Colored Precast Panels Brighten Chicago's Chinatown

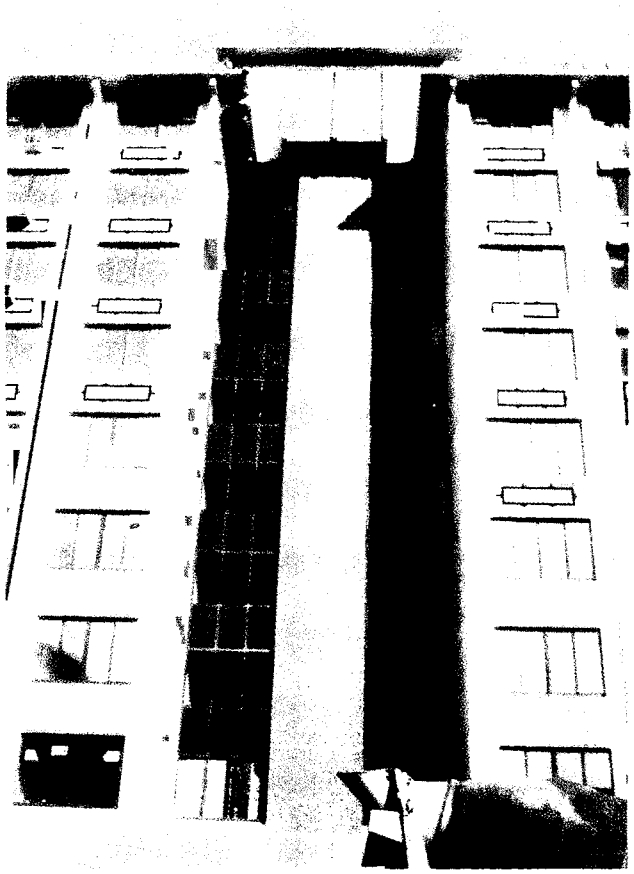


Fig. 1 — Chinese Elderly Housing, 300 West 23rd Street, Chinatown, Chicago, Il.

A 9-story, 139 unit building for the elderly in Chicago's Chinatown was built of totally precast concrete elements. By using shop-fabricated precast concrete ornamental panels coated in bright red and green aliphatic urethane colors, the building clearly reflected the Chinese culture of its tenants and the surrounding community.

Keywords: architectural concrete; colored concrete; colors (materials); **concrete construction;** concrete finishes; decorating; earthquake resistant structures; hollow core slabs; paints; **precast concrete;** prefabricated.

Color in concrete is not a common sight, but when it is used correctly and with a little flair, it's a knockout!

Located on West 23rd Street in Chicago's Chinatown is a beautiful example of the possibilities of colored concrete (Fig. 1). The totally precast 9-story, 139 unit Chinatown Elderly Housing project, built between January and November of 1978, is adorned in striking form, color, and symbolization, which clearly establish the building's identity and elevate it in terms of quality above the average elderly housing (Fig. 2).

The local Chinese community organization, called the Neighborhood Redevelopment Associates (NRA), (headed by G. H. Wang, President), had actively promoted the urgent need for suitable elderly housing in Chinatown, but they had not been successful in organizing the necessary financial backing. ACI member Michael A. Lombard, Board Chairman of The Lombard Company, Alsip (Chicago), Illinois, and general contractor for the project, had worked with the Neighborhood Redevelopment Associates before and agreed to sponsor the project. With Lombard's help, the NRA and The Lombard Company (part owner in the project) were able to secure HUD Section 8 Funds to finance the design and construction.

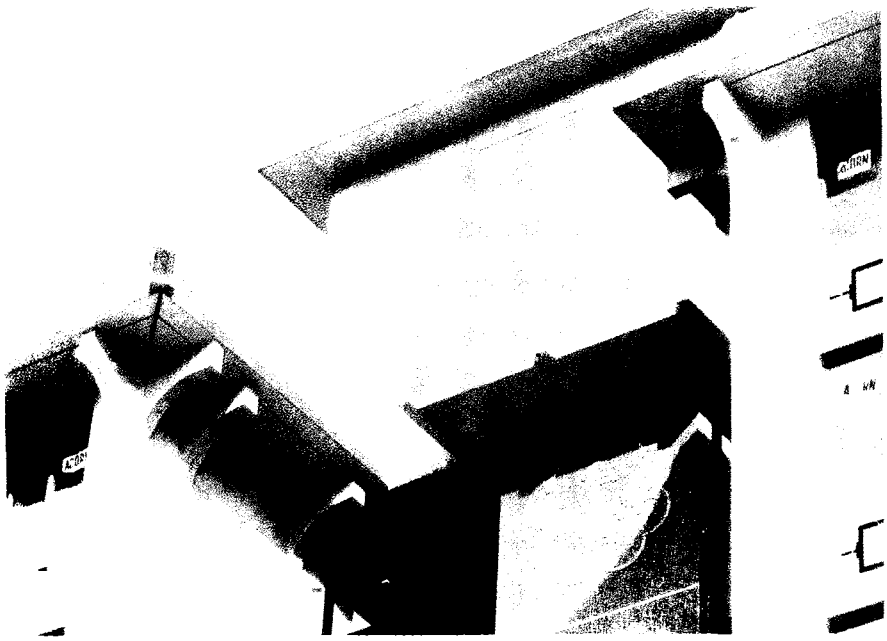


Fig. 2 — The striking form, color, and symbolization clearly establish the building's identity and elevate it in terms of quality.

General description

The building is a 9-story, wall-bearing low-rise (Fig. 3). It is 209 ft (64 m) long, 96 ft (29 m) high, and 65 ft (20 m) wide. Load-bearing walls are spaced at 23 ft 2 in. (7 m) o.c. in the transverse direction, forming nine typical bays each 23 ft (7 m) wide. Except for the ground floor clear height of 9 ft (2.7 m), all story heights are 8 ft (2.4 m) clear.

The entire building was constructed with precast concrete components. The load-bearing walls consisted of 6 in. (152 mm) thick precast concrete panels and were stacked to a total height of 80 ft (24 m) under the main roof and to 96 ft (29 m) at the penthouse (Fig. 4). The floors and roof were built with prestressed precast hollow-core concrete slabs, 8 in. (203 mm) thick, that span 23 ft (7 m) between the load-bearing walls (Fig. 5). Non-load-bearing partitions, exterior curtain wall panels, elevator shaft, stairs, and canopies, were also precast concrete (Fig. 6).

Foundation

A heavy structure on poor soils dictated the use of typical Chicago-type hardpan caissons, 30 in. (762 mm) in diameter, 60 ft (18 m) deep. Each 32 ft (10 m) long wall element was supported on two caissons, therefore a total of 4 caissons at each bay line of transverse load-bearing walls.

The first floor load-bearing walls were designed as wall girders to spread the concentrated reaction from the caissons to a rather uniform reaction at the second floor level. This design approach reduced the amount of reinforcing steel required in the load-bearing walls to a minimum, from the second floor to the roof.

The 3 ft (0.9 m) deep cast-in-place grade beam system below the ground floor was designed to carry reactions from loads other than the wall girder system, such as the elevator shaft, stairwells, longitudinal gravity-type shear walls, and any reactions at points where no wall girder action was possible because of large openings in the ground floor walls accommodating community rooms and other open spaces.

The "Balco Building System"

The particular system of precast components is called the "Balco Building System," a division of the Lombard Company. The method of interconnecting the precast con-

Fig. 3 — The 9-story, wall bearing low-rise was built in busy, contested Chicago's Chinatown.

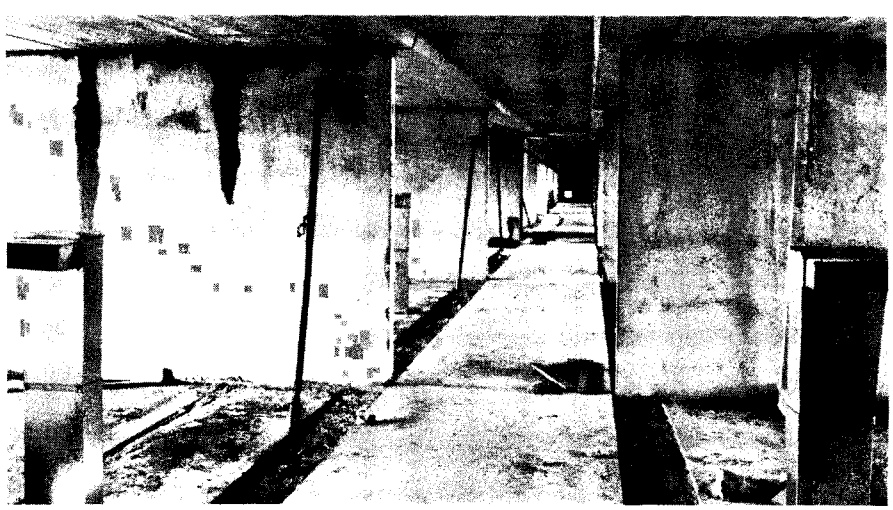


Fig. 4 — Precast 6 in. (152 mm) thick concrete load-bearing walls were braced until they reached sufficient strength.

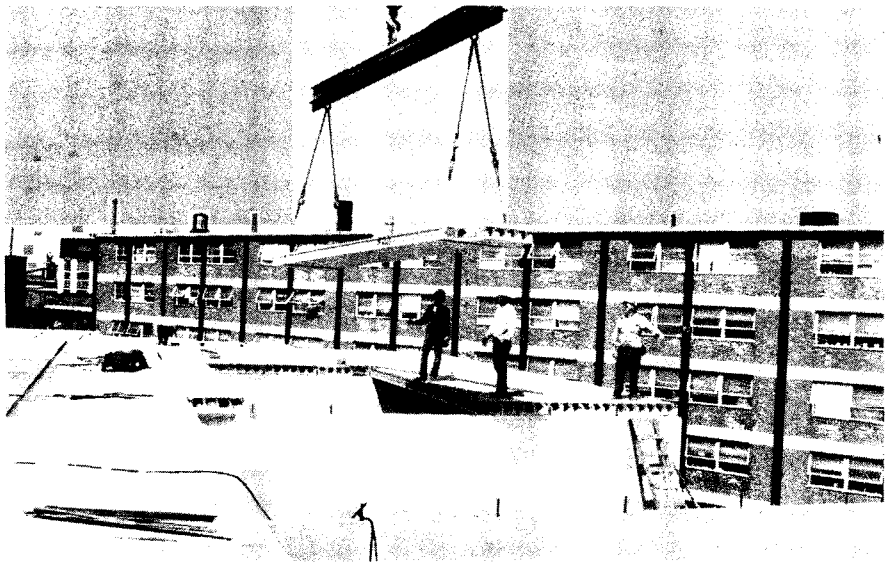


Fig. 5 — The floors and roof were built with prestressed precast hollow-core concrete slabs, 8 in. (203 mm) thick, that span 23 ft (7 in.) between the load-bearing walls.

Fig. 6 — Precast concrete stairs.

crete elements was developed by Paul E. Mast, engineering consultant on the project, in collaboration with The Lombard Company since 1970.

All the precast elements were interconnected by reinforcing bars embedded in grout or by field-bolted hardware. No welding or post-tensioning was used anywhere for structural reasons.

The 8 in. (203 mm) prestressed precast concrete hollow-core floor slabs bear 2½ in. (64 mm) on the 6 in. (152 mm) thick load-bearing walls. Vertical dowels were provided in the top of each wall for lateral support. The bottom of the walls was held laterally by a grout bed and by a final 2½ in. (64 mm) lightweight concrete topping over the hollow-core concrete floor slabs (Fig. 7). The exterior load-bearing walls were similarly supported with additional reinforcing bar loops going around the vertical wall dowels and grouted into the voids of the hollow-core slabs.

Ductility and continuity

Three design principles were combined with the precast system to achieve the required ductility and continuity to safeguard against seismic forces or the "progressive-collapse" concept.

1. Diaphragm action of the floors and roof was achieved by reinforcing steel grouted into the shear keys between the hollow-core slabs at all discontinuities.
2. Field welding of the structural connections was avoided so that embrittlement of the concrete due to excessive heat applied at the embedded hardware (or just plain faulty welds) could not result in "weak links" in the continuity of the system.
3. Grouted reinforcing bar connections were designed with embedment confined laterally or by gravity forces such that any grout shrinkage could not loosen the grip on the bars. Bolted connections were designed for ordinary machine bolts (ASTM A307) such that the ultimate bolt strength always exceeded the capacity of the hardware anchorage embedded in the precast elements.

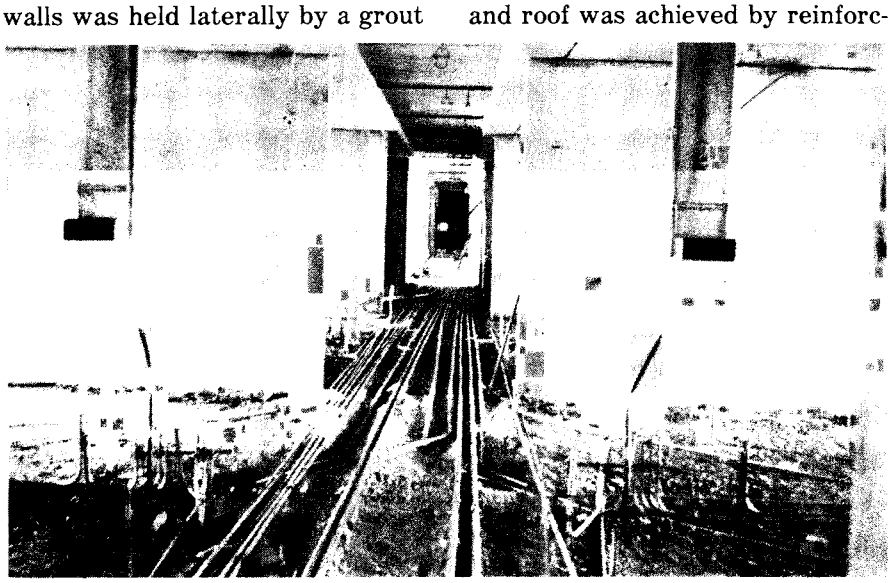
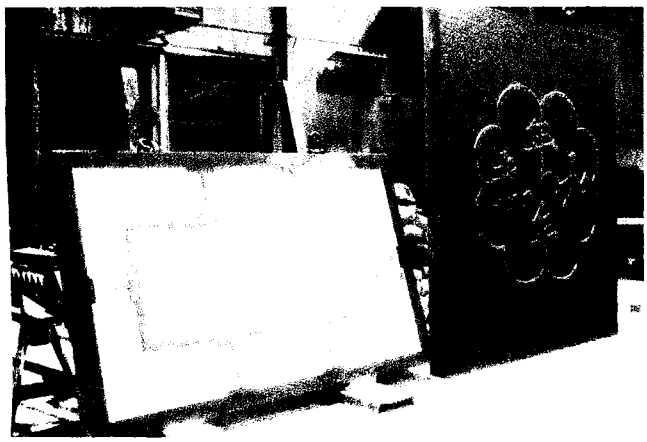


Fig. 7 — A 2½ in. (64 mm) lightweight concrete topping was placed over the hollow-core precast concrete floors, to cover pipes and laterally stabilize the walls.

The building was designed for the standard Chicago wind load of 20 psi (98 kgf/m²) and for the lateral forces resulting from seismic effects equivalent with Zone No. 1 of the U.S. Seismic Risk Map. The seismic forces governed the design and resulted in a total of 70 ft (21 m) of gravity-type shear walls distributed along the central corridor in the longitudinal direction of the building.

The shear walls were interconnected to the adjacent transverse load-bearing walls in order to increase the shear walls' moment-re

Fig. 8 — The precast ornamental panels received a textured finish and a final coat of bright aliphatic urethane colors. The panel on the right means, "Year after year, your wish comes true."



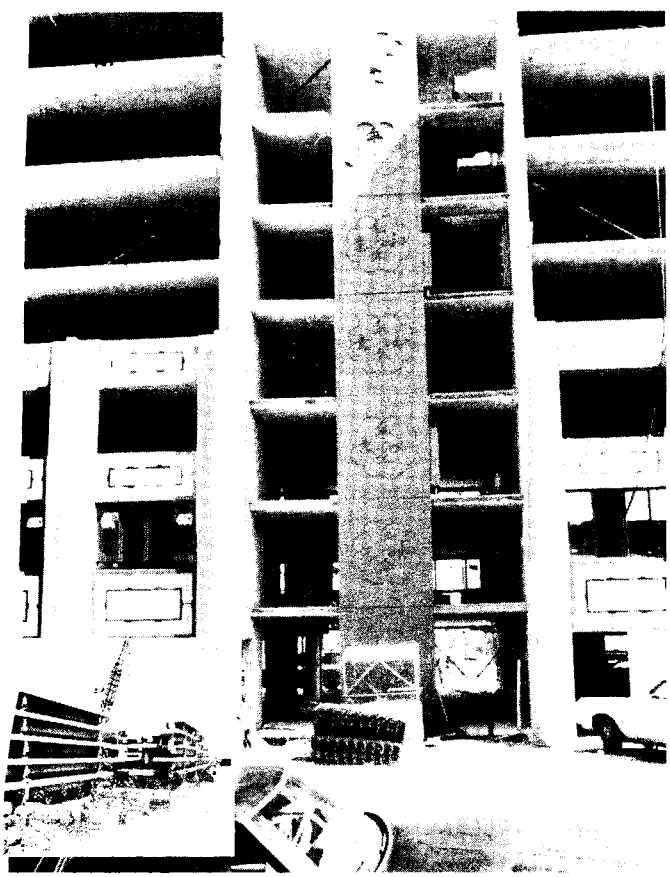
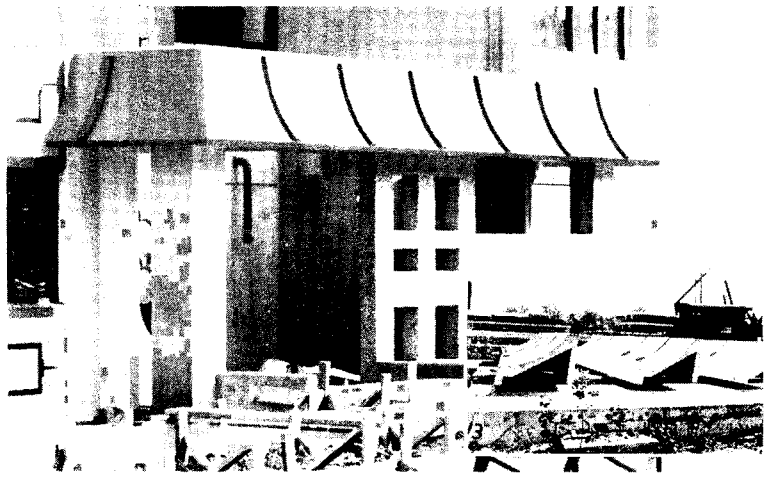


Fig. 9 — Precast concrete roof canopies.



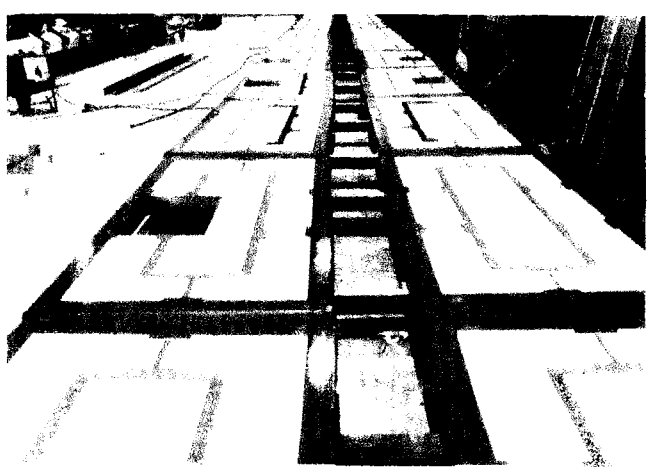


Fig. 11 — Production shop for rectangular spandrel panels.

Fig. 10 — Precast concrete single-T type vertical ribs were positioned at every wall line and at all bay centers. Rectangular fill-in spandrel panels were hung between two adjacent tee-rib panels. All these nonstructural panels were attached to either the load-bearing transverse walls or to the exterior boards of the hollow-core floor system. Connections were bolted to assure ductility with respect to the inevitable deformations of a hollow-core floor system.

sisting capacity by increasing the stabilizing gravity forces. Interaction was achieved by providing serrated shear keys along the vertical joints and by adding tensile interconnection by means of grouted reinforcing bars at the floor levels.

Architectural precast elements

One of the most important criteria established for this building was that it clearly identify itself as a home for the Chinese elderly and appropriately reflect their community's culture.

Early on in the development of the design, Michael Lombard met with G. W. Wang of the NRA and discussed several alternative symbols to be displayed on the building. They finally selected a popular Chinese expression suitable for the Chinese elderly, meaning "Year after year, your wish comes true." From a photocopy of the symbol, Lombard made an acetate positive which he used to make an enlarged projection onto the wall. The enlarged projection was traced and a wood reversible mold was made from the tracing. The panels with the Chinese script were cast directly from this mold (Fig. 8). All the other ornamental precast concrete, including the roof cornice, canopy, and spandrel panels, were cast from concrete molds (Fig. 9 & 10).

All the ornamental precast concrete was factory finished as follows:

Fig. 12 — The completed project was a community success.

1. Concrete was allowed to dry for ten days in temperatures ranging from 60-70 F (16-21 C).
2. The panel was then etched with 5 percent strength muriatic acid.
3. After etching, one coat of epoxy primer was applied.
4. A final finish coat was applied of either one topcoat of green or red aliphatic urethane, manufactured by Zummach Paint Co. of Milwaukee, WI. The coating was based on a Mobay Chemical Corp. resin.

The kind of special casting done on this job would normally have been prohibitive in cost. But by minimizing the number of molds necessary to cast the vertical wall panels, spandrel panels, canopies, and ornamental panels, and close cooperation between the design and production ends of the project, this kind of customizing was made cost effective (Fig. 11).

Something to be proud of

The project was a financial success and the community was very pleased with their new building for the elderly (Fig. 12).

But going deeper than that, Michael Lombard said his greatest satisfaction from this job was going back a few months later after its completion and marveling at how immaculately clean and orderly the building was. Even though the people were poor, they took a lot of pride in their individual apartments and the buildings as a whole.

And in honor to the man that made their hopes a reality, the tenants have dedicated the recreation room the Michael Lombard Room. □

Information and photographs for this article were supplied by:
Contractor: The Lombard Company, Alsip (Chicago), IL
Architects: Duane E. Linden and Associates, Lansing, IL
Engineer: Paul E. Mast, Chicago, IL
Supplier: Mobay Chemical Corporation, Pittsburgh, PA
Zummach Paint Co., Milwaukee, WI.