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REPORT

Zhangjiang Science Gate Twin Towers

Lianjing Bao†

East China Architectural Design & Research Institute Co., Ltd. Shanghai, China
†Corresponding author: Email: blj0068@ecadi.com

Zhangjiang Science Gate project is located in the core area of Zhangjiang Science City in Pudong New Area, Shanghai. The project comprises twin towers (Fig. 1): the East Tower stands on Plot 58, and the West Tower on Plot 57. The twin towers, identical in height and architectural form, rise to 320 meters with 60 storeys each, collectively forming the "Gate of Science". Both towers serve as office buildings and were honored as the CTBUH Best

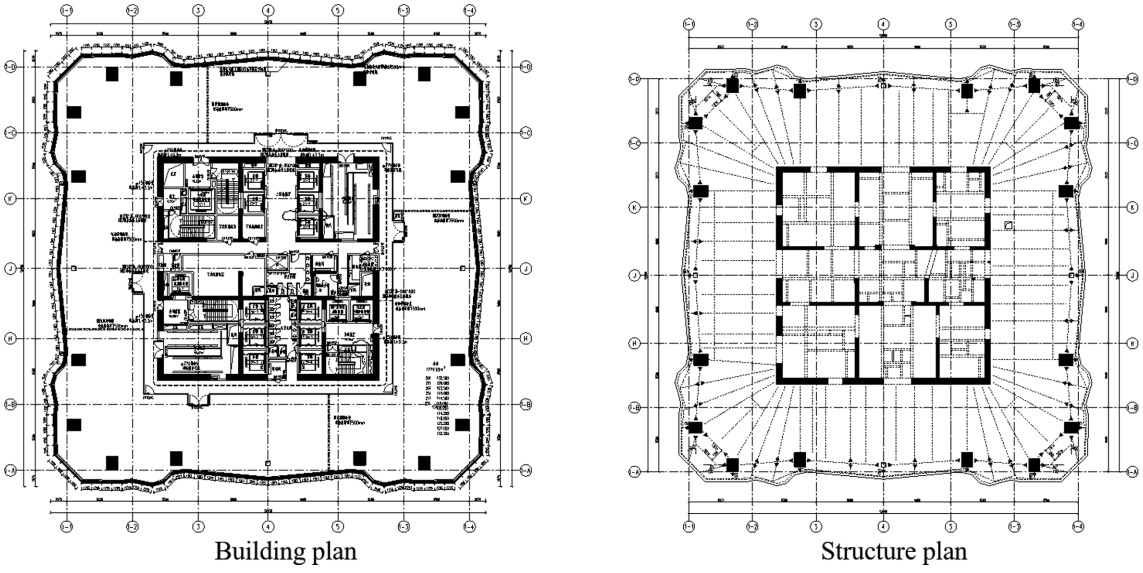


Fig. 1. Tower standard floor plan.



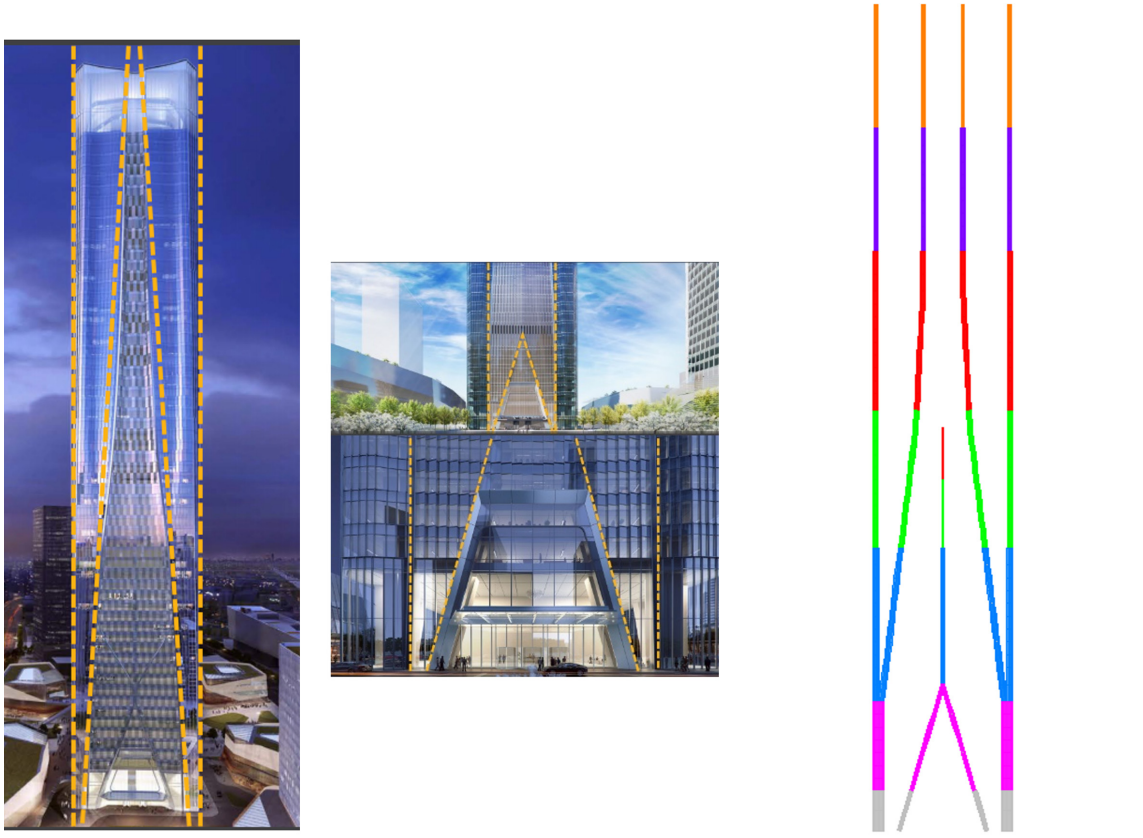
Fig. 2. Tower completed and honored.

Tall Building Award (over 300 meters) in 2025. (Fig. 2).

The structural design working life of the project is 50 years. The project falls into the key seismic fortification category with a seismic fortification intensity of 7 degrees; the maximum horizontal seismic influence coefficient is 0.10, and the site class is VI. The basic wind pressure for a 50-year return period is 0.55 kN/m², and the ground roughness category is Class C.

Both towers adopt the SRC column steel beam frame - reinforced concrete core tube hybrid structure system, and the architectural appearance design pursues the unity of the variation of architectural form lines and the rationality of the layout of structural outer frame columns (Fig. 3). The facade effect mainly controls the lines to be rich in variation, enriches the facade effect, and the changes in the height of the structural frame columns are highly in line with the facade, highlighting the design concept of integrated building structure.

The appropriately inclined frame columns on the facade significantly enhance the lateral stiffness of the overall



(a) Corner lines (b) Middle lines (c) Outer frame column arrangement

Fig. 3. Tower architectural effect control lines and structural frame column arrangement.

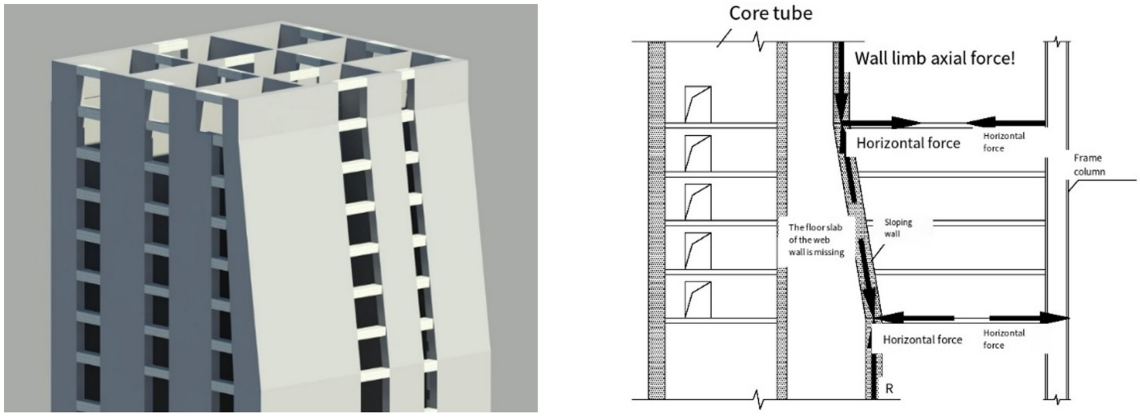


Fig. 4. The inclined wall in the high area of the core tube is drawn in.

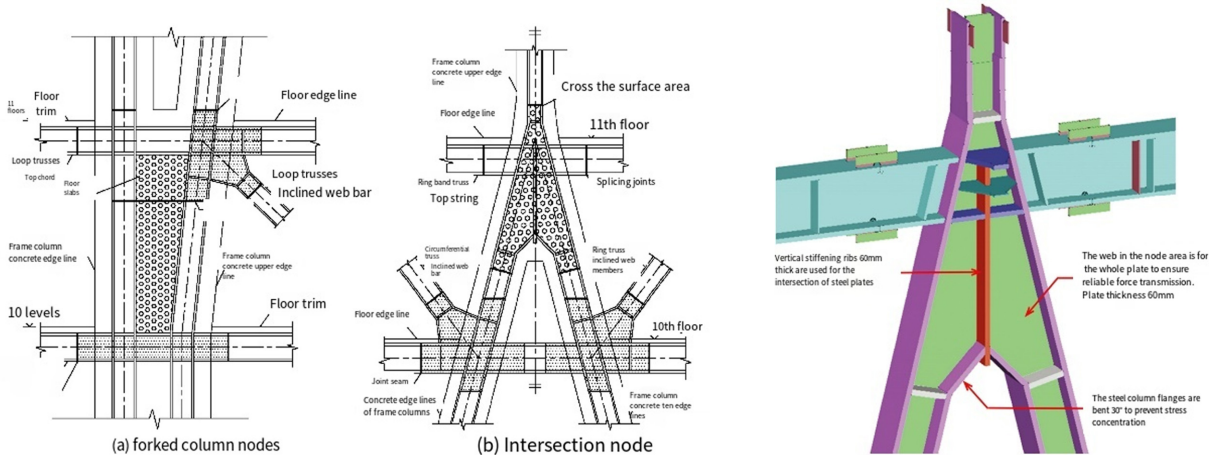


Fig. 5. Complex nodes related to ring trusses.

structure and improve parameters such as the shear weight ratio of the structure. More importantly, the arrangement of inclined columns on the outer frame can increase the seismic shear force borne by the outer frame under horizontal seismic action, which is conducive to enhancing the lateral force resistance capacity of the outer frame and better realizing the seismic design concept of multi-line defense.

In order to ensure the overall appearance of the building, in addition to paying attention to the control of facade form changes, architects also have very high control requirements for the floor plan shape of the tower, which is reflected in the complex and different floor slab edges of each floor. In addition to being inclined within the outer frame plane, the columns in the structural outer frame also need to be inclined inward and outward relative to the core tube on certain floors to form bidirectional inclined outer frame inclined columns within a certain height range.

The tower's outer frame columns are in the form of I-shaped steel SRC column sections, which are more likely to meet the higher fire resistance requirements of towers over 250 m in height.

The core tube of the tower is in the form of a sloping wall on the south side of the 45th to 50th floor above ground, with an incline of about 2.85 m and a slope of 1:7.9 (Fig. 4). Due to the inward incline of the inclined wall, the axial force generates horizontal components, and the horizontal forces on the upper and lower parts of the inclined wall are opposite in direction. The horizontal component force produced by the inclined wall is transmitted through the floor slab to the outer frame and shear wall.

The effective connection and reliable force transmission of the complex nodes of the ring truss connecting the inclined columns at the intersection and bifurcation on the 10th floor of the tower are the foundation for the overall structural system to work together (Fig. 5).