DESIMONE

Design of the Tallest Reinforced Concrete Structure on the West Coast – a 58-story Residential Tower in San Francisco

DERRICK D. ROORDA, SE
Senior Associate
160 Sansome Street, 16th Floor, San Francisco, CA 94104
T. 415.398.5740 | F. 415398.9834 | droorda@de-simone.com

NICOLAS J. RODRIGUES, PE
Senior Project Engineer
160 Sansome Street, 16th Floor, San Francisco, CA 94104
T. 415.398.5740 | F. 415398.9834 | nrodrigues@de-simone.com

Abstract

This paper presents analysis, design, construction document methodologies, peer review procedures and special component testing performed for the Millennium Tower project in San Francisco located at 301 Mission Street. When completed in 2008, this project will be the tallest reinforced concrete structure situated in a seismic zone 4 region, the 4th tallest structure in the City of San Francisco and the tallest residential building west of Chicago. The tower has 58 occupied floors and combines with an adjacent 12-story tower and surrounding podium to provide over 1,150,000 sf of luxury condominiums and recreational amenities. The tower's immense height posed many challenges and required the creative use of technologies and cutting edge innovations.

The tower's dual lateral system is comprised of a 36-inch-thick concrete shear wall core and partial perimeter special moment-resisting frames. The heaviest building ever constructed in San Francisco on a psf basis, the tower is supported by a mat foundation resting on 950 130-ton piles, each approximately 80 feet in length. Outrigger trusses connecting the interior core with robust perimeter columns are provided at three intermediate levels to control lateral deflections. In order to reduce the required floor-to-floor heights, shallow steel link beams are used within the shear wall core as coupling beams, in lieu of deeper diagonally reinforced concrete beams.

Closely spaced ties in columns and walls posed a challenge to the placement of the high strength 10 ksi concrete needed for this project. To alleviate some of this congestion, DeSimone specified a system of welded grid reinforcement that eliminated all hooks, significantly reduced the volume of rebar and decreased overall labor costs. A successful laboratory test program was implemented to demonstrate the adequacy of this product for use on the project.

Session Buildings
Topic High-Rise