



“China Zun” Tower: Pushing the Limits to Chinese Practice

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Abstract

The “China Zun” tower Beijing reaches 528m high and will be the tallest building in Beijing once built. Inspired by an ancient Chinese vessel “Zun”. The plan dimensions reduce gradually from bottom to the waist and then escalate bigger as it approaches to the top to form an aesthetically beautiful and unique geometry. To satisfy the structural requirement for seismic and wind resistance. The structure is a dual system composed of the perimeter mega structure which is made of composite mega columns, mega braces and belt trusses, and the reinforced-concrete core with steel plate embedded walls. Advanced parametric design technology is applied to find the most efficient outer perimeter structure system. The seismic design basically follows a hybrid empirical and performance-based methodology which was verified by the shaking table test and other specimen lab tests.

Keywords: “China Zun” tower, super high-rise building, mega frame, mega column, concrete-filled steel tube, parametric design

1 The Background

The “China Zun” tower, located in the Beijing CBD Core Area Z15 plot, is an super high-rise building functioned as office, retail and sightseeing spot. This tower contains 350,000 m² GFA above ground and reaches 528m high with 108 floors. Developed by CITIC Heye Investment Co. Ltd, it will be the tallest building in Beijing once built.

The building’s shape is inspired from an ancient Chinese vessel “Zun”, which is used to hold wine during religious ceremonies. The dimension of the corner-rounded square floor plan is reduced from 78m at bottom to 54m at 3xxm high and then enlarged to 70m at top. This is different from most

other super high-rise buildings which have smallest dimension at top to reduce the wind load and seismic mass. On the other hand, it brought more value to the client by elevating much more floor area to higher levels considering the tower is surrounded by a cluster of buildings 200~400m tall in the same area.

Beijing is located in seismic fortification density 8 as defined in Chinese code which means a $PGA=0.20g$ for 475-year return period. This is the highest in major China cities while $PGA=0.10g$ or less for cities like Shanghai and Shenzhen.

The structural height 522m (to the main roof) and the structural width at ground floor 72.7m (measured from the outer surface of mega column