Paper No. 1

Reviews the development of precast concrete wall panels. Discusses early exposed aggregate work, panel shape, use of color, structural panels, sandwich panels, and shocked concrete.

Precast Concrete Wall Panels: Historical Review

By T. W. Hunt

■IT IS A COMMON MISTAKE to think of precast concrete panels as a recent development; say, of the past ten years. Actually, limited use of panels started prior to 1912 when units were cast at the job site and tilted into place. Similar methods were used for several housing developments and buildings of various occupancies built between 1912 and 1940. Growth in the use and variety of panels has been so spectacular in recent years, that it has overshadowed much of the earlier work.

EARLY EXPOSED AGGREGATE WORK

We are inclined to think that the various methods of producing decorative surfaces on concrete panels are recent developments. In many cases this is true, but some are merely refinements of methods that have been known for many years. For example, an article in the April 3, 1909 issue of *Engineering Record* describes in considerable detail methods of exposing surface aggregate in concrete to produce a decorative finish. Three different patents were granted previous to 1918 covering methods of achieving exposed aggregate surfaces.

An example of exposed aggregate concrete produced prior to 1920 is in Meridian Hill Park in Washington, D. C. (Fig. 1). This work was directed by John J. Earley. The close-up photograph, taken in 1961, reveals how well the surface appears after more than 40 years of exposure to the elements. By 1925, the Parthenon in Centennial Park, Nashville, Tenn., was completed with the exterior surfaces of exposed aggregate (Fig. 2). In 1932, Earley and his associates started work on panels and other precast units for one of the finest exposed aggregate

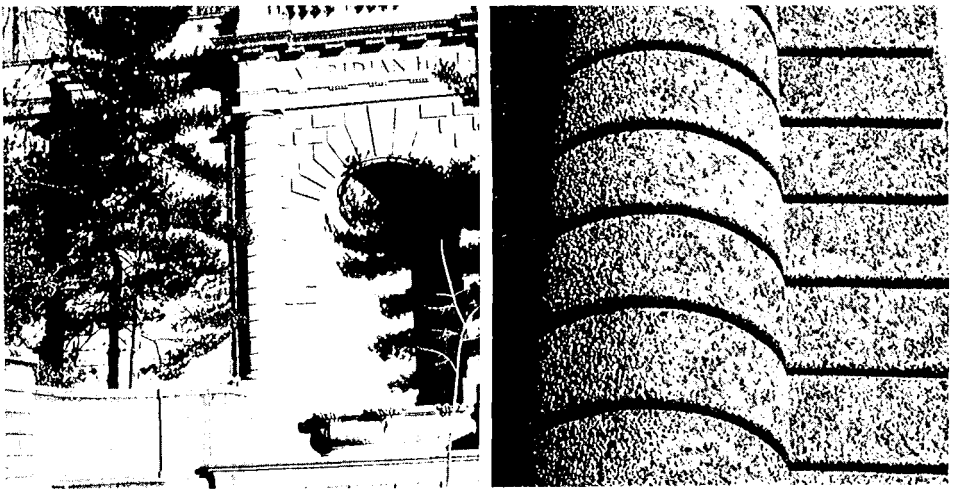

Fig. 1—Meridian Hill Park, Washington, D. C.

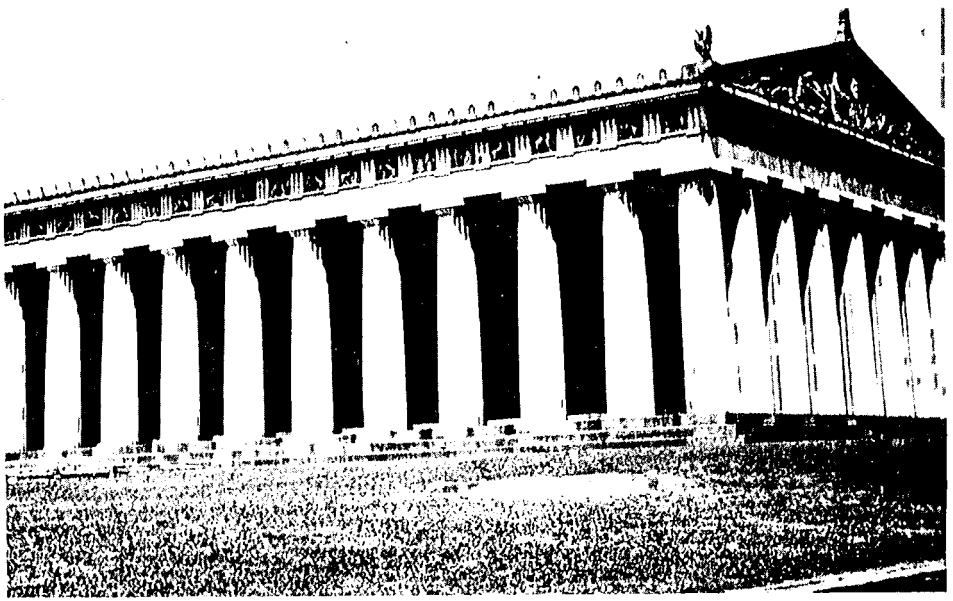

Fig. 2—Parthenon, Nashville, Tenn.

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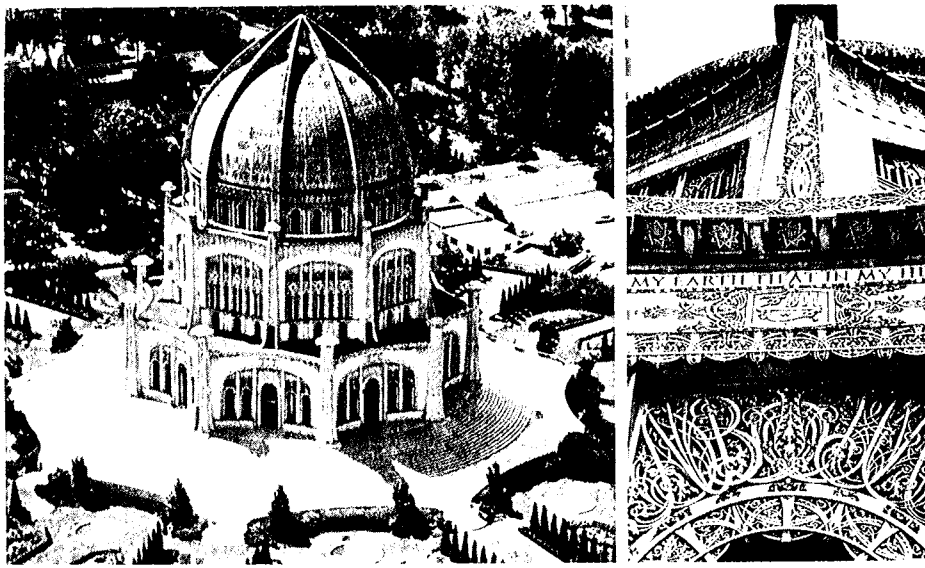

Fig. 3—Baha'i Temple, Wilmette, Ill.

structures of all time—the Baha'i Temple, Wilmette, Ill. (Fig. 3). Because of shortage of building funds the exterior was not completed until early 1943. This building is an example of decorative concrete work which is still unsurpassed in detail and workmanship.

POST WORLD WAR II DEVELOPMENT

During the ten years following the end of World War II there was a steadily expanding use of precast panels, although this growth was not startling. Since 1955, however, there has been a tremendous increase in the use of precast concrete panels of all types, and a concurrent growth in the development of new textures and patterns. Reasons for this expanding usage include improved methods of production, better handling and erecting equipment, and development of new techniques and materials. Probably the greatest factor, however, has been the realization by architects that precast panels provide a pleasing variety of surface textures and patterns and exterior designs that generally cannot be accomplished as economically in other materials.

CHANGE IN PANEL SHAPE

For many years the typical panel was rectangular in shape, with a flat surface. Usually it was of only one color, such as white aggregate in a white cement matrix. Such panels still fill a large share of the requirements but the relative ease with which an almost unlimited range of shapes, designs, colors, and textures can be produced has stimulated the imagination of engineers and architects. Some idea of the variety of shapes that have been produced may be gained from a look at several new structures.

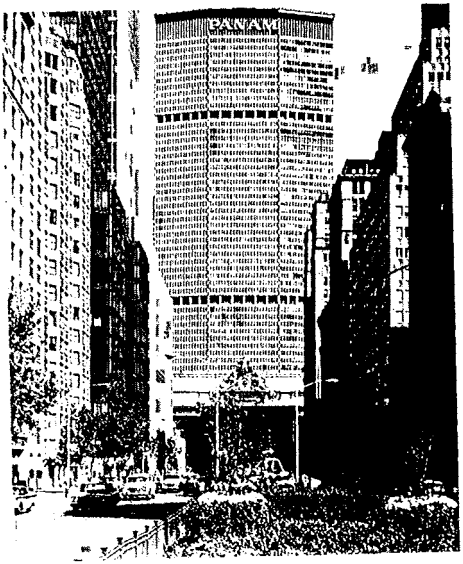

Fig. 4—Pan Am Building, New York, N. Y.

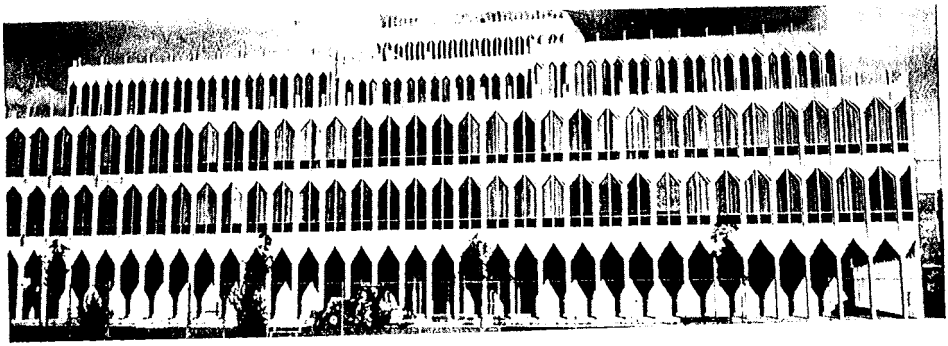

Fig. 5—Education Building, Wayne State University, Detroit, Mich.

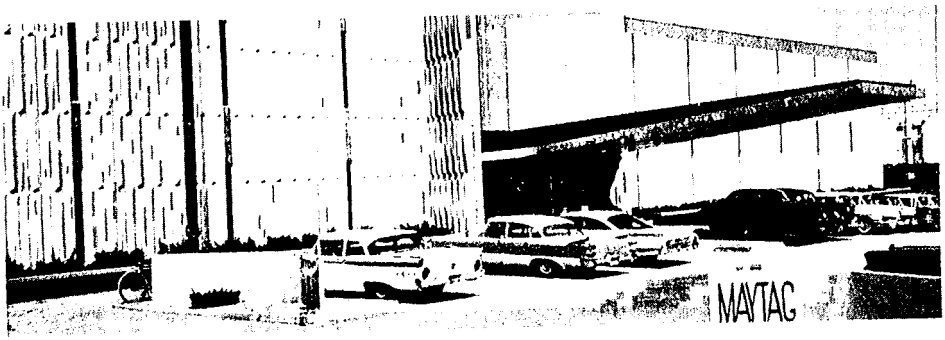

Fig. 6—Maytag Company Office, Newton, Iowa

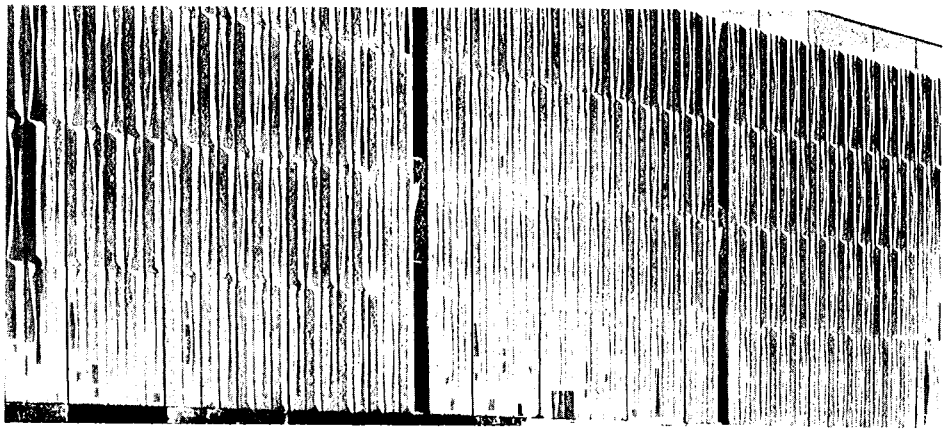

Fig. 7—Maytag Company Office, Newton, Iowa

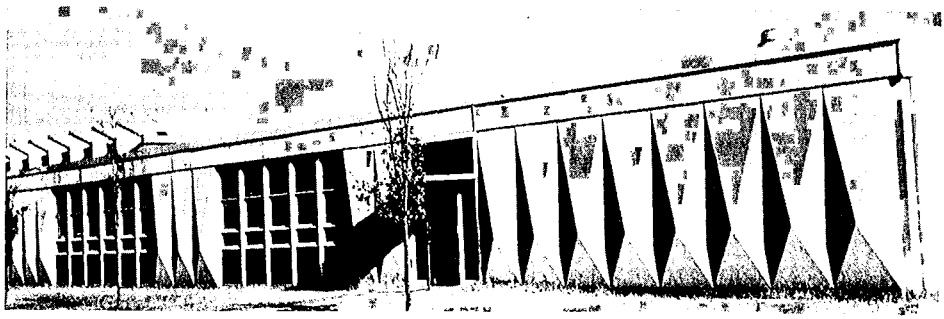

Fig. 8—Garinger High School, Charlotte, N. C.

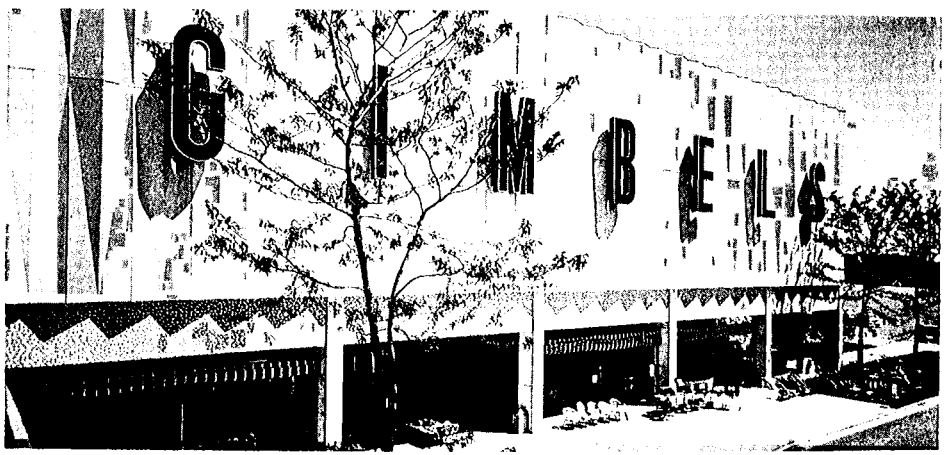

Fig. 9—Gimbels Store, Wauwatosa, Wis.

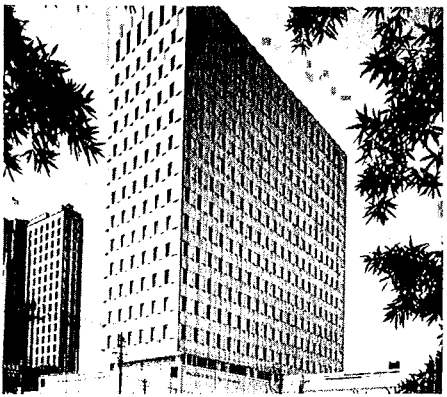

Fig. 10—Wachovia Bank & Trust Company, Charlotte, N. C.

We have interesting panels on the exterior of the largest commercial office building, the Pan Am Building, located over Grand Central Station in New York (Fig. 4); the Education Building at Wayne State University in Detroit (Fig. 5); a new office building for the Maytag Company in Newton, Iowa (Fig. 6-7); a classroom building, part of a new high school complex (Fig. 8); a large department store near Milwaukee (Fig. 9); and a bank and office building in Charlotte, N. C. (Fig. 10).

GROWING USE OF COLOR

The increased use of color, both in the cement matrix and in exposed aggregate, has made it possible to produce patterns or designs in panel surfaces that add to their attractiveness. A few of the effects possible through combinations of two or more colors may be seen in the panels over the auditorium entrance at the Oak Park High School, Laurel, Miss. (Fig. 11); similar but larger panels enclose the Wieboldt Department Store in a Chicago shopping center (Fig. 12).

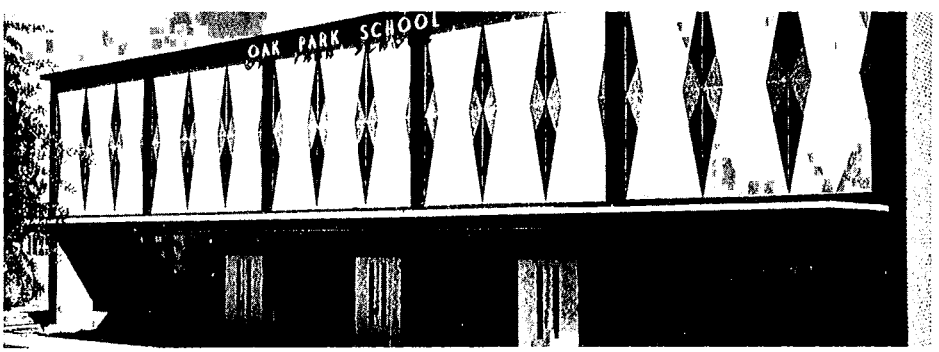

Fig. 11—Oak Park High School, Laurel, Miss.

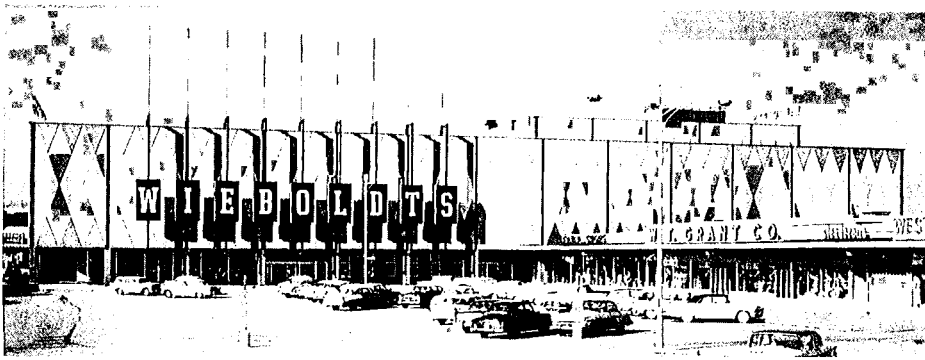

Fig. 12—Wieboldt's Department Store, Chicago, Ill.

Fig. 13—Fremont Hotel, Las Vegas, Nev.

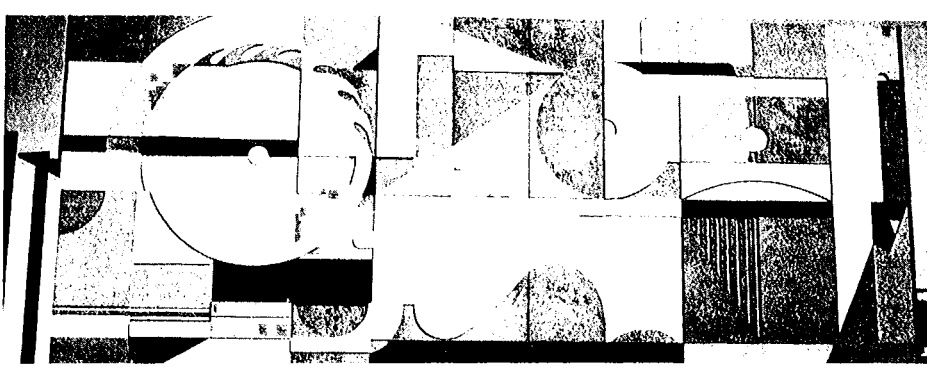

Fig. 14—Yates American Company, South Beloit, Ill.

It may be interesting to note that while these panels are rectangular in shape, by proper placement of the colored facing mixes it has been possible to create a harlequin diamond pattern. On the Wieboldt store there are nine panels to each bay, three wide by three high, with each panel being slightly under 8 x 14 ft. The L-shaped panels on the Fremont Hotel, Las Vegas, were designed to be distinctive even when surrounded by a jungle of signs and neon lights (Fig. 13).

A mural was made of 22 rectangular panels, each 6 x 14-1/2 ft., with a variety of colors being used to create an abstract representation of the products manufactured in a northern Illinois plant (Fig. 14). The designer deliberately developed a pattern that could be seen at a distance as the structure is set back from an Interstate highway with potential viewers traveling 70 mph.

DUAL PURPOSE PANELS

Another innovation has been the design of precast units to serve as both window frames and the exterior facade. When erected the units make up the entire wall surface, with no further additions. The precast exposed aggregate window frames that form the exterior of the new Bankers Trust Building (Fig. 15) on Park Avenue in New York are of white quartz aggregate in a white cement matrix with the glass being installed after the precast units had been

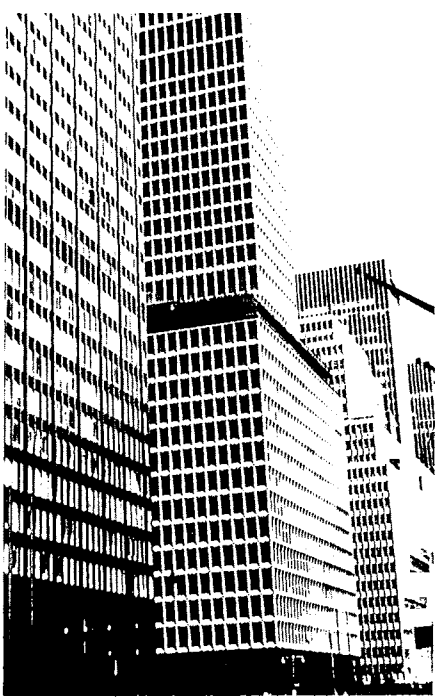

Fig. 15—Bankers Trust Company, New York, N. Y.

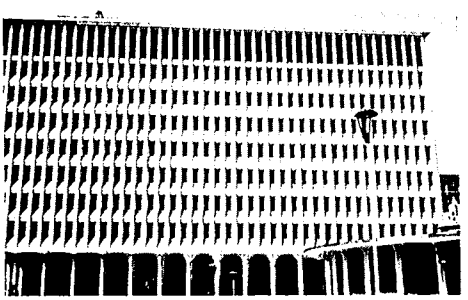

Fig. 16—City Hall, Phoenix, Ariz.

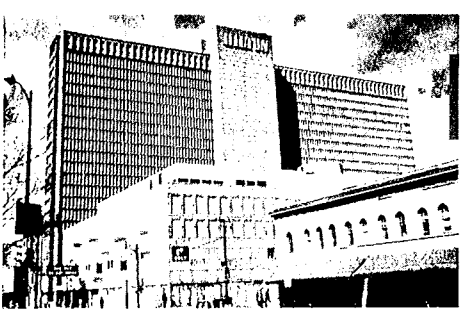

Fig. 17—Hilton Hotel, Denver, Colo.

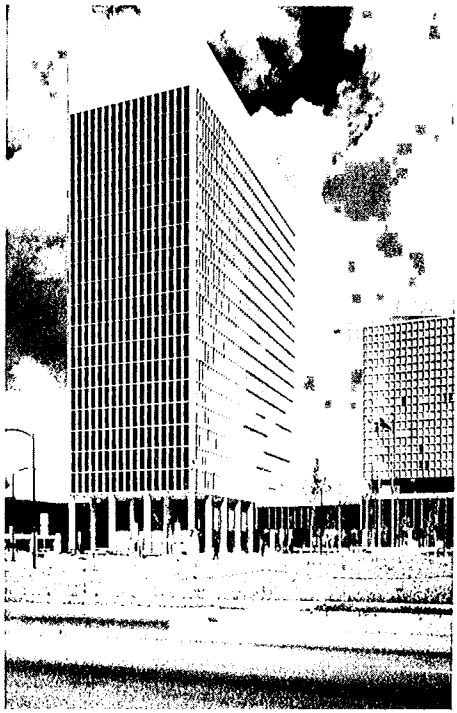

Fig. 18—500 Jefferson Building, Houston, Tex.

erected. Deeply recessed windows were provided in the frames that make up the exterior of the new Phoenix City Hall (Fig. 16), and the units on the Hilton Hotel in Denver (Fig. 17). Each unit on the hotel contains two windows. The 500 Jefferson Building (Fig. 18), erected in Houston during 1963, added a new fabrication technique to precast window unit production. The glass was installed at the precasting plant, eliminating glazing operations on this tall building. A secondary benefit of this method was that the precast units were handled a little more carefully with the glass in place.

STRUCTURAL PANELS AND UNITS

To date, practically all panels have been curtain wall units supported by the building frame. An occasional structure, however, has incorporated units that are both ornamental and structural. In some cases this has been done through the addition of an exposed aggregate surface to structural units, such as prestressed double-T members (Fig. 19). The John Hancock Insurance Building in Kansas City has a precast exterior frame of cross-shaped units with exposed aggregate surfaces on all sides (Fig. 20). This was accomplished by using white cement and white quartz aggregate in the mix and later exposing the aggregate by acid etching.

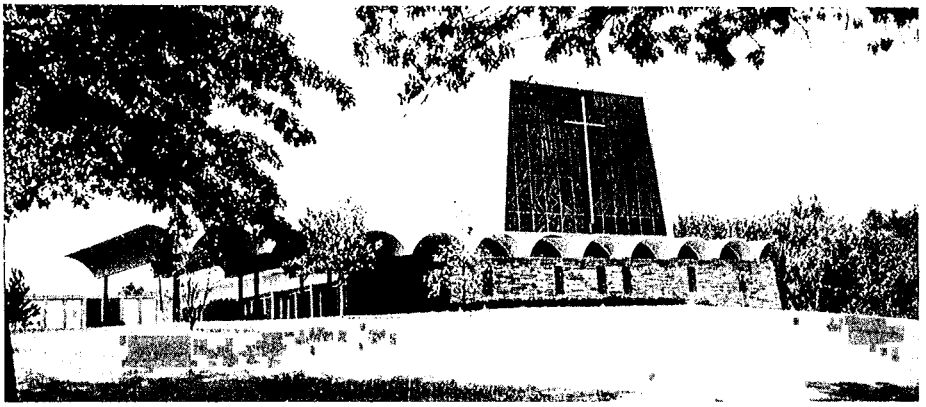

Fig. 19—Kenwood Baptist Church, Kenwood, Ohio

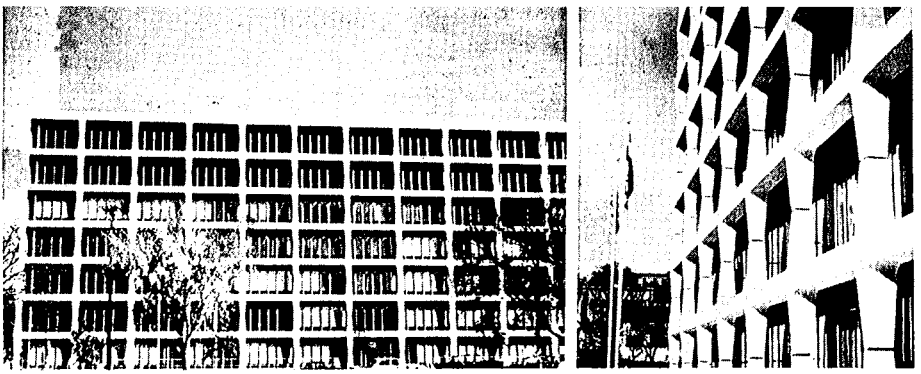

Fig. 20—John Hancock Life Insurance Co. Bldg., Kansas City, Mo.

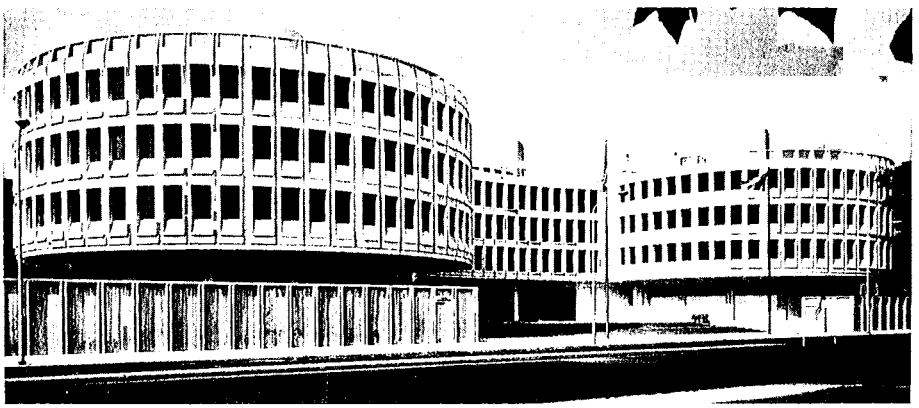

Fig. 21—Police Administration Building, Philadelphia, Pa.