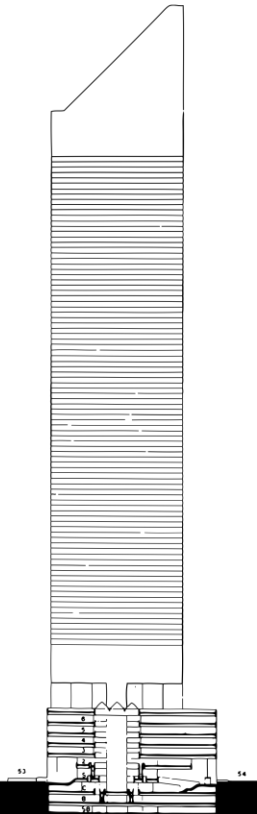


Citicorp Center: New York, NY

A Structural Analysis

Architect: Hugh Stubbins

Structural Engineer: William LeMessurier



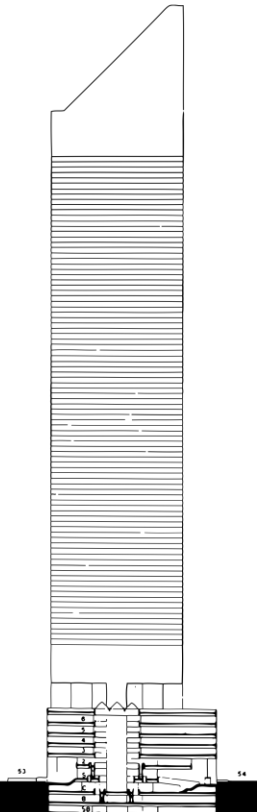
General Information

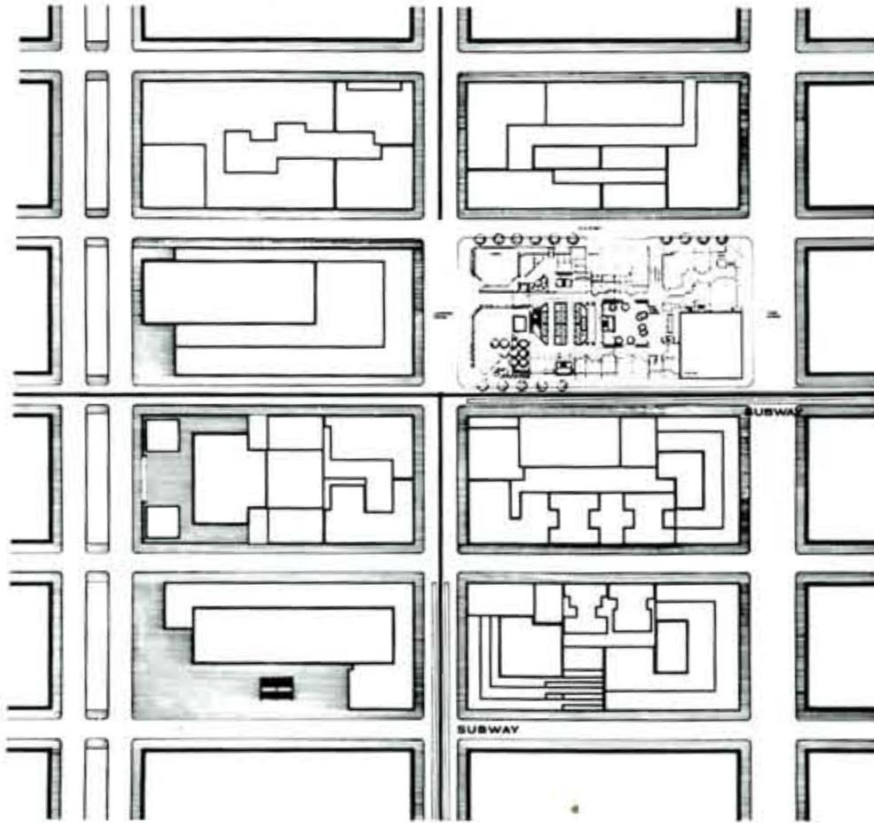
- Architect: Hugh Stubbins
- Structural engineer: William LeMessurier
- Site: Lexington Avenue & 54th Street
- Construction Date: 1974-1977

- Height: 915 ft (7th tallest structure in New York City)
- Height of atrium: 114 ft
- # of floors: 59, 46 of office space

- Total square footage:
- Office Level: 24400 ft²
- Plaza Area: 9000 ft²

- Building Use: office
- Building Cost: 195 Million

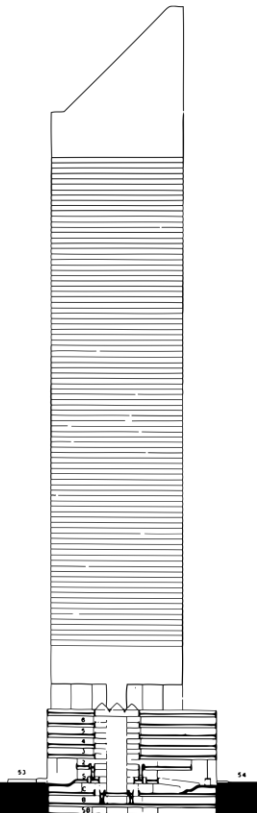


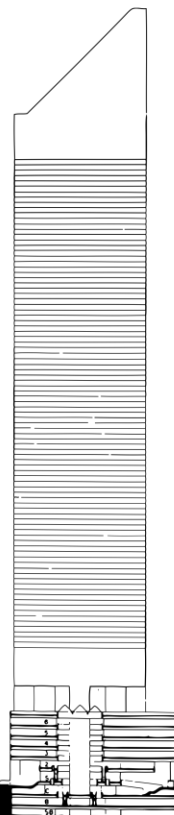
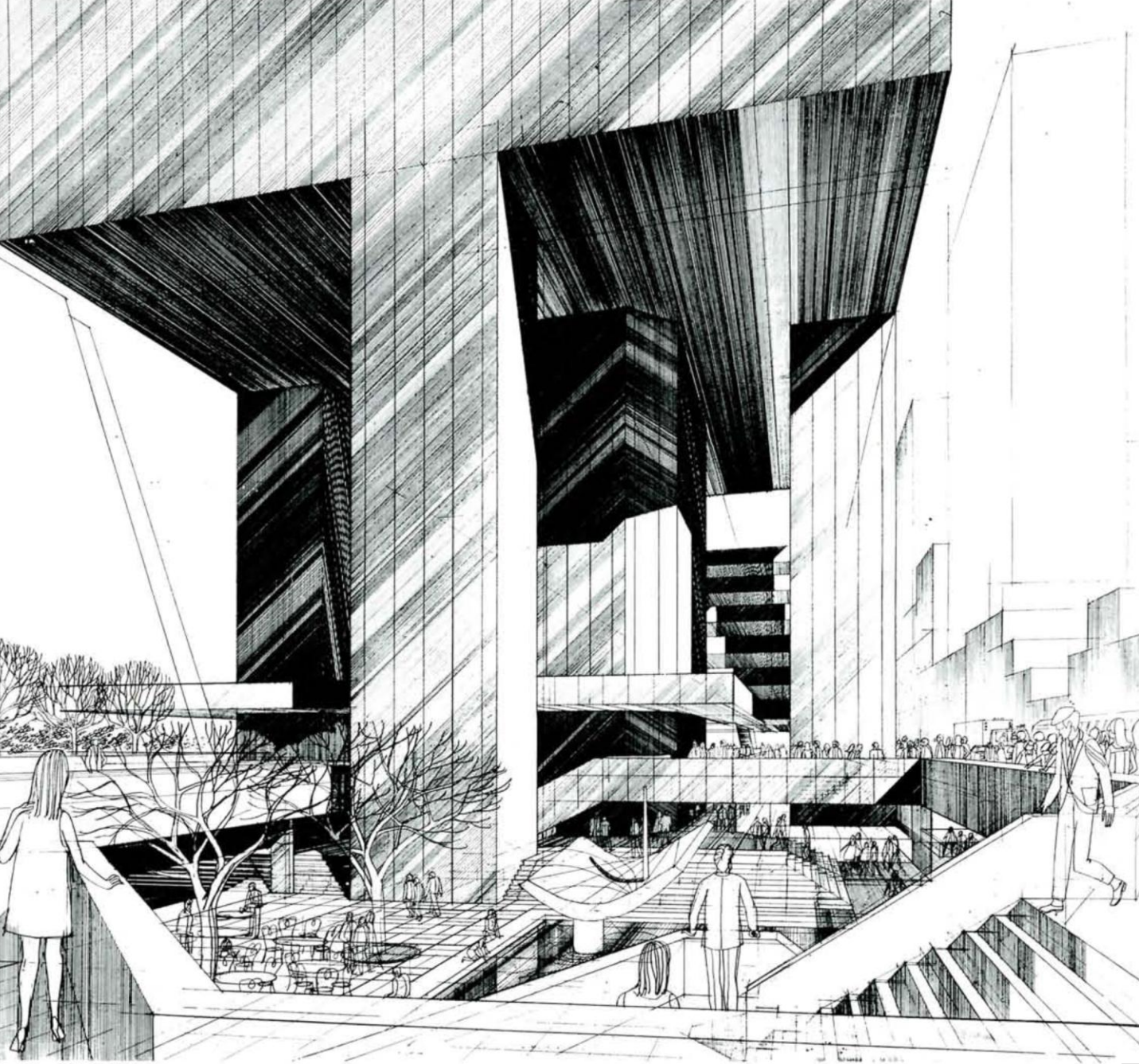


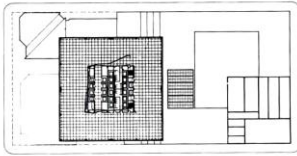
Site plan

Unique Structural Considerations

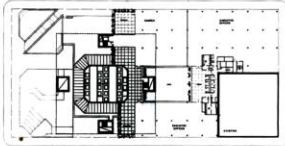
- Existing buildings on the site
- Major subway station located underneath
- Air rights were sold to allow development overtop



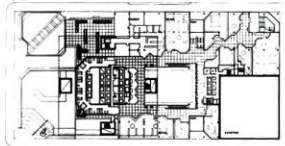




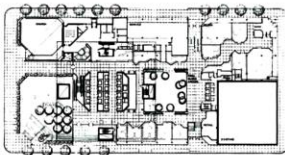
typical floor plan



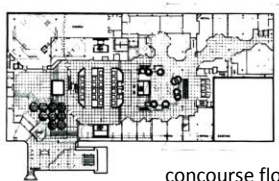
third floor plan



second floor plan



first floor plan



concourse floor plan

Concourse Level

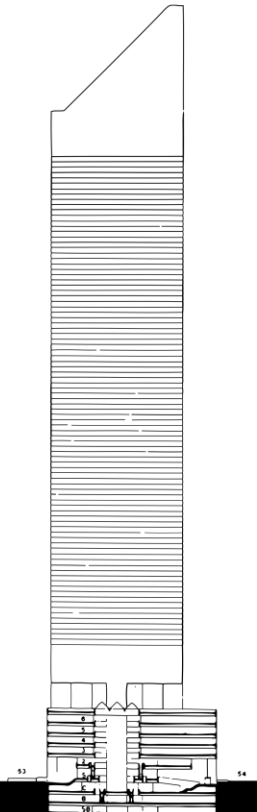
- Open to street level
- Connected to the subway
- Church located on Northwest corner
- Office/Retail on the Southeast corner

First, Second & Third Floor

- Connected to retail & restaurants

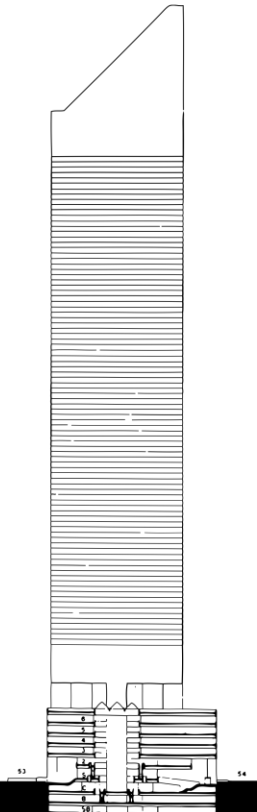
Typical Floor Plan

- Open office floor plan
- 4'-9' building module throughout
- Centrally located elevator core
- Exterior columns with diagonal cross bracing



Materials

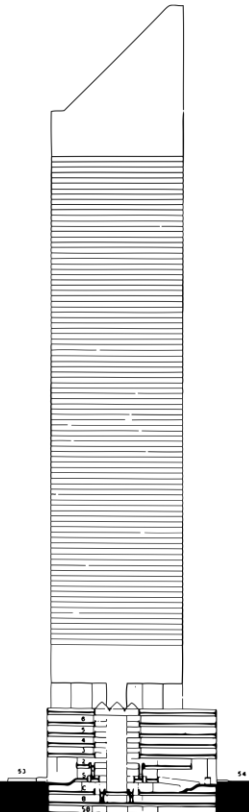
- Structural Steel Members
 - W21x44-45 for horizontal floor plates
 - W14x550 for diagonal bracing
 - W8x24-31-48 for vertical columns
 - W12x40-58-85 for interior columns
 - Columns were reinforced with steel to protect against terrorist attacks
- Concrete
 - Reinforced concrete throughout floor plates
 - Reinforced concrete columns
 - Steel reinforcement allows concrete spans and cantilever
- Aluminum
 - Exterior building cladding
 - Light weight and cheaper than steel
- Glass
 - Mirror finish
 - Aesthetic from mirror and aluminum finish





Aluminum & Glass Cladding

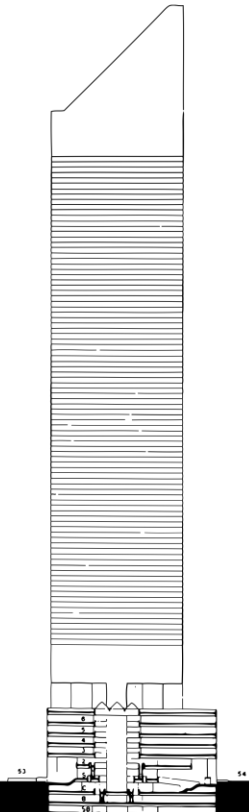
- Aluminum Material Properties
 - Light weight
 - Cost
 - Satin mirror finish reflects light
 - Hides interior structure
 - Post-Modern Period
- Mirror Glass Façade
 - Emphasizes Post-Modern
 - Allows natural light
 - 46% of exterior façade
 - Binary bands

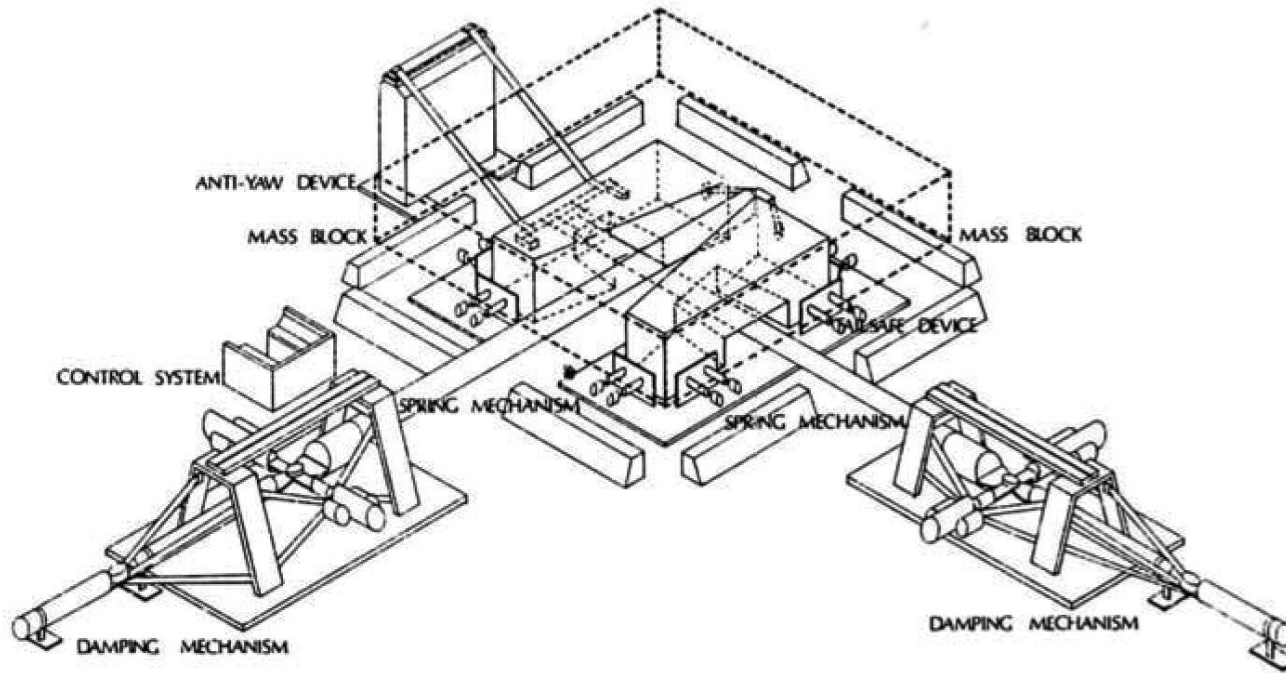




Building Construction

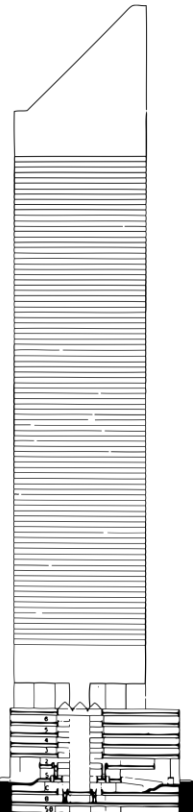
- 6 - 8 Story modules
 - Each structural independent
 - One full chevron bracing per module
- Each corner cantilevers out 45 feet
- Sitting on four columns located at the center of each side with a central core
- Loads are transferred from the six modules through the chevron bracing to each of the columns

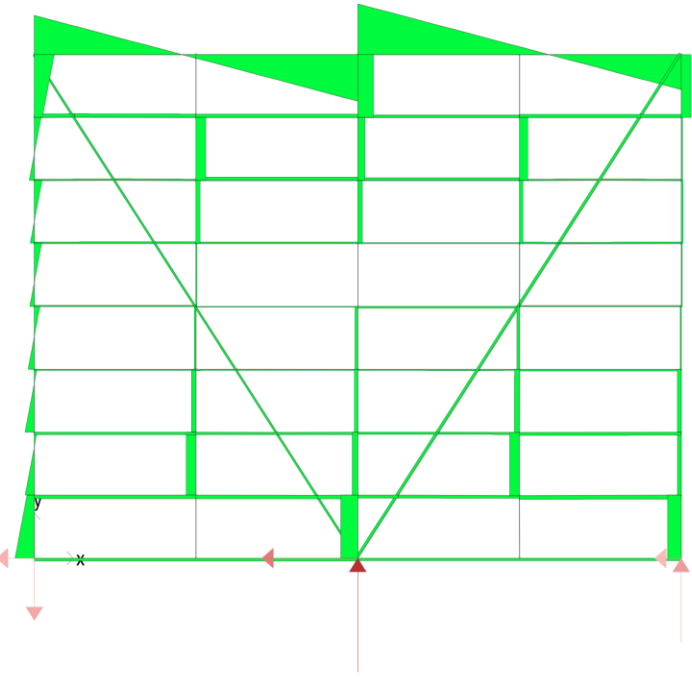




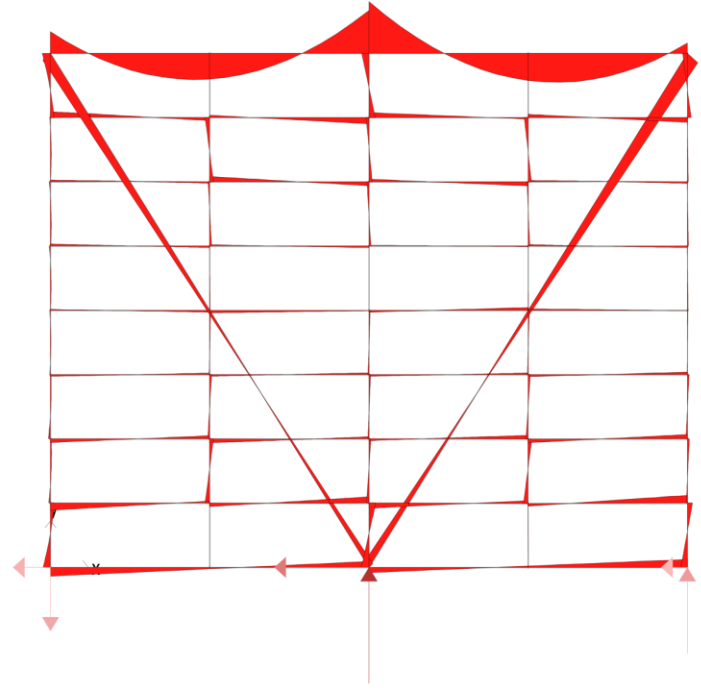
Tuned Mass Damper

- 400 ton concrete block
- Uses two hydraulic pumps to stabilize the block
- Located at the uppermost full floor plate

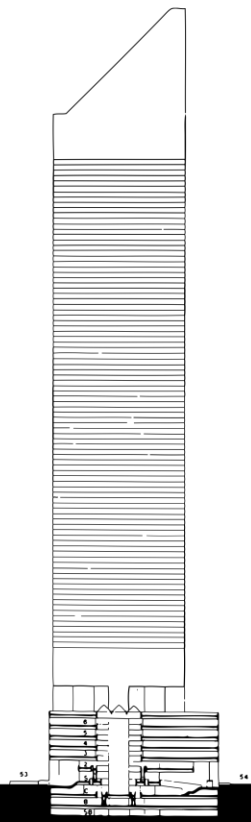




Multiframe – Shear Diagram



Multiframe – Moment Diagram



Citicorp Center: New York, NY

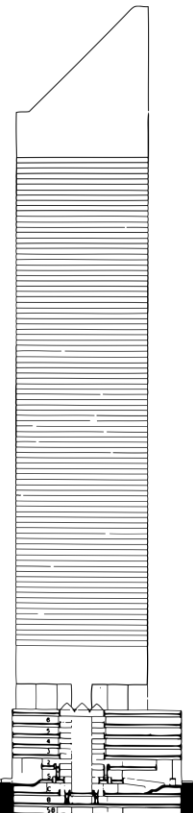
A Structural Analysis

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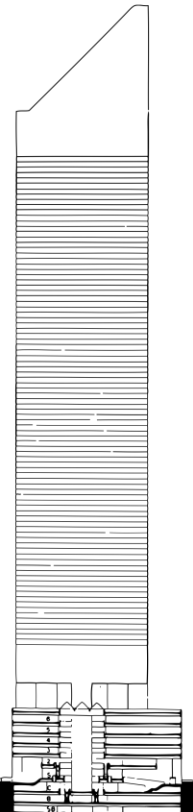


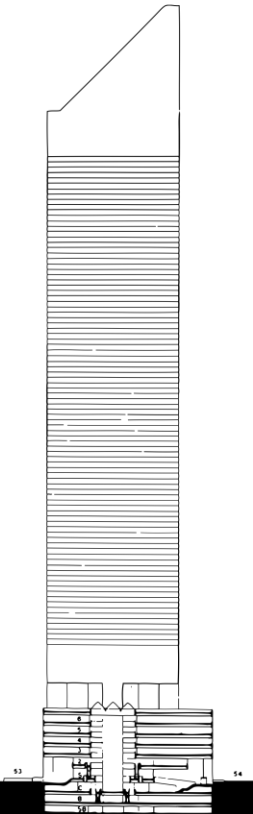
southern ellis . kyle reader . matt miller . will paton . andrew pipkin

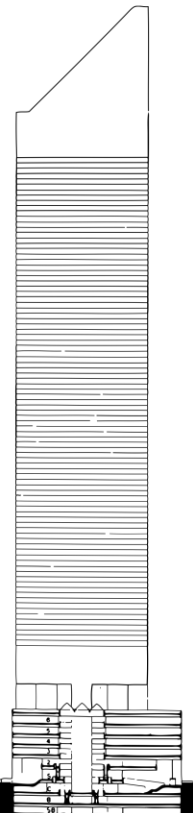




- The slender profile has a tendency to produce a periodic shedding of vortices
- A main design concern for the Citicorp Center was avoiding lock-in
- Flutter was alleviated by welded connections which limited torsional movements







southern ellis . kyle reader . matt miller . will paton . andrew pipkin

References:

Braybrooke, Susan. ARCHITECTURE: The Design Experience. New York: John Wiley & Sons

Ichinowatari, Katsuhiko. PROCESS: Architecture no. 10 Tokyo: Process Architecture Publishing Co.

Citigroup Center's Secrets

<http://www.youtube.com/watch?v=bXpyukjQoGw>

Music:

“O Fortuna” – Carl Orff

