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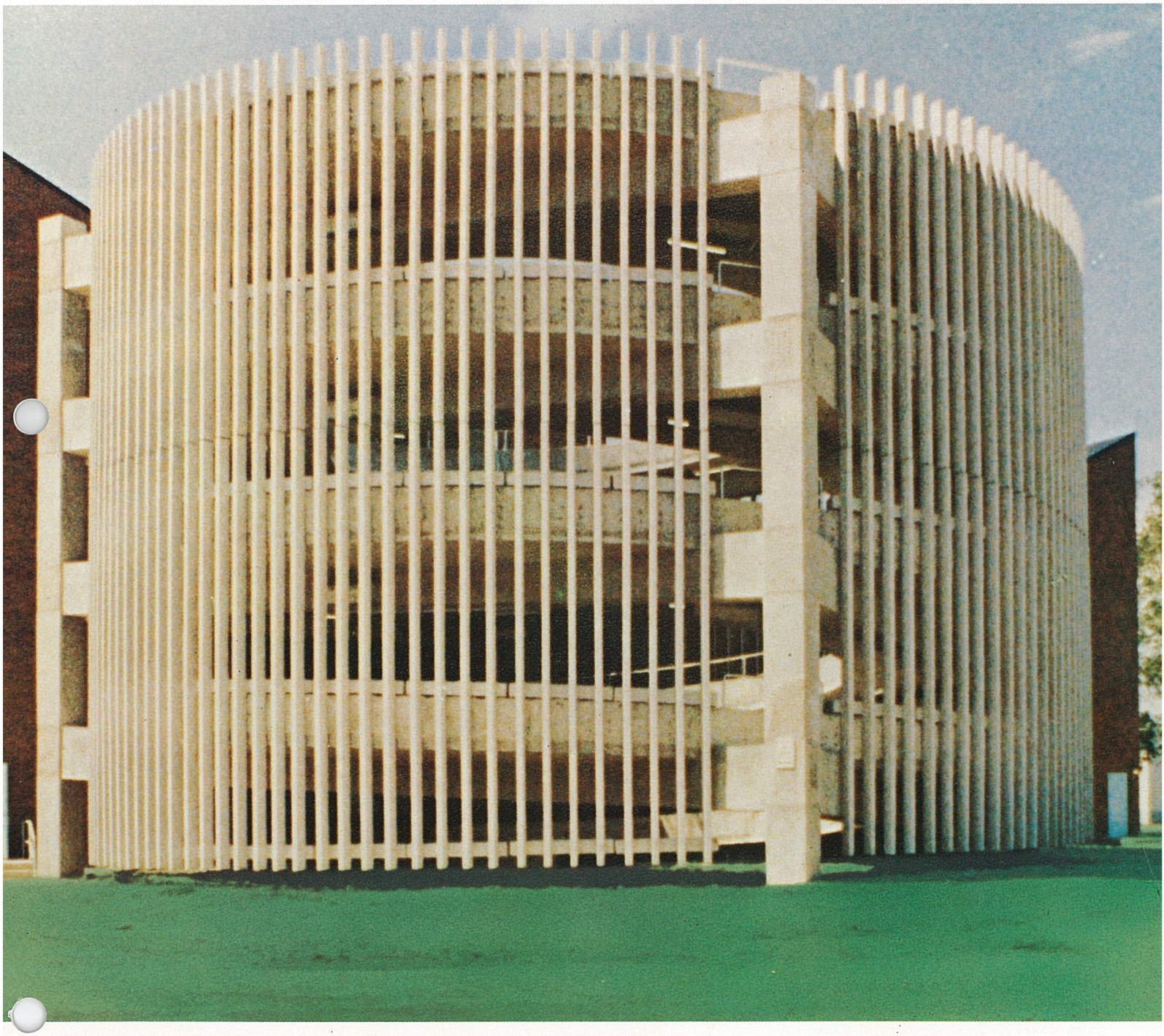

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PRESTRESSED CONCRETE INSTITUTE

Parking Structures

Precast prestressed concrete offers many advantages for parking structures

Our dependence on the automobile has made the parking structure a necessity in urban settings today. Though it is only a necessity, it need not obtrude nor blight its location.

If precast prestressed concrete is used, it can, indeed, be a real asset, esthetically, to its neighborhood.

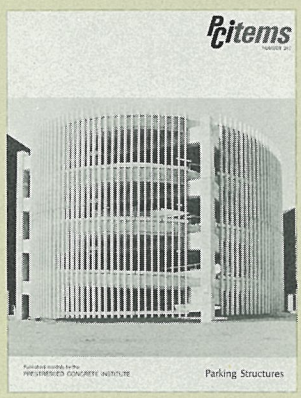
Also, the long span capability of prestressed concrete allows the best design of the parking facility without the need to "juggle" supporting columns. Long clear spans accommodate logical traffic flow and open parking according to the pattern chosen without squeezing around or between hugh columns.

Rapid completion of the unit with small crews reduces construction costs and financing and leads to earlier use of the facility for quicker return on investment and earlier relief of crowding.

The rugged durability of precast prestressed concrete can withstand the hard usage involved without damage or maintenance. In fact, low maintenance is the by-word with precast prestressed concrete.

And of course, the inherent fire resistance of concrete means you get the fire ratings you need in a parking unit without the cost of applied protection.

From all points of view, esthetics, economy, low maintenance, durability, clear space, and fire resistance, precast prestressed concrete is **the choice** building material for parking structures large or small.



The cover shows the parking structure of the Southern Alberta Institute of Technology in Calgary. Details on page 8.

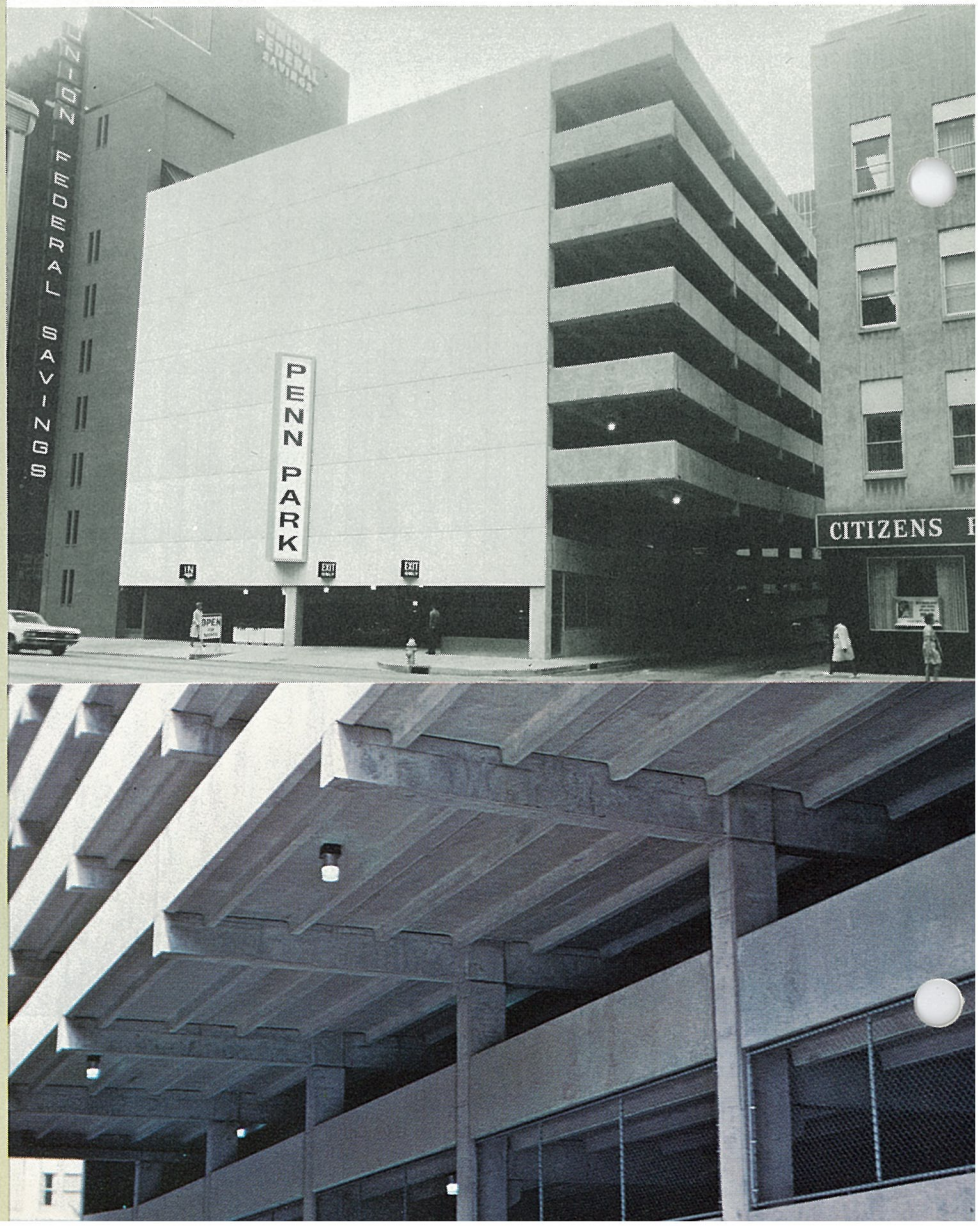
Precast pretensioned unit parks 505 cars on narrow site

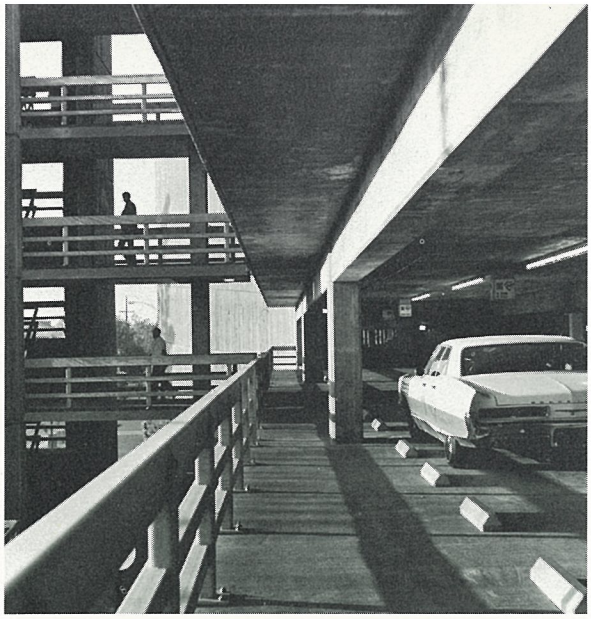
Despite the small site, 200x90 ft., Penn Park parking structure in Indianapolis, Indiana, can accommodate 505 cars with good maneuverability. The 6 upper levels cantilever 15 ft. into air space over an alley.

Columns, some as long as 80 ft., are precast concrete. Beams are precast post-tensioned concrete which are also field post-tensioned through the columns. Prestressed double tees support the decks themselves which are light-weight concrete post-tensioned in both directions for a crack-free, waterproof surface without any costly membrane.

Construction was complicated by the necessity to keep all lanes of the street in front open at all times. The combination of precast prestressed and post-tensioned concrete was the only solution for the criteria established.

Architect: Wesley P. Martin, AIA, The Geupel Architects & Engineers, Inc., Indianapolis
Structural Engineer: Carl Walker & Associates, Inc., Kalamazoo, Michigan
Construction Manager: Geupel De Mars, Inc., Indianapolis
Precaster/Prestresser: American Precast Concrete, Inc., Indianapolis
Post-tensioner: Conesco Midcontinent, Inc., Brookfield, Illinois





Double helix ramp can empty 6 deck structure quickly

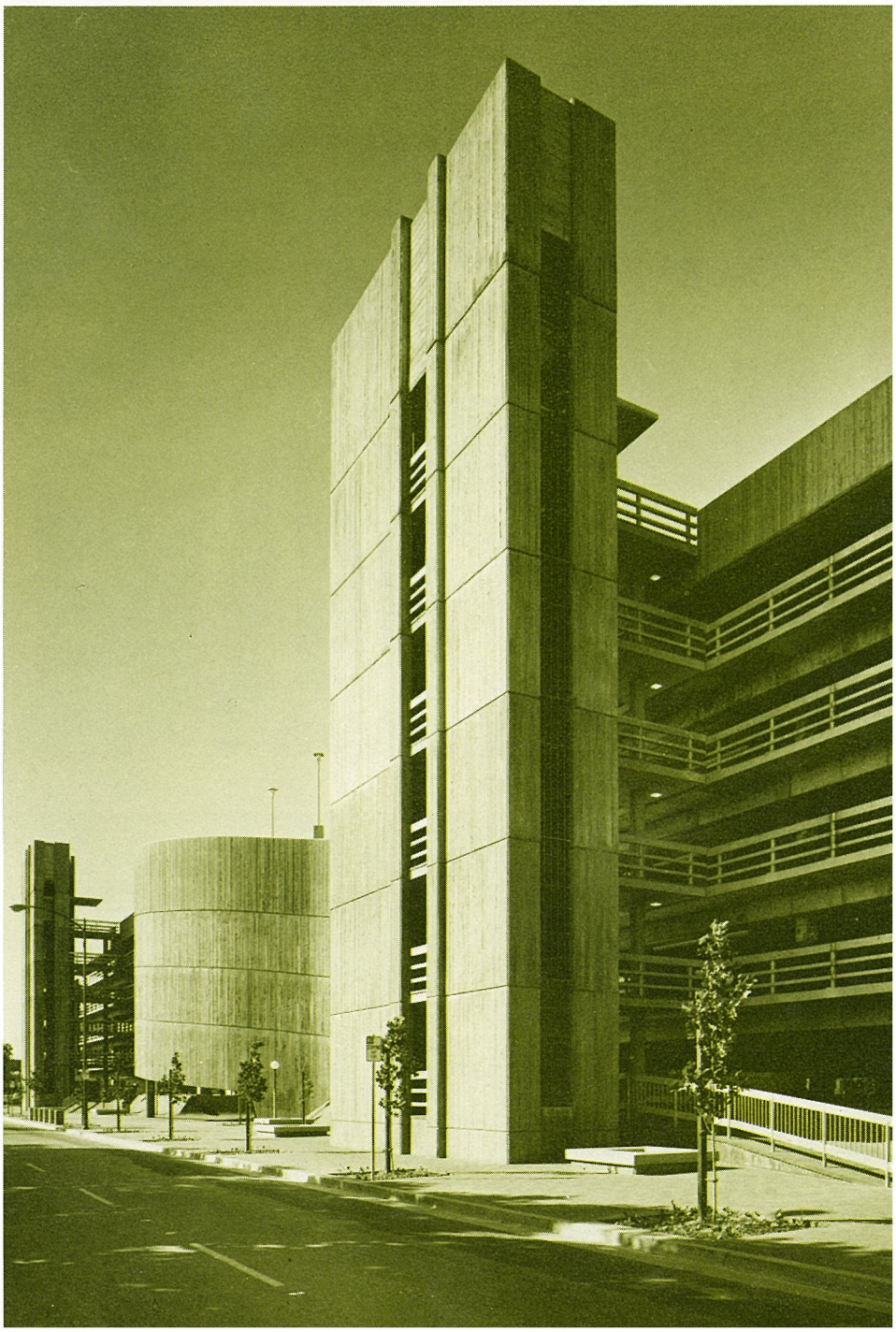
This 2010 car parking facility for the University of California at San Jose uses precast prestressed concrete piles as its foundation. A total of 485 piles are used, each with 100 ton capacity and averaging 65 ft. in length. A typical interior column rests on five piles with a reinforced concrete cap.

Long span prestressed concrete framing was selected to provide maximum physical and visual open-space to accommodate the traffic and parking plans. Beams span over 64 ft. and are spaced on 25ft.-6in. centers. A 7 in. thick deck spans between the beams and is post-tensioned to approximately 50 Kips/ft.

Access is provided by a reinforced concrete double helix ramp which separates entering and exiting traffic and allows general one way traffic on all floors. Floor to floor access requires one-half turn. The access ramp and four elevator-stair towers at the perimeter of the building are separated and isolated from it to allow for any movement.

North-south seismic forces are resisted by the concrete frame and east-west forces by three bays of prestressed diagonal beams.

Architect: Callister, Payne & Rosse, San Francisco
Structural Engineer: T. Y. Lin, Kulka, Yang & Associate, San Francisco
General Contractor: Jasper Construction, Inc., Santa Cruz
Precaster/Prestresser: Santa Fe-Pomeroy, Inc., Div. of Santa Fe International, Inc., San Francisco
Post-Tensioning: Atlas Prestressing Corp., Panorama City



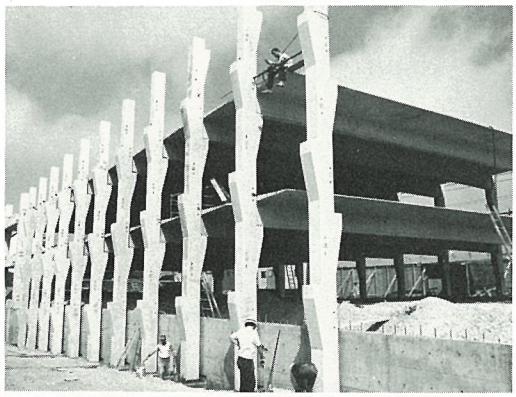
750 car parking garage uses double tees, precast panels

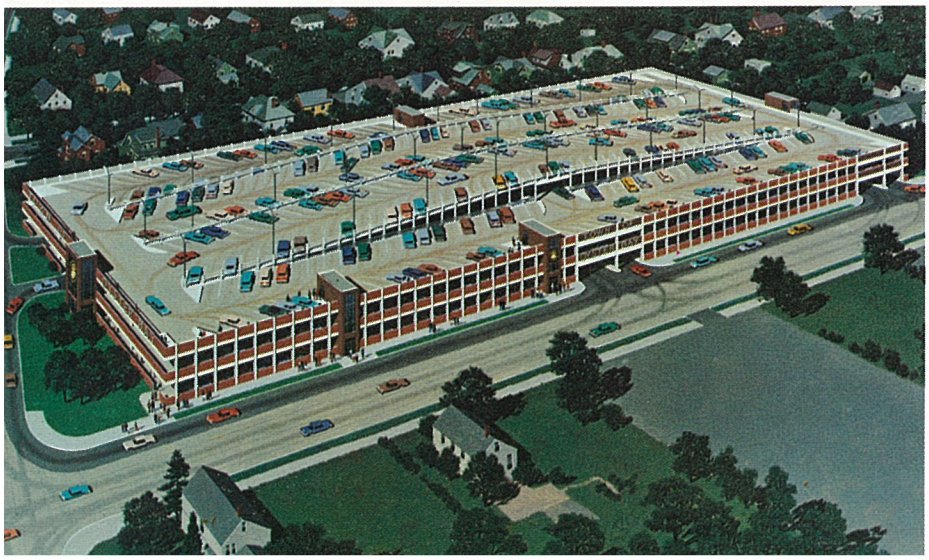
Fast construction and minimum cost were critical criteria in the design of Travis Park West in San Antonio, Texas, and led to the selection of long span double tees. The parking structure is built around and above an existing jewelry store on one corner of the site.

Cast-in-place concrete columns and beams support the long span double tees used for the parking decks. Twenty-four inch tees are used to span up to 53 ft. Twelve inch tees, also 8 ft. wide, are used for the roof. Erection of the double tees proved to be very fast and efficient.

Precast spandrel panels 4 ft. high are placed on top of exterior beams to protect and conceal the cars inside. These slabs project 4 in. beyond the beams to reduce the apparent height. Vertical tee sections are placed in the center of each facade to enhance the architectural design. The structure has a small basement and is connected by tunnel to the bank building.

Architect: Atlee B. and Robert M. Ayers, San Antonio
Structural Engineer: Reynolds and Ikels, San Antonio
General Contractor: G. W. Mitchell and Sons, San Antonio
Precast/Prestresser: Wolco Corporation, San Antonio





1281 car unit structurally completed in 66 days

The largest parking structure on Long Island (at the time of completion, last year) was structurally completed in 66 calendar days. The commuter parking facility for the Town of Oyster Bay at Hicksville, Long Island offers 10 acres of parking on 3½ levels in a structure 540x230 ft. Capacity is 1281 cars.

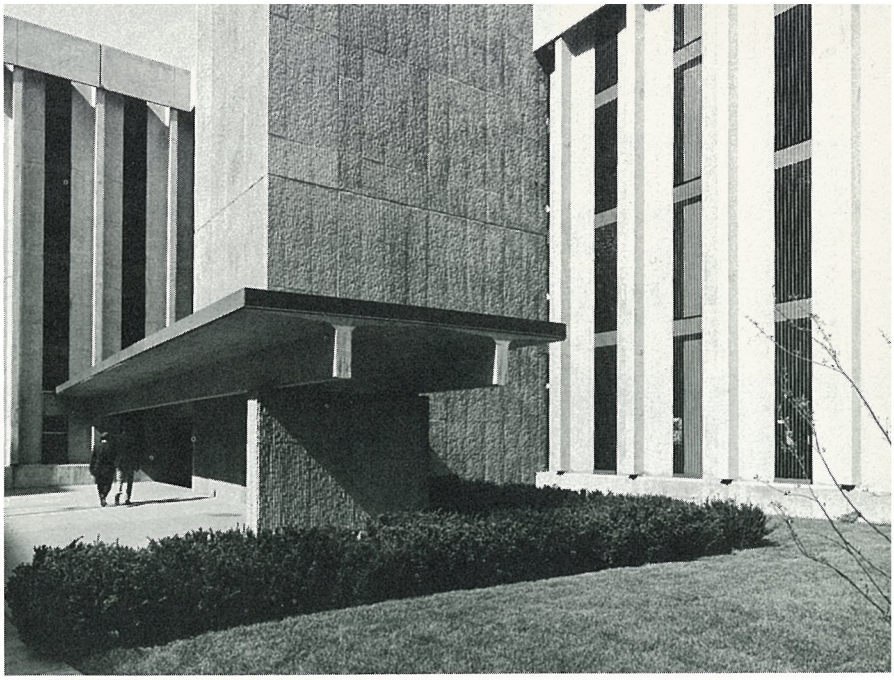
Sloped footings are used throughout so that all precast haunched columns are of the same length. The one piece haunched columns were used to avoid stub columns at the girders.

The girders are all prestressed precast concrete. All 10 ft. wide, 32 in. deep single tees are also prestressed precast concrete and are all of uniform length.

Perimeter bays are level, except for a slight positive drainage grade. The central bays have a 5% slope to provide independent double up and down ramps. Structurally, provision is made for the addition of another 2½ decks and all necessary connections are ready to begin expansion when needed.

Engineer: Sidney B. Browne & Son, Mineola
General Contractor: Falcon General Contracting Corp., Mount Vernon
Precast/Prestresser: C. W. Blakeslee & Sons, Inc., New Haven, Conn.

Corporate Headquarters uses precast prestressed concrete to park 800 cars on crowded site



The L shape of this parking structure for Montgomery Ward & Company in Chicago was dictated by the site available at the corporate headquarters.

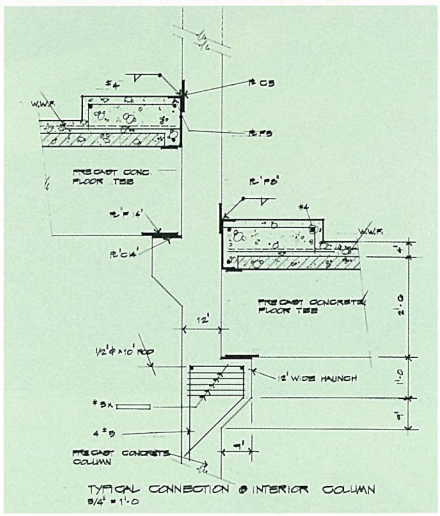
A centrally located spiral provides down access for both legs. The legs have their own slope to provide parking and up circulation. Ramp/floors consist of 30 in. deep, 8 ft. single tees, typically 56 ft. long. Controlled camber is provided in each tree to provide drainage to the end of the span.

Walls are 20 in. deep single tees set on a grade beam, exposed above grade to form a visual base for the structure. Flanges are cut back for natural ventilation and haunches are provided as bearing for the ramp tees.

Smooth surfaced fascia panels cap the exterior tees which terminate the wall visually. The exterior stair towers have fractured fin flat wall panels.

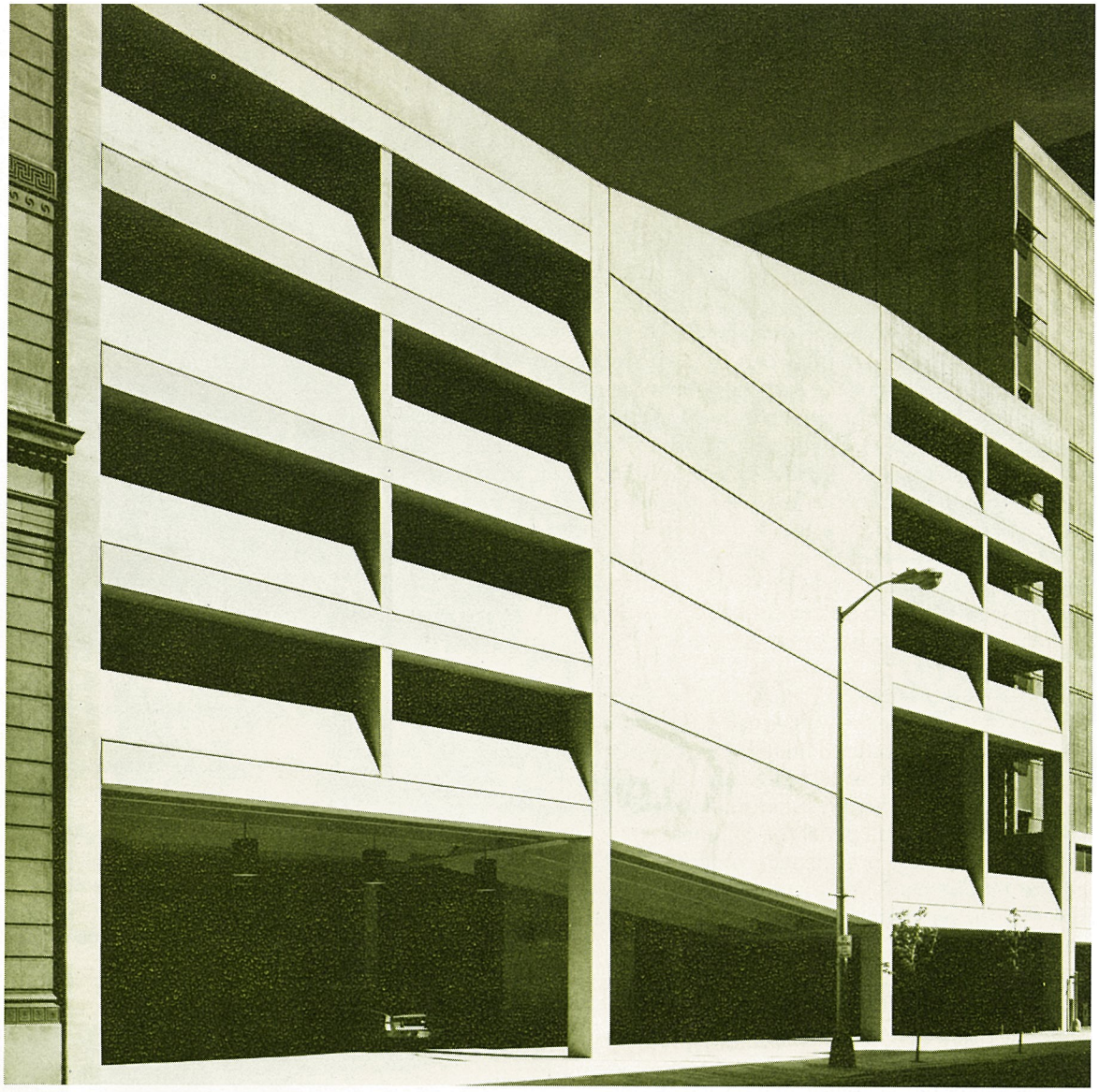
The curbs which collect drainage act as car stops and as lateral load resistances since they are connected to the wall panels or columns.

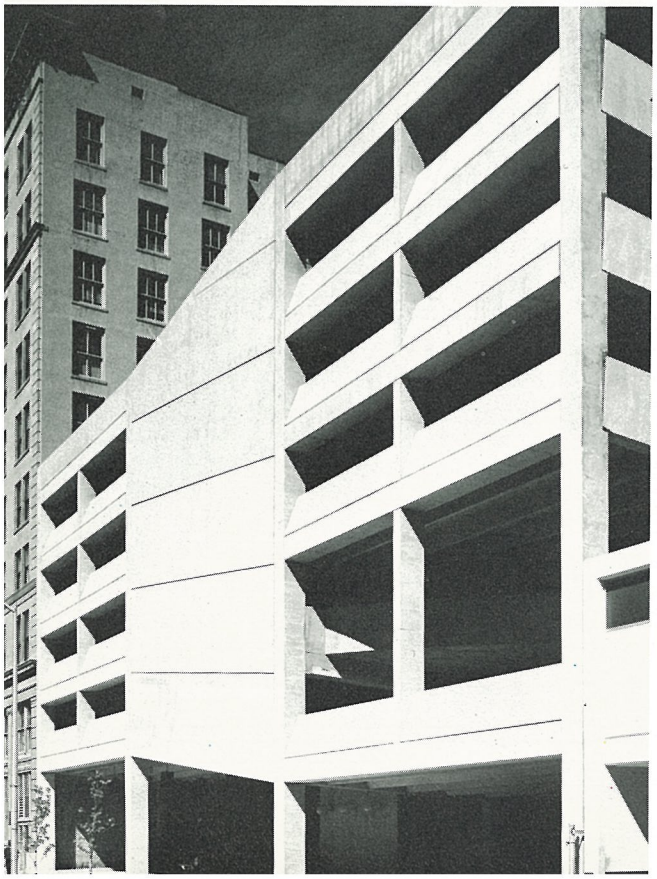
Standard precast prestressed components met all fire requirements for a congested downtown site, met the need for early completion and did so very economically.



TYPICAL CONNECTION @ INTERIOR COLUMN
3/4" = 1'-0

Architect: Seracuse Lawler & Partners, Denver, Colorado
Structural Engineer: Richard Weingardt Consultants, Sterling, Colorado
General Contractor: Craftsman Construction Co., Inc., Englewood, Colorado
Precaster/Prestresser: J. W. Peters & Sons, Burlington, Wisconsin





Garage meets quick construction, low cost, clear span criteria

The six deck Reliable Parking Garage in Denver, Colorado, has a 200 car capacity. The client ordered a building with minimum construction time and cost, and clear spans for parking bays.

The design solution is a double threaded helix with the in system threaded to the out system. As a result, there is no cross traffic. All ramps are at 5°.

Structurally, the unit consists of column and beam construction with all members of precast prestressed concrete. Decks and ramps are prestressed double tees topped with cast-in-place concrete with a non-shrink additive. This eliminated many interior columns, leaving the bays clear. Precast panels mask the facade.

Fabrication of the precast prestressed components began as the foundations were being prepared. The superstructure was completely assembled in seven weeks. This, of course, saved construction time and financing charges. An alternate bid for a cast-in-place system came in significantly higher at the bid opening.

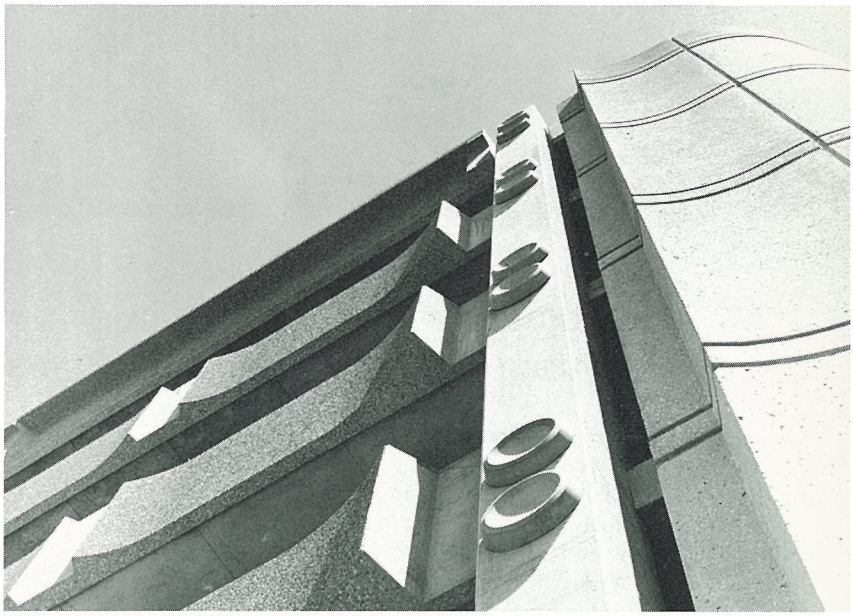
Architect: Charles S. Sink & Associates, Denver
Structural Engineer: Johnson, Voiland, Archuleta & Associates, Boulder
General Contractor: Al Cohn Construction Company, Denver
Precaster/Prestresser: Prestressed Concrete of Colorado, Inc., Denver

Large Michigan parking unit uses precast pretensioned concrete

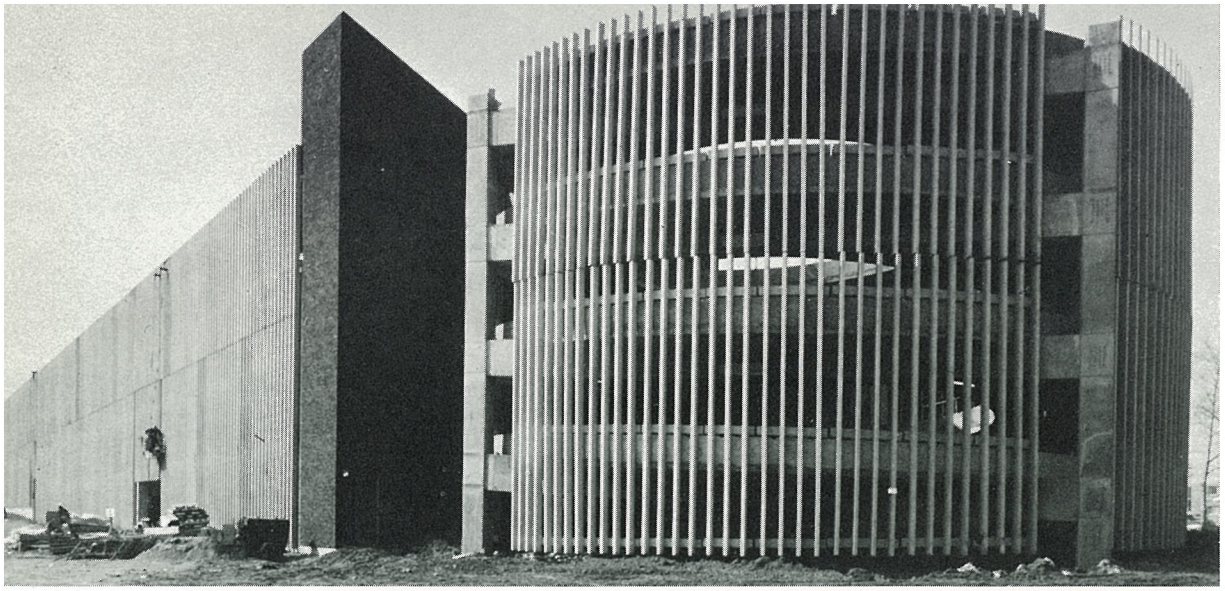
This 446,000 sq. ft. parking structure combines precast, cast-in-place, prestressed and post-tensioned concrete in one functional, effective and esthetic whole. It is the Saginaw, Michigan, Parking Deck #2, with a capacity of 1350 cars.

Six story high precast columns support the precast prestressed beams which were post-tensioned in the field after erection. Parking decks and ramps are 6½ in. thick cast-in-place concrete post-tensioned in two directions. The one piece columns have steel flanged sections cast into the sides as haunches for the beams.

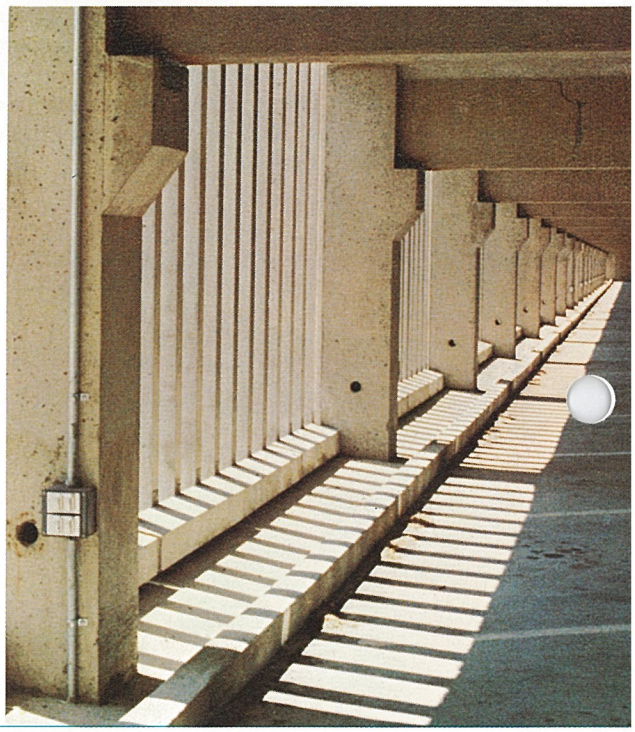
Stairwell/elevator towers at the perimeter are cast-in-place concrete as an architectural expression of the serviceability and pedestrian security of the facility. Precast spandrel panels with exposed aggregate finish close the spaces between columns and accent the vertical lines of the columns. The solid walls adjacent to the towers are cast-in-place concrete affixed to the frame, but able to slide on teflon pads at the base to compensate for movement. Circular precast caps protect the post-tensioning anchorages.



Architect/Engineer: Conrad Associates, Inc., Chicago, Illinois
General Contractor: R. C. Hendrick and Son, Inc.
Precaster/Prestresser: Precast/Schokbeton, Inc., Kalamazoo
Post-Tensioning: Stressteel Corporation, Wilkes-Barre, Pennsylvania
Atlas Prestressing Corp., Panorama City, California



Rectangular helix, spiral ramp combine for 605 car parking garage



Southern Alberta Institute of Technology's parking structure in Calgary, Alberta, uses a rectangular helix for upward access and parking and a spiral ramp for exit.

Sixty precast haunched columns support 34 in. deep prestressed single tees 8ft. wide and 60ft.-6in. long. These in turn, support the composite cast-in-place post-tensioned deck. This combination provides a long, clear span with a minimum depth.

The spiral ramp is supported on 16 post-tensioned girders supported on only 4 reinforced concrete columns spaced for maximum support and architectural interest. Exterior architectural treatment consists of vertical precast concrete fins 8in. deep and 4in. thick.

Architect/Engineer: Structural Engineering Section, Department of Public Works, Province of Alberta, Edmonton
General Contractor: Cascade Builders, Ltd., Calgary
Precaster/Prestresser: Con-Force Products, Limited, Calgary
Post-tensioner: Titan Prestressing Corporation, Limited, Calgary

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