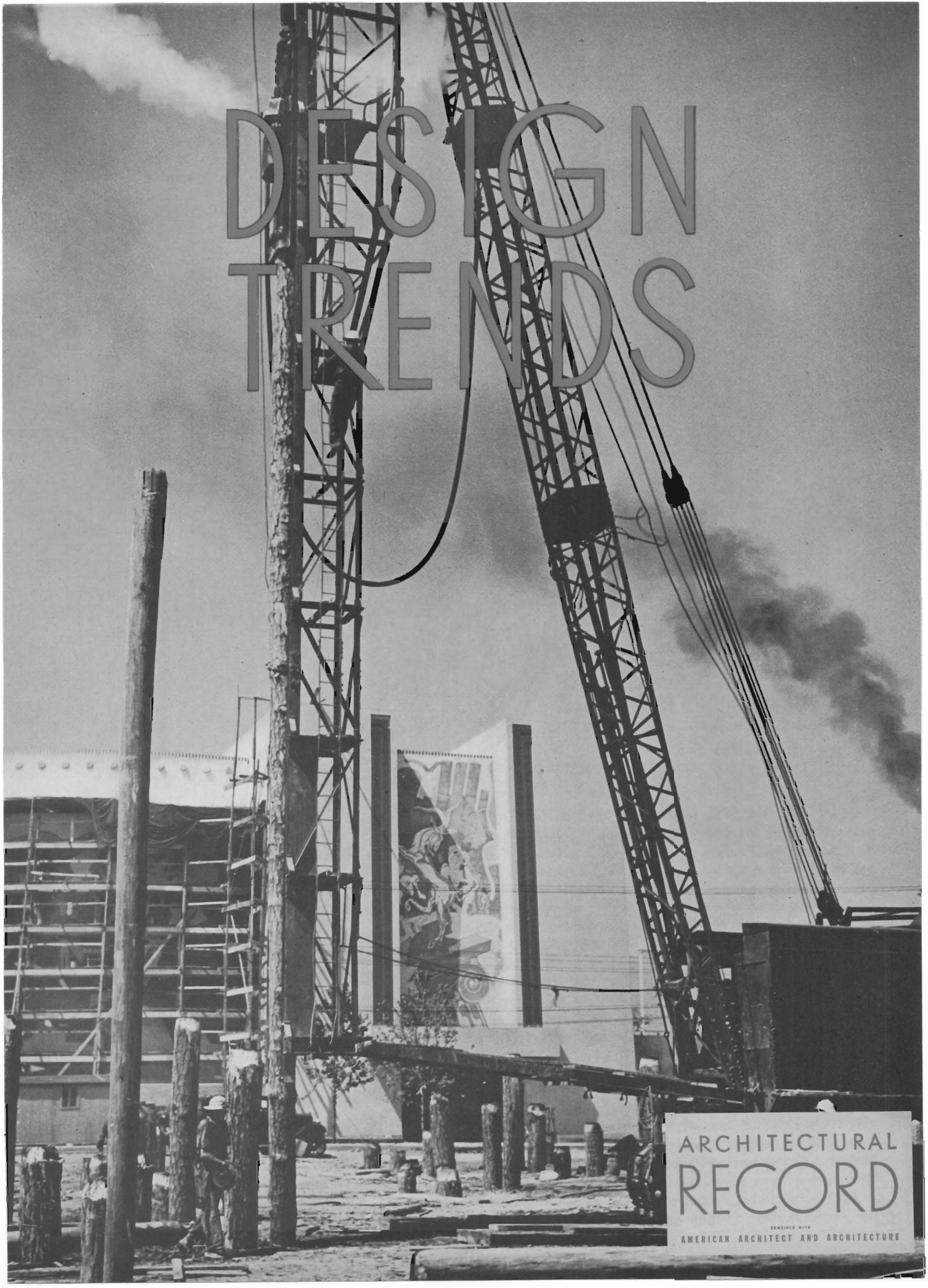
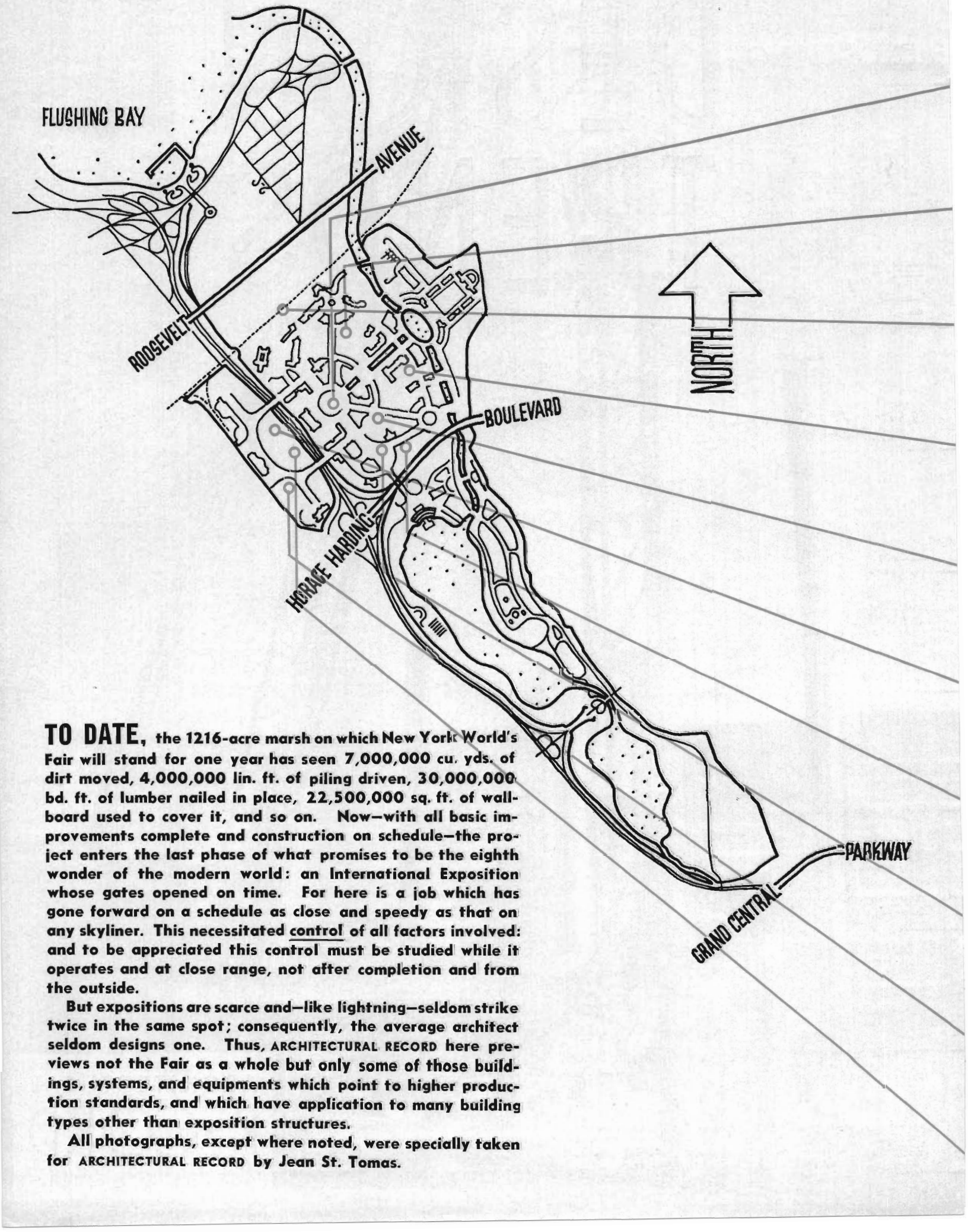

DESIGN
TRENDS
ARCHITECTURAL
RECORD
COMBINED WITH
AMERICAN ARCHITECT AND ARCHITECTURE

PREVIEW :

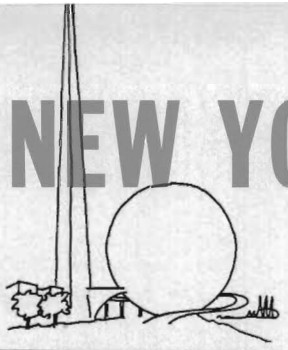


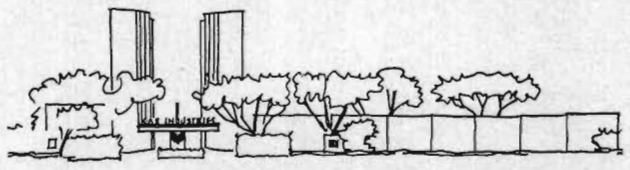
TO DATE, the 1216-acre marsh on which New York World's Fair will stand for one year has seen 7,000,000 cu. yds. of dirt moved, 4,000,000 lin. ft. of piling driven, 30,000,000 bd. ft. of lumber nailed in place, 22,500,000 sq. ft. of wallboard used to cover it, and so on. Now—with all basic improvements complete and construction on schedule—the project enters the last phase of what promises to be the eighth wonder of the modern world: an International Exposition whose gates opened on time. For here is a job which has gone forward on a schedule as close and speedy as that on any skyliner. This necessitated control of all factors involved: and to be appreciated this control must be studied while it operates and at close range, not after completion and from the outside.

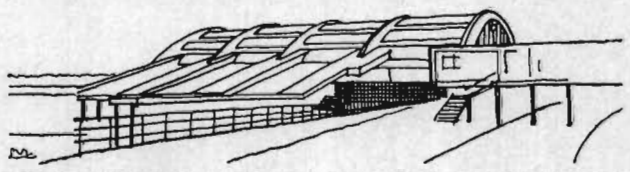
But expositions are scarce and—like lightning—seldom strike twice in the same spot; consequently, the average architect seldom designs one. Thus, ARCHITECTURAL RECORD here previews not the Fair as a whole but only some of those buildings, systems, and equipments which point to higher production standards, and which have application to many building types other than exposition structures.

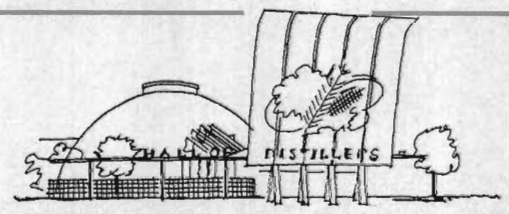
All photographs, except where noted, were specially taken for ARCHITECTURAL RECORD by Jean St. Tomas.

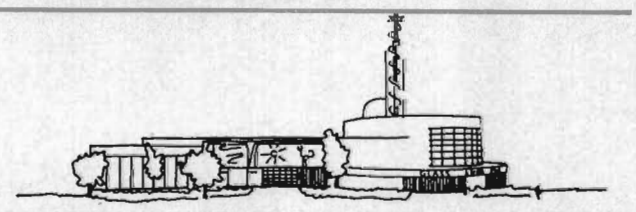
NEW YORK WORLD'S FAIR - - - 1939

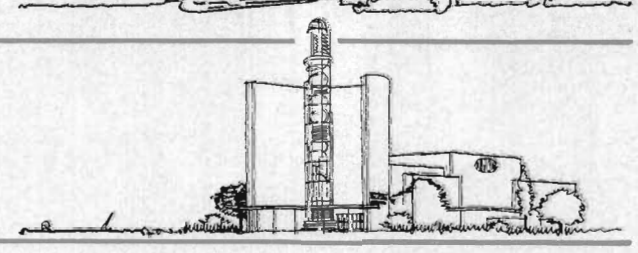


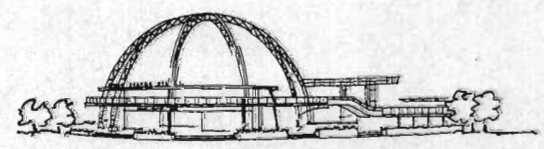


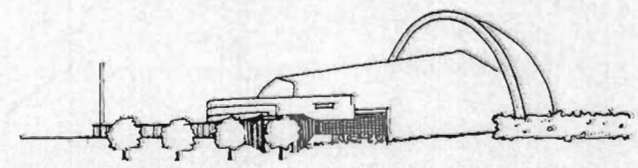


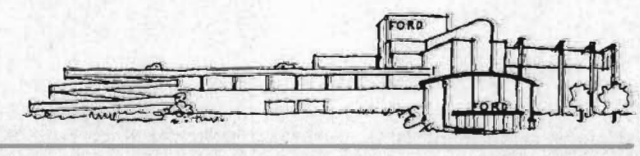


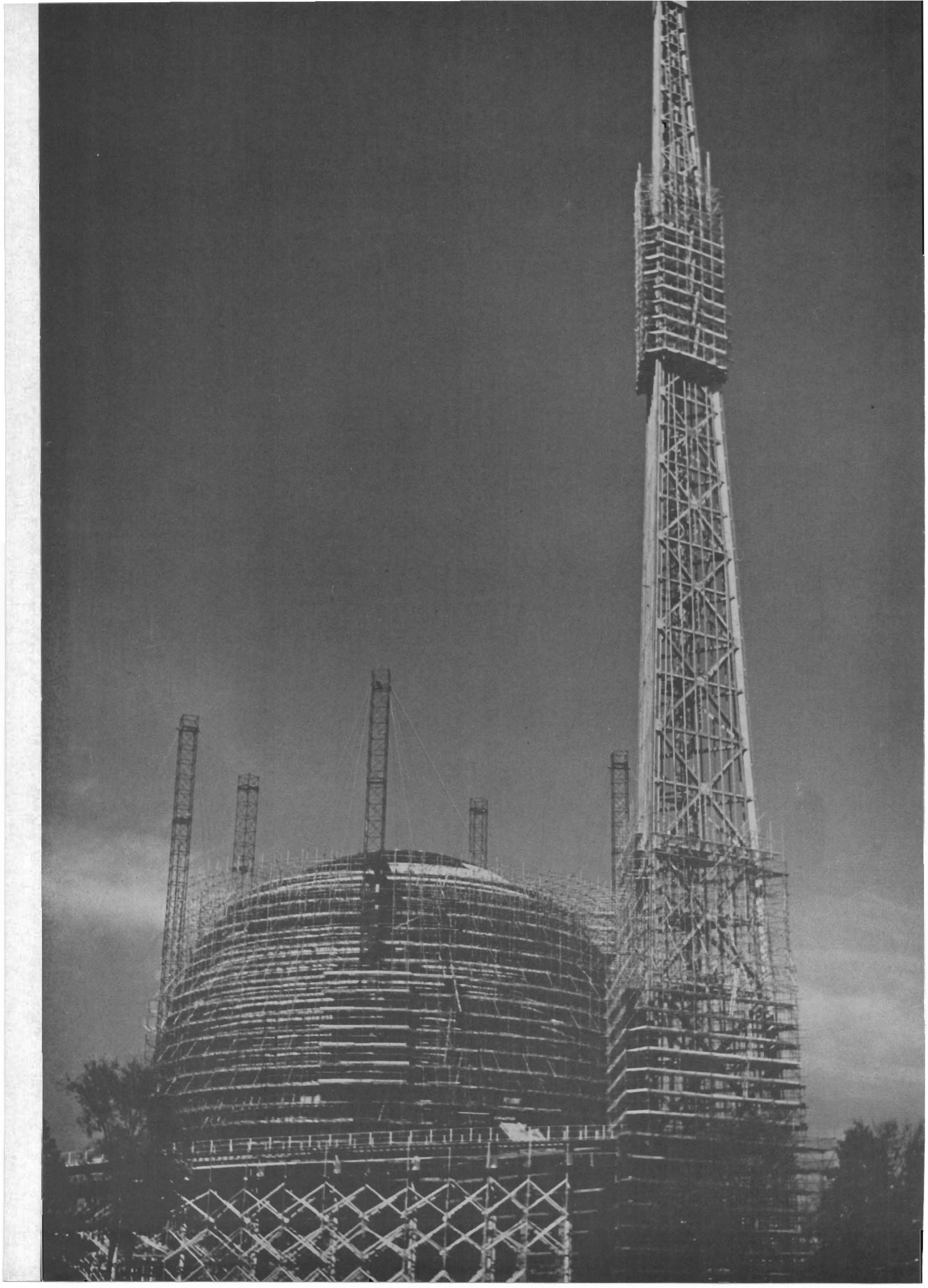










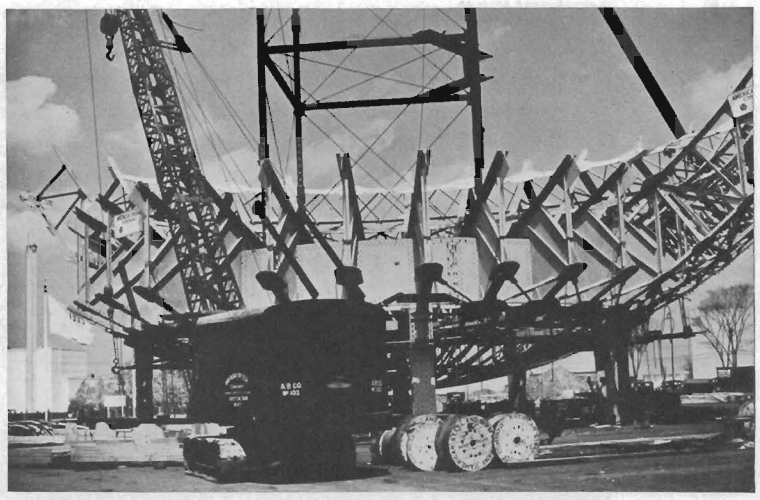


1. TRYLON, PERISPHERE, HELICLINE

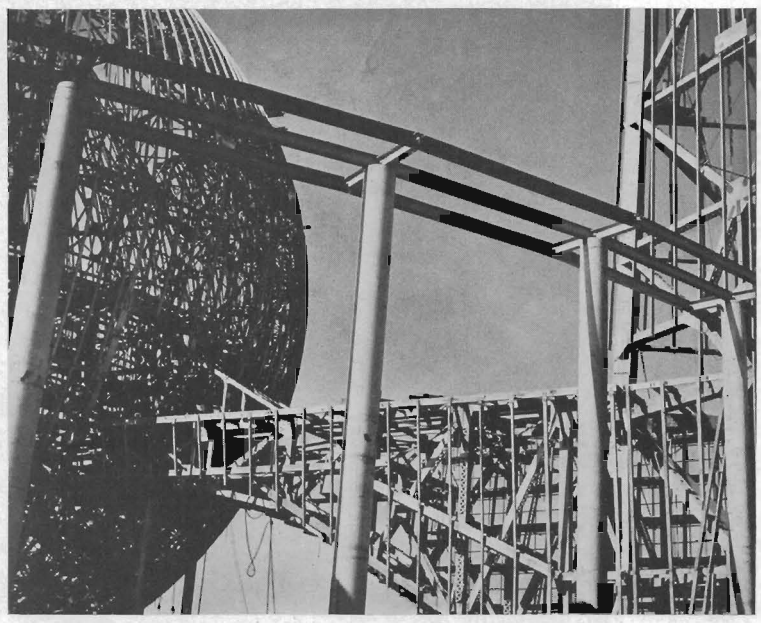
HARRISON and FOUILHOUX, Architects
HENRY DREYFUSS, Designer
MORAN, PROCTOR & FREEMAN, Foundation Engineers
SHORTRIDGE HARDESTY, Structural Engineer

1,035 SKETCHES were discarded before the present design for the Fair's Theme Center was finally accepted; and the problem had just begun. The design process was difficult, since no precedence existed for such structures, and an entire series of tests had to be carried on to determine the characteristics of such structures under loads, wind pressure, etc. Nor were fabrication and erection problems any simpler; extraordinary standards of precision had to be maintained throughout. This led to the development of a novel rigging set-up; of cantilevered scaffolding outside and rotating scaffolding inside the Perisphere; of a new material to surface the structures; etc. Yet, in spite of its complexity, the entire job is on schedule, with only one minor injury—"a crushed toe-nail".

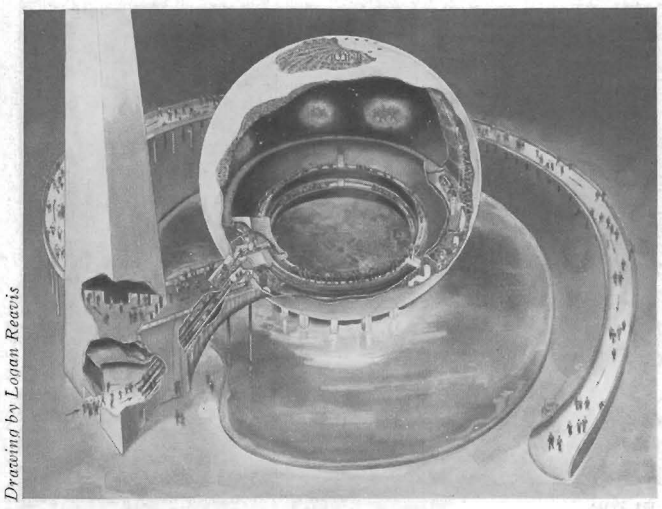
As finally constructed, the Perisphere rests on a circle of 528 piles driven into sand about 100 ft. below the surface: these piles are capped with a concrete ring. From this foundation eight columns support a huge ring girder 72 ft. in diameter; and from this girder spring 32 meridian trusses similar to the lines of longitude on a globe. These in turn are joined together by 15 horizontal trusses. Smaller purlins complete the assemblage. The Trylon and Helicline are of more usual design and presented no such problems as the Perisphere.



ERECTION required specially-designed rigging system

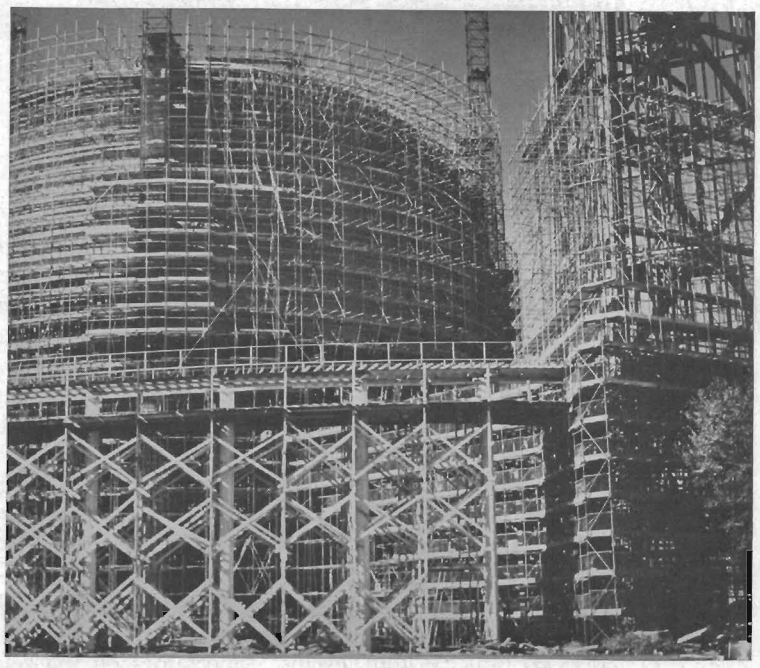


FRAMING: 7,125 pieces of shop-fitted steel in proper place



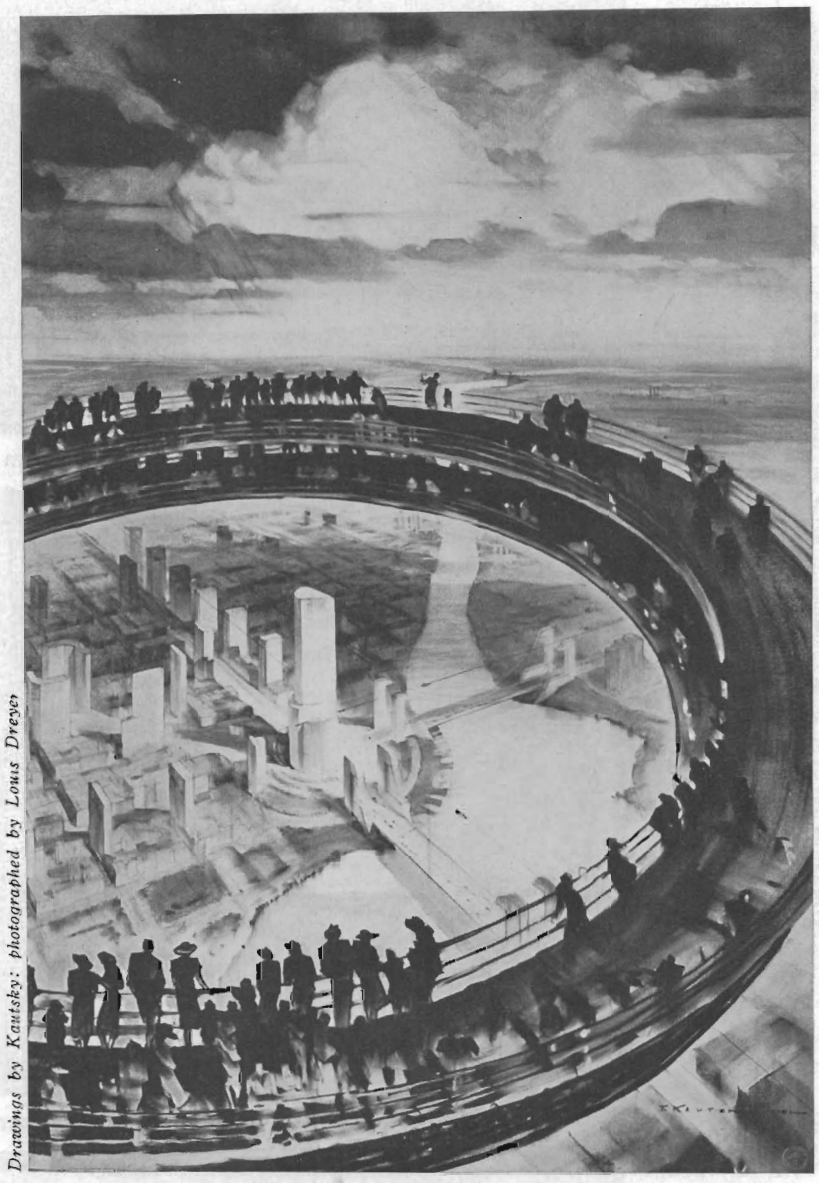
Drawing by Logan Reavis

Two giant escalators (lower left) spill 8,000 persons per hour onto two circular platforms (center); moving in opposite directions, these platforms make complete circuit in 5½ min., where barrier deflects traffic onto Helicline (left, center).



SCAFFOLDING so complex that separate bids were taken on special scaffolding design.

PERISPHERE



Drawings by Kautsky: photographed by Louis Dreyer

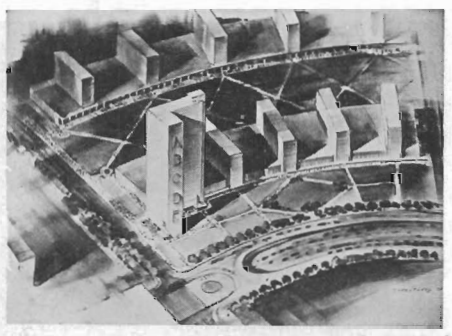
Sketch showing relation of spectator to Perisphere's huge diorama of Town of Tomorrow.

DRAMATIZATION of the Perisphere's thematic display, "Building the World of Tomorrow", was the task of designer Henry Dreyfuss. While the accepted design for the Perisphere is essentially that for a theater—with a slowly moving audience in the center and "show going on above it, below it, and all around it"—the design involves many problems in traffic, display, lighting, acoustics, etc., not found in the usual theater. The central task of the designer was therefore to integrate a number of specialized fields into a theater for which there was no single precedent.

The central display—a scale model of a city which incorporates current standards of town and regional planning—will occupy the bottom of the sphere; by means of the diorama technique, it will merge into the walls of the sphere. Lighting effects—not only in the model itself but on the entire inner surface of the sphere—will then reproduce a 24-hour day—clouds, stars, sunrise, and sunset—compressed into 5½-min. cycles. Spectators on the rotating platforms will thus get the illusion of moving freely through space. Elaborate sound effects are also planned.

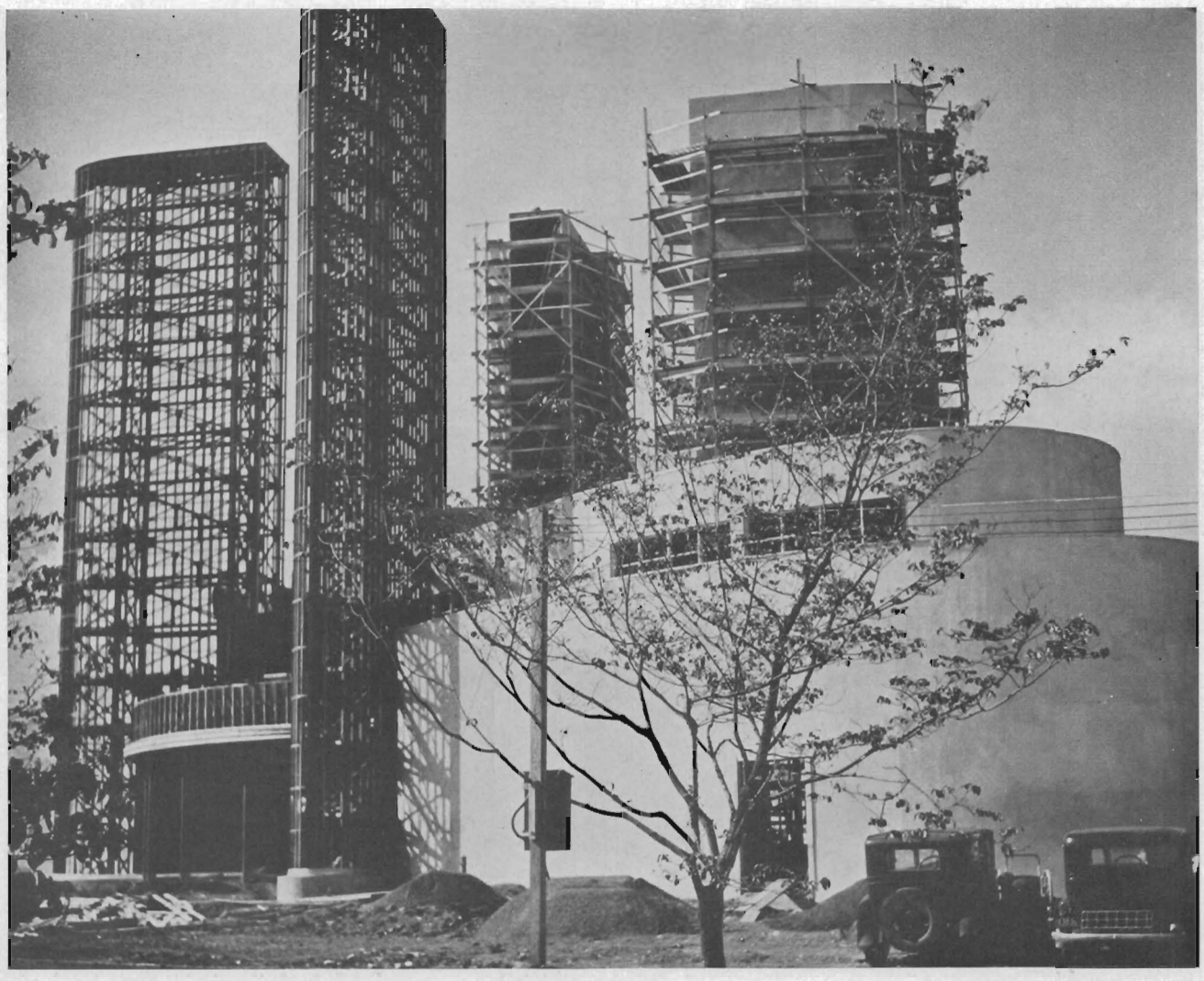
Photo by Dimitri Kessel

Preliminary model: "Democracity"



Tomorrow Town's Democracity's retail shops

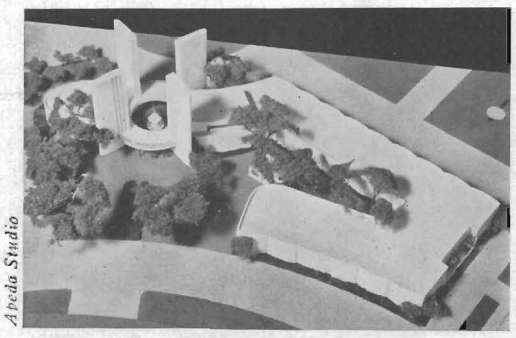
Democracity's sports center



2. GAS EXHIBITS, INC.

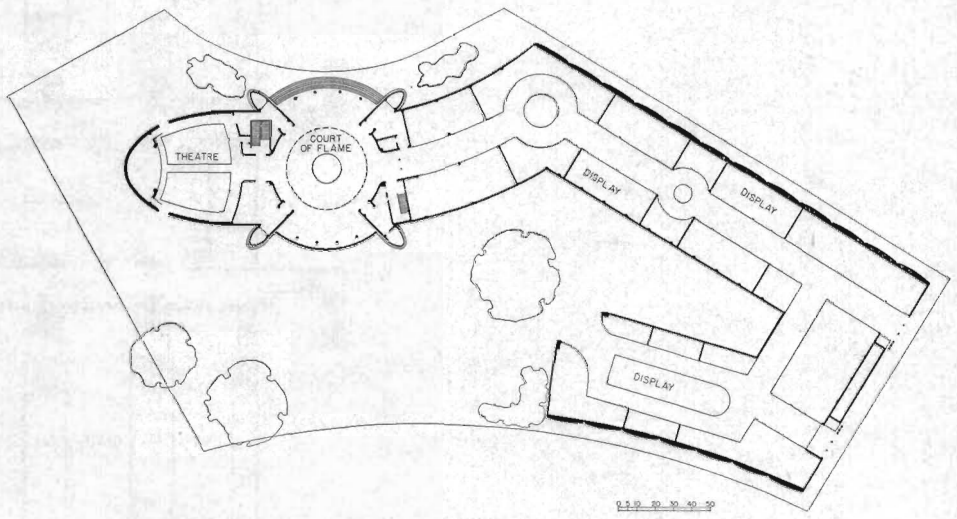
SKIDMORE & OWINGS, Architects
JOHN MOSS, Associate

SPONSORED jointly by 169 gas companies in America and Canada, this is a single-level structure for display of gas appliances for cooking, heating, and air conditioning. Chief external feature is the circular "Court of Flame", flanked by four pylons, in which a (gas) flame will burn continuously. One end of the structure is occupied by a 350-seat theater for demonstration purposes.

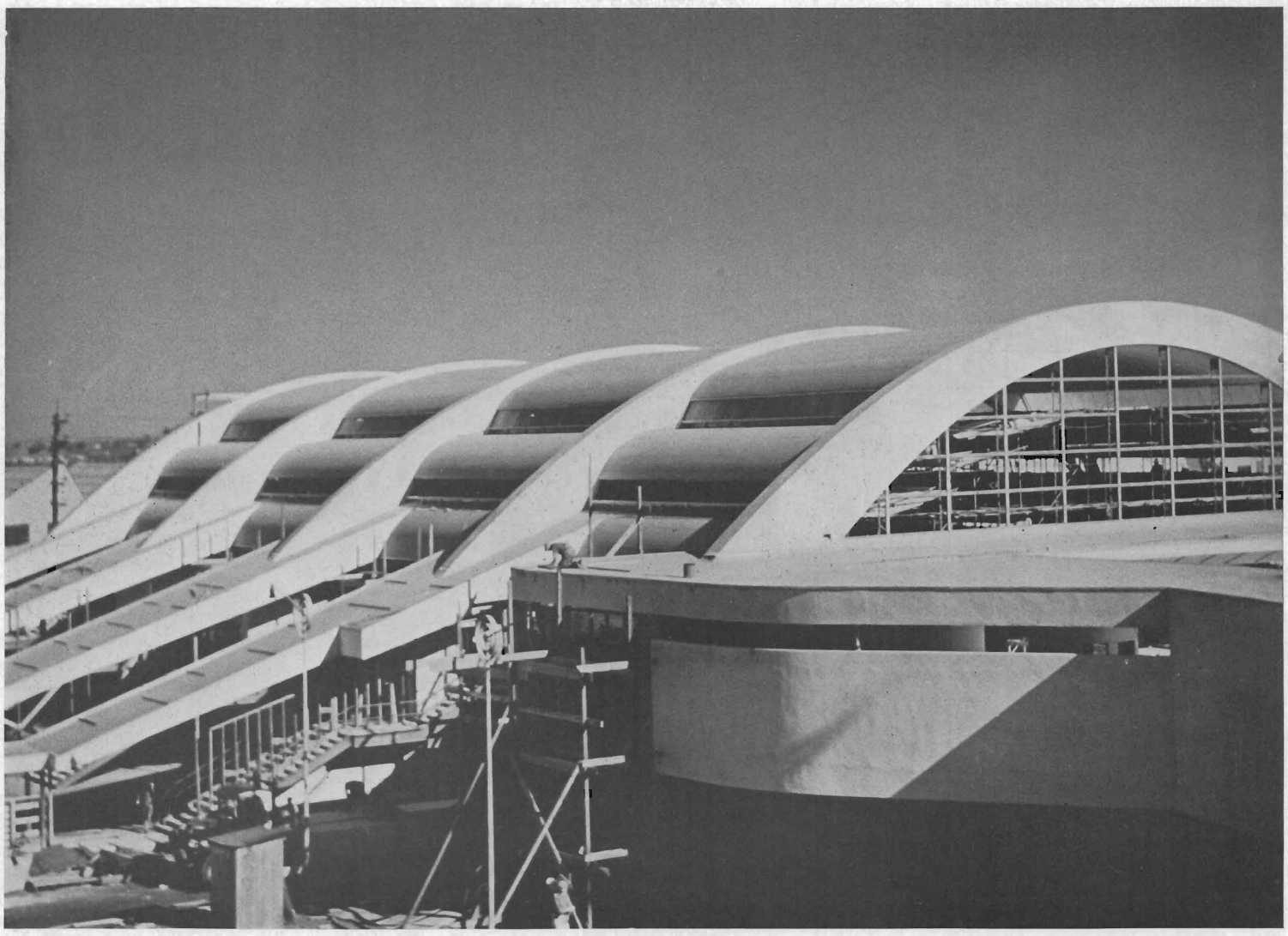


Apeda Studio

Model

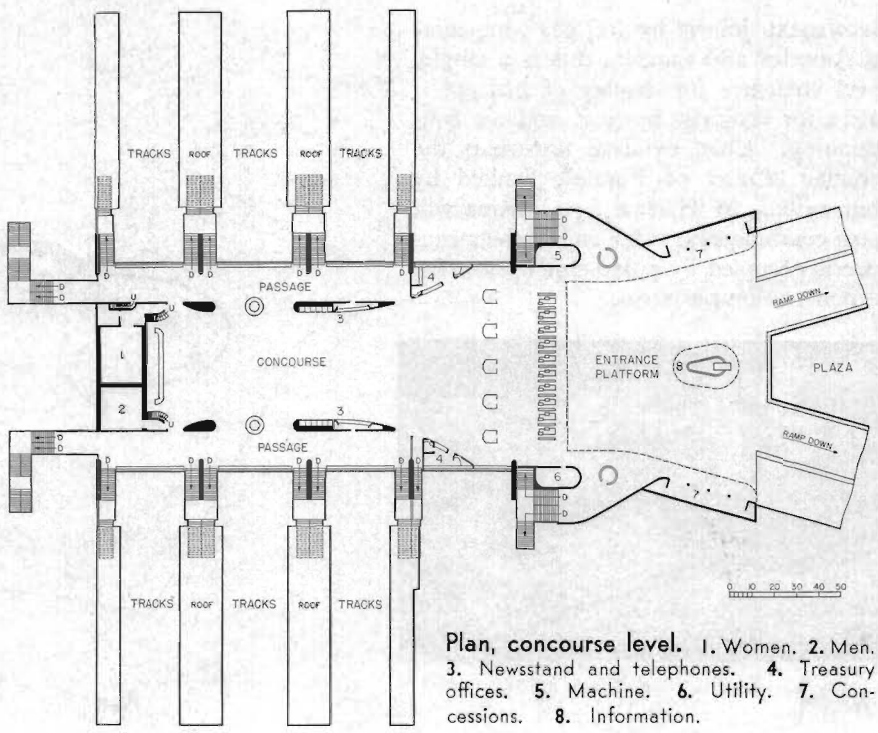


Plan

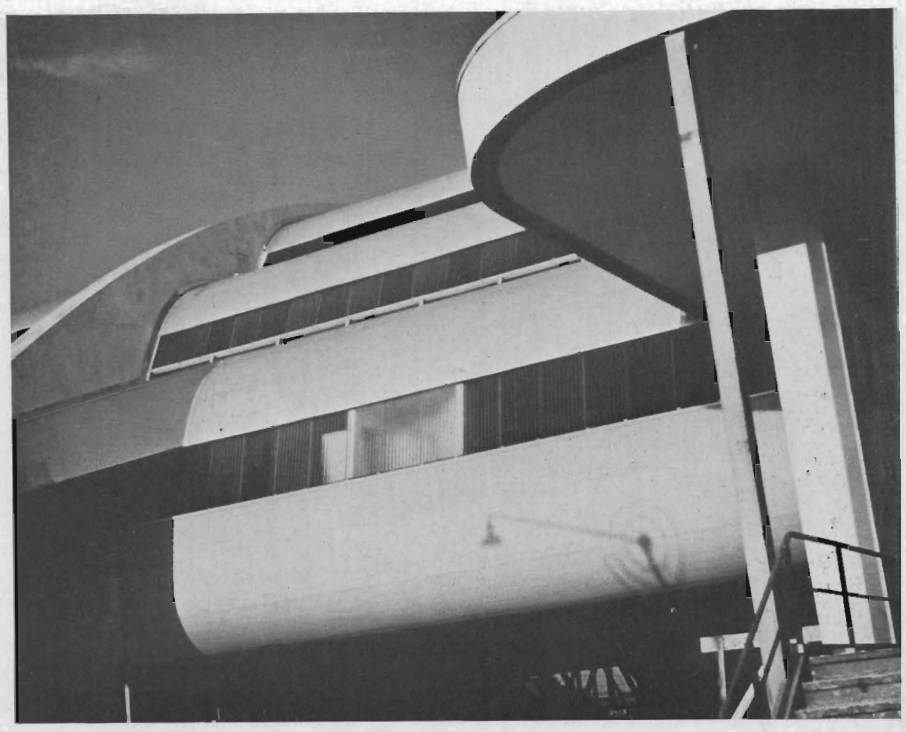


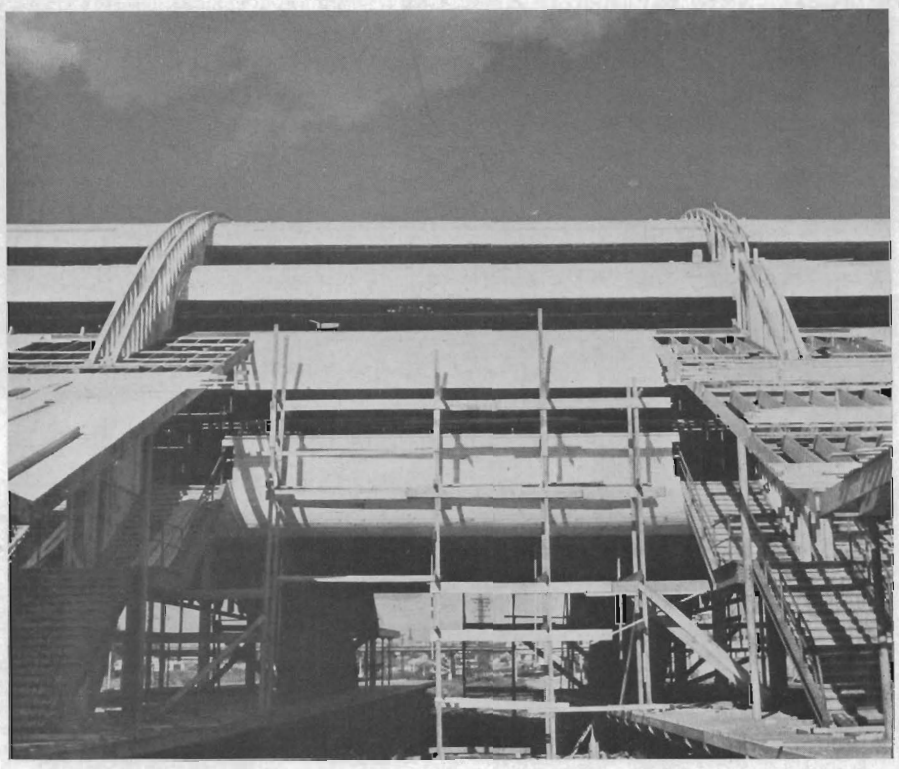
3. LONG ISLAND R. R. STATION

FAIR CONSTRUCTION DEPARTMENT, Designers



Plan, concourse level. 1. Women. 2. Men. 3. Newsstand and telephones. 4. Treasury offices. 5. Machine. 6. Utility. 7. Concessions. 8. Information.

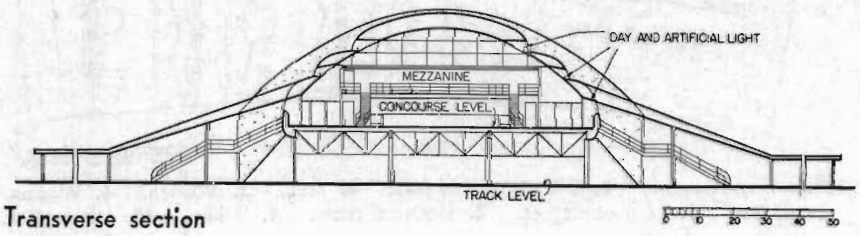




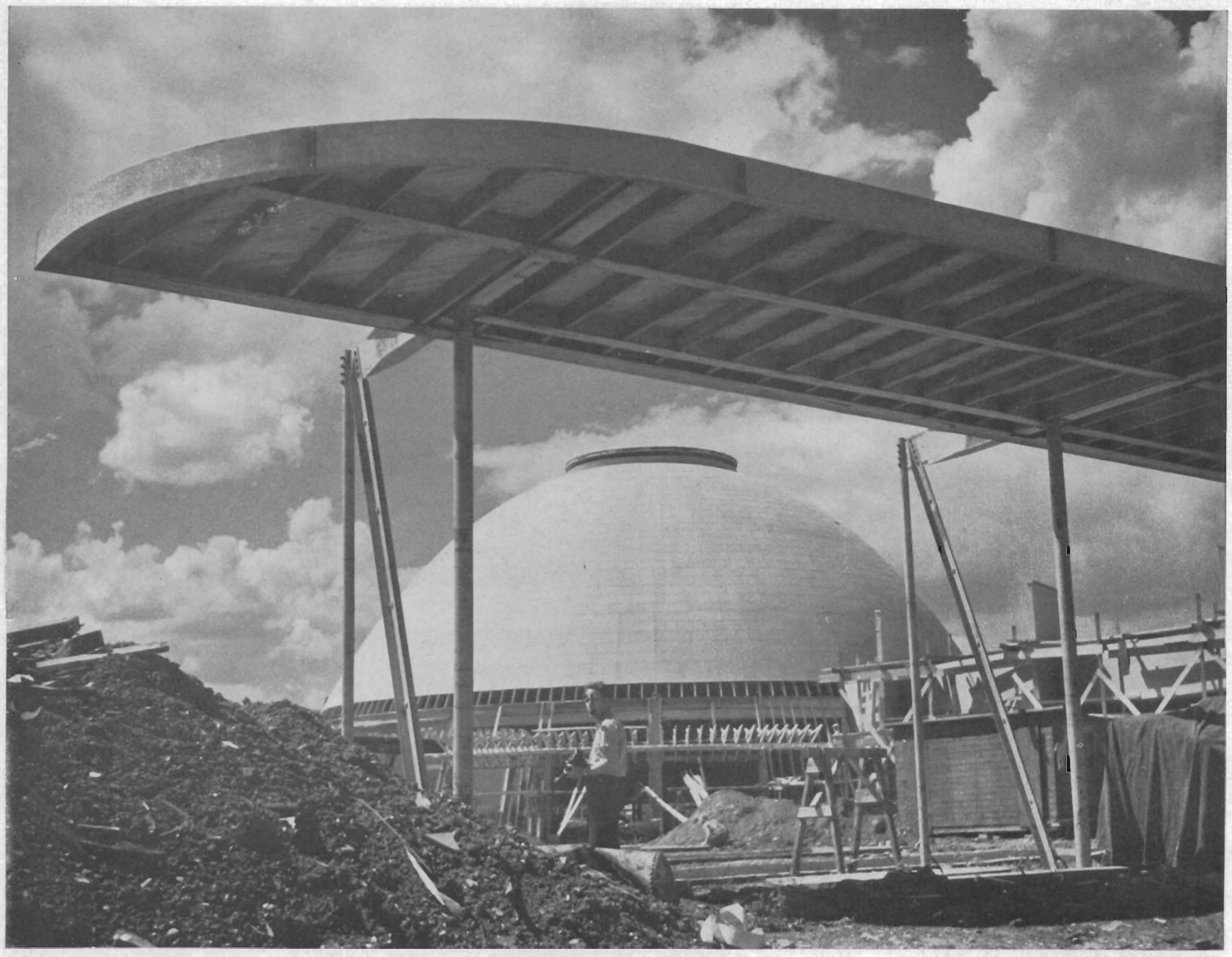
IN BOTH PLAN and construction, the Long Island Railroad Station is one of the Fair's most notable structures. Although frankly temporary in character (and consequently not fireproof in construction), it indicates new standards for a common design problem—that of the busy suburban station. Lineal descendant of the old "covered" bridge, the station is actually a wood-and-steel bridge carried by five transverse (rather than lateral) arch trusses. This basic concept yields not only an economical plan and construction, but also an appropriate esthetic quality. Thus certain elements even *look like trains* (top, right) without in any sense being representational.

Although the station is essentially steel-framed, there is a wide and novel use of wood. With only the trusses and end walls stuccoed, the rest of the shell is wood-sheathed and canvas covered. In the continuous clerestory fenestration, windows and window frames have been eliminated; the corrugated glass strips thus become an integral part of the envelope. The clerestorys are also designed so as to serve as source of both natural and artificial light (section, below).

Location of the station is fortunate, from the standpoint of visitors; ramps from the concourse level give directly into one of the Fair's secondary plazas; and the station is closely flanked by exhibit buildings so that the visitor finds himself inside the Fair immediately upon leaving the station.

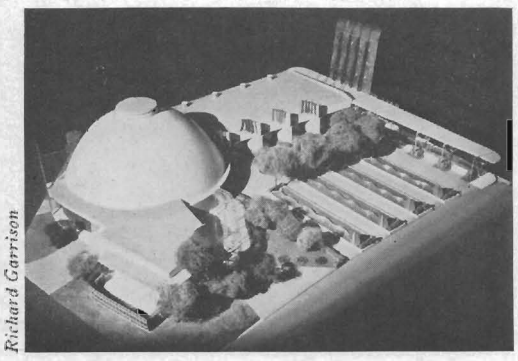


Transverse section



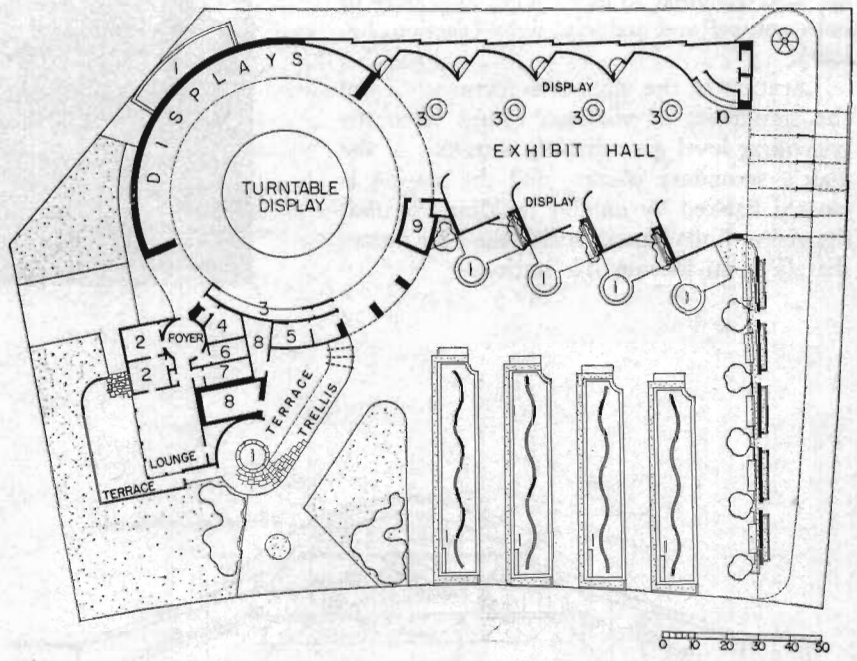
4. DISTILLED SPIRITS, INC.

MORRIS B. SANDERS, Architect
ROSS-FRANKEL, INC., and
MORRIS B. SANDERS, Co-designers



Richard Garrison

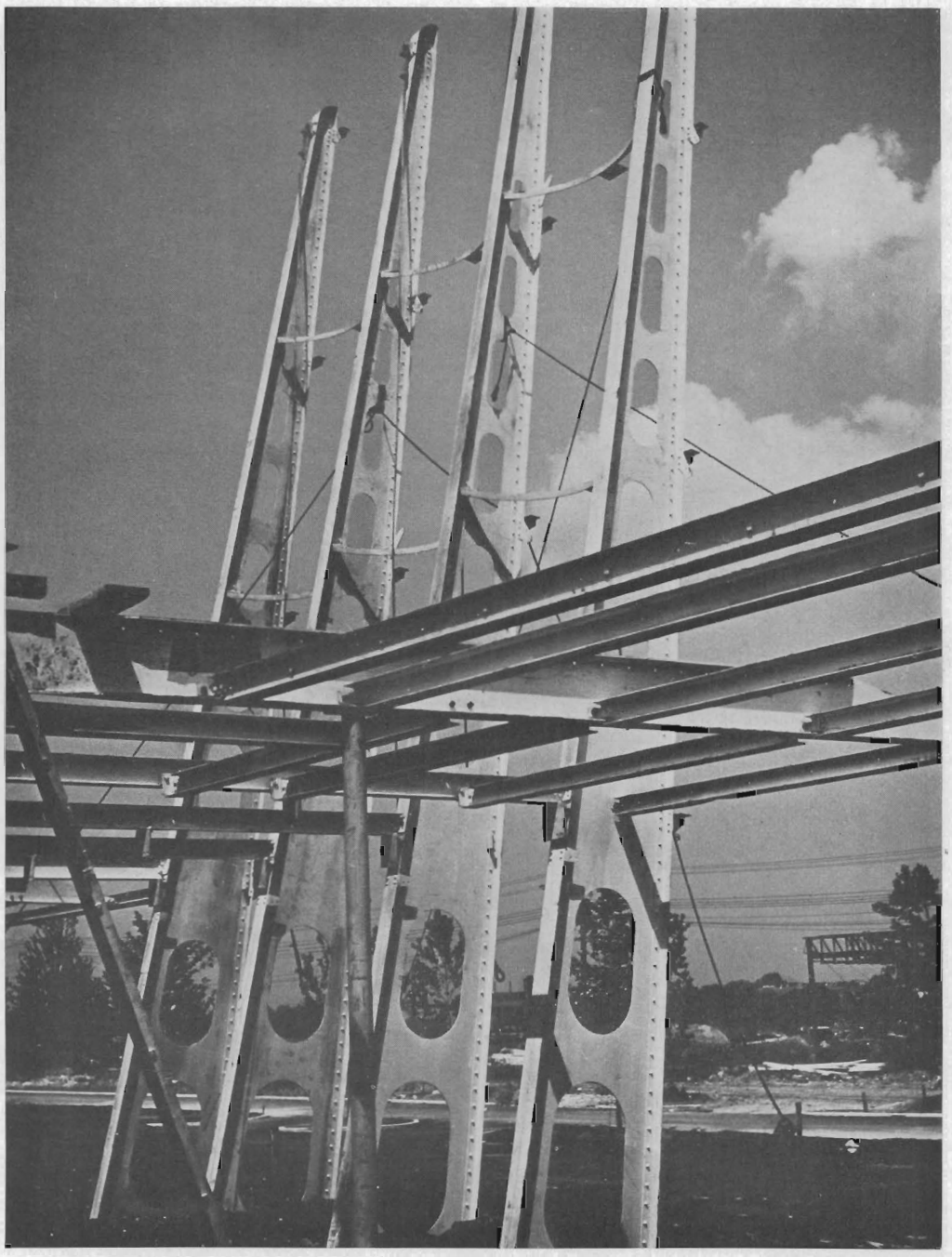
Model

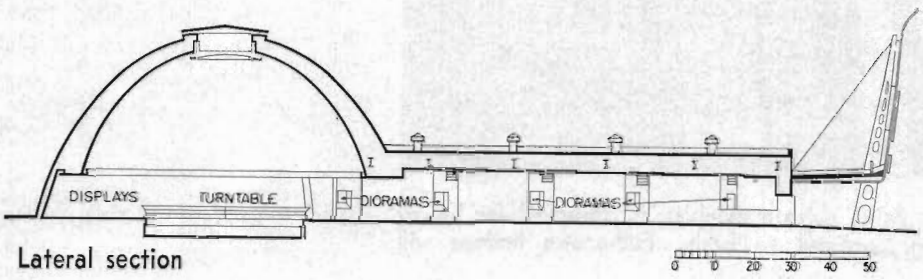


Plan. 1. Fountain. 2. Office. 3. Display. 4. Men. 5. Women. 6. Women employees. 7. Men employees. 8. Electrical room. 9. Utility. 10. Information.

THE DISTILLERS' building not only boasts an unusually wide range of structural and finish materials—steel, glass, wood, metals—but also new applications of many of them. The steel framing of both canopy (top, left) and marquee (right) is unusual. In the former, a cantilever is achieved by means of diagonal bracing and an anchor-type footing (see Foundations, page 91.) In the marquee, the 40 ft. vertical members become a decorative feature of the entrance, their pierced webs lightening the construction actually as well as esthetically. In its finished form (right, below) this marquee will be faced with corrugated enamel sheets, on which a free-standing design in sheet metal and composition will be applied. Corrugated and block glass are widely used in the garden, both for decorative (see pools, over page) and utilitarian purposes.

Exhibit material—which is industry-wide and with no brand or company advertising—is organized into two main halls, the second one centered by a revolving turntable. Lounge, terrace, and dressing rooms for exhibit members are grouped along one end, while the garden (bottom, over page) occupies a large proportion of the remaining ground area.

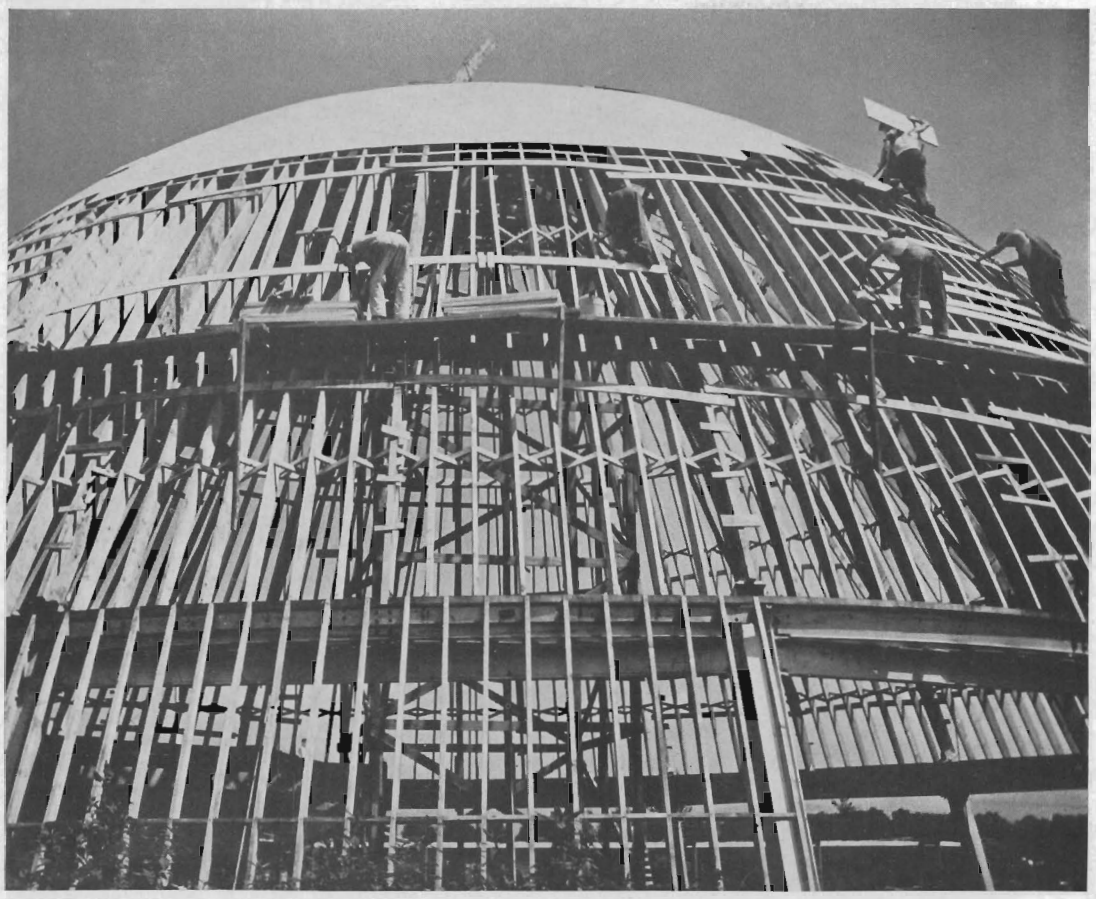




Lateral section

Richard Garrison

DISTILLED SPIRITS, INC.



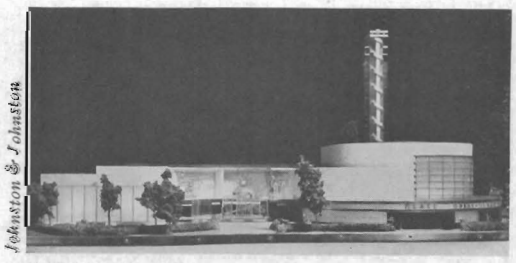
The steel-framed dome is sheathed in wood and insulation board, finished in stucco, painted.

The garden, one of the most elaborate of the Fair's private exhibits, is designed for heavy use. Hence, grass areas are eliminated, planting confined to beds. Full-grown lindens will shade each bench.

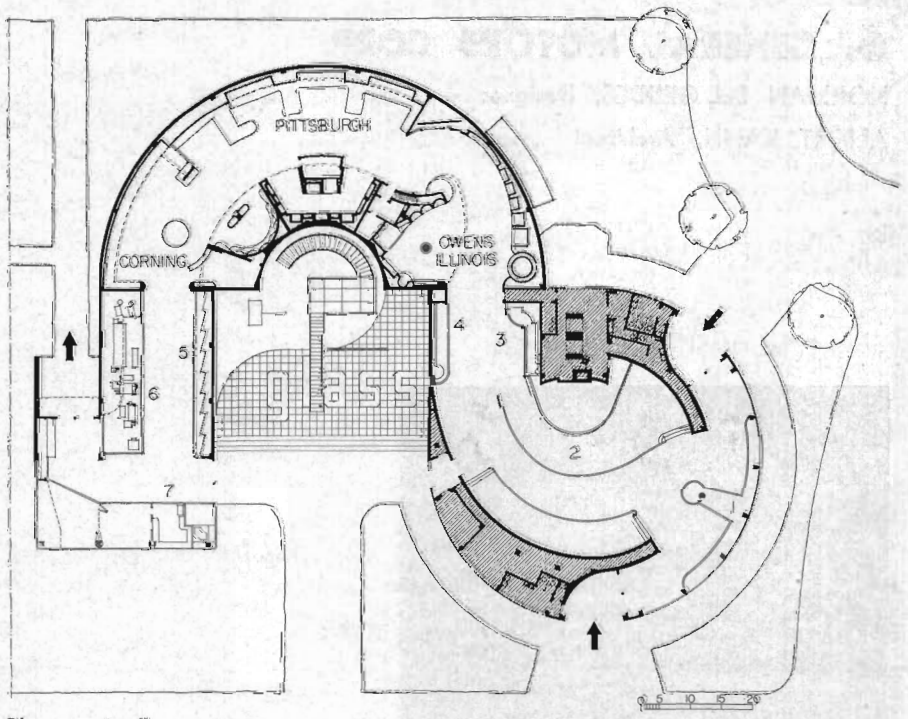
5. GLASS, INC.

SHREVE, LAMB & HARMON, Architects
SANDERSON & PORTER, Engineers

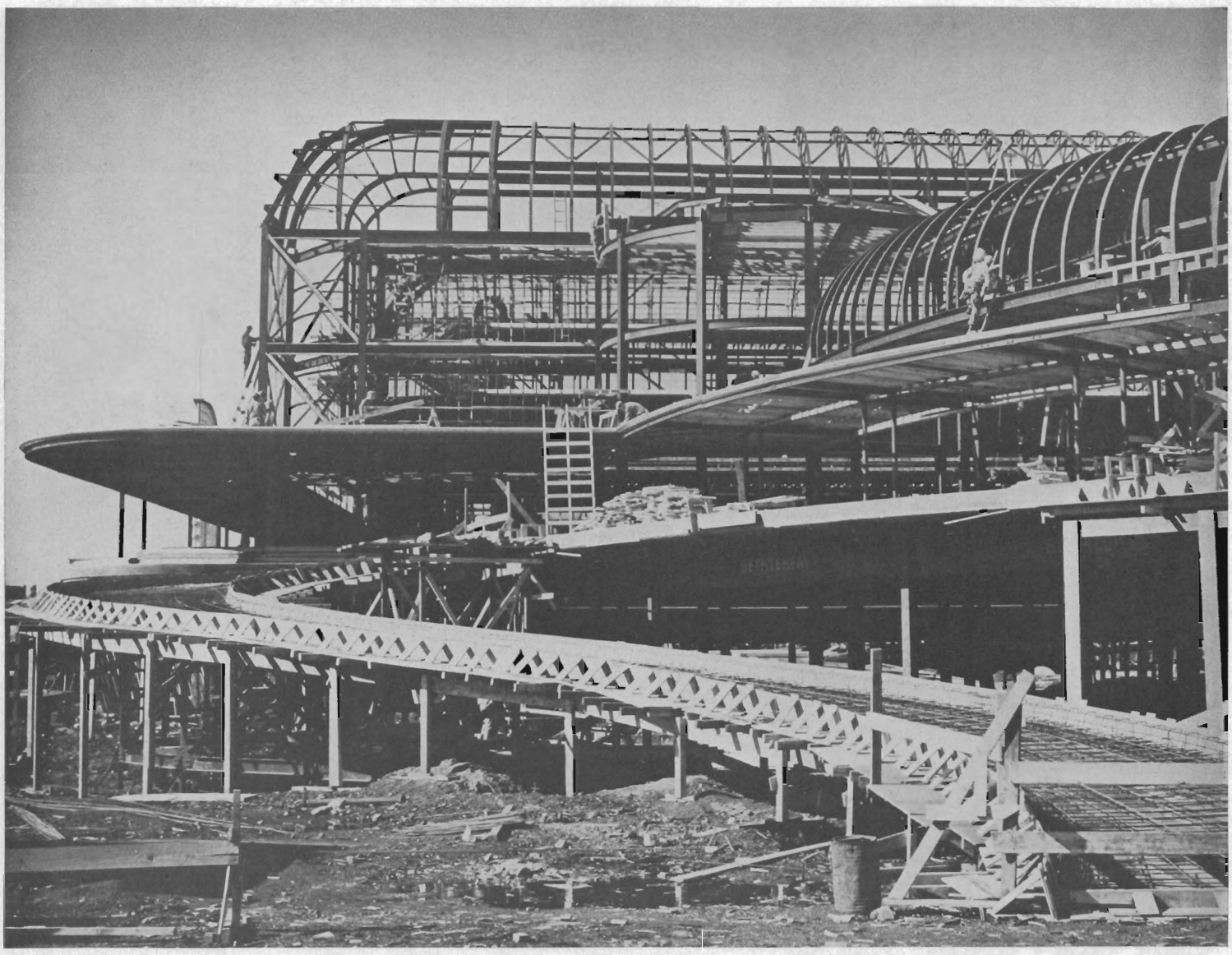
ANOTHER industry-wide exhibit, this building makes use of glass in block, plate, and structural forms to demonstrate its properties: strength, transparency, and precision. The structure is multi-level, designed for one-way traffic (see plan, right). Among its novel features will be a glass-paved terrace, a stairway and ramp of the new case-hardened plate, and a decorative tower of blue plate.



Model

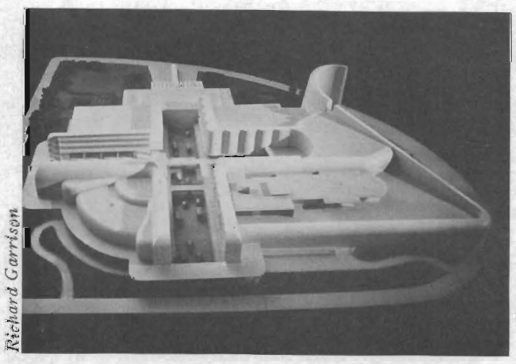


Plan, main floor. 1. History of glass. 2. Hot-glass exhibit. 3. Manufacture. 4. Chart of glass. 5. Properties of glass. 6. Glass-fibre machine. 7. Glass in the home.



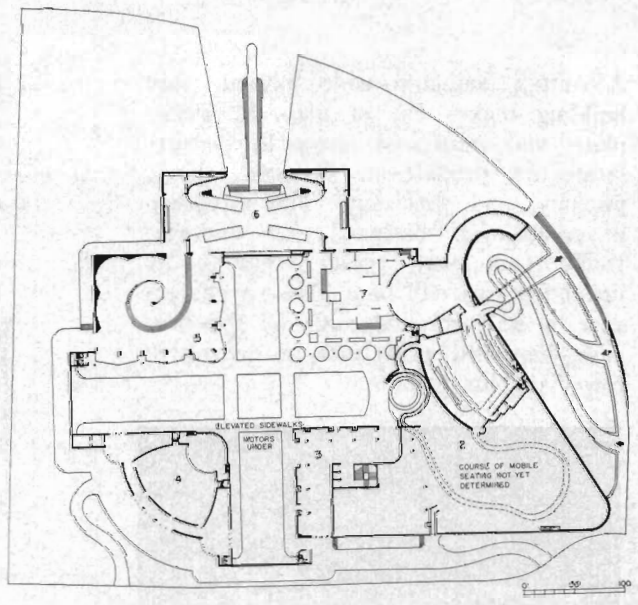
6. GENERAL MOTORS CORP.

NORMAN BEL GEDDES, Designer
ALBERT KAHN, Architect

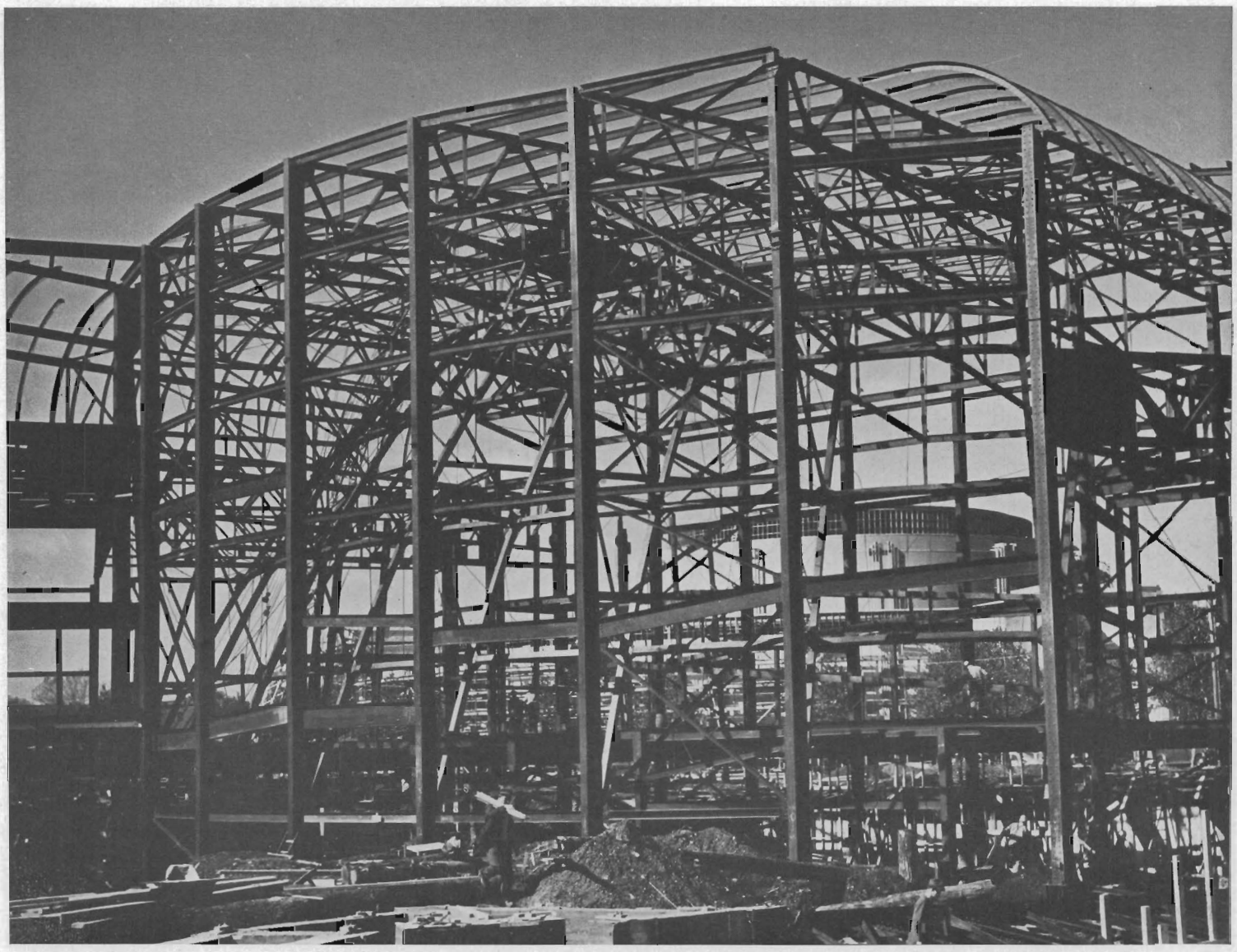


Richard Garrison

Model



Plan, main floor: 1. Main entrance and loading platform. 2. Display space for model town. Moving chairs on ramp will take visitors through exhibit. 3. Apartment and hotel display. 4. Auditorium. 5. Automobile display. 6. Entrance and Diesel display. 7. Frigidaire display.

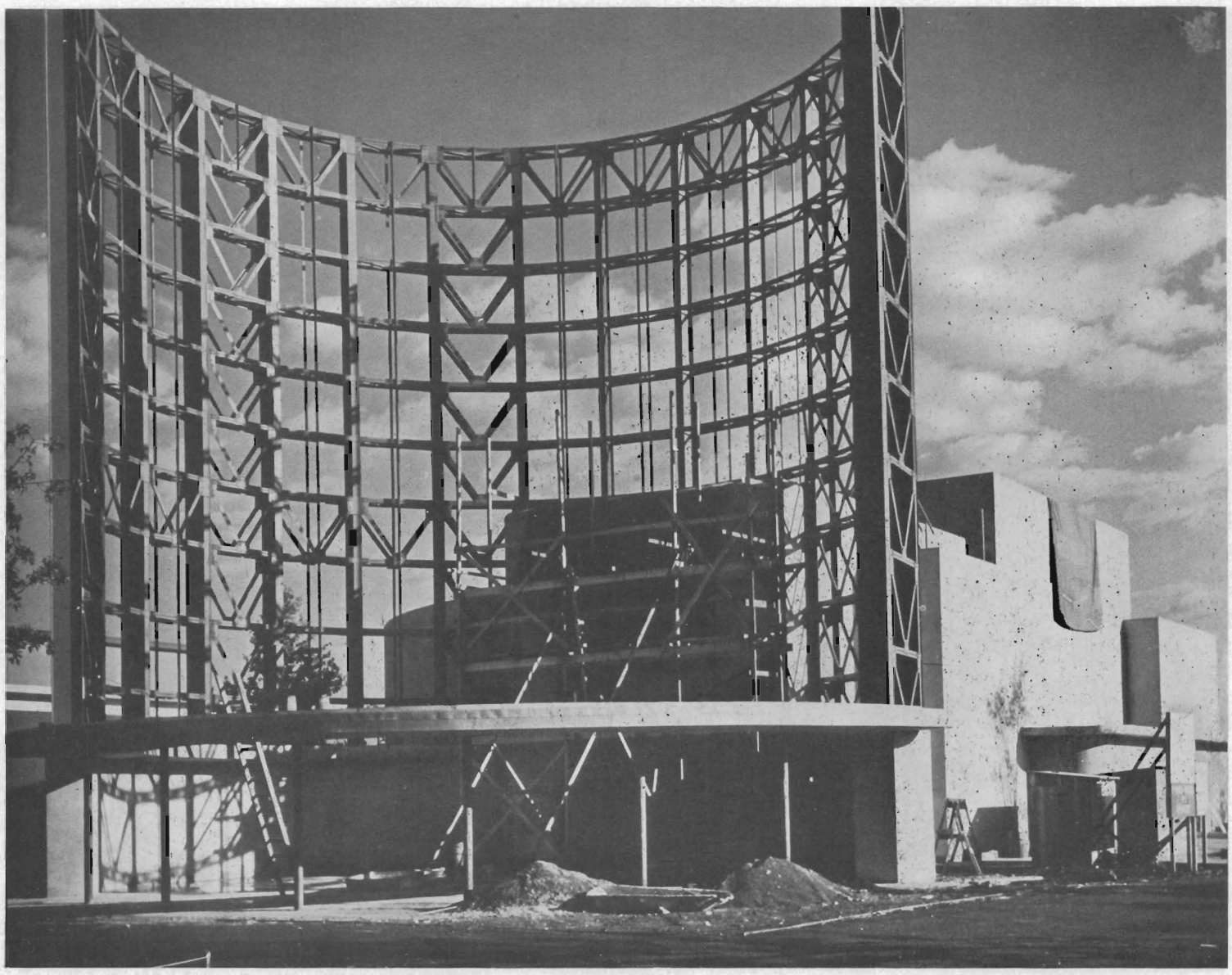


THE LIGHT but elaborate steel framing of the G-M building grows out of the design problem of housing an exhibit which not only focuses on the mobility resulting from the development of the motor car but also attempts to express architecturally the concepts of "streamlining" now current in the automotive field. Thus the full-scale model of an urban street intersection of the future (complete with elevated pedestrian walks, full-sized motor filled streets, and life-size modern buildings) is an expression of the first requirement. The curving walls, rounded parapets and "streamlined" lettering are expressions of the second.

Notable feature of the exhibit will be the street intersection (open cruciform in model, facing page) flanked by four full-size buildings—apartment hotel, theatre, sales and office building, retail store. This last will boast circular showcases which rise as a unit to upper floors for changes in display.

Although the exhibit has three entrances and is multi-level, the main traffic stream will be routed through the major entrance along a series of spectacular ramps into a loading room (1 on plan). From this point visitors will be carried —on an escalator comfortably equipped with paired seats—through a huge introductory diorama (2 on plan) showing potential traffic facilities of the future. In the rest of the exhibit, traffic is not controlled.

Exterior finish will be a new lacquer developed for auto bodies, applied to stucco with air brush.

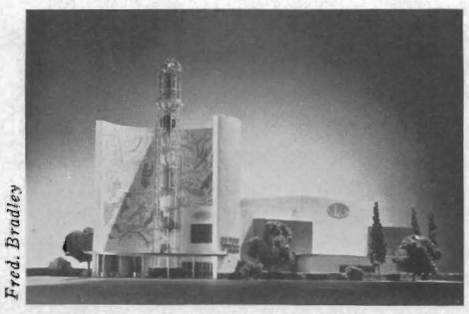


7. E. I. DUPONT DE NEMOURS & CO.

WALTER DORWIN TEAGUE, Designer of Exhibit

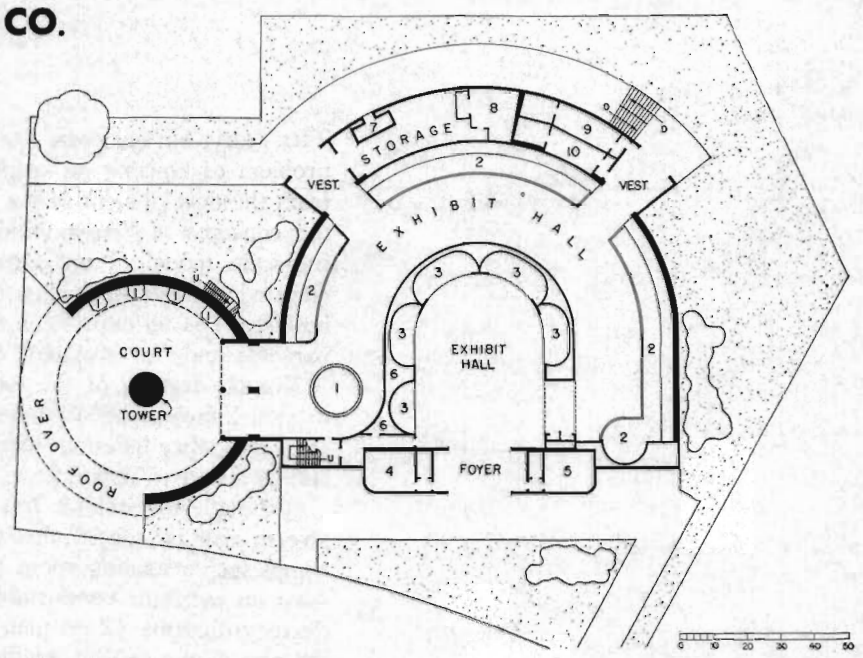
ROBERT J. HARPER, Associate

A. M. ERICKSON, Engineer



Fred. Bradley

Model

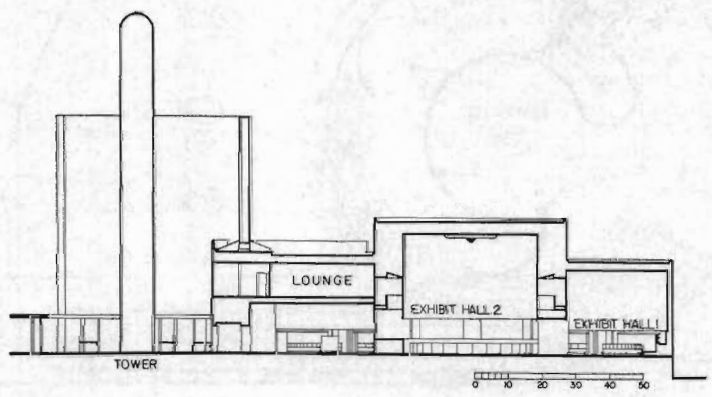


Plan, Main floor. 1. Display cases. 2. Exhibit platform. 3. Dioramas. 4. Men's rest room. 5. Women's rest room. 6. Service. 7. Transformer vault. 8. Air conditioning. 9. Women's lockers. 10. Men's lockers.

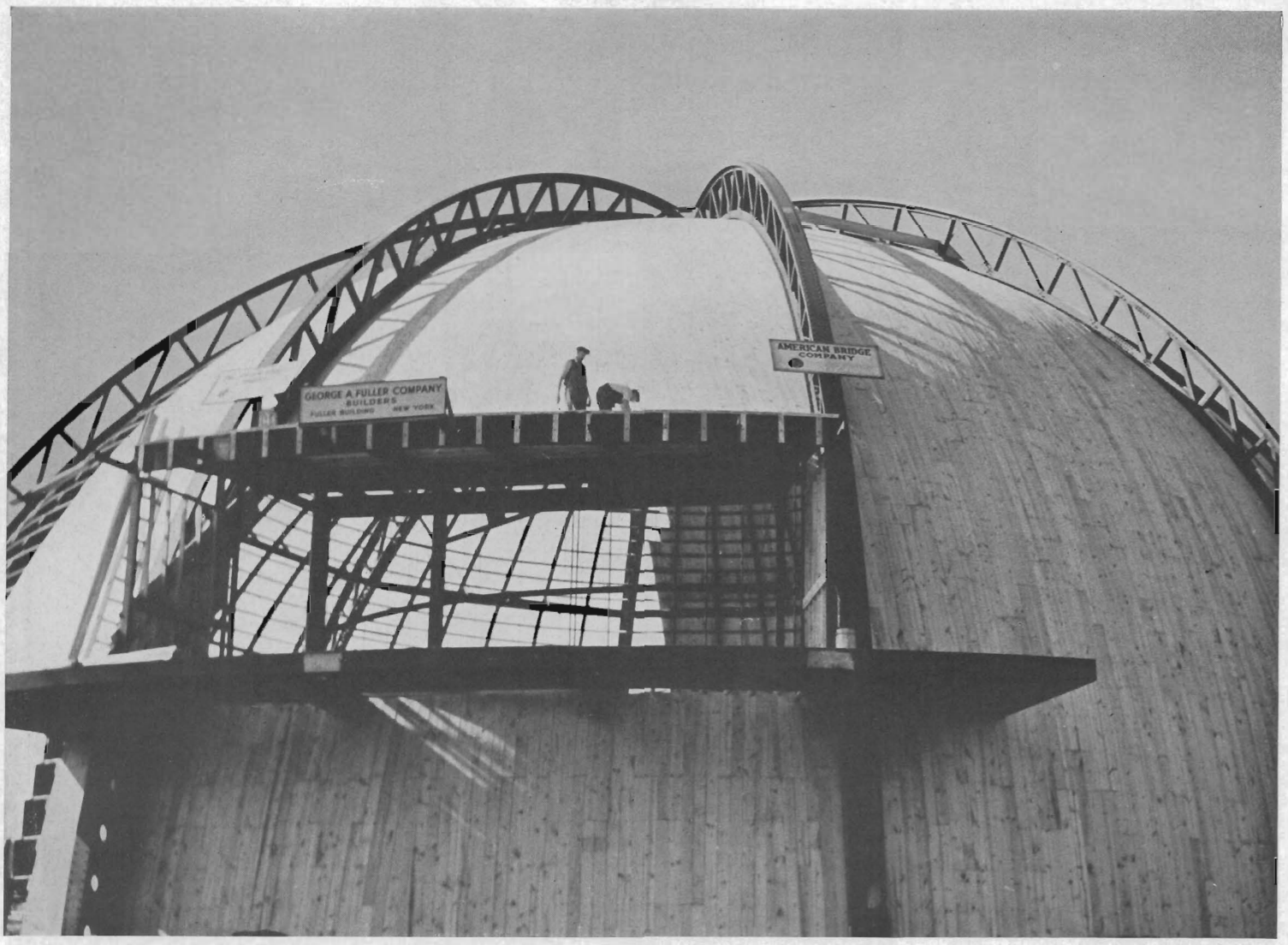
MAIN ARCHITECTURAL emphasis of the DuPont building was originally scheduled to have been "one of the largest murals ever executed" on the plastered surface of the semicylindrical entrance court (bottom, facing page). As the steel framing—designed to withstand wind pressures created by its odd shape—went up, its decorative possibilities became increasingly apparent (right); it has now been decided to leave it unplastered.

The exhibits are organized in sequence for one-way traffic. The entrance court is centered by a 100-ft. tower consisting of laboratory equipment, greatly enlarged.

Active displays of chemical processes will be arranged in the outer hall, while in the central room 5 small stages will be used for a marionette production. Many of the exhibitors' own products—plastics, enamels, fabrics—are incorporated in the building itself.

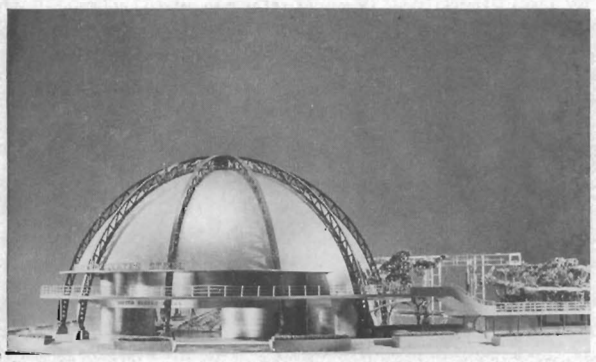


Longitudinal section



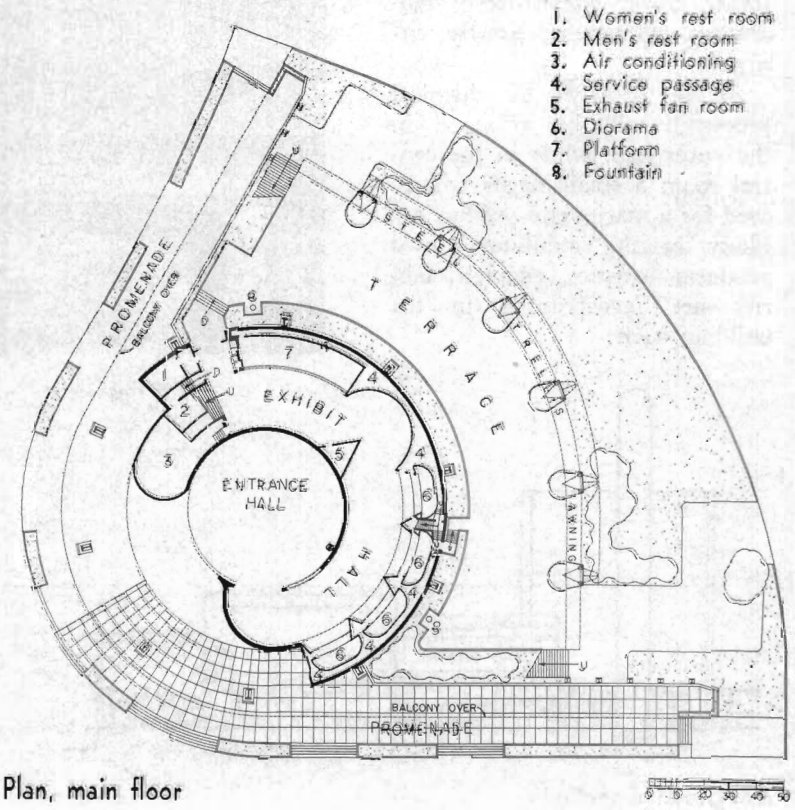
8. UNITED STATES STEEL

WALTER DORWIN TEAGUE, Designer of Exhibit
GEORGE FOSTER HARRELL, Associate
YORK & SAWYER, Architects



John Wolfe

Model

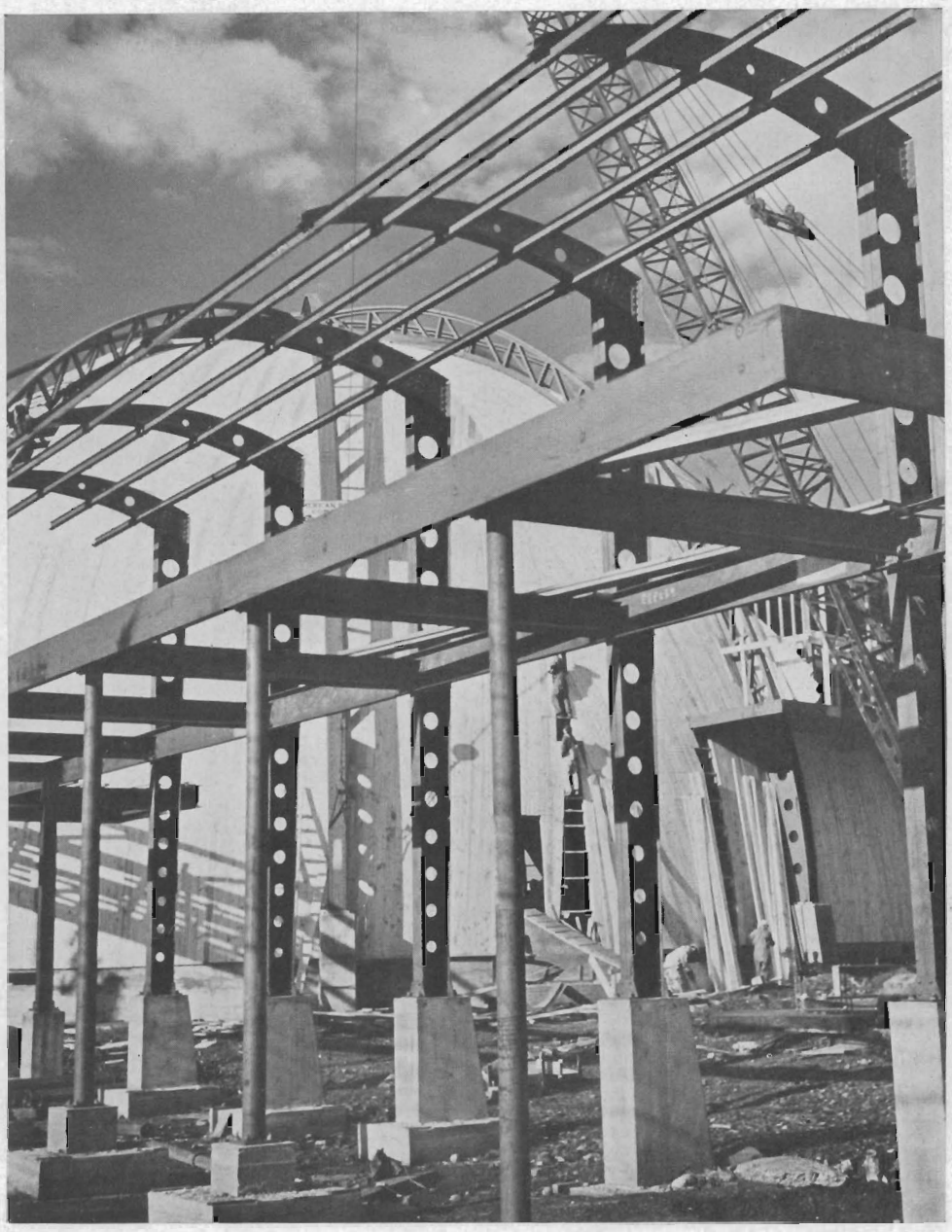


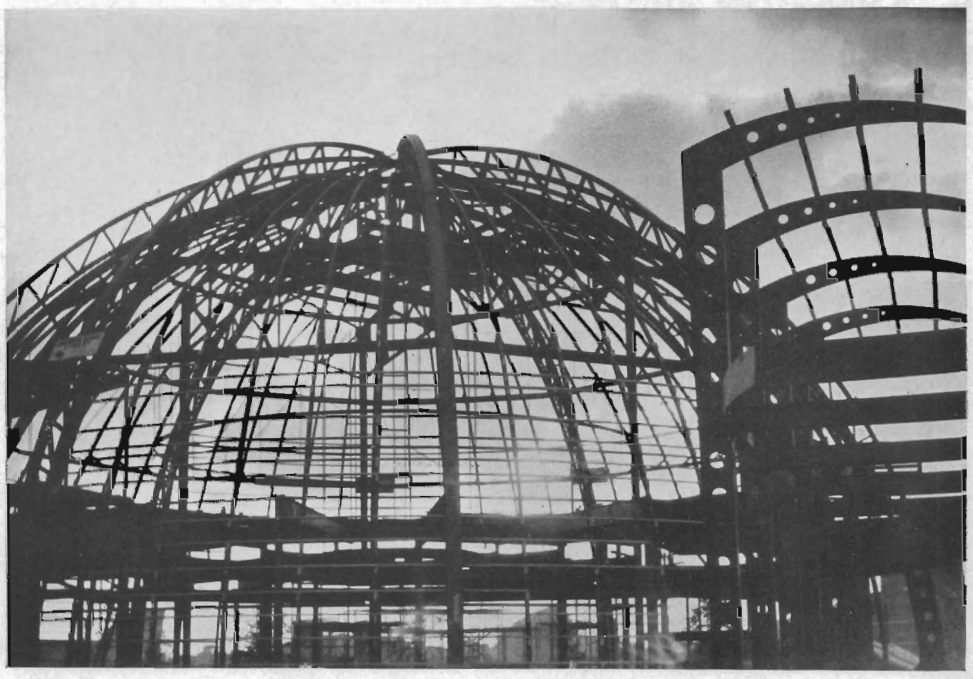
Plan, main floor

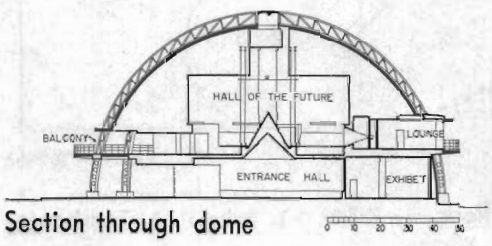
U. S. STEEL is one of the few exhibitors at the Fair whose building will itself be largely fabricated of its own products — steel and concrete. From the dome, with its stainless steel shell hung from five intersecting open-web arches, to the elaborate treillage employing various steel members (right), the structure will demonstrate the multiple uses of steel in specific design problems. Most notable structural application is in the dome itself (right, below) which — with a relatively light and simple construction—gives an unbroken floor area of approximately 15,000 sq. ft. and a maximum height of 65 ft. Stainless steel will be used in a number of forms for surfacing — in corrugated panels on some of the outer walls, in specially fabricated curved sheets on the dome, in paper-thin sheets on interior walls; exterior flooring on the rear balcony is of multi-grip steel floor plates. Much of the interior trim and finish will be of steel in various commercially available forms.

The plan is organized to permit an orderly and easy flow of traffic through the exhibit, which occupies two floors. Entering the circular Entrance Hall (bottom, facing page), traffic flows through a semicircular corridor (whose outside walls are lined with dioramas depicting manufacture of steel products), up the stairs into a circular "Hall of the Future", out onto the balconies and down the exterior steps.

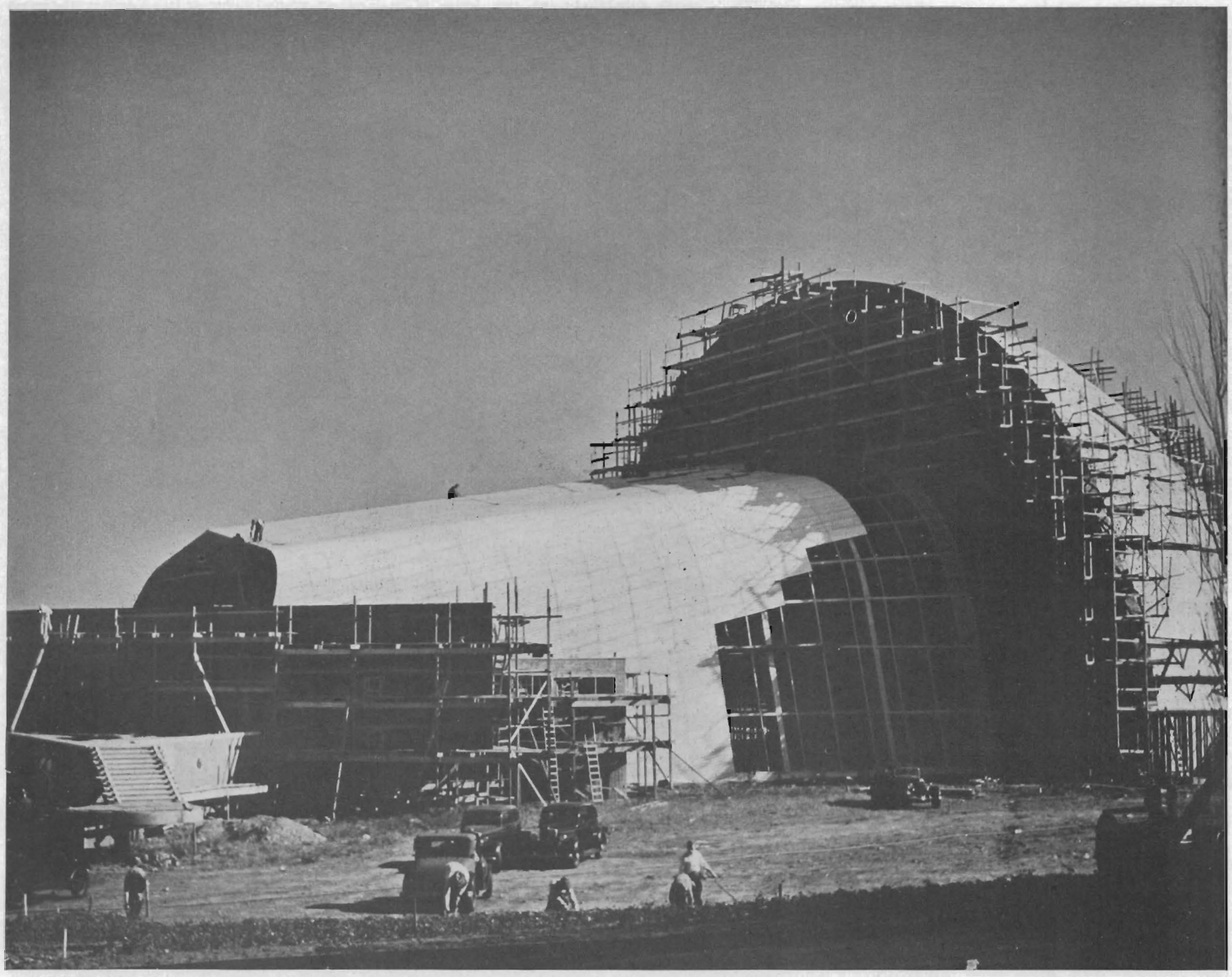
Externally, the building will be in stainless steel, except for structural members, which will be painted blue.





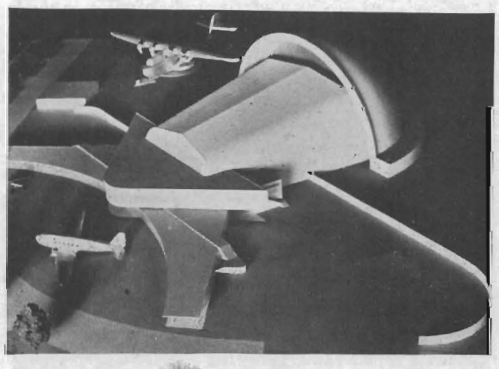


Section through dome

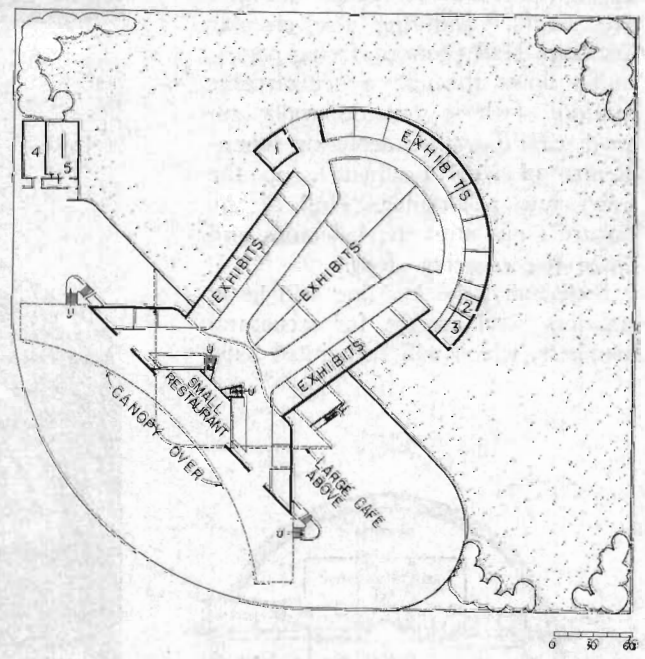


9. AVIATION BUILDING

WILLIAM LESCAZE and GORDON CARR
Associated Architects



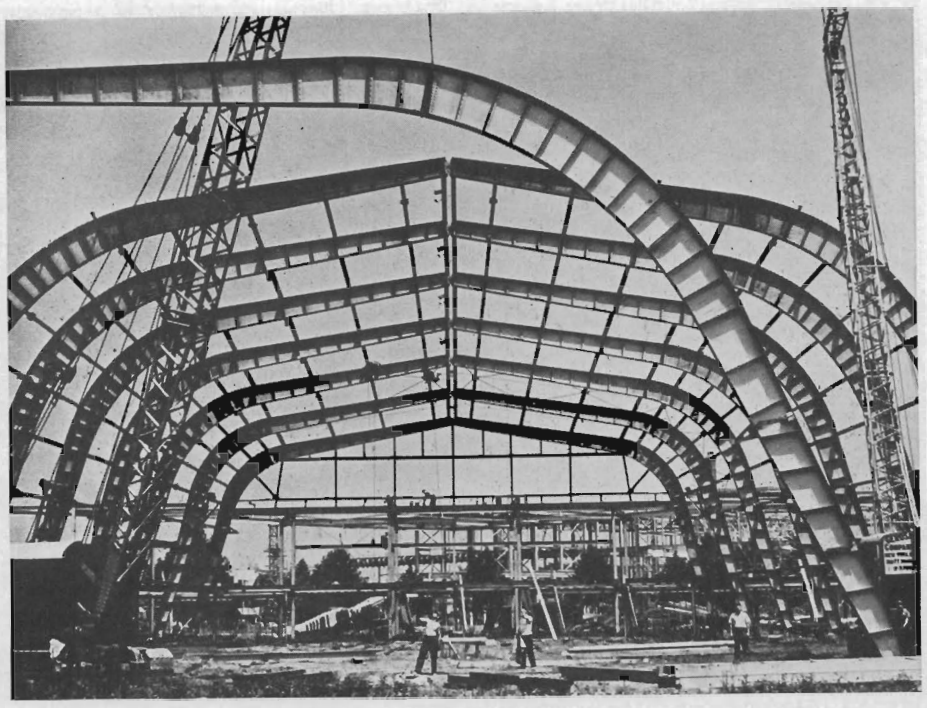
Model

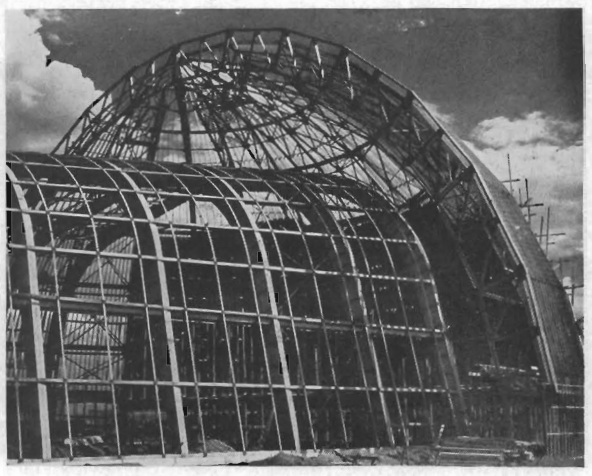


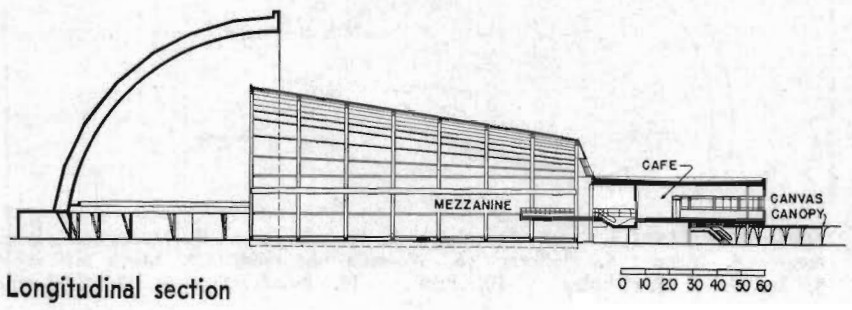
Plan, main floor. 1. Utility. 2. Switch. 3. Transformer. 4. Men. 5. Women

ANOTHER OF THE structures notable for its steelwork is the Aviation Building. It is one of the few Fair-built structures which departs from the standards of design governing general exhibit buildings (see p. 89). Although its general form is representational of "flight in space", the Aviation Building actually fills two basic requirements: a large floor area, and sufficient internal height in which to suspend a modern skyliner. The problem of a low-cost, rigid envelope has been solved by the designers in the use of two structural systems — shop fabricated, solid-section, hinged arches for the cone (top, right) and open-web arches of more usual design in the semisphere (center, right). The former is sheathed in corrugated asbestos, the latter in canvas. Another feature is the huge stressed-canvas canopy across the entire front (see plan, facing page). Laced, ship style, to a system of braced tubular steel columns, the canopy is anchored by means of tie-rods to concrete blocks at each end.

The exhibit space is confined to one floor, with no provisions for traffic control. Focal point of the display will be the plane, suspended in the open semi-spherical dome on whose cement-plastered surface cloud and light effects will be projected to create illusion of movement. The triangular "prow" on the second floor will house a large cafe, with auxiliary services.





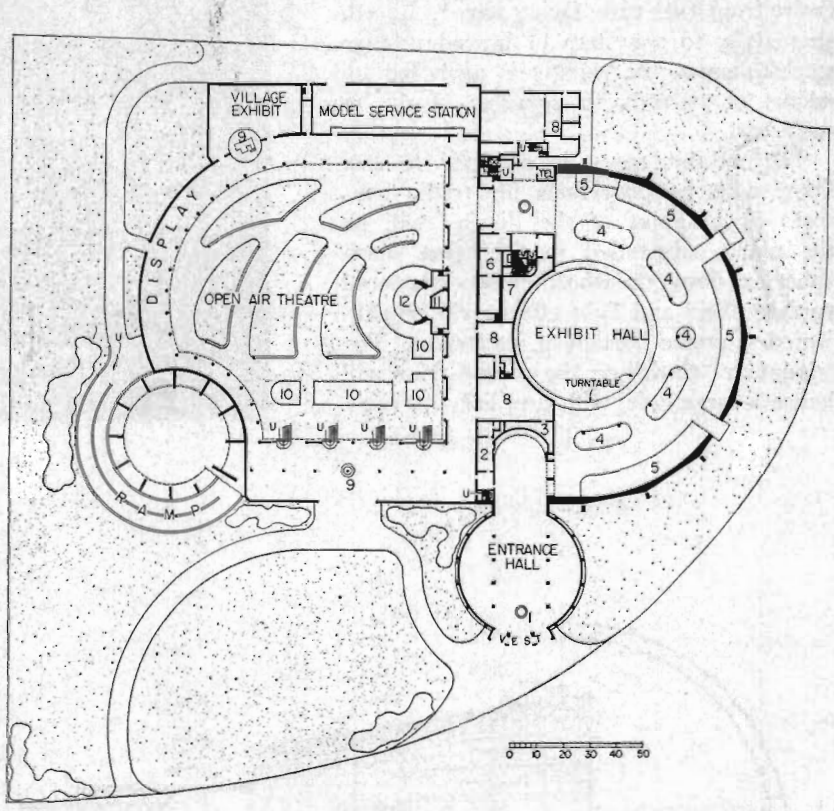


Longitudinal section

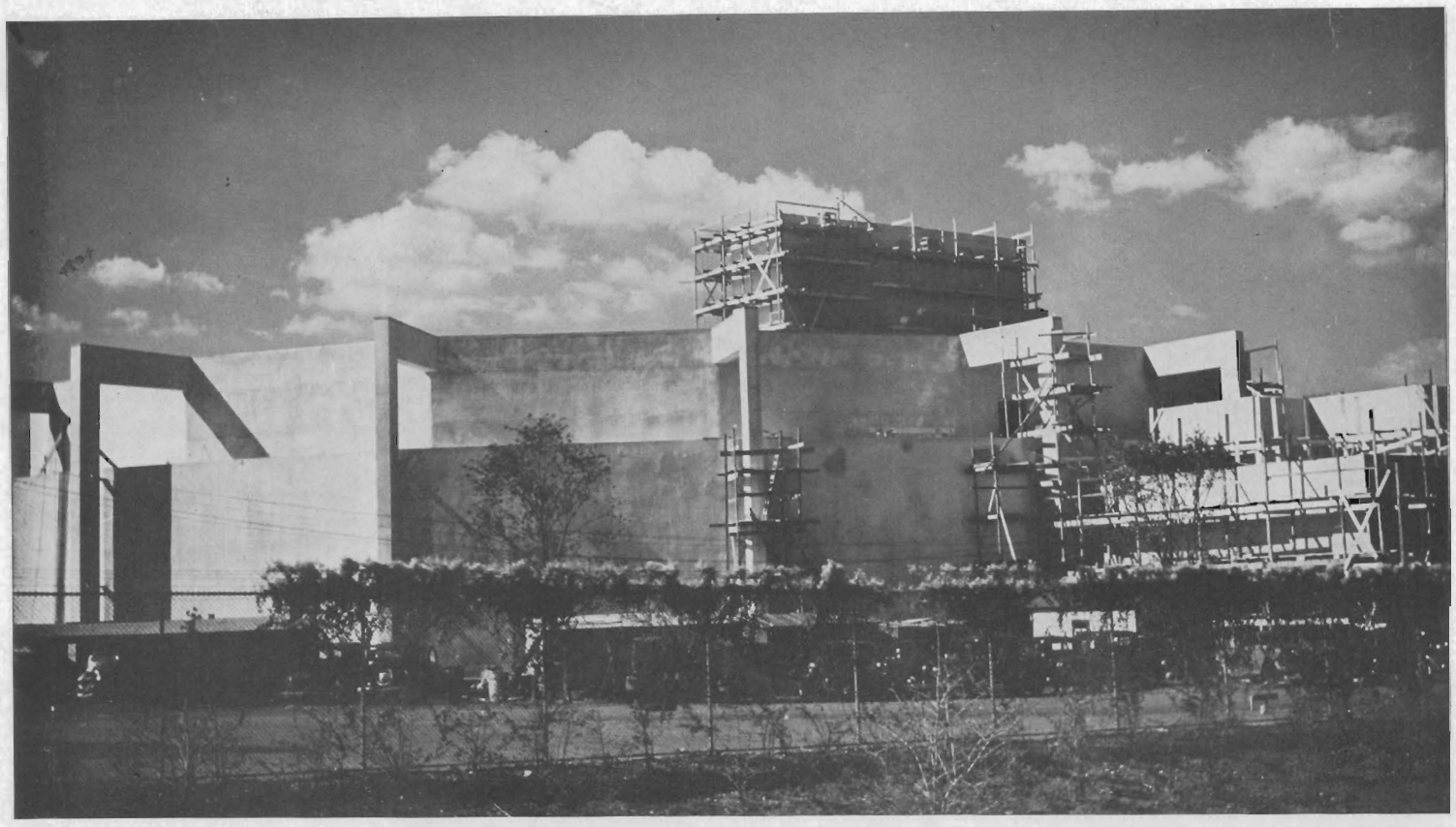
10. FORD MOTOR COMPANY

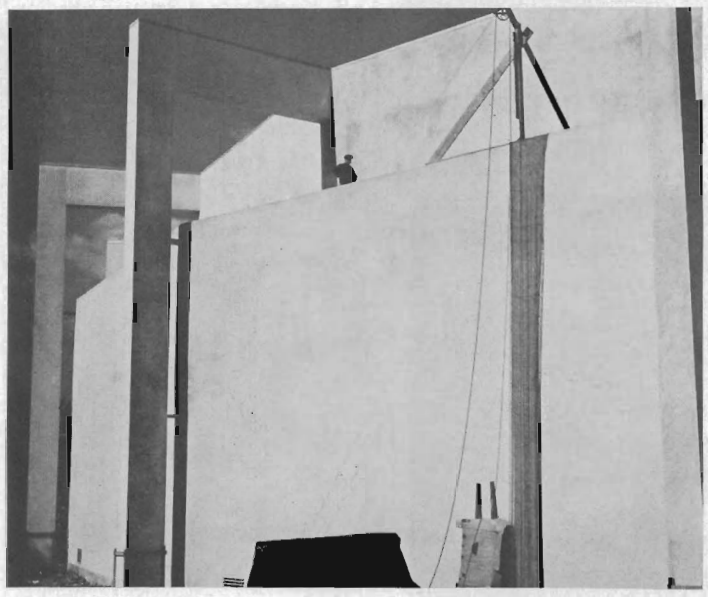
WALTER DORWIN TEAGUE, Designer of Exhibit
CHARLES C. COLBY and RUSSELL R. KILBURN, Associates
ALBERT KAHN, Architect

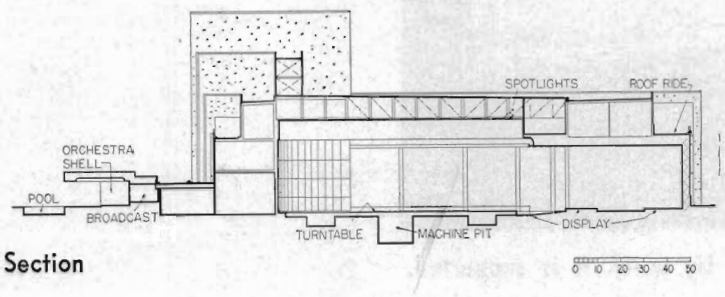
Model



Plan, main floor: 1. Information desk 2. First-aid room 3. Mechanical equipment 4. Island 5. Platform 6. Women's rest room 7. Men's rest room 8. Service 9. Display 10. Pool 11. Broadcasting 12. Orchestra







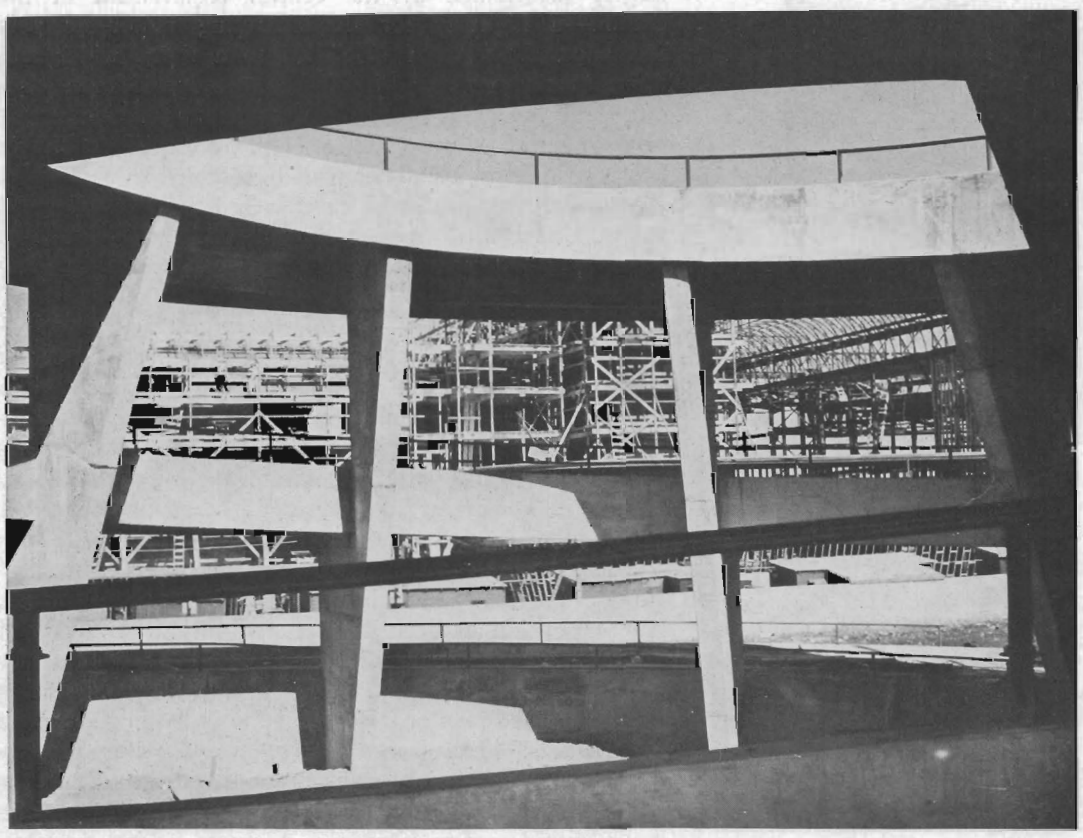
Section

BOTH CONSTRUCTION and plan of the Ford building were largely determined by the central requirement of the exhibit—a highway for demonstrating motor-car performance. This "roof ride" led to a much wider and more spectacular use of reinforced concrete than elsewhere at the Fair. In both spiral ramp (facing page) and steps to loading platform (top, over page), concrete has been used in a manner usually confined to permanent structures. Notable is the cantilevered three-tiered spiral ramp; a truncated cone in section, this ramp is carried by a ring of columns around its inner circumference (bottom, over page).

In plan, the exhibit—one of the largest at the Fair—is organized around a 100-foot turntable in the center of the large exhibit hall. Mechanical and other displays are placed across a semi-circular aisle around the turntable. Leaving this part of the exhibit, the visitor passes into a large patio, which is surounded by the half-mile "Roads of Tomorrow," an elevated roadway winding over the building and around the garden at various levels. The musical programs, which are an integral part of Ford promotion, had to be provided for in the structure. But exposition audiences differ radically from those of radio: they move on a casual schedule and consequently require not only different music but also different seating facilities. The plan of the Ford patio is designed to meet these needs. The irregular tree-shaded paths roughly circle the orchestra platform; the sides furthest from the platform are lined with benches; thus the audience can move with complete freedom. A studio behind the platform provides complete broadcasting facilities.

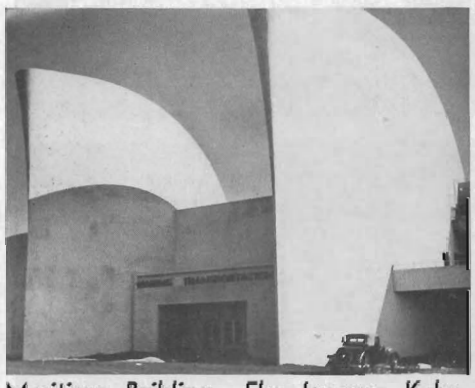
FORD MOTOR COMPANY

Entrance to loading platform of "roof ride" is by means of cantilevered concrete stairs.

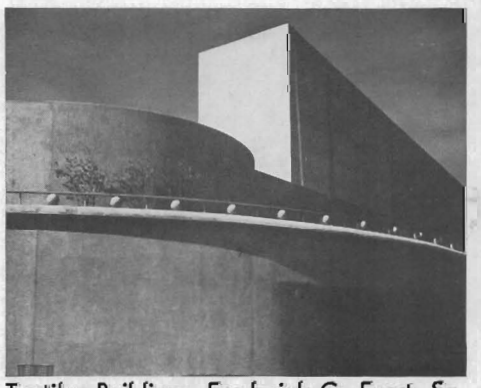


Interior detail of spiral ramp on "roof ride", showing method by which it is supported.

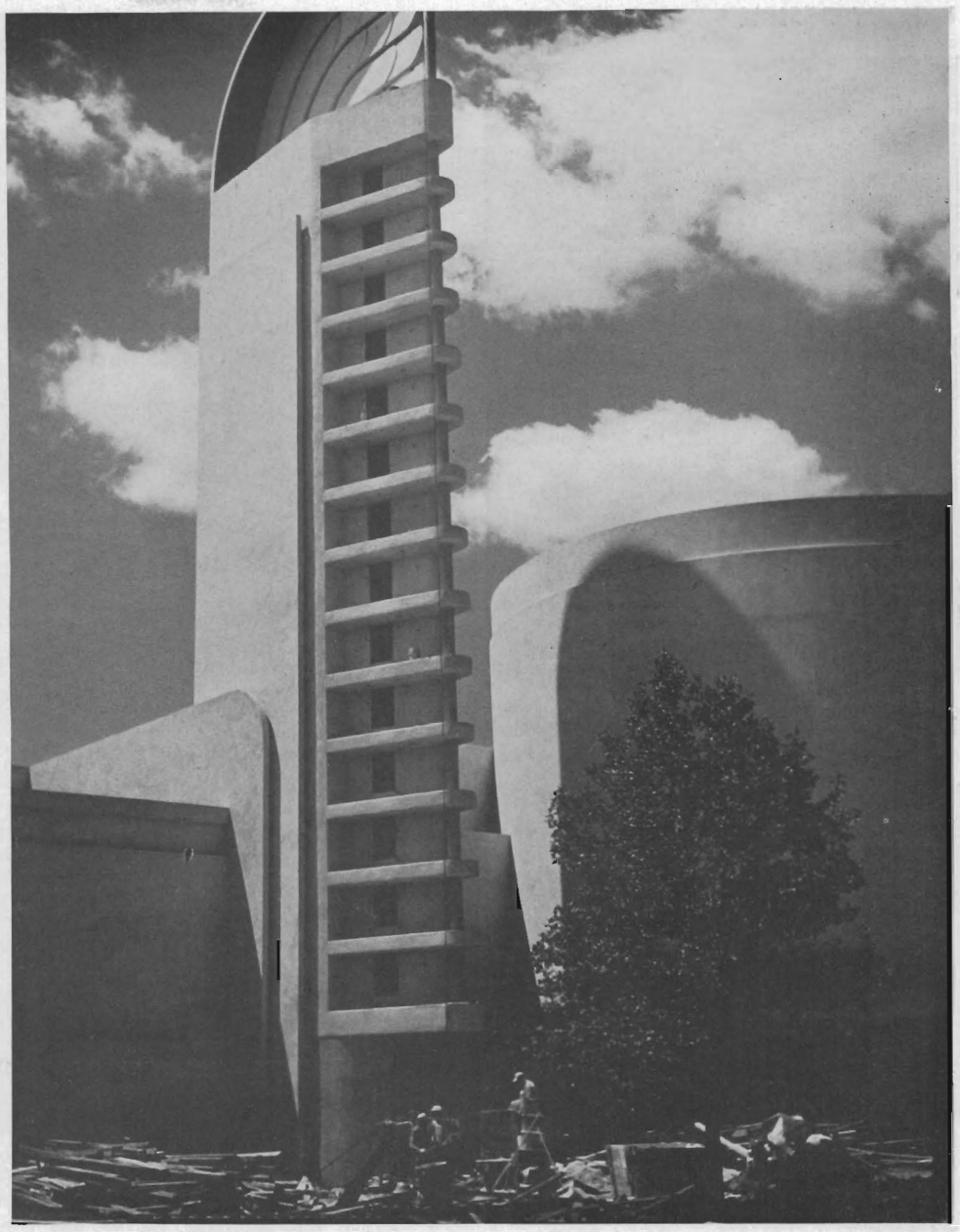
Chemicals and Plastics Building. Joseph H. Freedlander, Maximilian Bohm, and Charles Beeston, architects.



Maritime Building. Ely Jacques Kahn, Muschenheim and Brounn, architects.



Textiles Building. Frederick G. Frost, Sr., Frederick G. Frost, Jr., and Ward W. Fenner, architects.



Decorative pylons, Transportation Building. James Gamble Rogers, architect.

EXHIBIT DESIGN

JOHN P. HOGAN*

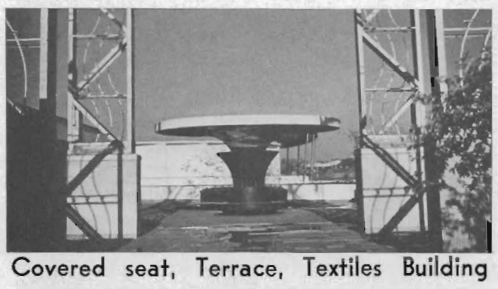
THERE WILL BE in all on the Fair Site about 375 structures ranging from information booths and concession stands to pumping stations and exhibit buildings. Of the major structures, 100 will be exhibit buildings and 50 amusement concessions.

Of the 100 or more exhibit buildings, the Fair Corporation will construct only about one-third. Most of the Corporation buildings were completed before the other exhibitors began to build. With some notable exceptions, the general character of the buildings has followed the principles, both in interior arrangement and in details of construction, which were established by the Corporation. As the general plan was completed, Fair buildings were located throughout the exhibit area in strategic places in order that they might serve as a control for the architecture of the buildings to be constructed by exhibitors.

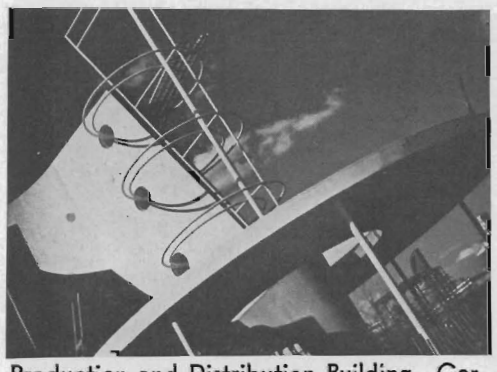
In the Government Area, where a greater variation was to be expected in buildings constructed by foreign nations, unity was retained by grouping the government buildings and the pavilions to be occupied by foreign nations (who are not erecting their own buildings) around a central court. The Board of Design did not itself design the Fair-owned exhibit buildings, although some of the members in their private capacity were architects for other exhibitors. Architects, or in many instances groups of architects, were selected for the design of the Fair-owned exhibit buildings on a program prepared by the Board of Design. In this way, and through the

* Chief Engineer and Director of Construction, New York World's Fair 1939

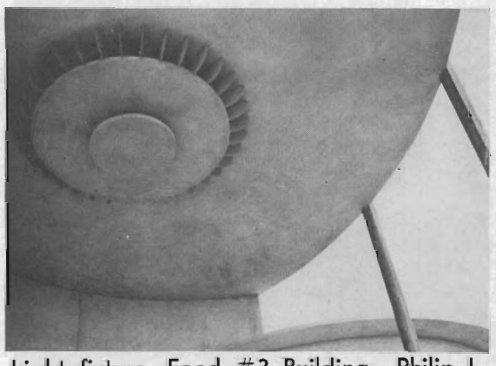
EXHIBIT DESIGN



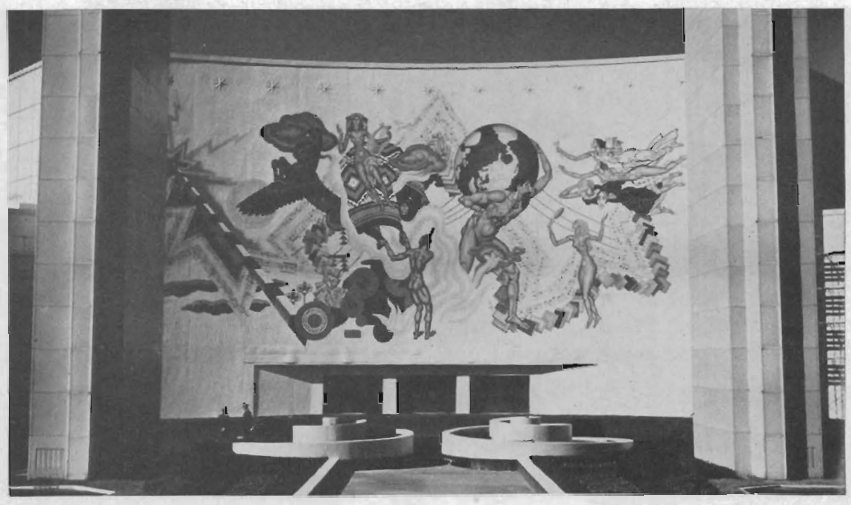
Covered seat, Terrace, Textiles Building



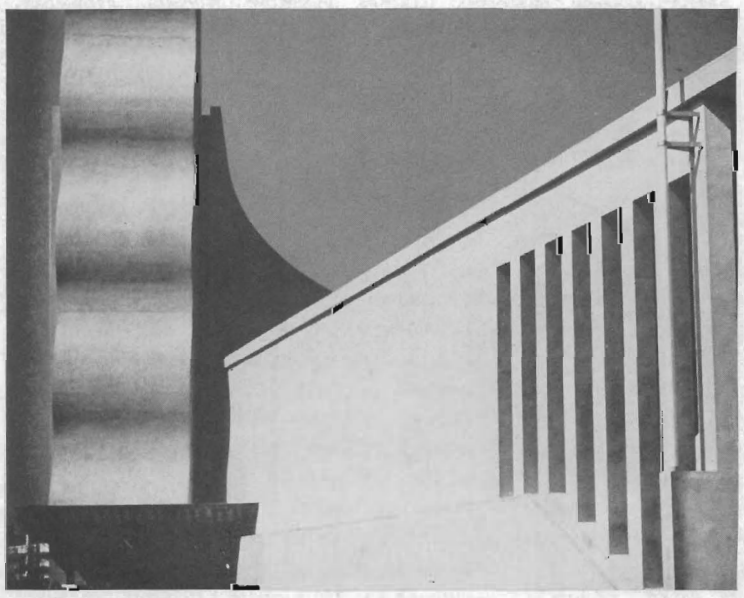
Production and Distribution Building. Corbett and MacMurray, Robert W. Cutler, architects.

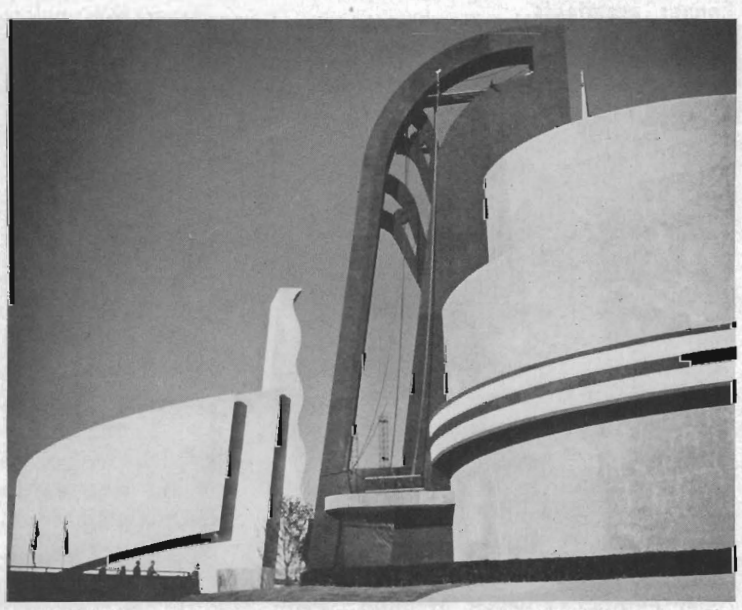


Light fixture, Food #3 Building. Philip L. Goodwin, Eric Kebbon, Edward D. Stone, Richard Snow, and Morris Ketchum, Jr., architects.

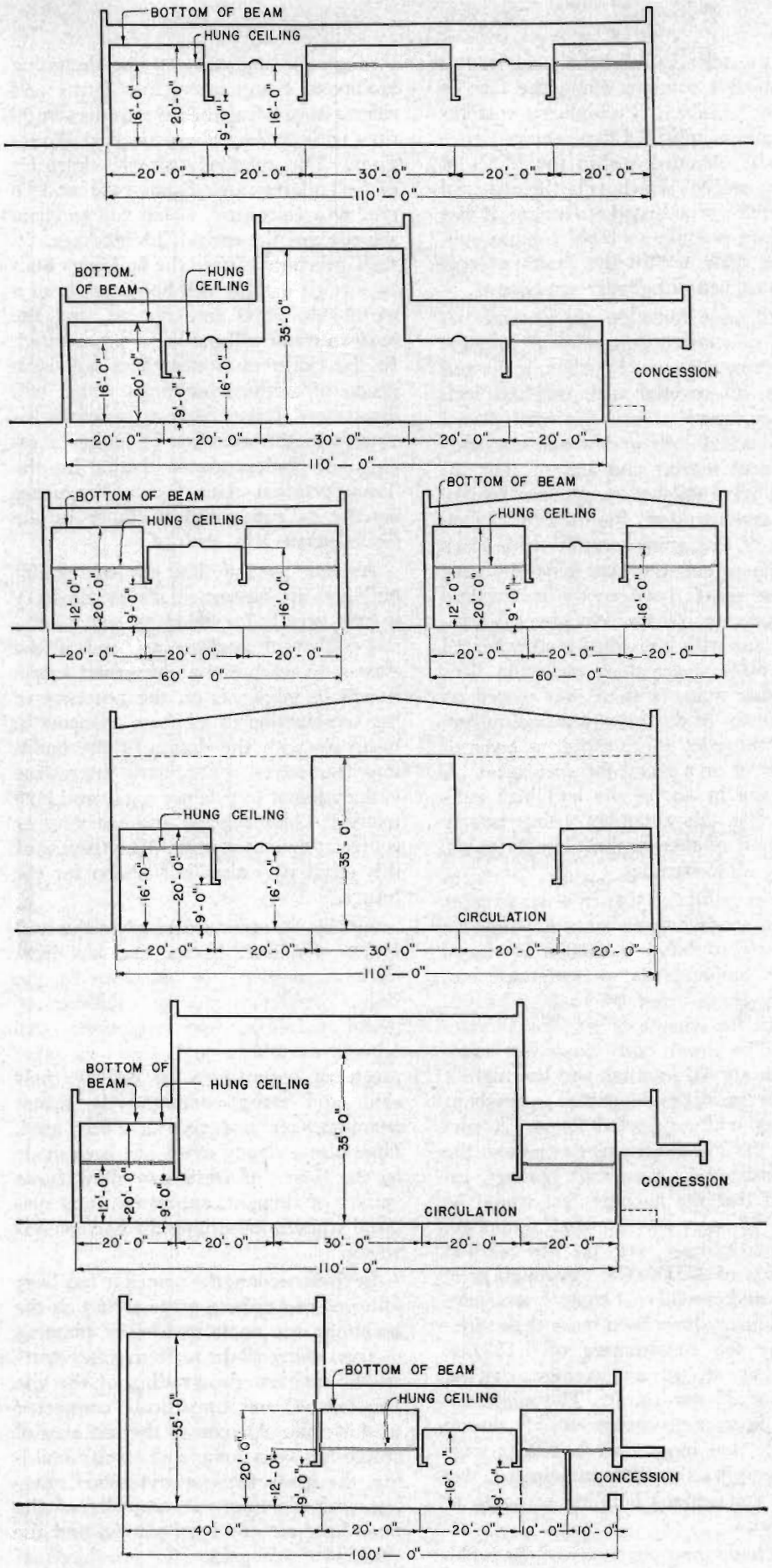


Top: Communications Building. Francis Keally and Leonard Dean, architects; Eugene Savage, muralist. Bottom: Food #2 Building. Aspinwall and Simpson, M. W. del Gaudio, architects; Carlo Ciampaglia, muralist.





Left, Hall of Pharmacy. Pleasants Pennington, George L. Payne, Jr., I. Woodner-Silverman, architects. Right, Electrical Products Building. Walker and Gillette, architects.



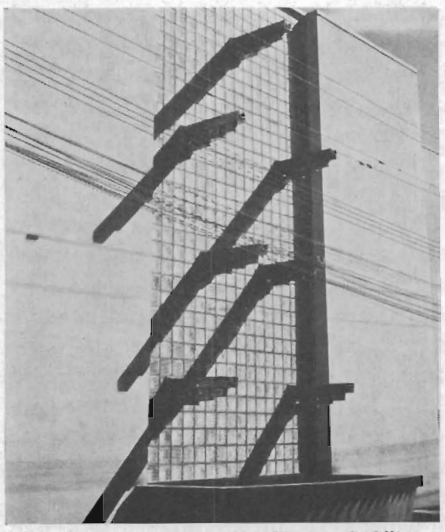
Architects of the 30-odd Corporation buildings were guided by these basic types; evolved by the Fair staff, they embody the standards here described.

freedom of individual exhibitors to select their own architects, literally hundreds of architects, sculptors, and mural painters have participated in the preparation of the Fair. All plans from Fair architects or architects of exhibitors were reviewed by the Board of Design, and in most instances were modified by suggestions from the Board.

The purpose of this control was to create a certain amount of unity without uniformity, and insofar as possible, to avoid a lack of cohesion. For the same reasons, general control of light and color within reasonable bounds was exercised by the Board of Design in uniformity with a general light and color scheme prepared by the consultants of the Board. Proper landscaping was made mandatory and while very considerable latitude was allowed, pressure was brought on all exhibitors to present satisfactory landscape plans.

In determining the program for the World's Fair exhibit buildings, it was necessary for three separate departments of the Fair to cooperate, the Board of Design, the Construction Department, and the Department of Exhibits and Concessions. The Fair had been zoned by the Board of Design into eight main sectors, and it was the duty of Management to determine the amount of space in Fair Buildings which should be assigned to each sector and to determine the size of the Fair buildings which should be located in each sector. Management decided that there should be provided in the Fair-owned exhibit buildings 450,000 net sq. ft. of exhibit space, 100,000 sq. ft. of gross space for stores and restaurants, and 40,000 sq. ft. of net space for concessions. They also made suggestions in regard to the most saleable arrangement of this space based upon the experience of other Fairs.

As the Board of Design is a board of review and not an administrative branch of the Corporation, it was decided that the Construction Department was to prepare all working drawings based on approved definitive designs of contract architects, and to construct all buildings either by contract or with forces employed by it, which placed the important element of cost control in the Construction Department, and also the responsibility of carrying out into detailed design architectural conceptions of the contract architects as approved by the Board of Design. The Construction Department was also charged with the administration of the entire construction budget and preparation of detailed land-



Fountain, Metals Building. William Gehron, Morris & O'Connor, architects.

scape plans, detailed lighting plans, and the enlargements and erection of murals and sculptures from models approved by the Board of Design.

The requirements of both Management and exhibitors were analyzed, and four important determinations were reached: First, that the buildings should be one story, with entrances level from the streets and sidewalks. Second, that since the bulidings were to be occupied by a number of exhibitors it would be impossible to secure good results in lighting and decoration unless complete reliance was placed upon interior lighting. This brought about a decision to have no windows. Third, that the interior should be susceptible to division into minimum units 20 by 20 ft. or multiples thereof, wherever the exhibit space was located on the side with a central aisle. Wherever a central exhibit space was provided with an aisle on each side, it was decided to make this central island 30 ft. wide. Fourth, that all aisles were to be 20 ft. wide.

This led to a typical arrangement of buildings either 60 ft. wide with two exhibit spaces and a central aisle, or buildings 110 ft. wide with two aisles, two side exhibit spaces, and a central exhibit. This determined the economical plan of the Fair buildings and was followed generally, although domes and rotundas were provided for points of special interest.

Based upon these determinations, a careful structural study was made on the various possibilities of economical construction. Many types of material were investigated and economics finally dictated the selection of light steel frames and interior columns along the face of the side exhibits. Preliminary cost investigations indicated that required space could be obtained within the limits of cost in stucco, which was the material preferred by the Board of Design. It was therefore possible to build a more substantial Fair within the limits of cost than had been originally anticipated.

With some variation, the general materials of construction were as follows: steel frame with wood purlins, joists and rafters, all covered with one-half inch gypsum board. Over this was placed paper-backed lath and about one inch of cement mortar and stucco. The interiors were finished in gypsum boards, taped and sparkled. Floors were of four inches of fine stone covered with black top. Hung ceilings were generally used and the spaces between the ceiling and roof serves as plenum chambers for exhaust fans with individual motors placed about 50 ft. apart along each side. For insulating material there was placed on the interior of the outer wall and underneath the roof joists either a layer of rock wool or a metal foil insulation. A small fire in one of the buildings indicated that this assembly, being largely composed of non-combustible materials, is very slow burning.

It was estimated that in order to meet the net space requirements it would be necessary to build 1,400,000 sq. ft. of exhibit buildings at an estimated cost per sq. ft. of from $4 to $6, depending on the character of the foundation. The lower costs were for buildings on spread footings and the highest cost for buildings supported throughout on piles with supported floors. A survey of the soil conditions throughout the site, assisted by numerous borings, indicated that the average cost would be about $5 per sq. ft., and a budget was accordingly set up for exhibit buildings of $7,000,000. Through good design and careful cost control, the space requirements have been more than satisfied by the construction of 1,159,000 gross sq. ft. at an average cost of about $5.25 per sq. ft. The slight increase in average cost is entirely due to the fact that more Fair buildings were built on piles than was anticipated, due to the tremendous building program of exhibitors.

The temporary character of the buildings and the need for economy dictated a rather plain type of building, but through the ingenuity of the designing architects, many interesting forms and shapes have been worked into the structures without exceeding the cost limitations. The relatively simple character of the buildings also dictated the modern type of architecture, which will be characteristic of the entire Exhibit Area. In the Government Area the buildings built by foreign nations will be generally of a more substantial construction, and the modern trend will not be so pronounced. In the Court of States there will be a group of thirteen buildings which will illustrate different early types of architecture in this country, including a replica of Independence Hall. In the Transportation Area the buildings are equally as substantial as those in the Government area will be.

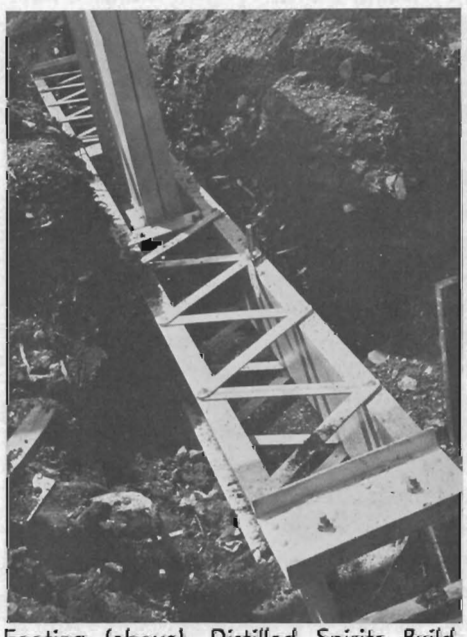
As far as the Fair-owned exhibit buildings are concerned, it was necessary to rely greatly for effect on color, light, and elaborate landscaping, and if the Fair is to teach any architectural lesson it will be emphasis on the necessity of the combination of all these elements in harmony with the design of the buildings themselves. Particularly interesting is the attempt to produce a gay and harmonious color scheme without varying contrasts or incongruity. The success of this effort may also be a lesson for the future.

Finally, in order to complete the decorative features, liberal use has been made throughout the site both by the Fair Corporation and by exhibitors of mural paintings and sculptures. All schools of artists and sculptors were given an opportunity to display their skill, and many comparatively recent techniques and materials have been used. Here also a strong effort has been made by the Board of Design to allow for a variety of thought, expression, and material without disturbing the harmonious whole.

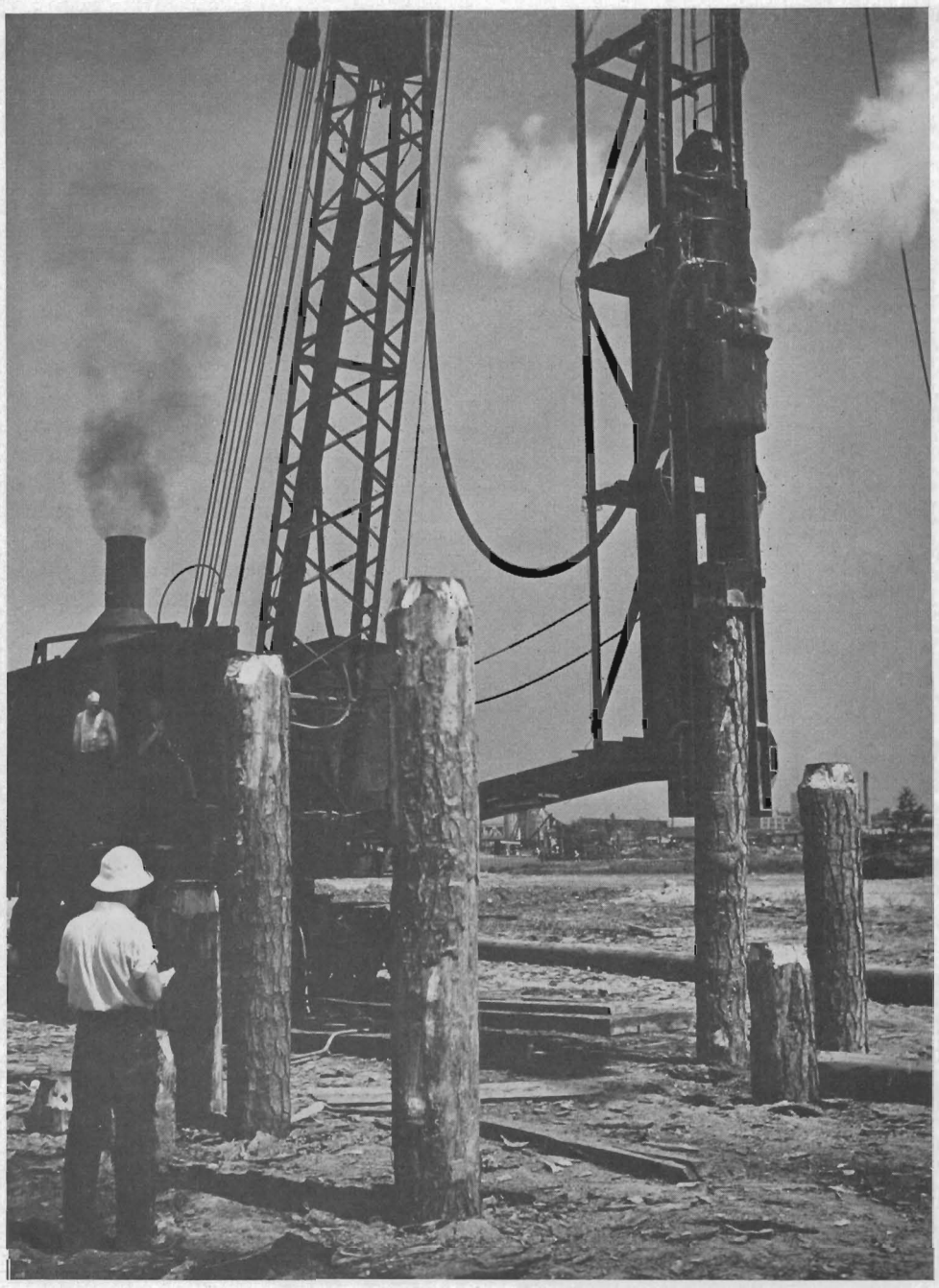
In construction, the principle has been followed of finishing areas as fast as the buildings are completed. The planting of trees along all the main avenues started the moment the grading of the site was finished and is practically completed at this time. As soon as the last area of stucco has been completed on any building, the landscape engineers start grading, and planting. A majority of the trees have already been planted and the remainder are going in; two-thirds of the roads and walks have been paved; utilities are all in and operating.

Richard Wurts

Concrete piling, New York Amphitheater. Sloan and Robertson, architects.



Footing (above), Distilled Spirits Building. Piling (right), French Building. Expert and Patou, architects.



FOUNDATIONS

L. B. ROBERTS*

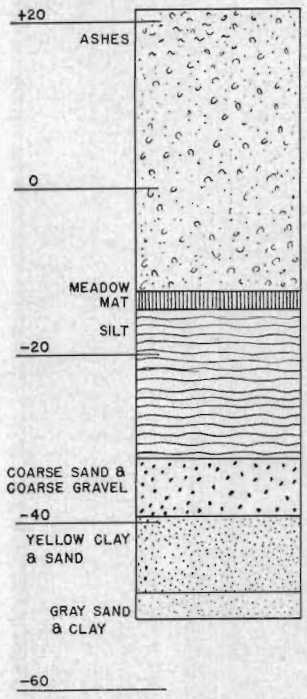
THE SITE selected for the New York World's Fair 1939 was known as Flushing Meadows—a tidal marsh over three miles long and more than a mile wide in certain places, traversed by a sluggish tidal stream known as Flushing Creek. This location was regarded as ideal for such a purpose, due to its adequate area and its accessibility to high-speed transportation facilities.

The original swamp surface of matted vegetation covered a silt formation containing a high percentage of water which in places is as much as 80 ft. deep below high tide. Underlying this silt is a stratum of firm sand suitable for foundations.

For more than 30 years portions of this swamp had been used as a City dump, and some fifty million cubic yards of ashes and rubbish had been placed on the area. During the years when this material was being dumped, the fill in some places, had a total depth of over 125 ft., and its weight had forced the meadow surface downward 30 to 40 ft. below the original swamp level.

Ownership of the greater part of this swamp had been acquired by the City of New York for development as Flushing Meadow Park. An agreement was entered into between the World's Fair Corporation and the City of New York providing for the temporary use of the site by the World's Fair in return for which the latter would install extensive landscaping and other permanent im-

*Assistant Chief Engineer, New York World's Fair 1939



Typical test boring at Fair site, showing soil conditions which building designers faced and overcame with a variety of foundation designs

provements for the future park site.

The site was graded by the City of New York and this operation involved the movement of about 7,000,000 cu. yds. of rubbish material. This was spread over the low land and during the work the course of Flushing Creek was changed, a new channel created and two lakes having an area of 135 acres were developed.

When the grading was complete, soil borings and loading tests were made throughout the entire site. Test piles were driven and loading tests were made to determine the safe loading capacity of both the ash fill and the sand stratum underlying it. From the results of these tests certain general deductions were made for various parts of the site in advance of knowledge of proposed structural loadings. These basic conclusions have been summarized by Messrs. Foster and Glick as follows:*

"(1) That spread foundations for heavier constructions should be confined to the areas previously loaded by large depths of ashes, and where, after final grading, a considerable depth of ashes remained over the underlying silt and clay.

"(2) That where loads were to be placed in recently filled areas, settlements of considerable magnitude could be expected, and where ash fill over the Meadow was shallow, loads should be limited to a maximum of 300 lb. per sq. ft.

"(3) That where structures were to be built, filling should be done prior to the construction of the foundations.

"(4) That grading, or modification of existing grades, should be limited to a 3 per cent slope where the fill of ashes was relatively thin over the original ground."

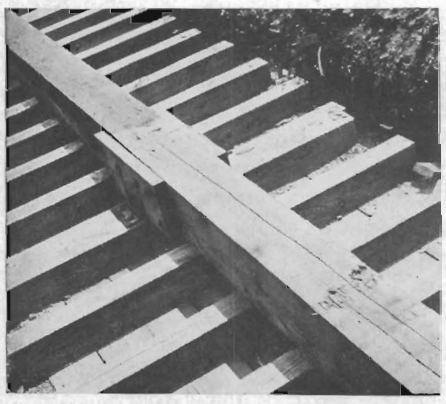
*Engineering News Record, September 22, 1938.

The pile driving operations have been on an extremely large scale. At the present time over 470 miles of piles have been placed.

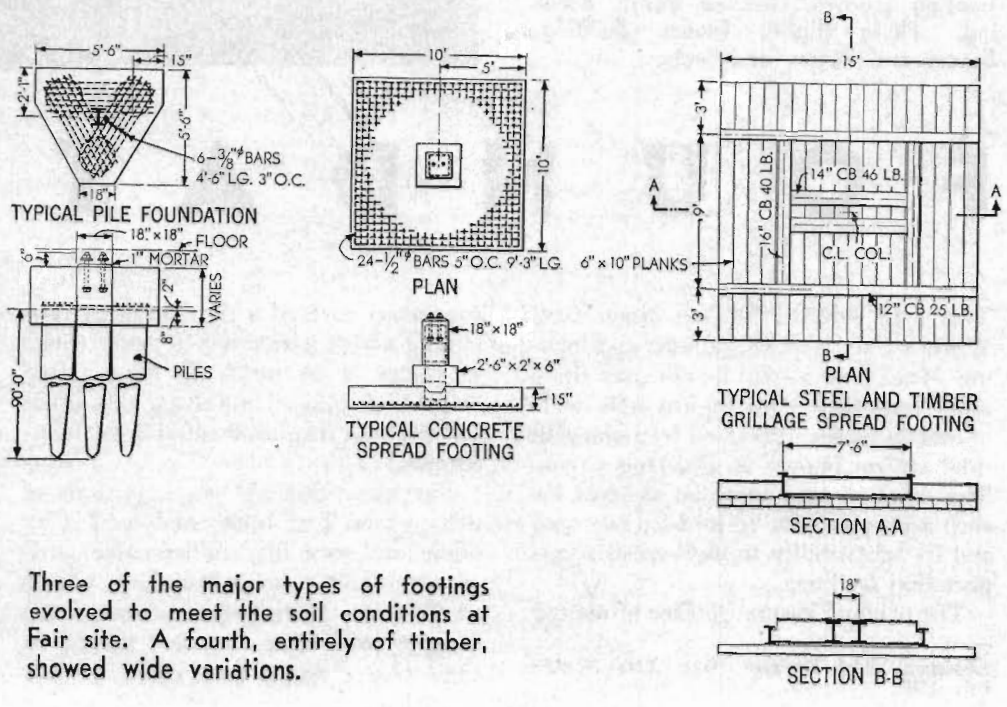
The actual driving of the piles under the conditions described—through meadow mat surface and semi-liquid silt to firm bearing sand—is very interesting. Where the ash fill is thin, a hole is punched in it by a steel "spud" which is then removed. The pile is lowered into this hole and the steam hammer placed on top of it. Even a light tap will drop the pile and hammer as much as forty feet as the pile passes through the silt. The pile meets resistance as it penetrates the underlying sand and this resistance increases until the desired bearing capacity is reached. It is also interesting to note that if the driving of a pile is discontinued at this point for only a limited period of time—often less than an hour—the pile is "frozen" in the silt and ash fill. It becomes difficult to start driving it again—often fifty blows not producing any increase in penetration. Maximum design loadings for piles average 18 tons. Test piles were loaded as high as 36 tons.

Lighter structures are supported on spread footings, particularly in areas of deep ash fill. Building settlements were anticipated and damage has been averted by providing joints to prevent cracking of stucco and walls. Settlement records of buildings confirm the design assumption cited above and continued experience on the site indicates that the foundation problems have been satisfactorily solved.

Footing, Distilled Spirits Building

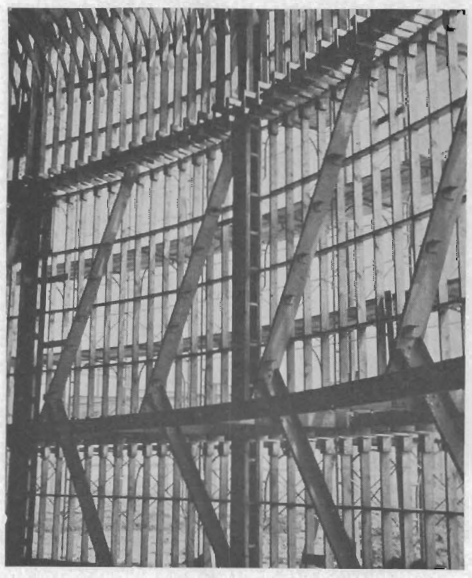


Spread timber footings, Gas Exhibits, Inc.



Three of the major types of footings evolved to meet the soil conditions at Fair site. A fourth, entirely of timber, showed wide variations.

Steel framing, U. S. Government Building. Howard L. Cheney, architect.

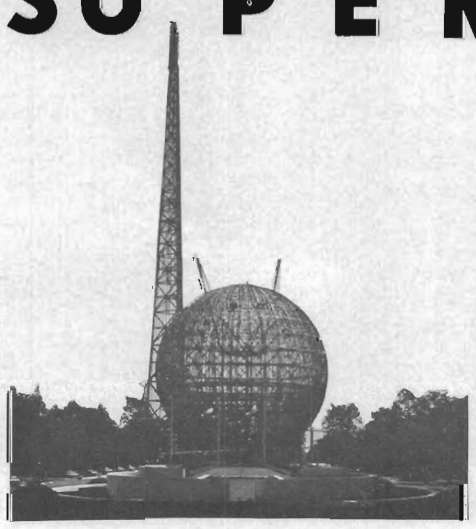


Internal bracing, Consolidated Edison Corporation Building. Harrison and Fouilhoux, architects.

Steel framing, timber studs, and plasterboard. Main entrance, Hall of Pharmacy.

SUPERSTRUCTURE

IRVIN L. SCOTT*



WORLD'S FAIR Exhibit Buildings in general fall into two main categories: (1) Those designed and erected by the Fair Corporation itself for rental to prospective exhibitors, and (2) Those erected by private participants to house their individual exhibits. In the former group it was necessary that the design should be conceived along broad general lines to satisfy the then unknown specific needs of the greatest number of exhibitors, whereas in the case of the exhibitor who elected to pitch his own tent, he was able to design his building around a pretty well determined type of exhibit. Fair-built buildings are, therefore, more or less standardized in plan as to depth of the exhibit space and circulation, and in elevation as to materials and absence of fenestration, for who could say what exhibitor would want windows and where?

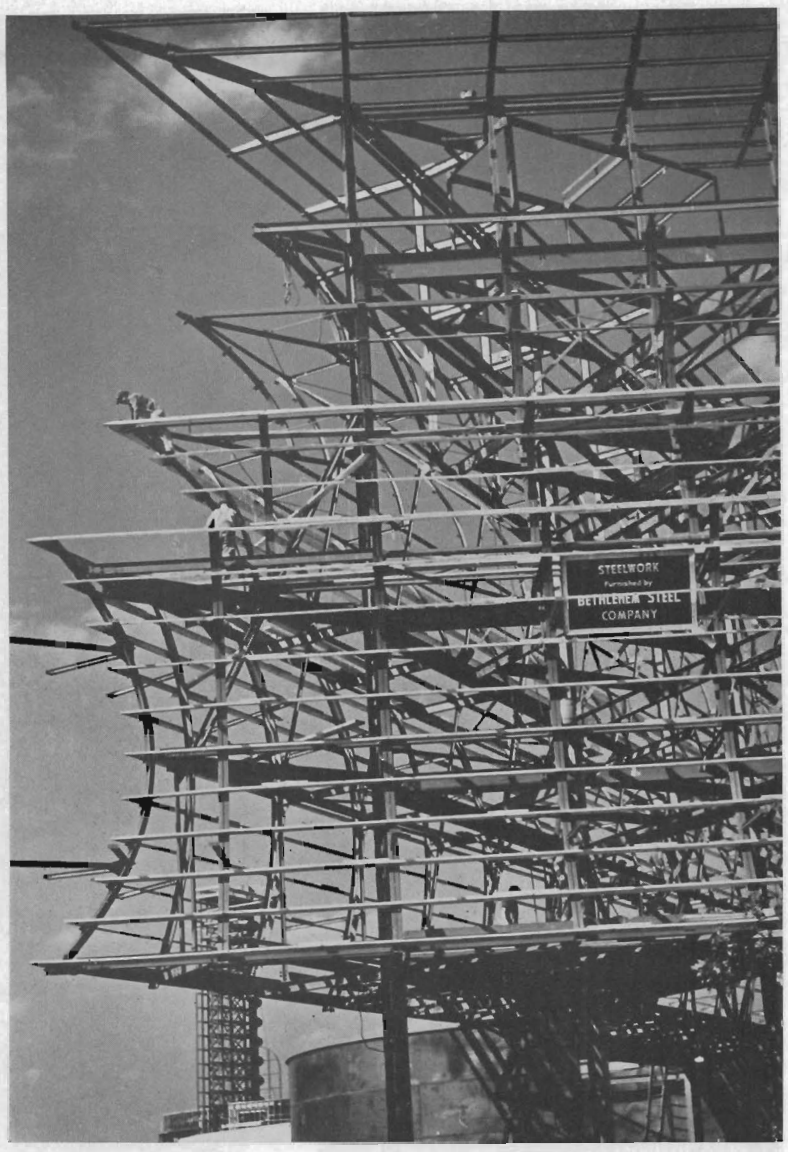
Since the cost of the exhibit buildings has to be amortized, during the life of

*Chief architect, Construction Department, New York World's Fair 1939

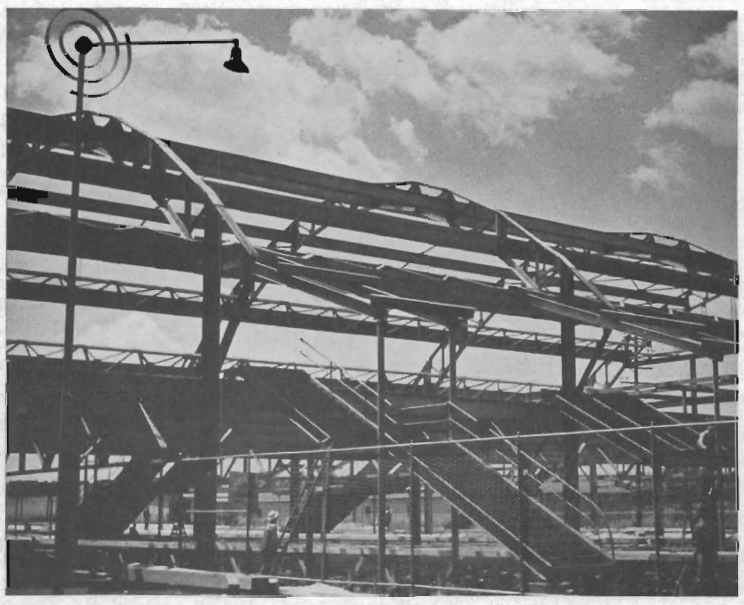
SUPERSTRUCTURE

Aviation Building's solid-web arch trusses are swung into place.

Wood templates in place on dome of Distilled Spirits Building, timber studding follows.

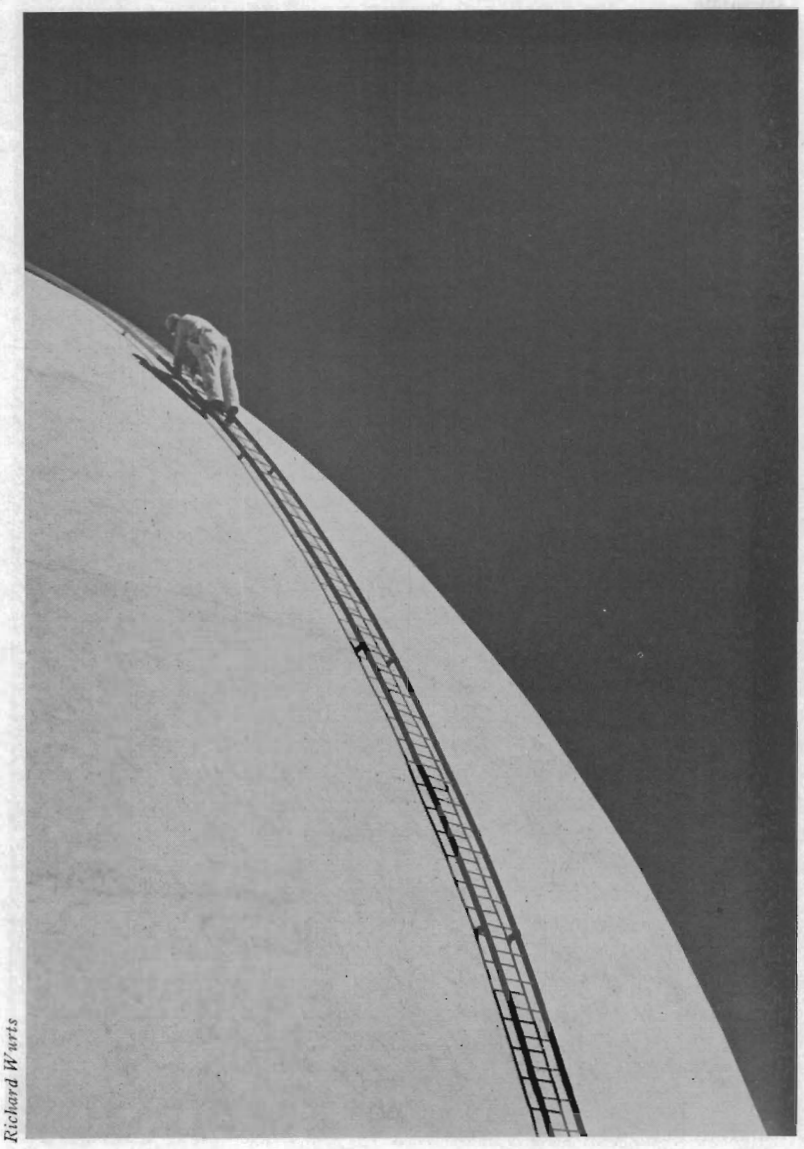


Special light steel framing on Petroleum Industry Building to accommodate exterior lighting design. Voorhees, Gmelin and Walker, architects.



Left: trusses of Long Island Station.

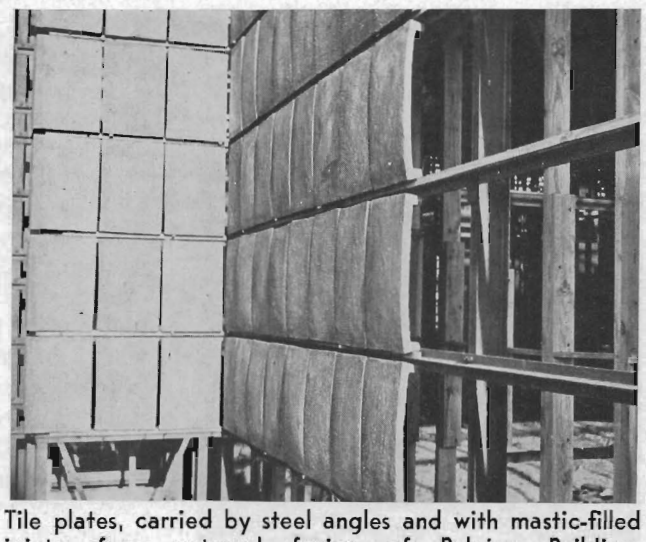
Right: cantilevered canopy, Distilled Spirits Building.



Richard Wurts

Painting the dome, Food Building No. 1. Leonard M. Schultze and Archibald M. Brown, architects.

Stucco on metal lath, Transportation Building. James Gamble Rogers, architect.



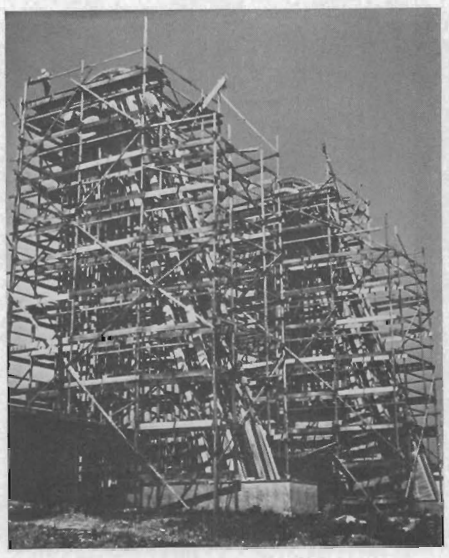
Tile plates, carried by steel angles and with mastic-filled joints, form external facing of Belgian Building. Van de Velde, Stynen & Bourgeois, architects.

the Fair, by the sale of space to participants, it was necessary that careful analysis should be made as to what combination of materials for the superstructures should effect the maximum economy and produce the best architectural effect. Many types of structures were suggested and investigated, all the way from precast cellular concrete walls and roof, forming both the inner and outer "skin" to prefabricated sections of so-called "bird cage" construction, with stucco or gypsum board applied to the inner and outer surfaces. None of these, however, offered the necessary economy on the one hand, nor the flexibility required of expositional architecture on the other. The type of construction finally adopted was the light structural steel frame with curtain walls of gypsum board, wire lath and stucco on 2 x 6 in. studs between the supporting columns, and wood framing resting on trusses or girders with sheathing and three-ply built-up roofing forming the roofs. By and large, this type of construction has been followed by the private exhibitor, either taking his cue from the analysis made by the Fair Corporation or from his own independent studies. However, in the programming of the Fair-constructed buildings, the skin covering of stucco was suggested but not made mandatory. Where the designing architect elected, he could suggest other exterior treatments provided they did not exceed the cost of stucco. As a result, there are such interesting deviations from the rule as the sand-blasted vertical red-wood siding on the Community Arts Building, and the corrugated V-beam sheets forming the outer skin of the Cosmetics Building.

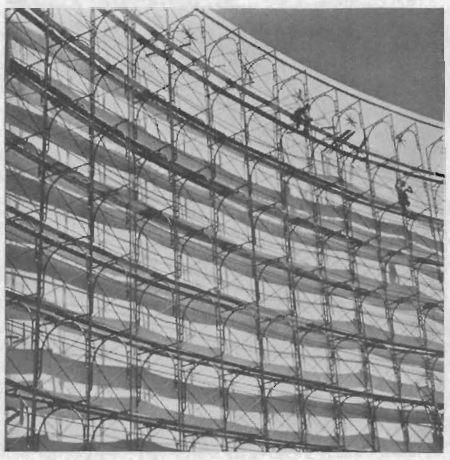
Also in the private exhibit building of the A. T. & T., 3/16-in. asbestos boards in 4 x 8 ft. sheets have been applied with wide joints to the gypsum board backing, giving an interesting pattern that lends relief and variety to the general architectural effect.

It is a requirement of the Fair code that, in general, structural members be protected by a material having a fire resistive rating of at least ½ hour. This naturally has ruled out the use of exposed steel as an architectural expression except in certain cases where a deviation from the Code could be justified or where no combustible materials were used in connection with the steel structure. An example of this is the main exhibit hall of the Aviation Building. Here the architects suggested spanning the hall with a series of three centered steel arches of increasing magnitude, tying these together with connecting beams and purlins. Quite naturally, fabrication cost ran high but this was offset by the fact that the protection

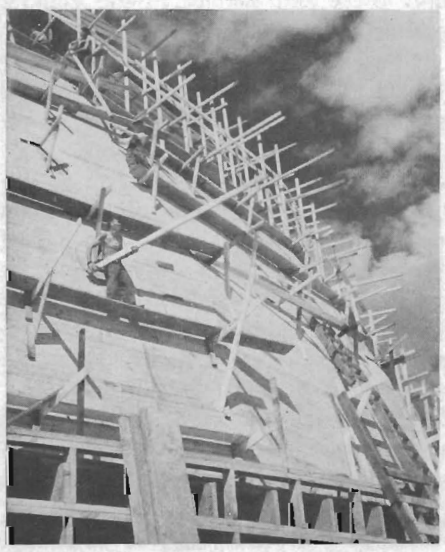
SUPERSTRUCTURE



Wood scaffolding on Transportation Building.



Lightweight, prefabricated steel scaffolding for Communications Building.



Wood sheathing on semisphere of Aviation Building.

from the weather is afforded by a single skin covering on the exterior of corrugated steel sheets protected with saturated felt and aluminum foil, leaving the well-designed steel arches exposed to view on the interiors.

This treatment exists "in reverse" in the case of the U. S. Steel Building. Here it was natural that the exhibitor would want to attract attention to his own product in the construction of his building. Accordingly, a smooth stainless steel "inner dome" is suspended on the inner chord of the main supporting steel arches which are left entirely exposed to view from the outside. Other lower elements of the building carry out the theme, the whole forming a fine expression of the use and function of steel.

From a point of view of fabrication, it is interesting to note the steel superstructure of the Belgian Building. Having been designed and fabricated abroad, it forms a graphic picture of the relative costs of labor and materials in Belgium as compared to this country. One is immediately struck with the use of small members throughout. Where in this country a steel member of large section would be used to cut down fabrication and erection cost, they choose to use several small members so fabricated as to perform the same function, with a resulting economy in material but with a large increase in man-hours of labor; a practice prohibitive here. Another feature of interest in this building is the skin covering of rough terra cotta tile approximately 2 in. thick, 18 in. wide, and 2 ft. long. These are supported directly on light horizontal steel members and pointed up with mortar after erection. Wood is used only as interior furring.

Perhaps the most novel type of construction to be seen anywhere on the site is that of the dome of one of the Food Buildings built by the Fair Corporation. The diameter exceeds 100 ft. and rises to a height of 90 ft. from grade. Its main structural members consist of vertical studs cut to radius from 3 x 14 in. wood members. Each tier of these was notched to receive a 3-in. pipe ring around the circumference. The next tier of studs were correspondingly notched to fit over this pipe ring and so on upward, the wood members and pipe rings diminishing as they near the top. The outer surface was then sheathed with diagonal wood sheathing after which felt roofing was applied. A broad meshwork of pencil rods was then laid over the dome to which was wired metal lath for the final stucco skin. The inner surface of the dome was sheathed with gypsum board, making an entire thickness from inner to outer skin of not over fifteen inches.

Space does not here permit even a hasty reference to all the varied and interesting forms of construction to be seen at the site. No review, however, would be complete without a mention of the dominating architectural feature of the Fair, the Theme Center, composed of the Perisphere, Trylon, and Helicline. Though based on the simplest of geometric forms, the structural difficulties of the Perisphere have seemed to increase as the square of its diameter. Here again, numerous were the suggestions as to how to construct it—"re-inforced concrete," welded steel plates, "bird-cage", and stucco, all were investigated and somewhere found wanting. In the end, the structural steel frame was adopted. In its final design, it consists of 32 meridian trusses, running from the zenith and connecting to a ring girder 8 ft. deep and 72 ft. in diameter near the base of the sphere, which is in turn supported by eight columns. Horizontal members connect the meridian trusses at various stages and the whole basic framework is overlaid with curved vertical purlins 4 ft. on centre at the equator, on which is applied the wood nailers for the final skin covering. This latter consists of two layers of gypsum board with staggered joints and a coat of waterproofing between each layer. On top of this are applied two layers of burlap successively trowelled into two ¼-in. coats of a magnesite type of stucco, after which a final finish coat of magnesite plaster is applied and steel trowelled. Two coats of chlorinated rubber base paint will be applied for additional waterproofing and color.

The Trylon, rising 700 ft. from the bottom of its foundation, has a structural steel frame to a height of 500 ft. and from this point a self-supporting exterior sheathing of riveted steel plates. A skin covering similar to that of the Perisphere will be applied flush with these steel plates and the whole painted with rubber base paint.

The Helicline, descending from the 50 foot level of the Trylon to grade and encircling the Perisphere is an 18-foot ramp supported on single tubular columns of varying sizes and spacing along the centre of its run. The soffit curves upward on either side to meet the deck and is covered with brushed stainless steel sheets studded with polished rivets. The balustrade will be of transparent wire glass.

LANDSCAPING

GILMORE D. CLARKE*

THE MEMBERS of the Board of Design met together for the first time late in May, 1936. The task before them was not a simple one, considering the fact that a theme and a general plan for a development were required within a period of three months. The site had been chosen. Even those who were familiar with it and who had had experience in large-scale construction operations had some difficulty in visualizing this vast ash dump and swamp developed into a great garden; a place where, a short three years later, millions of people would be entertained as guests of the City of New York through the New York World's Fair Corporation headed by Grover Whalen.

The development of the plan was carried on concurrently with the evolution of a Theme, the latter under the guidance of Board Member Robert D. Kohn. Normally, a World's Fair plan is devised to serve a single purpose, that of a fair: this one, however, had to be designed to serve two purposes—first the Fair, and after the Fair a great park. The land the Fair occupies is owned by the City of New York and is under the jurisdiction of the Park Department. The lease gives the head of that Department, Robert Moses, control over certain factors in the development, among them approval of the general plan to the end that the basic pattern for the Fair would serve adequately for park purposes later.

One might think it impossible to lay out a satisfactory two-purpose pattern on a grand scale covering an area of 1,216½ acres; and that, to accomplish such a purpose would result in a compromise for one scheme to the other. It seems that the axial pattern developed within the first three months by the Board of Design admirably fulfills the dual purpose for which the plan was devised. In any event, it pleased the Directors of the World's Fair and was approved by the Park Department.

The deep swamp, overlaid with a mat of cinders, presented problems which required much study and necessitated that the special factors relating to soil conditions be kept uppermost in mind throughout the development of the scheme. For example, the transportation sector, requiring the installation of heavy machinery, was located between Grand Central Parkway and 111th Street, the only section providing fairly solid ground with no underlying swamp.

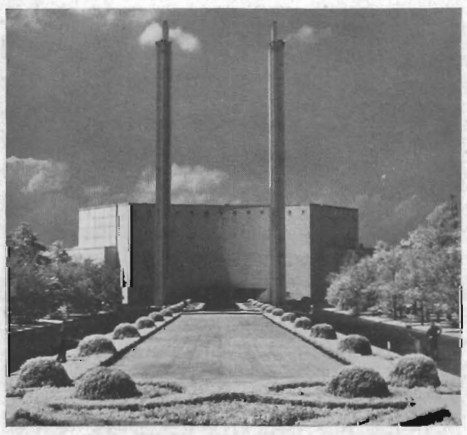
The pattern of the Fair was laid out, having in mind the creation of a central Theme Center—the Perisphere and Trylon—with a number of theme subcenters around which the several major subdivisions of the Fair are being developed. The New York World's Fair was not conceived as a prototype of any other

*Member, Board of Design, New York World's Fair 1939

"American Womanhood", Gaetano Cecere, Sculptor.

Gardens of New York City Building, looking toward Business Systems and Insurance Building. Eric Cugler, Slee and Bryson, architects.

Spiral gardens, Court, Hall of Pharmacy.



Court of Communications Building.

pattern of a city or garden: true, it has a central axis along which a great mall has been developed. In that respect, it may have some relation to Versailles, or other French monumental compositions. If that is so, the park was evolved as a result of the functions and requirements of the Fair combined with the restrictions and advantages provided by the site. The principal asset is its location almost at the geographic center of the city, providing potentially adequate transportation services by water, rail and road. The visitor will easily find his way around on foot or by means of several types of vehicular transportation. There is no main entrance; rather, there are several entrances of more or less equal importance. Thus, the people are immediately decentralized upon arrival, resulting in a minimum of congestion.

Not a tree or bush was left upon the site when the grading operations had been completed. At the very beginning, when budgets were being discussed, the estimates to provide adequate planting amounted to more than $1,500,000. A sum greater than that was granted and during the spring and fall of 1937 one of the largest big tree moving programs ever attempted was carried out. For example, elms in the Theme Circle have trunks more than eighteen inches in diameter, and the trees are sixty feet high. (The fact that the trees were planted two years in advance insures that they will be well acclimated before the opening day, April 30, 1939.) These and the thousands of other trees in great variety will supply the necessary shade for the malls and combine to create many delightful compositions with the architecture and its mural decorations, the sculpture, flags, and fountains—both in daylight and nightly splendor. All the large trees are in locations where they will grow on to maturity in the Flushing Meadow Park of tomorrow. They are mature now; they will grow to a ripe old age and give enjoyment to countless millions in years to come. And so these living reminders of the New York World's Fair of 1939 will be perpetuated for those who visit the park in later years.

The Fair will be a great, colorful garden of a magnitude never before realized in America. Almost three quarters of a million bedding plants will be used. The Holland Government has donated over one million flowering bulbs, the large majority, of course, being tulips. The display of these bulbs and bedding plants in carefully designed gardens will be one of the most noteworthy displays of the Fair. It will demonstrate that the old art of bedding may be adapted to the present modern trends in architectural design and result in securing dramatic compositions of formal ground patterns in wide ranges of color in harmony with the gay colors of the architecture and the murals. Once more we shall use petunias, lantanas, annual phlox, verbenas, tagetes, heliotrope, ageratum, and geraniums by the thousands in mass display for dramatic color effects. Hedges of taxus, privet, laurel, thuja, hemlock, and other material are planted to form varied and fantastic effects.

The gardens and courts about the Theme Center and those along the main arteries of circulation were designed in the offices of the Board of Design. The bulb and flower displays were patterned and arranged by Miss M. B. Sprout. The courts and gardens provided by the Fair were designed by Landscape Architects A. F. Brinckerhoff and C. D. Lay. Mr. C. N. Lowrie is Landscape Architect for the large lake area between Horace Harding Boulevard and 69th Road. The several gardens of private exhibit buildings were planned by several landscape architects chosen by the exhibitors. Plans for these gardens received approval of the Board of Design before going forward, thus enabling the layout of the minor parts to be coordinated with the general scheme of the Fair.

The co-ordination of the various phases of the work at the Fair is a most noteworthy example of co-operation between many men and women of different professional fields of endeavor. A work of the magnitude of the New York World's Fair could not be a success without the closest kind of collaboration between the arts; of the arts with engineering, and of both of these with the manifold fields of endeavor which enter into this most complex work.

Enterprises of this sort often go along with the interesting personalities involved in it completely submerged. It is out of the question to mention here the names of all those who contributed so ably in the development of the design of the landscape of the Fair, but the writer cannot end this article without paying tribute to the man who had charge of the preparation of specifications, the purchase, inspection, delivery and planting of all the plant material, Mr. Henry Nye. It is the biggest job of its kind ever accomplished within a short two years.

Pedestrian overpass. Fair Board of Design: Michael L. Radoslovich and Arthur Barzaghi, designers.

CIRCULATION

STEPHEN F. VOORHEES*

WE CONSIDER, first, external circulation, the problem of getting people to the Fair Site. The Site is located near the center of population of Greater New York. It will be possible to reach it from any of the five-cent fare subway systems in the city. This was one of the factors which influenced the choice of the Site for the Fair. Both the I.R.T. and the B.M.T. use elevated tracks running from Queens Plaza to Main Street in Flushing. This track cuts the western end of the Fair Site and additions to the Willetts Point Station are being built with an overpass to carry the people directly into the Exhibit Area. It is estimated that a peak load of 40,000 visitors per hour can be expected through this gate. On this side of the Fair also is the Long Island Railroad which is also enlarging its facilities. A special station is under construction and it is estimated that some 18,000 passengers per hour will be brought from the Pennsylvania Station.

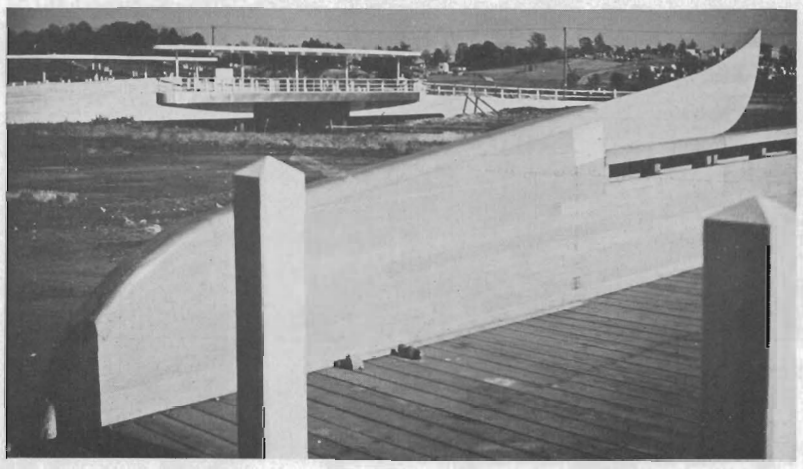
At the other side of the main exhibit area will be the terminus of a spur being constructed by the Independent Subway System. This station will discharge passengers into one of the principal plazas of the Amusement Area and facilities will be available for handling 40,000 people per hour.

While these three means of transportation will bring the vast majority of visitors to the Fair, a not inconsiderable number will come by bus and private car. In cooperation with the Department of Parks and the Queens police officials carefully calculated routings for automobiles are being worked out. The Triborough Bridge will lessen somewhat the load on the Queensboro Bridge, and the new Whitestone Bridge will be open in time to divide the traffic still more by providing a short cut for cars from New England and the North. On the Fair Site, but outside the turnstiles will be parking fields to accommodate a total of 40,000 cars. Private cars will discharge passengers at the gate on Horace Harding Boulevard and the Corona Gate. The Corona Gate on 111th Street will also be the entrance for passengers arriving by the various bus lines.

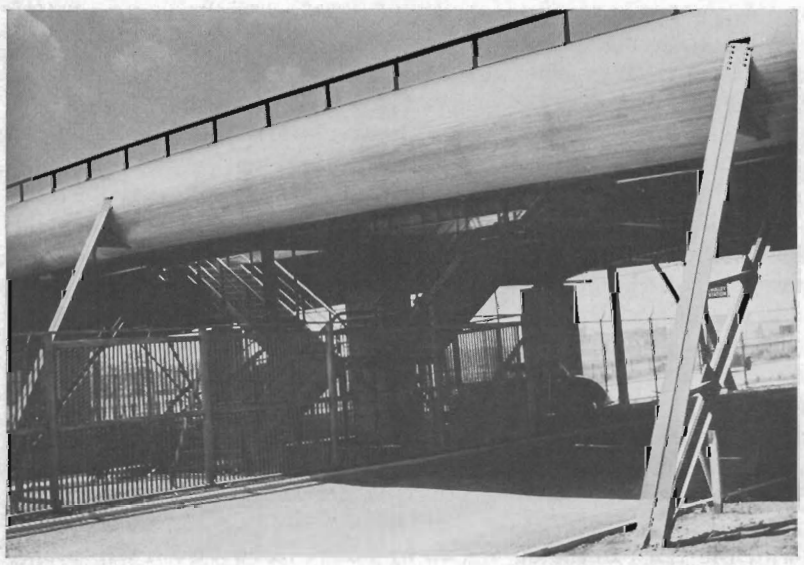
While the number of passengers expected is not large, it should be noted that facilities will exist for coming to the Fair by water. A boat basin and landing dock are being prepared on the edge of Flushing Bay adjacent to the Site. Also the North Beach airport is within five

*Chairman, Board of Design, New York World's Fair 1939

Approach ramps to Long Island Railroad Station. Fair Board of Design: Michael Radoslovich and Irwin L. Scott, designers.



Passenger bridge, Amusement Area. Fair Board of Design, architects.



Temporary pedestrian additions to permanent bridge at Horace Harding Blvd. Fair Board of Design: Michael L. Radoslovich and Arthur Barzaghi, designers.

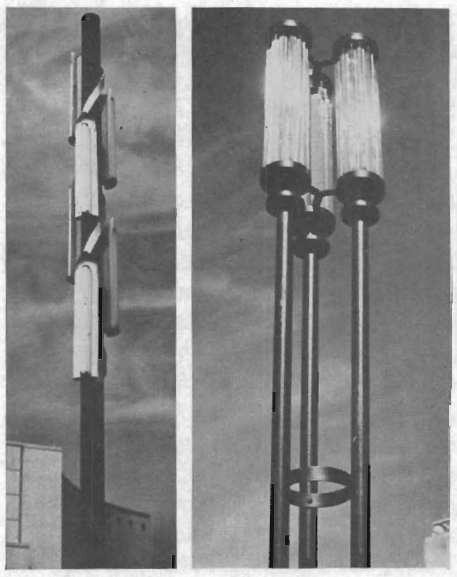
minutes' motor distance from the Fair Grounds.

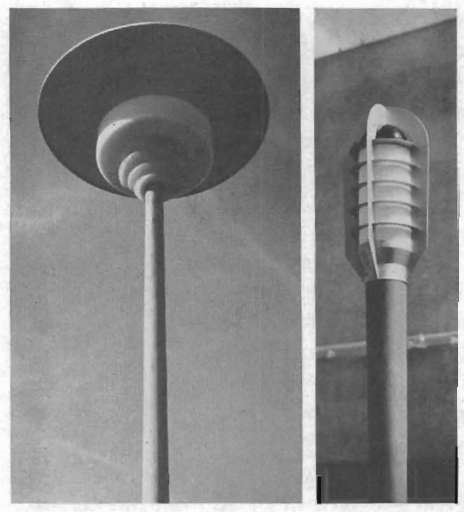
Within the Fair, circulation has been planned, not to lead visitors through a pre-conceived logical scheme, but to make it as easy as possible for visitors to follow their own whims and interests. The logical arrangement that might be appropriate for a museum cannot be adapted to the purposes of a Fair where the crowds to be handled are much larger and the material to be shown is less subject to logical arrangement. The great objective in handling Fair crowds is to make it easy for visitors to find their way about, and to so arrange the various exhibits and attractions to spread the crowds over as large an area as possible. The Fair has been deliberately planned on a large scale. A generous amount of landscaped space is provided around both the Fair Corporations' buildings and those of the various exhibitors. The streets are wide and full advantage has been taken of the fact that after the Fair, the Site is to become a Park. Much of the planting for the future park is already done.

Each of the principal gates leads directly into an open plaza and each plaza has several attractive vistas. Thus, entering crowds will be spread through adjacent exhibit areas rather than guided along single paths. The visitors will be assisted in orienting themselves by several conspicuous monuments which will help them identify various gates and important buildings. The chief of these, of course, is the Trylon and Perisphere which occupy the Theme Center, the highest point on the Fair Site. Free-standing towers and pylons at various other points combined with available maps will enable people to find their way about the grounds easily.

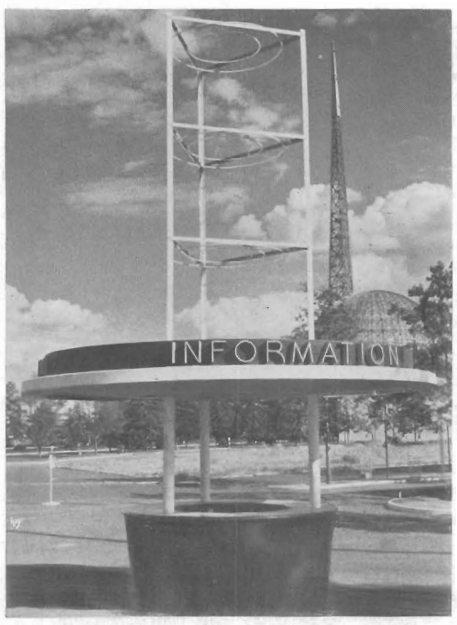
A concession contract has been awarded to the Greyhound Bus Lines for an intramural bus system covering the whole Fair. Bus routes are planned to avoid pedestrian crossings as much as possible and at no point will pedestrian and bus traffic be routed together. Arrangements are now being discussed for some form of transportation for individuals.

Nearly all of the exhibit space in buildings by the Fair Corporation will be on one level and very few of the exhibitors who are building their own buildings are planning for more than one floor. Thus stairs will be a rarity—changes of level where they do occur will be accomplished by ramps.





Above, four light standards. Fair Board of Design, architects. Right, light towers, Textiles Building.



Light tower, Information Booth. Fair Board of Design, architects.

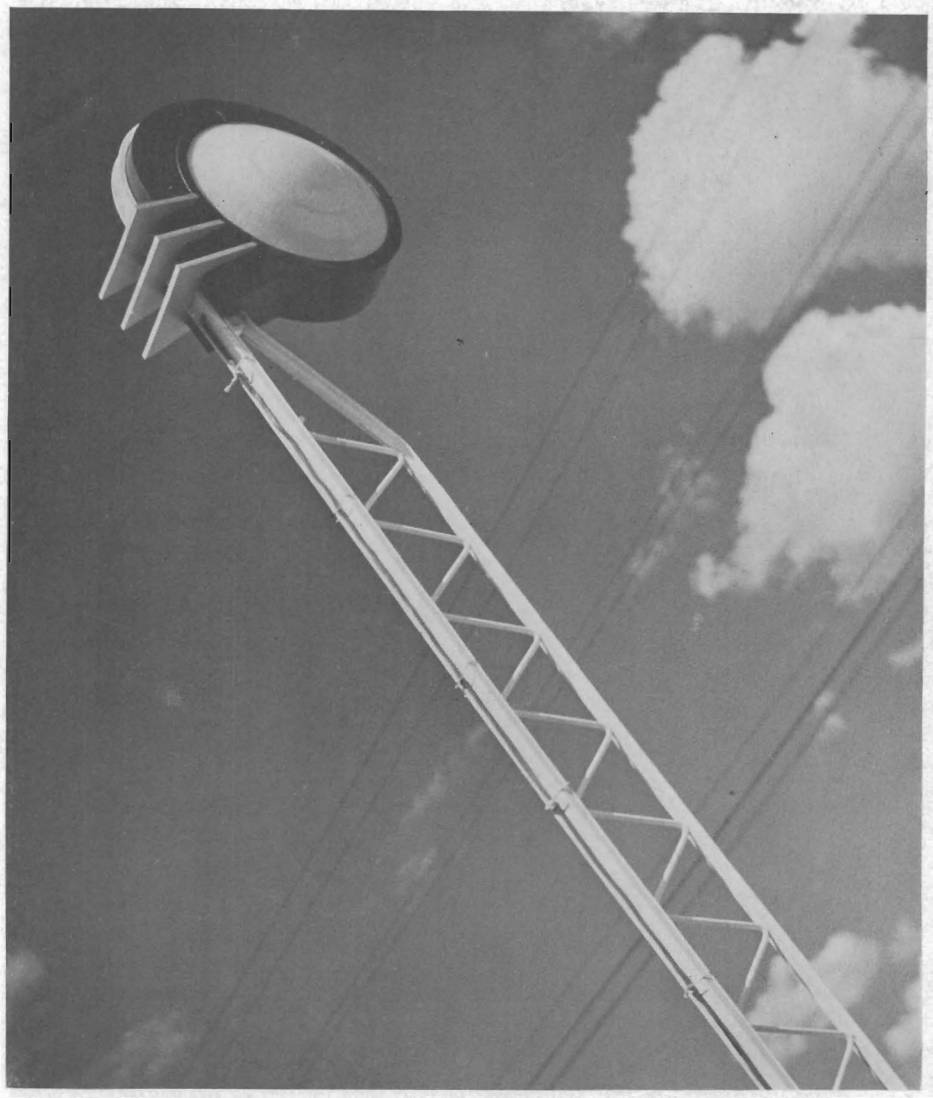
LIGHTING

STEPHEN F. VOORHEES

LIGHT AS WELL as sound will be controlled in the interest of visitors to the Fair. All possible cooperation has been given to the various exhibitors to enable them to make advantageous use of lighting effects but within rules which prevent annoyance to the public and unfairly competitive displays. The use of lighting effects by any exhibitor, for example, which would detract from the effect of neighboring exhibits is forbidden. Decisions on such questions rest with the Fair's Board of Design and its lighting technicians.

The Fair itself, as is the case in the field of sound, is using the most advanced developments to create novel and beautiful effects. An example is the use of the new source of light, the capillary mercury tube. Light from these tubes is picked up by the green coloring matter in foliage. A dramatic and interesting effect will be created along the main esplanade by illuminating the trees from beneath with this type of light.

The great sphere of the Theme Building, white and opague by day, will at night seem to lose its solidity. Lighting effects which have been evolved during two years of research by the Fair's technicians will give the sphere the appearance of a huge luminous globe like an iridescent soap bubble filled with moving clouds and color mist. The Perisphere is one focus in the gigantic display of light and color which will animate the



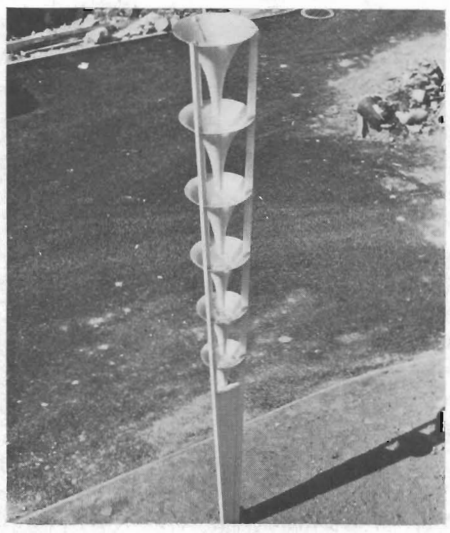
Light fixture. Fair Board of Design, architects.

Fair at night. At the other end of the Mall will be the body of water named the Lagoon of Nations, approximately 800 ft. long and 400 ft. wide. This Lagoon will be the scene of displays combining light, sound, and color in a way never before attempted. In the center of the Lagoon is a submerged platform nearly 400 ft. long and 150 ft. wide. On it are mounted over 1,400 water nozzles, 400 gas nozzles, containers for fireworks, and 500 lighting units with various types of lamps and apparatus for color changes. This equipment is partly submerged; the parts above water are camouflaged in the appearance of water flowers or formal decorative shapes. Camouflaged to the likeness of huge flowers will be the openings of the sound projectors mentioned above. Each of the elements will be controlled from a single room on the roof of one of the government buildings. Here a board resembling a huge organ console will be operated by three men and a director. A number of compositions for this great instrument are in preparation.

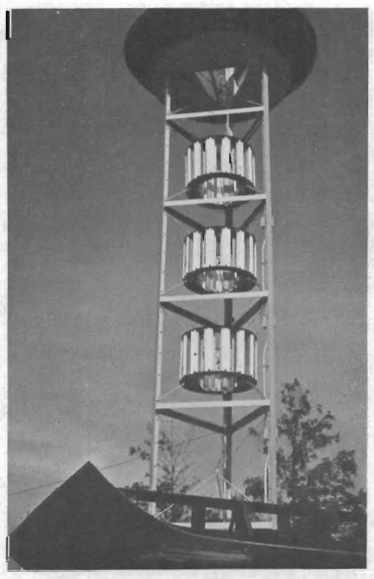
Other dramatic effects are in preparation for Meadow Lake which lies south of the amusement section of the Fair. Here, from barges which can be moved about in the lake to vary the pattern, more compositions using water and light will be created.

Some measure of the effectiveness of these spectacles can be found in the fact that when a model was set up to demonstrate them in miniature, so many showings became necessary that the model finally had to be dismantled.

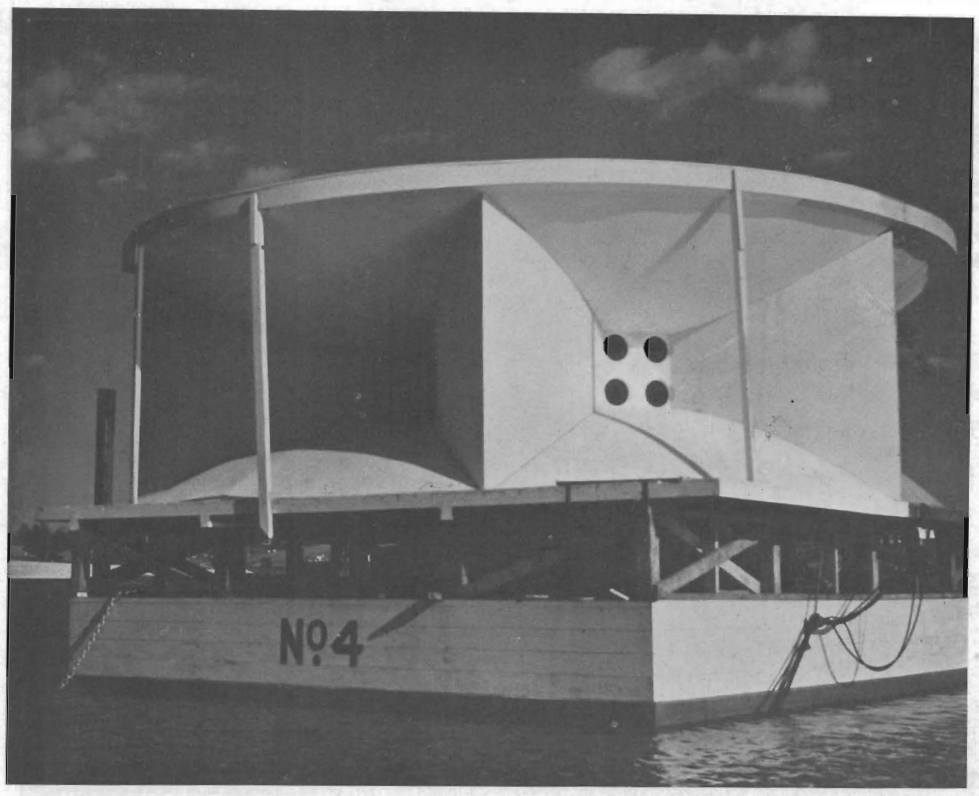
Aqualon, combination light fixture and fountain. Fair Board of Design, architects.



Indirect lighting fixture, using conventional incandescent lamps. Fair Board of Design, architects.



Zeon lighting on Information Booth. Fair Board of Design, architects.



One of the floating amplifiers "anchored" offshore on Meadow Lake to be used in conjunction with water carnivals.

SOUND

STEPHEN F. VOORHEES

SOUND WILL be controlled by the Fair in the interests of visitors to a greater extent than has been done in most of the recent fairs. The Corporation itself is avoiding any use of either light or sound which could conceivably become anoying to visitors and is enforcing the same principle on the private exhibitors. This means first of all that the Fair Grounds will not be dotted with loud speakers as was the case in some of the recent fairs. The visitor will not have the feeling of wishing to turn off a neighbor's radio as he walks about among the exhibit buildings; and within the buildings, the use of sound by each exhibitor will be restricted to prevent people in other exhibits being distracted. In other words, both the Fair Corporation itself and the various exhibitors will use sound only in two ways—first as a background to create atmosphere, and as a part of an artistic presentation to the public. The traditional barkers standing before exhibits competing with each other will be entirely absent and even the more modern version of the same scene in which competing loud speakers blare at passers-by will be absent.

The Fair will have, however, a comprehensive sound system. It will be centered in a specially reserved section of the Communications Building. Here the amplifiers and technical equipment of the sound system will be set up as an exhibit by the Fair Corporation. There will be small studios where speeches and musical programs can originate either for broadcast or for the Fair's Public Address system. Here also will be a Fair sponsored exhibit of sound equipment and provision for explaining to the public the detail operation of a large example of modern sound engineering.

Carried on the wires of the regular telephone system the programs will be sent to sixteen speakers or sound outlets. There will be one inside each of the main entrances to the Fair to give incoming visitors a feeling of the festive spirit that should characterize a Fair. There will be other speakers at strategic points on the grounds—one on each of the bridges connecting the transportation area with the main exhibit section and one in the main plaza of the amusement section. These will aid in leading crowds from one area to another.

This Public Address system will be built from stock equipment and will be a more or less standard example of modern methods of handling sound. Of more spectacular interest will be the specially designed equipment installed for particular purposes at the Fair. Among the spectacles presented by the Fair Corporation will be the shows combining water, fire, and sound on the Lagoon of Nations. Combined with the dramatic use of gas jets, fountains, and fireworks will be sound effects and especially composed music emanating from sound reproducing equipment especially designed for this purpose. All the equipment, from the records through the various amplifying devices to the loud speakers is being created by the most competent sound engineers especially for this purpose. The speakers will send out sound of a lower frequency than is possible from any standard equipment and will be capable of delivering an enormous volume of sound.

Perhaps the most spectacular of the Fair's special sound equipment is that which is being built under the Perisphere. The engineers in discussing the possibilities of music and sound effects around the Theme Plaza discovered that the curve of the Perisphere constitutes a very rough approximation of the horn of a loud speaker. To make this approximation more complete, a pit roughly fifteen feet deep, is dug under the sphere—its walls are of a shape calculated to simulate a section of a horn. In effect the lower half of the sphere, the surface of the water under it, and the walls of the pit will constitute an enormous annular horn. Sound originating under the sphere will spread out in all directions except into the interior of the sphere which will be protected by sound proofing material. These shapes will form the equivalent of a horn whose mouth is over 100 ft. in diameter and whose length is well over 100 ft. The designers of this sound system are certain that vibrations down to sixteen cycles a second can easily be created. This will give an effect in the open air similar to that caused in cathedrals by the vibrations of sixteen-foot pipes. This will be, in other words, far and away, the largest loud speaker ever created and will assure effects never before attempted.