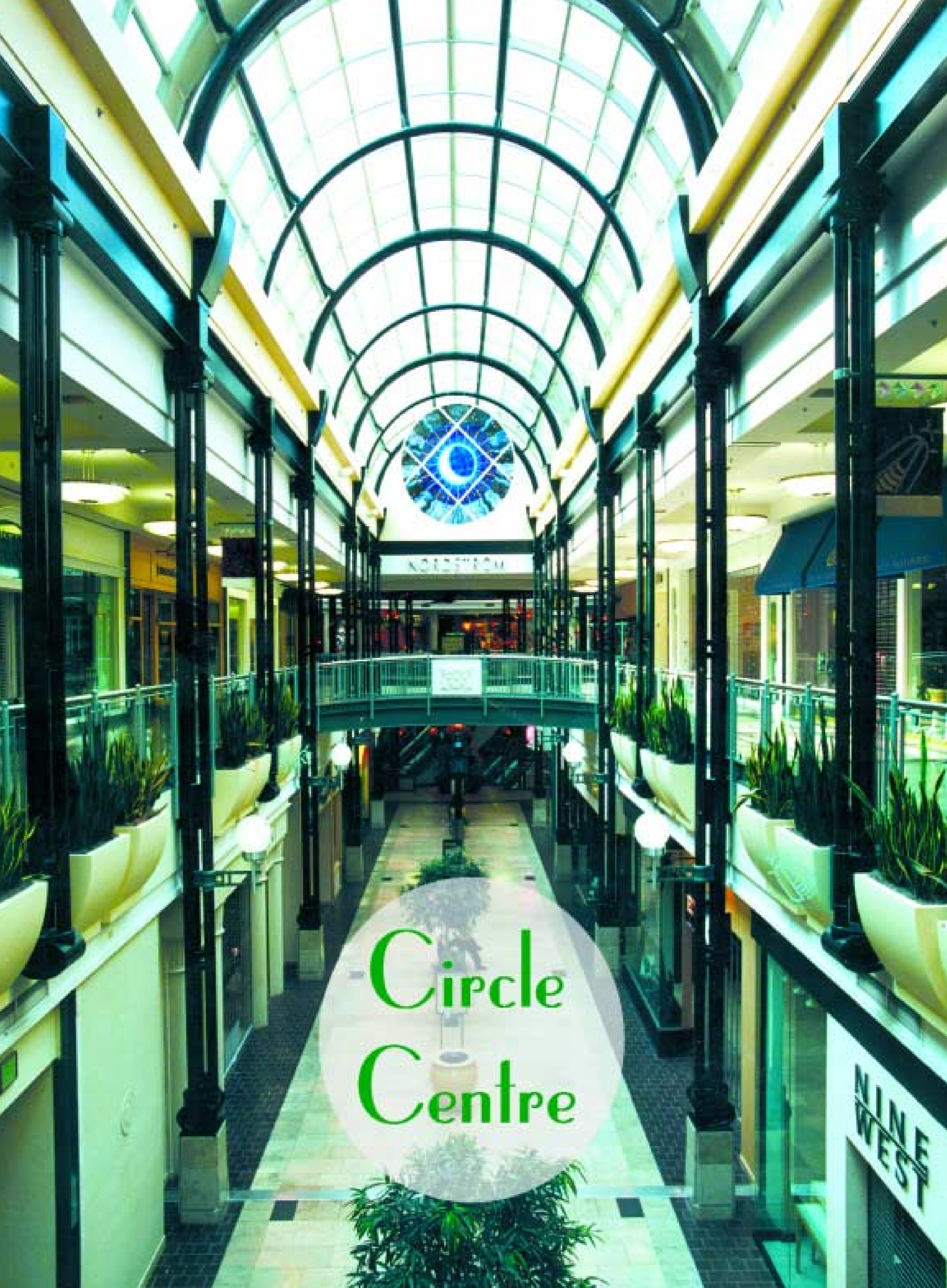
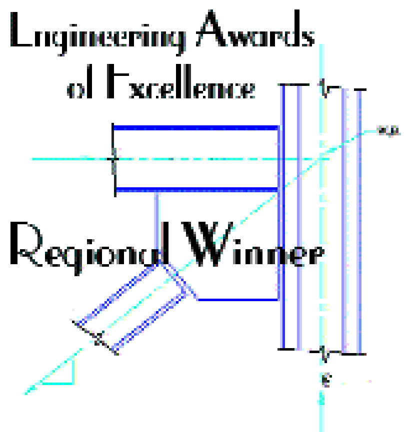

Circle Centre
NORDSTROM
NINE WEST



Occupying 3½ city blocks in downtown Indianapolis, Circle Centre contains more than 970,000 sq. ft. of retail, parking and entertainment space, as well as a series of walkways connecting pedestrians to existing hotels and other facilities in the heart of the city. But what makes the project unique, both in its architecture and engineering, is its preservation of many exterior facades and surrounding structures: The new construction had to be "shoehorned" in, around and even over various existing historic structures and facades.

Fortunately, much of the project was fairly straightforward, with typical bays of 30'x30', though many cantilever conditions existed around the perimeter where the project butts against existing structures. The floor system consists of a composite metal deck and a concrete slab on composite structural steel beams. The most efficient lateral system consisted of bracing the building in one direction and using moment connections in the other. The columns, as designed for gravity loads, provide sufficient stiffness for moment frames as long as they are all oriented in the same direction. Load and Resistance Factor Design was used for the project, which resulted in substantial material savings. A total of 4,500 tons of structural steel was used on the project, approximately 10% less than would have been required from a comparable design based on allowable stresses.

Composite shear walls were used in the braced direction, since potential bracing locations were limited and uplift, due to overturning, became a prohibitive issue for normal X-bracing.

The main challenge from the very

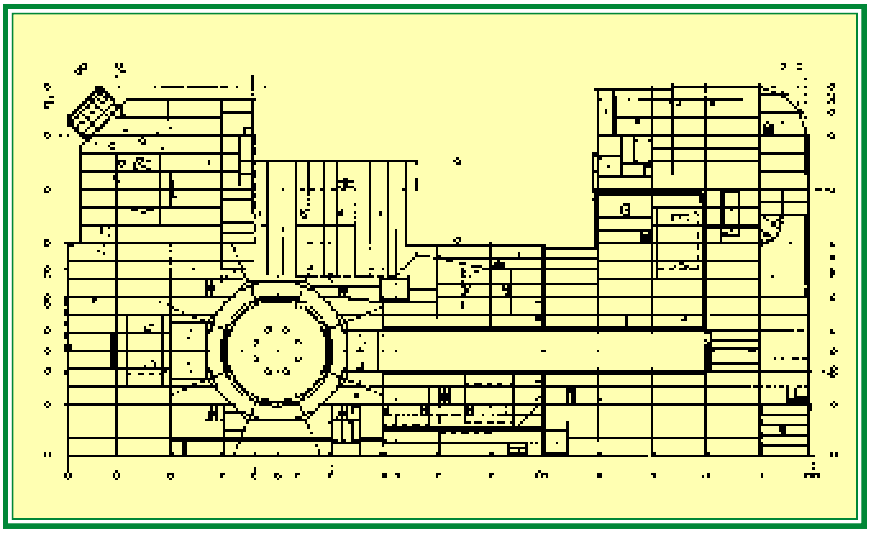
Judges Comments

The marriage of the architectural ornamentation with the structural elements leads to both an aesthetic and economical structure

beginning of the project was creating a framing system that could economically satisfy both the architectural and structural requirements of the project. Early on it was decided to leave much of the structural system exposed—a marriage of architecture and structure that produced tremendous cost savings to the owner. The architect came up with a triangular grouping of three 5" diameter pipes (8" in the main atrium) with vertical transitions for the main ornamental columns along the length of the concourse of the project. However, the configuration of the columns, along with varying properties along the height, dictated a special buckling analysis since no conventional means was readily available. Instead, the engineer created a spreadsheet program based on Newmark's finite difference method to calculate the varying moments of inertia in the many columns and to calculate the load-carrying capacity of the columns.

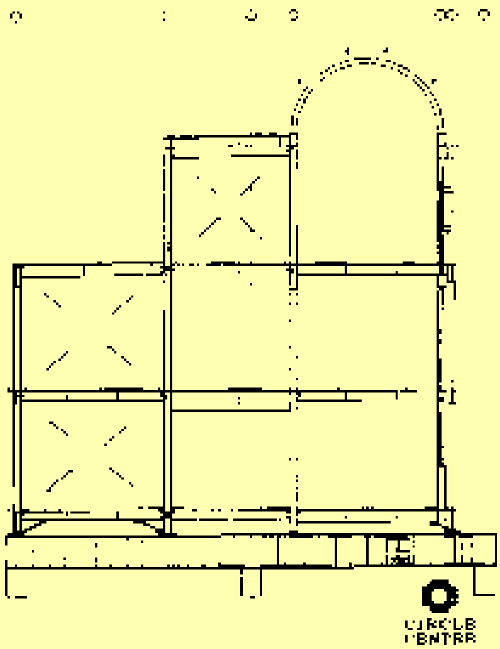
The central concourse splits the building into two halves. Stretching above the concourse is an arched skylight. Structurally, the skylight framing was insufficient to tie the two portions of the building together in a seismic event. Therefore, the pedestrian bridges stretching across the second level of the concourse were designed to serve this purpose. The bridges consist of two curved W18x60 members with shear connections designed for the axial loads necessary to connect the bridges with the building.

Another challenging "overpass" occurs above what one of the main entrances to the center. The owner desired a "transparent" look for the overpass without any visual obstructions in the center portion from diagonal truss members. As a result, conventional truss design methods were discarded and a hybrid truss/suspension bridge was created with two main diagonal tension members in the two outer panels, but none in the middle bay—similar to the concepts used for suspension bridge design. The design provides the desired openness, which was further emphasized by the exclusion of large gusset plates for the connections of the diagonals. Instead, the members were welded directly together.



One of the keys to the success of the project was the combination of the old streetscape with new retail space. In one section of the project, the historic St. Elmo/Ryder Building complex, the entire first floor of the existing buildings were left intact. However, rear portions of the second and third stories were removed while the front portions were left alone—thereby preserving the street scene. In addition, after foundation work was complete, a partial fourth floor was added. The new construction is supported on a truss over the first level. One end of the truss is supported on the existing foundations, while the other end is supported on a new foundation added to an adjacent alley.

Sensitivity in renovation also was important in the creation of a new atrium in the existing L.S.



Ayres building. The tenant required a new atrium space through the lower four levels. The size of the atrium necessitated the removal of four existing columns up to the fourth floor, with the columns remaining intact for the stories above. Four columns were removed and loads were transferred to adjacent columns via a W36 member cantilevering into the space. The system had the added benefit of not requiring temporary shoring.

The project has proved to be an overwhelming success, with more than 12 million visitors in the first year and sales in 1996 averaging $400/sq. ft., compared to an industry-wide average of $230.

Project Team

Engineer and Architect:
Fink Roberts & Petrie, Indianapolis

Construction Manager:
Geupel-DeMars, Indianapolis

Fabricator:
PKM Steel Service, Inc., Salina, KS