



# MERIT AWARD

\$25M OR GREATER, BUT LESS THAN \$100M

## Erie on the Park CHICAGO



**JUROR COMMENTS:**

*Structural steel responding well to irregular floor-plate geometry and need to keep floor-to-floor heights at a minimum.*

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| <b>STRUCTURAL ENGINEER</b><br>Thornton-Tomasetti Engineers,<br>Chicago        | <b>DETAILER</b><br>Dowco Consultants, Ltd. (NISD<br>member), Burnaby, BC Canada     |
| <b>ARCHITECT</b><br>Lucien Lagrange Architects,<br>Chicago                    | <b>JOIST FABRICATOR</b><br>Canam Steel Corporation (AISC<br>member), Washington, MO |
| <b>FABRICATOR</b><br>Zalk Josephs Fabricators (AISC<br>member), Stoughton, WI | <b>ENGINEERING SOFTWARE</b><br>RAM Structural System, ETABS                         |
| <b>ERECTOR</b><br>Area Erectors (NEA member),<br>Wheeling, IL                 | <b>DETAILING SOFTWARE</b><br>Xsteel   |

Read more about Erie on the Park in the May 2002 issue of *Modern Steel Construction*.

**E**rie on the Park is a striking statement in steel. This sleek 25-story residential tower emphasizes the material with exposed chevron-shaped steel bracing punctuating the façade. The result is a distinctive design that stands out in the Chicago cityscape, where concrete is the typical choice for apartment buildings. Floor-to-ceiling glass runs between steel spandrels and the dramatic chevrons, achieving an open airy look and offering building residents views of nearby Lake Michigan.

The building site is in the shape of a parallelogram, with existing neighboring buildings located directly on the property line on the east and west sides, and major streets on the north and south sides. The dimensions of the site and the largest floor plates are approximately 90' between the existing buildings and 120' between the streets. The 266,000-sq.-ft building consists of three concrete stories at the base, and 22 stories framed in rolled shapes and steel joists rising above the base. The

typical floor-to-floor height is 10'-8". The lateral system is comprised of concrete shear walls at the base and three-story steel mega-braces in the steel stories. The foundation system consists of grade beams and caissons. Unlike typical mid-rise construction, there is no basement. As a result, a structural slab was designed at the base of the building to act as a rigid diaphragm and transmit the base shear to all of the caissons.

### **STEEL-FRAMED RESIDENTIAL BUILDING**

Architecture and structural engineering are virtually inseparable at Erie on the Park. The design team began with several constraints: the owner wanted to optimize the space within the tight confines of the site, offer a range of floor plans and unit sizes, and achieve fast-track construction.

Thornton Tomasetti Engineers began by analyzing a concrete structural system and found insufficient torsional resistance, due to Chicago's high winds and the unusual parallelogram building shape. Changing concrete formwork for varied layouts would have slowed erection, and concrete was more costly than steel.

The design team, led by Lucien Lagrange Architects (LLA), explored a steel

structural system, and focused on bracing. Thornton-Tomasetti Engineers's decisions on the type of needed bracing for the size and shape of the building influenced LLA's aesthetic choices. In one direction, the engineers placed bracing within two interior walls, but the building core made this approach impossible in the other direction.

The design team then developed the dramatic exterior chevron design, which was derived from the angles that the engineers calculated for optimal bracing shapes. These chevrons brace two sides of Erie on the Park. The bracing on each side forms eight vertically stacked chevrons 52' wide; seven are three stories high, and the uppermost is two stories high. The result is an aesthetic marriage of architectural interest and structural elegance. The diagonal elements transfer lateral loads from floor to floor, and a column bisects the chevrons for gravity resistance. At the three-story-high lobby, construction transitions to concrete. Chevron bracing lateral loads are transferred to concrete shear walls, and uplift is resisted by a reinforced-concrete, grade beam-and-caisson foundation.

### **3-DIMENSIONAL MODELING**

Thornton-Tomasetti used Xsteel, a 3-D computer-modeling tool from

Tekla, to efficiently handle the project's difficult geometry and to accelerate steel production. Xsteel allowed geometry and member sizes to be exported directly from compatible analysis programs, potentially to be used to develop fabrication shop drawings. All parties could see in a three-dimensional model how the structural steel and connections fit together. In particular, Xsteel allowed Thornton-Tomasetti to model the architecturally exposed structural steel with the structural steel to determine how they looked together. This attribute was instrumental in achieving the desired aesthetic appearance, such as having all gusset connections concealed by the architectural covers for the steel.

Erie on the Park is an example of how a design team's creative approach achieved a distinctive building. In contrast to concrete frames typically used in residential construction, the project illustrates how the use of steel both structurally and architecturally proved to be an economical and efficient way to frame the building. The use of Xsteel modeling enabled the team to facilitate erection speed and achieve the desired building aesthetic. The result is a boldly modern structure that takes residential construction in a new direction. ★

