



# The HSBC Building

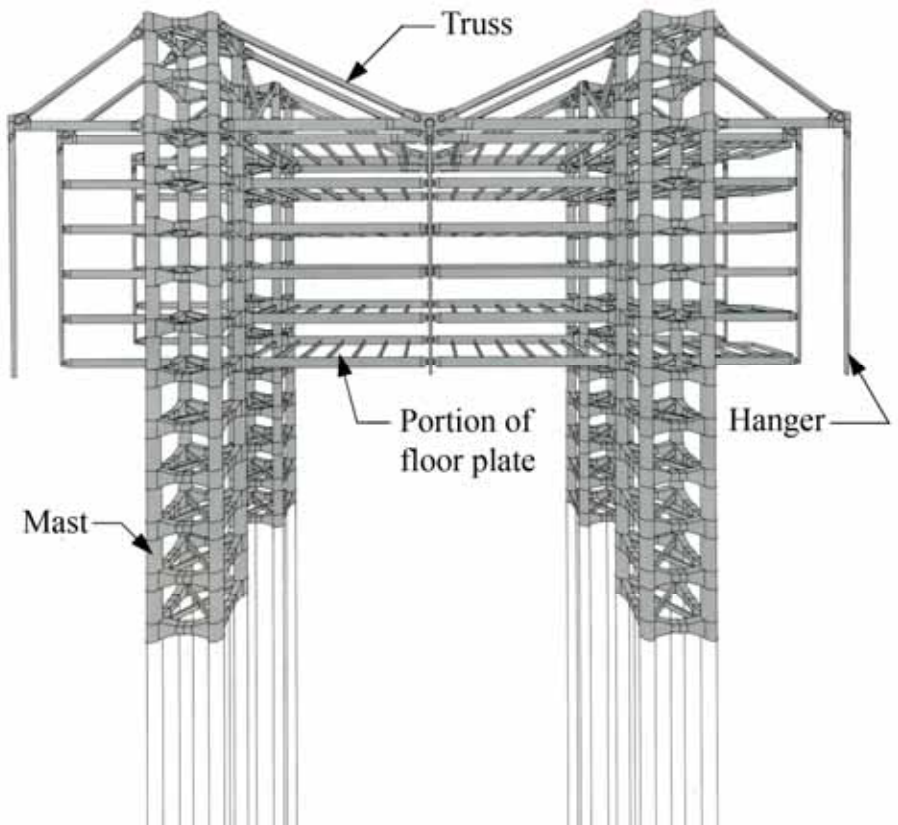
ARCH 631, Fall 2007

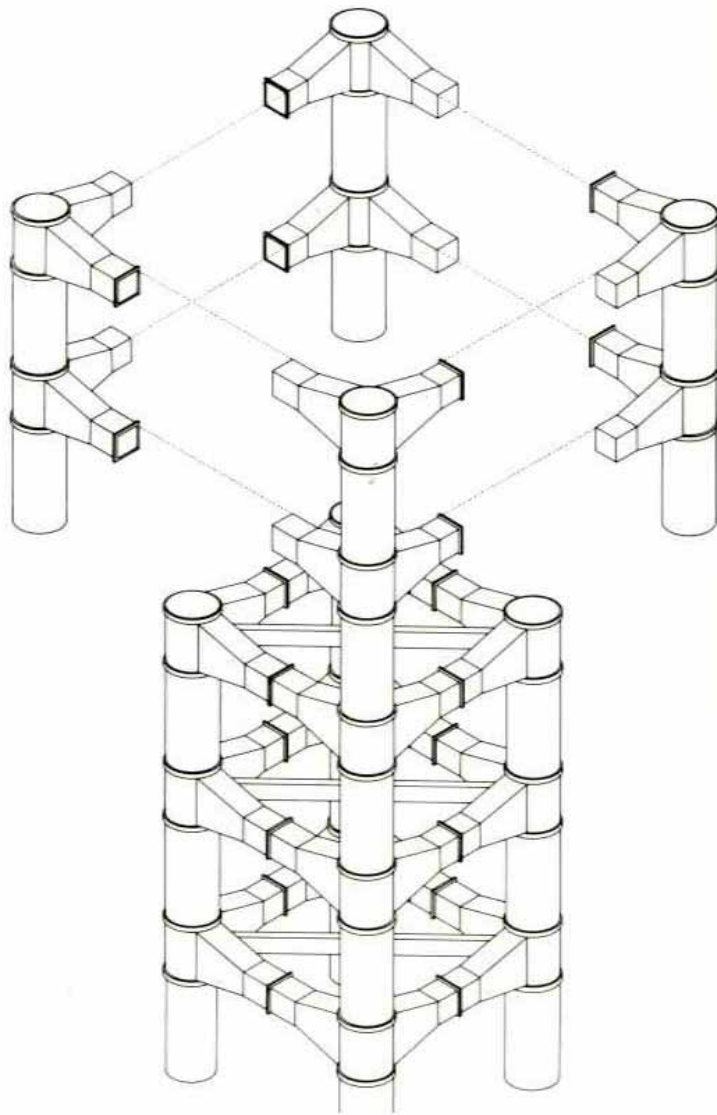
Phillip Steffy  
Shawn Chen



The Hong Kong and Shanghai Banking Corporation (HSBC) headquarters building took seven years to complete from concept to construction and has become not only the icon for the region's largest bank but the city of Hong Kong itself.

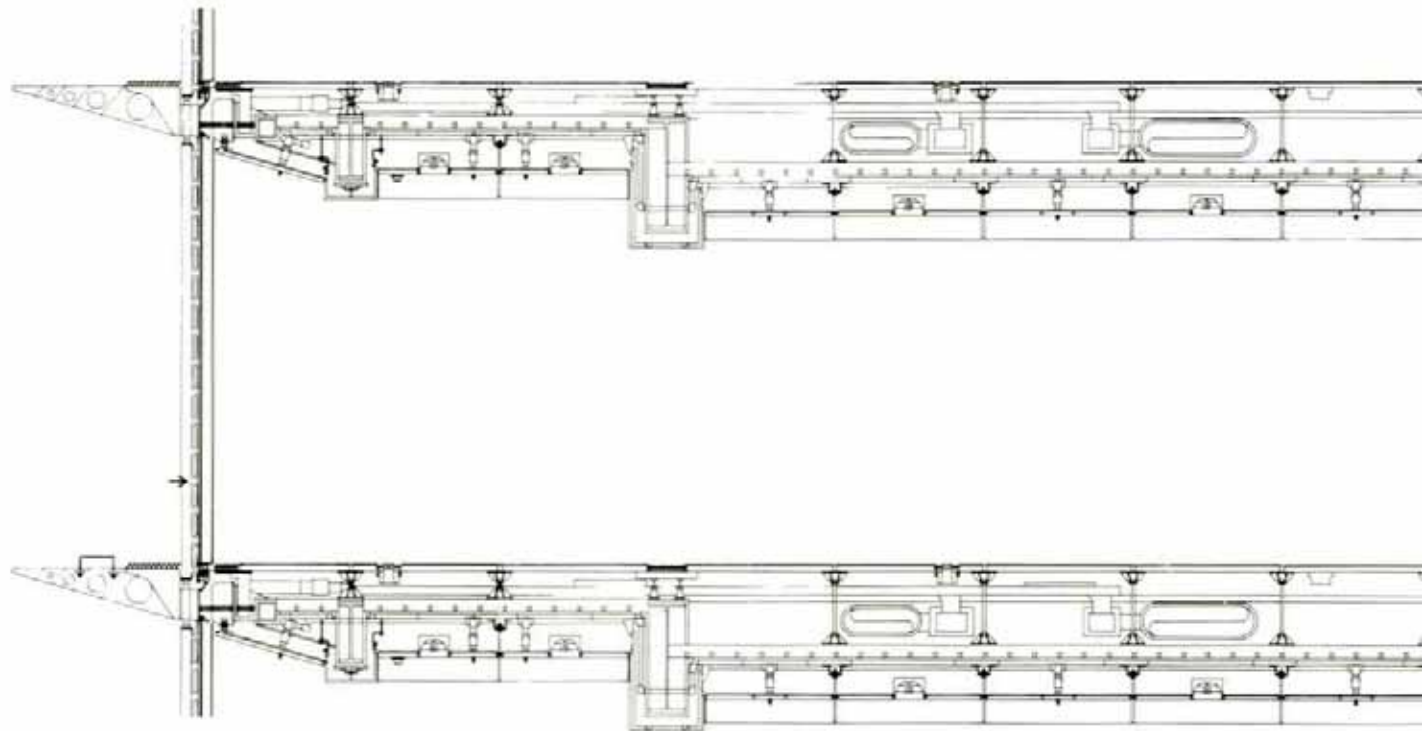
# Structural Components and Systems



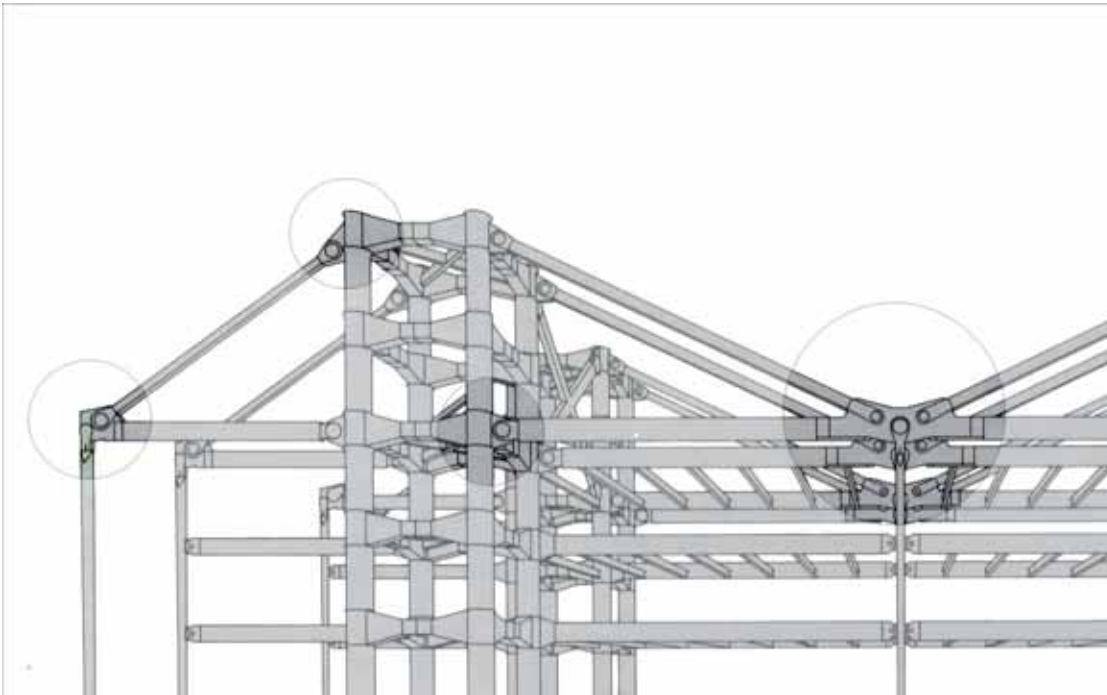


The eight masts, arranged in two rows of four, is composed of four tubular steel columns each, for a total of 32 columns. These groups of four columns are braced to each other by large, rectangular beams attached rigidly to form a vierendeel frame.

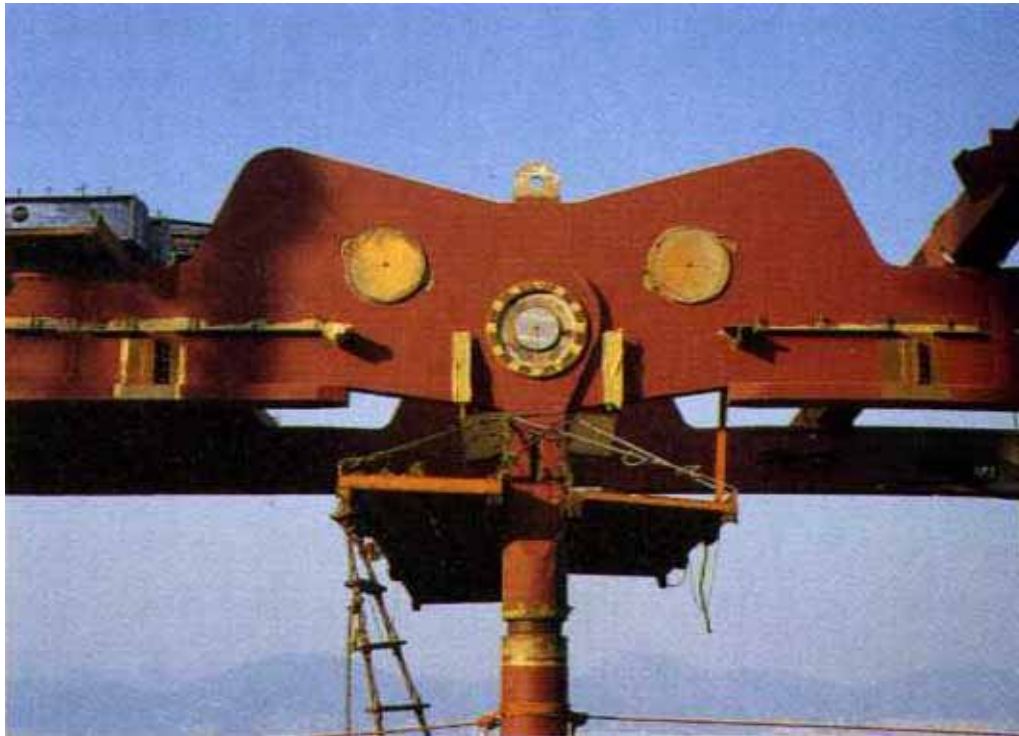
The floor planes are framed by a “series of primary and secondary beams, decked with steel and topped with a [4 inch] thick reinforced-concrete slab.



# Connections



The masts connect to the truss components with pinned connections (highlighted) and the beams in rigid connections (unhighlighted).



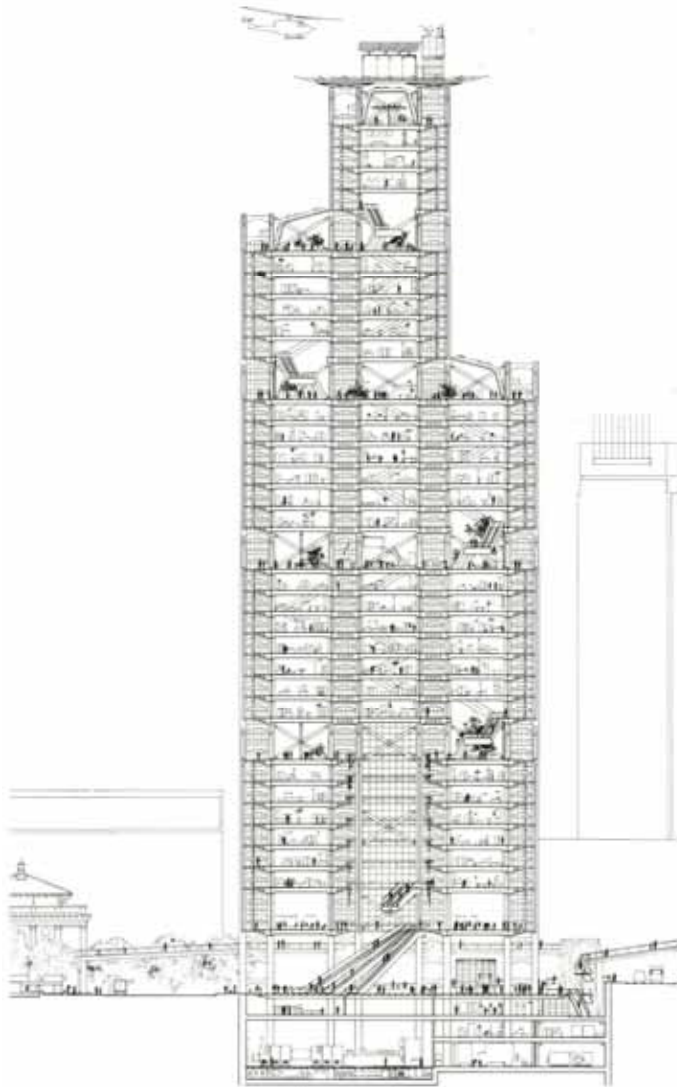
The butterfly plate connections came to fruition because of the inability to create a pinned connection at the center of the truss that would be small enough and precise enough during the manufacturing process.



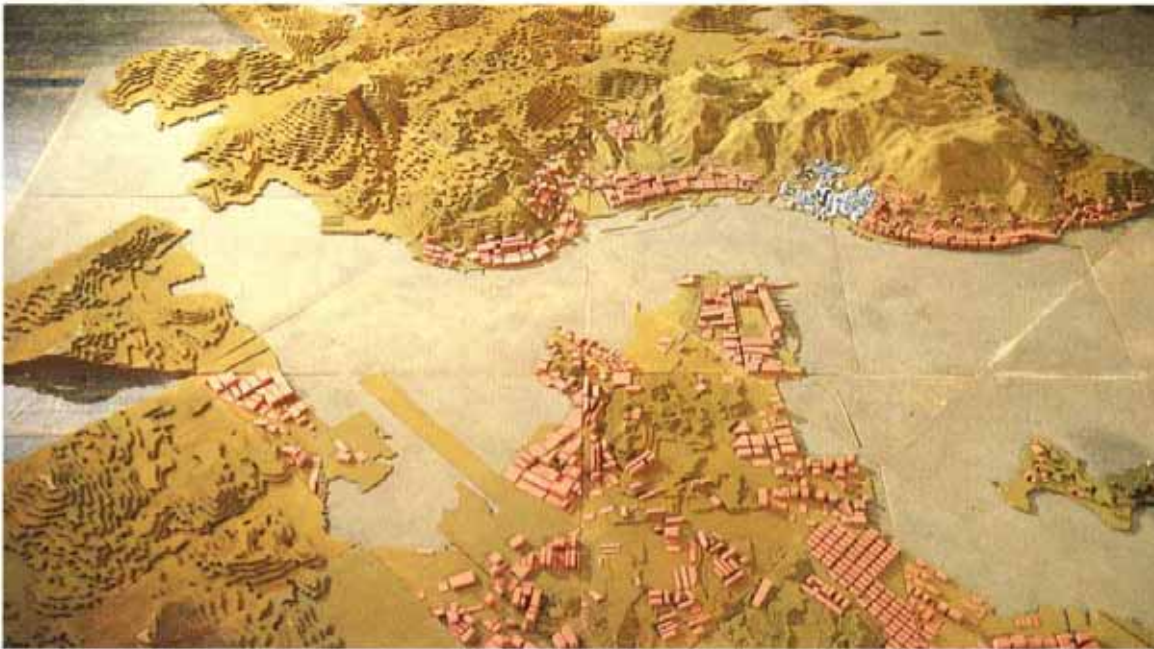
Two three-story high cross braces are located on both ends of the inner atrium and provide additional North-South stabilization



# Loads

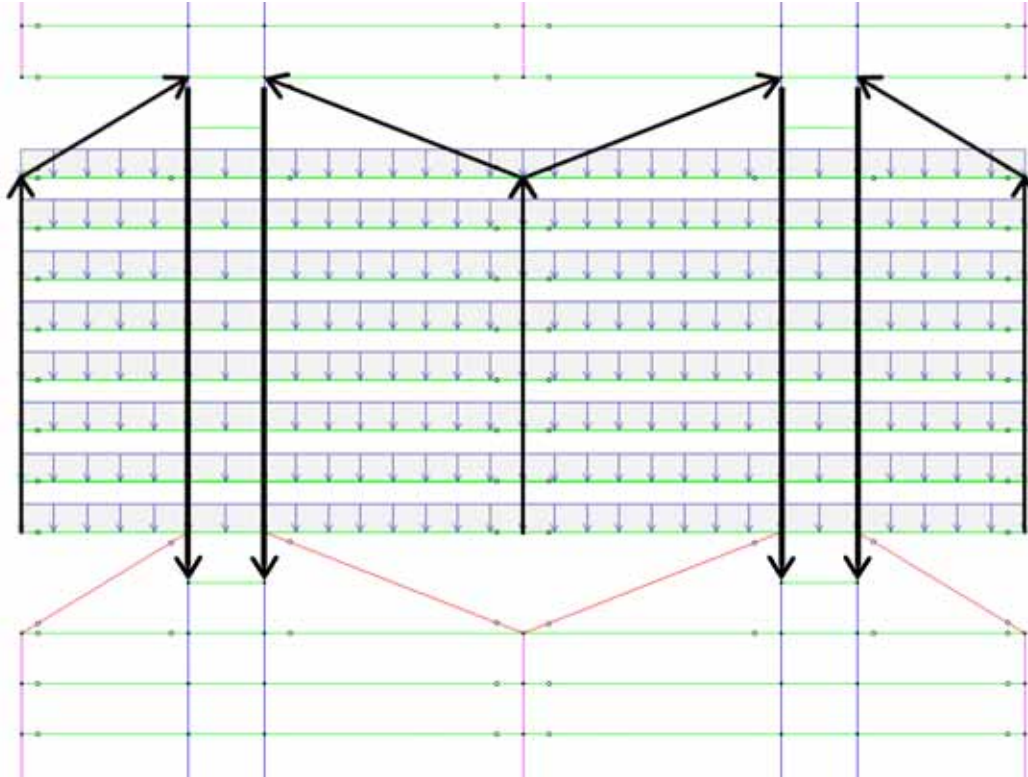


The loads would not be symmetrically distributed and would thus cause the building to twist slightly, changing the behavior of the system. Setbacks established by the city required the eastern portion of the building to be cut back severely.



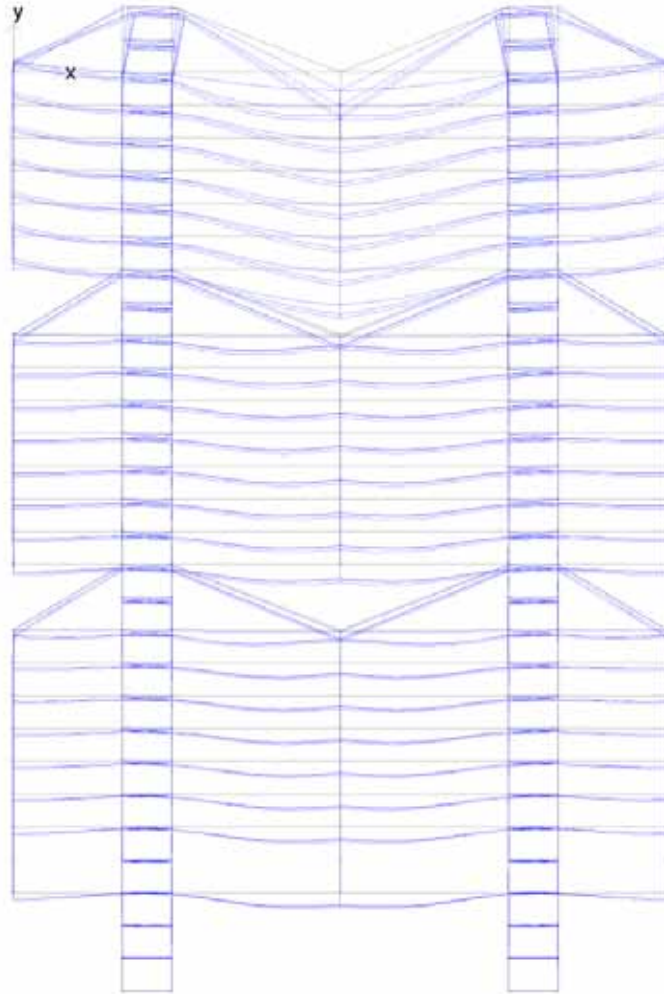
In order to determine exactly how much load would be placed on the building in these times, a wind tunnel test using a 1:2500 topographical model was used.

# Load Transfer Path

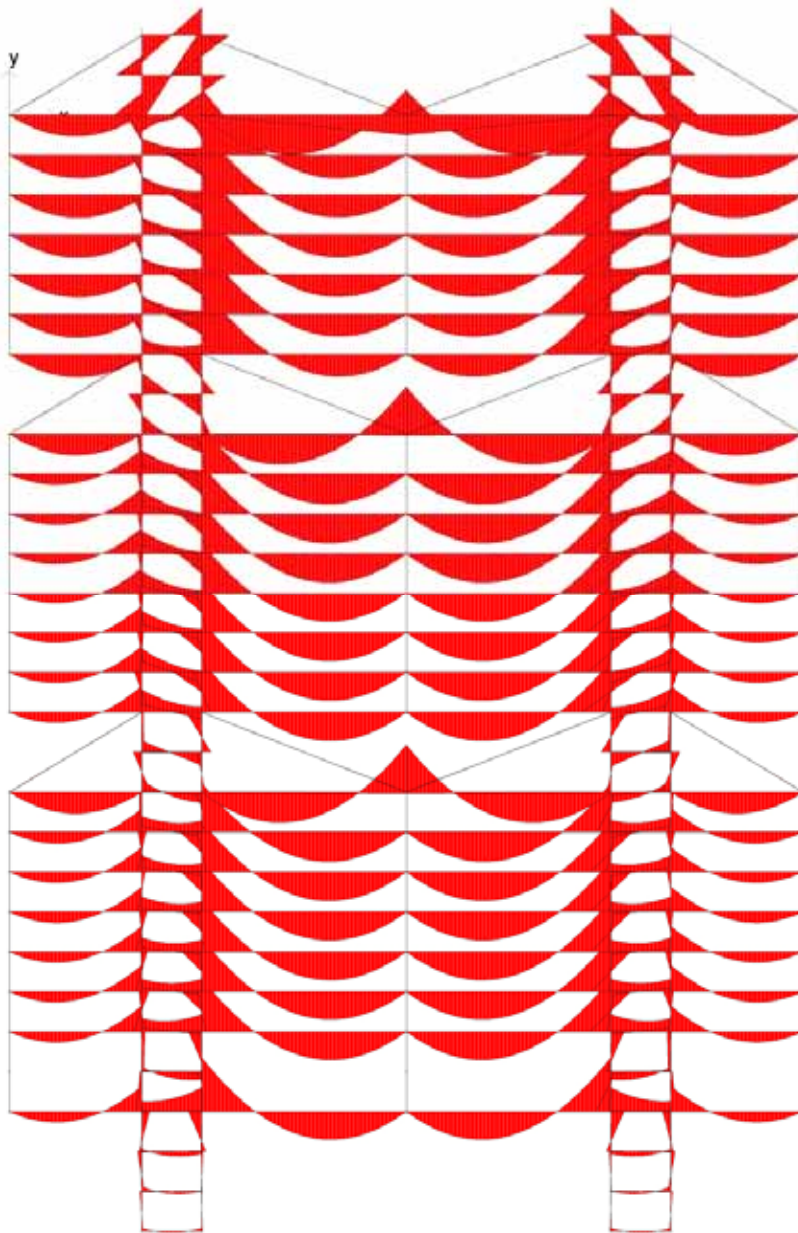


There is a unique suspension hanger located at the ends of each module which carries the loads up, rather than down. These loads are transferred upwards to the truss system and then taken down through the masts.

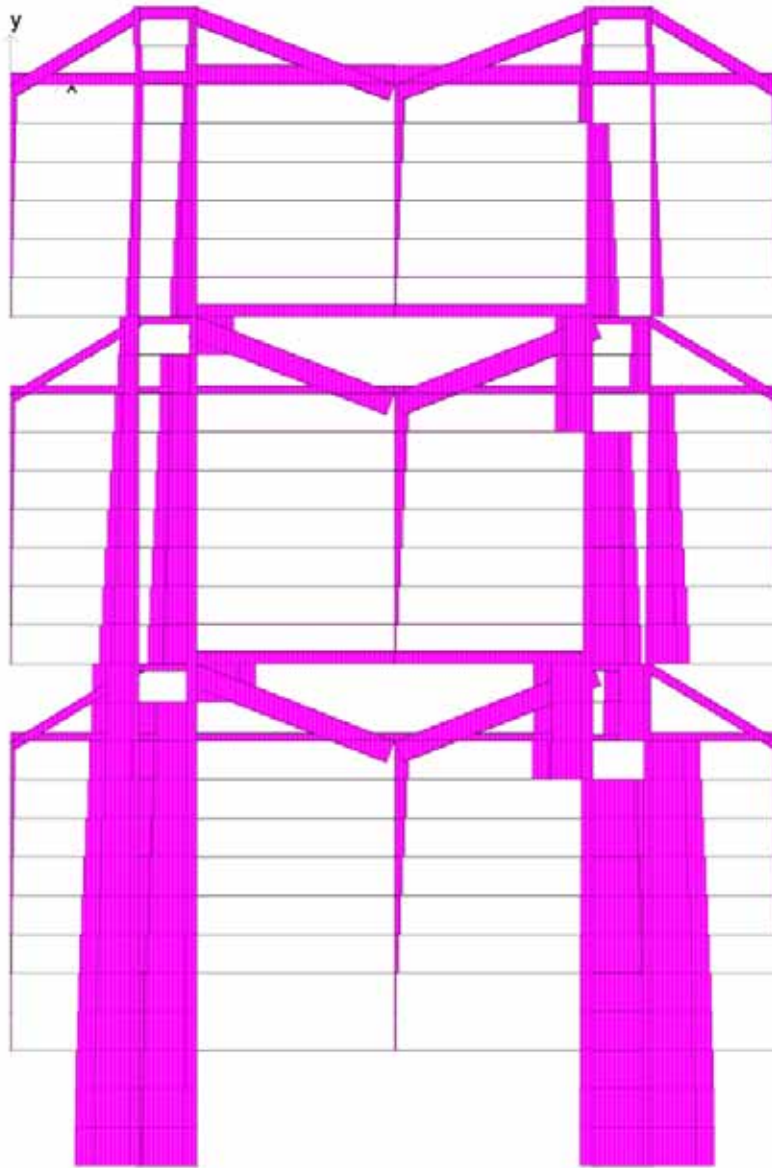
# Multiframe Analysis



Deflections caused by  
vertical loading

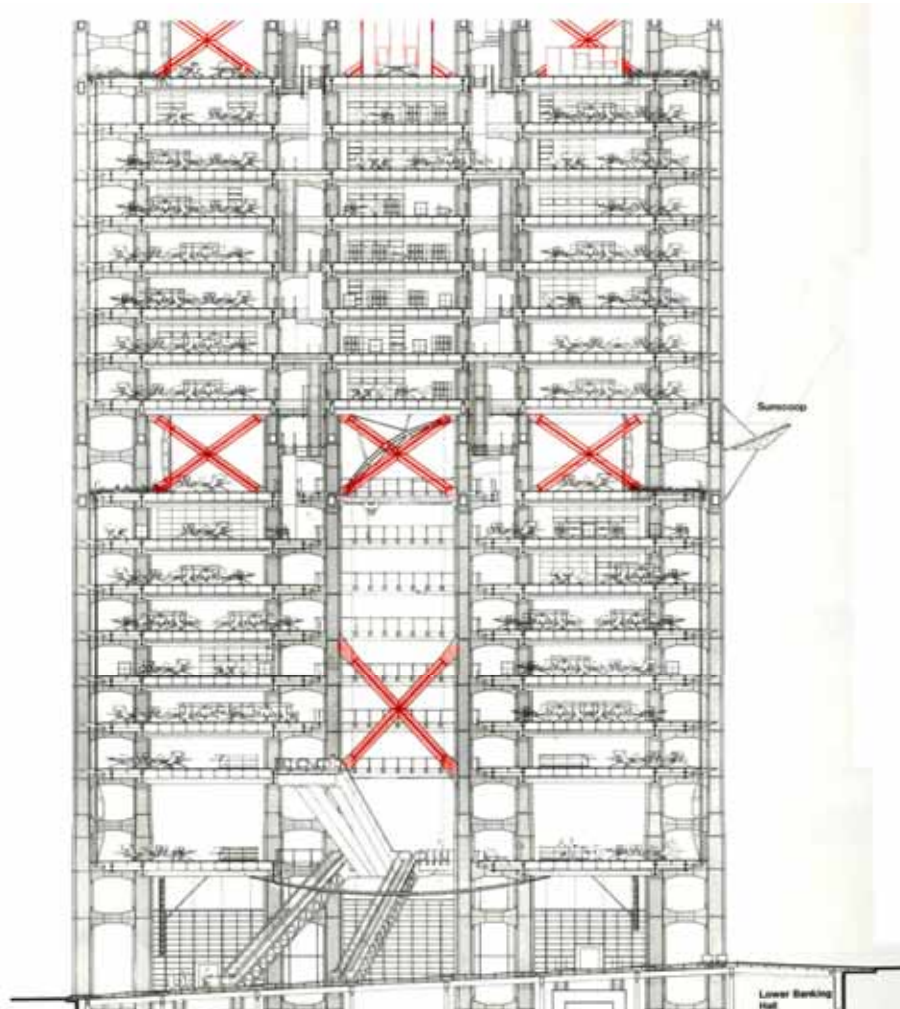


Moment caused by vertical loading

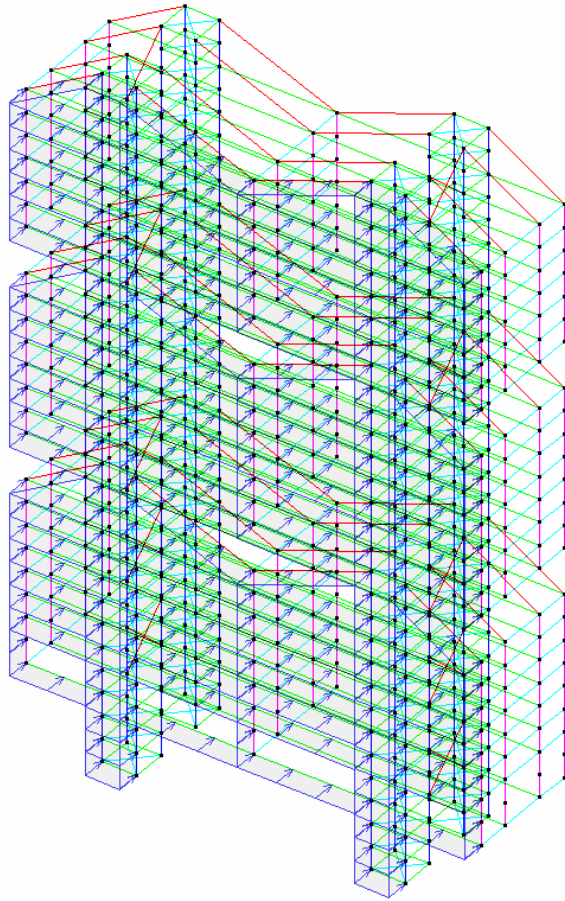


Axial load placed on primary structural members

# Lateral Resisting Systems



In order to resist the lateral load from natural weather occurrences and its own twisting from the uneven distribution of loads, two story high cross braces were placed every five to seven stories on the inside of the building with the addition of a few three story high cross braces.



Multiframe 4D model  
with lateral load  
applied



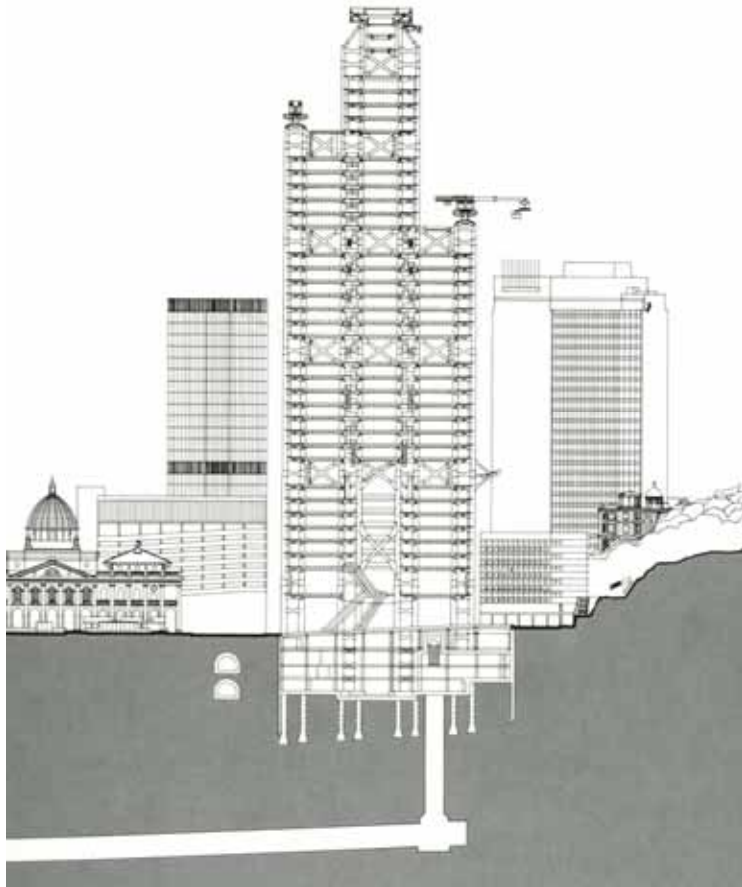
Moments created by  
lateral loading



Axial loads placed on  
cross members from  
lateral loading



# Foundation and Soil



The new site was from infill land reclamation programs. As such, it was not suitable for accepting the total foundational loads the building would put out. The designers chose to dig out the 20 meters of infill and place four additional levels below grade.

A total of 32 reinforced concrete piles exist below the building and transfer loads through frictional contact and distribution over the surface of the piles.

A tunnel was also dug out to the waterfront so as to run plumbing for the chilled water system

# Summary



The design, which has become the iconic image of the bank and Hong Kong, is a prime example of structural expressionism, as it showcases its structure as its main architectural focus.