



Figure 1: Ping An Finance Center (http://www.kpf.com/projects/ping-an-finance-center/)

PING AN FINANCE CENTER

GENERAL INFO

- LOCATION: Shenzhen, China [1]
- ARCHITECTURAL HEIGHT: 599 m [1]
- OCCUPIED HEIGHT: 563.7m [1]
- NUMBER OF STORIES: 115 Above Ground [1]
4 Below Ground [1]
- ASPECT RATIO: 8.3 (599m/72m)
- BUILDING FUNCTION: Office [1]
- OWNER: Ping An Life Insurance Company of China [1]
- ARCHITECT: Kohn, Pederson and Fox Associates [1]
- ARCHITECT OF RECORD: CCDI Group [1]
- STRUCTURAL ENGINEER: Thornton Tomasetti [1]
- STATUS: Architecturally Topped Out (Will complete in 2016) [1]
- DEVELOPMENT COST: 459.525m³ [1]
- STRUCTURAL SYSTEM:

- According to Thornton Tomasetti, A composite concrete core with steel outriggers connecting to eight super-columns.
- According to BS5336 class, Outriggerged Frame System.
- MATERIAL: Composite (Steel + Reinforced Concrete) [1]
- RATES: 8th tallest in China [1], 8th tallest in the world [1]



Figure 2: Ping An Finance Center (http://www.kpf.com/projects/ping-an-finance-center/)

PING AN FINANCE CENTER

SITE PLAN



Figure 3: Ping An Site View / Source: KPF/CTBUH (http://pinganfinancecenter.com/building/ping-an-finance-center/54)



Figure 4: Night view of tower under construction Source: Ping An, CTBUH Research Paper- Designing China's Tallest: DNA of the Ping An Finance Center

The Project is being built in the Futian District of Shenzhen, a coastal city near Hong Kong which was declared as a special economic zone by the government [3].
The owner of the building, Ping An Group, has more than 200,000 staff and office space is "infinite demand." To consolidate all functions in a single headquarter, Ping An began construction of Shenzhen Ping An Finance Center (PAFC) in 2009 [4].

PING AN FINANCE CENTER

ARCHITECTURAL DESIGN



The main architectural design moves behind PAFC are following:

- Widened Base, to increase structural resistance
- Tapered Profile, to reduce aerodynamic and wind forces acting on structure
- Shaped Corners, to improve aerodynamic performance
- Mega Structural System, as a means of economic structural efficiency
- Multi-stage Vertical Transport, to minimize the size of high-service core. Each zone in the building is about 8-14 floor, and each zone have 6-8 double deck elevators.
- Modular Design of the structure and facade system
- Mass Transit Connectivity, to network with other urban clusters [5]
- Energy Label, Leed Gold

Figure 5: Ping An Finance Center/ Source: KPF (http://www.kpf.com/projects/ping-an-finance-center/)

[4] Retrieved From CTBUH Research Paper - Ping An Finance Center: The Development and Construction of a Megatal

PING AN FINANCE CENTER

PLANS

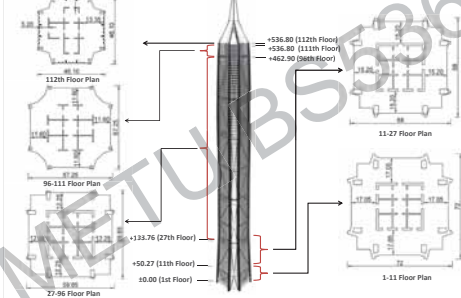


Figure 6: Plans Drawn By: Gülçin ÇAMLİBEL (Source: Binder, G., Tall Buildings of China) Dimensions (in meters) are determined approximately according to sources.

PING AN FINANCE CENTER

STRUCTURAL SYSTEM



The selected structural system consists of a composite concrete core with steel outriggers connecting to eight super-columns. The exterior frame is composed of seven double layer belt trusses located at the mechanical and refuge floors.

The exterior belt trusses are interconnected with a super diagonal at each exterior face of the building. The project also includes a steel-framed 12-story podium with high-end shopping arcades, restaurants and roof-top cafes. Thornton Tomasetti has performed extensive nonlinear dynamic time history seismic analysis [5].

Figure 7: Structural Rendering Source: CTBUH Research Paper - Ping An Finance Center: The Development and Construction of a Megatal

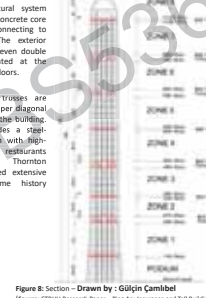


Figure 8: Section - Drawn by: Gülçin Çamlıbel (Source: CTBUH Research Paper - Ping An: Insurance and Tall Buildings) Measurements are determined approximately according to sources.

[5] According to Thornton Tomasetti (http://www.thorntontomasetti.com/projects/ping_an_international_finance_center/)

PING AN FINANCE CENTER

STRUCTURAL SYSTEM

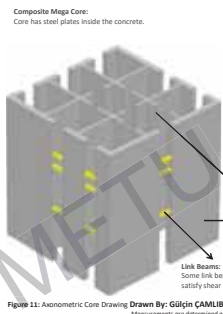


Figure 9: The Model of Structure Drawn By: Gülçin ÇAMLİBEL (The sources of measurements and structure system are given in references.)

There are a mega composite core, a mega frame which have 4 level outrigger and 8 level belt truss with braces and curtain wall framing system in the main structure of Ping An Finance Center

PING AN FINANCE CENTER

STRUCTURAL SYSTEM - CORE



Composite Mega Core:
Core has steel plates inside the concrete.

Figure 11: The outrigger levels, steel beams are continuous along the core (Source: Malhot, Bhoon, Ping An Finance Center - 2012 Shanghai Congress)

Inner Core Walls:
Thickness of the inner walls are decreasing 0.3m to 0.4 m from bottom to top.

Outer Core Walls:
Thickness of the outer walls are decreasing 1.3m to 0.5 m from bottom to top.

Link Beams:
Some link beams have embedded steel shapes to satisfy shear requirements.

Figure 11: Anomeric Core Drawing Drawn By: Gülçin ÇAMLİBEL (Source: Malhot Bhoon, Ping An Finance Center - 2012 Shanghai Congress) Measurements are determined approximately according to sources.

PING AN FINANCE CENTER

STRUCTURAL SYSTEM - MEGA COLUMN

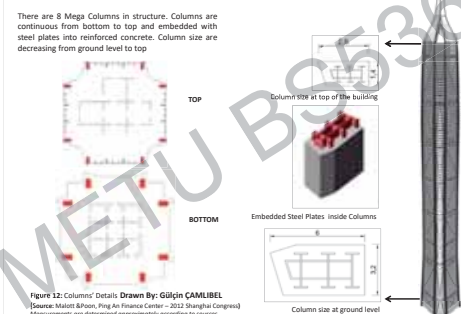


Figure 12: Columns' Details Drawn By: Gülçin ÇAMLİBEL (Source: Malhot Bhoon, Ping An Finance Center - 2012 Shanghai Congress) Measurements are determined approximately according to sources.

There are 8 Mega Columns in structure. Columns are continuous from bottom to top and embedded with steel plates into reinforced concrete. Column size are decreasing from ground level to top

PING AN FINANCE CENTER

STRUCTURAL SYSTEM - OUTRIGGER

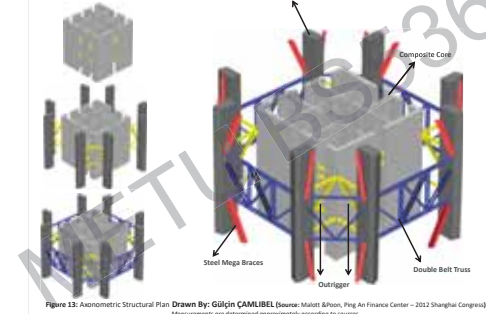


Figure 13: Anomeric Structural Plan Drawn By: Gülçin ÇAMLİBEL (Source: Malhot Bhoon, Ping An Finance Center - 2012 Shanghai Congress) Measurements are determined approximately according to sources.

PING AN FINANCE CENTER

STRUCTURAL SYSTEM - OUTRIGGER/BELT TRUSS

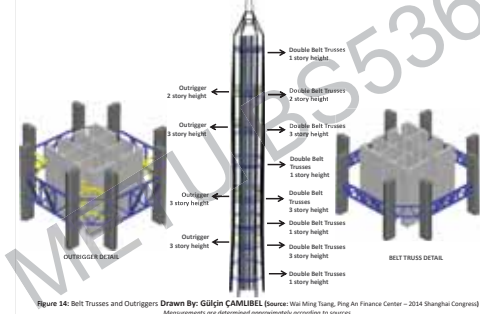


Figure 14: Belt Trusses and Outriggers Drawn By: Gülçin ÇAMLİBEL (Source: Wai Ming Tsang, Ping An Finance Center - 2014 Shanghai Congress) Measurements are determined approximately according to sources.

PING AN FINANCE CENTER

STRUCTURAL SYSTEM

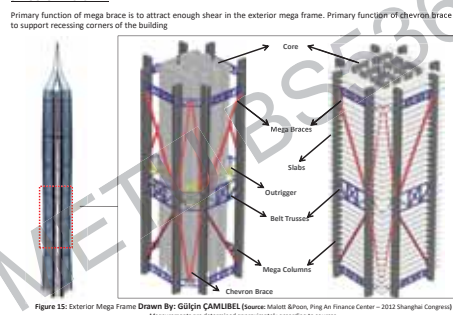


Figure 15: Exterior Mega Frame Drawn By: Gülçin ÇAMLİBEL (Source: Malhot Bhoon, Ping An Finance Center - 2012 Shanghai Congress) Measurements are determined approximately according to sources.

PING AN FINANCE CENTER

STRUCTURAL SYSTEM

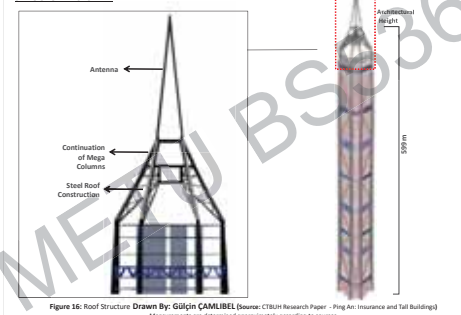


Figure 16: Roof Structure Drawn By: Gülçin ÇAMLİBEL (Source: CTBUH Research Paper - Ping An: Insurance and Tall Buildings) Measurements are determined approximately according to sources.

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CONSTRUCTION PHOTOS



Figure 17: Mega Brace Detail (Source: CTBUH) Figure 18: Outrigger and Composite Column Detail (Source: CTBUH)

PING AN FINANCE CENTER

REFERENCES

- 1- Wai Ming Tsang, Ping An Finance Center, The Development And Construction of a Megatal, CTBUH Research Paper
- 2- Malhot, et al., Ping An Finance Center: Pioneering China's Tallest-Efficiencies of Form And Structures, CTBUH Research Paper
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