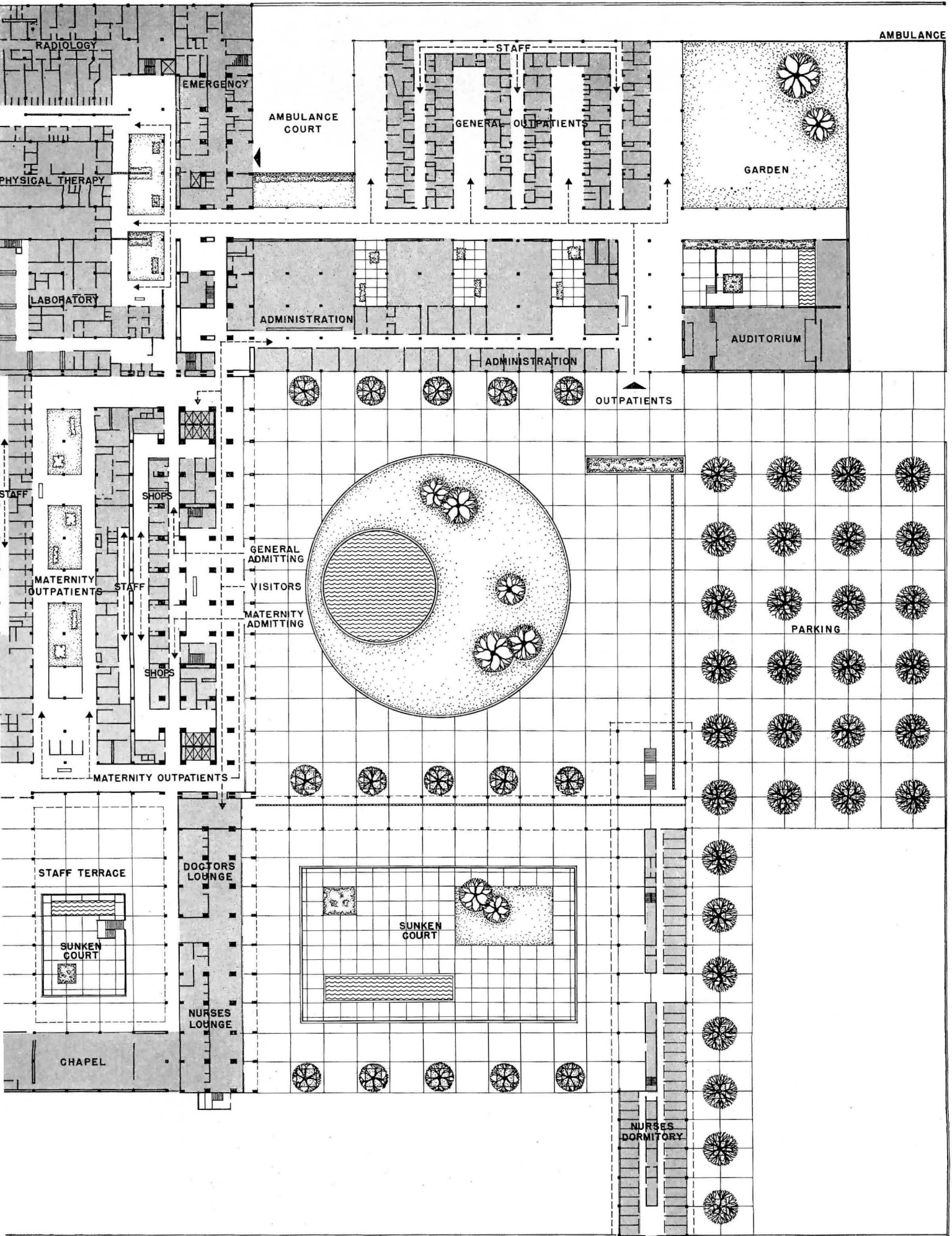






VERTICAL HOSPITAL FOR LIMA, PERU

This enormous, vertical hospital by Edward D. Stone and A. L. Aydelott, Associated Architects, planned some six years ago, contrasts sharply with the preceding new Palo Alto scheme. Yet for its particular requirements for custom, climate and social institutions, it works equally well. Called the Central Hospital of Social Security for Employees (S.S.E.), the Lima institution will serve as the base unit in a nationwide, coordinated hospital system. Specifically, the new hospital is a dual one, providing medical and surgical care for Lima's white collar workers under Peru's social security plan, and maternity care for their wives. The idiom of patterned grills and pleasant courts is to some degree still present, but on a monumental scale — this is reportedly one of the larger reinforced concrete buildings in the world. There is a total bed capacity of 850; 500 in the general hospital, 350 in the maternity section. Outpatient clinics for each section have the respective capacities of 630 and 589 per day. Perhaps the most remarkable thing about such a big complex institution is the forthright simplicity that has been achieved in plan, structure and design.

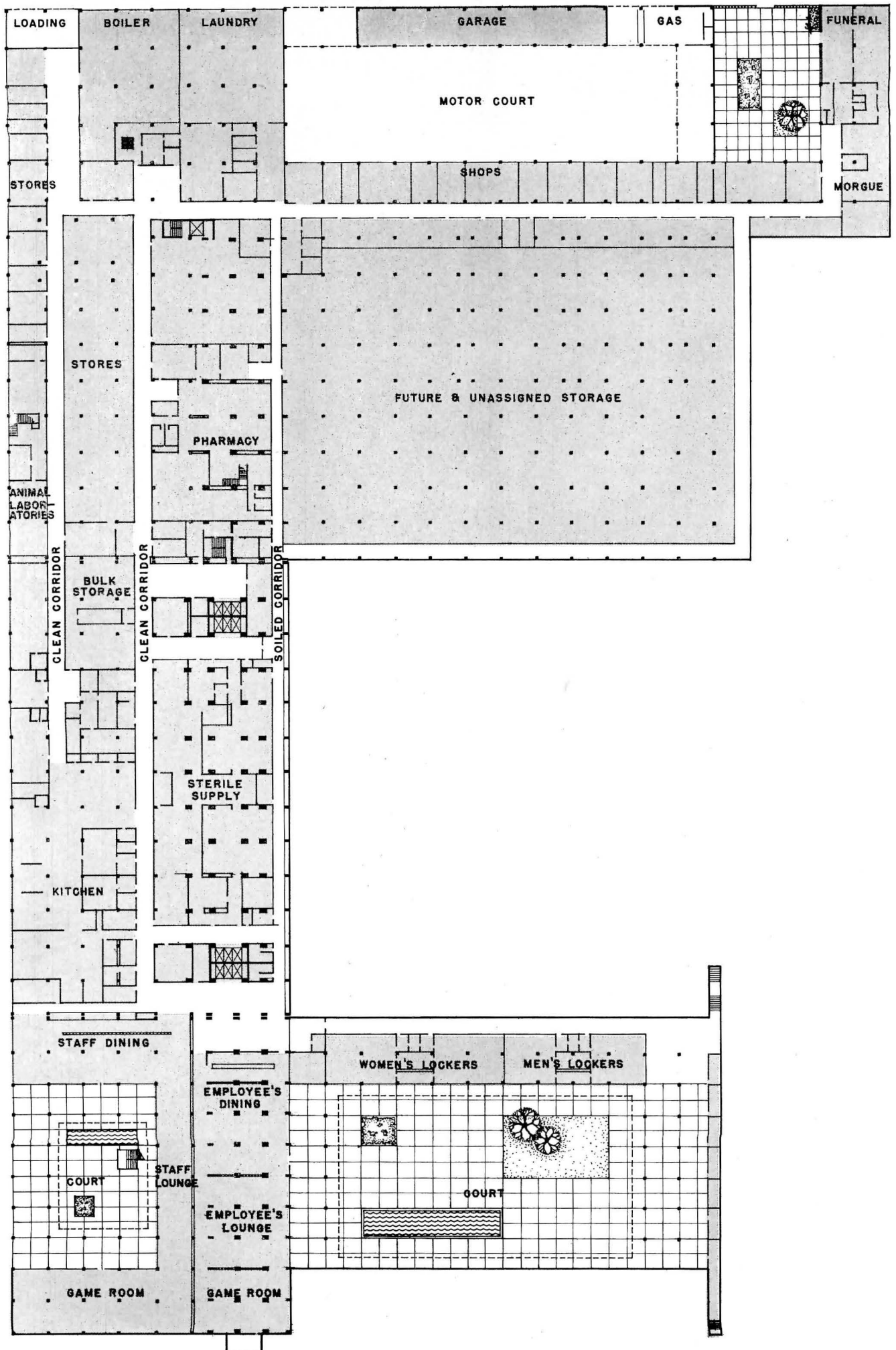




VERTICAL HOSPITAL FOR LIMA, PERU

Circulation is exceptionally well handled in this huge hospital. Basically, the institution is divided into two separate, distinct hospitals (maternity and general), but lower floors contain facilities available to both. From the main entrance (above) a central lobby branches to elevator cores for each of the two hospitals. Maternity outpatient traffic is confined to the ground floor of the central wing, general outpatients to the east wing. Separate staff corridors have back doors to examining rooms. The basement serves all with kitchen, laundry, supply.

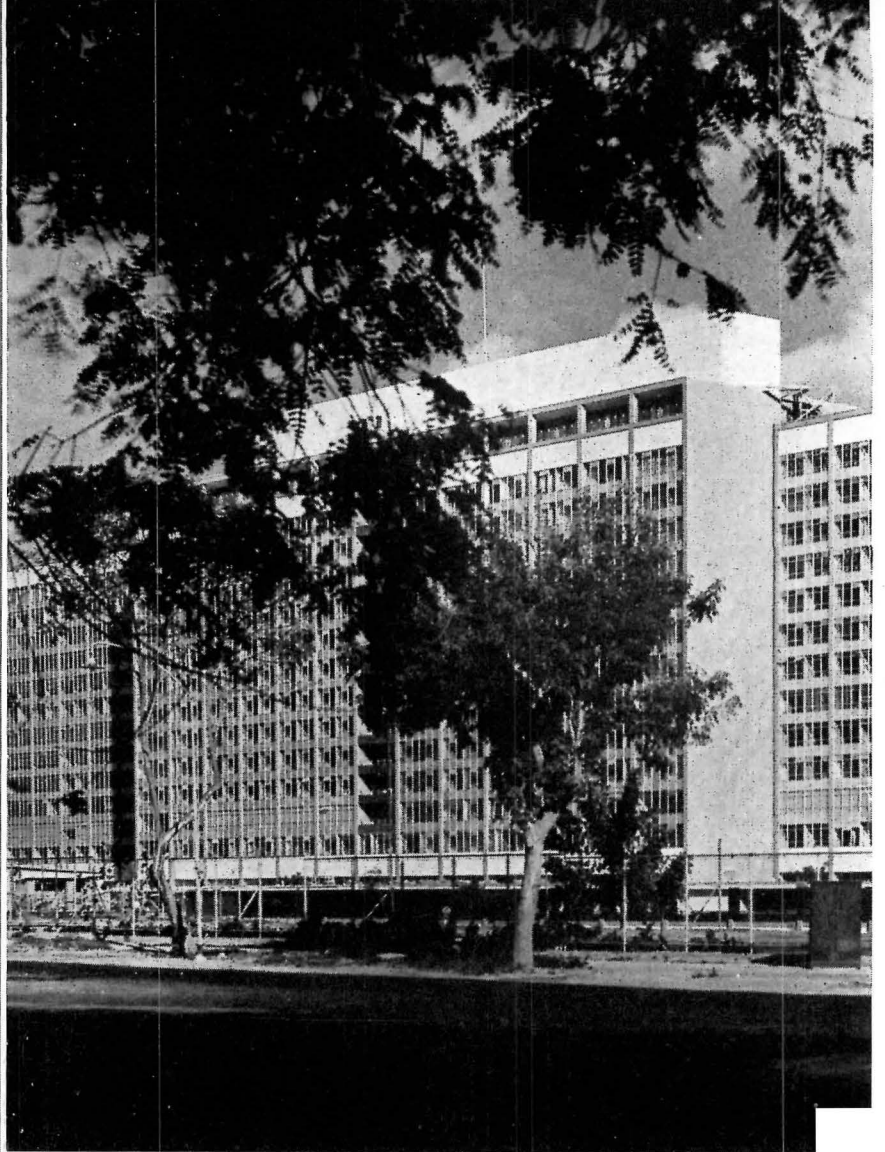
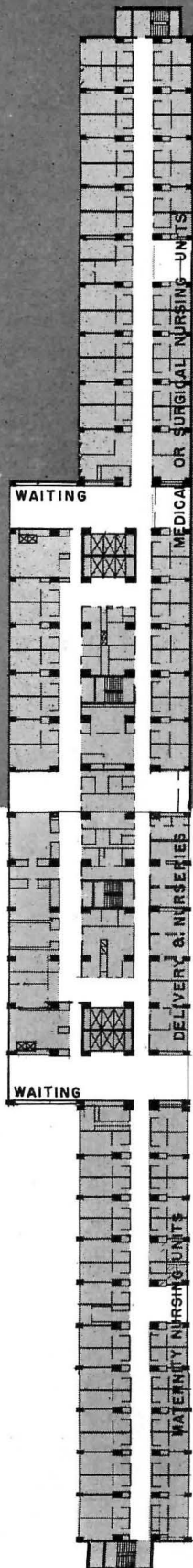






VERTICAL HOSPITAL FOR LIMA, PERU





VERTICAL HOSPITAL FOR LIMA, PERU

Nursing floors are divided down the middle from the top of the hospital to the third floor. Each side is served by its own elevators. Each room, with the exception of a few on the psychiatric floor, has a private bath. All rooms facing south are single, and measure 10 by 12 feet. Most rooms facing north measure 12 by 16 feet, and can be used as double rooms. Delivery rooms are dispersed to permit local custom of family gatherings.

The Central Hospital of Social Security for Employees (S.S.E.) was planned and built during the administration of General Manuel A. Odria, President of the Republic of Peru. The plans were developed in cooperation with U. S. Public Health Service, Divisions of Hospital Facilities and Medical and Hospital Resources; the late Marshall Shaffer, Chief of the Technical Services Branch, U.S.P.H.S., was especially interested in this project and made a great contribution.



BANGKOK, THAILAND; Embassy Office Building; John Carl Warnecke, Architect. Water in the "klongs," reflecting colorful local architecture, plus heavy rainfall conditions, inspired a delicate, lacy building with wide protective balconies, reflected in a miniature lake

AMERICAN ARCHITECTURE DESIGNED FOR EXPORT

Since the Department of State began its current program of foreign buildings, something like three years ago, some important break-throughs have been registered. For here the call is clear: architecture is to speak to people, vast numbers of people in far-off places, of vastly differing experiences and persuasions. It is to speak to them of the United States of America.

The thoughtful way the FBO has set out to organize its visual messages is refreshing. Its advisory panel of famous architects, helping select architects of individual buildings and advising with them, represents reaching new ground in this age-old type of communication. The conscious charge by the State Department to the participating architects, written early in the program by Pietro Belluschi, was significant:

"To the sensitive and imaginative designer it will be an invitation to give serious study of local conditions of climate and site, to understand and sympathize with local customs and people, and to grasp the historical meaning of the particular environment in which the new buildings must be set. He will do so with a free mind without being dictated by obsolete or sterile formulae or clichés, be they old or new; he will avoid being either bizarre or fashionable, yet he will not fear using new techniques or new materials should these constitute real advance in architectural thinking.

"It is hoped that the selected architects will think of style not in its narrower meaning but as a quality to be

imparted to the building, a quality reflecting deep understanding of conditions and people. His directness and freshness of approach will thus have a distinguishable American flavor."

The panel has been careful not to impose its own interpretations on individual architects doing specific projects. Thus the designs presented here (and in the two groups previously shown) represent considerable variety. Clearly all designs would not earn universal approbation. Even so the freedom must be considered good; freedom was an early American break-through.

With an advisory panel to guide it, the Department has patently refused to assert its own competence in matters of design. And, bless us, isn't this an important break-through? And it has undoubtedly achieved the best possible answer to uninformed criticism that seems the lot of government bureaus.

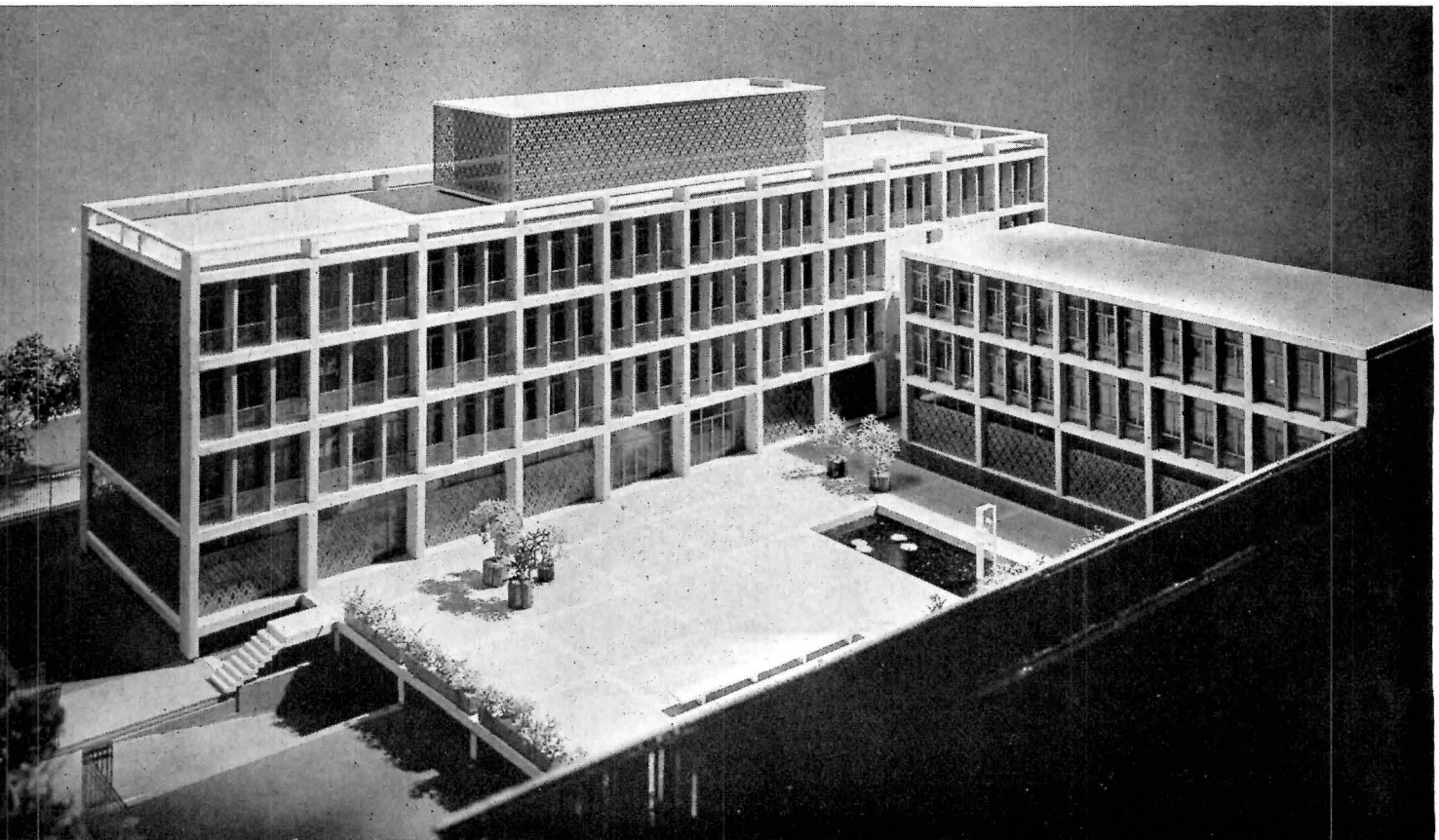
Results surely represent an excursion into new territory. The panel has been the means of introducing into government, notoriously tradition-bound, some of the most enterprising of architectural break-throughs. At the same time it has adjured architects to lay aside their more egocentric preoccupations, to align their purposes with those of this terribly important communication.

This approach to regionalism, to style, to a focussed architectural objective, might be opening up a great break-through for contemporary architectural effort.



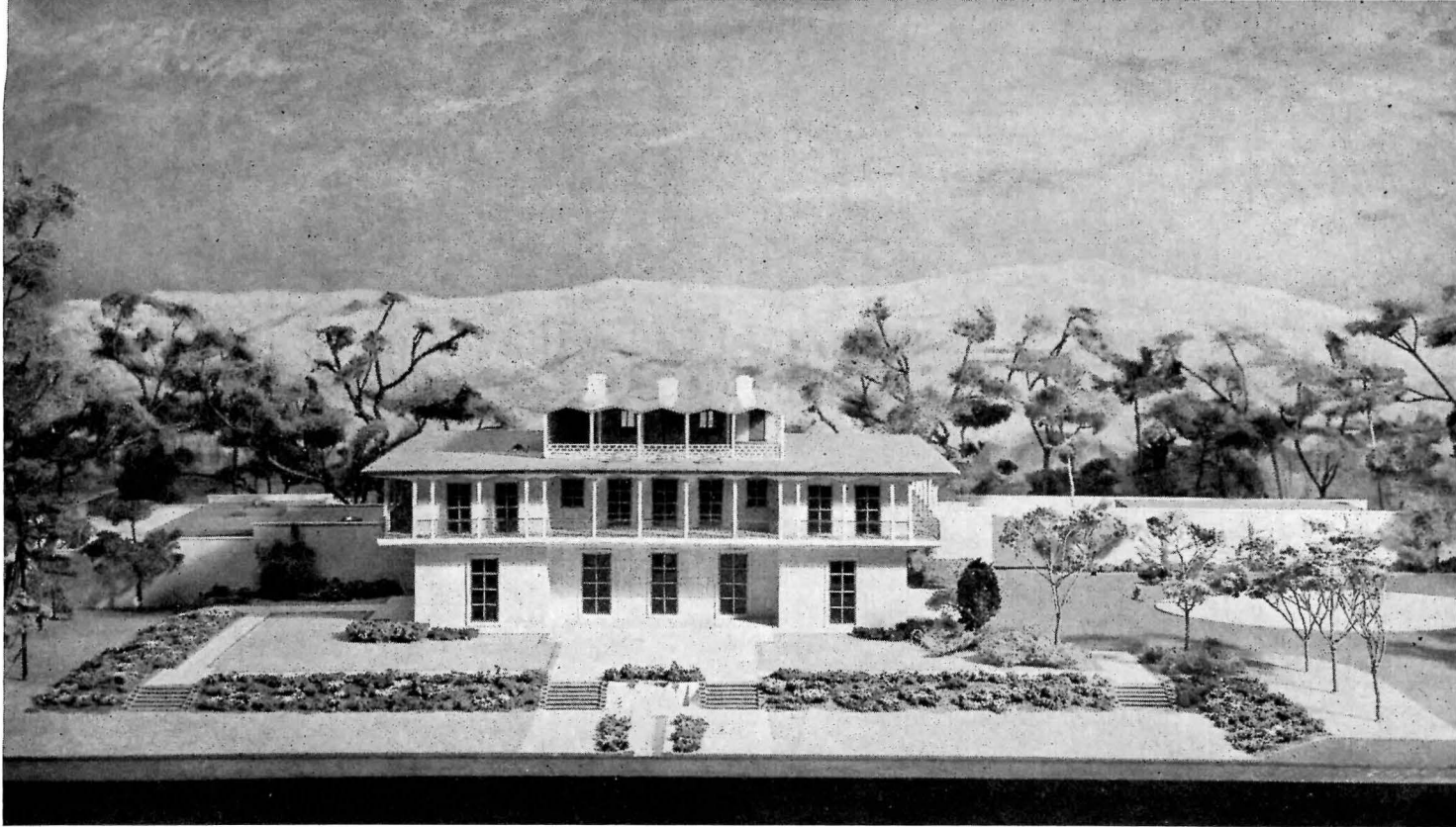
Art Hupy

SANTIAGO, CHILE; Ambassador's Residence; Paul Thiry, Architect. Sitting with stately grace atop its rather high hill, the building seems to have a congenial feeling for its site, seems likely to engender a sympathetic response. Reinforced concrete will fit local usage



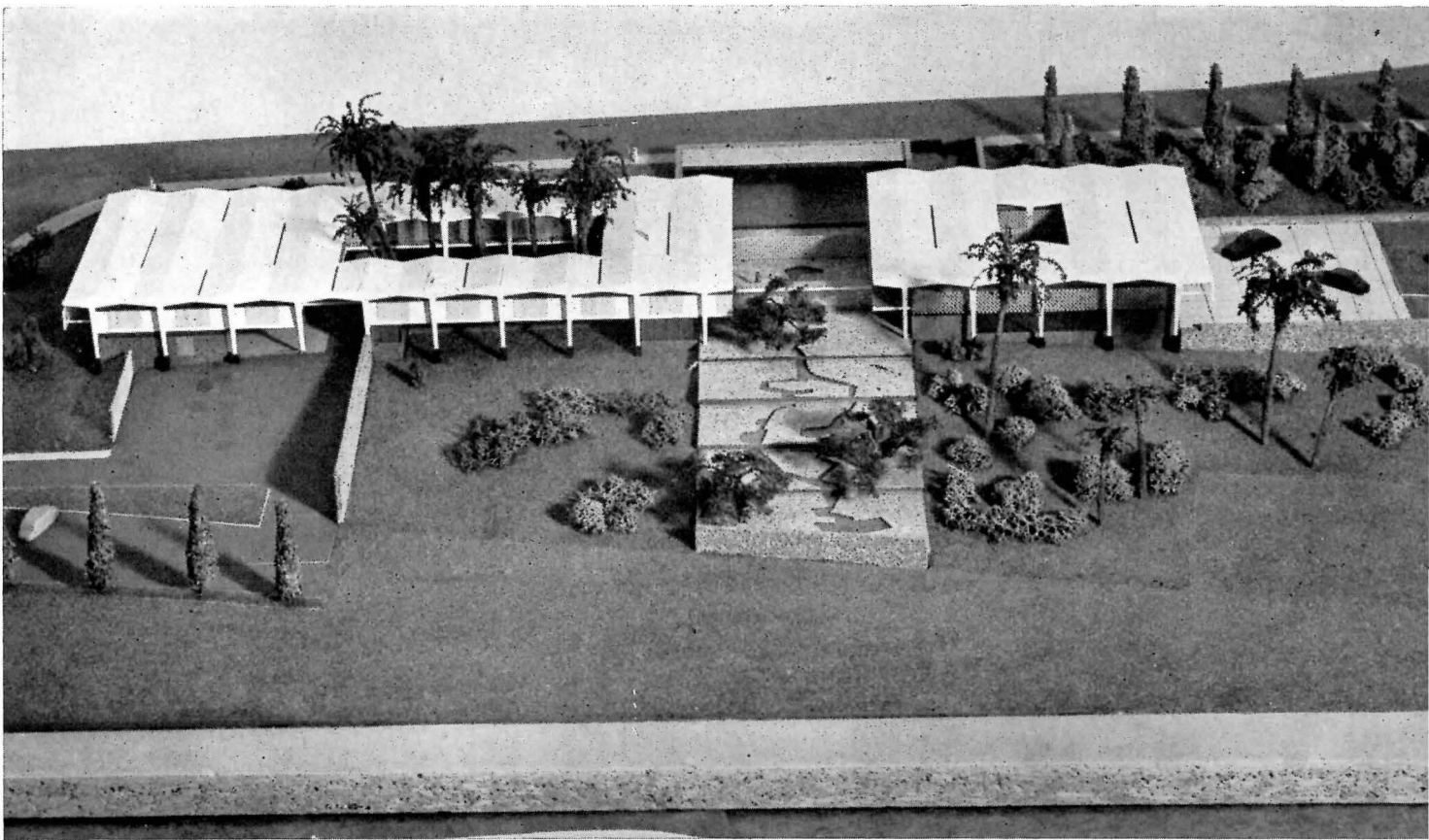
Robert C. Lauffman

LIMA, PERU; Embassy Office Building; Keyes & Lethbridge, Architects. Having no serious weather problems, the building makes much use of open tile screens; their burnt orange color sets a warm scheme, carried on with sepia mahogany doors and beige travertine



Gilbert Ask

TEHERAN, IRAN; Ambassador's Residence; Victorine & Samuel Homsey, Architects. Site was once a private estate; it has a well developed garden already, with jube (water trough) through which a brook is directed. Reinforced concrete structure, travertine facing



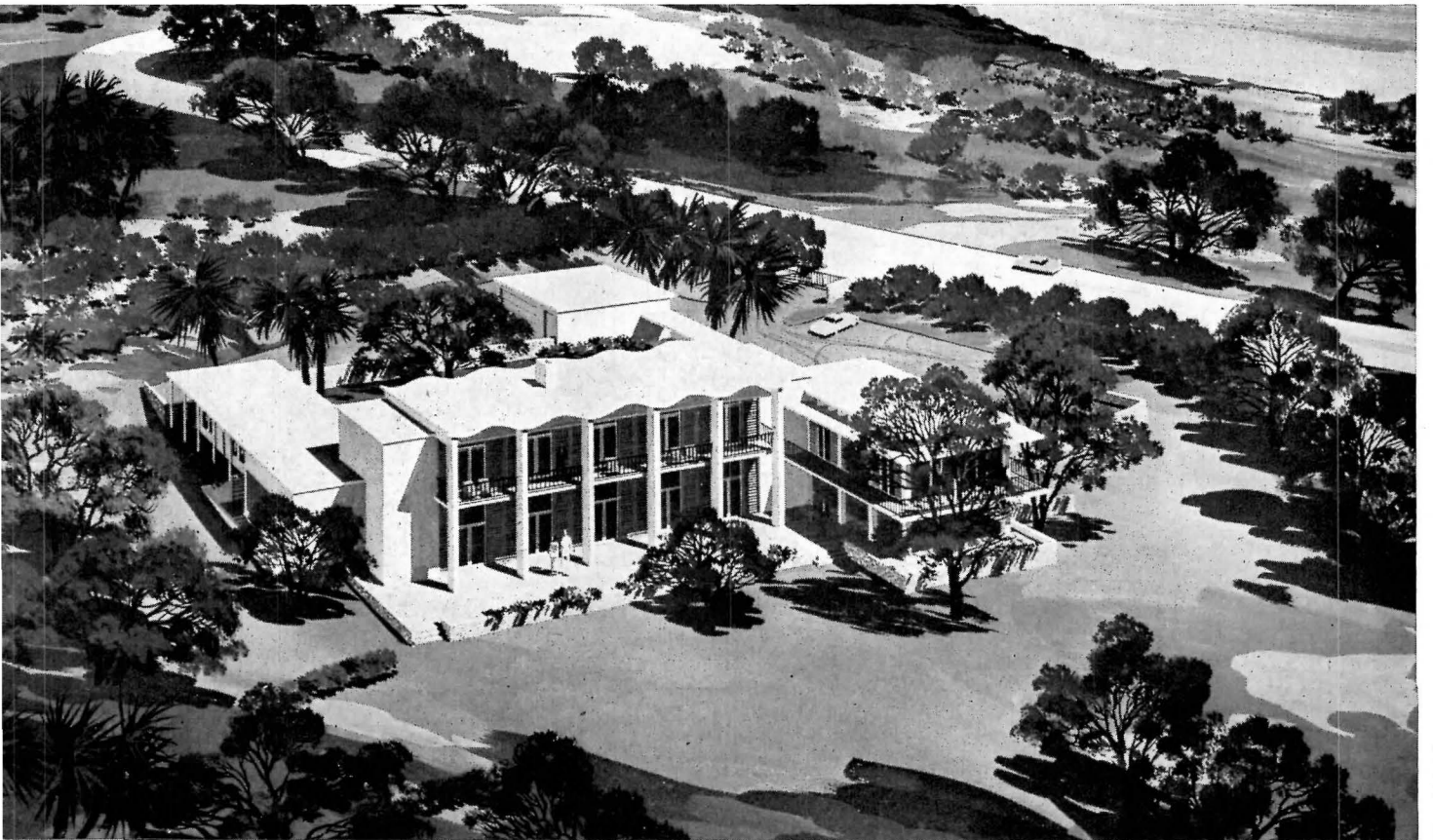
Edward Mt. Allen

RABAT, MOROCCO; Embassy Office Building and Residence; Ketchum, Giná & Sharp, Architects. The emphasis here was on making the Embassy inviting rather than imposing; main entrance is in patio. Local practice determined choice of reinforced concrete construction



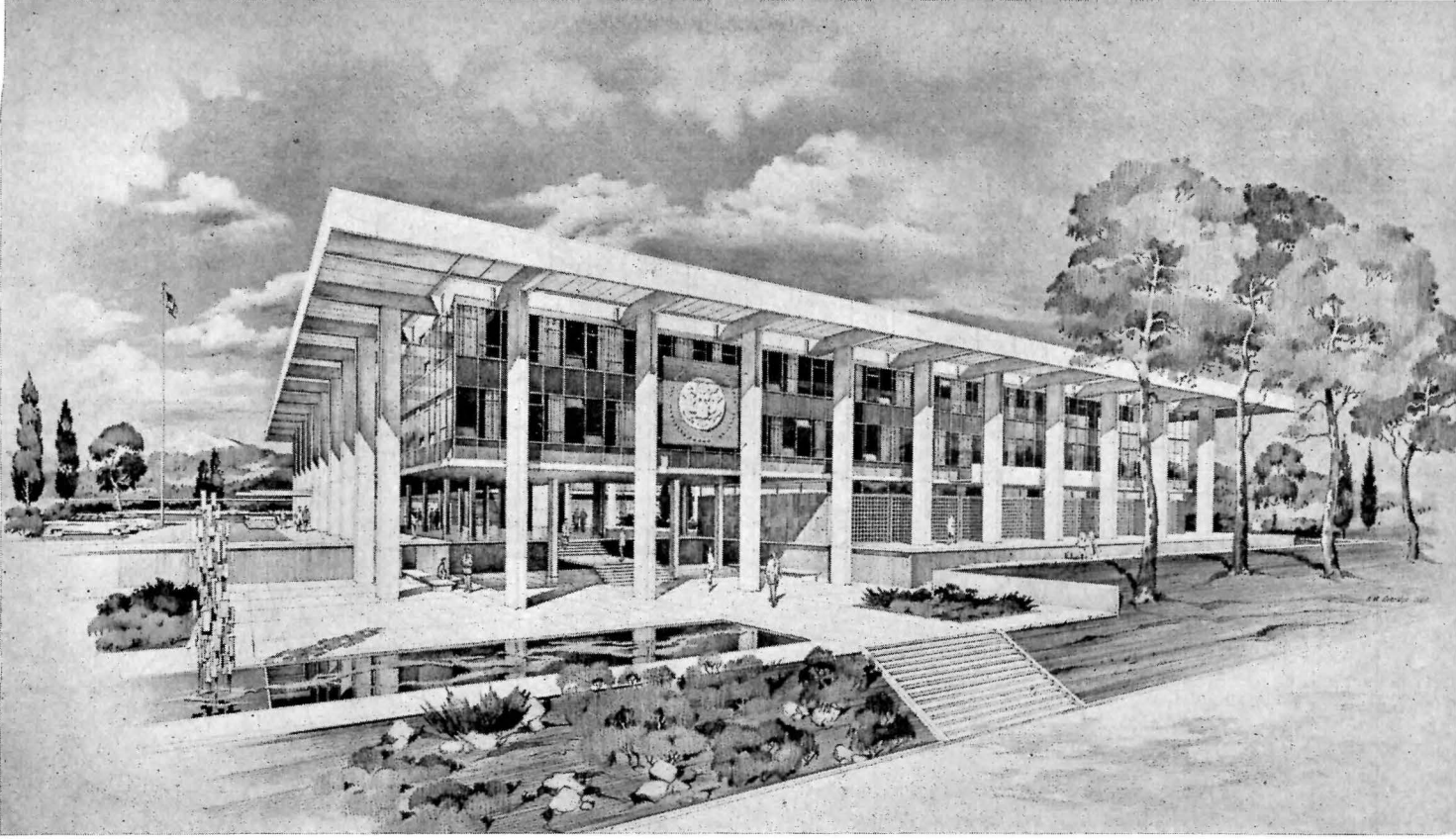
M. E. Warren

CIUDAD TRUJILLO, DOMINICAN REPUBLIC; Embassy Building; Rogers, Taliaferro & Lamb, Architects. This addition follows local tradition with its enclosed court. Strong sunlight suggested the pierced screen wall; lush greenery suggested it be white

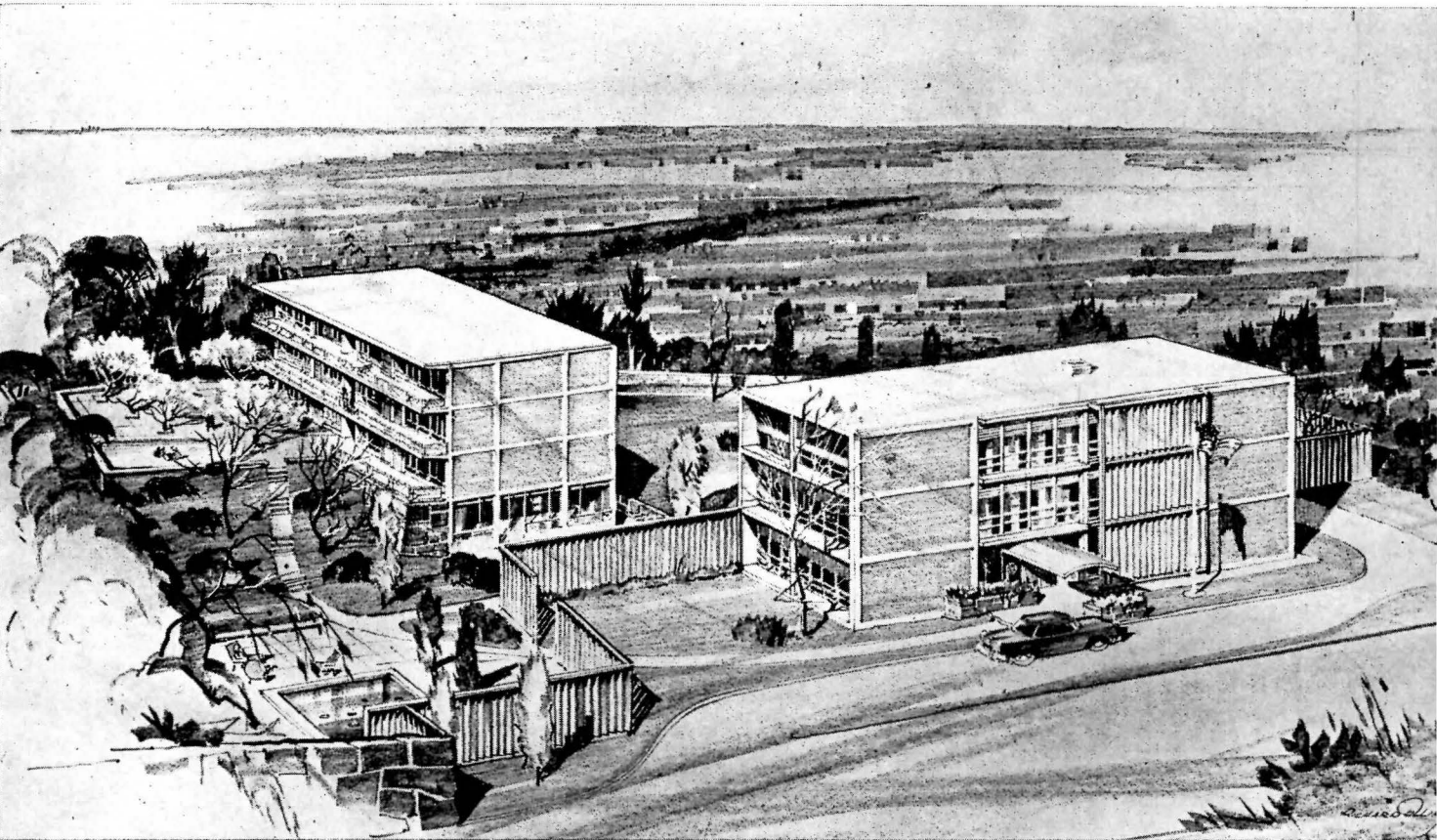


Edward M. Allen

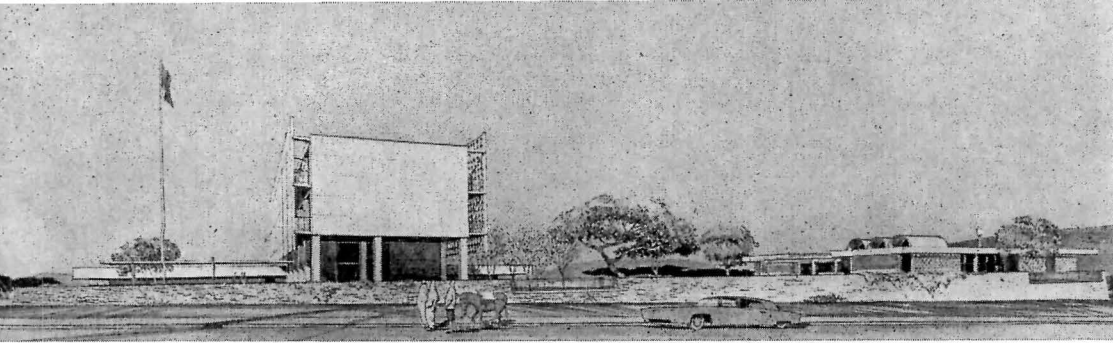
DAKAR, FRENCH WEST AFRICA; Consul General's Residence; Moore & Hutchins, Architects. Designed for a tropical climate, the building makes features of protection devices. Balconies and roof overhangs permit the large windows to be open during rainstorms



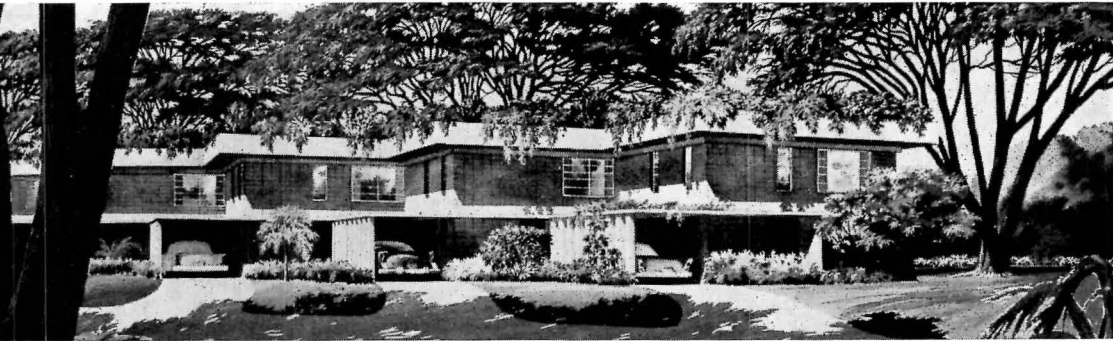
ATHENS, GREECE; Embassy Office Building; The Architects Collaborative, Architects. Here Walter Gropius has the role of the old master returning to the land of old masters, to show what changes the centuries have wrought in a building for essentially an old problem



NAGOYA, JAPAN; Office Building and Staff Quarters; Alexander Smilh Cochran, Architect. Security was desired, but "western compound" to be avoided. Building exposes its earthquake-resistant concrete structure. Sun protection east and west by wood louvers

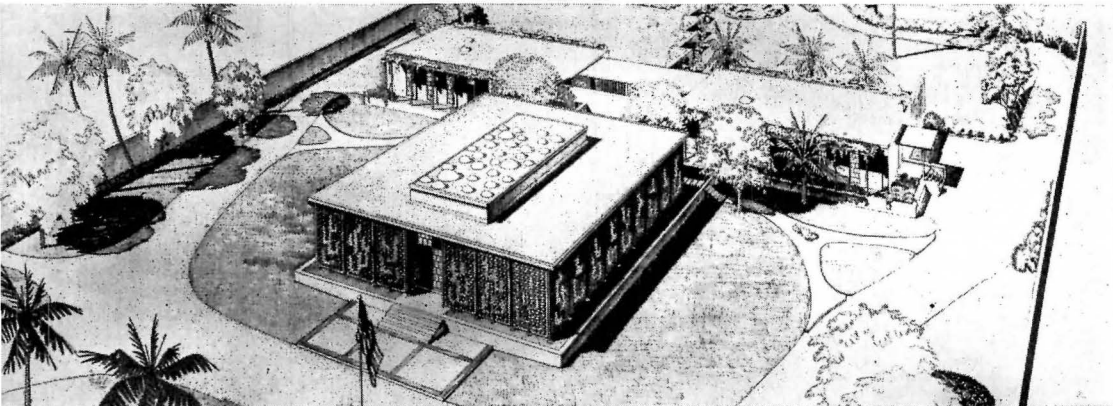


TANGIER, MOROCCO; Consulate General and Residence; Hugh Stubbins Associates, Architects. A new and smaller version of an earlier scheme, the design retains the pierced masonry sun screens, the barrel roofs, the strong, unifying walls, the sense of technology-not-forgetting-well being

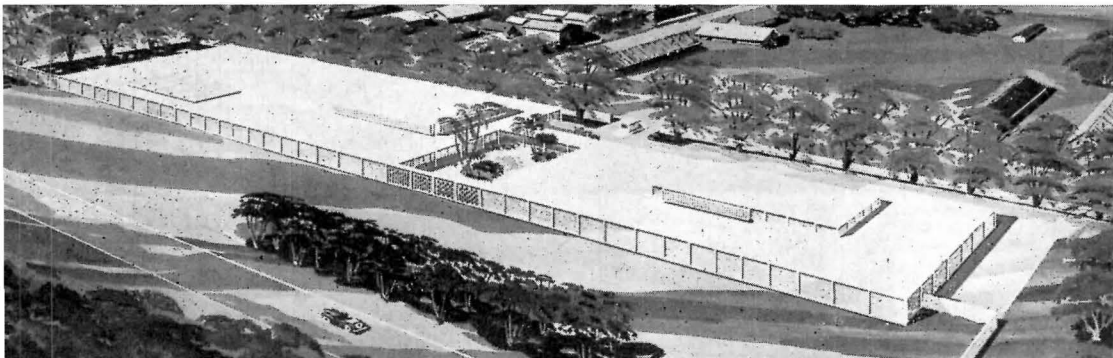


Edward M. Allen

MANILA, THE PHILIPPINES; Staff Apartments; Alden B. Dow, Architect. The ubiquitous American carport, attached to individual apartment units, joins with other shade devices to establish a unifying motif and establish a note of shelter and composure in a very hot climate



BASRA, IRAQ; Office Building and Staff Housing; Harris Armstrong, Architect. This consulate group will front on the Shat-el-Arab River, near the Persian Gulf. Office building has shade walls of teak wood grills. All buildings are air conditioned, for temperatures that go as high as 120 degrees



MANILA, THE PHILIPPINES; Regional Production Center Building (printing plant); Sherlock, Smith & Adams, Architects and Engineers. A slick, efficient-looking industrial building, to be built in two stages, softened by pleasant interior court and some local stone in exterior facing

Mexico City's EARTHQUAKE

Early reports of damage to buildings caused by the July 28 earthquake were both sketchy and misleading; an architect or engineer could hardly have surmised what happened, or did not happen, to the sleek office buildings and hotels, to the buildings in University City, and to some of the familiar landmarks. It was said, for example, that the Continental Hilton had a bad crack in its side. Actually this was a ruptured construction joint — not in itself an indication of structural failure.

On the following five pages are photographs of typical damage, and notes obtained from interviews with Mexican and American engineers during a brief visit to Mexico City a week after the earthquake.

First appearances were deceiving, since the ride from the airport into the city revealed no obvious damage, and a quick look around upon arrival showed not much more than a few broken windows and cracked facings. A strong hint that damage might be more severe than it first seemed was given by a 5-story, steel and concrete columned, flat slab building under construction which looked like it might have been bombed.

Closer inspection told more about the effects of the 'quake, estimated to have been between 7 and 8 on the Mercalli scale. (Sometimes natural frequencies of buildings were the same as the earthquake period — a resonant effect resulted.) Damage included broken windows and spalled facings; cracked plaster and broken walls; buckled steel columns; fractured concrete beams; severe settlements and buildings jarred out of plumb; and opened construction joints.

Several large downtown office buildings must be scrapped because either they are too expensive to rehabilitate or unsafe. One of these, Reforma 1, is shown here with tell-tale cracks in the pilasters.

The colorful, striking buildings





1



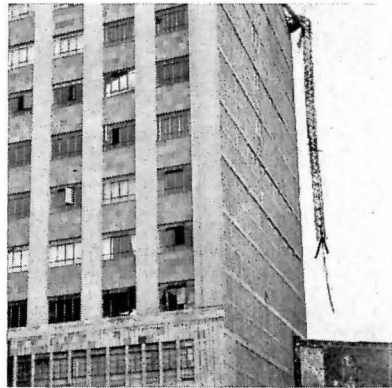
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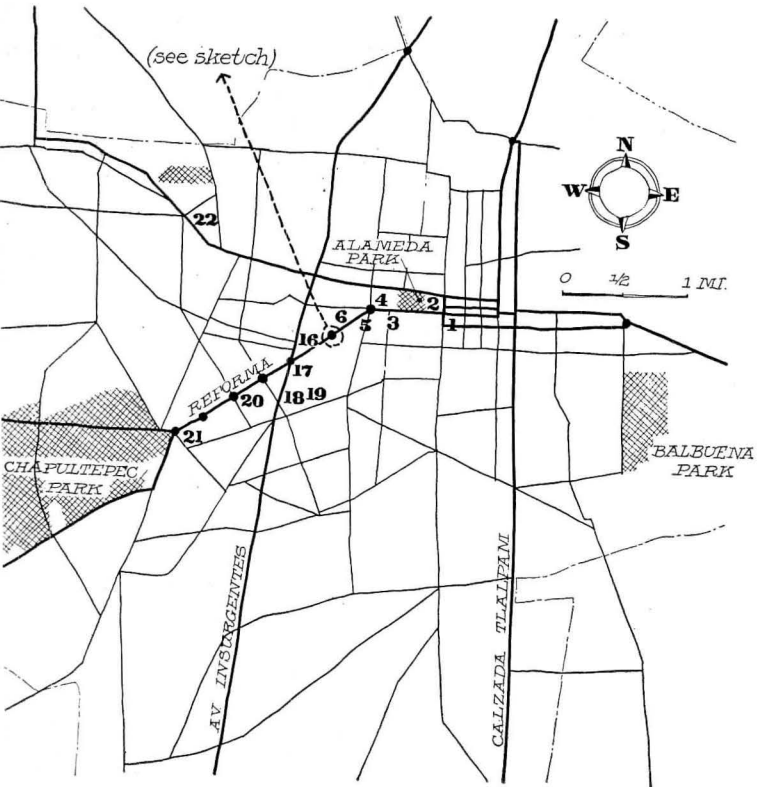
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Adolfo Zeevaert



4



Numbers on map correspond to numbers under photographs

at University City appeared untroubled by the earthquake, but it is probable the shock was much less severe there. The small cosmic ray laboratory of Candela stands undamaged along with other buildings on stilts at University City.

A Mexican engineer said that four movie theaters collapsed, as well as about four other buildings up to seven stories. One of the theaters showed films the day following the 'quake, and that night after it was empty, the theater collapsed — presumably the structure could take the live load, but not the temperature stresses.

It was obvious in the collapsed buildings that scant attention had been paid to lateral resistance, including connection details. In one concrete structure, seven floors pancaked, indicating that it probably had barely enough strength to take normal dead and live loads.

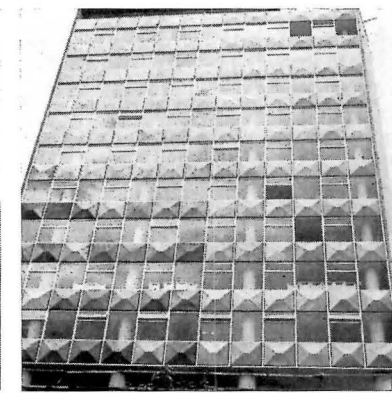
Dynamically designed buildings came through the shocks in fine shape. The 43-story tower, La Latino-Americana escaped undamaged. Displacement measured at the 25th floor was 1.5 cm.

Much of the damage occurred to buildings with foundations on soft ground. Earthquake loads are difficult to anticipate even for ideal soil conditions such as rock. But in Mexico City, built over dried up lakes and canals, spongy clay, alluvial and archeological deposits, the problem is extremely complex.

— ROBERT E. FISCHER



6



13



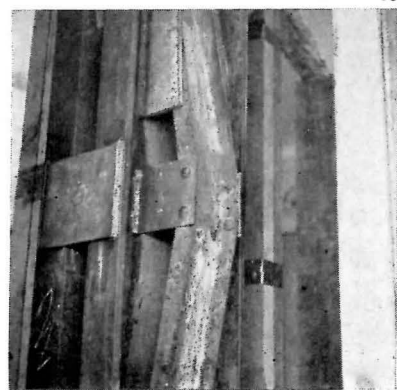
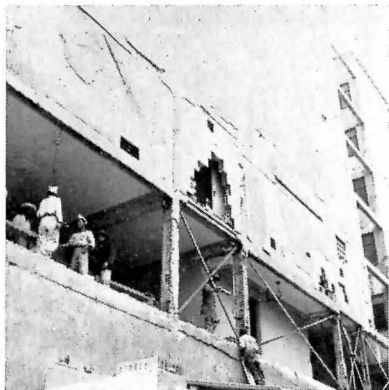
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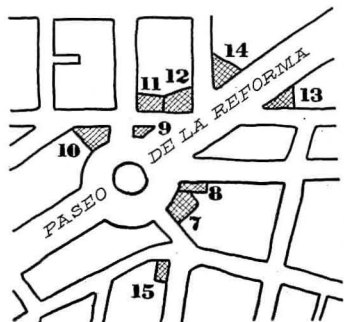
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Owners and engineers of the Latino-Americana 43-story skyscraper (1) were proud of the fact that the tallest building in Mexico escaped unharmed. The Palace of Fine Arts (2) which has been sinking for some time came through without trouble. Famed Del Prado Hotel (3) had slight damage which was not obvious from outside. A familiar landmark (5), Reforma 1, 17-story concrete structure, unscathed in the last earthquake, has severe structural damage now; this plus earlier foundation problems, makes it impractical to save; note the toppled antenna. Another office building, this time a 14-story steel structure (4) at Juarez 90, must come down also. At Reforma 35, marble facing fell off a 14-story concrete structure (6) when it banged against building to left. New concrete frame, enclosed in glass and blue aluminum (13) lost several panes of glass. Morelos 110, 13 floors, concrete (8), suffered severe damage to glass and interior walls.



9

Next to it, Reforma y Versalles (7), steel frame of 18 stories, designed according to dynamic theory, successfully withstood the shake. Columns on the 2nd and 3rd floors of Apartments Latino-Americana buckled (10). This was said to have minimized damage to upper stories since shock was not transmitted after buckling occurred. Frame will be strengthened by adding additional steel at the columns. Shear walls will be built along exterior. Reforma 69, 20-story steel structure (9), settled 4 in.; front facing cracked. Dynamic design aided Reforma 51, a 25-story steel building (12) — no damage. Spectacular failure downtown was building for Banco Nacional (11), of "hollow slab" construction; no beams; light exterior steel columns, concrete interior columns. U. S. embassy (14) had considerable damage on 15th and 16th floors. Cantilevered slab building (15) lost all glass, permanently fastened.



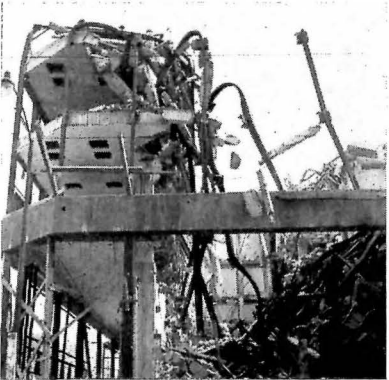
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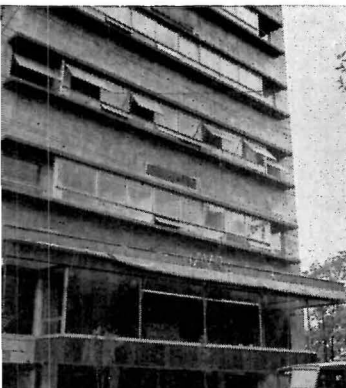
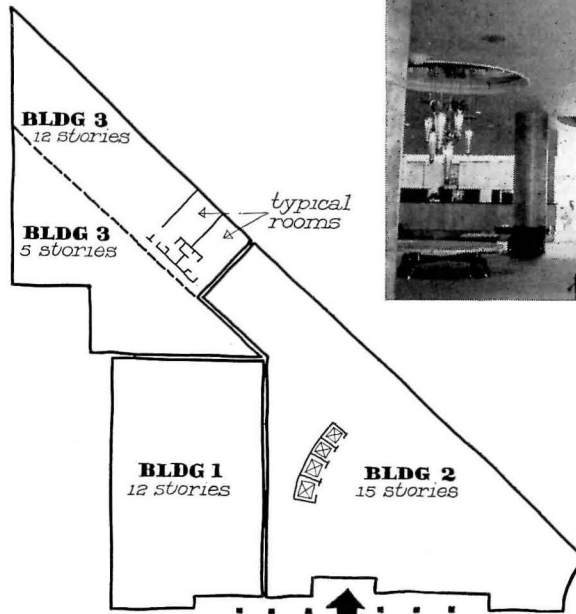


17

While the exterior of the Continental Hilton (17), except for broken glass in the back, does not appear damaged, and the dining room and lobby on the ground floor are unscarred, only 40 per cent of the guest rooms can be occupied until after extensive rehabilitation. The hotel is comprised of three structures, separated by 12-in. construction joints, with floor slabs extending 6 in. into the cavity. During the quake, the buildings banged together. Building No. 2, which suffered most damage, apparently whipped around the elevator core, according to Murray Erick, Los Angeles engineer and consultant to the hotel. There are diagonal tension cracks in short beams over the room entrance halls and broken partitions. (There is a smaller crack in the beam, invisible in the photo, identical to the one that can be seen, running in the opposite direction from top to bottom indicating that racking motion took place in both directions.)

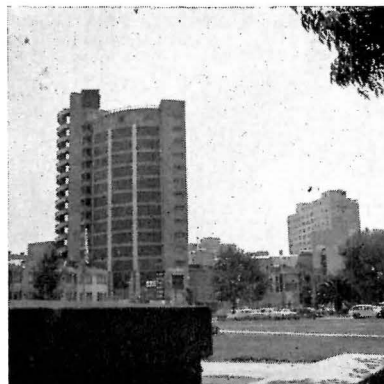


17



19

A doctors' office building (19), out of plumb and sunken almost a foot below street level, is beyond repair. Only visible exterior damage to the Plaza Hotel (16) was opening of construction joint; there appeared to be no damage to the circular staircase. Probably having only enough strength for normal dead and live loads, a new seven-story concrete structure (18) at Insurgentes 377 "pancaked" to destruction. At the Instituto Politecnico (22) a several-storied concrete building collapsed. Reported in the newspapers was the fact that the angel toppled off Independence Monument (20); the column was badly cracked. At Reforma 208, the top two floors of an unfinished 16-story concrete structure (21) were shaken down. Similar damage occurred to several other tall buildings in Mexico City and to two penthouses atop a 12-story concrete building in Acapulco, scheduled to be a hotel for the Hilton chain.



16



18 Adolfo Zeevaert



22 Adolfo Zeevaert

EARTHQUAKE FORCES AND DESIGN PRINCIPLES

By Edward Cohen, Associate, Ammann & Whitney Consulting Engineers

THOUSANDS OF EARTHQUAKES are recorded at seismological stations every year. Potentially destructive earthquakes occur on the average of twice a week. Fortunately, most of the activity occurs in well defined earthquake belts. It has been estimated that the greatest earthquakes release energies equivalent to almost 1,000,000 Hiroshima type atomic bombs or 1000 large (20 megaton) thermonuclear bombs. The energy involved in the recent Mexico City earthquake is estimated as approximately equal to that in the explosion of a single two megaton nuclear weapon.

Major earthquakes are believed to occur as a result of the sudden release at faults of strains and stresses developed in the earth's crust over long periods of time. This is known as the elastic rebound theory and is generally accepted as a workable explanation of the mechanism involved in earthquakes.

Although no complete explanation is available, current theories which are advanced to explain the development of these forces include shrinkage of the earth's crust, mountain building, and isostatic compensation. The last assumes that the earth's crust consists of many large solid blocks which are supported by uniform pressure which exists toward the liquid core of the earth. As material is eroded from one block and deposited on another, the first tends to rise and the second to sink. The motion does not occur continuously, but in erratic jolts when the unbalance has become sufficient to break the bond between the blocks. These explanations are consistent with the location of the major earthquake belts along mountain ranges and ocean troughs. Since early times volcanic action has been suggested as a basic cause of earthquakes. Although there may be some common factors involved, it is doubtful whether volcanic action causes earthquakes other than those of a local character associated with eruptions.

Although practically no region of the world can be considered safe from earthquakes, there are certain earthquake "belts" where destructive earthquakes are most frequent. One belt extends from west of the Mediterranean eastward through northern India and China to the Pacific, around the borders of the Pa-

cific, northward from New Zealand and the East Indies through the Philippines and Japan to Alaska, and southward along the western and coastal regions of North and South America. It also reaches across Mexico and Central America to the West Indies although little activity has ever been noted in the Bahama Islands. Another belt extends north-south almost from pole to pole through the mid-Atlantic.

While it is well known that our West Coast is subject to relatively frequent earthquakes of a destructive nature, it is not so well known that major earthquakes have occurred throughout the United States. The most famous earthquake of colonial times occurred in 1663 in the St. Lawrence valley and was felt throughout New England. In 1755 a severe earthquake caused extensive damage in Boston, Mass. In 1811 a great earthquake occurred at New Madrid, Missouri. One of the greatest earthquakes in the United States took place in Charleston, South Carolina in 1886. In 1904 an earthquake of about the same magnitude as the famous San Francisco quake of 1906 occurred on the East Coast near the Canadian border. Other important earthquakes have taken place throughout the country.

A map showing major earthquakes in the United States through 1946 is shown on following page.

In general there are two methods for defining earthquake magnitudes. The first is based on the visual observation of damage and the second by estimating the total energy (ergs, foot pounds, kilowatt hours, etc.) released by the earthquake.

In the United States the Rossi-Forel and the Modified Mercalli scales are used for determining earthquake magnitude based on direct human observations of damage and motion.

MODIFIED MERCALLI INTENSITY SCALE, *Wood and Neumann 1931 (abridged)*

1. Not felt except by a very few under especially favorable circumstances (I Rossi-Forel Scale).

2. Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing. (I to II Rossi-Forel Scale).



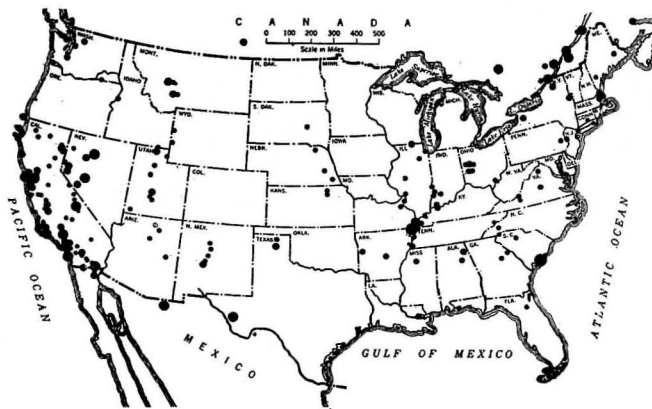
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20



21



Destructive and near destructive earthquakes through 1946

(from ASCE Transactions, vol. 117, 1952)

3. Felt quite noticeably indoors, especially on upper floors of buildings. Vibration like passing truck. Duration estimated. (III Rossi-Forel Scale).

4. During the day felt indoors by many, outdoors by few. At night some awakened. Dishes, windows, doors disturbed; walls make a creaking sound (IV to V Rossi-Forel Scale).

5. Felt by nearly everyone, many awakened. Some dishes, windows, etc., broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles, and other tall objects sometimes noticed. (V to VI Rossi-Forel Scale).

6. Felt by all; many frightened and run outdoors. Some heavy furniture moved; a few instances of fallen plaster or damaged chimneys. Damage slight. (VI to VII Rossi-Forel Scale).

7. Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures, some chimneys broken.

8. Damage slight in specially designed structures; considerable in ordinary substantial buildings with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. (VIII+ to IX Rossi-Forel Scale).

9. Damage considerable in specially designed structures; well designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken. (IX+ Rossi-Forel Scale).

10. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from river banks and steep slopes. Shifted sand and mud. Water splashed (slopped) over banks. (X

Rossi-Forel Scale; this is top of scale).

11. Few, if any (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.

12. Damage total. Waves seen on ground surfaces. Lines of sight and level distorted. Objects thrown upward into the air.

In the Gutenberg-Richter energy system which is more useful for certain scientific purposes the relationship between the energy, E , and the magnitude, M , is given by

$$M = 0.56 \log_{10} (E/E_0)$$

where E_0 is the energy release of a zero magnitude shock = 2×10^{11} ergs. On this scale the greatest earthquakes have a magnitude of 8.5.

However, the shock magnitude does not indicate "the intensity, violence or strength of the shock, either at epicenter or elsewhere but (only) its total size or output of energy."

Design for earthquakes is similar in some respects to design for wind and nuclear weapon blast forces, and in other respects completely different.

In all three cases, strength against lateral loads is required. For wind and blast the loading is determined by the exposed area; for earthquake it is independent of exposed area. For both earthquake and blast, the dynamic properties (mass, stiffness) determine the response (maximum stresses and damage) of the structure, whereas wind on buildings may be treated as a static problem except in special cases. For blast resistance increased mass is desirable and damping is unimportant; for earthquake resistance increased mass is objectionable and damping is an important, favorable factor. However, in the case of earthquakes the increase in load is not proportional to increase in height, whereas wind load increases faster than the height. In the case of earthquake design, the loads are

affected by the type and compaction of the foundation material, more damage being expected the softer the ground.

In all three cases vertical loading is present but in the case of wind and earthquake it is generally much less critical because most structures have excess strength in this direction provided by the factor of safety on normal dead and live vertical loads.

Review of earthquake damage leads to some general observations:

The firmer the foundation the less the damage, rock being the ideal foundation.

The stresses in flexible buildings on firm material are generally lower than in rigid structures, but the displacements are greater. Partitions, windows, etc., must have clearance to allow movement or rehabilitation will be expensive even though the building suffers no structural damage.

Buildings having a natural frequency close to the apparent earthquake period will be more severely stressed than if the periods were different. Thus flexible (long period) rigid frame type structures would appear to be most suitable for rock foundations while stiff (shear wall) buildings would be best for soft soils. Structures of ductile structural materials are least likely to collapse. Thus reinforced brick is suitable to aseismic structures while plain brick is not.

A symmetrical building (a cube, for example) with the center of gravity of bracing at the center of gravity of the mass can be made earthquake resistant more easily than an unsymmetrical layout.

Providing rigid connections among all foundations is helpful in reducing damage in soft material by minimizing relative settlements and motions.

Shear wall construction of reinforced concrete or reinforced brick provides high strength and stiffness.

Unreinforced bearing wall structures are highly susceptible to collapse.

Light box type wood frame houses may be made highly earthquake resistant by proper attention to the details which tie the structure together into a unit.

Chimneys and parapets are most subject to damage unless specifically designed for earthquake resistance.

Curtain walls should be well anchored to the structural frame.

Tall buildings close together may cause considerable damage by banging against each other.

The safest place during an earthquake is in an open field.

(Continued on page 254)

TOWER LATINO AMERICANA:

MEXICO CITY'S 'QUAKE-PROOF' SKYSCRAPER

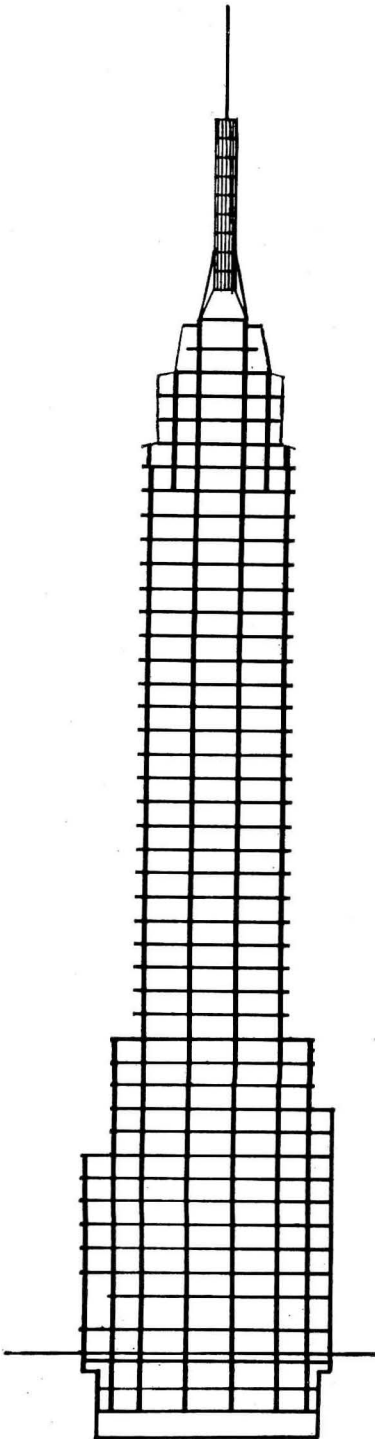
By Adolfo Zeevaert, C. E.

Chief Engineer,
La Latino-Americana, Seguros de Vida, S. A.

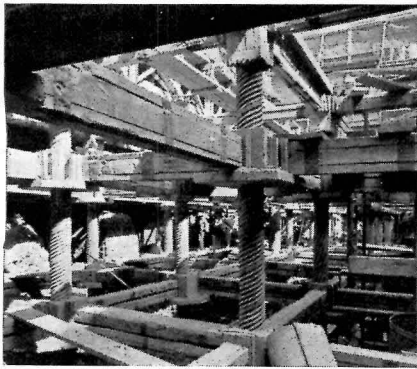
SINCE ITS FOUNDING by the Aztecs in the 14th century, Mexico City has grown to a metropolis of some four million inhabitants, its population multiplying more than ten times since the turn of the century. Such growth has brought an important increase in all kinds of business, but, from the engineering point of view, it has created serious problems.

In addition to the usual problems of traffic, transportation and water supply, the city area is subject to a ground surface subsidence of about two feet per year. And because Mexico City is in an active volcanic zone, it is menaced by strong earthquakes as well. When La Latino Americana, Seguros de Vida, S. A., first decided to construct a much larger building for its home office, the company's engineers presented a project for the new building which consisted of one basement and 27 stories. Some time later this project was reviewed, and, in view of the fact that La Latino Americana wished to have the tallest building in Mexico City's strong volcanic and earthquake zone, a thorough study was undertaken of all the conditions that would be imposed by the new project of the building. From subsoil studies, in conjunction with architectural considerations, it was found that a tall building could be designed, provided it was built with light materials. La Latino Americana then conceived the idea of constructing a 43-story building with three basements, using the lightest and most modern materials available in Mexico City.

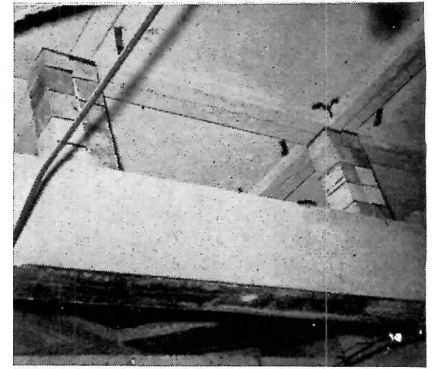
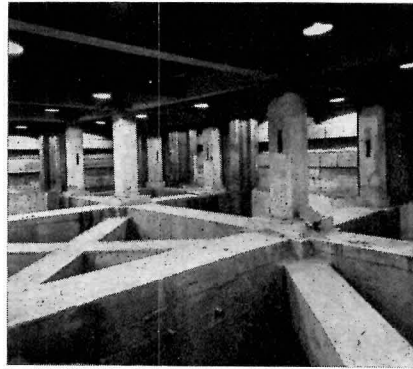
In order to go through with such an undertaking, it was necessary first of all to study carefully the ground surface subsidence caused by the continuous pumping of water from deep wells drilled within the city area. This factor has caused serious problems in foundations of buildings, and failure in many cases of improper design. To study the problems of foundation, structural and architectural design, La Latino Americana called in Dr. Leonardo Zeevaert as consulting engineer in soil mechanics and structures; Dr. M. N. Newmark as



Recent quakes were "proof of the pudding" for aseismic design of Mexico City's lone skyscraper, the 43-story Tower Latino Americana (above)

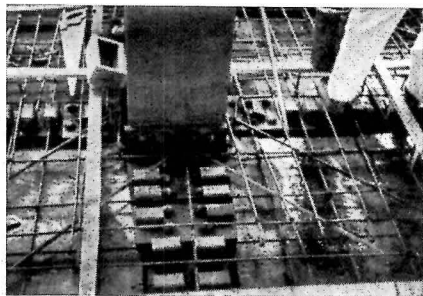


TOWER LATINO AMERICANA

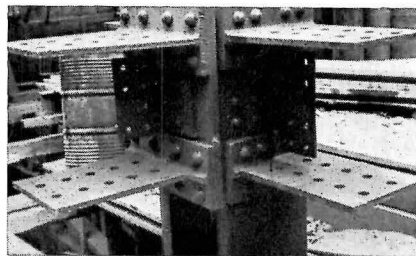


Superstructure for the Tower Latino Americana "floats" in a watertight concrete box supported on button-bottom piles. Steel framing starts in the second of three basement levels, is fixed to foundation structure below. Ground floor slab rests on concrete blocks supported by a steel structure 4 ft below present street level, can be lowered as sidewalk settles

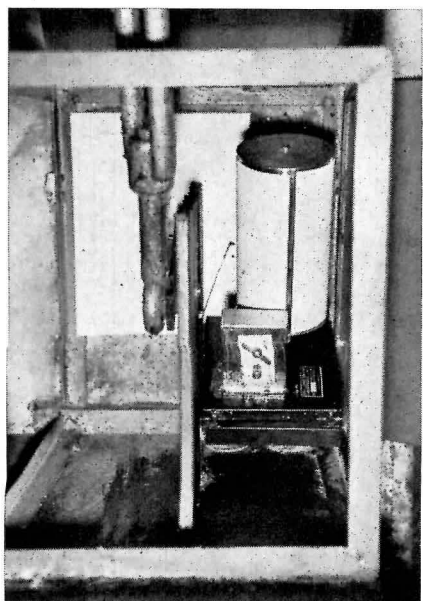
consulting engineer in the aseismic design; and Augusto H. Alvarez as consulting architect for the general architectural design. The principal problems to be solved were the selection of light materials for the construction of the 43-story Tower Latino Americana, the development of a foundation design to take care of the above mentioned problem of subsidence of the city — and, furthermore the problem of the vibration of the structure during earthquakes.



Floors are stiffened by steel shear connectors which assure composite action between girders and concrete slabs; cross bars welded to the columns resist diagonal tension. The steel frame is stiffened at the connections. Displacements between floors are measured by recorders (below) at the first, 25th and 39th floors



The building, which is located on an almost square site (109 ft on Madero Avenue and 123 ft on San Juan de Latran Avenue), has three basements, including the foundation structure, and covers the total site area of 13,500 sq. ft. Two of the basement levels are used for machinery, water supply pumps, boilers and air conditioners, while the first basement and lobby house commercial spaces. A bank occupies the second and third floors. Offices are located on thirty-three typical floors; five floors are given over to a night club and restaurant; and the 42nd, 43rd and roof floors are reserved for an observatory. In addition, a television tower was constructed, giving a total height of 597 ft from street level, and 254,000 sq ft of rental area.



A boring to a depth of 230 ft was made in order to obtain undisturbed samples of the subsoil to learn the mechanical properties. The report by Dr. Leonardo Zeevaert established the fact that a total weight of 25,000 metric tons could be safely applied at the site in question, using a special compensated point bearing pile foundation design.

The first step was to excavate the total area to a depth of 10 feet, removing all the old foundations encountered to depths of 15 ft. Three hundred and sixty one concrete piles of the button-bottom type were driven to a compact sand layer 117 feet below the street level. The piles were driven to a minimum of 10 blows per inch with a single acting hammer with a point bearing 17 inches in diameter. Three loading tests





TOWER LATINO AMERICANA

were made on different piles up to a load of 120 metric tons, giving an elastic deformation for 90 metric tons. The length of the piles did not vary more than one and a half foot from the longest to the shortest pile but from one pile to the next this difference was only on the order of one inch.

The computed working load in the worst condition — that is, without any water uplift pressure and during a heavy earthquake — will be 60 metric tons per pile. Under normal conditions the working load will be only 35 tons per pile. Because the water level is four feet below the sidewalk it was necessary to drive a wood sheet pile 52 ft long all around in order to protect the buildings nearby and to perform the excavation. The hydraulic system consisted of four wells inside the cofferdam formed by the wood sheet-pile. During the excavation, the water was drained with these wells and the same water was injected again into the soil around the working area by means of eight injection wells. This practice proved necessary to prevent upheaval in the excavation as well as settlement in the outside area of the cofferdam occupied by the buildings nearby.

After the hydraulic system was achieved, deep excavation and bracing of the wood sheet pile started. Some of the piles were used as supports for the long 112 ft bracing that covered the entire area of the excavation until a depth of 25 feet in the total area was obtained. From there on, the excavation was performed in trenches to place the concrete beams of the foundation. After the beams were poured, the panels between them were excavated and the foundation slab was poured to hold the water pressure and the pile reactions.

The foundation was designed as a grid of concrete beams supporting the columns. The total load of the building was made to correspond with the resultant of the pile distribution and with the center of gravity of the foundation area.

The water pressure on the foundation represents 54 per cent of the total

weight of the building. The volume of concrete used was 3570 cubic yards. The beams were as large as four feet wide by 12 feet deep and the reinforcement up to 110 steel bars of $1\frac{1}{2}$ inches diameter. To assure a perfect water uplift pressure, the concrete foundation was made water-tight.

The superstructure is designed as a steel frame to take the horizontal forces due to the wind pressure and earthquakes. The aseismic design showed the real stresses in the structure during an earthquake and the deflections possible between the different floors without any damage in the steel structure, slabs, walls or windows. The steel structure started in the second basement and was fixed to the foundation structure. Considering that the settlement of the building on piles would be definitely less than that of the sidewalk, the designers left the ground floor steel structure four feet below the street level. The precast concrete slab floor at this level is supported on concrete blocks in order to allow adjustment to follow the settlement of the sidewalk.

In this way it was assured that the commercial areas would always be at the same level as the sidewalk. The four foot clearance is expected to eliminate for the next thirty years the necessity of making steps into the building, as is usually required for other buildings on piles.

All the concrete slab floors are connected to the steel structure by steel shear connectors, to make them work as a unit during an earthquake and to obtain more rigidity in the building against large deformations. The slabs were provided with cross bars for diagonal tension to take care of the earthquake forces induced in them.

In order to prevent possible damage of the partition walls and glass windows because of relative displacement between floors during a severe earthquake they follow a special design. The displacements between floors are measured by six recorders installed in the building at the first, 25th and 39th floors.

PORTABLE PREFAB CLASSROOMS

SEVERAL SCHOOL DISTRICTS in Southern California are meeting the mushrooming demand for new school facilities with the help of a modular all-steel construction system that produces classrooms in record time — and at a saving of 10 per cent over conventional wood framing. Lightweight structural steel framing, steel roof decking and insulated wall panels are combined in basic structural units which, when bolted to a concrete slab, form permanent classroom buildings. However, because the classrooms are both light in weight and structurally separate, they can be easily relocated as the occasion arises.

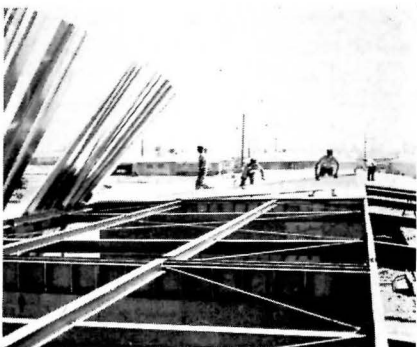
Although the standard classroom unit is 28 ft wide by 32 ft long, an 8-ft module allows flexibility in the arrangement of doors and windows, and classroom lengths may be varied by four or eight feet with only minor changes in the framing system. Thus design flexibility is maintained in spite of the standardization which makes possible the low construction cost.

Basis for the modular system is a double wall panel made up of insulated inner and outer layers which combine to form a three inch wall equal in insulating value to a 12-in. masonry wall. The exterior surface is a heavy gage galvanized sheet with stiffeners at 16-in. centers, while the interior surface is a lighter gage sheet with interlocking joints at 32-in. centers. The two are joined by screws at the stiffeners. Acoustical and thermal insulation is provided by a ½-in. thickness of gypsum board attached to the interior sheet and a 1-in. blanket of Fiberglas attached to the exterior sheet. After assembly, the insulating materials become the core of a sandwich panel, with the exposed metal sheets forming the interior and exterior wall surfaces.

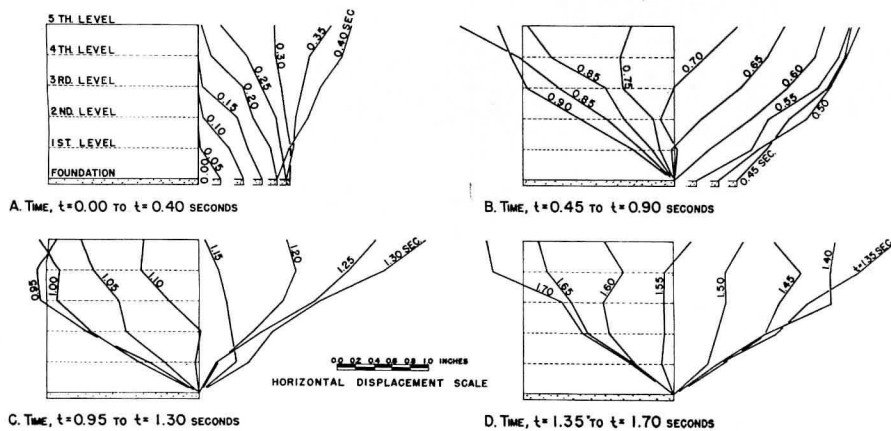
With this wall panel, only a light structural steel frame is required to carry the roof, which is a standing seam steel deck with interlocking ribs on 16-in. centers and a 12-ft clear span. The finished ceiling is of Fiberglas acoustical board suspended from the decking. Sound absorption and thermal insulation are provided for by an air space ventilated by wall louvers and roof ventilators, and by a coating of aluminum asbestos on the topside of the roof.

Framing members, roof decking and wall panel components are all shop prefabricated, and can be rapidly assembled on the site. To insure correct dimensioning of the concrete slab and footings, and proper location of the anchor bolts, the concrete contractor is provided with steel channel templates when construction begins. After the slab has been poured and properly cured, the structural columns, door frames, roof beams and purlins are bolted into place, and the roof decking and exterior surfaces of the wall panels attached to the frame. At this point construction is halted while electrical, heating and plumbing work is done. When the conduit and piping have been placed within the wall panels where required, the interior panels are attached to complete the structure. Conduit and plumbing connections are exposed on the exterior of the building and the base molding around each unit is removable to provide access to the anchor bolt and column base connections. *Steel Building Div., Calcor Corp., 1620 N. Spring St., Los Angeles 53, Calif.*

(More Products on page 280)



Prefabricated steel framing, roof decking and insulated panels are combined in modular all-steel classrooms that are low in cost, rapidly assembled (construction time: 90 days), and readily adapted to design modifications. Construction is permanent and durable; but because classrooms are built as separate, integral units, they can be easily lifted from their foundations and relocated as required



This figure, from a paper by Whitney, Anderson and Salvadori, shows how a building might move during an earthquake. The theoretical building is 60 ft wide and has a period of 0.83 sec. Earthquake pulse (half-sine) is 0.6 sec, causing 1-in. foundation displacement

It is dangerous to classify the earthquake resistance of buildings according to their structural type without further description of their construction. Structural steel and reinforced concrete buildings can be highly earthquake resistant, but buildings of these materials may also be totally inadequate.

In order to study earthquakes for the purpose of analyzing and designing structures, it is desirable to have accurate records which indicate the actual intensities and types of ground motions in a way that does not depend on the personal reactions and general observations of often untrained observers.

Instruments used for recording and studying earthquakes are of two types, sensitive seismographs whose purpose it is to record weak ground motions and strong-motion seismographs which are activated only in the event of destructive or near destructive ground motions. The former are used to study the internal structure of the earth from the velocity of the waves traveling through the interior and to determine the location of the foci of the distant shocks thus helping to delineate the areas of seismic disturbance.

On September 19, 1957 the United States Atomic Energy Commission set off an underground atomic explosion at the Nevada Test Site which was recorded hundreds of miles away for scientific seismological purposes.

An unfortunate aspect of earthquakes is that strong motion records cannot be made until strong shocks occur in the immediate vicinity of the instruments. However, the information presently available has been sufficient to give a strong impetus to the rational design of aseismic structures. Many methods of analysis which treat the dynamic problem of a structure subjected to accelerations and displacements at the base have

been developed both for mathematical and experimental solution.

Unfortunately these methods are comparatively complicated and much design is still done on a rule-of-thumb static force basis. It is a credit to the engineering profession that, with such a crude tool, it has been able to raise the earthquake resistance of the most critical areas of this country to a reasonable level. The recently adopted San Francisco Building Code has attempted to simplify and codify the dynamic method of design and represents a great step forward.

The static force method ignores the elastic properties of the building. It assumes the building to be a completely rigid structure in which the acceleration of every point conforms to the acceleration of the ground. The theoretical lateral loads for design are then equal to the various masses of the building times the maximum ground acceleration. In practice the lateral design loads have been established on the basis of experience without any fixed relationship to expected ground accelerations. It can be seen that such methods are useful for structures within the range of experience and are of doubtful validity for new types. It is fortunate that the above static method is most reasonable for low rigid buildings of which many have been built. When tall and perhaps flexible buildings are being planned, the design criteria must be re-evaluated in terms of safety and minimum cost consistent with that safety.

Dynamic analysis recognizes that buildings are elastic, not rigid, and that the ground motions are transients of various durations and directions. It indicates that the stresses and distortions in structures will vary as a function of the natural periods of the structure and the applied ground motions.

Since the obvious purpose of aseismic design is to minimize damage or prevent collapse, design criteria for aseismic structures should be based on such considerations. Theoretical stresses computed from elastic analyses based on equivalent static loads derived for average conditions are often not representative of earth shock forces and in many cases may either be excessive or inadequate.

The use of allowable stresses reduced in accordance with a so-called "factor of safety" is deceptive because there is no linear relationship between "load" and stress. In 1952 the writer proposed that dynamic analysis be combined with plastic-limit design and that the factor of safety, or rather the strength, of aseismic structures be expressed in terms of the maximum intensity quake which they can sustain without (1) collapse or (2) without exceeding some limiting permanent distortion.

In earthquake resistant structures where economy and accuracy of design are dependent on having the strength and behavior match the requirements determined from a dynamic analysis, conventional methods of computing structural resistance are generally unsatisfactory because plastic deformations of substantial magnitude occur before failure. The computed strength of an earthquake resistant structure should be based on the full development of the ultimate moment or limit capacity at all critical sections.

Even on firm material, a structure will have a tendency to slide and rotate on its base and may often develop temporary instability. (The condition of temporary instability is one which is not serious but often causes confusion in arriving at equivalent static lateral load provisions which consider only the magnitude and not the durations of the maximum horizontal shears which are developed in the various stories.) This reduced fixity of the base has important effects on the magnitude and distribution of the shears in the structure.

The main problem with respect to low buildings is the prediction of earthquake frequencies and magnitudes as well as the variations in ground motion due to local soil types and stiffness. The other problems of earthquake design which are being investigated and discussed currently are those relating to tall buildings or flexible structures.

In this area the progress has accelerated greatly in the last two decades and it appears that adequate methods of design are available.

USEFUL CURVES AND CURVED SURFACES: 25—Construction of Spheres

By SEYMOUR HOWARD, Assistant Professor, Pratt Institute, Architect associated with Huson Jackson and Harold Edelman

Since the sphere is curved in two directions and cannot be developed, many methods have been used to build domes of this shape. These may be grouped under the headings of radial domes and geodesic domes.

1. *Radial Domes.* This is the most commonly used method and is based on the image of latitude and longitude circles. Curved ribs are built along the longitude circles, radiating from the top, with or without transverse ribs on the latitude lines. The lune or gore spaces between the ribs are filled with thinner vaulting or paneling. If the lune (see Sheet 22) is thought of as the unit, this method is adaptable for prefabrication; domes have been built with a minimum of formwork by first erecting two diametrically opposite lunes, forming an arch against which the others can be constructed. The only difficulty is to join the many ribs which converge at the top; this is solved by introducing a compression ring. The ring may be closed or open.

If the radial dome is constructed as a triangulated network, with one side of each triangle lying on a latitude line, this system has the inconvenience of presenting ever diminishing triangles as the latitude circles become smaller toward the top. The lamella dome is built on this principle, with the latitude ribs replaced by a membrane or by simple tension rods.

Essentially similar is the method of building by zones (see Sheet 22), particularly adapted to small vaults. All the stones in one zone can be cut alike, but those in the next higher zone must be different. If the blocks follow along some kind of a helical line, as in an igloo, every block would have to be different to make an accurate sphere.

2. *Geodesic Domes.* The so-called spherical geodesic dome consists of a network of framing members which make a more or less uniform pattern over the whole surface, particularly the truncated icosahedron and the snub dodecahedron. (See drawings of polyhedra, Sheet 26.) It could be built with curved members which would lie along geodesic curves and thus be a portion of a true sphere, but is usually built as a polyhedron with straight members which form the chords of geodesic arcs. The perimeter of the dome at the bottom usually presents an irregular, ragged line.

If one attempts to cover a sphere with such a network, certain basic principles must be observed. Since the triangle is the simplest polygon and also the only one which is rigid in itself, the network will usually consist of triangles. These form larger configurations, depending on how many triangles meet at a point or vertex.

If six equilateral triangles meet on a plane surface, they form a regular hexagon. This is impossible on a sphere because the sum of the angles must be less than 360° around the vertex. On the sphere, therefore, all the members cannot be of the same length and the hexagons formed cannot be regular. Even if the pattern is made up of irregular hexagons, no matter how distorted, it is impossible to cover a complete sphere with them. A minimum of 12 pentagons must be introduced in order to satisfy Euler's formula.

Euler's formula states that, in any convex polyhedron, the number of faces (F), the number of vertices (V) and the number of edges (E) are related:

$$F + V - 2 = E$$

This formula can be used to check a dome which is not a complete sphere by considering the open bottom as a single face or non-plane polygon, the number of whose sides equals the number of members along the perimeter of the framework of the dome.

The basic possibilities and limitations of this type of framework are given by studying all the regular and semi-regular polyhedra and their duals, remembering that polygonal faces can be subdivided. Their number is quite limited.

There are only five regular polyhedra, all of whose edges are the same length and all of whose faces are regular, identical polygons. Called the Platonic polyhedra, they can have a sphere inscribed within them touching each face in its center, or have a sphere circumscribed about them, passing through each vertex. These points of tangency or vertices are the only regular systems of points which are equidistant from each other on the surface of a sphere.

There are the 13 semi-regular polyhedra, called Archimedean. All edges are the same length and every face is a regular polygon, but all the faces are not identical. The

vertices are all congruent (identical) but not regular (the angles between pairs of edges are not all the same). These polyhedra can have a sphere circumscribed about them, passing through each vertex. Prisms and anti-prisms (see sheet 17 for drawings) also meet these conditions if the top and bottom polygons are regular and if the sides are squares in the case of the prisms and equilateral triangles in the case of the anti-prisms.

There are also the 13 duals of the Archimedean polyhedra. A polyhedron P_2 is the dual of polyhedron P_1 if the faces of P_2 correspond to the vertices of P_1 . Thus, the octahedron is the dual of the cube, the icosahedron is the dual of the dodecahedron. The number of vertices and the number of faces are interchanged; the number of edges remains constant. The vertices of the Archimedean duals do not fall on a sphere, but a sphere tangent to every face at its center can be inscribed within each dual. Every face is identical but is not a regular polygon. Every vertex is regular but all vertices are not identical. (The duals of the prisms are called dipyrramids, made of two pyramids placed base to base. The faces are all isosceles triangles. The duals of the antiprisms are called trapezohedra. The faces are kites, or quadrilaterals with adjacent pairs of sides of equal length.)

In order to keep strut lengths as short as possible and avoid buckling, and in order to provide complete triangulation for rigidity, the polygons forming the polyhedra can be subdivided into triangles, and all triangles can be further subdivided. If the members thus added are the same length as the others, the added vertex will not be on the sphere; if the added vertex is held on the sphere, the added members will have to be of a different length. Continuous membranes, plane or warped, may also be used to provide rigidity.

See Sheets 26 and 27 following for diagrams and schedules of the polyhedra. The index number lists the number of faces of the polygons meeting at a vertex (see sheet 18 for similar index numbering system). For the Archimedean duals the index number of the corresponding semi-regular polygon is used with the prefix V

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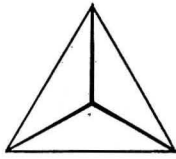


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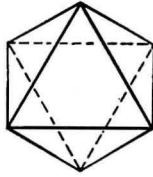
USEFUL CURVES AND CURVED SURFACES: 26—Polyhedra

By SEYMOUR HOWARD, Assistant Professor, Pratt Institute, Architect associated with Huson Jackson and Harold Edelman

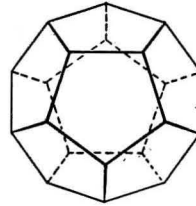
Drawings of the Polyhedra, shown in plan, with name of each, and the number of faces, vertices and edges of each.



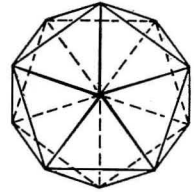
Tetrahedron
F V E
4 4 6



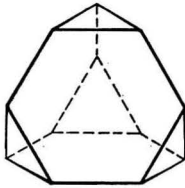
Octahedron
F V E
8 6 12



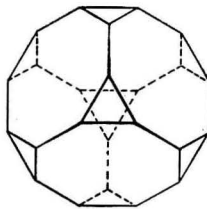
Dodecahedron
F V E
12 20 30



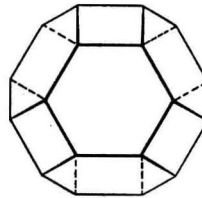
Icosahedron
F V E
20 12 30



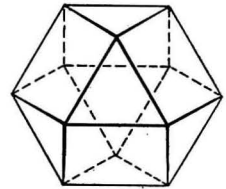
Truncated Tetrahedron
F₃ F₄ V E
4 4 12 18



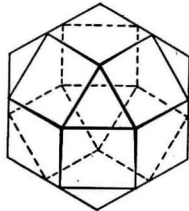
Truncated Cube
F₃ F₈ V E
8 6 24 36



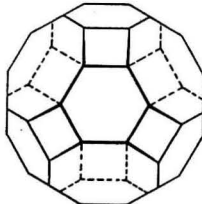
Truncated Octahedron
F₄ F₆ V E
6 8 24 36



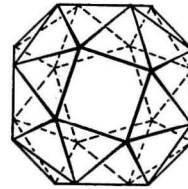
Cuboctahedron
F₃ F₄ V E
8 6 12 24



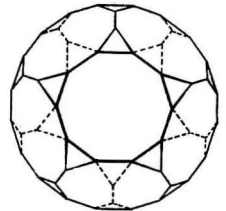
Rhombicuboctahedron
F₃ F₄ V E
8 18 24 48



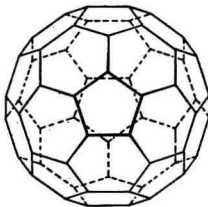
Truncated Cuboctahedron
F₄ F₆ F₈ V E
12 8 6 48 72



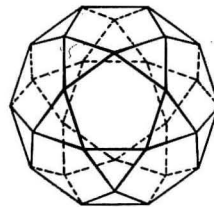
Snub Cube
F₃ F₄ V E
32 6 24 60



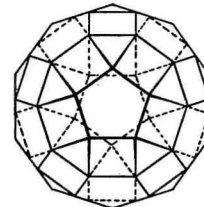
Truncated Dodecahedron
F₃ F₁₀ V E
20 12 60 90



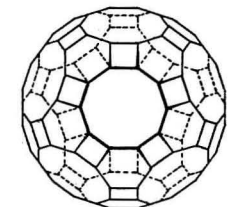
Truncated Icosahedron
F₅ F₆ V E
12 20 60 90



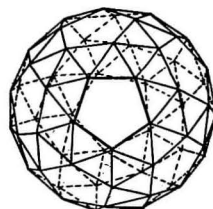
Icosidodecahedron
F₃ F₅ V E
20 12 30 60



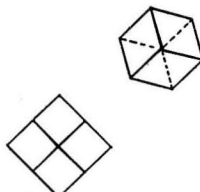
Rhombicosidodecahedron
F₃ F₄ F₅ V E
20 30 12 60 120



Truncated Icosidodecahedron
F₄ F₆ F₁₀ V E
30 20 12 120 180

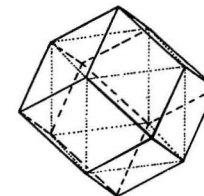


Snub Dodecahedron
F₃ F₅ V E
8C 12 60 150

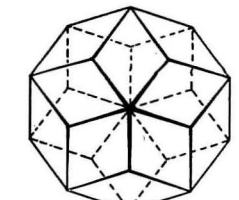


Plans

Rhombic Dodecahedron
F V E
12 14 24



Projection



Rhombic Triacontahedron
F V E
30 32 60

Notes:
1. Only two of the Archimedean duals are shown. The rhombic dodecahedron is drawn in an oblique or axonometric projection, as well as in two plan views. Note it is a cube (shown in fine dotted line) with a square pyramid added to each face. The

others can be drawn from the corresponding Archimedean polyhedron: (a) Draw plan with vertex in center; (b) Draw on plan the perpendicular bisector of each edge which meets at vertex; (c) Extend all bisectors until they intersect; they form irregular

polygonal face of the dual.
2. For making models, polygons can be drawn on a flat sheet, with some edges of each polygon in common with adjacent polygons, making a continuous strip called a net.



Library of Junior High School, Chico, California, has structural framing of glulam timber arches. Architect: Lawrence G. Thompson, Chico; general contractor: Ellis Barker, Salt Lake City, Utah.

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USEFUL CURVES AND CURVED SURFACES: 27 — Polyhedra

By SEYMOUR HOWARD, Assistant Professor, Pratt Institute, Architect associated with Huson Jackson and Harold Edelman

INDEX NO.	DUALS OF SEMI-REGULAR POLYHEDRA	E/r	DIHEDRAL ANGLE	FACE ANGLES	R/r
V.3.6 ²	Triakis Tetrahedron	3.127 1.876	129° 32'	112° 53' 33° 33½'	1.2222
V.3.8 ²	Triakis Octahedron	2.083 1.219	147° 21'	117° 14' 31° 23'	1.0858
V.4.6 ²	Tetrakis Hexahedron	1.491	143° 8'	83° 37' 48° 11½'	1.1111
V.(3.4) ²	Rhombic Dodecahedron (Octahedric Granatohedron)	1.118 1.225	120°	109° 28' 70° 32'	1.3333
V.3.4 ³	Trapezoidal Icositetrahedron	0.887 0.686	138° 7'	115° 16' 81° 34½'	1.1464
V.4.6.8	Hexakis Octahedron	1.070 0.878 0.656	155° 5'	87° 12' 55° 1½' 37° 46½'	1.0488
V.34.4	Pentagonal Icositetrahedron (Two Enantiomorphs)	0.727 0.513	136° 20'	114° 48½' 80° 46'	1.1602
V.3.10 ²	Triakis Icosahedron	1.254 0.728	160° 36'	119° 3' 30° 28½'	1.0302
V.5.6 ²	Pentakis Dodecahedron	0.780 0.692	156° 43'	68° 36' 55° 42'	1.0425
V.(3.5) ²	Rhombic Triacantahedron (Icosahedric Granatohedron)	0.727	144°	116° 34' 63° 26'	1.1056
V.3.4.5.4	Trapezoidal Hexecontahedron	0.584 0.379	154° 8'	118° 16' 86° 59' 67° 46'	1.0530
V.4.6.10	Hexakis Icosahedron	0.689 0.586 0.373	164° 54'	89° 0' 58° 14' 32° 46'	1.0174
V.3+5	Pentagonal Hexecontahedron (Two Enantiomorphs)	0.500 0.286	153° 10'	118° 8' 67° 28'	1.0574

NOTES:

e = length of edge of regular and semi-regular polyhedron. θ = angle subtended by edge at center (for regular and semi-regular polyhedra). **R** = Radius of circumscribed sphere (regular + semi-regular polyhedra). **r** = radius of inscribed sphere (regular polyhedra and duals of semi-regular polyhedra). **E** = length of edges of duals of semi-regular polyhedra. **R/r**: This ratio, when given for the Archimedean duals, is the ratio of the radius of the circumscribed sphere of the corresponding Archimedean polyhedron to the radius of the sphere inscribed within the dual. Enantiomorph means form of opposite hand (in drawing, change broken lines to solid and solid lines to broken). There are only five possible ways of filling up three dimensional spaces with only one type of regular or Archimedean polyhedra and their duals = cubes; triangular prisms; hexagonal prisma; truncated octahedra; rhombic dodecahedra. There are three additional ways, using more than one type = tetrahedra + octahedra; tetrahedra + truncated tetrahedra; octahedra + cuboctahedra.

INDEX NO.	REGULAR POLYHEDRON	e/r	DIHEDRAL ANGLE	θ	R/r
3 ³	Tetrahedron	1.633	70° 32'	109° 28'	3.00
4 ³	Cube	1.155	90°	70° 32'	1.732
3 ⁴	Octahedron	1.414	109° 28'	90°	1.732
5 ³	Dodecahedron	0.714	116° 34'	41° 49'	1.258
3 ⁵	Icosahedron	1.051	138° 11'	63° 26'	1.258
INDEX NO.	SEMI-REGULAR POLYHEDRON	e/r	DIHEDRAL ANGLES		θ
			Faces	Angles	
3.6 ²	Truncated Tetrahedron	0.853	6-6 6-3	70° 32' 109° 28'	50° 28'
3.8 ²	Truncated Cube	0.562	8-8 8-3	90° 125° 16'	32° 39'
4.6 ²	Truncated Octahedron (Tetrakaidecahedron)	0.6325	6-4 6-6	125° 16' 109° 28'	36° 52'
(3.4) ²	Cuboctahedron	1.00		125° 16'	60°
3.4 ³	Rhombicuboctahedron	0.715	4-4 3-4	135° 144° 44'	41° 53'
4.6.8	Truncated Cuboctahedron	0.431	8-4 8-6 6-4	135° 125° 16' 144° 44'	24° 55'
34.4	Snub Cube (Two Enantiomorphs)	0.744	4-3 3-3	142° 59' 153° 14'	43° 40'
3.10 ²	Truncated Dodecahedron	0.337	10-10 10-3	116° 34' 142° 37'	19° 24'
5.6 ²	Truncated Icosahedron	0.4035	6-6 6-5	138° 11' 142° 37'	23° 17'
(3.5) ²	Icosidodecahedron (Triacantagon)	0.618		142° 37'	36°
3.4.5.4	Rhombicosidodecahedron	0.448	5-4 3-4	148° 17' 159° 6'	25° 52'
4.6.10	Truncated Icosidodecahedron	0.263	10-4 10-6 6-4	148° 17' 142° 37' 159° 6'	15° 6'
34.5	Snub Dodecahedron (Two Enantiomorphs)	0.464	5-3 3-3	152° 56' 164° 10'	26° 50'

References: Cundy and Rollett "Mathematical Models" Matila C. Ghyka "Esthetique des Proportions", Gallimard, 1927

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Throughout with**



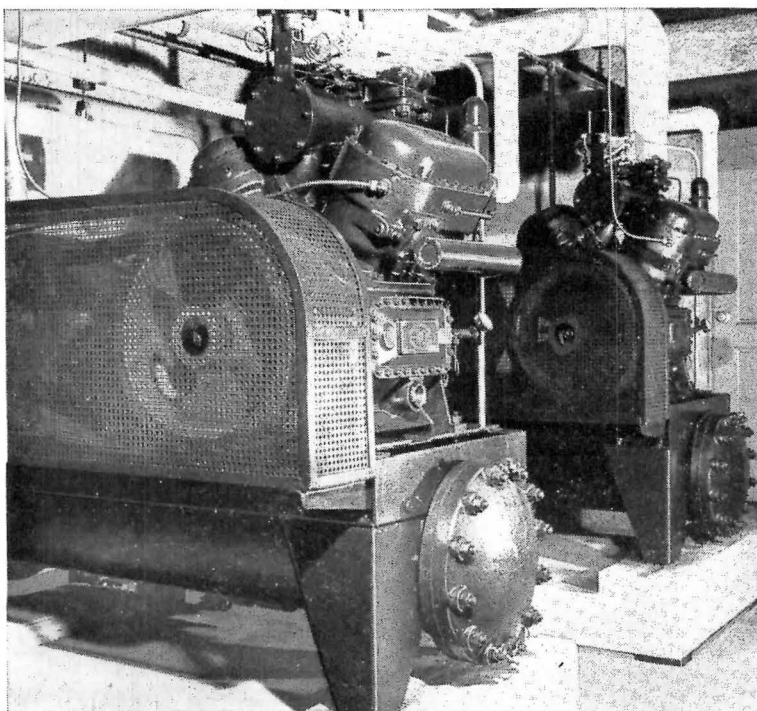
Refrigeration



4200 Marine Drive Apartments, Chicago, Ill. Architect: Lewis Simon. Mech. Eng.: Arthur Wallace. Installing Contractors: Midwest Eng. & Equipment Co., Economy Plumbing & Heating Co.

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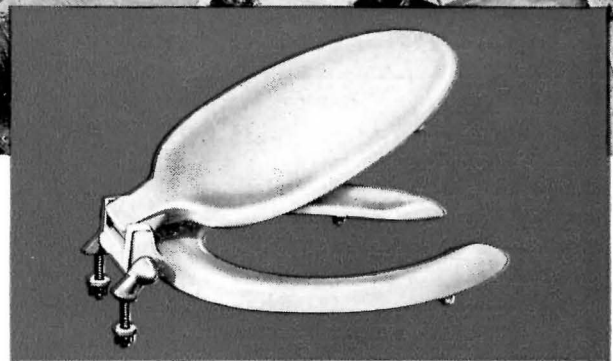
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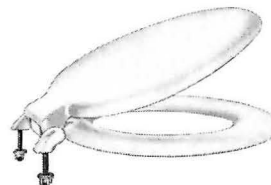
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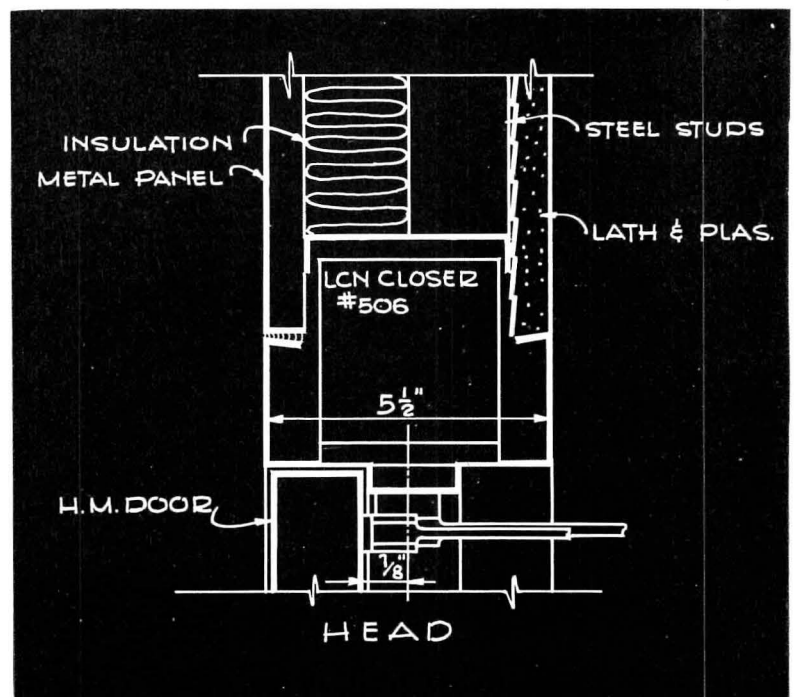
The kite-shaped canopy soaring over a tiny triangular tourist information center east of Grand Junction, Colorado, marks the first use of canvas in hyperbolic paraboloid form in this country.

In designing the structure, architects Day and Thorson of Grand Junction were posed the twin problems of providing a roadside center that would encourage tourist to stop — and stay — and of keeping within a minimum budget. The canvas hyperbolic paraboloid offered a solution to both. Striking enough to be conspicuous even in the midst of the scenic grandeur surrounding its site, the center was built at a cost of less than \$2000.

The triangular building sheltered by the canvas awning is constructed of redwood, blue-painted hardboard and copper screen, with the sides, floor and roof built as separate panels which can easily be dismantled for winter storage. The back panel includes the entrance door and a gold pegboard interior wall for brochure display; the two front panels are equipped with a shelf and sliding information doors. The apex of the triangle points toward a drive-through sheltered by the stretched canvas skin. Shaped in a hyperbolic paraboloid by tension applied at the four corners, the canopy is 44 ft wide at the quarter point (its widest span) and 48 ft long. The tail of the kite, which points toward the highway, is supported on a canted four inch pipe 20 ft high. The other end of the awning is connected to a 14 ft pipe centered behind the information building, and the two sides are fastened at the ground. (Side connections are not in full tension in photo shown above right). The canvas is attached directly to the high front pole by a grommet; the other three corners are attached by a $\frac{3}{4}$ in. rope with a ratchet winch to adjust tension. Guy wires supplement removable sleeved poles set in concrete.

Fabricated of 15 ounce natural finish water proof canvas running perpendicular to the main axis, the skin is reinforced with double french seams along the joints, and $\frac{1}{8}$ in. rope sewn in along the main axis and the four edge seams. Corners are specially reinforced to hold the "D" rings. Like the main building, the canvas is easily demountable for storage.

The triangular sign, of 10 ounce double canvas, prepainted red, is edge reinforced and attached by grommets. Guy wires support movable signs below.



CONSTRUCTION DETAILS

for LCN Overhead Concealed Door Closer Installation
Shown on Opposite Page

The LCN Series 500 Closer's Main Points:

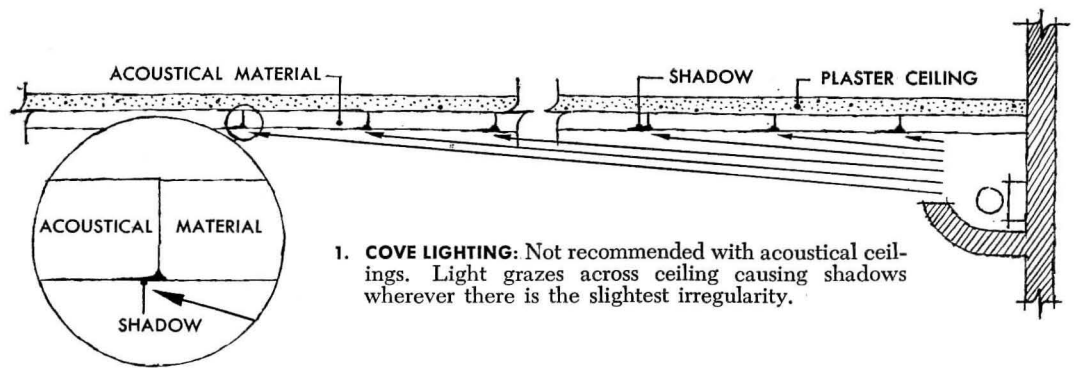
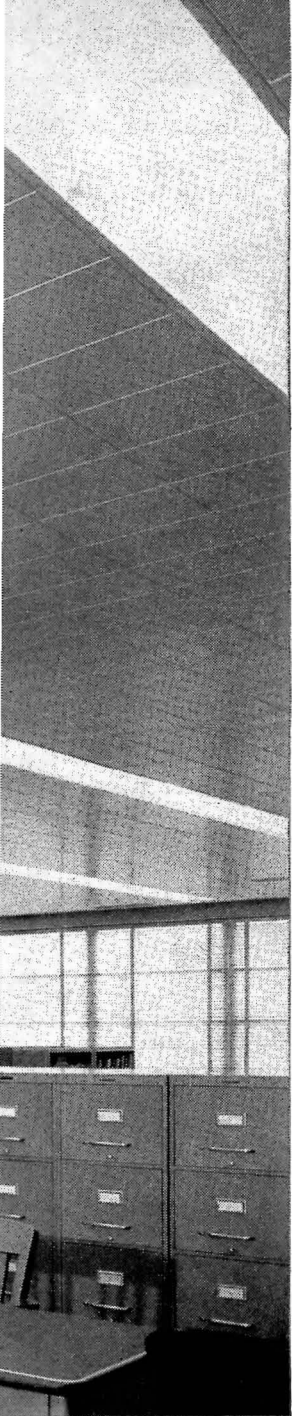
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5. Arm may be hold-open type, 90°—140° or 140°—180°

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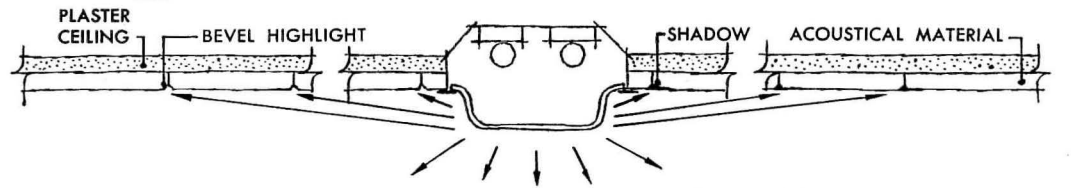
LCN CLOSERS, INC., PRINCETON, ILLINOIS

Canada: Lift Lock Hardware Industries, Ltd., Peterborough, Ontario

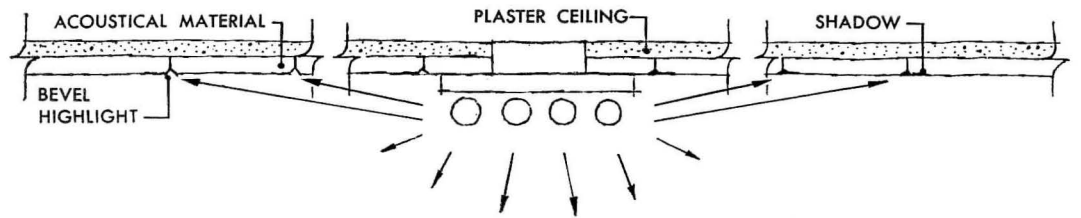
(More Roundup on page 268)



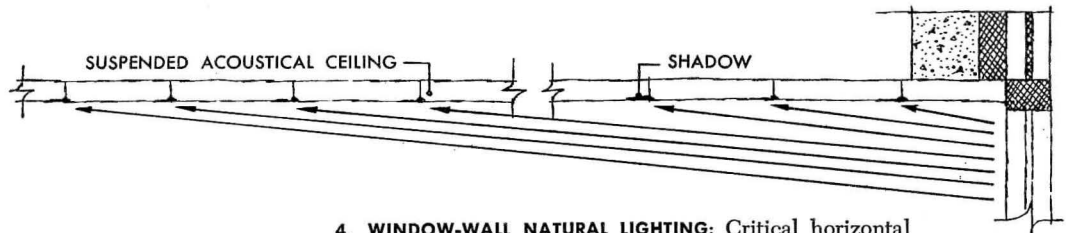
1. **COVE LIGHTING:** Not recommended with acoustical ceilings. Light grazes across ceiling causing shadows wherever there is the slightest irregularity.



2. **SEMI-RECESSED LIGHTING:** Creates the same effect as cove lighting unless fixture is shielded to prevent side light from grazing across ceiling. It may also emphasize bevel highlights, even on a level ceiling.



3. **SURFACE MOUNTED LIGHTING:** Creates much the same effect as cove lighting, unless the fixture is shielded to prevent low-angle glaring light from striking the ceiling.



4. **WINDOW-WALL NATURAL LIGHTING:** Critical horizontal light accentuates ceiling irregularities. A valance, draperies, or venetian blinds minimize grazing light.

an acoustical ceiling

the shadow problems of side lighting and complements the appearance of an acoustical ceiling.

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TECHNICAL ROUNDUP

TESTS PROVE STABILITY OF SINGLE SPAN CABLE-ARCH

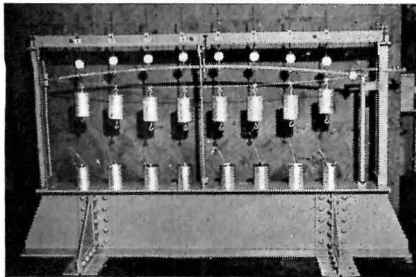
A new approach to the design of wide span, column-free structures has been proved feasible by recent stability tests on a structural model of a special type of long span roof supporting member. The model represents a single span structure consisting of an upwardly curving arch member whose springing points are connected by a downwardly curving cable member with a sag equal to the rise of the arch. The two are joined directly at their extreme ends, and by struts of various lengths at several intermediate points. There are no diagonal bracing members.

The basic idea for the mating of the arch and suspension system has been

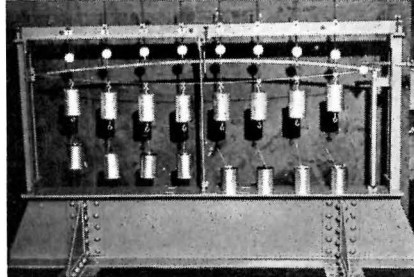
championed in recent years by Italian architect-engineer, Paul Chelazzi, who believes that it might be both feasible and economical for such structures as hangars, arenas, auditoriums, stadiums, terminals, gymnasiums, warehouses, industrial plants and theaters, where wide free spans are necessary or desirable. Although the Suspenarch, as Chelazzi calls the structure was previously known to be stable with equal loads on arch and cable, there was some question as to its stability under unbalanced loading conditions. And, since there are few structures in which loads are always equal, uniform and unchanging, there was a need for developing reliable data on the behavior of the Suspenarch under unsymmetrical live loads.

For this reason, stability tests of the new structural member were undertaken

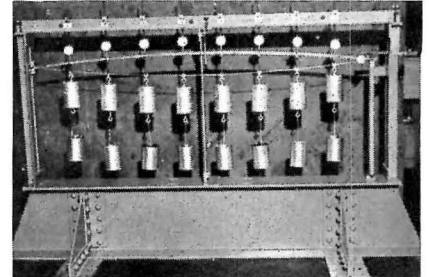
at the laboratory of John A. Roebling's Sons Corporation, under the direction of Blair Birdsall, chief engineer of the firm's Bridge Division. Taking as prototype a hypothetical Suspenarch with a clear span of 127 ft, a structural model was built at a scale of one inch to twenty feet. A series of tests was then conducted to determine the deflection and bending moment of the members under dead load, unbalanced live load and full live load. According to Mr. Birdsall, the results seemed to verify the stability of the member under all conditions of loading. Although no attempt was made to determine whether the particular section selected would be adequate to support the load at allowable unit stresses, the tests seemed to show that it would be satisfactory with some slight changes in the section of the arch.



Dead Load in Place: No Live Load

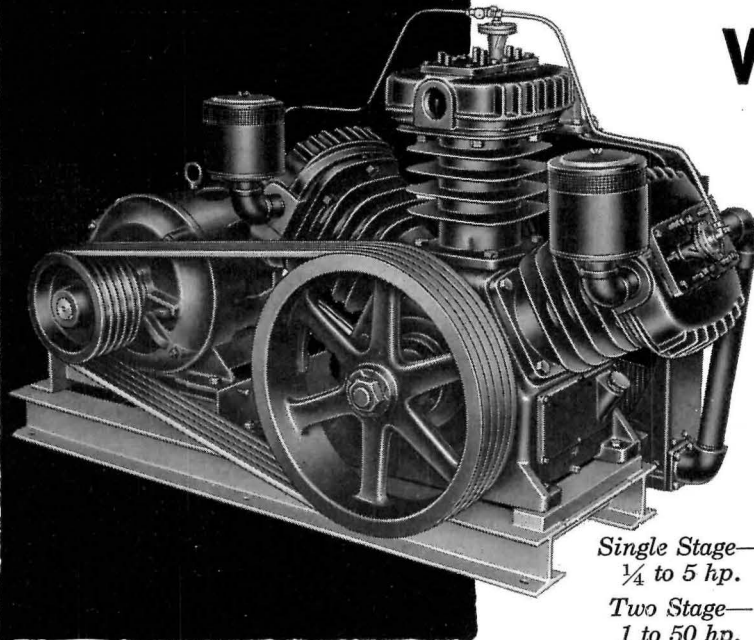


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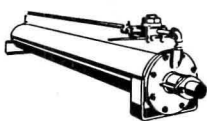
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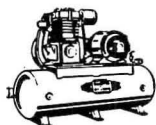
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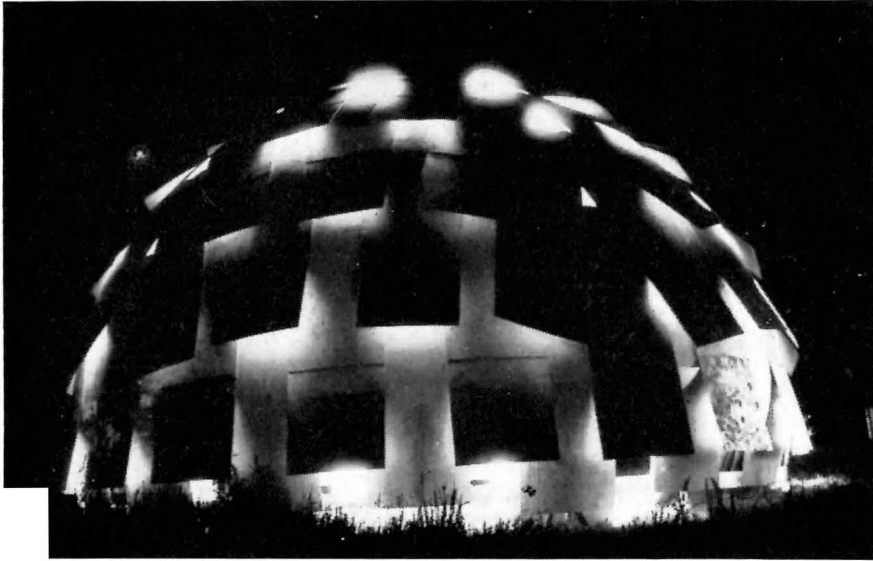
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FULLER, STUDENTS, BUILD GEODESIC "PINE CONE"



During a recent stint as visiting critic in Cornell University's College of Architecture, Buckminster Fuller enlisted student manpower to build a prototype of the plywood geodesic structure which he proposes as centering for a cheaper kind of reinforced concrete dome. Wrapped with aluminum foil, polyethylene films and reinforcing mesh, the wooden dome could be used to form a

concrete shell one inch thick — or less — and left in place afterwards to serve as a lining for the finished vault. Forming of this type would thus have the dual advantages of low cost (about one-third that of conventional scaffolding and framing) and permanence.

The dome constructed by Cornell's architects-to-be was built of standard 4 by 8 plywood sheets at a cost of 1500

dollars and 750 man-hours. Similar to the conventional geodesic dome in most respects, it differs in one: additional boards are overlapped longitudinally on the boards which form the basic geodesic structure. These "tails" were added to strengthen what was feared to be a potentially weak point in the structure, and to eliminate weatherproofing by serving as shingles over the joints. They also give the dome a spiny appearance that has resulted in its being dubbed Project Pine Cone.

Just shy of 40 ft across and approximately five-eighths of a diameter (25 ft) high, the structure is fabricated of over two hundred sheets of 1/4 in. exterior grade fir plywood fastened by 1 1/4 by 1/4 in. bolts. It was assembled piece by piece at the site, starting with the top section which was then raised to allow attachment of the next lower boards. This process was continued until all the sections were in place. The lowest boards were then bolted to a plywood collar which had been previously constructed to serve as a mounting for the dome. Holes for the bolts were shop bored, and the boards were prefinished with an aluminum paint before their removal to the site.

(More Roundup on page 272)

IMPORTANT REASONS WHY

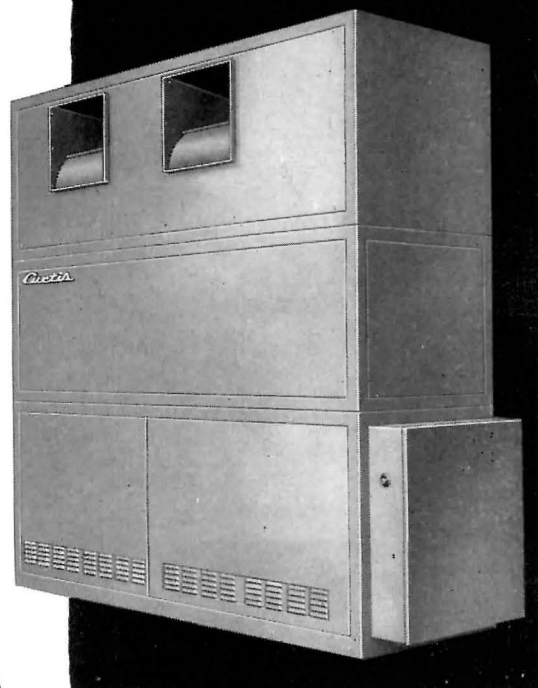
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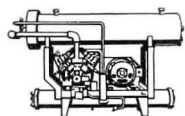


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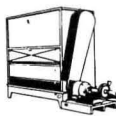
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The objectives were: maximum flexibility and economy of operation . . . modern good looks with no loss in functionalism . . . in a suburban environment.

The result: indoor-outdoor living for business that may well be a classic for its time. And inherent in the achievement of functional beauty was the prominent use of Alcoa® Aluminum in natural color for covering exterior columns and spandrel beams . . . for

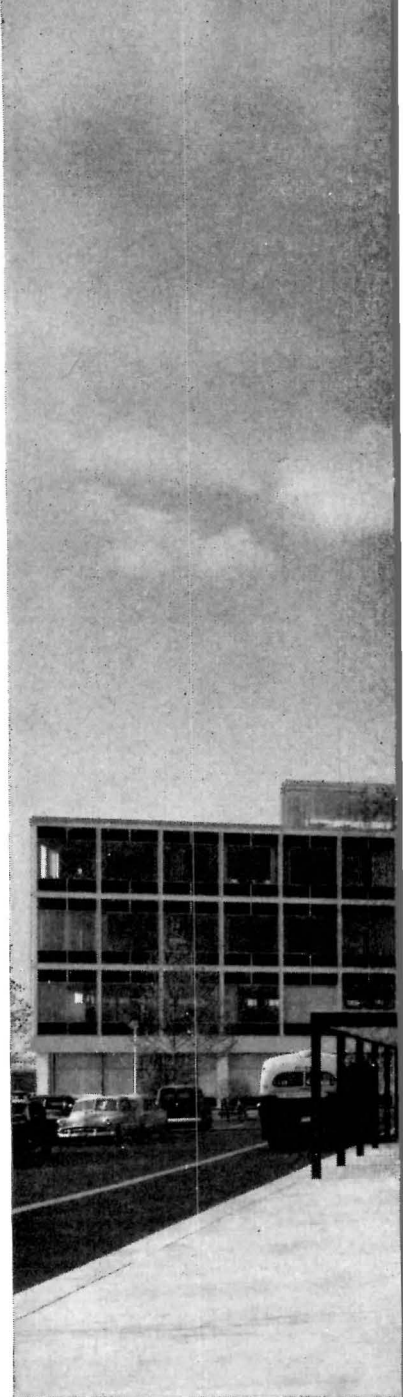
Sweeping curvature of the main entranceway relieves the long, low lines of the building, adds a graceful note to the structure. See how bold use of aluminum accents the facade design.

fascias, handrails, structural window framing and many other applications. Another example of the many ways you can use Alcoa Aluminum in architecture.

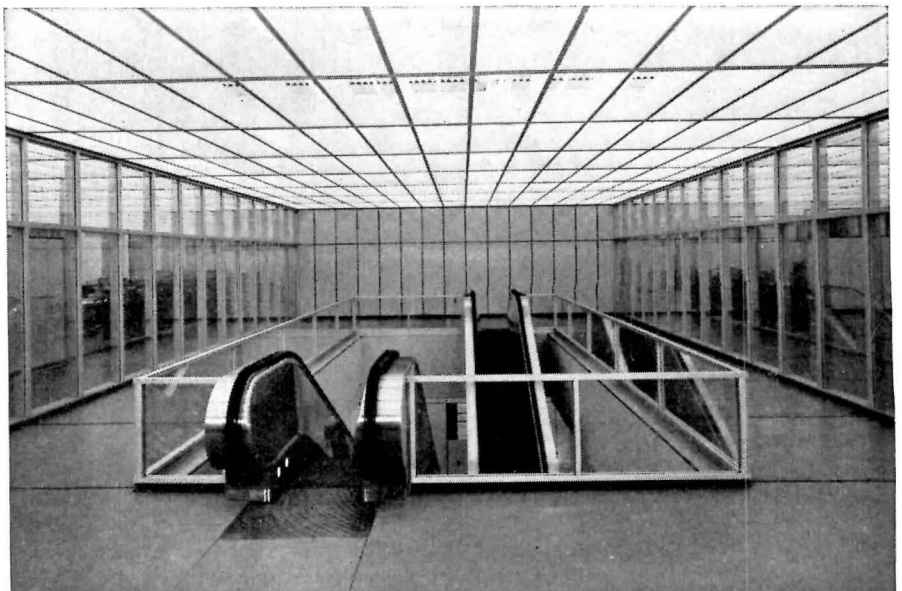
As the pioneer and pace-setter of architectural uses of aluminum, Alcoa has much to offer you. Complete technical data for many uses and forms are available at your nearest Alcoa sales office. Or write: Aluminum Company of America, 1888-K Alcoa Building, Pittsburgh 19, Pennsylvania.



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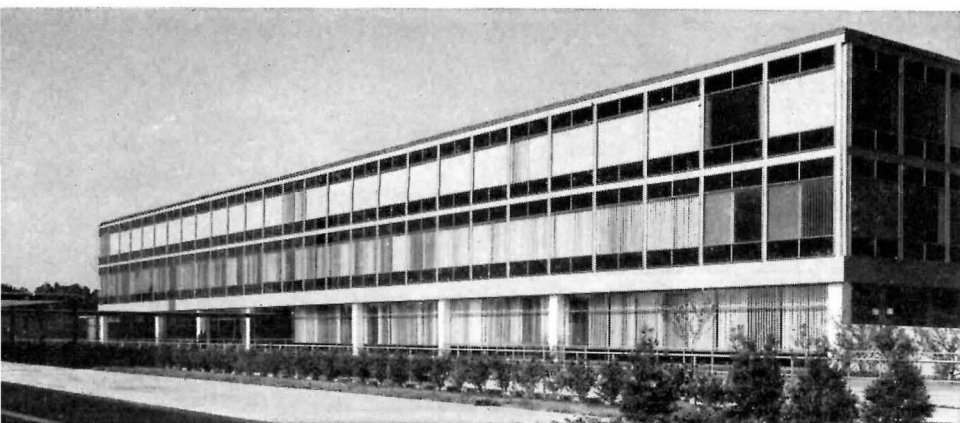


Indoor-outdoor openness is carried through-out interior as shown here. Handrails are Alcoa Aluminum.





Masterful blending of functionalism and beauty won Connecticut General's new home office a place on the American Institute of Architects' list of "Ten Buildings in America's Future."



*Building: Headquarters Office
Connecticut General Life Insurance Co.
Hartford 15, Connecticut*

*Architect: Skidmore, Owings & Merrill,
New York*

*General Contractor: Turner Construction Co.,
New York*

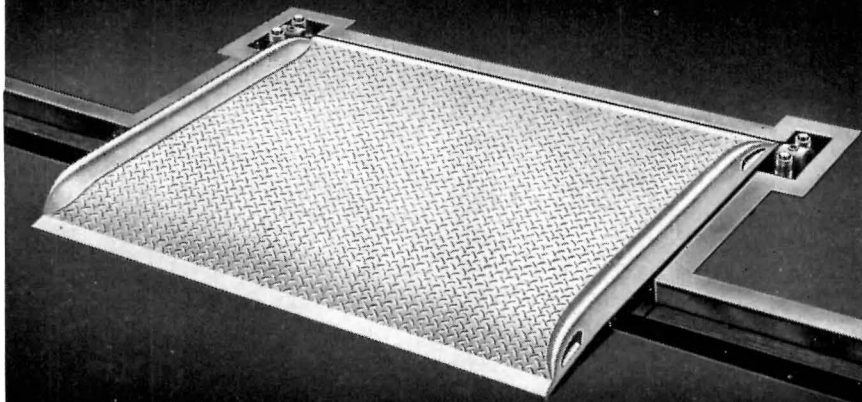
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Indoor-outdoor business living is achieved through lavish expanses of glass framed in aluminum that draw the beautiful natural setting into the office.



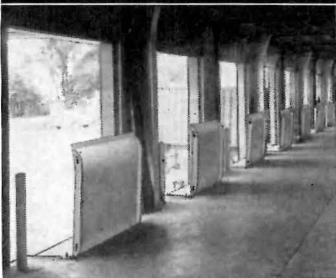
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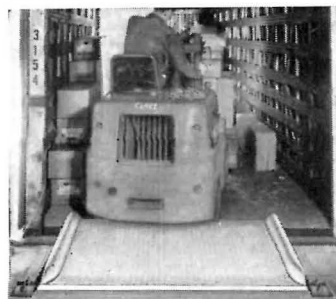
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TECHNICAL ROUNDUP

MINIATURE LIGHT CELL FOR DAYLIGHT RESEARCH



A miniature light cell developed by Bob H. Reed and Matthew A. Nowak (photo above) for use in lighting research at the Texas Engineering Experiment Station makes it possible to conduct illumination studies on smaller models than have heretofore been considered practical. The body of the cell, into which a filter and cosine corrector have been incorporated along with a sensing element only $\frac{1}{4}$ in. in diameter, can be attached to various size bases so that the 30 in. desk height of the cell can be maintained for different scales of models. Since most model studies are conducted under the stations artificial sky, cell response is quite low; and readings are taken with a driver amplifier and recorder coupled to a low level preamplifier with zero suppression.

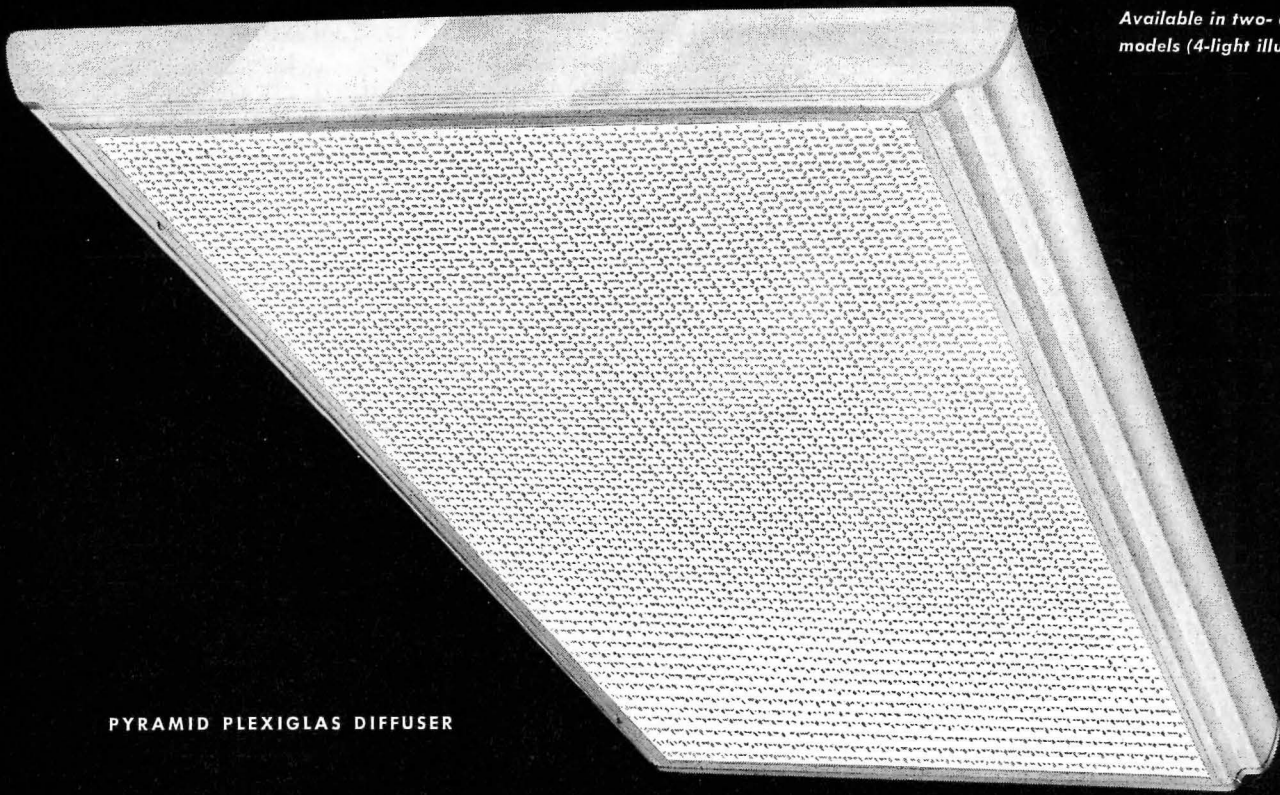
To cover both dynamic and steady state conditions, a two channel system is used. For the dynamic conditions, one cell is used to measure illumination from a quarter sphere of unobstructed sky; while a second cell measures the illumination level at various points within the building; and both readings are recorded simultaneously. The daylight factor is then obtained by dividing the inside illumination value by the outside illumination at various points.

For steady state conditions, a single cell is placed in a baffle which cuts off the ground light and allows the cell to receive light from a quarter sphere of sky. This reading is set up on the recorder as a full scale deflection by use of a variable shunt, and expressed as 100 per cent or as 1. The cell is then removed from the baffle and placed at various points within the model, and internal readings are recorded as percent available light or as utilization factors.

Although readings taken by the two methods are said to show excellent agreement under similar conditions, the single-cell technique reduces calibration time and facilitates recording.

(More Roundup on page 276)

Available in two- and four-light
models (4-light illustrated).



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the new Gibson Ceilo-35^{*}

A fixture of incomparable beauty,
designed expressly for low-ceiling application.

Measures only 2 $\frac{3}{4}$ " in depth and
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You really ought to know more about it—so why not drop
us a line now for complete information on the Ceilo-35?

^{*} Patent Applied For

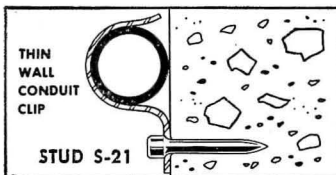
1915 Piedmont Circle, N.E., Atlanta 9, Georgia

Just one of **101** Stud Driver uses!



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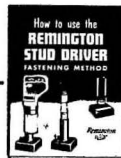
Anchor conduit clips to concrete or steel in seconds with the Remington Stud Driver



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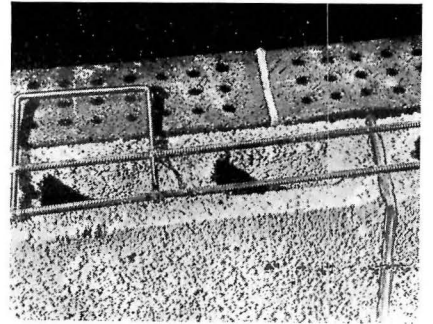
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**STUD
DRIVER**

TECHNICAL ROUNDUP

TESTS SHOW MASONRY WALL TIES CAN ELIMINATE HEADERS



Preliminary results of studies on the possibility of eliminating the header course in two wythe masonry wall construction indicate that the use of properly designed masonry wall ties not only makes a header unnecessary, but also increases the lateral strength of the wall.

The investigation, conducted by Armour Research Foundation at Illinois Institute of Technology, was carried out using transverse and compressive tests on small-scale masonry walls 48 in. high, 32 in. wide and 8 in. thick. The first test series consisted of two sets of brick and block walls, one with header courses and the other with wall ties; the second series consisted of reinforced and unreinforced 8 in. concrete block walls. The ties used were those marketed by the AA Wire Products Company under the trade name *Econo-Lok*. Designed to control the difference in expansion and contraction of the concrete block backup and brick facing used in the most common type of two wythe wall, this combination reinforcement and tie provides two parallel reinforcing wires which rest on the face shell webbing of the concrete block backup. The facing is tied to the backing by 4 in. rectangular ties flush welded to the parallel wires at 16 in. intervals.

From the test results, the following conclusions were drawn:

1) Replacement of header courses by wire reinforcement does not reduce the transverse strength of a wall, but may increase it. (Average modulus of rupture was 77 psi for wire reinforced walls, 31 psi for header tied walls.)

2) Replacement of header courses by wire reinforcement does not reduce the compressive strength of a wall.

3) Wire reinforcement of correct design can satisfactorily replace header courses.

4) Wire reinforcement improves neither the transverse nor compressive strength of 8 in. block walls.



Christian High School Memorial Gymnasium, Grand Rapids, Michigan
Architect: James K. Haveman, Grand Rapids, Michigan
General Contractor: William DeVries, Grand Rapids, Michigan

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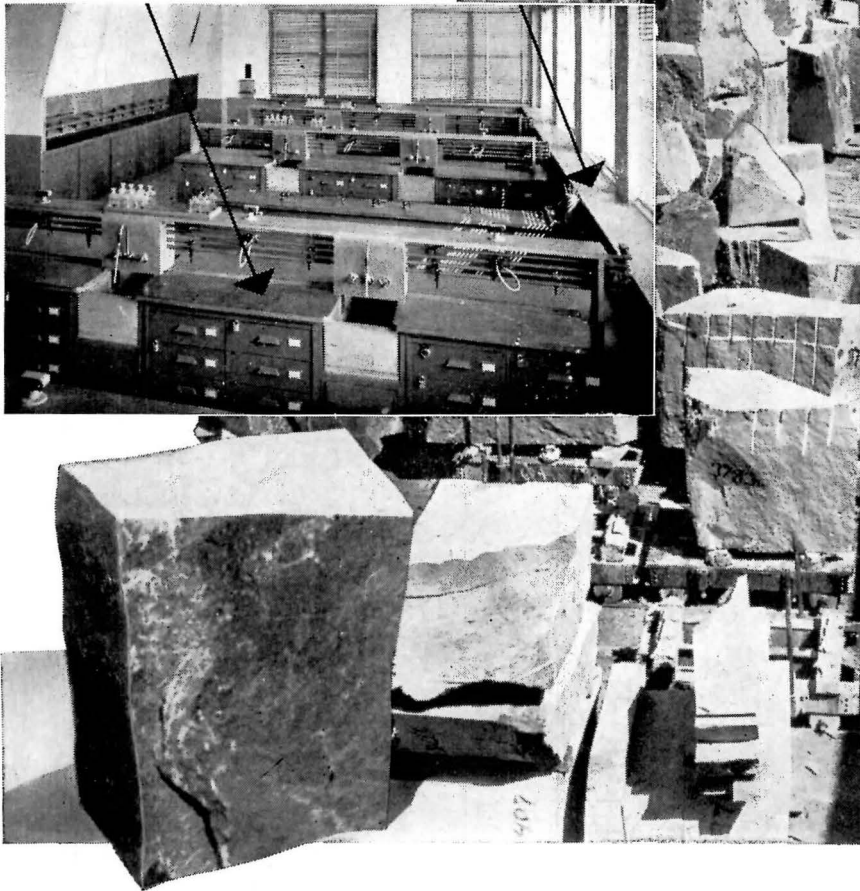
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THE RECORD REPORTS

DANISH ARCHITECTURE

(Continued from page 16)

unobtrusive people who seldom take the lead in pioneer ventures. On the other hand we have sometimes been successful in adapting and developing the new ideas which the pioneers have presented to the world.

“But though we are not cultural innovators, I think it can be justly claimed that the average cultural level in our country is a high one. Socially Denmark is not a country of strong contrasts; there are neither a great many poor people nor a great many rich ones. But we have a middle-class with a solid position both economically and culturally and this is particularly reflected in our houses. We own very few of the monuments of paramount worth in the history of architecture, but neither do we have any really wretched dwellings or real slums.

“To understand a foreign country’s architecture it is essential to know something about the possibilities and limitations imposed by indigenous circumstances. Architecture is not an isolated branch of our culture but an integral part of our civilization. A country’s economic foundations, its national heritage, and its access to raw materials are governing factors in its architecture. Therefore I wish to call attention to the following facts, which according to present-day conceptions, must be regarded as of essential importance to Danish architecture.

“The total area of Denmark is 16,576 square miles — that is to say it is smaller than all but eight of the states of the Union. It consists of the peninsula of Jutland, seven or eight larger islands, and hundreds of small ones, of which however only about one hundred are inhabited. The population is 4,400,000 with a density of 265 per sq mi, making it one of the most densely populated countries in Europe.

“Denmark is primarily an agricultural country though it has a large and growing industrial population. As it has practically no raw materials these must be imported and our industries are therefore refining and processing ones rather than basic industries. Our agriculture is based on small holdings, and the many small farms give the country a special ‘homely’ character not found in countries with large-scale agricultural holdings.

“Though our geographical location
(Continued on page 334)



Riverside Elementary & High School, Pendleton, South Carolina, an outstanding example of modern, split-level school design. Contains 38,360 square feet. Capacity: 500 students. 170 Fenestra Intermediate Steel Windows, with their slim, steel members, contribute to the building's architectural beauty, give classrooms better daylighting and ventilation. **Architect:** John M. Lambert, Jr., A.I.A., Anderson, S. C. **Contractor:** Triangle Construction Co., Greenville, S. C.

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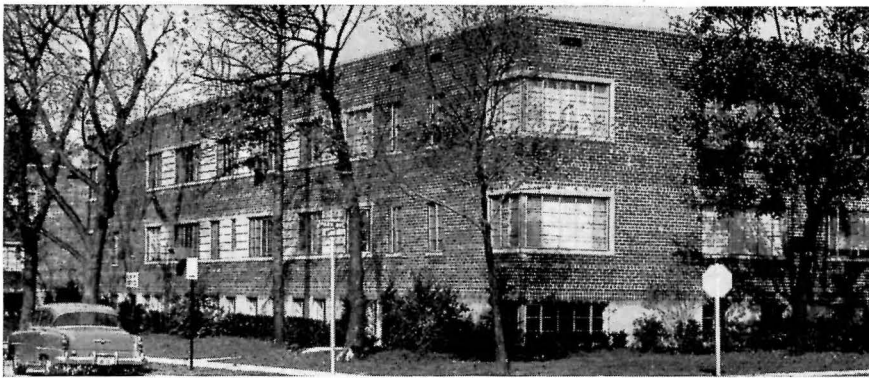
DANISH ARCHITECTURE

(Continued from page 330)

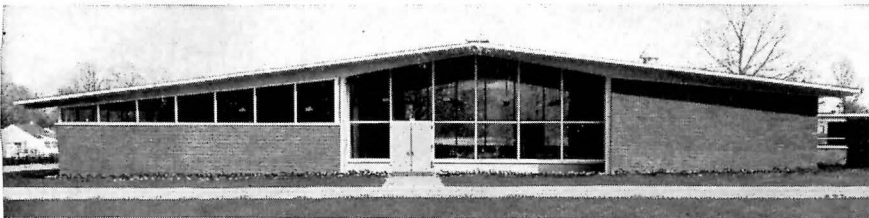
between 55°-58° latitude roughly corresponds to the southern part of Hudson Bay, the Danish climate is temperate but windy—a typical coast climate with mild winters and not altogether dependable weather. Often it changes from sunshine to rain several times a day. Denmark has no mountains whatsoever, the highest point above sea-level being about 573 feet. There are no longer any large forests but every farmhouse is sheltered from the wind by a group of trees, and cultivated woods, mostly of beech, dot the countryside.

“The wind, the rain, and the flat terrain have naturally influenced Danish building customs. Danish houses are low; they follow the gentle contours of the landscape and seek to escape the winds by keeping as close to the ground as possible. The traditional roof is a saddle roof with ample slope to carry off the rain. Such roofs are a still greater necessity in winter, for the snow which falls during the night, when the temperature hovers around freezing-point, melts as soon as the sun ascends the sky—and in the early afternoon the temperature is likely to return to freezing again. This continuous change from thaw to frost within intervals of only a few hours has a deteriorating effect on flat roof surfaces where water from melting snow is slow to drain off. At any rate in Denmark the modern flat roof demands special and expensive surface treatment. Lumber for building purposes is largely imported from our Scandinavian neighbors, Sweden and Finland. The building material that has characterized Danish architecture since the middle of the 12th century is fired clay, both as brick and roof tiling. Clay is found everywhere in Denmark and is processed locally at small or large brick-yards. Although Denmark has an extensive cement industry, and cement is one of our important exports, it has been difficult for reinforced concrete to compete with brick, partly because reinforced concrete construction demands a fairly heavy import of iron, and partly because in our type of low building reinforced concrete does not offer the same economic advantage that it does in high building. Naturally, circumstances are not as simple as I have sketched them here. Danish architectural styles are not solely determined by rain and wind and clay. Many distinctive and varied archi-

(Continued on page 338)

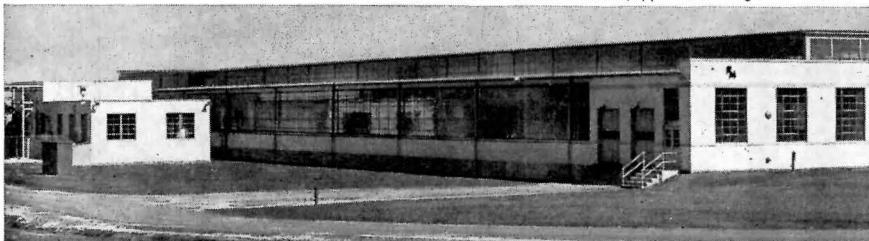


(Above) Suburban Apartment House using Wing Draft Inducers



(Above) Modern school using Wing Draft Inducer

(Below) Industrial Plant equipped with Wing Draft Inducers



Look! — no chimneys

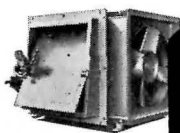
MODERN buildings are now being designed without tall obtrusive chimneys marring their clean horizontal lines. This refreshing trend is made possible by the use of Wing Draft Inducers in the boiler or furnace room, eliminating the necessity for stack or chimney.

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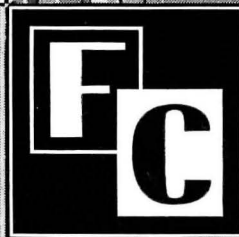
We, at FLOUR CITY, recognize the rich heritage left us by the art blacksmiths. Over the years, their experience and knowledge of the plastic possibilities of metals has been inherited by our new generation. Our metal fabricators of today, now aided by modern machinery, fit and assemble curtain walls for multi-story buildings with the same care and skill that has distinguished our products for the past sixty-five years.

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Obviously, the architect with an imaginative and creative design must rely upon skilled and experienced fabricators to assist him in advancing the frontiers of architecture. We, of course, cannot predict what the walls of tomorrow will be, but we can and do assure you . . . if those walls are made of metal, the finest will be fabricated by FLOUR CITY.

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THE RECORD REPORTS

DANISH ARCHITECTURE

(Continued from page 334)



Blistering and peeling paint is one of the most common types of damage caused by the collection of excessive vapor in the side walls.

Eliminate the ravages of moisture with *Premoulded Membrane* the only **TRUE** vapor seal!

TRADEMARK

Rotting walls . . . blistering and peeling paint . . . masonry efflorescence (the white powder that forms on the outside of brick buildings) . . . warping and rotting wood floors and termite problems are just a few of the many evils we have learned to live with . . . all of them are directly or indirectly caused by excessive vapor condensation.

Governmental and academic research has proven that more than 80% of the moisture induced into the home is from the ground source. It makes little difference whether gravel is used under the basement, slab floor or crawl-space . . . or whether the site is on high or low ground, whether it's on a sand dune or a cess pool—somewhere below the structure, water exists and vapor will soon rise into the

building. The only way to eliminate destructive moisture is in the original construction with the installation of "PREMOULDED MEMBRANE," the industries only TRUE vapor seal. In construction application the 4" x 8" sheets of "PREMOULDED MEMBRANE" are laid directly over the hard tamped grade or fill with a 6" head and side lap that is sealed with Sealtight Catalytic asphalt . . . producing a monolithic vapor seal with mechanically sealed joints, that will expand and contract with the concrete slab above . . . without breaking the bond. "PREMOULDED MEMBRANE" has a permeance rating of only .0066 grains per square foot. We sincerely invite your comparison of "PM" against all other so-called vapor barriers on the market.

tectural trends have spread more or less violently through Denmark; but all of them have sooner or later been adjusted to the Danish conditions and temperament briefly described above. In Denmark it has been our good fortune to have a number of architects who, quietly and without official recognition—indeed, even in opposition to the popular and dominating trends—have worked on a conception of architecture which reaches back to the essential characteristics of Danish building without ever resulting in carbon copies of antiquated external forms. This trend, like functionalism, strives for relationship between content and form. Because of their common aim these two conceptions have been able to grow and flourish side by side. They have developed under reciprocal influences and have drawn so near to each other that today it is often difficult to determine to which group a certain building belongs.

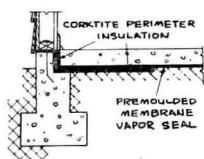
"Denmark today is not troubled by the violent conflict in concepts of architectural forms of expression which is rife in so many other countries. We do not have a tug-of-war between the two opposing camps—the modern school and the Beaux Arts school.

"In putting together this exhibition we have endeavored to give you a comprehensive impression of modern Danish architecture, laying particular stress on that which is especially characteristic of the present moment. I think I can say without exaggeration that Danish architecture is steadily advancing, but along a line not entirely independent of tradition, following trends that are adapted to the Danish environment and character; a sober and unpretentious architecture influenced by currents from the outer world but never forgetting its Danish heritage."

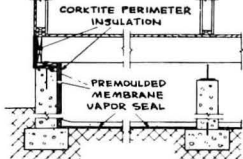
Architects whose work is shown in the exhibit are: Acton Bjorn, Jorgen Bo, Ebbe Clemmensen, Karen Clemmensen, Kay Fisker, Broge Glahn, Halldor Gunnlogsson, Ole Hagen, Knud Hallberg, Hans Hansen, Hans Chr Hansen, Preben Hansen, Knud Peter Harboe, Ole Helweg, Povl Ernst Hoff, Arne Jacobsen, Gunnar Jensen, Ib Martin Jensen, Finn Juhl, Kaare Klint, Eva Koppel, Nils Koppel, Eske Kriestensen, Gunnar Krohn, Hans Erling Langkilde, Morgens Lassen, Vilh. Lauritzen, F. C. Lund, Ministry of Defense, Borge Mogensen, Finn Monies, C. F. Moller, Jorn Nielsen Axel Olesen, T. Miland Petersen, Harald Plum E. Hartvig Rasmussen, Frits Schlegel, Pall Suenson, Erik Chr. Sorenson, Bertel Udsen Hans J. Wegner, Bennet Windinge, Vilhelm Wohlert.

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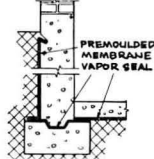
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