

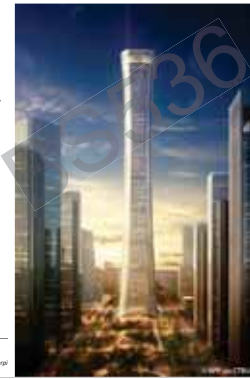


CHINA ZUN TOWER  
BEIJING, CHINA  
528 M TALL WITH 108 STORIES

Case Study: China Zun Tower by Yeliz Aksu  
Submitted to: Günel, Ay – Fall 2015

GENERAL INFO

OFFICIAL NAME: CHINA ZUN TOWER  
OTHER NAMES: CITIC Plaza, Z15 Tower, China Honor Tower, Zhongguo Zun (Zun)  
LOCATION: CHINA, BEIJING  
STRUCTURAL & ARCHITECTURAL HEIGHT: 528 m  
OCCUPIED HEIGHT: 515 m  
ASPECT RATIO: 6.76 (HEIGHT/FOOT PRINT TO NARROWEST DIMENSION)  
NUMBER OF FLOORS: 108 (ABOVE GROUND), 7 (BELOW GROUND)  
BUILDING FUNCTION: OFFICE  
STATUS: UNDER CONSTRUCTION  
CONSTRUCTION TIME: 2012 – 2018 (estimated)  
ARCHITECT: KOHN PEDERSEN FOX ASSOCIATES (KPF)  
STRUCTURAL ENGINEERING: ARUP  
STRUCTURAL SYSTEM: BRACED TUBE SYSTEM  
STRUCTURAL MATERIAL: COMPOSITE



[1] Retrieved from <http://www.scribd.com/document/211161116/China-Zun-Tower>  
[2] Retrieved from <http://www.scribd.com/document/211161116/China-Zun-Tower>  
[3] Retrieved from <http://www.scribd.com/document/211161116/China-Zun-Tower>

LOCATION



Figure 1. Panoramic view of Beijing towards Zun tower<sup>[1]</sup>  
Zun tower is located at plaza district in Beijing, China. Although, there are several known other buildings located around the tower, Zun is planned for being tallest of Beijing.  
"...an iconic skyscraper that demonstrates efficiency, sustainability and creativity in design"  
"...tallest of Beijing, China with its 518 m height."<sup>[2]</sup>

[1] Retrieved from <http://www.scribd.com/document/211161116/China-Zun-Tower>  
[2] Retrieved from <http://www.scribd.com/document/211161116/China-Zun-Tower>

SITE PLAN



Figure 2. Site plan of plaza district<sup>[1]</sup>  
China Zun tower is located in east of Beijing where the new CBD (Central Business District) extension is developed. Situated close to new CCTV Headquarters and WTC 3, Zun is planned for being an international iconic landmark for future of China<sup>[2]</sup>. Z15 is one of the other names of tower is come from the district planning codes. Also, its known as Cite plaza, since the owner and developer company of this project is Cite Heye Investment Company Ltd.<sup>[3]</sup>

[1] Retrieved from <http://www.scribd.com/document/211161116/China-Zun-Tower>  
[2] Retrieved from <http://www.scribd.com/document/211161116/China-Zun-Tower>

DESIGN CONCEPT



Figure 4. a) Footing, heading and concave shape of the building is inspired by the shape of a "water vessel". b) Water vessel<sup>[1]</sup>  
Figure 5. Building function changes in design process. <sup>drawn by Yeliz AKSU</sup>  
It was intended to be a multipurpose tower. However, architectural program of the building changes many times according to client's request, and the last decision is on office usage and an observation deck. It is important, since the architectural and engineering group of the project states that the structural design and facade envelope of the building changes with the usage too. After many variations are taken into consideration, the most suitable structural components and curtain wall system is applied to the project.<sup>[2]</sup>

[1] Retrieved from <http://www.ctbuh.org/TabBuilding/VideoLibrary/tabid/486/templatename/Default.aspx?vid=62086>  
[2] Retrieved from <http://www.ctbuh.org/TabBuilding/VideoLibrary/tabid/486/templatename/Default.aspx?vid=62086>

STRUCTURAL VARIATIONS



Figure 6. Structural variations related to changing building function<sup>[1]</sup>  
Order of structural components of the building changes for function expression which is a significant criteria in Zun tower's design concept.

[1] Retrieved from <http://www.ctbuh.org/TabBuilding/VideoLibrary/tabid/486/templatename/Default.aspx?vid=62086>

MODEL, CRITICAL FLOOR PLANS AND RADIUS VALUES OF PLANS



Figure 7. Model, critical floor plans and radius values of corners in those plans<sup>[1]</sup>  
[1] Within values are approximate meters and compiled from Peng, L., Luo, N., Whitlock, R., Lai, L. (2014). Case study: China Zun Tower, Beijing  
[2] Retrieved from <http://www.ctbuh.org/TabBuilding/VideoLibrary/tabid/486/templatename/Default.aspx?vid=62086>

STRUCTURAL SYSTEM

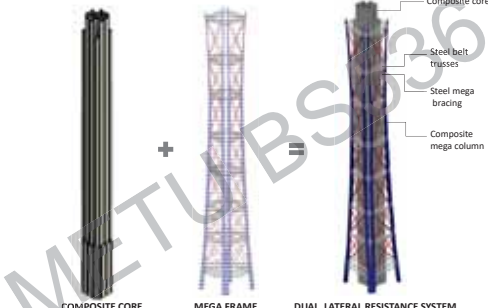


Figure 8. Model<sup>[1]</sup> <sup>drawn by Yeliz AKSU</sup>  
[1] Measurements are retrieved from Peng, L., Luo, N., Whitlock, R., Lai, L. (2014). Case study: China Zun Tower, Beijing.

STRUCTURAL SYSTEM COMPONENTS

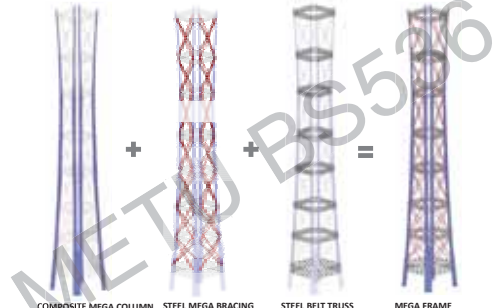


Figure 9. Model<sup>[1]</sup> <sup>drawn by Yeliz AKSU</sup>  
[1] Measurements are retrieved from Peng, L., Luo, N., Whitlock, R., Lai, L. (2014). Case study: China Zun Tower, Beijing.

MEGA COLUMN

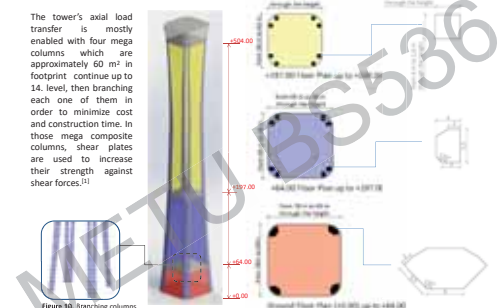


Figure 10. Model, plans with columns<sup>[1]</sup> and column dimensions<sup>[2]</sup> <sup>drawn by Yeliz AKSU</sup>  
[1] Dimensions are retrieved from <http://www.ctbuh.org/TabBuilding/VideoLibrary/tabid/486/templatename/Default.aspx?vid=62086>  
[2] Dimensions are retrieved from <http://www.ctbuh.org/TabBuilding/VideoLibrary/tabid/486/templatename/Default.aspx?vid=62086>

CONSTRUCTION PHOTO OF BELOW GROUND

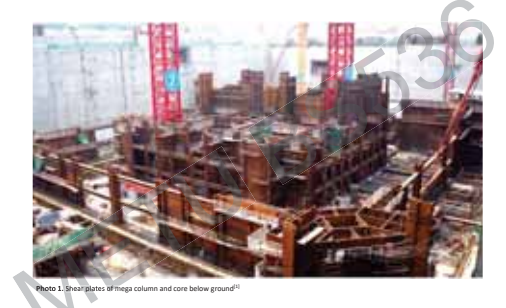


Photo 1. Steel plates of mega column and core below ground<sup>[1]</sup>  
[1] Retrieved from <http://www.skyscraper.com/showthread.php?p=118607&page=42>

CORE

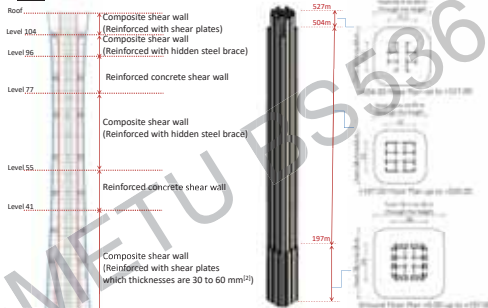


Figure 12. Section<sup>[1]</sup> <sup>drawn by Yeliz AKSU</sup>  
Figure 13. Model and core configuration<sup>[2]</sup> <sup>drawn by Yeliz AKSU</sup>  
[1] Core parameters are retrieved from <http://www.ctbuh.org/TabBuilding/VideoLibrary/tabid/486/templatename/Default.aspx?vid=62086>  
[2] Measurements are retrieved from Peng, L., Luo, N., Whitlock, R., Lai, L. (2014). Case study: China Zun Tower, Beijing.

RENTABLE AREA

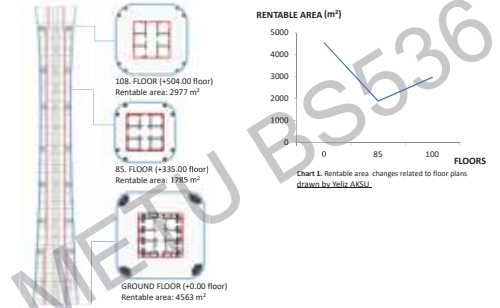


Figure 14. Section and floor plans<sup>[1]</sup> <sup>drawn by Yeliz AKSU</sup>  
[1] Core parameters are retrieved from <http://www.ctbuh.org/TabBuilding/VideoLibrary/tabid/486/templatename/Default.aspx?vid=62086>

BELT TRUSS

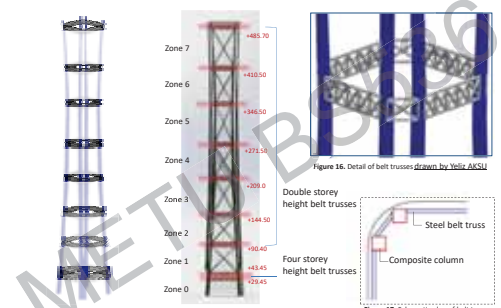


Figure 16. Model and side view<sup>[1]</sup> <sup>drawn by Yeliz AKSU</sup>  
Figure 17. Detail of belt trusses<sup>[2]</sup> <sup>drawn by Yeliz AKSU</sup>  
Figure 18. Location of columns<sup>[3]</sup> <sup>drawn by Yeliz AKSU</sup>  
Figure 19. Truss pattern<sup>[4]</sup>  
Figure 20. End treatment- distance between two branching column<sup>[5]</sup>  
[1] Measurements are retrieved from <http://www.ctbuh.org/TabBuilding/VideoLibrary/tabid/486/templatename/Default.aspx?vid=62086>  
[2] Measurements are retrieved from <http://www.ctbuh.org/TabBuilding/VideoLibrary/tabid/486/templatename/Default.aspx?vid=62086>  
[3] Measurements are retrieved from <http://www.ctbuh.org/TabBuilding/VideoLibrary/tabid/486/templatename/Default.aspx?vid=62086>  
[4] Measurements are retrieved from <http://www.ctbuh.org/TabBuilding/VideoLibrary/tabid/486/templatename/Default.aspx?vid=62086>  
[5] Measurements are retrieved from <http://www.ctbuh.org/TabBuilding/VideoLibrary/tabid/486/templatename/Default.aspx?vid=62086>

OPTIMIZATIONS FOR STRUCTURE

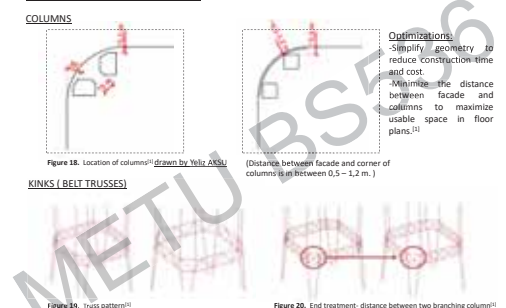


Figure 18. Location of columns<sup>[1]</sup> <sup>drawn by Yeliz AKSU</sup>  
Figure 19. Truss pattern<sup>[2]</sup>  
Figure 20. End treatment- distance between two branching column<sup>[3]</sup>  
[1] Measurements are retrieved from <http://www.ctbuh.org/TabBuilding/VideoLibrary/tabid/486/templatename/Default.aspx?vid=62086>  
[2] Measurements are retrieved from <http://www.ctbuh.org/TabBuilding/VideoLibrary/tabid/486/templatename/Default.aspx?vid=62086>  
[3] Measurements are retrieved from <http://www.ctbuh.org/TabBuilding/VideoLibrary/tabid/486/templatename/Default.aspx?vid=62086>

### AXONOMETRIC STRUCTURAL PLANS

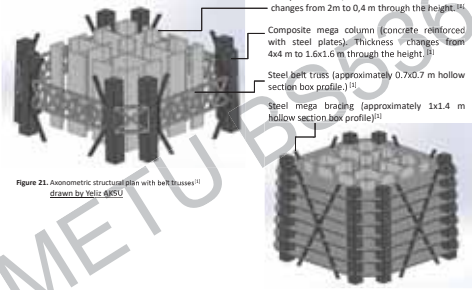


Figure 21. Axonometric structural plan with belt trusses<sup>[1]</sup>  
drawn by Yeliz AKSU

Figure 22. Axonometric structural plan with bracings<sup>[1]</sup>  
drawn by Yeliz AKSU

### CONSTRUCTION PHOTOS



Photo 2. Construction of Zun tower with four stately height belt truss and mega bracing. <sup>[1]</sup>

Photo 3. Detail of mega bracing profile. <sup>[1]</sup>

Photo 4. Branching mega columns, core and belt truss<sup>[1]</sup>

### EXTERIOR ENVELOPE



Figure 23. Model of exterior envelope design<sup>[1]</sup>  
drawn by Yeliz AKSU

### REFERENCE LIST

- Gunel, H. & Ilgin, E. (2014), *Tall Buildings: Structural Systems and Aerodynamic Form*, Routledge – Taylor and Francis Book Company.
- Peng, L., Luo, N., Whitlock, R., Lei, L. (2014). Case study: China Zun Tower, Beijing. *CTBUH Journal*, Issue III, pp.14-20
- Smith, B.S. & Coull A.(1991). *Tall building structures analysis and design*. New York: Wiley.
- Taranath, B. S. (1998). *Steel, concrete & composite design of tall buildings*. McGraw Hill Education.
- <http://alittlepieceofnorway.blogspot.com.tr/2012/07/china-zun-citic-plaza-by-ftp-farrells.html>
- [http://www.arup.com/Projects/China\\_Zun\\_215.aspx](http://www.arup.com/Projects/China_Zun_215.aspx)
- <http://www.ctbuh.org/TallBuildings/Videolibrary/tabid/486/language/en-US/Default.aspx#videos/watch/2072>
- <http://www.ctbuh.org/TallBuildings/Videolibrary/tabid/486/language/en-US/Default.aspx#videos/watch/2086>
- <http://www.skyscrapercity.com/showthread.php?t=1186075&page=42>
- <http://www.skyscrapercity.com/showthread.php?t=1186075&page=44>

[1] All measurements are retrieved from Peng, L., Luo, N., Whitlock, R., Lei, L. (2014). Case study: China Zun Tower, Beijing.

[2] Retrieved from <http://www.skyscrapercity.com/showthread.php?t=1186075&page=42>

[3] Measurements are retrieved from Peng, L., Luo, N., Whitlock, R., Lei, L. (2014). Case study: China Zun Tower, Beijing.