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Building Facade Emphasizes Steel Frame

Philadelphia Savings Fund Building, in addition to presenting a new architectural concept, is structurally important, including cantilever walls and 60-ft.-span trusses carrying upper 30 stories as a rigid frame, for cantilever construction on the front wall, and for a complicated framing layout that carries the show windows of the sidewalk shops several feet outside the column lines at the front corner of the building.

THE DUAL distinction of being the tallest building in Philadelphia and one of the most unique of modern structures in design and appearance belongs to the Philadelphia Savings Fund Society Building. Owned and partly occupied by the oldest savings-bank institution in America, this 33-story building incloses a volume of about 8,000,000 cu.ft., has a floor area of 560,000 sq.ft., and cost about $8,000,000. Architecturally, it is notable for its special grouping of bank quarters, office space and service facilities, for an absence of columns and attendant vertical lines in the front facade, for a facade on the two sides of the building in which the outline of the steel frame is reproduced in the inclosure materials and in general for the attempt made to create an efficient building that would reflect its character and function as a machine. Structurally, the building is noteworthy for the large banking room on the second floor, 130 ft. long and 60 ft. wide, spanned by trusses that carry the upper 30 stories of the building, for the unique make-up of these trusses, for the wind design that considered these trusses and their supporting columns

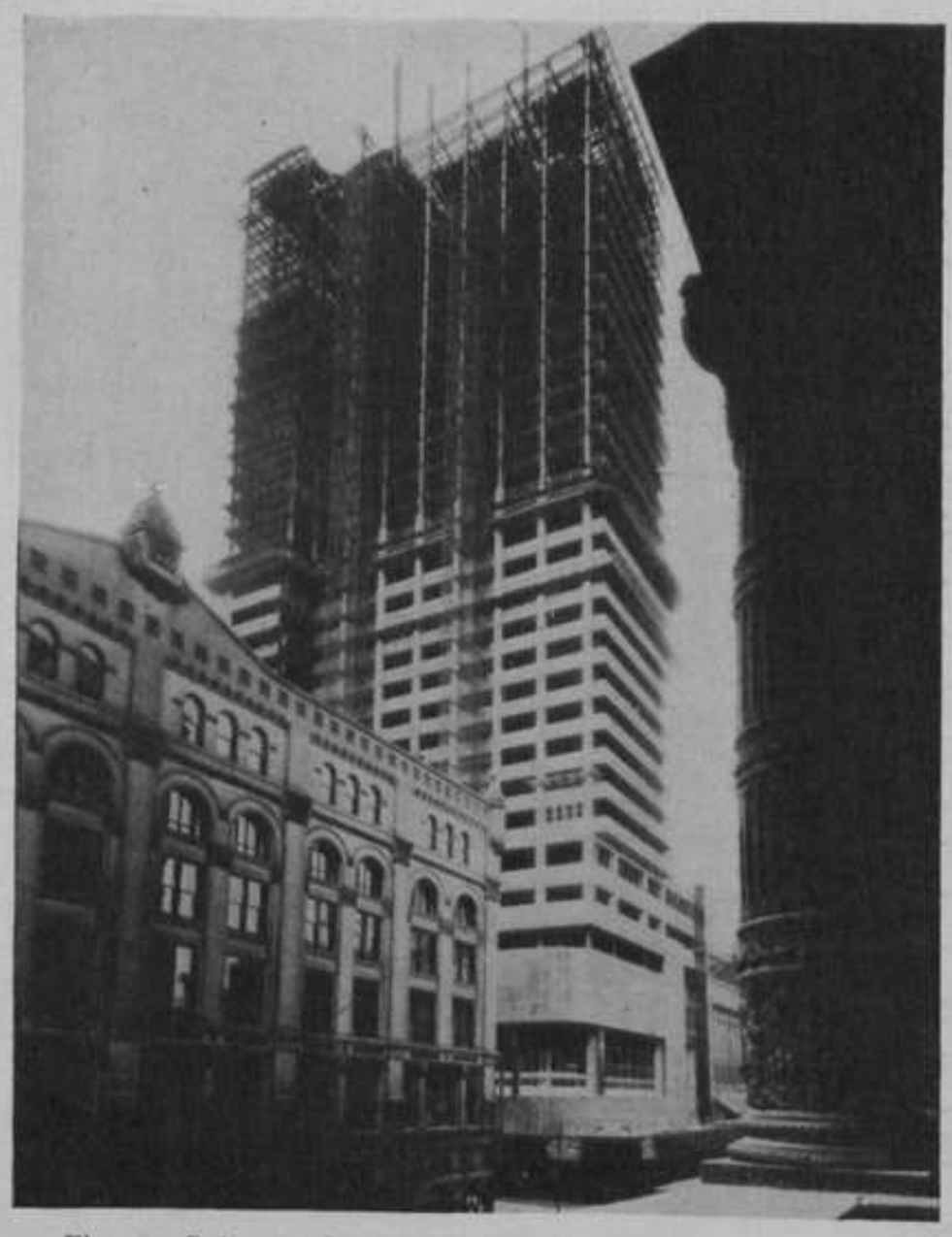


Fig. 1—Column pilasters in relief on the side faces and cantilever walls on the front face lend a new architectural note to the 33-story Savings Fund Society Building, tallest office structure in Philadelphia.

The ground-floor plan of the building is a rectangle 132 ft. on Market St. and 164 ft. on 12th St., but above the sixth floor level areas on either side are discontinued so that the prevailing shape is that of a T. In the stem of this T, which is 63 ft. wide by 132 ft. long, are concentrated the offices and banking rooms, while the head of the T is devoted largely to service facilities such as elevators, stairs, flues and duct shafts. The dimensions of the stem of the T outline the banking room on the second floor, spanned by seven double trusses 16½ ft. deep. The fourteen columns supporting these trusses carry the load of the entire stem of the T. Of the 11,000 tons of steel in the building, 5,600 tons is utilized in columns and 750 tons in trusses.

According to the architects, Howe & Lescaze of New York City, "The banking quarters on the second and third floors are emphasized by their scale and a covering of polished granite as the dominating note in the composition. The entrances to the banking quarters and office-building lobby are

placed off center in the extreme corners of the property so as to leave the stores on the first floor and the banking room on the second floor entirely available for use. The banking room on the second floor is reached by a stair, two elevators and two escalators. The wide band over the banking-room window is the envelope of the large trusses that carry the tower. These form the bony structure of the 'lung cavity' where the ventilating machinery for the building is housed. The legs on which the building is balanced may be seen through the light skirt of plate glass which forms the bulkhead windows of the stores at the sidewalk level. The vertical tower of black glazed brick at the rear contains the vertical circulation of the building. To it, ribs marking the horizontal floors of the office tower and made of gray matt glazed brick are attached. The air throughout the rentable area of the building is cooled and dehumidified in summer, thermostatically controlled and humidified in winter."

Among the other architectural features of the building are double-hung aluminum windows, stainless-steel flush doors in the lobby, terrazzo floors in corridors and lobbies, concrete floors with integral coloring in the service areas, concrete floors with integral coloring in the service areas, concrete floors with colorless hardening in the tenant areas, concealed fin-and-tube type radiators, copper-bearing-steel heat piping, brass hot and cold water piping, radio outlets and thermostatic heat control.

In addition to the structural features in the main portion of the building, the

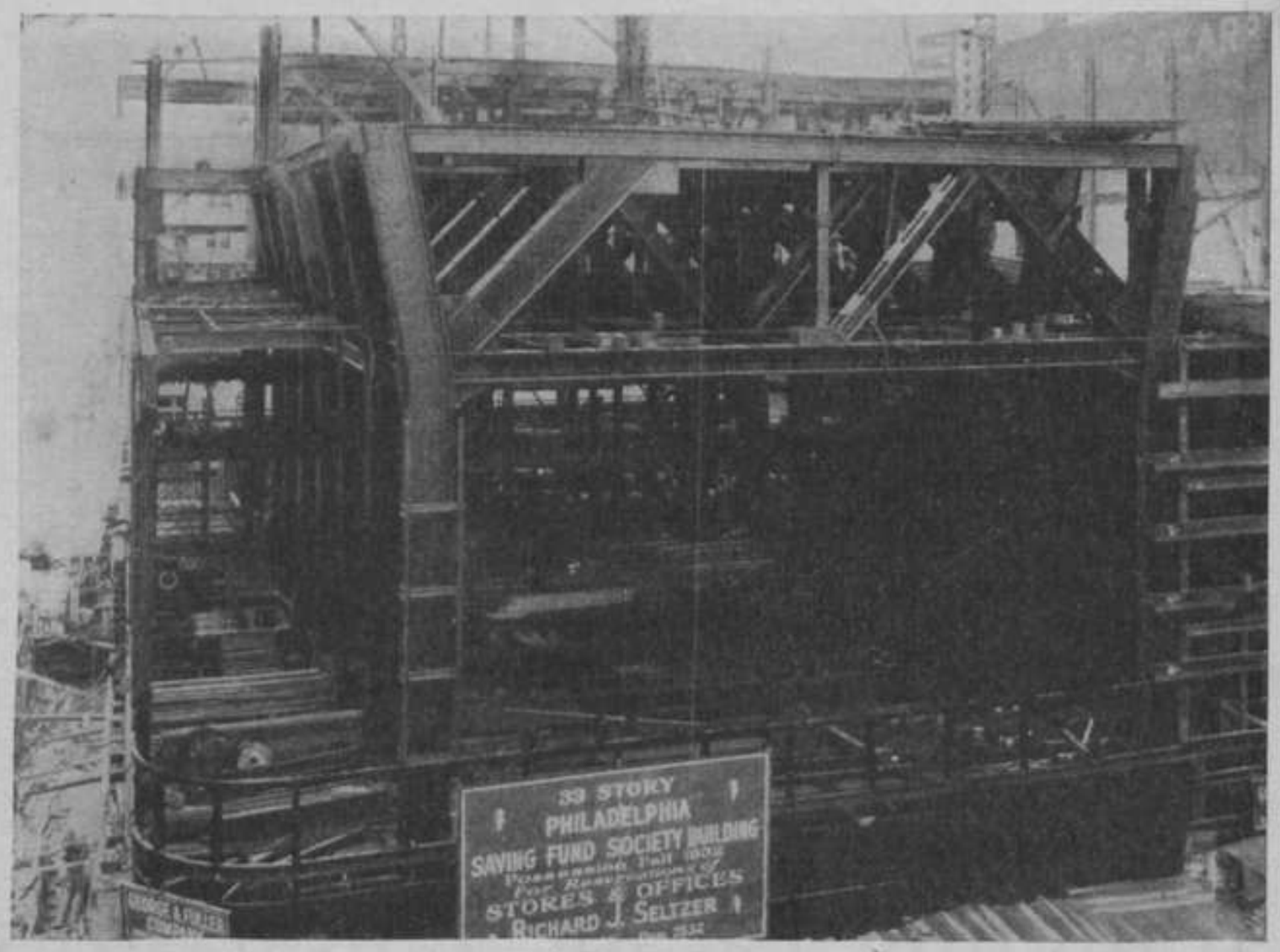
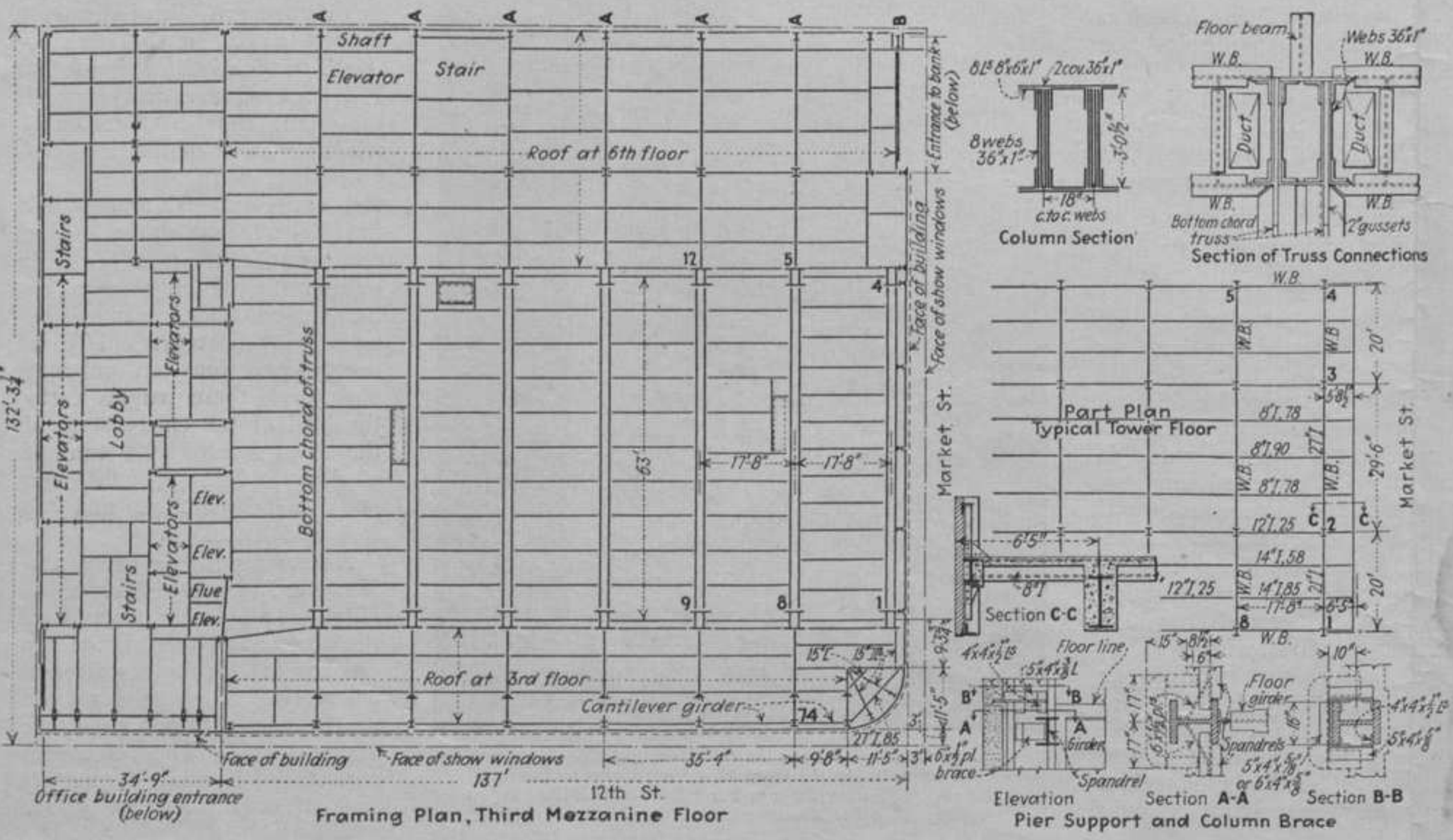


Fig. 2—Truss-framed bents designed as rigid frames carry 30 upper stories of building over banking room 60x130 ft. on the second floor. Truss gussets are milled to bear on web plates of supporting columns and on base billets of columns carried above.

framing used to support the store fronts along the 12th St. face is noteworthy because of the desire for wide column spacing and the necessity for carrying the unusually heavy load of granite facing. On the front corner there is no column, and a complicated cantilever framing layout results. At this point a 40-ft. length of store front (from col. 74 on the 12th St. side to col. 1 on the Market St. side) is devoid of column support. The framing at this corner (between the show-window head and the second floor) is shown on the plan, Fig. 3, and in the photograph, Fig. 5. Briefly, it consists of a 27-in. 85-lb. beam forming a chord of the circular arc, carried at one end by an inclined hanger from col. 1 and at the other by a plate girder that cantilevers 9 ft. 8 in. beyond col. 74 (Fig. 6). Pairs of 15-in.

Fig. 3—Prevailing shape of building above sixth floor is that of a T, with offices in stem and service facilities in head. Plan shows cantilever framing on Market St. front and wide column spacing in store fronts along 12th St.



channels pla[illegible]ly over the 27-in. beam [illegible]mns on their ends that [illegible]apet of the granite facin[illegible]e third floor.

[illegible]gh lighter, framing ar[illegible]l at the second-floor corn[illegible] in Fig. 6, a marquee roof e[illegible]walk is also carried from [illegible]loor framing. On the Market St[illegible]t the facing is hung outside the main steel supports from inclined cantilever beams (Fig. 6).

The stem portion of the T-shaped building contains the main features of structural interest. The banking room, in the central portion of which no interior columns were permitted, being on the second floor, high wide-span bents were required from the basement to the third floor. These bents are spanned below the third floor by deep two of 20 ft. on the outside and a central bay of 29½ ft. The depth of all bays is 17 ft. 8 in.

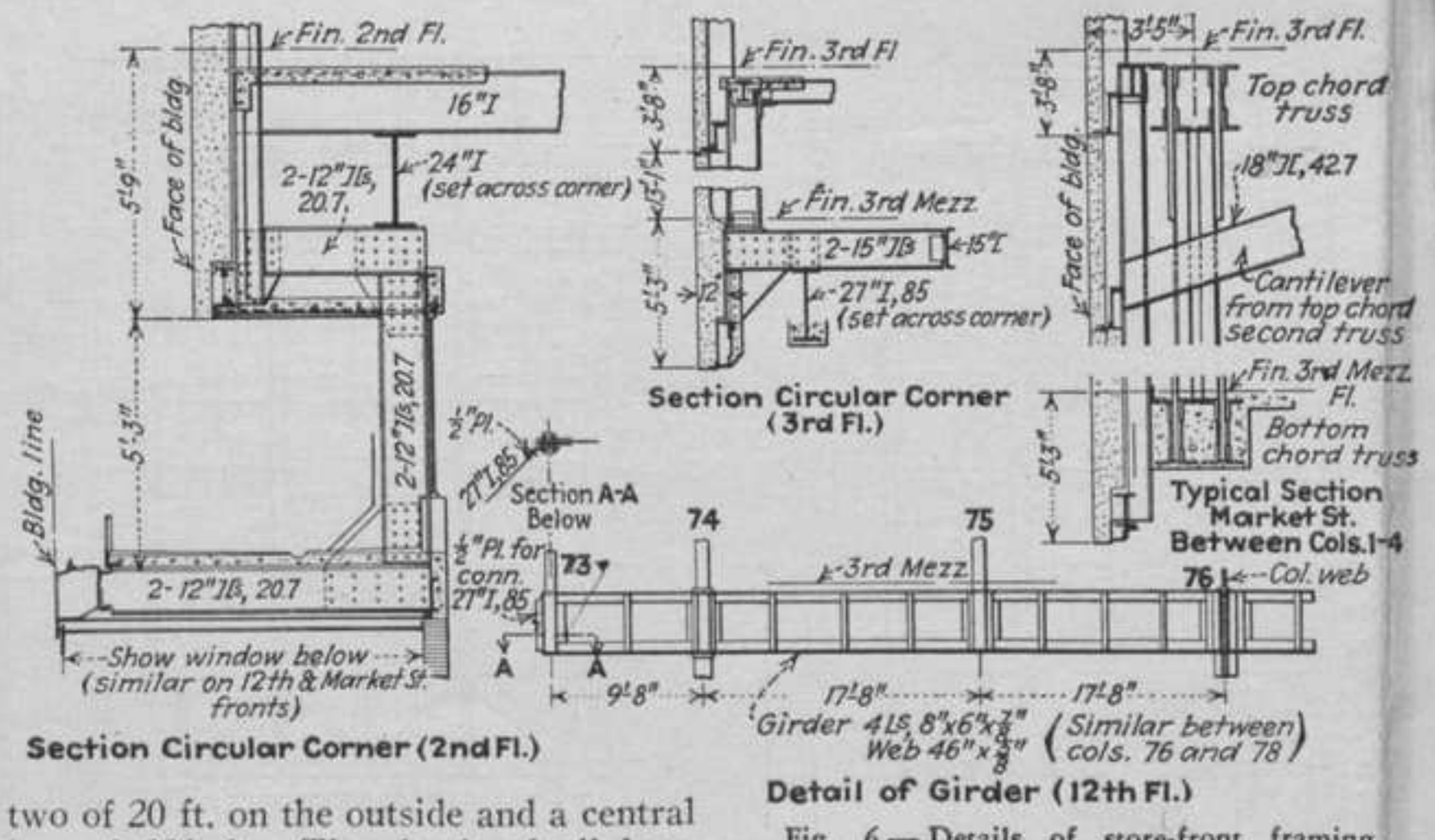


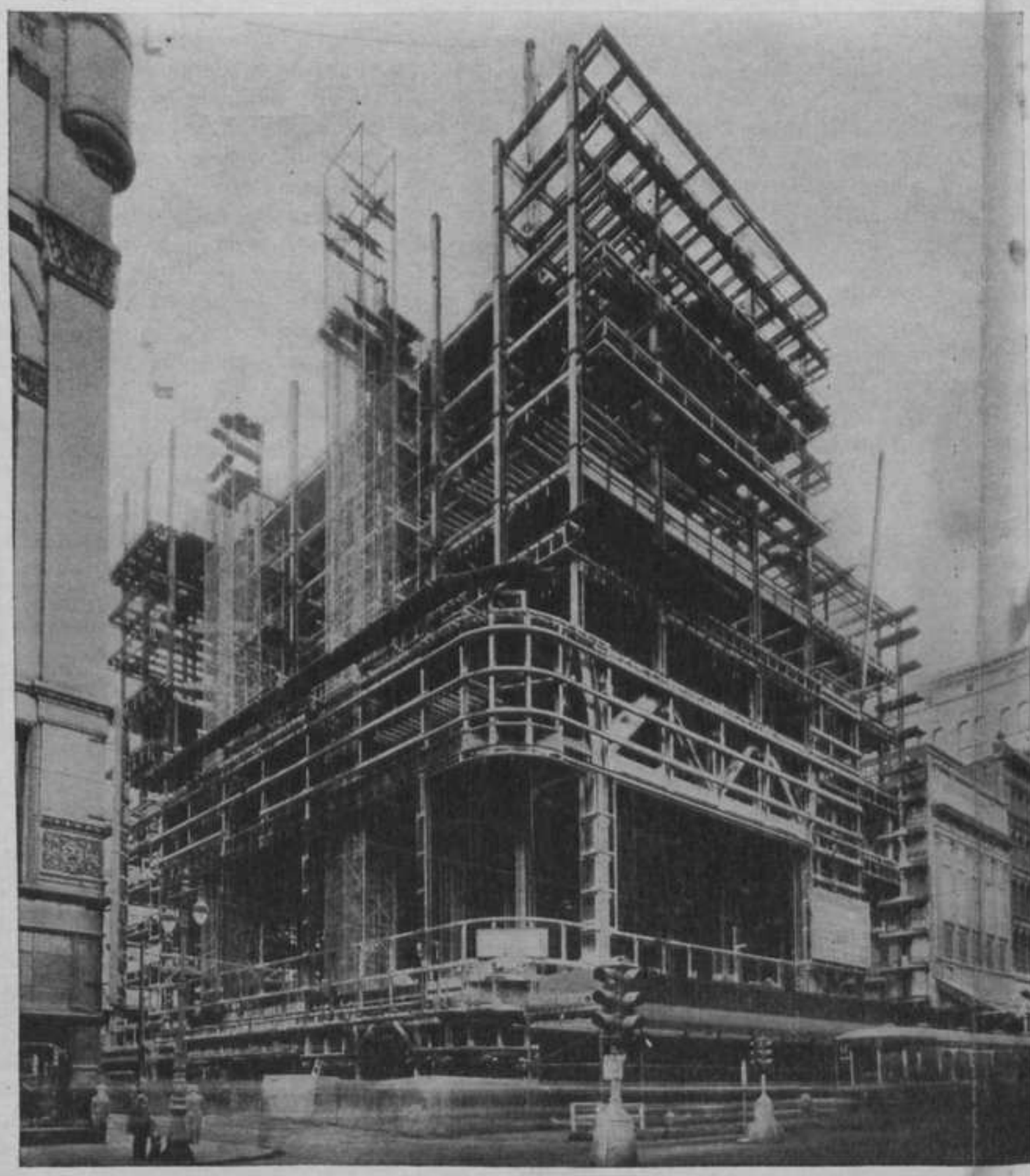
Fig. 6 — Details of store-front framing, which is to a large extent carried outside the column lines.

Wind Design

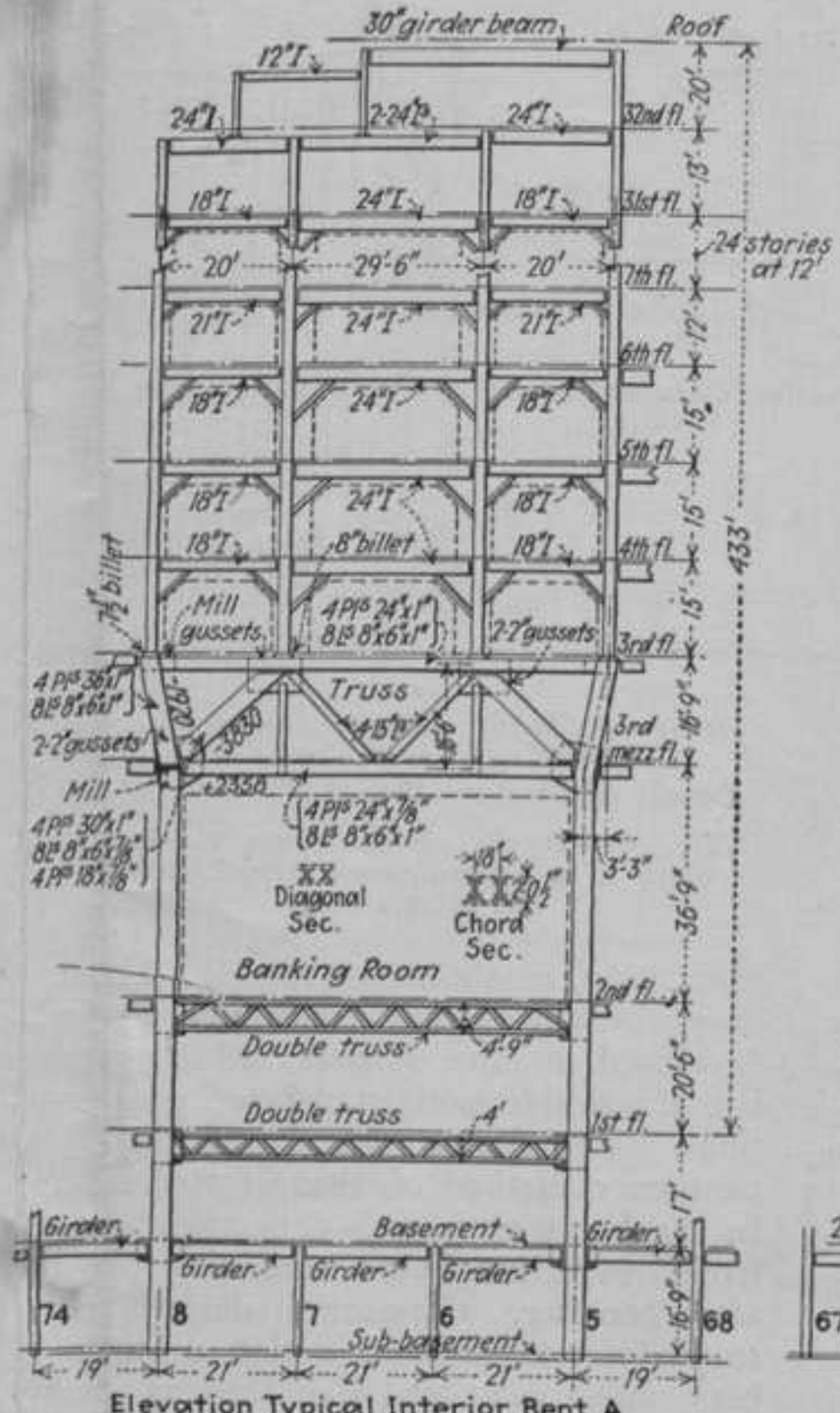
Wind design in a building of this character—30 stories on a three-story frame of 63-ft. span—is unusually important. The three-story lower portion of each bent was designed as a rigid frame. In the upper stories kneebraces are used at every girder-to-column connection, as shown in Fig. 7. These knees permitted full continuity to be developed in the girders, which was not practicable with split-beam connections. The design was based on the cantilever method of shear distribution in the bents with web deflections controlled to insure floors remaining plane after bending. Connection design was studied for continuous action of members under dead and live load as well

Fig. 4—In the completed building the rear wing, containing the service facilities and some offices, is inclosed in darker brick than the main-office portion in which the columns appear in relief except on the front facade, which is devoid of all columns.

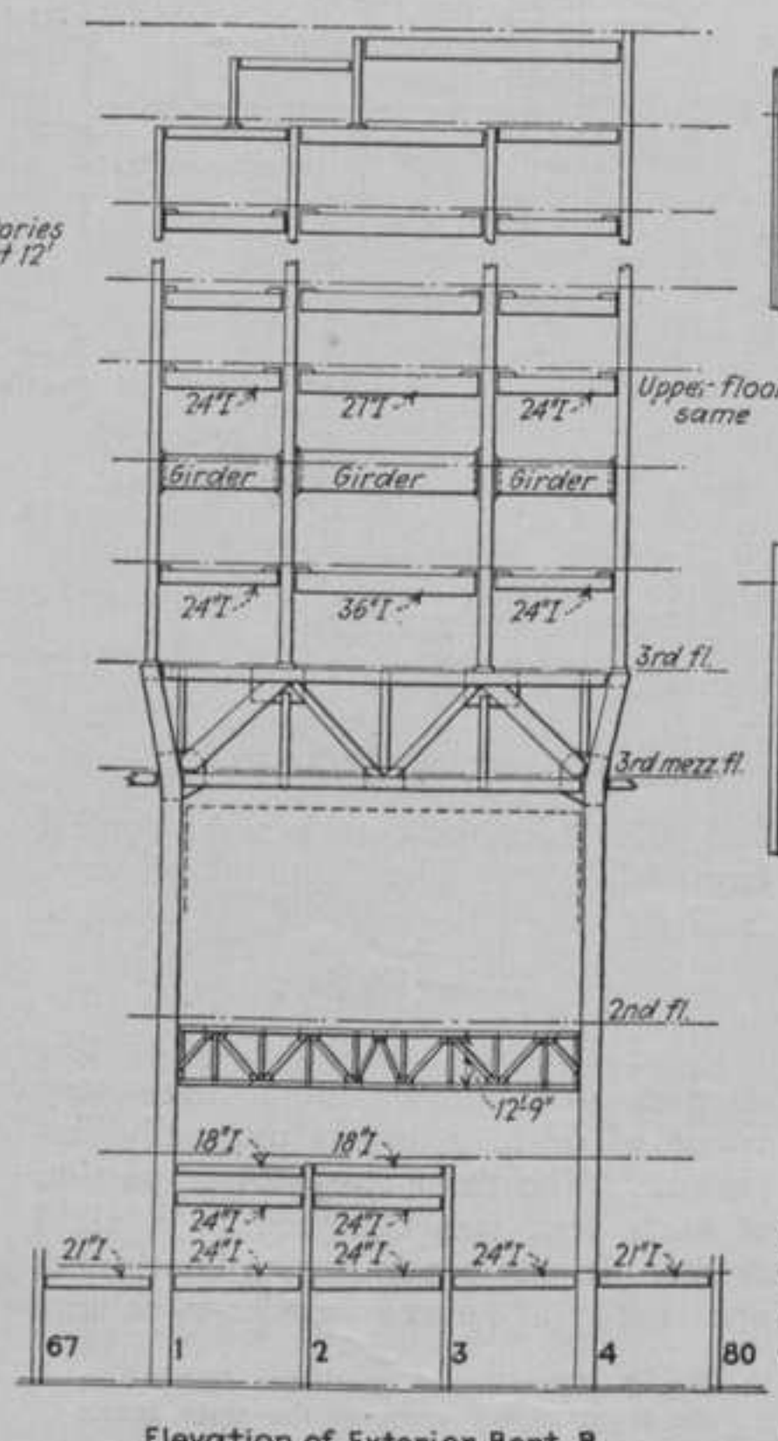
Fig. 5—Complicated cantilever framing at the front corner supports the store fronts and the granite facing. The truss story is devoted to air conditioning equipment.



and heavy double trusses that carry the upper 30 stories of the building. In addition, shallower double trusses carrying the first and second floors, and girders carrying the basement floor serve to brace these bents against wind and reduce the unsupported length of the columns. Above the third floor two interior lines of columns are introduced, carried on the top chords [illegible]usses. Since the colum[illegible] trusses are inclined [illegible] depth a distance of [illegible]th of the upper part [illegible]9 ft. 6 in. as co[illegible] in the banking [illegible]his 69 ft. 6-in. wid[illegible]is divid[illegible]hree bays—



Elevation Typical Interior Bent A



Elevation of Exterior Bent B

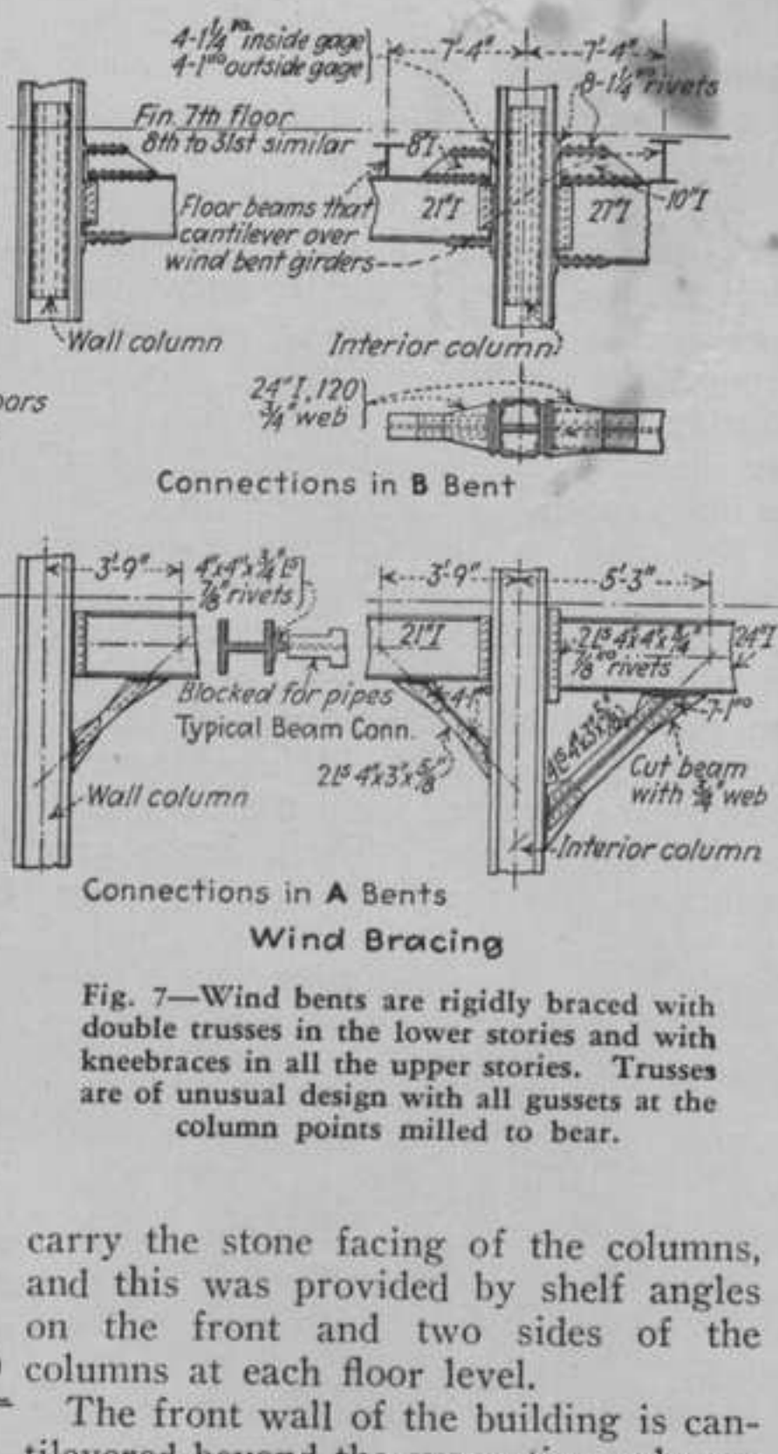


Fig. 7—Wind bents are rigidly braced with double trusses in the lower stories and with kneebraces in all the upper stories. Trusses are of unusual design with all gussets at the column points milled to bear.

as under wind load. Girder sizes and connections were proportioned to permit a maximum deflection of the top of the building of 0.002 times the height, or about 7 in., which is 0.35 in. drift per story. A wind pressure graduated uniformly from 30 lb. at the top of the building to zero at the sidewalk level was used.

Columns

In the service area of the building (the head of the T) columns in general are of rolled sections, with or without coverplates. A typical column for a load of 3,956 kips consists of a 14-in. H 425-lb. section with plates 22x3⅛ in. on each flange. In some locations in this area where clearance requirements were severe built-up columns were used, a typical example for a load of 1,771 kips, utilizing a 14x2⅛-in. web plate, four angles 6x4x1 in. and side plates 12x2½ in.

The columns carrying the trusses in the office portion of the building are the most notable. Occupying an area about 3 ft. square, they utilize eight 36x1-in. web plates, eight 8x6x1-in. flange angles and 36x1-in. coverplates (Fig. 3). The loads on these columns averaged about 6,170 kips. In general the columns weigh about 45 tons each, or 1,750 lb. per foot.

Trusses

The trusses in the first, second and third floors occur in pairs, each truss of a pair framing into a web of the large supporting columns. At the points of connection the two center web plates of the column are replaced by a gusset, milled to bear top and bottom on the webs. For the shallow first- and second-floor trusses these gussets are full-truss depth. For the deep third-floor trusses the gusset arrangement is as shown in Fig. 7. In these latter trusses the gussets in the top chord are also milled on their top edges to support the billets that carry these upper-story columns.

The make-up of the members of these third-story trusses is similar to that of the supporting columns—namely, two I-shapes joined by coverplates. The heavy members are built up of plates and angles, while the lighter bracing members of the web system utilize pairs of channels to form the I's. The gussets are inserted between these channels. Each of these heavy double trusses below the third floor required about 115 tons of steel and rivets.

Special details

Because of the facade treatment on two sides of the building in which the columns appear as vertical bands with the window and wall areas depressed, all spandrels are connected on the inside flange of the columns as shown in Fig. 3. The outside flange of the column is thus without the usual bracing, and bent plates are utilized, acting as kneebraces between the outside flange of the columns and the spandrels. Special provision was also necessary to carry the stone facing of the columns, and this was provided by shelf angles on the front and two sides of the columns at each floor level.

The front wall of the building is cantilevered beyond the supporting columns a distance of 6 ft. 5 in., permitting continuous windows along the Market St. front. This is accomplished, as shown in Fig. 3, by extending the floor beams over the girder of the front bent and anchoring them to this girder and to the girder of the next bent in the rear. This arrangement of the cantilevers permitted the girder-to-column connection in the front bent (which are of split-beam type) to be made at the top of the cross-girder instead of at the bottom. Thus a higher ceiling height was permitted, and no encroachment of the connection on the floor above resulted.

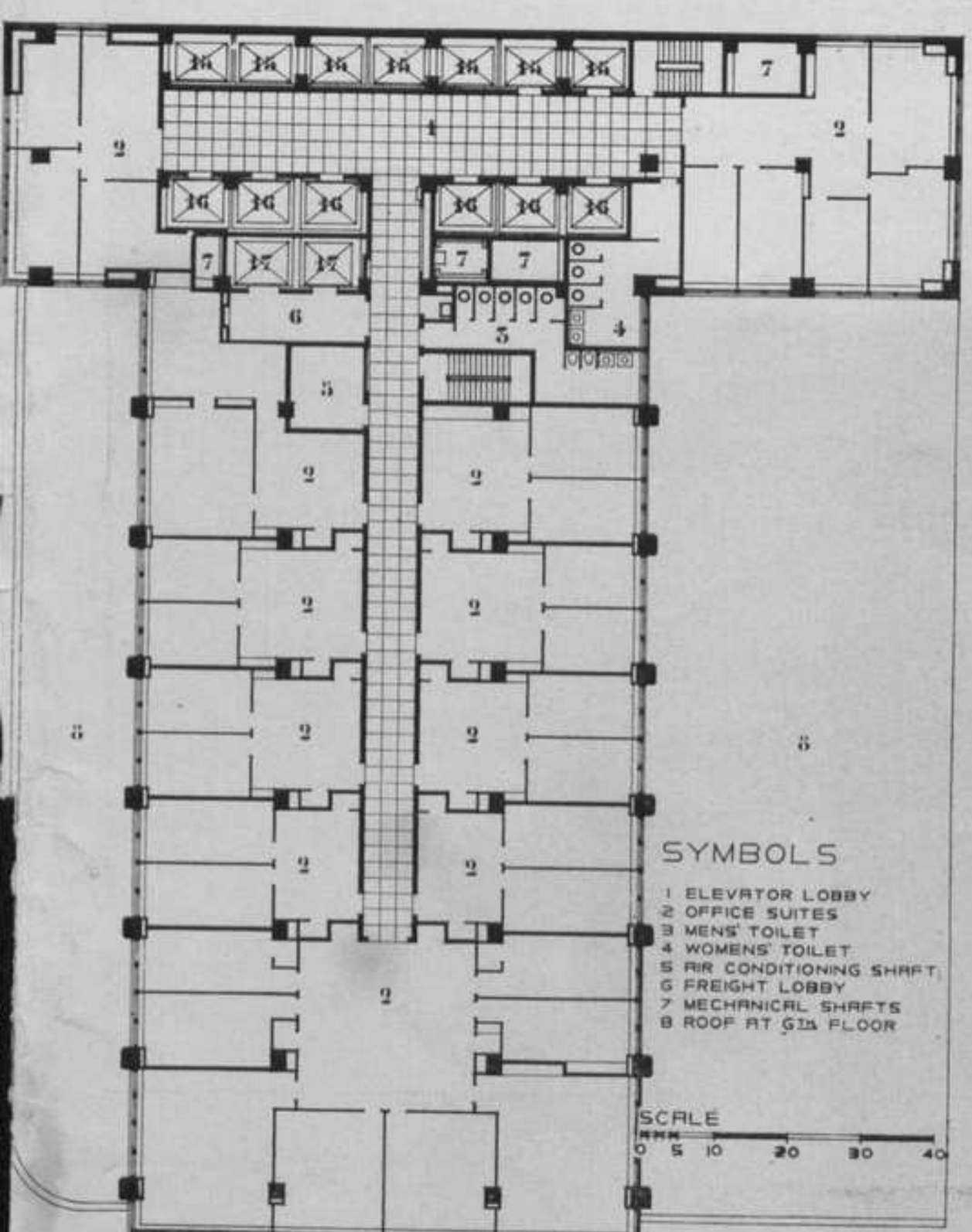
Personnel

For the Philadelphia Savings Fund Society Building, Howe & Lescaze, New York City, were the architects, Purdy & Henderson, New York, the structural engineers, and George A. Fuller Co., New York, the general contractor. Steel erection was by Karl Koch Erecting Co., Philadelphia.

Bridge Planned at Baton Rouge

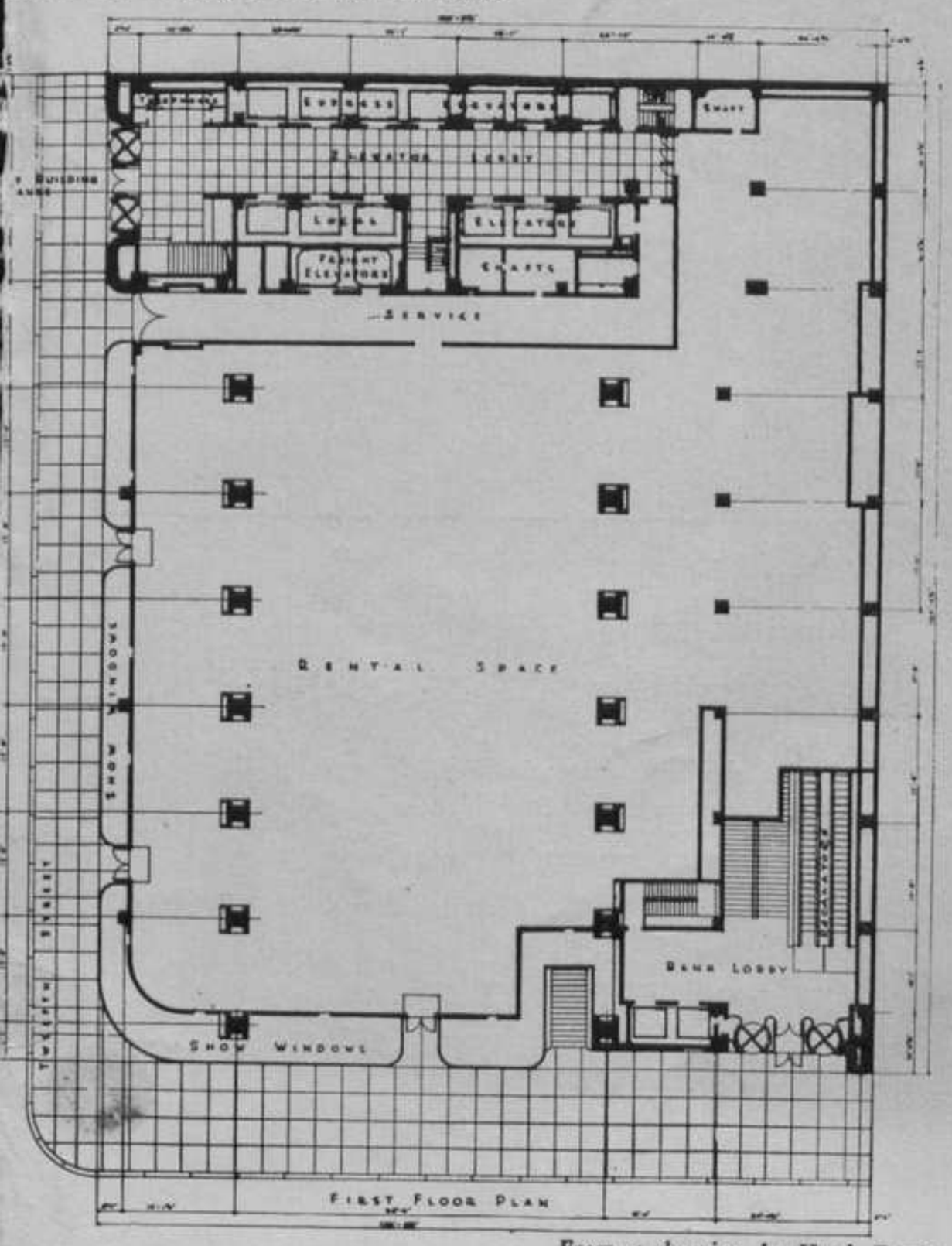
Plans for a combined railroad and highway bridge across the Mississippi River at Baton Rouge have been revived by the Louisiana state highway commission. Construction of such a project was proposed some years ago by the Missouri Pacific System and the Louisiana & Arkansas Railroad.

It is expected that application will be made to the Reconstruction Finance Corp. for funds to construct the bridge. Provision will be made for a lift span.



Typical floor, showing office space

eet floor, showing stores and escalators



From a drawing by Hugh Ferriss

if modernism finds bank

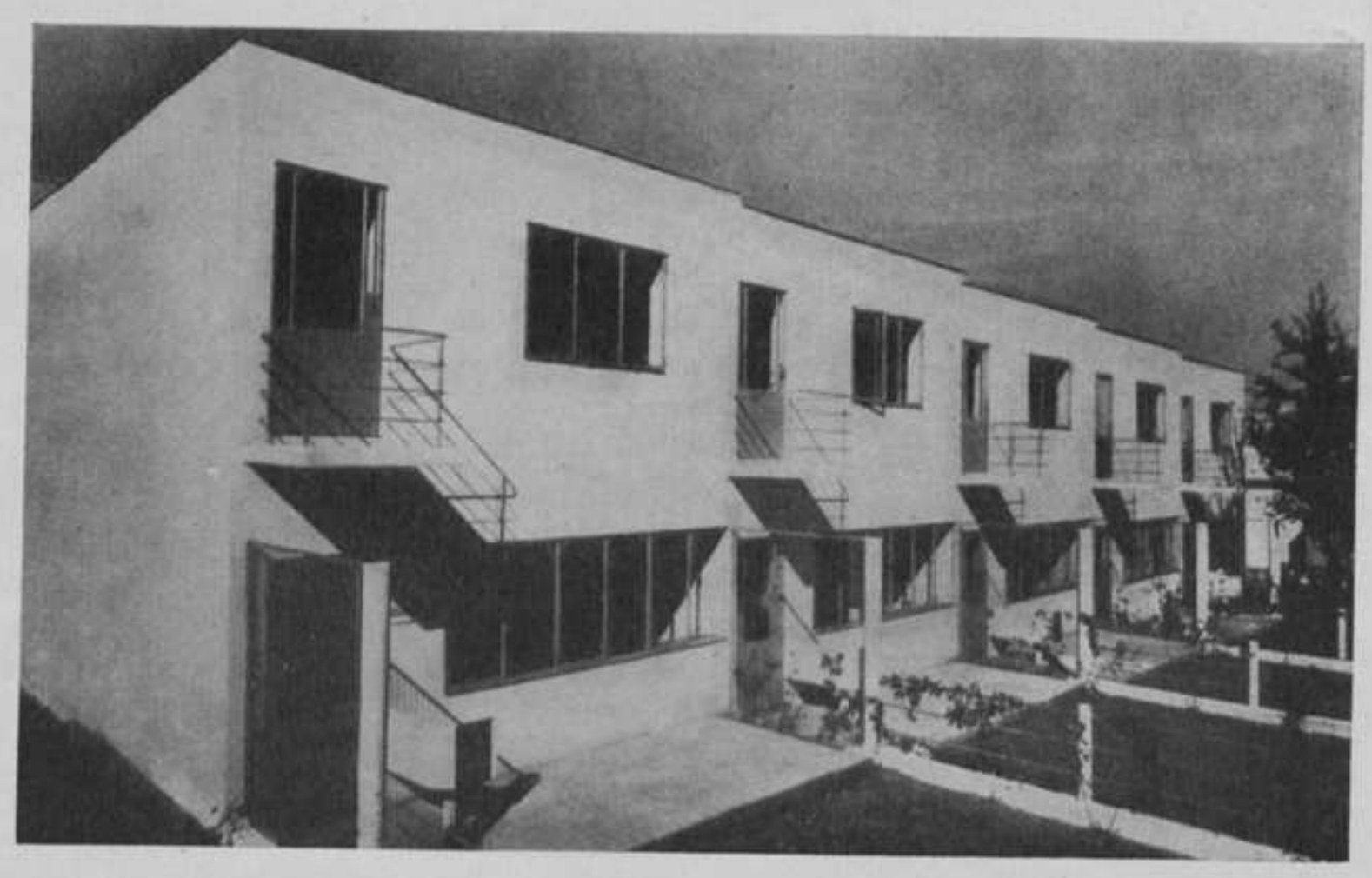
IN AMERICA:

a—For an apartment tower in the country (Hood & Fouilhoux)

b—For apartments in Evanston, Ill. (Bowman Bros., Chicago)

b

a



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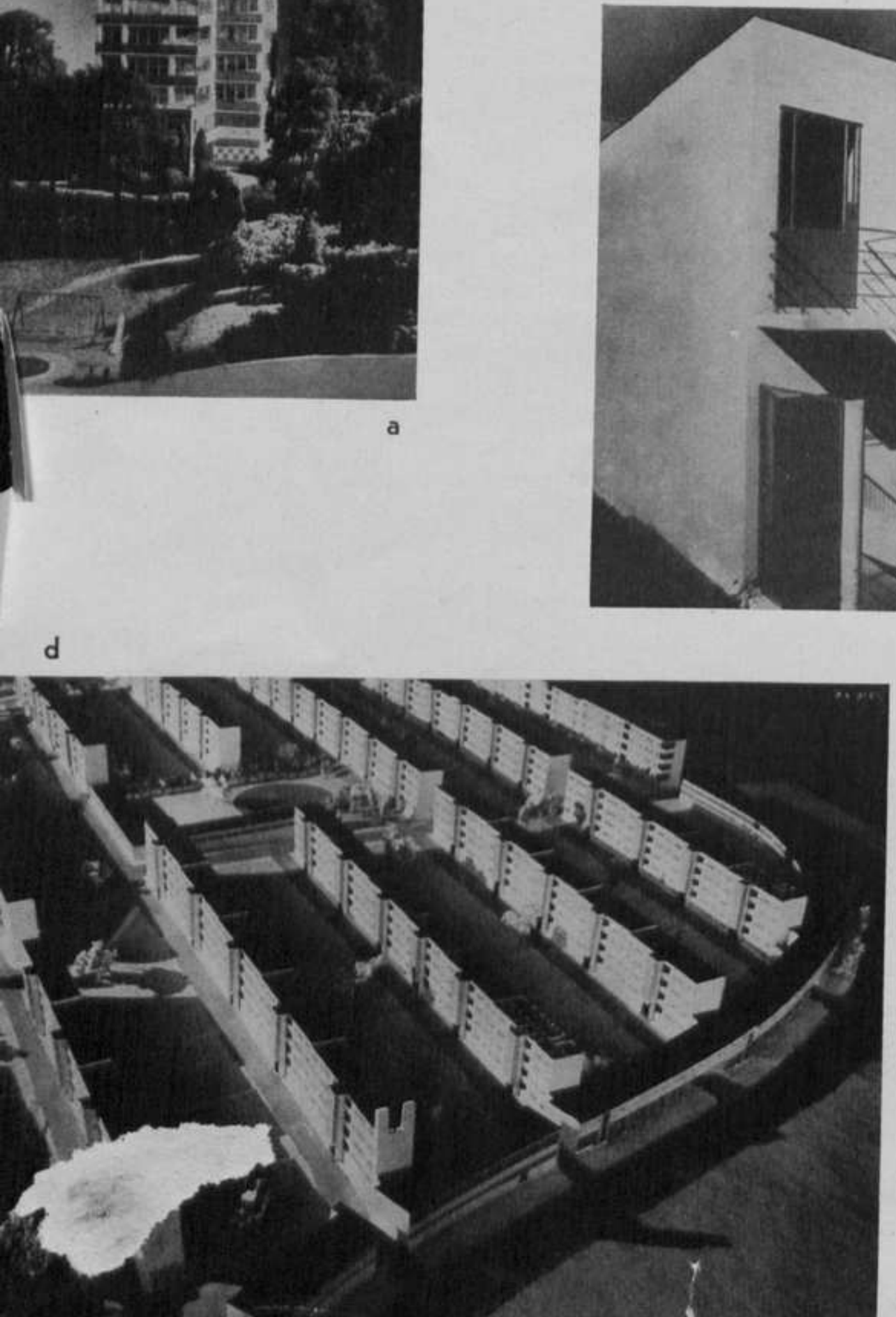

d

IN EUROPE:

c—Row houses, Stuttgart, Germany (J. J. P. Oud)

d—Rothenberg Housing Development, Kassel, Germany (Otto Haesler)

SAMPLES FROM THE WAY THE BUILDING WORLD IS GOING—Shown on Fifth Avenue, at the Museum of Modern Art . . .