A San Diego condominium project sets a structural precedent in a high-profile part of town.

BY ROBERT PYLE, P.E.

A New Approach

eSteel consulted the rest of the project team on a number of framing solutions before selecting a buckling-restrained braced frame system.

Above, left: Nexus is the first steel multi-story residential building to be constructed in downtown San Diego since the 1980s.

Below, left: The eight-story project, which includes three floors of underground parking, used 2,000 tons of structural steel.

Right: The project was the first in San Diego to use a buckling-restrained braced frame system.

Photos: KMA Architecture and Engineering
A buckling-restraint brace (BRB) acts like a large shock absorber, with a central plate or cruciform cross-section stretching in tension and shortening in compression. In contrast, a typical special concentrically braced frame (SCBF) has diagonal braces that stretch in tension but buckle in compression, which is not as ideal due to the buckled behavior. The BRB works without global buckling because the central plate is grouted solid—but free to elongate and shorten—inside a larger restraining tube.

Because this was the first time the BRBF system had been used in San Diego, the city's planning department was concerned that it was not recognized in the locally enforced UBC code. The department informed the design team that there would be a 90-day review period with no guarantee that they would approve the BRBF system, since it would set a precedent in town.

A workshop was set up between city officials and the eSteel team with support from AISC and Dr. Chia Ming Uang from University of California at San Diego. Dr. Uang has tested the largest buckling BRBs in the U.S. to date, and the samples for this project were loaded up to 1,200 kips. The workshop involved discussion of the specific design of the structure, review of the requirements included for the BRBF system in the 2005 AISC Seismic Provisions, and review of Dr. Uang's test results. It paid off for the design team, as the building department approved the plans two weeks after it took place.

**Tight Site**

On a job site with no lay-down area, everything had to be organized so that steel could be erected directly off of the trucks. The project involved significant early coordination between the structural and mechanical teams to ensure proper fit-up. Several openings were left in the framework so that building systems could be easily transported through the beams and properly placed. Approximately three or four beams per floor, used for shoring, were removed once the concrete floors cured, to raise the ceilings in certain areas.

Steel was also used for Nexus' balconies; all exterior steel was galvanized. The balconies were dropped down in thickness from 2 in. to 3 in. so that the floor slab could be cut into and sloped to allow for drainage.

**Architect**
KMA Architecture and Engineering, San Diego

**Structural Engineer**
Chavez-Grieves Consulting Engineers Inc., Albuquerque, N.M.

**Steel Fabricator**
AmFab, Inc., Bernalillo, N.M., (AISC Member)

**Steel Detailer**
dtl's, Inc., Albuquerque (NISD Member)

**Steel Erector**
Eagle Iron Erectors, Inc., Fontana, Calif. (AISC Member)

**General Contractor**
Balfour Beatty Construction, Dallas

**Robert Pyle** is AISC’s Southwest regional engineer. He can be reached at pyle@aisc.org.