

Shanghai Examples

- 1.- Shanghai Jinmao Plaza
- 2.- Thermal Analysis of Shanghai South Station
- 3.- Shanghai Pudong 21-Century Center Plaza



1.- Shanghai Jinmao Plaza

Shanghai Jinmao Plaza

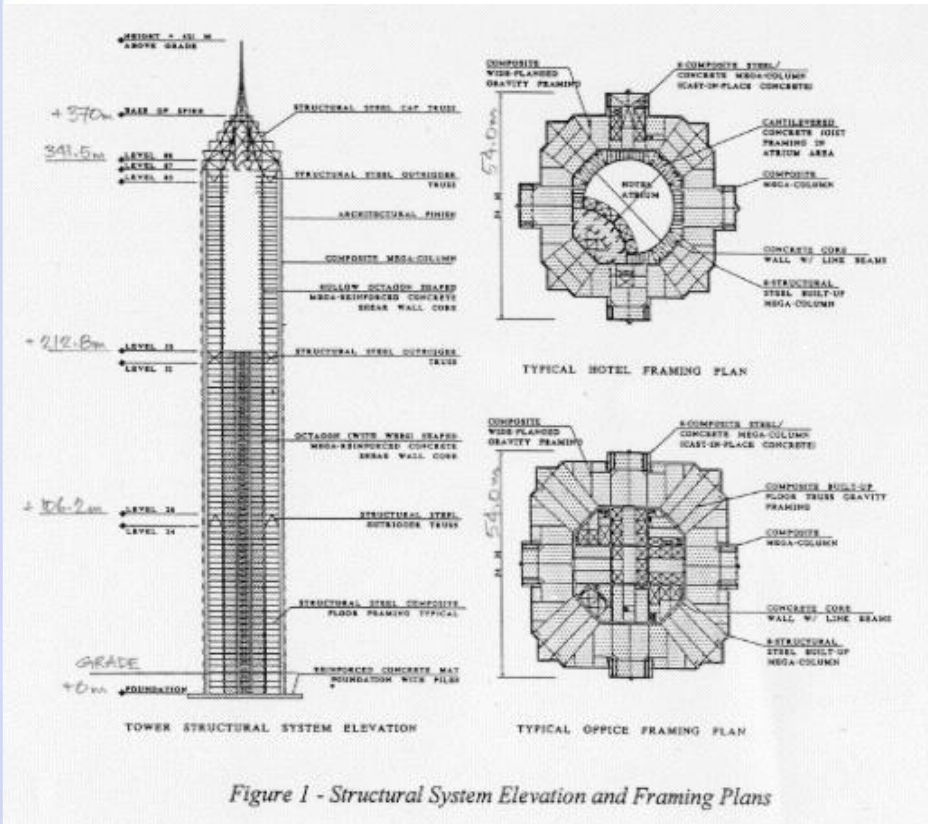


Figure 1 - Structural System Elevation and Framing Plans

Status: built

Construction Dates

Started: 1993

Finished: 1998

Floor Count: 88

Basement Floors: 3

Floors to Floor: 4.00 m

Floor Area: 278,707 m²

Cubical Space: 1,114,828 m³

Units/rooms: 555

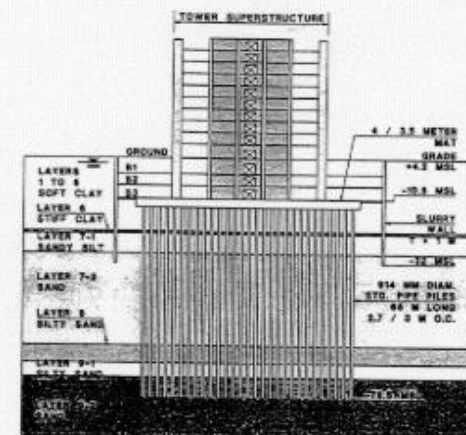
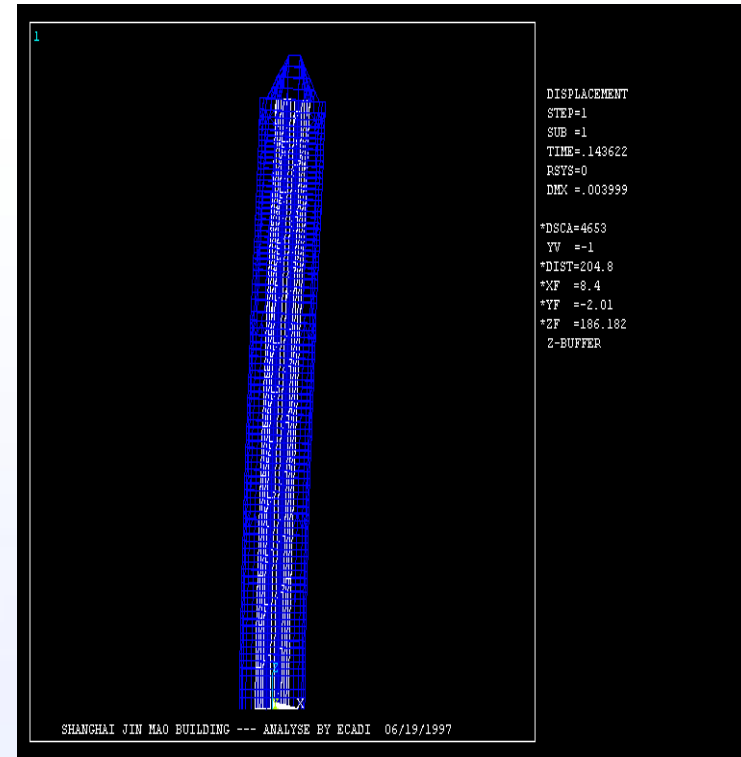


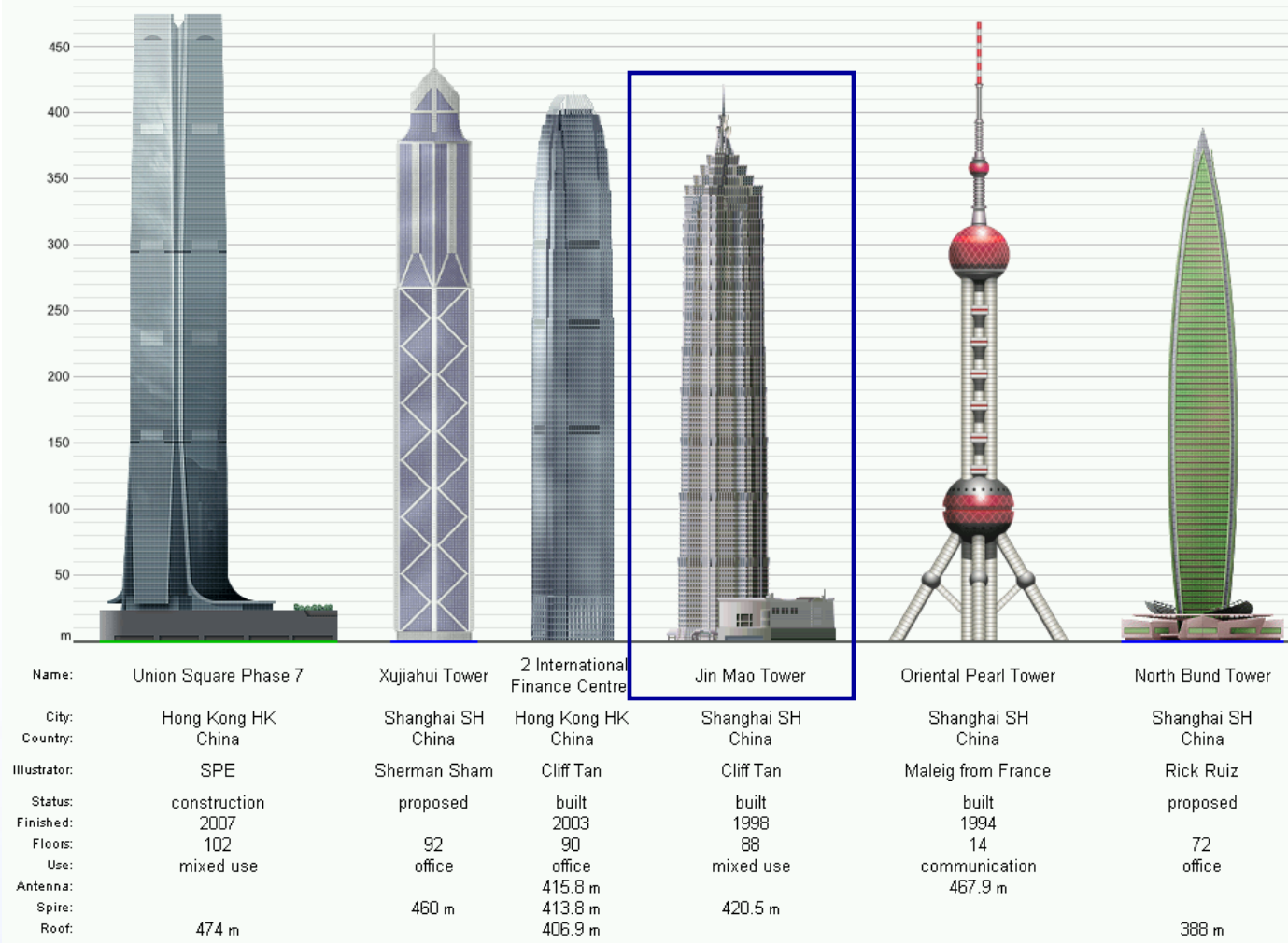
Figure 2 - Tower Foundation Systems

Shanghai Jinmao Plaza

- **Currently the People's Republic of China's tallest building, with 88 floors and the world's fifth tallest**

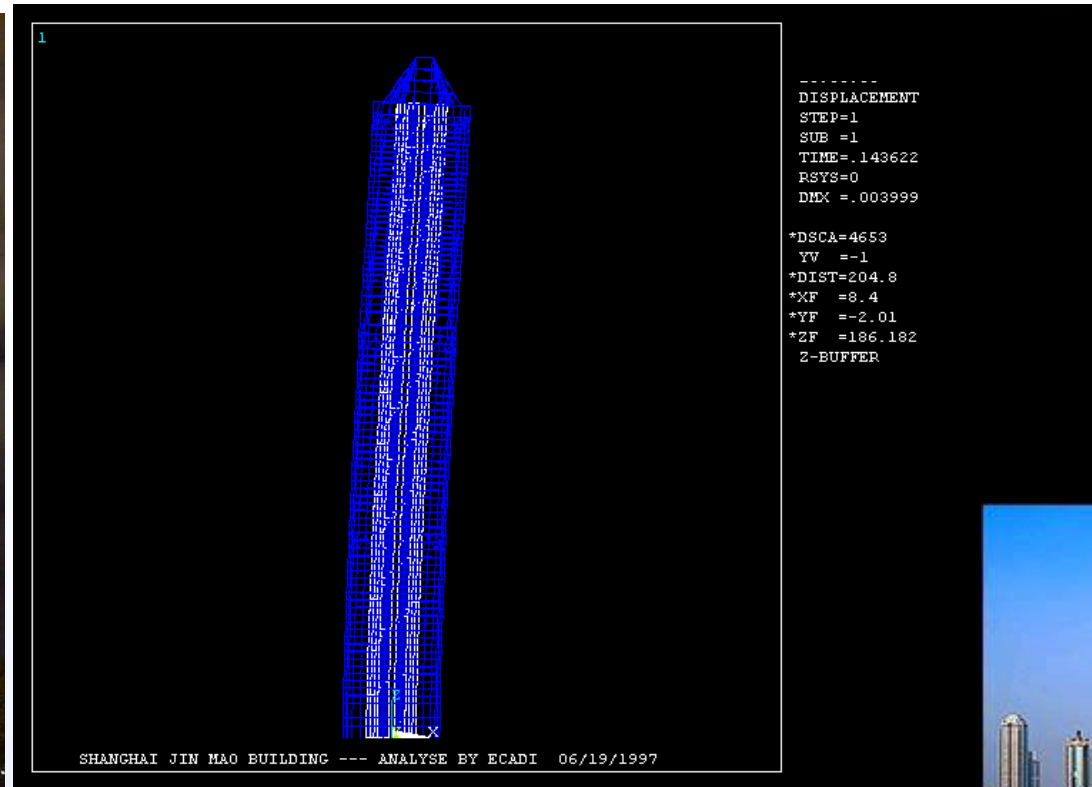


Shanghai Jinmao Plaza



Shanghai Jinmao Plaza

The static, harmonic and seismic analyses of it were done using CivilFEM with ANSYS.



Shanghai Jinmao Plaza



HEIGHTS

Spire:	420.5 m
Top floor:	366.0 m
Observation deck	340.1 m

Shanghai Jinmao Plaza

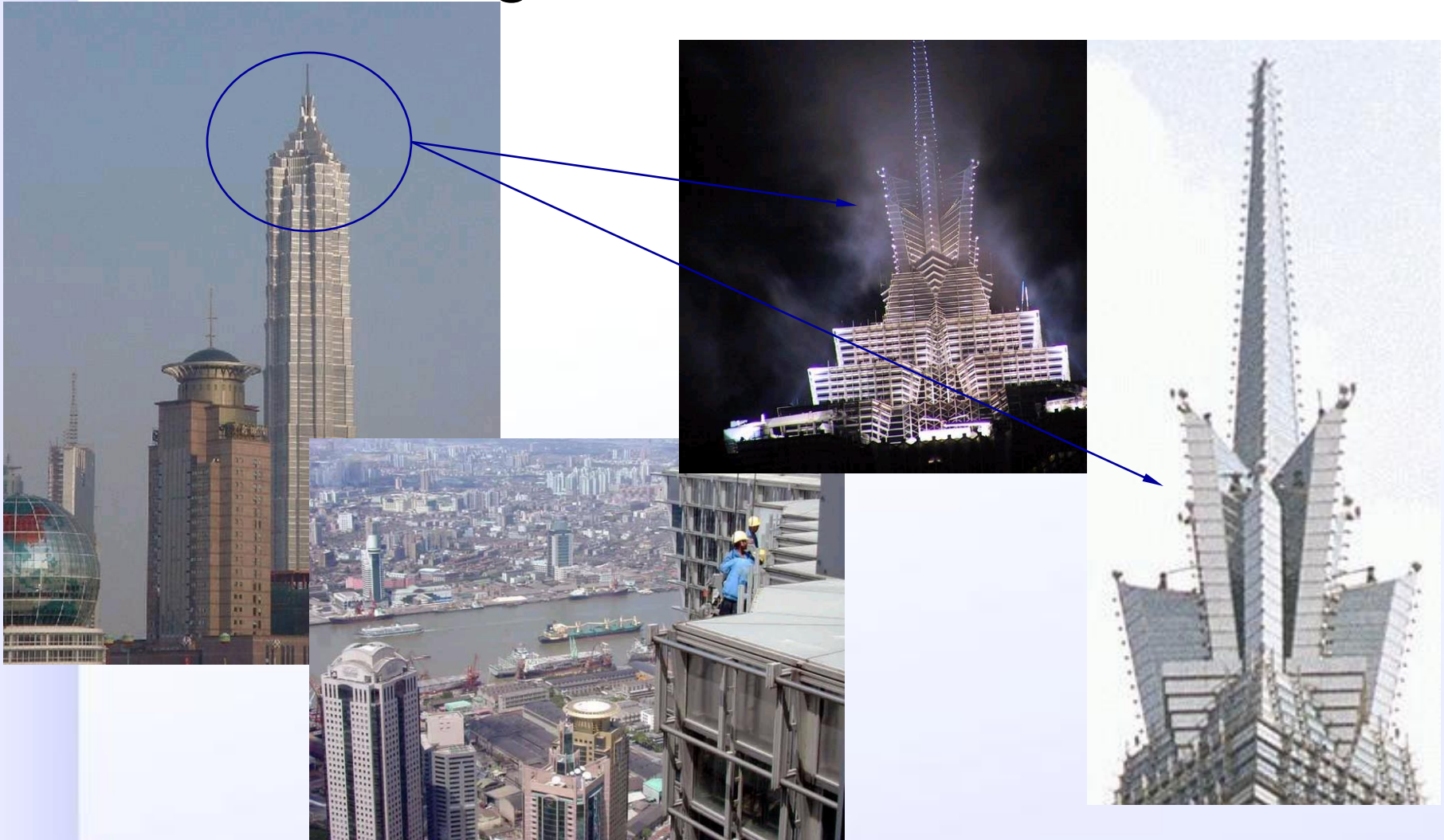


View from the 88th and lowest floor

Shanghai Jinmao Plaza



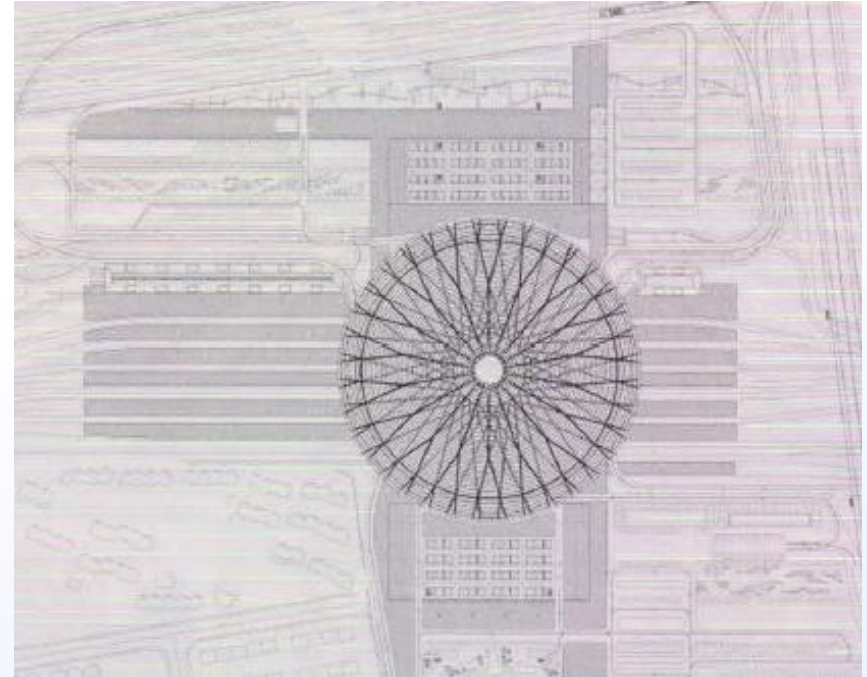
Shanghai Jinmao Plaza



2.- Shanghai South Station

GEOMETRIC CHARACTERISTICS

- Diameter = 270 m.
 - Height = 47 m.
- Weight = 6000 T.
- Maximum span = 150 m.
 - Surface = 56000 m².



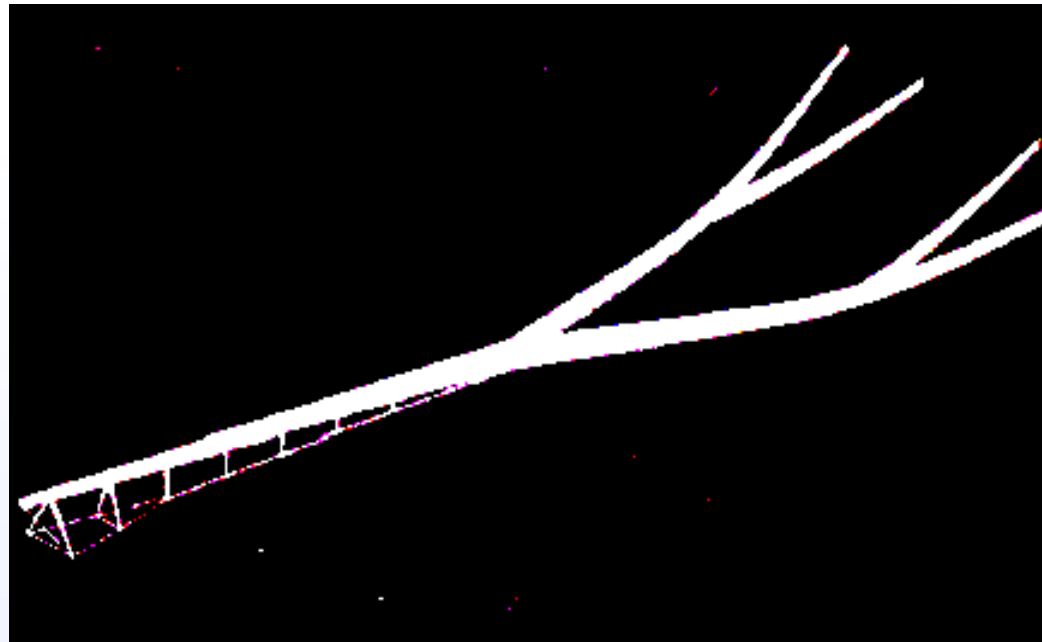
STRUCTURAL CHARACTERISTICS

- The structure is supported by 18 steel branche shaped beams relying on 3 columns each.
- Polycarbonate and aluminium sunblades.



STRUCTURAL CHARACTERISTICS

- Each of the 18 main beams to form three Y's.
- Shipbuilding techniques applied to civil structures



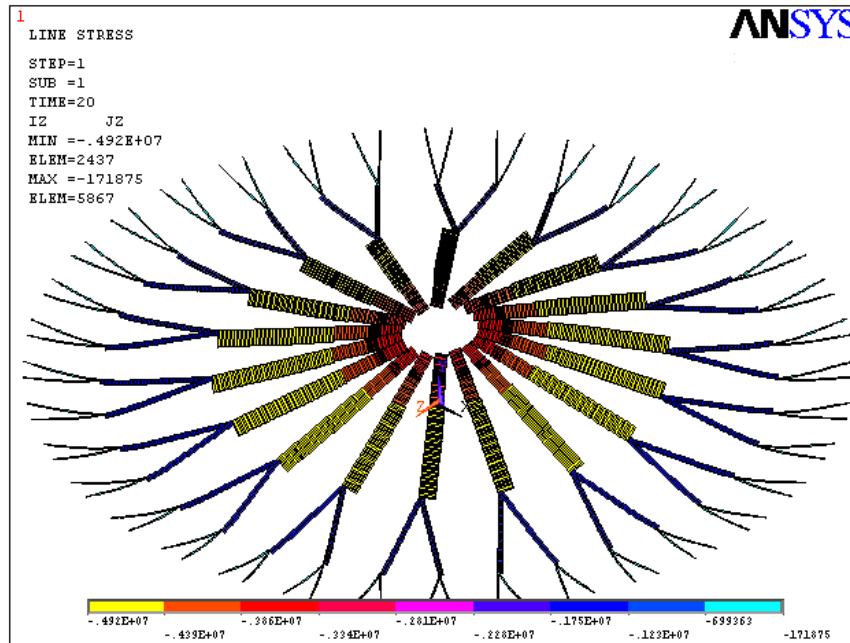
STRUCTURAL CHARACTERISTICS

- Perimetral columns form part of the facade (above).
- Columns are reinforced by two ties 100 mm. in diameter.
- Ties are connected to the main roof beams using yokes of cast steel.



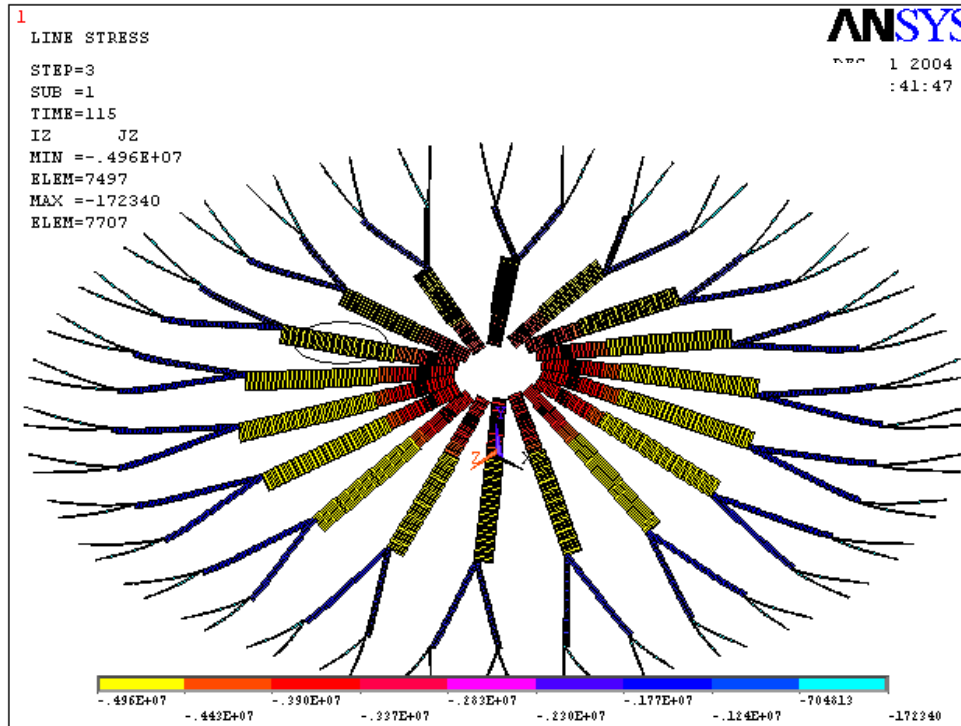
STRESS EVOLUTION DUE TO HEAT

- **Material properties can be set to change with temperature.**



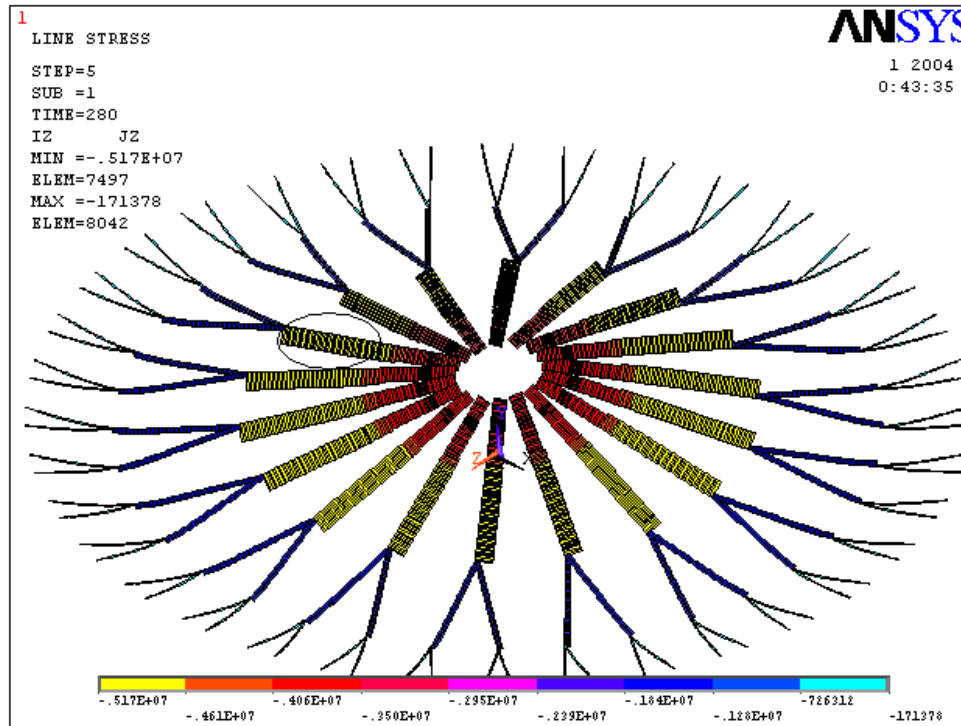
$t = 20 \text{ s.}$

STRESS EVOLUTION DUE TO HEAT



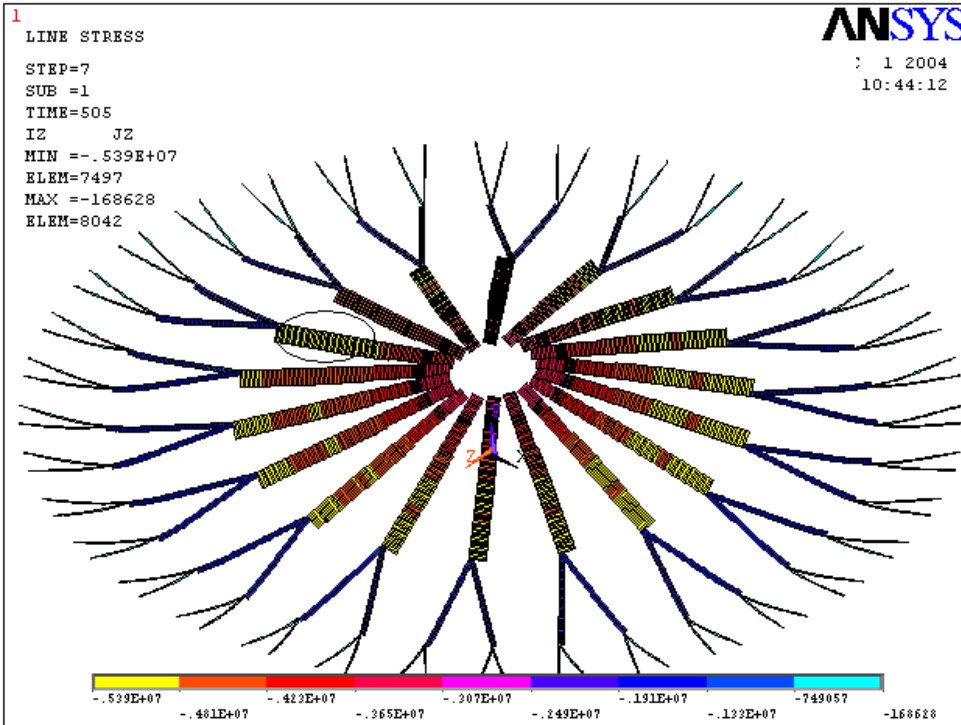
$t = 115 \text{ s.}$

STRESS EVOLUTION DUE TO HEAT



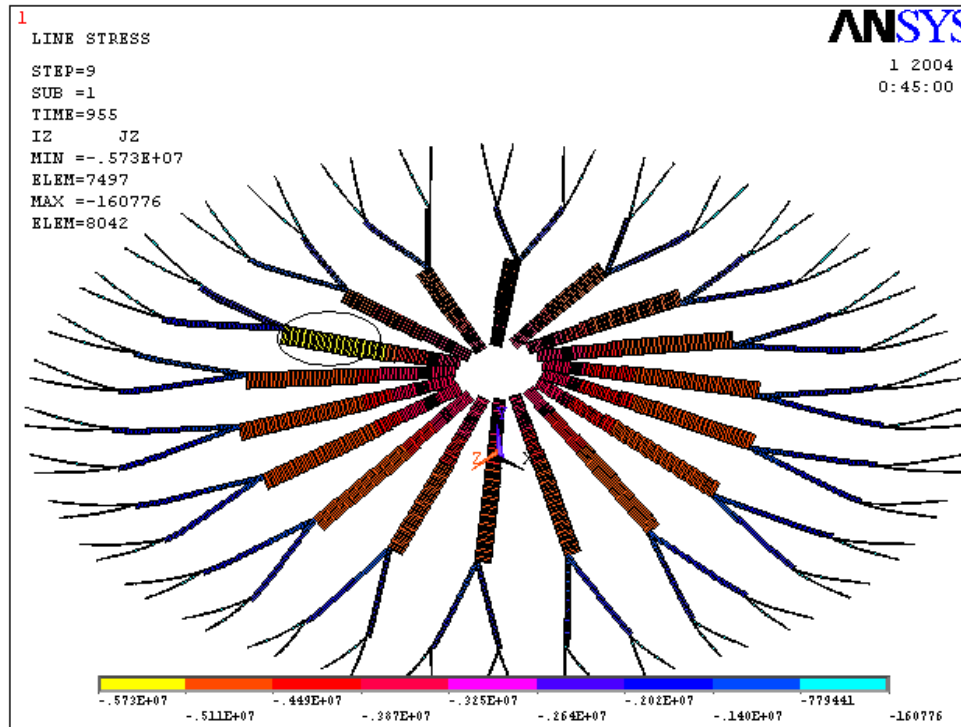
$t = 280 \text{ s.}$

STRESS EVOLUTION DUE TO HEAT



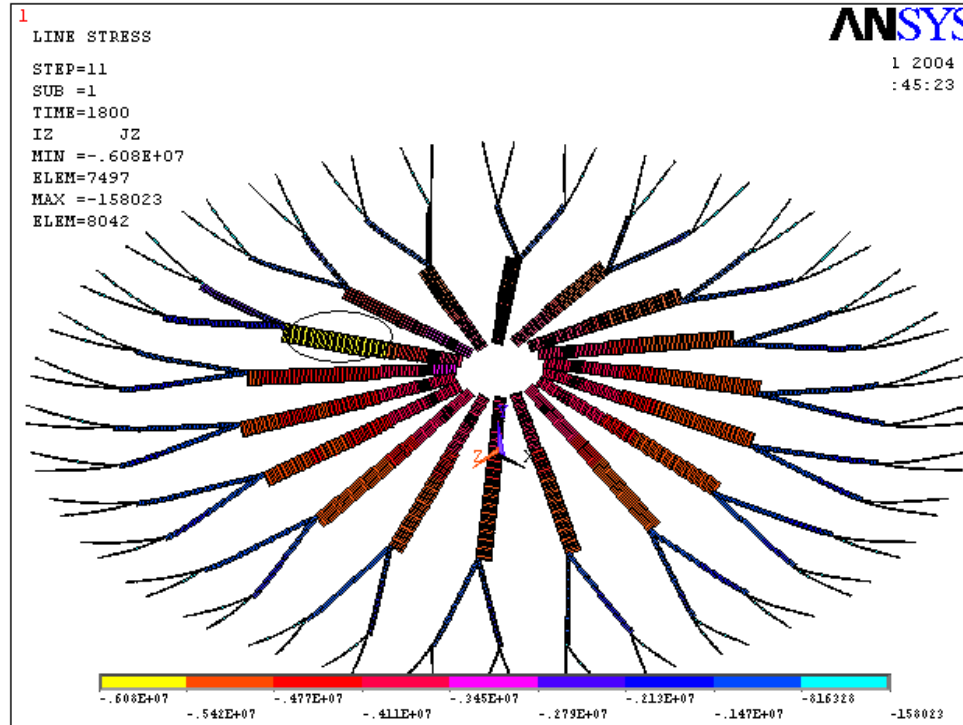
$t = 505 \text{ s.}$

STRESS EVOLUTION DUE TO HEAT



$t = 955 \text{ s.}$

STRESS EVOLUTION DUE TO HEAT



$t = 4800 \text{ s.}$

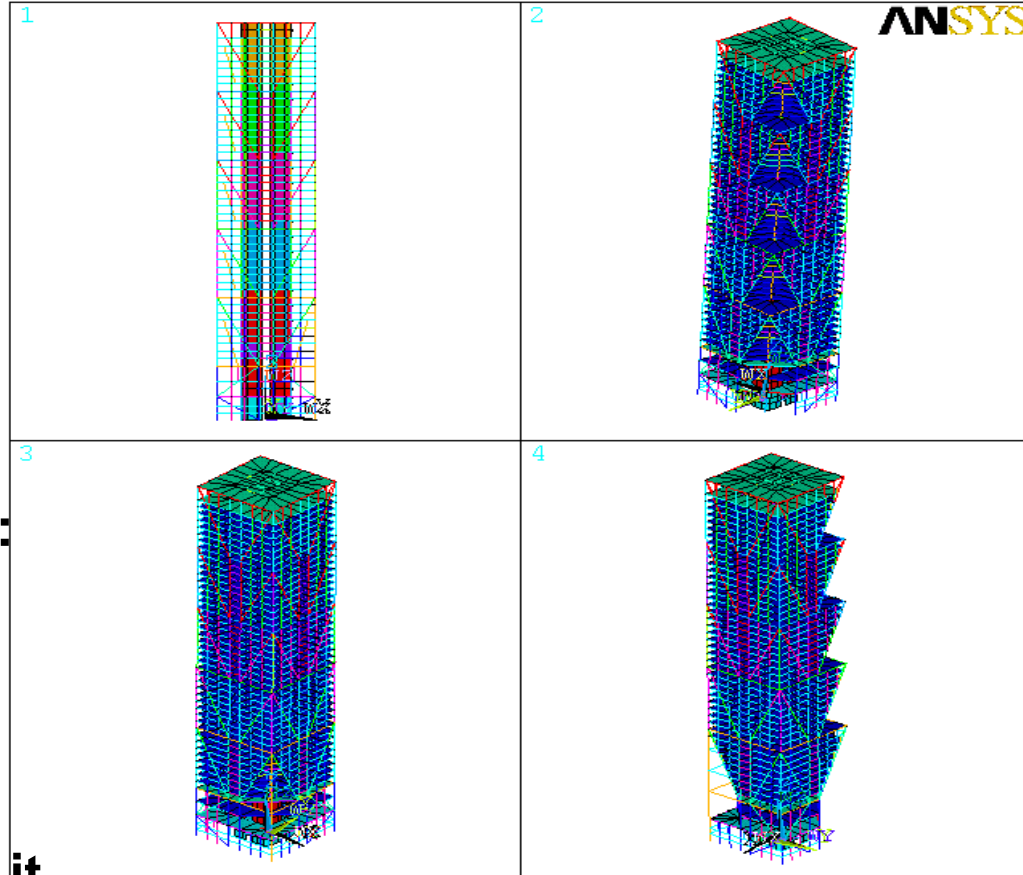
3.- Shanghai Pudong 21th Century Center Plaza

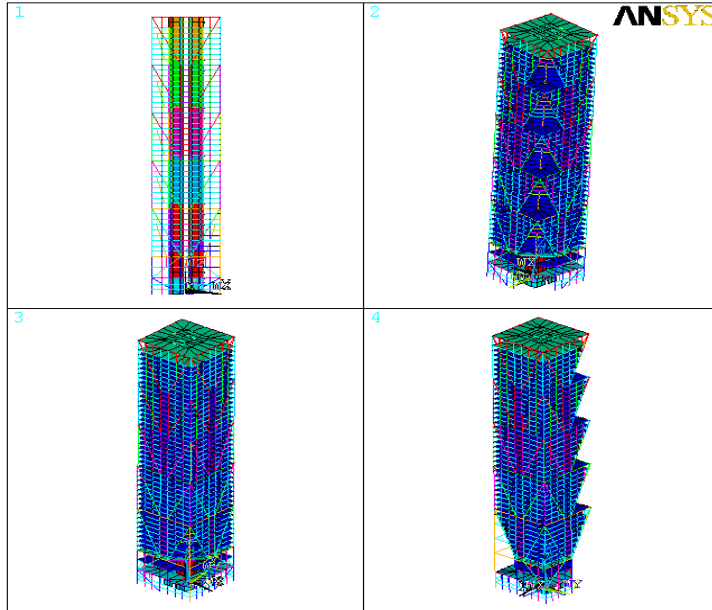




This Building has:

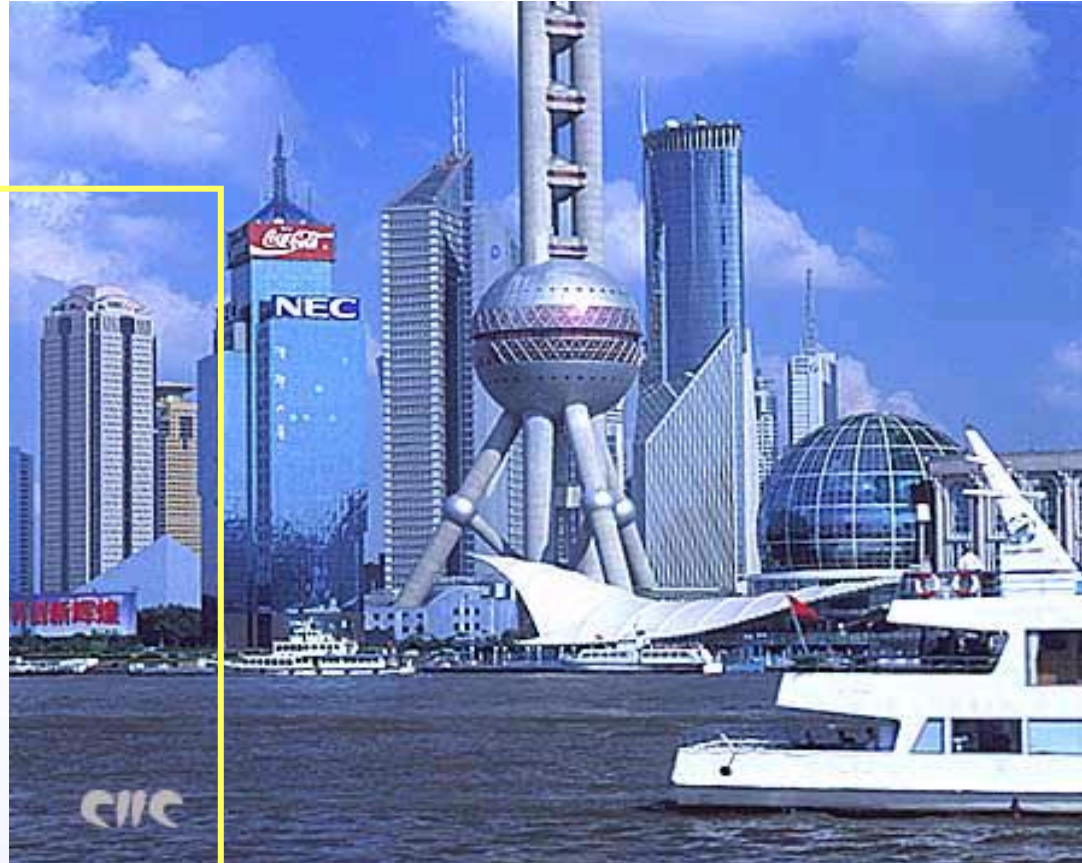
- 3 floors underground
- 48 floors overground with transition layer in it.



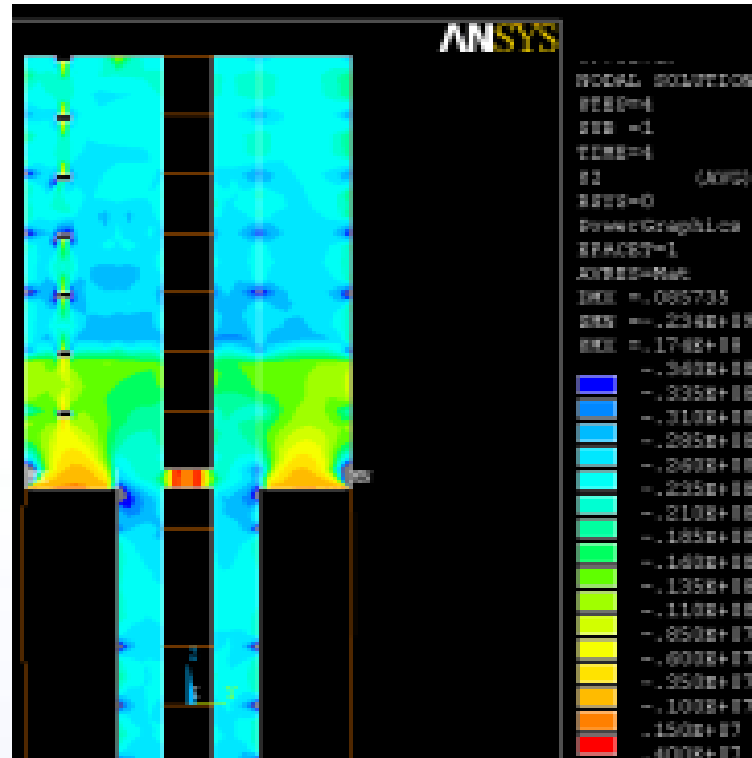


Seismic Analysis:

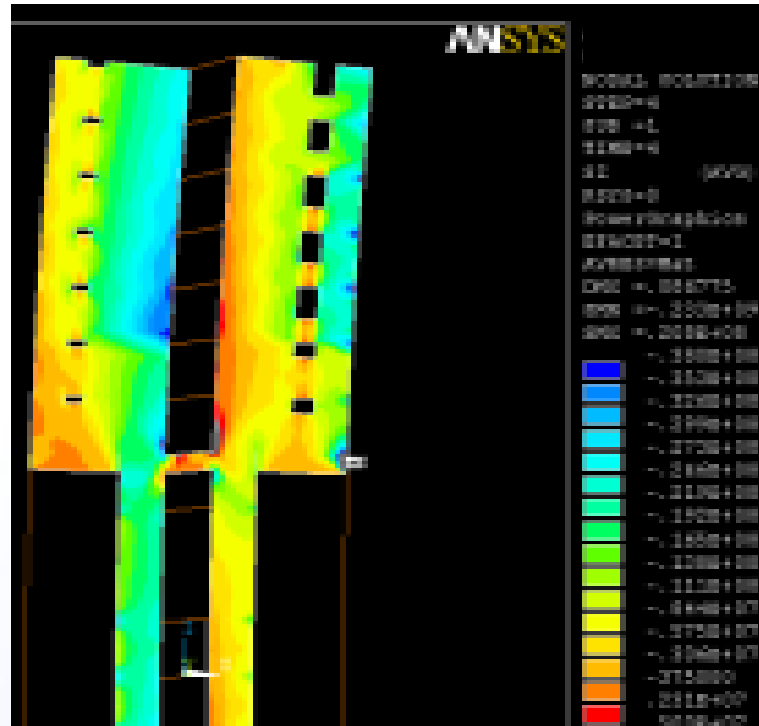
- **Modal-Spectrum analysis (global and each floor)**
- **Time-history non linear analysis**
- **Soil-structure interaction**



Shanghai Pudong 21-Century center Plaza



Vertical stress distribution in transition layer under vertical loadings



Vertical stress distribution in transition layer under horizontal loadings

Shanghai Pudong 21th Century Center Plaza

