Precast Concrete Panels Give Scale and Grandeur to Lazarus Department Store

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Precast concrete played a prominent role in building the new multi-million dollar Lazarus Department Store in dowtown Pittsburgh, Pennsylvania. The glitzy department store is four stories high with an underground three-level parking structure. Highly articulated precast concrete panels with deep reveals give the building scale and character, and also complement the nearby historic buildings. In addition, the use of granite at the base provides richness and depth of color. These features enhance the façade's verticality and contemporary look. To speed construction, structural precast concrete columns are used in the parking structure. This article presents the conceptual and architectural design features of the building, design considerations, and erection highlights of the project.

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Pittsburgh's downtown Fifth Avenue shopping district is undergoing a major revitalization, spearheaded by the city's own development activities and the deep involvement of a variety of retailers. A centerpiece in this renovation program is the Lazarus Department Store, a new four-story, 247,000 sq ft (23000 m^2) retail center and three-level underground parking facility. The new structure blends very well with the nearby historic buildings while offering a distinctly contemporary feeling in its character and tone (see Fig.1).

To achieve that combination, the design team took advantage of the many benefits offered by architectural precast concrete panels to clad the structure and precast concrete structural columns to support the parking structure. The result of their efforts was not only an impressive and successful addition to the downtown area but the building won the award for the Best Retail Facility in the 2000 Design Awards Competition sponsored by the Precast/Prestressed Concrete Institute.

Fig. 1. The Lazarus Department store in downtown Pittsburgh features a three-layer look on its façade and a strong entrance tower aligned with the intersection.

The project was designed and built following the requirements of two distinct clients. The Pittsburgh Economic Industrial Development Corporation (PEIDC) owns the site and served as the impetus for the construction. PEIDC in turn leased the building to Federated Department Stores to operate a Lazarus retail center in the building. As a result, both groups provided input into the design, with the PEIDC focused primarily on the structure and the underground parking facility, and Lazarus working with the team on the store design. Figs. 2 and 3 show a plan, elevation and various sections of the building.

The site selected by PEIDC is within the city's main downtown shopping district and required the demolition of eight existing buildings to clear the site for construction of the new building. The availability of this site convinced Federated Department Stores to agree to build a new downtown store; however, once site work began, demolition and foundation preparation showed that a retaining wall was required before the new construction could begin, causing an unforeseen delay that threatened to slow down the project substantially.

Timing was a critical issue for the retailer, as the project had to be completed before the Christmas holiday season, when the company makes a significant percentage of its annual sales and profit. Because the demolition and preparation work delayed the time when the site could be turned over to the general contractor to begin construction, the contractor suggested converting the underground parking structure's structural components to precast concrete rather

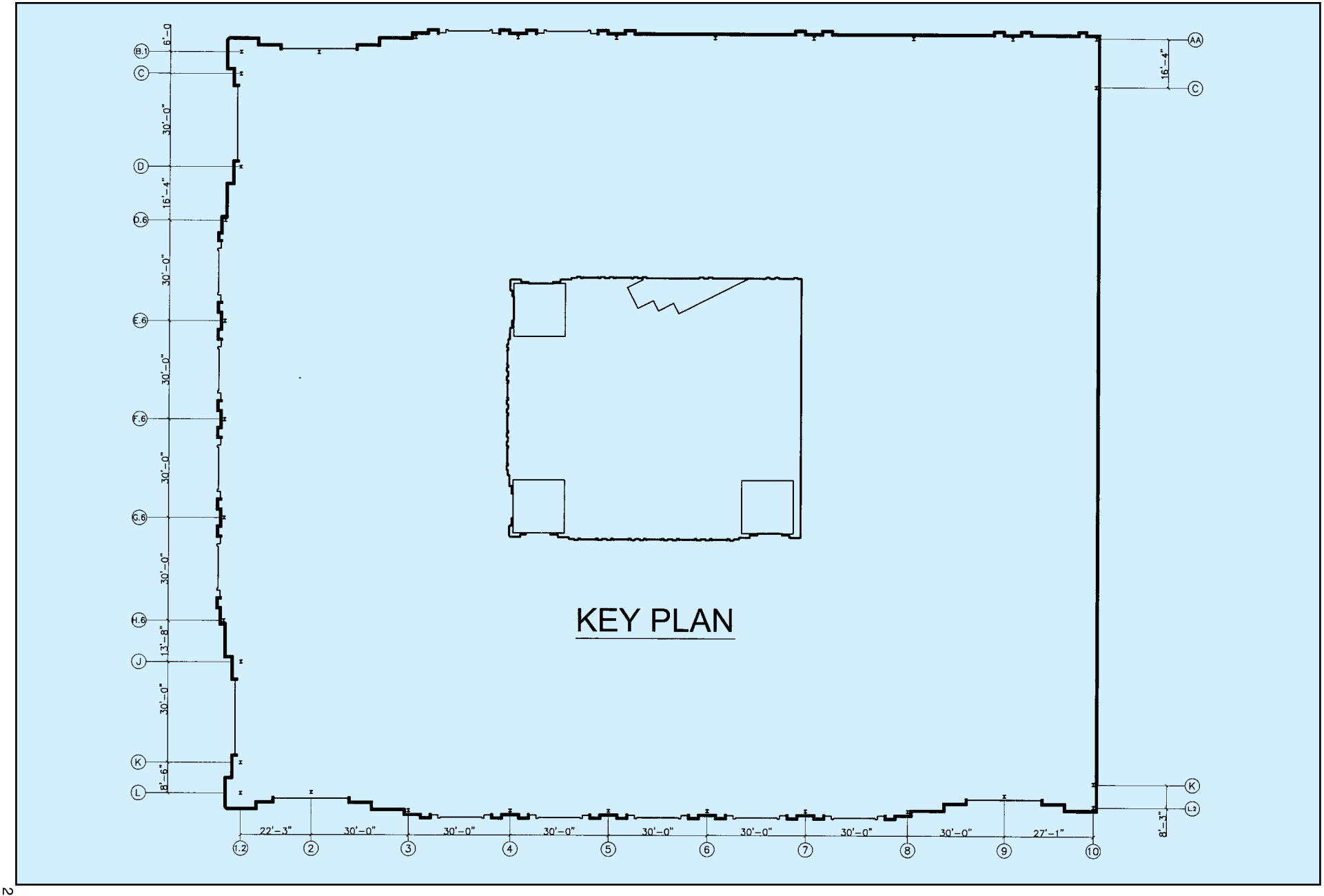

Fig. 2. North and south plan of perimeter of building showing location of precast panels.

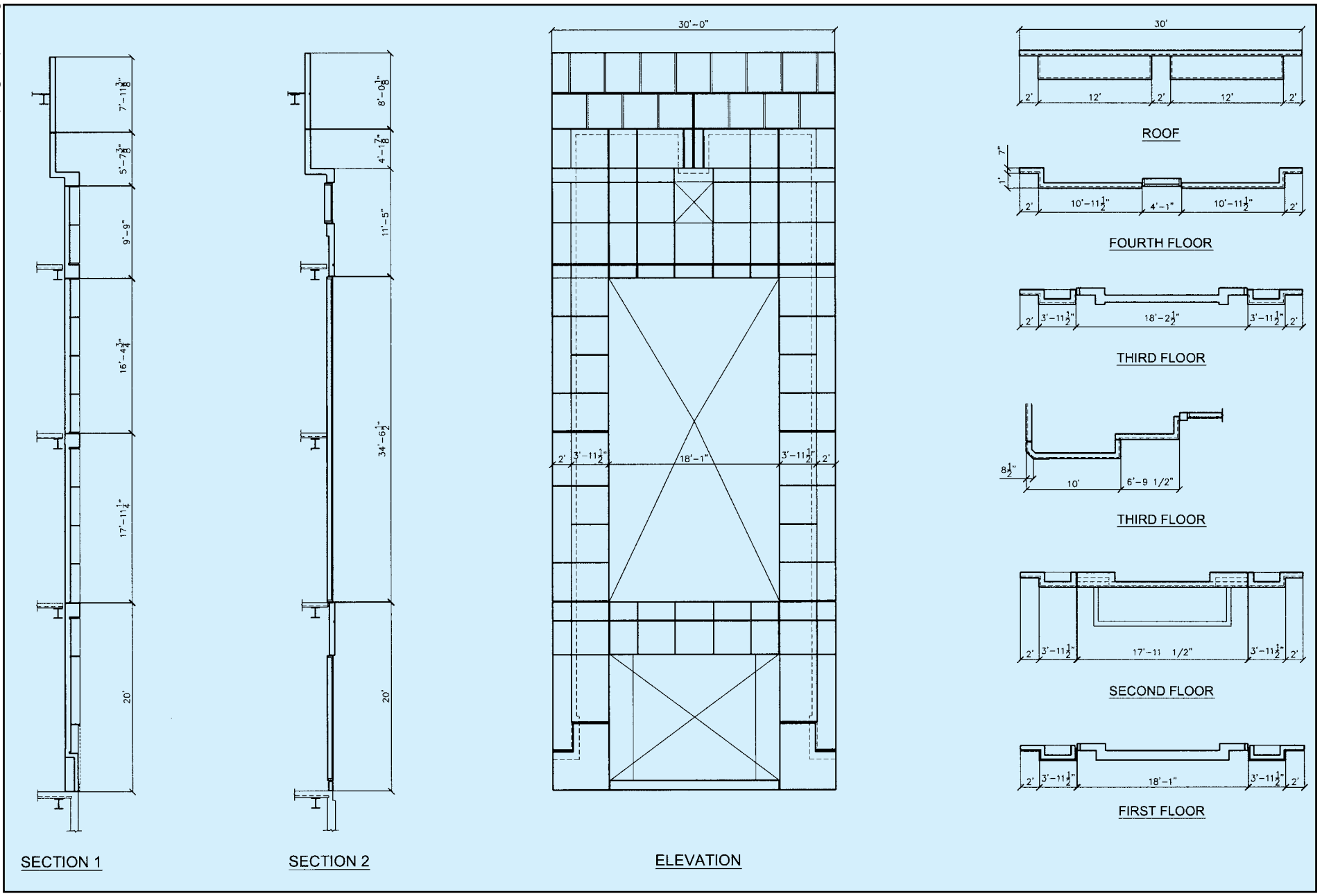

Fig. 3. Elevation of building showing shape and detail of precast panels.

Fig. 4. Architect's rendering of building façade showing three layers and entry tower.

Fig. 5. Rustication and textures on the precast panels help the luxury store fit in with its neighboring buildings, built in the 1900s.

than using cast-in-place construction. The parking facility contains 192,700 sq ft (17920 m^2) of vehicular space on three floor levels.

Using precast concrete columns saved approximately one month out of the project's construction schedule, because the precast scheme allowed for the implementation of an "up-down" construction approach. Originally, the plan was to use cast-in-place columns, install the floor on the upper level of parking and build the retail store with a steel framework on top of that base.

With the change to precast concrete columns, the underground parking structure could be built in modules, with construction on the retail center progressing as each parking bay was completed. Erection of the precast columns was performed with the crane sitting on a 30 ft (9.14 m) deep foundation and working its way backward across the site.

One end of the site was secured with a retaining wall, with the foundations for the precast columns set and the precast columns lifted into place on the footings. Then, the crane

moved backward across the hole to set more columns. Once the bay was completed, steel crews began erecting the steel framework above. Thus, while the final parking levels were being completed, the initial portions of the retail store above were already underway.

Although their primary concern was the structure and parking facility, city planners had considerable influence on the overall design of the retail portions as well. In particular, they wanted to ensure the building's exterior look was appropriate for its setting in the retail area and complemented the surrounding older buildings. The design team worked closely with the city's Design Review Committee and Urban Planning Department to find a design that fit those needs.

In fact, the designers spent considerable time working with city planners and the head of the PEIDC, who provided a tour of the downtown neighborhoods to explain the ambience and design goals they wanted to reach. The designers did not actually begin creating the building's final look until they had been working on the project for three months. That lag time gave the designers time to sort out all the variables involved in the design process and think through how best to meet the varying needs of the participants.

In determining the final approach, the designers took note of what the area stood for and the statement made by other buildings surrounding the site. These buildings included the city's courthouse, the Koppers Building, and others built at the turn of the century using heavily rusticated stone. The design team's goal was to provide a façade that blended with these designs without incurring the high cost that using real stone would have meant. This goal was the reason why architectural precast concrete panels with stone accents were specified.

Often, for this type of retail design, Cooper Carry's designers furnish a façade incorporating an alternate insulating finish system in conjunction with precast concrete panels. The architect has worked on a variety of projects for Federated Department Stores, and the retailer had in fact suggested to the PEIDC that its planners interview the architect, leading to the commission for this project.

In this instance, however, an all-precast design was recommended to take advantage of the contemporary sophistication of an established urban context and blend it closely with the environment. The goal was to have the building appear to be crafted much as the stone buildings around it had been. With the precast concrete panels, the architect could design scaled-down modules with rustication joints, so the retail center would feel like a building made up of components rather than one monolithic structure (see Figs. 4 and 5).

Connections for the panels were fairly conventional, with loads handled by the first-floor retaining wall along the parking structure and the steel frame used for bracing on the gravity connections (see Figs. 6 and 7). Panel sizes for the most part corresponded to floor-to-floor heights. This meant that first-floor panels were 20 ft (6.10 m) high while panels for upper floors were

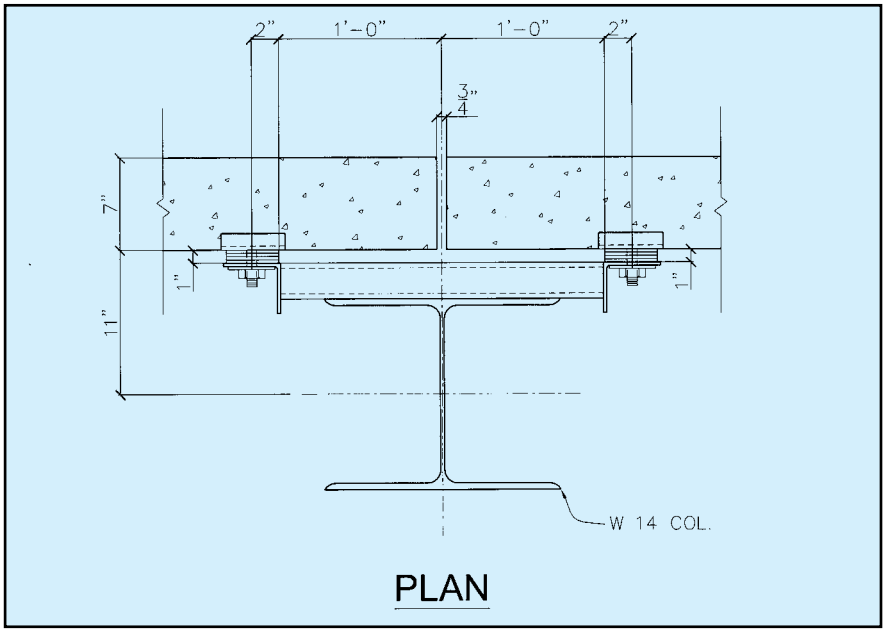

Fig. 6. Plan of typical panel connection with steel column.

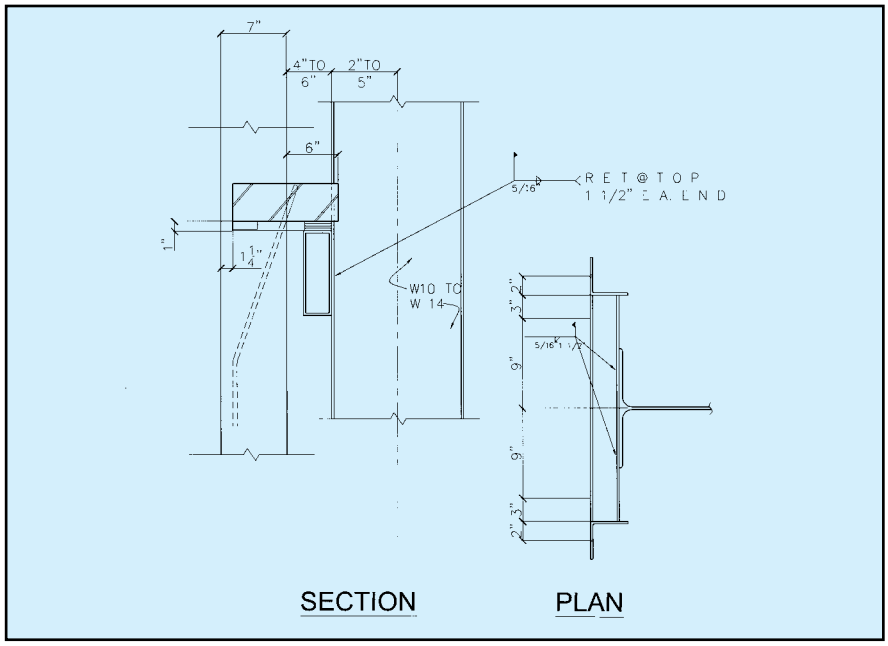

Fig. 7. Section and plan of typical panel connection with steel frame.

Fig. 8. The outer plane of panels is lighter in tone and serves to frame the tall window bays.

Fig. 9. The second plane of panels features a light sandblast that contrasts with the other layers.

18 ft (5.49 m) tall.

Within those sizes, the panels could vary by 1 ft (0.305 m) in cross section to achieve the thickness of the plane desired. The top component at the tower consists of 5½ ft (1.68 m) tall panels offset by 2½ ft (0.76 m) to meet the projection of the interior plane. The size made this precast component slightly more difficult to cast with uniform consistency and erect at the top of the structure.

The scaling of the rustication allowed the façade to address the other buildings in the area. A twist, however, was added to that design with the layering of three planes of panels across the façade and two textures achieved within one mix to allow the planes to stand out from one another. The three layers help emphasize the verticality of the four-story structure without adding significant depth to the façade.

Each plane is about 1 ft (0.305 m) deep, adding only 3 ft (0.91 m) from front to back. But the ways in which they weave together the three planes and emphasize the building's architectural features add considerable visual interest while maintaining the classic design look desired to match with the surrounding buildings.

The outermost layer of panels frame the tall bands of windows along both streets, four along one side and five along the other (see Fig. 8). These panels and tall windows provide the vertical emphasis that was desired. This outer layer uses Cedar Lake aggregate and limestone in the mix and the panel was given a smooth, acid-etched finish that emphasizes the lighter shade.

The middle plane of panels connects the ones behind and before it by using a darker shade of panels. This was achieved by lightly sandblasting the panels but not changing the cement mix used. The third plane of panels, which forms the backdrop and base for the projecting two layers in front, connects to the adjoining entrance tower and again features a lighter shade with heavy rustication to break up its mass.

The second plane's darker shade also was used as the main color and texture for the entrance tower, which was stepped back from the three-plane main facades, giving it a distinctive flair (see Fig. 9). The whiter tone again was used to frame the tall band of vertical windows stretching to the top of this section.

The tower's verticality was emphasized by aluminum "arms" that protrude above the window bands at the top of each tower side, as well as by the inclusion of added height with a grille design to make it a focal point (see Fig. 10). The entrance's presence at the street level was enhanced by setting the doorways at the corner of the intersection facing each street.

All three planes are tied together by the rustication in the panels, which match up from layer to layer and provide continuity among the dimensional pieces. Shaping these precast panels proved to be difficult due to the depth of the planes. Some of the panels required multi-stage casting to achieve the illusion of planes of stone set into each other and protruding from the one behind while in fact they were portions of the same panel.

To ensure the proper texture and colorations, samples were produced as a guide during the bidding process. These then were used by the precaster to produce strike-off panels for inspection. The first iteration was delicately adjusted and two samples of a final control panel were produced. The precaster retained one sample to ensure quality control while the other panel was shipped to the site for comparison with arriving panels.

Erecting the architectural precast panels presented numerous challenges for the erector. The major problem concerned the need to perform much of the work at night. Trying to use transits and levels to shoot elevations and set the precast panels to these lines and elevations was difficult with these complicated panel configurations. Often, what looked fine at night would have to be readjusted once the day shift came onto the job site and saw what it looked like in daylight (see Fig. 11).

Another major challenge was that the three sides of the building being clad with architectural precast panels faced busy streets in the downtown area (see Fig. 12). This was complicated by the fact that the building had not been back-filled. As a result, the erector had to work around a hole surrounding the structure about 30 ft deep and 15 ft wide (9.14 x 4.57 m).

In order to set up the crane, crews had to have falsework engineered and installed each time the crane had to be moved to another location. When each shift finished, crews had to take off the outriggers, pick up the mats and reinstall the fences so they would not interfere with traffic the next day.

In addition, because the precast components were being delivered from the precaster's plant in Niagara Falls, Ontario, Canada, the trailers delivering the pieces could not be dropped and left at the site, because their erection could not be timed that precisely. Instead, a storage yard was established where the panels could be left and shuttled to the site as needed.

If a truck still had pieces remaining on it at the end of the day, it had to be shuttled to the storage yard and brought back again for the next shift.

Construction of the project began in June 1997 and was completed in November 1998, right on schedule for the holiday season. The total shell cost for the retail facility was $16 million, while the underground parking structure cost $11 million. The architectural precast concrete contract totaled $1.1 million and included 300 components, including 255 architectural precast panels.

The resulting project proved to be well worth the time and extra care caused by the unique design. The use of tall expanses of glass not only emphasize the verticality of the building but add a distinctive and built-in marketing element. These openings allow passersby to peek into the store

Fig. 10. The tower's verticality was emphasized by adding aluminum projections at the top of the building.

Fig. 11. Erection of the panels required both a day and night crew, with major challenges arising from having to work in the busy downtown area.

Fig. 12. The tower's entrances align with the streets at the intersection where the structure is located.

throughout the day, while at night, the light shining out through the glass from inside creates excitement along the neighboring streets and sidewalk and provides a beacon of activity that can be seen from several blocks away (see Fig. 13).

PCI's Design Award judges were impressed by the design, too. In awarding the project the 2000 Award for Best Retail Facility, they said "This project is a good example of a façade that blends precast elements in a very appealing way with metal and glass. It also is very respectful of the fact that the building is located in a downtown streetscape with a need for a human scale. It shows that precast concrete can be used to create very delicate members that allow for a lot of openness and visual penetration in a building elevation. It is a big box done right."

In retrospect, the design creates a centerpiece for Pittsburgh's shopping district that illustrates how contemporary design can show its respect to the classical past. The façade harmonizes with the surrounding buildings while bringing a new sophistication to an established urban context. This could only have been achieved by using precast concrete components in the ways that were done, both to save precious time in the underground parking structure and to create a distinctive and complementary stone-like design for the façade that met the schedule and budget constraints.

CREDITS

Owner: Federated Department Stores, Cincinnati, Ohio

Architect: Cooper Carry Inc., Atlanta, Georgia

Engineer: Structural Engineering Corp., Pittsburgh, Pennsylvania

General Contractor: Turner Construction Co., Pittsburgh, Pennsylvania

Precast/Prestressed Concrete Manufacturer: Modern Mosaic Ltd., Niagara Falls, Ontario, Canada

Precast Concrete Erector: Alpha Steel Erectors Inc., Worthington, Pennsylvania

Fig. 13. Bright interior lights highlight the entrance tower of the Lazarus Department Store.