| **client** | taipei financial center corp. |
| **architect** | c y lee |
| **structural** | thornton-tomasetti engineers. new york consultants |
| **wind tunnel testing** | rowan williams davies & irwin inc |
| **cost** | $1.75 billion |
| **building typology** | mixed use |
| **height** | 508.0 m, (1667 ft) |
| **stories** | 101 |
| **area** | 412,500 sq.m |
| **construction material** | steel, in-situ concrete and glass |
| **date of commencement** | Jan 1999 |
| **date of completion** | Dec 2004 |
corner columns

super columns filled with concrete up to 62 floor

sub-super columns

core shear walls

core columns

one way slabs

core shear walls

level 10: tower framing plan

arch 631, fall 2005

taipei lol
The massive supporting pillars are made of boxes of 80 mm thick steel-plate, filled with concrete for stiffness.

However, only steel is used above the 62nd floor. There are 16 of these giant columns to support the gravity-load.

There are many lateral braces and moment-resisting frames around the building perimeter.

Wrapped around the supercolumns is a web of a ductile steel framework designed to bend during an earthquake.

The frames support the outward slope of the building, making possible the repeating inverted pyramid shape.

There is a dedicated mechanical floor every eight floors, with massive floor-high steel outrigger trusses.

These connect the columns in the core to the supercolumns on the perimeter, effectively widening the building to help it resist overturning.

arch 631, fall 2005
structural analysis

level 32, tower framing plan

saw tooth corners
super column
core columns
out trigger trusses
super column
sawtooth corners

arch 631, fall 2005
considering five bays of unequal lengths. The exterior columns are super columns sized 3m x 2.4m and the internal columns are 1.5m x 1.2 m. Loading conditions for a single module:
live load on each floor = 3.0 KN/m
live load on top floor = 3.5 KN/m
(considering load of the outrigger truss)
wind load = 3.0 KN/m to 3.8 KN/m
TAIPEI 101 follows the Chinese pagoda form, transcending the uni-body concept. Resembling the flexible yet persistent bamboo plant that rises into the sky, the building is a reflection of traditional Chinese building philosophy.

There is an 11-storey mega structure system, supported by eight 'super main' columns. As every eighth floor constitutes an autonomous space, wind effects on the surface seen in high rise buildings are eliminated.

The structural system developed has outrigger trusses and a braced core.

The architect, CYL decided to base the structure on the Chinese number eight, a numeral long considered lucky in Chinese culture. Eight-floor structural units are connected one by one, on top of each other to form the whole. This kind of rhythmic aesthetic is brand new to skyscrapers.

Special measures to resist wind and seismic forces include: high strength and high ductility steel plates; high strength and high performance concrete with a 10,000 psi; high ductility beam-column connection with reduced beam sections; a tuned-mass damper in the tower; and a smaller tuned-mass damper at the pinnacle.
Design concept of the module:
- Stepped profile
  (7° windowslopes)
- Enhance downward vision
- Reduce solar gain
- Creates external fire safety decks at
  the base of each eight-floor module
  (inside Shelters have fire fighting,
  smoke displacement and
  communications equipment)
- Fire- and smoke-resistant safety
  stairways and corridors also provide
  security

About damper:
6-meter-dia (660-tonne) steel ball will ensure user comfort in times of relative calm
- Damper visible from a mezzanine level:
  probably largest of its kind and first to form part of a building’s architecture
- Damper will reduce tower’s peak (non-seismic) vibrations by more than one third
- 60 cm dia pin projecting from the underside of the ball limits its movement to about 1 m
- During seismic or wind events, pin “nudges” surrounding ring and dissipates energy through pistons.

About outrigger trusses:
Outrigger trusses occur at 11 in locations in elevation. 6 of the trusses are one-storey high
fitting in mechanical floors.
The remaining 5 locations are double-height.
In plan, on each of these floors 16 outriggers occur.
For very high winds, and for significant earthquakes, the swinging of the pendulum is restrained at the bottom of the sphere by a large steel pin 60cm (2 ft) in diameter that restricts the movement of the pendulum to one meter.

Super columns ensure the towers survival in the event of an earthquake and typhoons. For wind, stiff bracing planes and outrigger trusses limit wind swaying effect.

For additional core stiffness, the lower floors from the basement to the 8th floor use concrete shear walls cast in between the core columns in addition to diagonal brusses.

This area has weak clayey soil and so the stiffness requirements of the structure is taken care by the super columns.


