The New York Times Building
ARCH 631 Case Study

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Overview

Location: Manhattan, New York
Owner: The New York Times Company
Architect: Renzo Piano Building Workshop/FXFOWLE ARCHITECTS, P.C.
Structural Engineer: Thornton Tomasetti
Area: 1,700,000 sf
Completion Date: 2007
Prospective

- a signature building in the New York City skyline
- a fitting home for a 21st-century media company
- reinforcing the values of the Times Company and its culture of transparency and openness
- a flagship building promoting sustainability, lightness, and transparency
Architect
Renzo Piano

Design Competition in 2000
Featured proposals from today’s most renowned architects
Italian architect Renzo Piano won the competition
Partnered with FXFOWLE ARCHITECTS NYC office
Design feature

The New York Times building is a 52-story high-rise office tower of lightness and transparency topped by a mast that disappears into the sky.

Concept
Exemplify transparency and lightness through every detail

Elements
elegant structural steel exoskeleton
a glass and ceramic curtain wall
52 stories
746 feet tall

mast tops off at 1,046 feet

curtain wall ends at 819 feet

Mechanical 51 story
FCRC 29-52 stories
Mechanical 28 story
NY Times 27 stories
NY Times 5-story podium

lobby, retail space and a glassenclosed garden
Floorplate
Approximately 32,000 rentable square feet with 30-foot column spacing
Main Structural System

- Column
- Steel column of the core
- Core
- Infill beam
- Lateral system
- Girder
- Floor system
- ‘Dog-leg’
Foundation

The ground floor plan is consisted by a tower portion and a podium portion.

In structure studying, we will focus on the tower portion which is 1,046 ft high.
Two different kinds of foundation constructions

The main portion showed on Figure 3-B
Beared on stronger rocks
21 of the columns: spread footings

The portion showed on Figure 3-C
7 columns: concrete-filled steel caisson

The portion A1 and A2 are cantilevered structure and do not need a foundation.
Floor System

The floor system includes surrounding bays to a central core. The bay sizes are varied concrete and metal decking.
‘Dog-leg’ connection

Figure 6 Exposed connection

Figure 7 Connection (Jeffrey, Kyle, and Thomas, 2009)
Lateral System

Figure 8 Typical lateral system, 1F-27F (Benjamin and Erika & Andres, 2009)

Key:
- Single Diagonal Bracing
- Pre-Tensioned Steel Rod X-Bracing
- Chevron & Open Knee Bracing

Figure 8 Typical lateral system, 29F-50F (Benjamin and Erika & Andres, 2009)
Loadings

Load Types

**Gravity loads**: dead loads, live loads and snow loads

**Lateral loads**: wind loads, seismic loads

A. **Gravity loads**:

1' **Dead loads**

It contain the typical tower floor dead load 93psf, typical tower mechanical floor dead loads 110psf, the exterior tower wall system dead load 25psf, total mechanical area roof dead load 100psf and normal roof dead load 100psf (all above when for seismic should be larger)

2' **Live loads**

Because we cannot know the weight of the mechanical equipment on the mechanical roof and the mechanical floor, and no minimum live load is provided in ASCE7-05 and the Building Code of the City of New York, the equipments' self weight was assumed to be equivalent to light manufacturing therefore we can get a minimum live load should be 125 psf.

3' **Snow loads**

From the ASCE7-05, since the weight of snow on the roof and snow drift is almost 2 times smaller of the controlling roof live load and mechanical area roof live load, we can get a total snow loads 35.28 psf.
Loadings

B. Lateral Loads

1' Wind load
During the time of the building’s design, this code permitted the use of a simplified approach for calculating the wind loads of all buildings not more that 300 ft within the Borough of Manhattan. ASCE7-05 was used to analyse the wind load as a method. To simplify the calculation the tower was analyzed with a rectangular footprint instead of a cruciform shape. The screens around each face of the roof top allow air flow through them. After the windward pressure was calculated on this “solid face”, a multiplier of 0.5 was implemented to account for the permeability of the screen.

<table>
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<tr>
<th>Method</th>
<th>Wind Load Design Variables Summary</th>
<th>Reference</th>
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</table>
Loadings

West-East Wind Force  North-South Wind Force  West-East Wind Pressure  North-South Wind Pressure

Conclusion Of wind loads
The analysis shows that the controlling wind loads are in the East/West direction with a base shear of 9336 kips and overturning moment of 3.7 million ft-kips. This direction was expected to control due to its wider façade face. Please note that the base shears and overturning moments calculated in this report only consider the direct loading from windward and leeward pressures.
Loadings

2' Seismic load

To calculate the seismic loads condition we need to use the New York City Building Code as a basis for calculation. The base shear was determined to be 1834 kips, calculated from the effective seismic weight, including the assumed dead loads and partition loads. The lateral seismic forces at each level increase with elevation, and range from 1.1 kips to 94 kips. Due to the height and location of the New York Times building, it was expected that the lateral loading due to wind pressure would control over seismic loadings.

Seismic Factors Summary

| Site Class | C |
| Occupancy Category | III |
| Importance Factor, I | 1.25 |
| Latitude | 40.756 |
| Longitude | -73.990 |
| \( F_a \) | 1.20 |
| \( F_v \) | 1.70 |
| \( S_s \) | 0.363g |
| \( S_l \) | 0.070g |
| Seismic Design Cat. | B |

Lateral Seismic Forces, N/S and E/W
Muliframe Analysis

Floor 23 & 24 Multi-frame
Moment Diagram

Shear Diagram
THANK YOU!

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Reference List:

