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.

Erie 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

Read more about Erie on the Park in the May 2002 issue of Modern Steel Construction.
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 struc-
tural 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 de-
cisions on the type of needed bracing for the size and shape of the building influ-
enced LLA’s aesthetic choices. In one di-
rection, the engineers placed bracing within two interior walls, but the build-
ing 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 brac-
ing 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 aes-
thetic 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 brac-
ing lateral loads are transferred to con-
crete 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 pro-
grams, potentially to be used to de-
velop fabrication shop drawings. All
parties could see in a three-dimen-
sional model how the structural steel and connections fit together. In particu-
lar, 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 appear-
ance, such as having all gusset connec-
tions 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 con-
trast 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 res-
idential construction in a new direc-
tion.