Standard versus special building elements: Prestressed concrete is precast in both

The architectural precast and prestressed concrete industry manufactures a broad range of standard products to meet the needs of the construction industry. But the precasters and prestressers also have sufficient flexibility to meet the special demands of architects and other building designers for non-standard building elements for special applications.

Perhaps nowhere is this dual ability more evident than in the commercial building market, which is the largest non-residential construction market, according to F. W. Dodge. In offices, stores, automobile agencies, gas stations, shopping centers, banks, and hotels-motels, designers today find fertile fields for application of unique architectural design.

In this month's PCI Items, a variety of architectural treatment is featured in the nine projects presented. All but one are built of standard precast, prestressed concrete members or feature standard applications. Our cover story, described on pages three and four, is a specially cast job WHICH NONETHELESS IS ECONOMICAL due to repetition of members throughout 49 other nearly identical projects planned for the future.

The architect for the Pansing Pontiac Automobile Agency, Littleton, Col., featured on page seven, testifies to the adaptability of design and the singular characteristics incorporable into buildings by using precast and prestressed concrete.

"We were able to meet our budget and long span requirements by using standard prestressed concrete tees," says Norman E. Hodge, "but more importantly, we were able to achieve a unique design."

On flexibility, Mr. Hodge says, "Architects have long realized the unique quality of concrete is its plasticity. However, prior to the advent of precast and prestressed members, we were limited by cost in taking advantage of this plasticity."

"The success of this project (Pansing Pontiac) for us, as architects, has been stimulating because fear existed that standardized systems such as prestressed concrete tees would be monotonous. This experience has erased such fear. We know now we can become master of the machine . . ."

This spring, PCI will have available a complete directory of standard precast, prestressed concrete members manufactured in North America and a listing of who manufactures these products. This directory will amply illustrate precast, prestressed concrete's versatility.

Bloomingdale's Department Store, Short Hills, New Jersey

Bloomingdale's Department Store, Short Hills, N. J., features precast, prestressed load-bearing panels for its exterior walls and precast, prestressed concrete in adjoining parking decks.

The 80 panels for the store are three stories tall and weigh 26 tons apiece, making them some of the largest panels ever cast. They are pretensioned vertically and post-tensioned horizontally for anticipated handling, transportation and erection stresses.

The panels were chosen for the decorative effect available with precast panels. In addition, the panels serve a structural function as load-bearing walls.

Measuring 12 ft. 6 in. across and 50 ft. in height, each panel was cast with a white concrete border and two exposed rose quartz aggregate concrete insets. The white concrete ribs are lightly sandblasted.

To tie the panels to the structure, dowel inserts in the form of four No. 8 rods were cast into each panel at each floor level. These dowels were inserted in pockets in the floor slab and then anchored with cast-in-place concrete.

Prestressed double tees were used in both adjacent parking decks for the store. In addition, precast columns and beams were used in the structures where rapid construction was needed.

Altogether, 190,000 sq. ft. of double tees spanning 58-ft. were used in the two parking structures. Each tee is 9-ft. wide and 32-in. deep. The girders in the first deck are 6-ft. wide and post-tensioned.
Jim Cordes Ford Agency
Waterloo, Iowa

The need for a quickly constructed building combined with economy without sacrificing attractiveness led to the use of precast, prestressed concrete in the showroom and service area for Jim Cordes Ford Inc., Waterloo, Iowa.

The showroom and approaches to service area consist of 13 precast, prestressed single tees erected in a spread system and covered by lightweight precast slabs. The tees are 53-ft. long and clear span 48 ft. with a 5-ft. cantilever. They are 8-ft. wide and 32-in. deep. The 275 precast slabs are 8-ft. 6-in. long, 2-ft. wide, and 4-in. thick.

Over the service areas, the second floor consists of cored slabs 4-ft. wide and 8-in. thick. Lengths of the 93 slabs vary from 11 ft. to 27-ft. 10-in. Most are 20-ft. long.

In addition to minimum construction time and esthetics, an additional advantage of low maintenance was cited for precast, prestressed concrete.

The structure was erected in only 2 1/2 months.

A crane lifts one of the 53-ft. long single tees into place during construction. Single tees are supported by steel columns.
A prototype service station in Natick, Mass., for 4-M Petroleum Co., featured on this month’s cover, uses precast, prestressed concrete in an unusual design which will be carried out in each of the succeeding 49 stations to be built.

The design features precast, prestressed concrete canopies over the service islands supported by precast concrete columns. In future stations, the structure housing the rest rooms, telephones, office, storage, and a lounge will also be of precast, prestressed concrete. These will be constructed with standard single tees with the stems helping form the side walls and the flanges forming the roof (see diagram).

Precast concrete was selected for the canopies because of its durability, its esthetics, its low maintenance, and the versatility in shape attainable, according to the architect. Ease of assembly was also a contributing factor.

The canopies are molded into the shape of an inverted “L” to provide a windbreak and for protection from the vagaries of weather. Each canopy is made up of two sections of precast elements which, when brought together, form the

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L. Two canopies back-to-back with a 3-ft. space between them service one island. In that 3-ft. space the architect placed an attendant's booth in the center island of the Natick station. The precast columns supporting the canopies serve as two walls for the booth, the other two walls are glass. In the future, this booth will be covered by a 2-in. thick precast slab, but at Natick it is glass covered.

The supporting columns are 3-ft. wide, 10-ft. high and 8-in. thick. Their wings (see sectional diagram) extend 3-ft. from the columns.

One of the two precast, prestressed sections of the canopies is the beam which serves as the leg. It is cast full length, which is 25 ft. at Natick. It is 5-ft. deep, and tapers to 6-in. thick at the bottom from a 9-in. thickness at the top.

The canopy roof is cast as a separate section 25-ft. long, 11-ft. wide, and 6-in. thick at the edge. It is connected to the leg by high strength post-tensioning bolts, which are also used to connect the leg with the columns.

The roof of the canopies is 14 ft. 6 in. from the ground, while the bottom of the stem is 7 ft. 6 in. off the ground.

Canopies are cast of white cement, regular hard rock aggregates, and slightly exposed aggregate finish. Concrete strength is 5,000 psi.

Natick, Massachusetts
Lawson's Dairy Store
Cuyahoga Falls, Ohio

Lawson's Dairy Foods has a chain of identical stores throughout Ohio and surrounding states, all designed similarly to the store in Cuyahoga Falls, Ohio, pictured at left.

The architect for the dairy chain chose a precast, prestressed double tee roof with brick walls to make an economical, attractive, and quickly erected commercial building. The roof was built in less than six hours.

Sixteen double tees 48-ft. long, 4-ft. wide, and 16-in. deep cantilever 5 ft. 6 in. past the front wall and extend 6 in. beyond the back wall.

The glassed entrance area is spanned by one large precast beam measuring 10-in. wide, 22 1/2-in. deep, and 24-ft. 6-in. long.

Bizer Optical Building
Louisville, Kentucky

The economy offered by long span prestressed double tees and precast columns was the determining factor in their use in the Bizer Optical Building, Louisville, Ky. In addition, the appearance of these elements was better than a steel system could offer.

The Bizer Building is an eye examination center with facilities for grinding lenses and fitting glasses. The building is located in an urban renewal area that is not completely developed. Because of its location and the nature of the area, the building has to be economical while still maintaining its attractiveness.

The architect's cost analysis confirmed precast, prestressed double tees combined with precast columns are less expensive than other comparable systems.

Thirty prestressed double tees 57-ft. 6-in. long and 5-ft. wide are supported by 30 precast tee columns 8-ft. 8-in. high and 5-ft. 8-in. wide at the top.

The 18-in. deep double tees clear span 37 ft. 6 in. over the main interior part of the building, and then span another 11 ft. before cantilevering out past the exterior wall.

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The need for clear spans inside the showroom and shop to allow maximum room for maneuvering new cars led the designer of Pansing Pontiac, Littleton, Col., to use precast, prestressed structural members throughout these areas.

A unique sawtooth pattern was cast in the 45-ft. 6-in. long double tees in the showroom at no additional cost. The tees clear span 35 ft. 6 in. over the showroom. This unique design provides the dealer with a positive public image, important in such a competitive industry.

The tees rest on a precast, prestressed spandrel box beam cast in three sections for a total length of 88 ft. This beam is supported by specially cast columns 12-ft. tall in three separately cast pieces surrounding a cast-in-place concrete core.

The shop area in back consists of precast, prestressed load bearing double tee wall panels 17-ft. 4-in. to 19-ft. 4-in. high and double tees in the roof spanning 75 ft. This eliminates interior columns.

Between the shop and the showroom 45-ft. long double tees provide an attractive ceiling for the first floor and serve as a second floor.

The need for long spans coupled with lower maintenance, fire resistance, and esthetic value led to the use of precast, prestressed concrete Y's and precast columns in the $122,742 General Tire Service Building, Greensboro, N. C.

A span of 88 ft. is required, so single stem Y's 10 ft. wide, 32-in. deep, and 88-ft. long are used in the roof. Not only do the Y's give the long clear span needed, but they also are more pleasing to the eye than other roof systems.

In order to match door widths of 11 ft. 4 in., precast columns 8 in. wide on 12 ft. centers are used. The columns are 12-ft. high.
Loew's Tara Theatre
Atlanta, Georgia

Load-bearing prestressed double tee wall panels precast with white cement provide Loew's Tara Theatre, Atlanta, Ga., with a strikingly beautiful appearance.

The panels, along with a single and double tee roof system, were used in the theatre to provide fast construction. In addition, comparative cost analysis indicated precast, prestressed concrete would be less expensive initially and in the long-run than steel and masonry.

The wall panels are 8-ft. wide and 34-ft. high in the viewing area of the theatre, and 18-ft. high in the lobby. The stems are spaced at 4-ft. intervals. The panels are decorated with shorter standard double tee wall panels with staggered stems at the roof line. Some of the 18-ft. lobby panels were cast with cut-back flanges for window openings.

The roof of the $315,000 structure is made up of 88-ft. long single tees 8-ft. wide and 36-in. deep over the viewing area, and 4-ft. wide double tees with lengths up to 30 ft. over the lobby.

To distribute the load of the heavy single tees evenly, a 12 by 12-in. spandrel beam, precast and prestressed, was post-tensioned to the tops of the wall panels on which the single tees rest.

Regional Shopping Center
Lone Star, Texas

Precast, prestressed double tees were used in the roof of a completely concrete regional shopping center in Lone Star, Texas. The use of the 160 double tees, ranging in length from 24 ft. to 44 ft. 9 in., enabled the roof structure to be erected in only four days.

In addition to the double tees, 25 modified prestressed bridge girders were employed as interior and spandrel beams. The girders ranged in length from 15 to 37 ft. and were 2-ft. 10-in. deep.

The double tees are supported by the back wall, the center beam, and the spandrel beam. The spandrel beam rests on concrete columns and serves as a background for store signs. Since the beam is not part of the front wall or store facade, it enables the sidewalk to be covered by the double tees. This arrangement also serves to cut down on the glare from the sun in the windows of the stores.