MIDDLE EAST TECHNICAL UNIVERSITY
DEPARTMENT OF ARCHITECTURE / BUILDING SCIENCE PROGRAM

BS 536
STUDIES ON TALL BUILDINGS: DESIGN CONSIDERATIONS
Fall 2010-2011

Case Study: **The New York Times Tower**
by
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Submitted to: Assoc.Prof.Dr. Mehmet Halis Günel
Arch. H.Emre Ilgın (MSc.)

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The New York Times Building

http://forum.skyscraperpage.com/showthread.php?p=4908399

Manhattan district

Location: 620 Eighth Avenue, New York
Use: office + retail in ground floor
Height: 319m / 52 stories (CTBUH)

According to CTBUH,
34. Tallest building in the world
8. Tallest building in the United States
4. Tallest building in New York

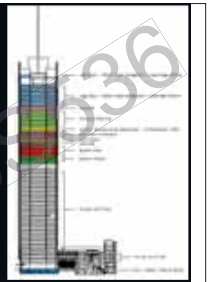
Status: in service
Cons. End: 2007
Cost: approximately $1 Billion (Hedrick *et al*, 2010)

http://eetdnews.lbl.gov/nl22/eetd-nl22-rh.html

Architecture:
Renzo Piano Building Workshop
FXFOWLE Architects, Gensler (interiors)

Structural Engineer:
Thornton Tomasetti

Owners:
The New York Times Company (%58),
Forest City Ratner Companies



http://www.daapspace.daap.uc.edu/~larsongr/Larson line/SkyCaseStu_files/Piano-Times.pdf

http://thomson.mobular.net/thomson/7/2698/3237/

Structural System:

- Centralized steel braced frame core with outriggers (Hedrick *et al*, 2010 & Scarangello *et al*, 2004)
- Outrigger and belt truss system (Taranath, 1998)
- Outrigger-Braced structure (Smith & Coull, 1991)
- Outriggered frame system (Günel & Ilgın, 2010)

Gross Floor Area: 143,601m2 (CTBUH)
Aspect Ratio (H/d): 7.09
Total Deflection at Top (Δ): H/450=0.7m (Hedrick *et al*, 2010)

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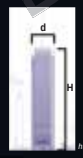
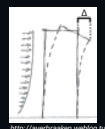




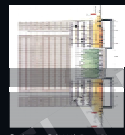
http://averbraaken.weblog.tudelft.nl/

http://eetdnews.lbl.gov/nl22/eetd-nl22-rh.html

Awards:

- 2009 AIA Honor Award for Architecture
- 2008 Council on Tall Buildings and Urban Habitat (CTBUH), The International High rise Award, Jury Commendation
- 2008 Society of American Registered Architects Design Award of Excellence
- 2008 Council on Tall Buildings and Urban Habitat (CTBUH), Best Tall Building Award, The Americas
- 2008 AIA New York State, Award of Excellence, Commercial/Industrial Large Projects
- 2008 The Municipal Arts Society of New York City MASterworks Award, Best New Building of 2007
- 2008 Society of American Registered Architects Design Award, Commercial Category
- 2008 AIA New York Chapter Design Award of Merit
- 2008 AIA New York Chapter Building Type Honor Award, Sustainable Design
- 2007 New York Construction Magazine Project of the Year

- The NY Times building composed of the main tower and a four-storey forepart connected by a garden.
- The ground floor directly accessible from NY street life, and so open to the city and crowd.



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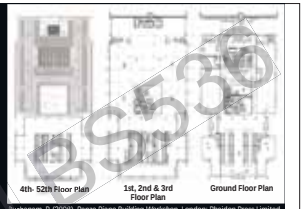

Buchanam, P. (2008). *Renzo Piano Building Workshop*. London: Phaidon Press Limited.

http://www.nyc-architecture.com/MID/MID125C.htm

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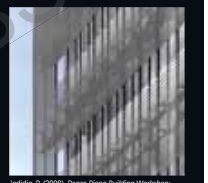
- Piano's principal objective in the design of the building was to reflect the ideas of journalist in being open and transparent to the world on which they report. (Hedrick *et al*, 2010; Scarangello *et al*, 2004; Bunchadam, 2008; Jodidio, 2008; Agnoletto, 2006)

- Piano envisioned a light, transparent building in which the outside world could watch the newsroom at work and the building's inhabitants could connect with the city. (Hedrick *et al*, 2010; Scarangello *et al*, 2004; Bunchadam, 2008; Jodidio, 2008; Agnoletto, 2006)

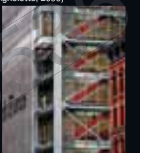
- The building's curtain wall system is a primary component to achieving this vision. The system consists of an inner glass wall that allows abundant natural light to the work space. An outer screen wall of closely spaced ceramic rods helps diffuse the light efficiently by eliminating excess heat and glare. (Bunchadam, 2008; Jodidio, 2008; Agnoletto, 2006)



Jodidio, P. (2008). *Renzo Piano Building Workshop: 1966 to today*. Singapore: Taschen GmbH.

- The superstructure is exposed in four corners of the building, giving the impression that the building is so transparent that its skeleton is visible. (Scarangello *et al*, 2004; Bunchadam, 2008; Jodidio, 2008; Agnoletto, 2006)

http://mysecondscape.blogspot.com/2007/12/new-york-times-building-by-renzo-piano.html?zx=890e6cb929a594eb



http://www.engr.psu.edu/ae/thesis/BIM%202009%20%202010/PDI%20BIM%20Thesis/stats.html

http://mysecondscape.blogspot.com/2007/12/new-york-times-building-by-renzo-piano.html?zx=890e6cb929a594eb

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Space Configurations

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- There are 26 passenger and 2 service elevators. The passenger indicates on the touchpad in the elevator lobby to which floor he wishes to go. The elevator system directs the passenger to a particular elevator, which picks up the passenger and drops him off on the correct floor. The elevators speed up to 30 km/h. 6 passenger elevators are used for floors between 1 and 4; 14 ones are used for floors between 5 and 27; and 6 ones are used for floors between 29 and 50. (Forest City Enterprises, 2007; Agnoletto, 2006; Buchanam, 2008)

Floor Efficiency Ratio
(Net Rentable Area/Gross Floor Area):

For floors between 1 and 27 $\frac{NRA}{GFA} = 0.746$

For floors between 29 and 50 $\frac{NRA}{GFA} = 0.833$

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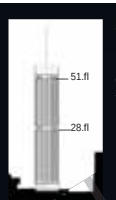
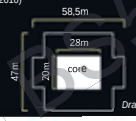


Structural System: Outriggered frame system
Material: steel (composite floors)

- **28th** and **51th** floors are mechanic floors, also outrigger floor. Floor height is **8,25m**. (Hedrick *et al*, 2010)



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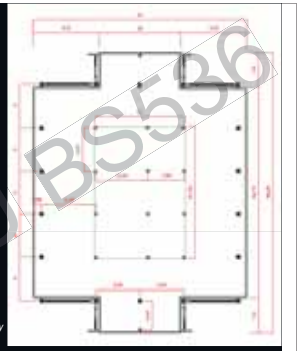
Leon Lai – selected portfolio 2010, http://ihlai.com/theVisualStimulus/index.php?/au/the-nyt-building-study/



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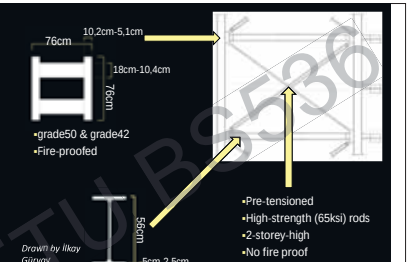
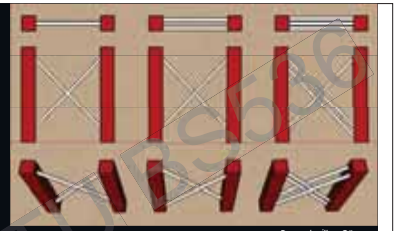


- grade50 & grade42
- Fire-proofed
- Pre-tensioned
- High-strength (65ksi) rods
- 2-storey-high
- No fire proof

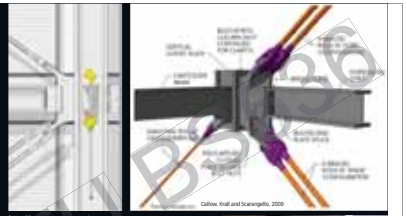
Drawn by İlkay Güryay

- Because the braces themselves are not fireproofed, the core is designed to resist lateral loads, assuming the exterior system is not present. The exposed bracing system helps to reach required comfort by reducing total deflection (from H/350 (91cm) to H/450 (70cm)). (Scarangello *et al*, 2004)



Drawn by İlkay Güryay

▪ One of the typical pitfalls of X-braces is how to handle the middle of the bay where the braces intersect. Creating a node at this location results in a bulky connection. They can also be offset so they run by each other, resulting in eccentric connections at columns. To solve these issues, pairs of rods were used , one pair aligned horizontally, the other one vertically. Thus, each of the pairs would maintain concentric alignment with the center line of the columns. (Hedrick *et al*, 2010)

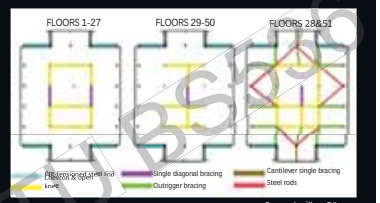


http://www.daapspace.daap.uc.edu/~larsongr/Larsonline/SkyCaseStu_files/Piano-Times.pdf

Callow, Krall and Scarangello, 2009

http://www.engr.psu.edu/ae/thesis/BIM%202009%20%202010/IPD%20BIM%20Thesis/stats.html

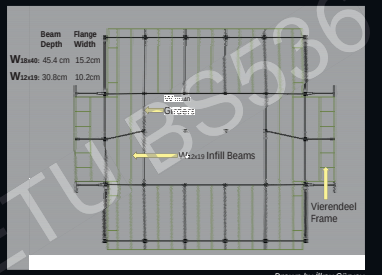
TYPICAL LATERAL SYSTEM



Drawn by İlkay Güryay

▪ The elevator layouts affect the lateral load-resisting system. 14 passenger cabs which are assigned only to the lower floors terminate above a mid-height mechanical room at level 29 and the space is available for lease above. (Scarangello *et al*, 2004)

FLOOR SYSTEM (Hedrick *et al*, 2010 & Scarangello *et al* , 2004)



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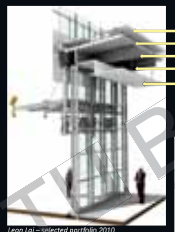
FLOOR SYSTEM



(Hedrick *et al*, 2010 & Scarangello *et al*, 2004)

Leon Lai – selected portfolio 2010

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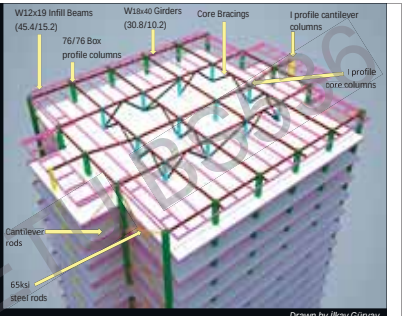

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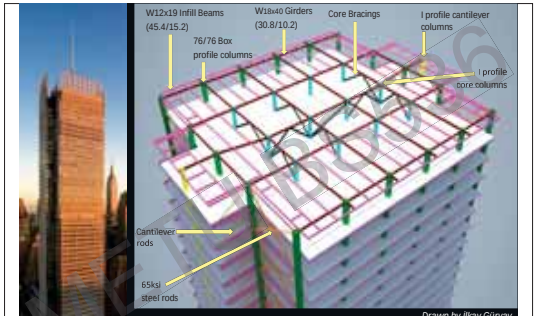
1st-27th Floors



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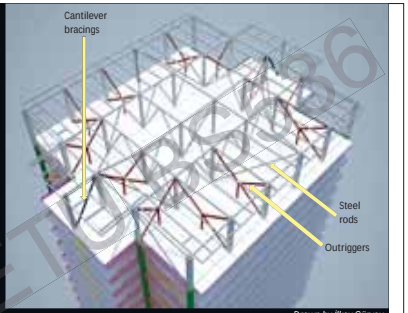
29th-50th Floors



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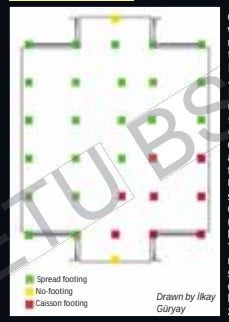
28th&51th Floors

FOUNDATION SYSTEM



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The foundation of the NYT8 combines typical spread footings with caissons to achieve its maximum axial capacity. The tower and the podium mostly bear on Medium/Hard rock with a bearing capacity of 80ksf. However, a core sample taken indicated that rock at the southeast corner of the tower only had a 16ksf bearing capacity. At the columns fall this area, 60cm diameter concrete-filled steel caissons were used. Under the other columns, spread footings with a concrete compressive strength of 6000 psi (**~C40**) are used to support the loads.
The areas depicted with yellow represent the two cantilevered sections of the tower. These columns do not directly transfer load to the ground. (Hedrick *et al*, 2010)

SUSTAINABILITY

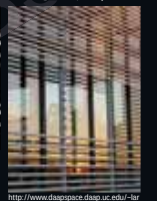
http://ecobuilding101.wordpress.com

Double-Skin Curtain Wall

- Reduces the amount of heat coming into the building
- Allow floor-to-ceiling ultra-clean glass, so maximizes views and light
- Each rod is 5cm in diameter, 150cm in length and 60cm away from the facade of the building
- The spacing of the rods varies to leave clear horizontal strips for unobstructed views through the middle portion of glazing on each office and podium floor. (Lutron, 2010; Bunchadam, 2008; Jodidio, 2008; Agnoletto, 2006)

http://www.treehugger.com/screen-nyt-building.jpg

http://marshallplan.blogspot.com/2007/11/praise-for-renzo-piano-new-york-times.html



http://www.daapspace.daap.uc.edu/~larsongr/Larsonline/SkyCaseStu_files/Piano-Times.pdf

Lighting and Shading System

- The lighting system and the dynamic shading system saves %30 of total energy. (Lutron, 2010)
- Lighting levels have been adjusted space-to-space electronically. (Lutron, 2010)

http://www.lutron.com/Residential-Commercial-Solutions/Solgp/Corporate/OpenOffice/NYTimes/Pages/NYTimes.aspx

http://continuingeducation.construction.com/article.php?L=20&C=526&P=6

- Shading system is programmed to use the position of the sun and inputs from an extensive sensor network to act as determinants to raise and lower shades. (Fact Sheet, 2007)

Underfloor Air Distribution

- Underfloor air distribution (UFAD) system is used for comfort and efficiency. (Lutron, 2010 & Fact Sheet, 2007)
- The company also uses free-cooling on cool mornings air from the outside can be brought into the building. (Lutron, 2010 & Fact Sheet, 2007)
- The UFAD also uses waste heat from the c0-generation process to heat the space on colder days. (Lutron, 2010 & Fact Sheet, 2007)

http://www.filconair.com/?p=Under-Floor-Air-Distribution-UFAD

Co-generation on Site

- **Cogeneration** is the use of a heat engine or a power station to simultaneously generate both electricity and useful heat. (Fact Sheet, 2007)
- It is used to supply %40 of the power for the building. (Fact Sheet, 2007)
- The plant's heat by-product is used to heat the Times Building during the winter and provide cooling during the reminder of the year. (Fact Sheet, 2007)

http://forum.globaltimes.cn/forum/showthread.php?t=5386

http://www.daapspace.daap.uc.edu/~larsongr/Larsonline/SkyCaseStu_files/Piano-Times.pdf

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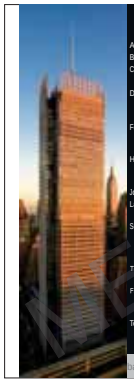

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