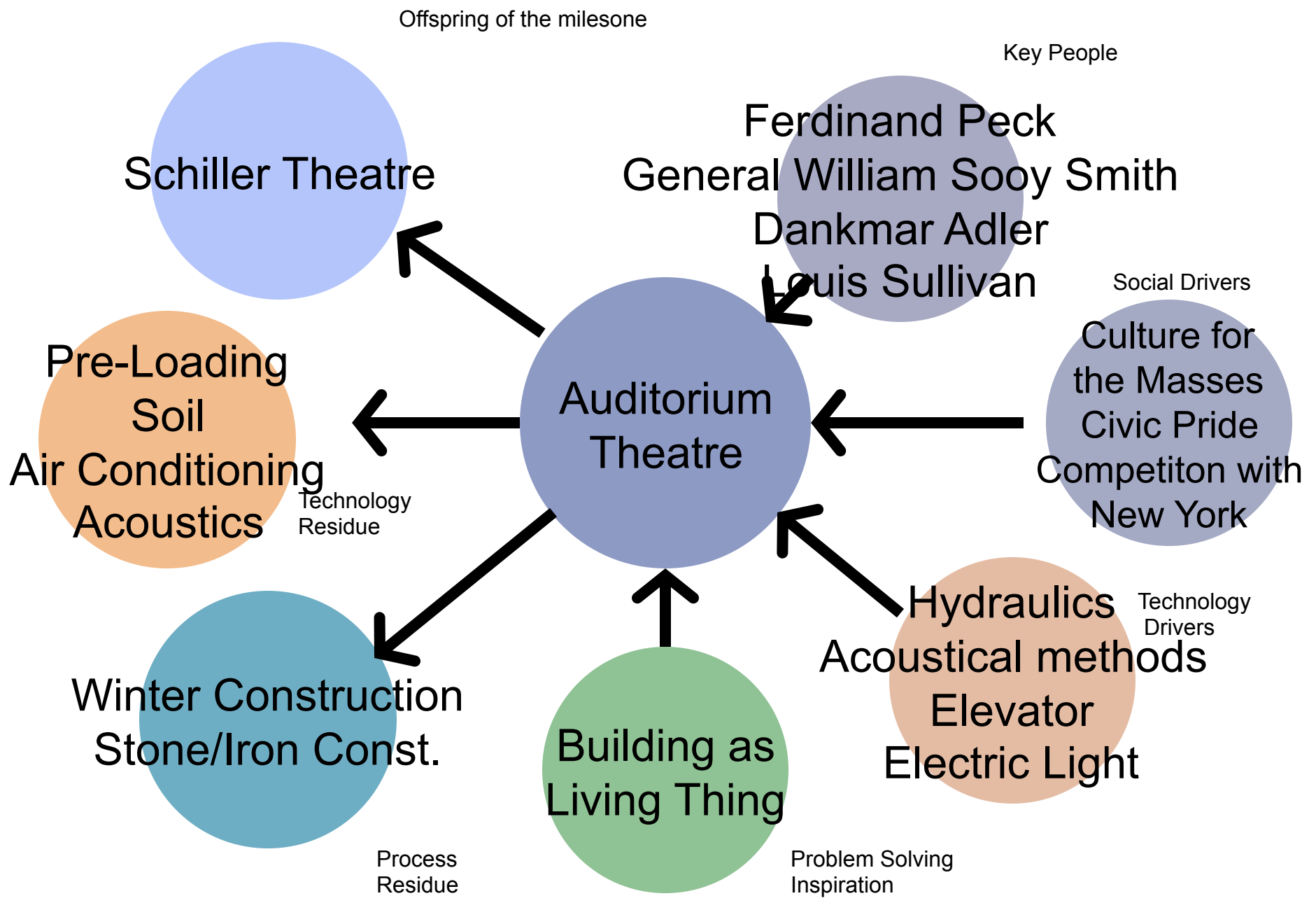


# The Auditorium Building

Monument as Enterprise



# Building a niche

- Runup to the Auditorium
  - Central Music Hall 1879
  - Borden's Grand Opera House 1880
  - McVickers Theatre 1 1883
  - Hooley's Theatre 1884
  - Haverly's Theatre 1884
  - McVickers Theatre 2 1885
  - Chicago Opera Festival Auditorium 1885
  - Auditorium Theatre 1889
- ...and after the Auditorium
  - McVickers Theatre 3 1890
  - Pueblo Opera House 1888
  - Schiller Theatre 1891



# Central Music Hall



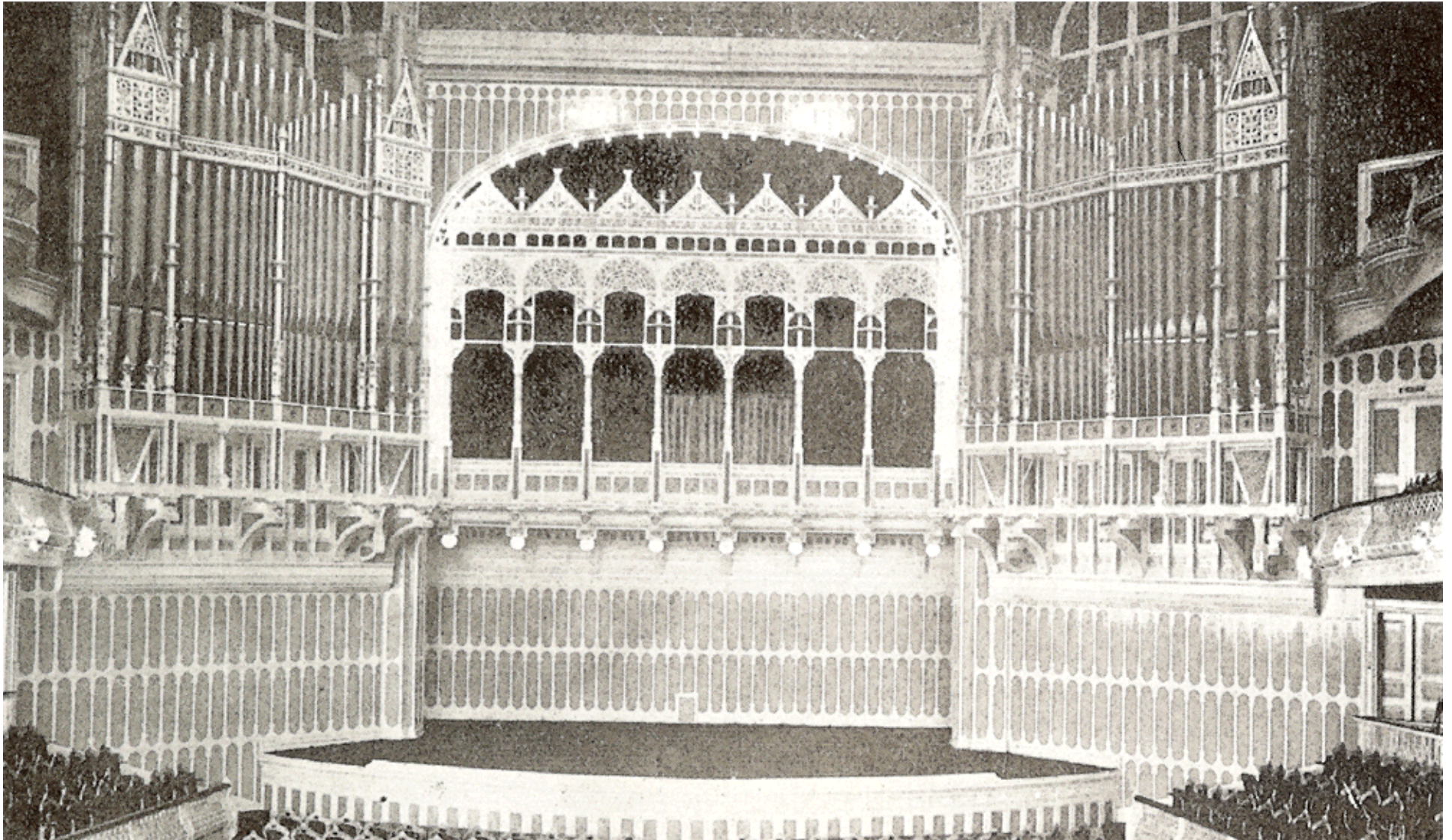
- Serving a large immigrant population
- 48% of city population from
  - Ireland
  - Germany
  - Poland
  - Italy
  - Russia
- No movies yet, Opera was king
- Seats 1,900

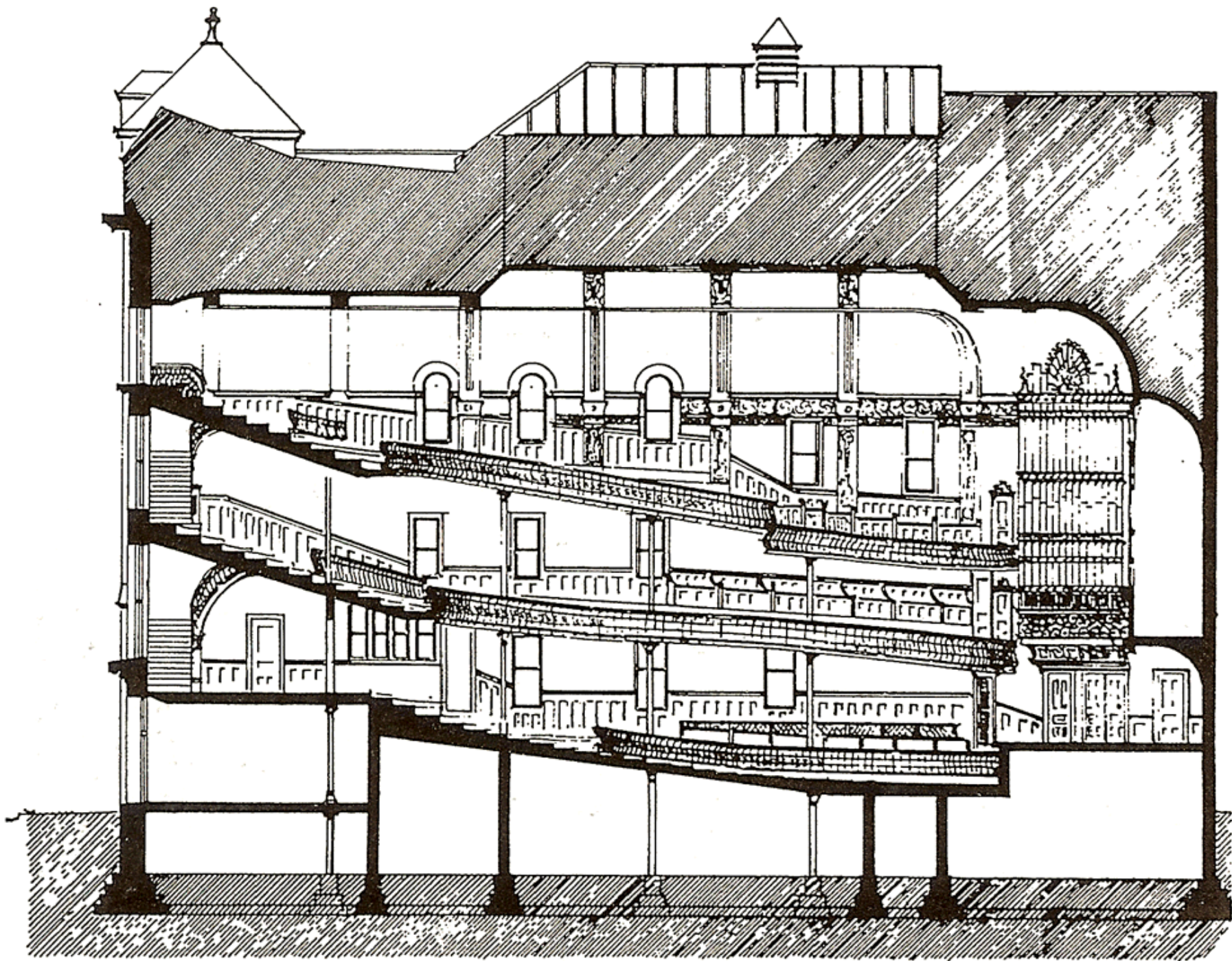
. CENTRAL MUSIC HALL, 1879

DANKMAR ADLE

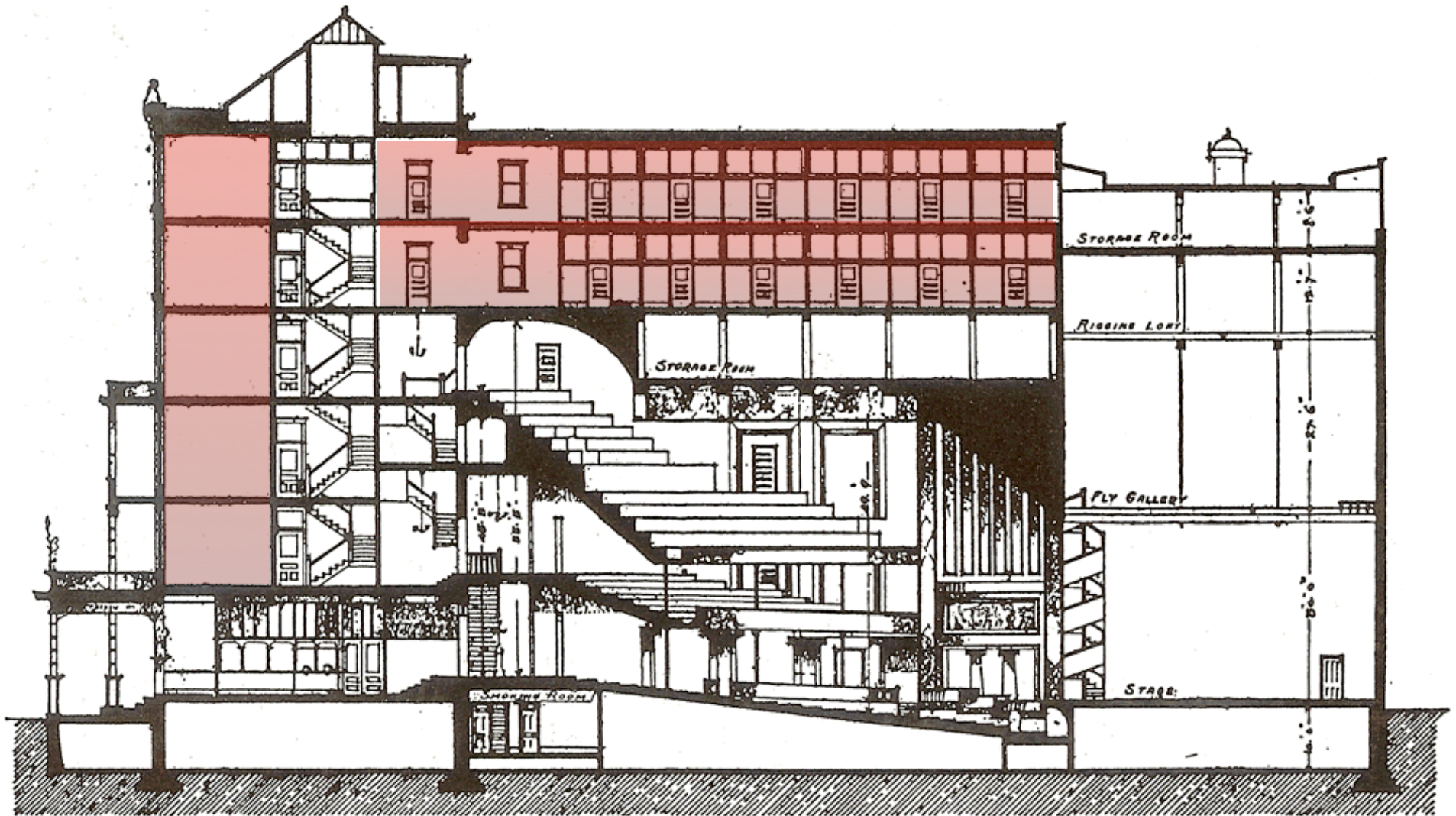
Formerly at the southeast corner of Randolph and State streets; demolished in 1900. (*Commercial Photographic Co.*)

# Central Music Hall after Organ 1881





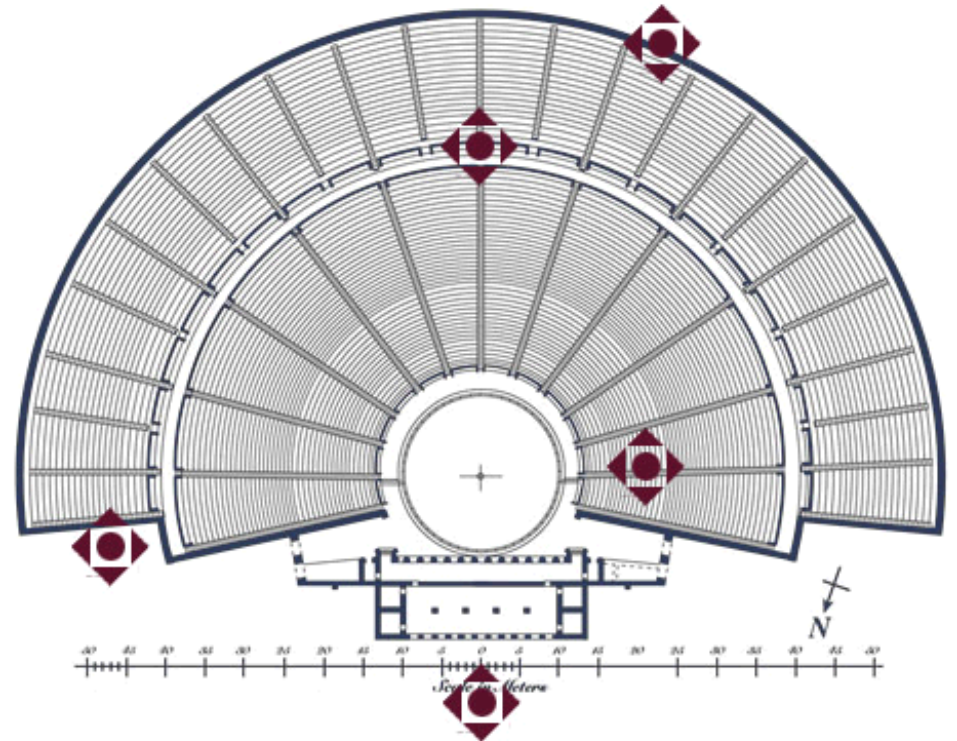
# Making money off the leftovers



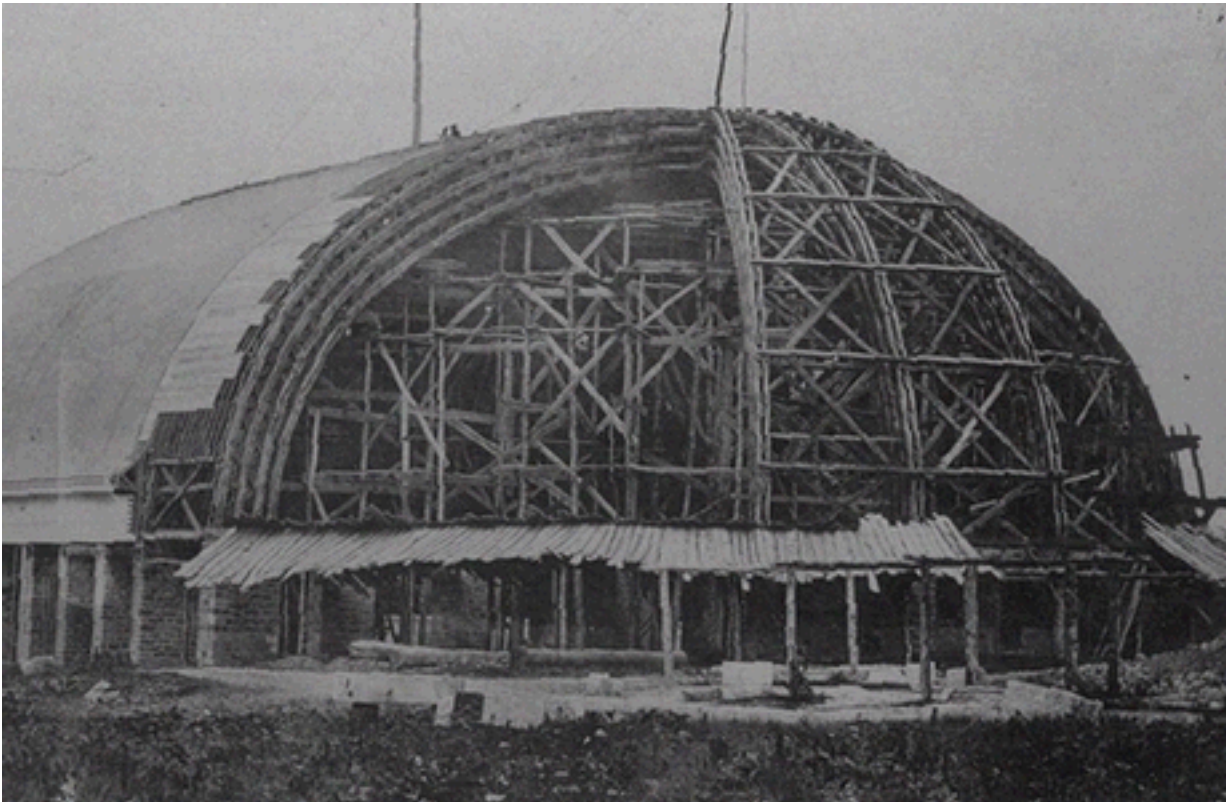
# Learning acoustics from History



- Theatre at Epidaureus, Greece, 4th Cent. BCE
- Designed by Polykleitos the Younger
- Seats 15,000
- No amplifiers required
- Bowl shape “fits” spherical sound wave and gives good line of sight



# Learning from experience



- No acoustical science society until 1928.
- “Father of Acoustics”  
Wallace Clement Sabine designs first project in 1895 Fogg Hall on Harvard Campus
- Little published on acoustics in late 1800’s
- Adler traveled to Salt Lake City, and to other Churches to learn what worked and what didn’t

# Sabine and “hang time”

- Developed theory of reverberation
- 

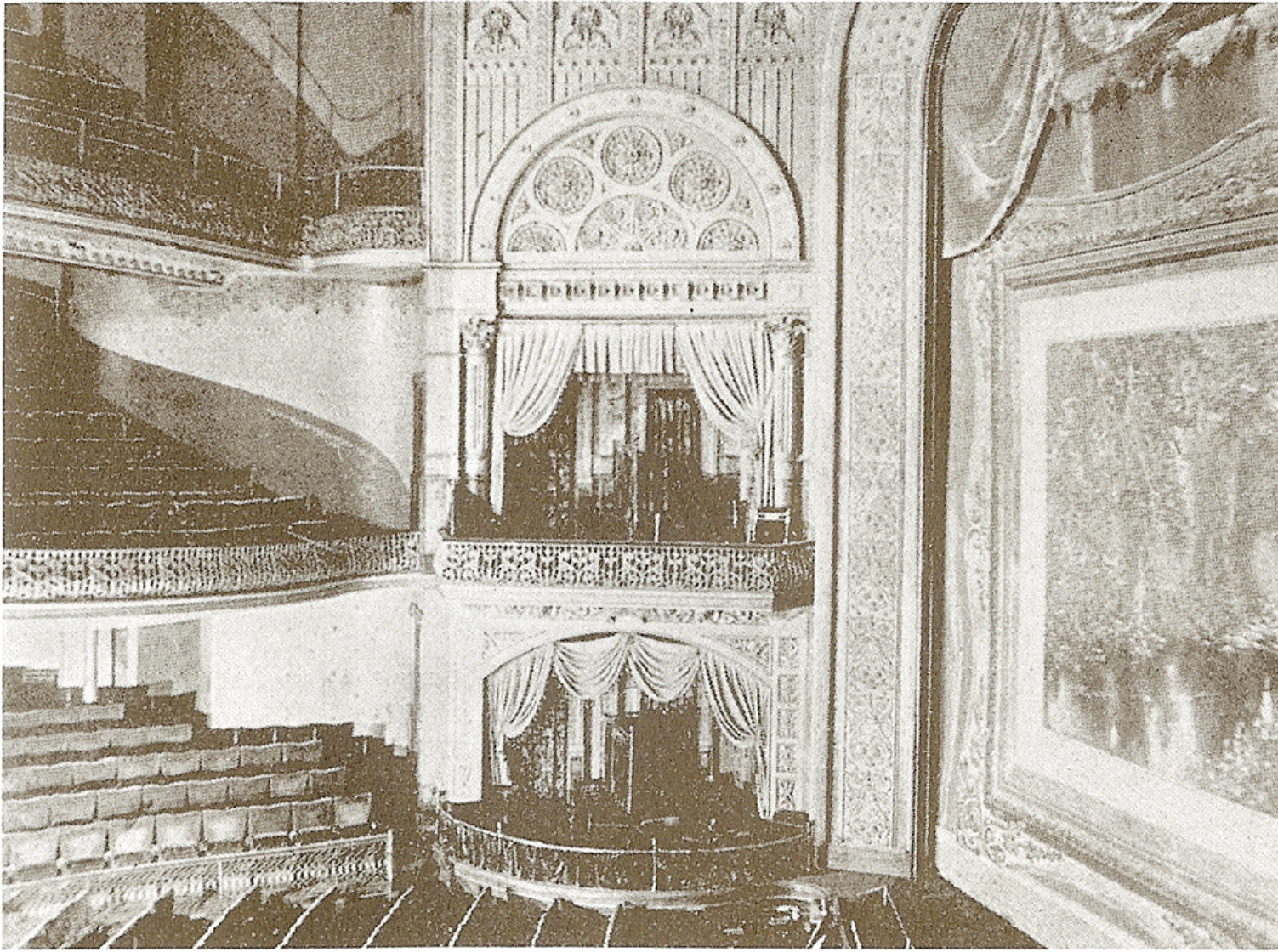
$$T = 0.161 \frac{s}{m} \frac{V}{A}$$

- where T is time, V is the volume of the room in cubic meters, and A is the absorption area in square meters.

# Sweet echo

- Concert Hall 2-2.5 s
- Lecture Hall 1 s
- Fogg Lecture Hall 5.5 seconds, echo bounced for 12-15 words making it hard to understand what was said.
- Fixed the long echo with absorbant materials, rated the absorption in “Sabines”

# Borden's Grand Opera House 1880

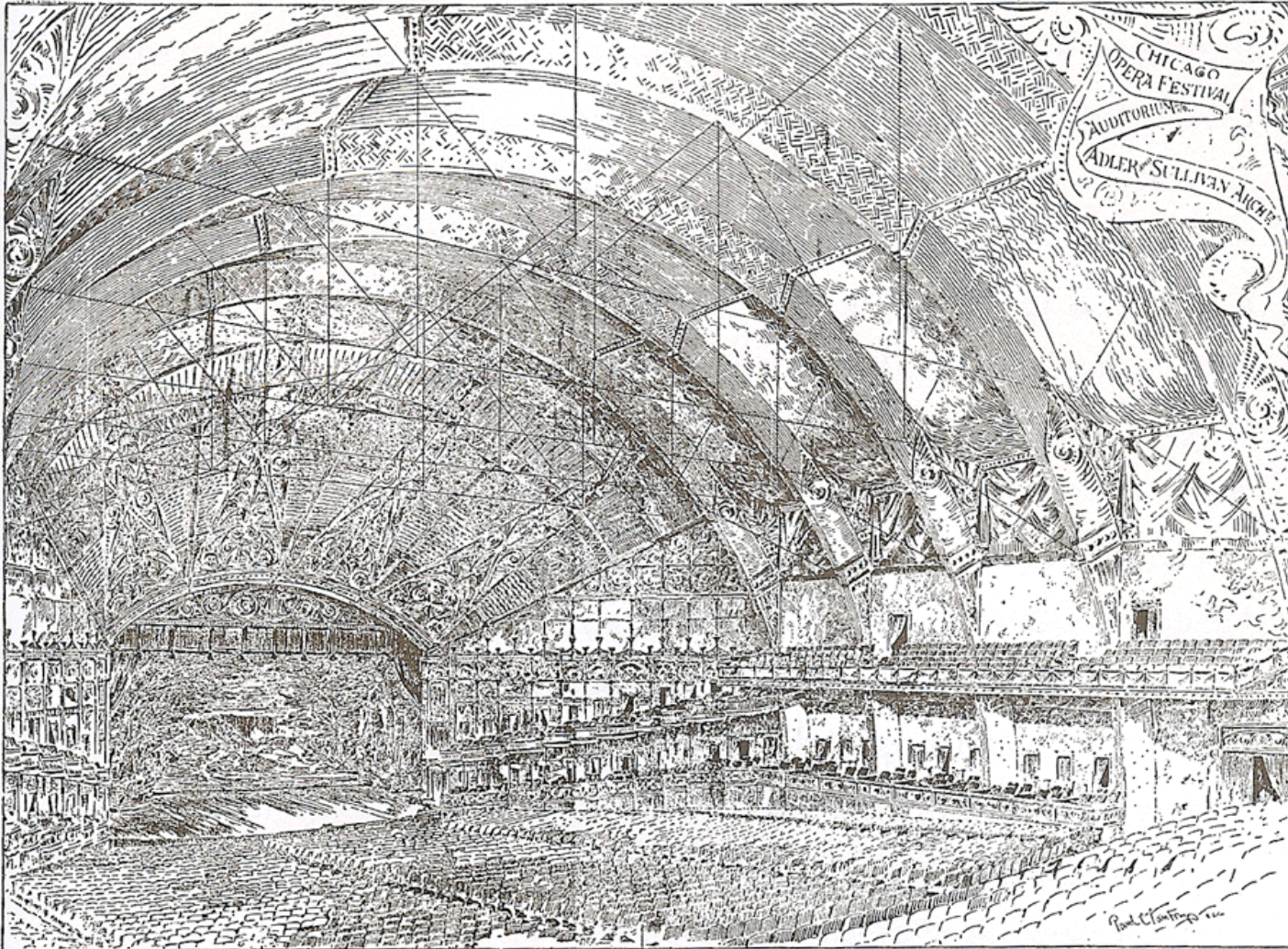


- small
- 7,200 s.f.
- Tiered seating
- Cast iron box fronts

10. Grand Opera House (remodeling), Chicago. 1880.

# Testing the market

...to convince investors...and like Roebling, prototype at a smaller scale

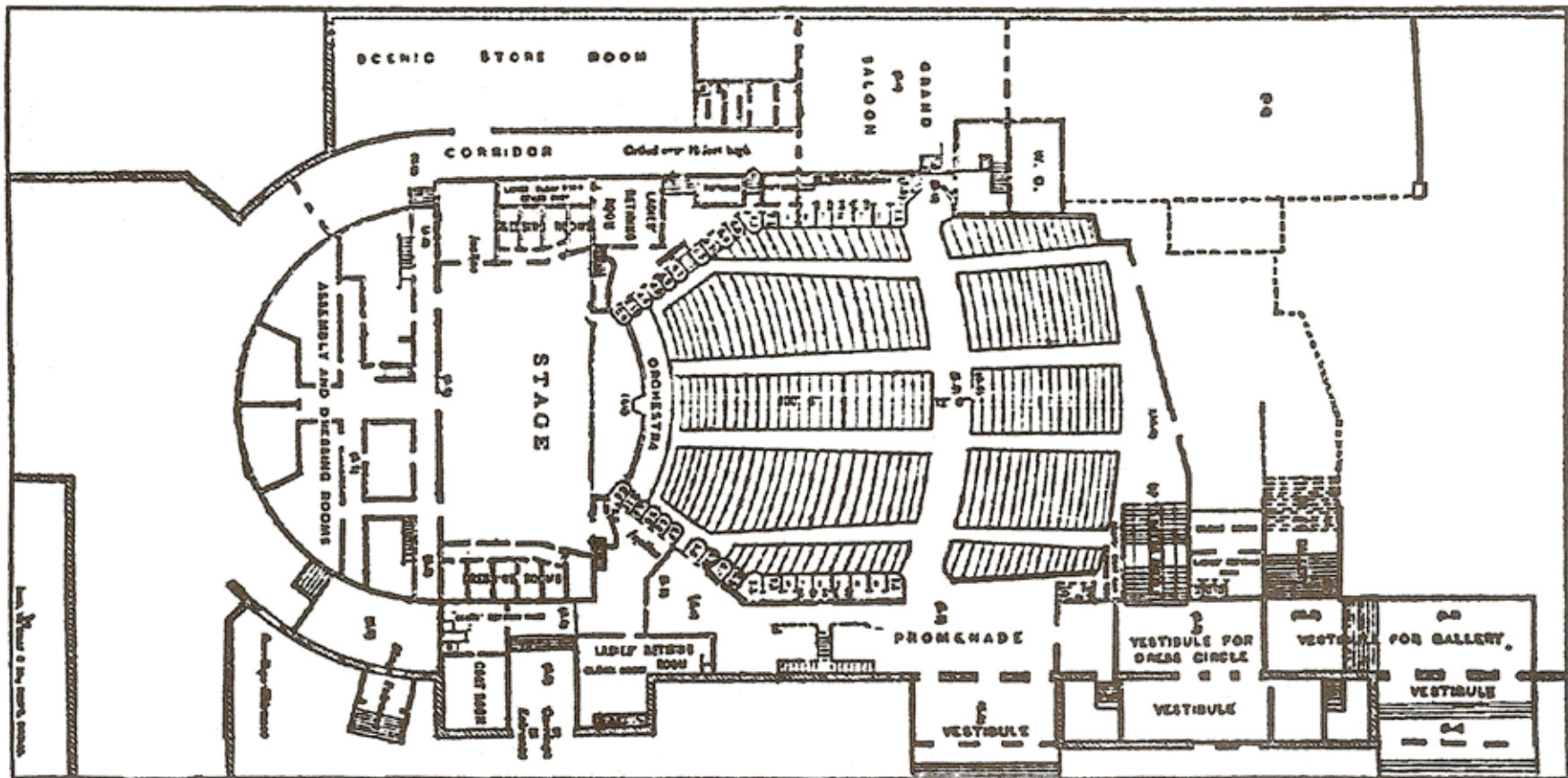


- Temporary Building in Grant park
- Rehab (1885) of the interstate exposition building 1873
- 6,200 seats
- No microphones
- 60,000 s.f.
- Start Feb 1885, done April 1885
- You could hear the faintest sound, no reverberation problems
- “Music for the People” Ferdinand Peck’s approach to variable pricing

Figure 3. Chicago Opera Festival Auditorium in the Interstate Exposition Building, Grant Park. 1885. (From the *Inland Architect & Builder*, March, 1885.)

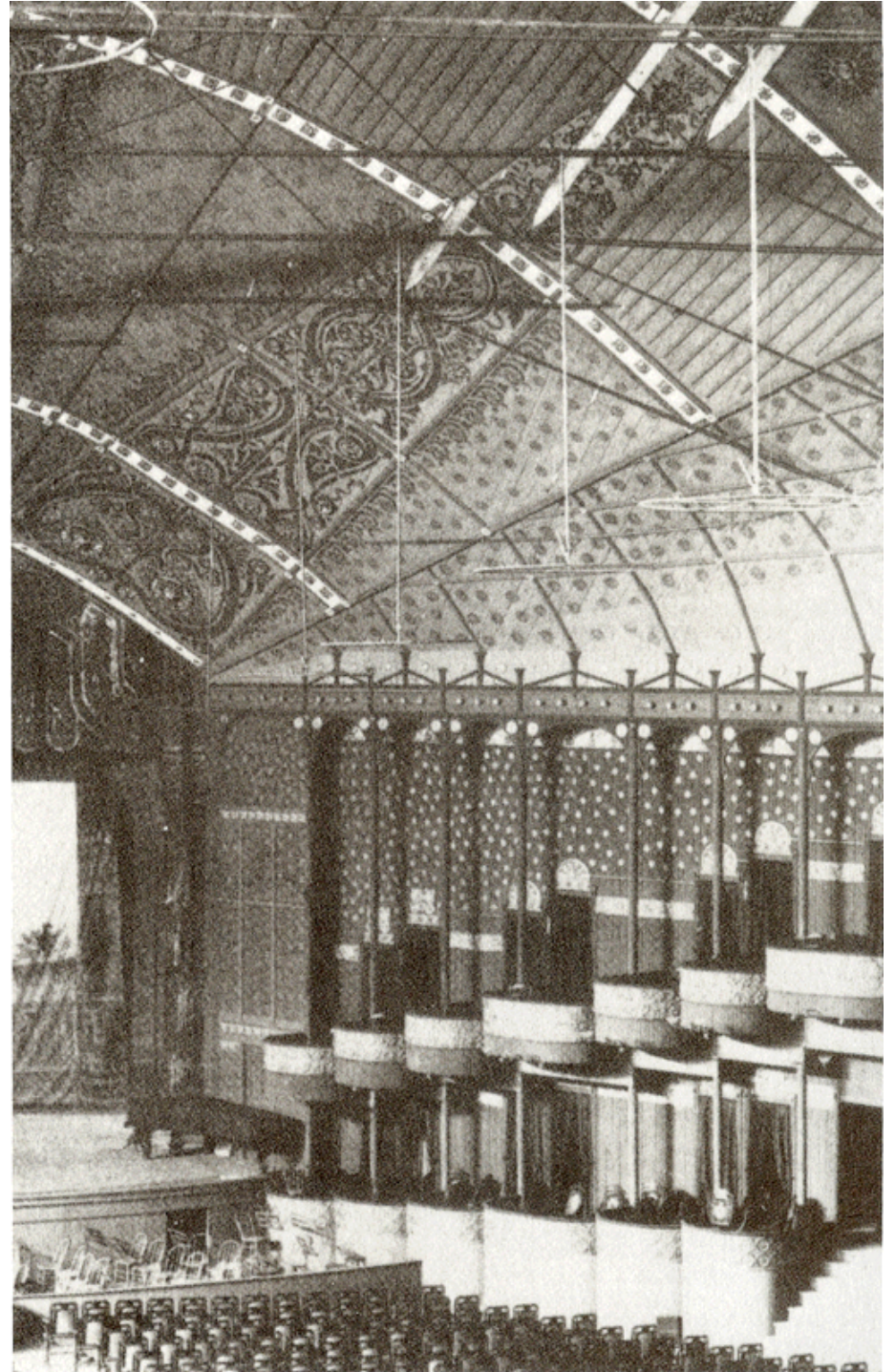
# Rehab an exhibition building...

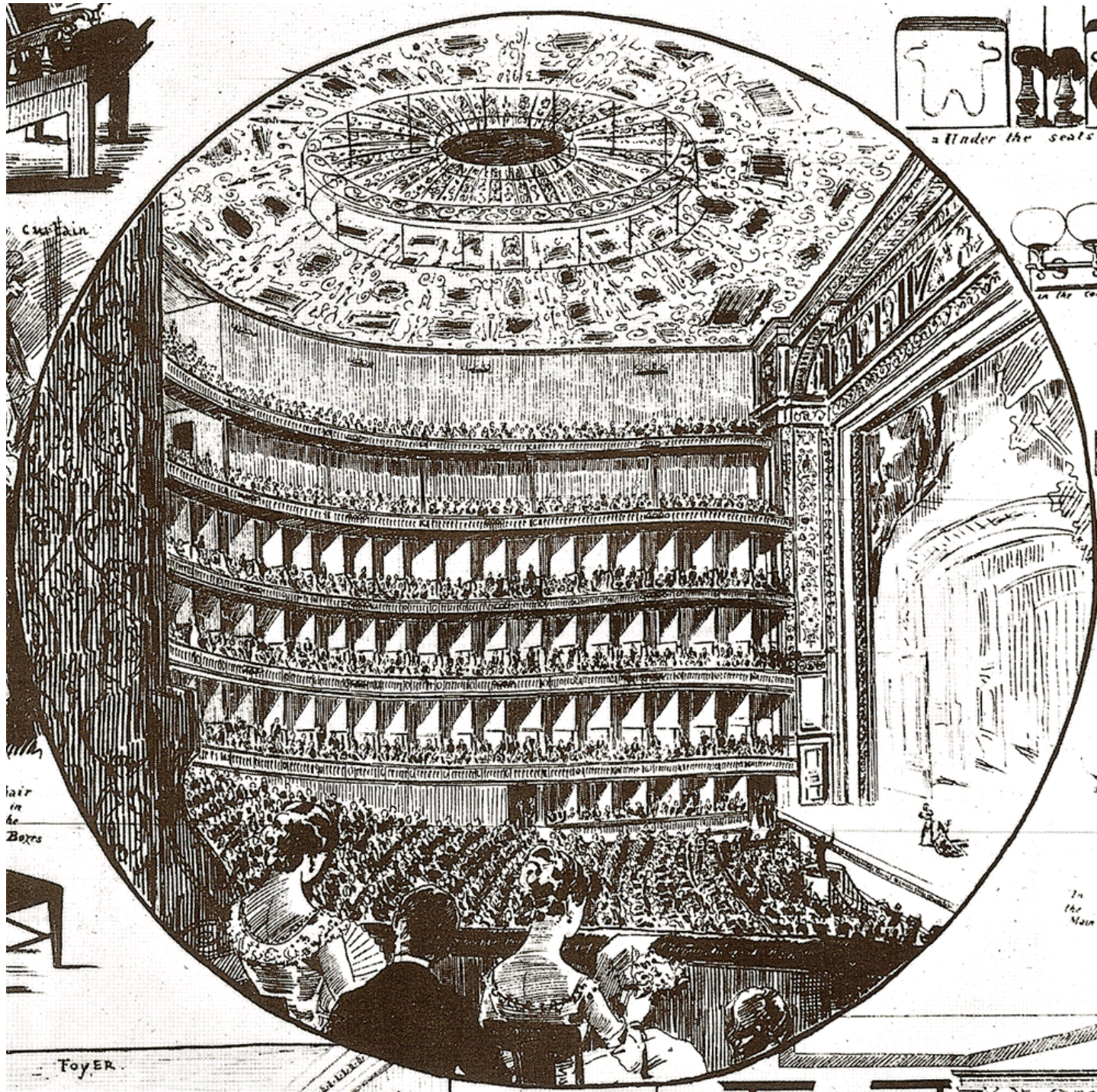
the Interstate Exhibition Hall



# Prototype Business Venture

- Music program appealed to immigrant groups, Italian, German, French Opera
- Raising the floor and adding balconies meant everyone had a clear line of sight
- Convinced Peck and his investors that a permanent Auditorium could be profitable





## The Competition, The Met

- Built 1883
- Seats 3,045
- Boxes rent for \$12,000 per season (in 1883 \$, in 2007 \$ that's \$229,361!!!)

# Adler sums up the stockholder's desires

- “The wish of Chicago to possess an Opera House larger and finer than the Metropolitan, a hall for great choral and orchestral concerts, a mammoth ball-room, a convention hall, an auditorium for mass meetings, etc. etc. all under the same roof and within the same walls gave birth to the auditorium proper”

# High culture for social pacification

- Chicago, home to radical labor movements... "Anarchism"
- City leaders thought cultural events, like opera, could sooth the heart of the savage labor organizer...kind of like what Reaganomics did to the USSR, pacification through capitalism

# Bricklayers Strike in 1883

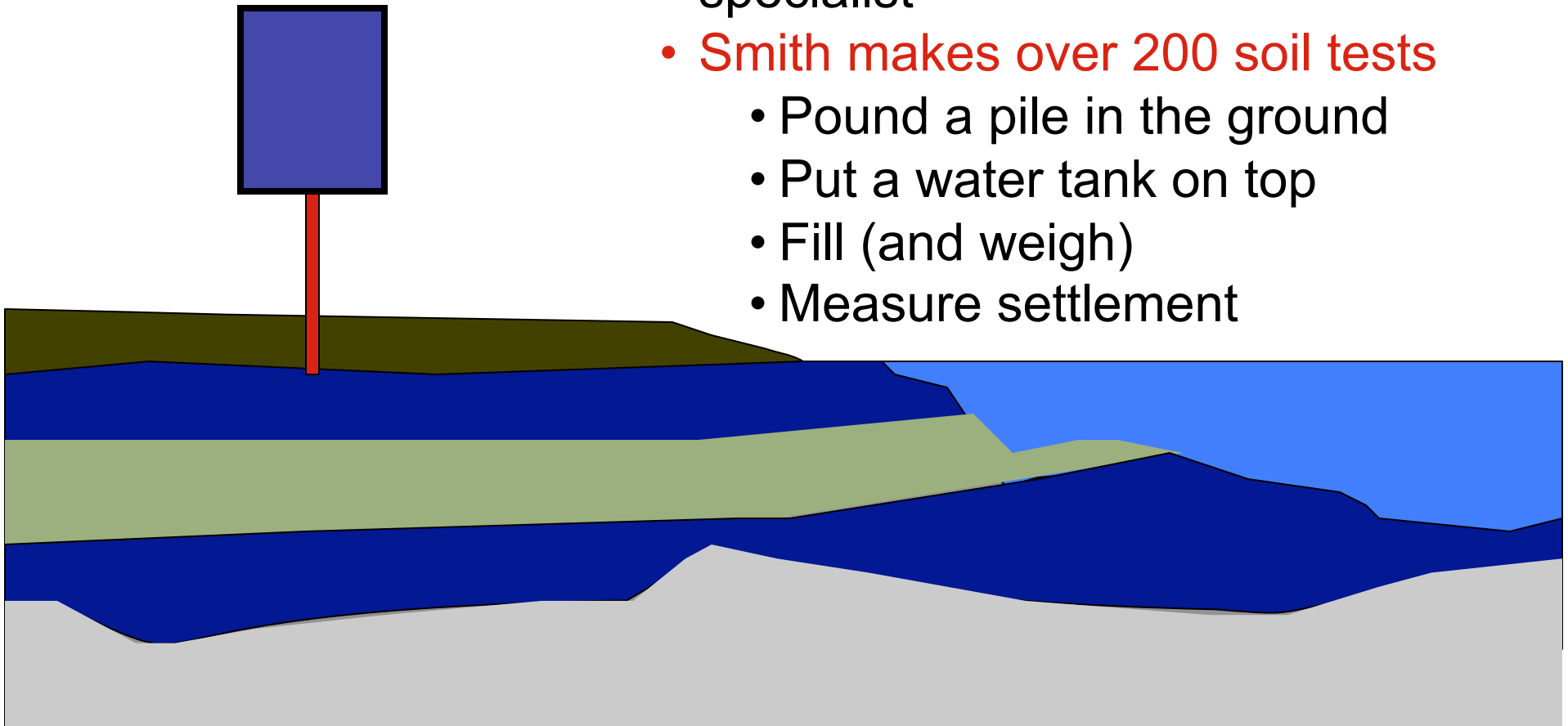
- Chicago board of trade construction stopped.
- Bricklayers organize into a union “The local United Order of American Bricklayers and Stonemasons” 1879
- Threats to stop all bricklaying in the city gives owners reason to consider other wall constructions

# Peck's Opera House idea gets no investors, had to buy the land himself

- Rethinks program to increase profitability.
  - Include a hotel
  - Include an office building
  - Include street level shops

# Start with poor soil...effectively the swamp at the edge of the lake

- No one knew the bearing capacity
- Called for the Calvary! General William Sooy Smith, now soil specialist
- **Smith makes over 200 soil tests**
  - Pound a pile in the ground
  - Put a water tank on top
  - Fill (and weigh)
  - Measure settlement



# Contracting

- Owner (Auditorium Corporation) was the GC.
- Architects (Adler and Sullivan) had two superintendents led by Paul Meuller who entered into subcontracts for the owner

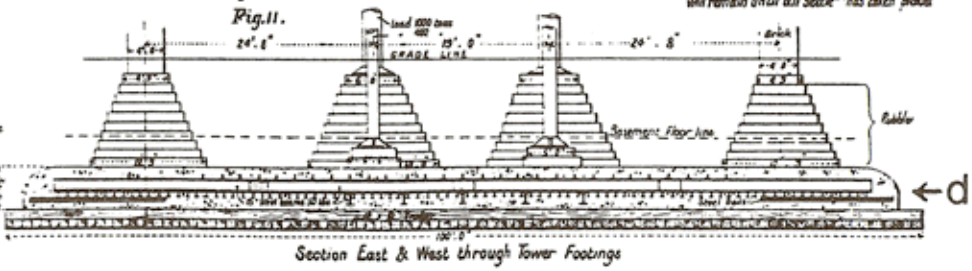
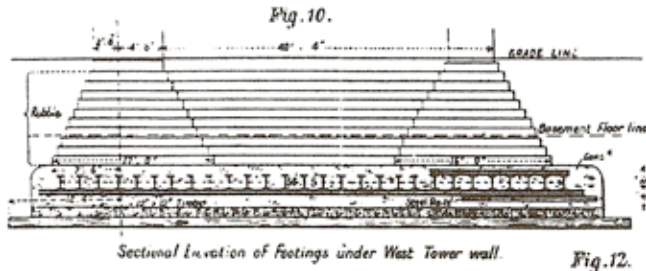
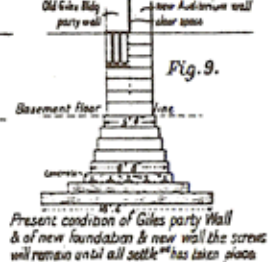
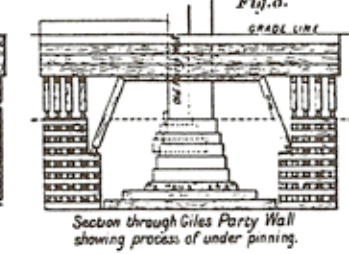
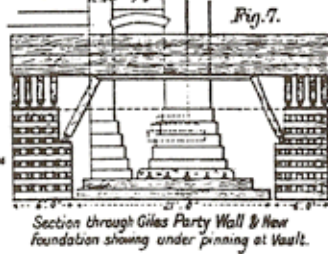
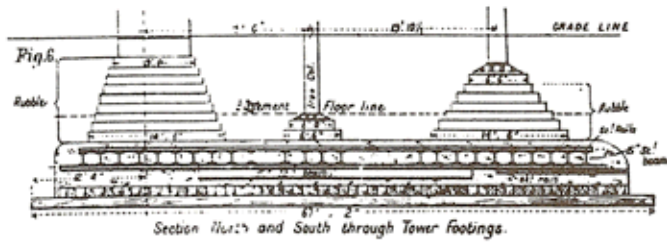
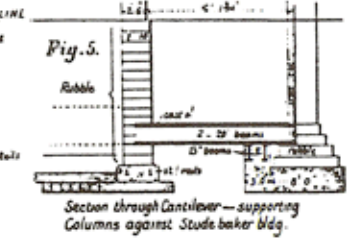
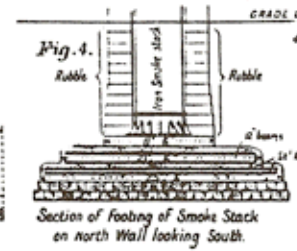
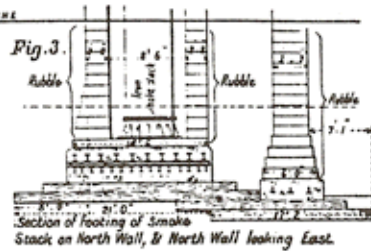
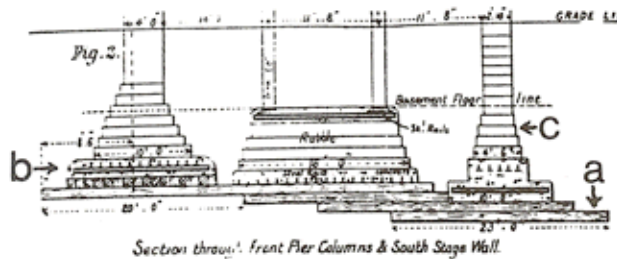
# Baumann & Smith Consultants

FOUNDATIONS OF THE AUDITORIUM BUILDING, CHICAGO.

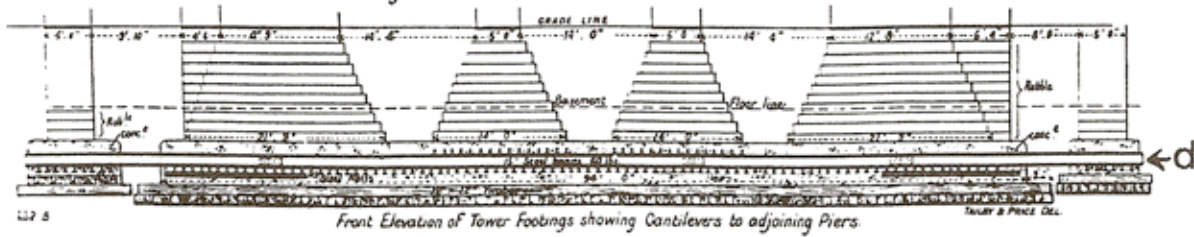
BY MESSRS. ADLER AND SULLIVAN, ARCHITECTS, CHICAGO.

(For Description, see Page 400.)

1-1'

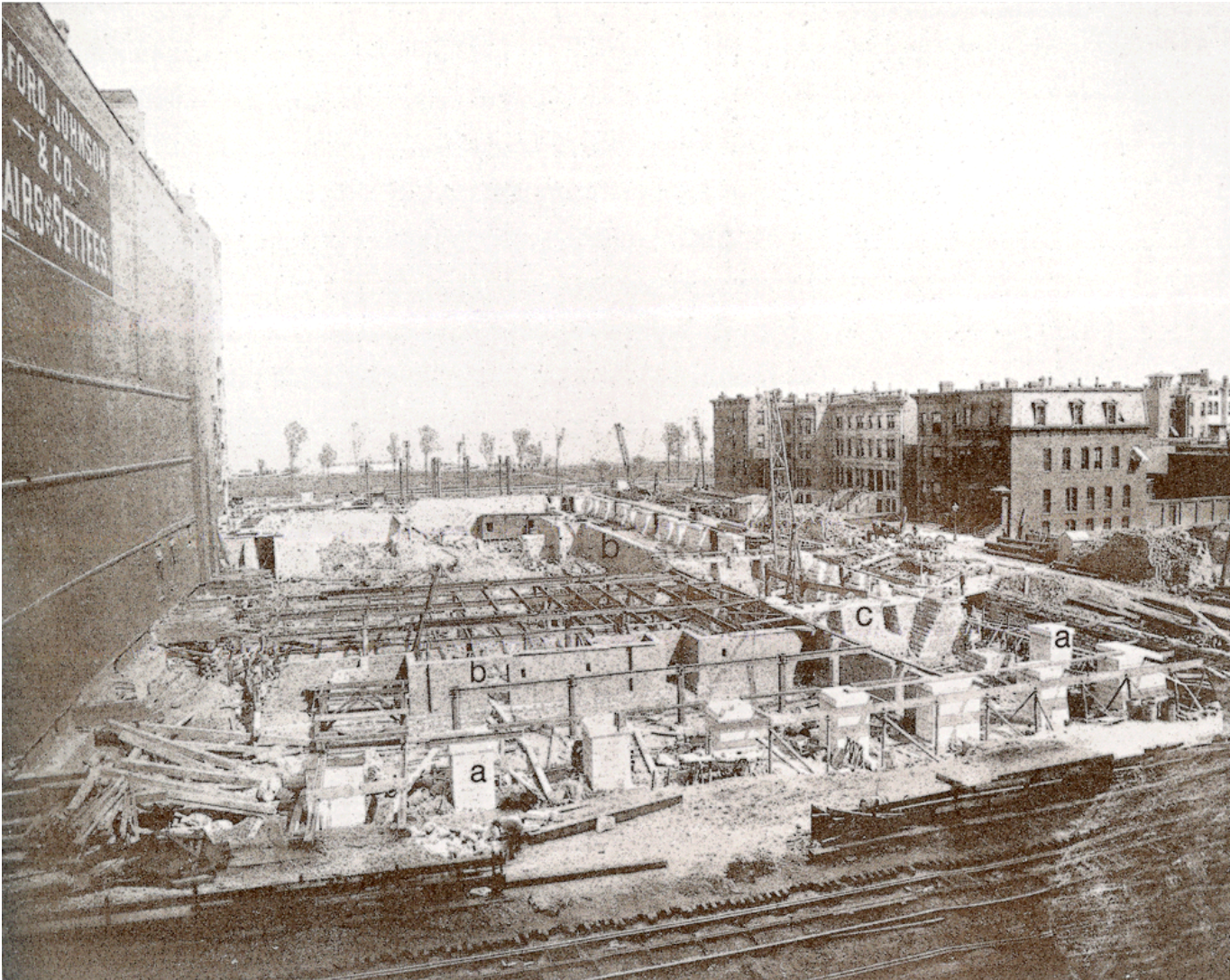


2-2'



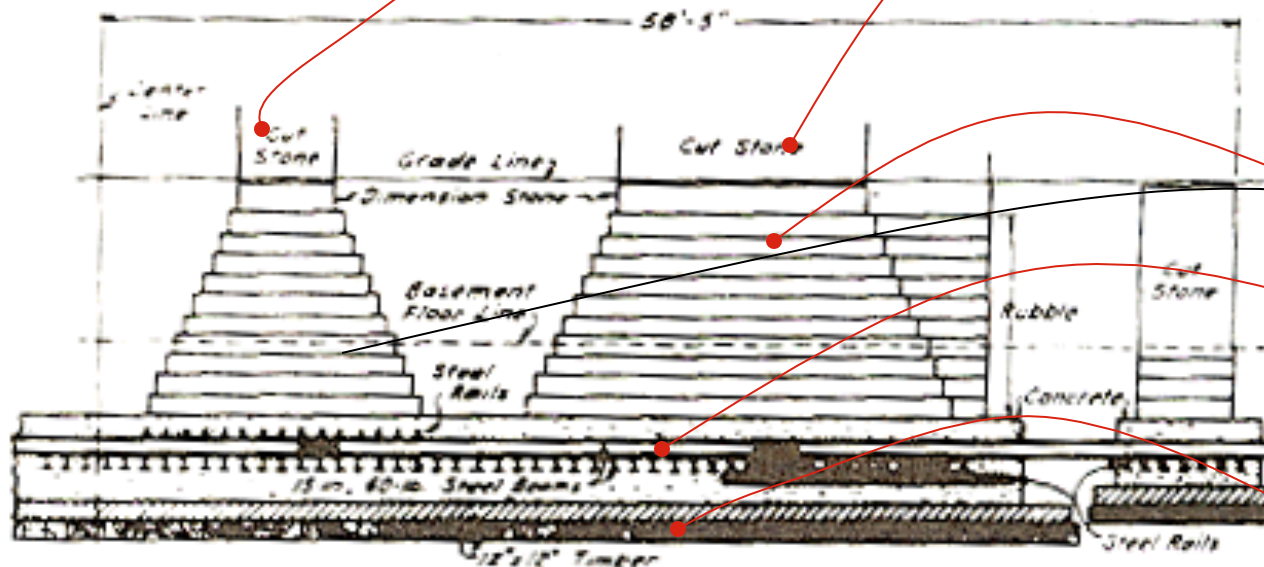
3-3'

# Excavation



- Smith says bearing is 4,500 psf, Adler uses 4,250 in struct design
- Overall excavation 12 feet deep
- Wall and column footings to 25 feet deep

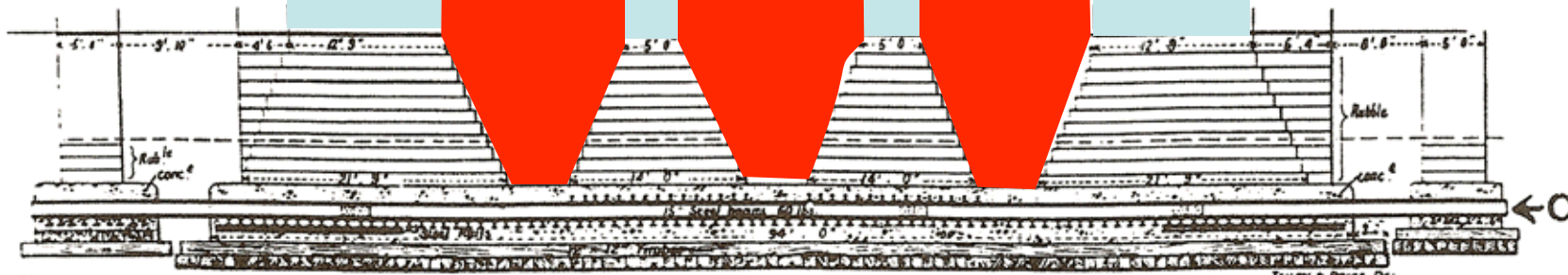
# Under the tower...wood like the Brooklyn Bridge



DETAIL 1 : TOWER FOUNDATION OF AUDITORIUM

- Cut stone walls, were supposed to be brick, would've been 30% lighter
- Stone pyramids for isolated piers
- Steel rails laid in perpendicular layers, grillage in concrete
- Timbers set in perpendicular layers, kept wet by groundwater to avoid rot

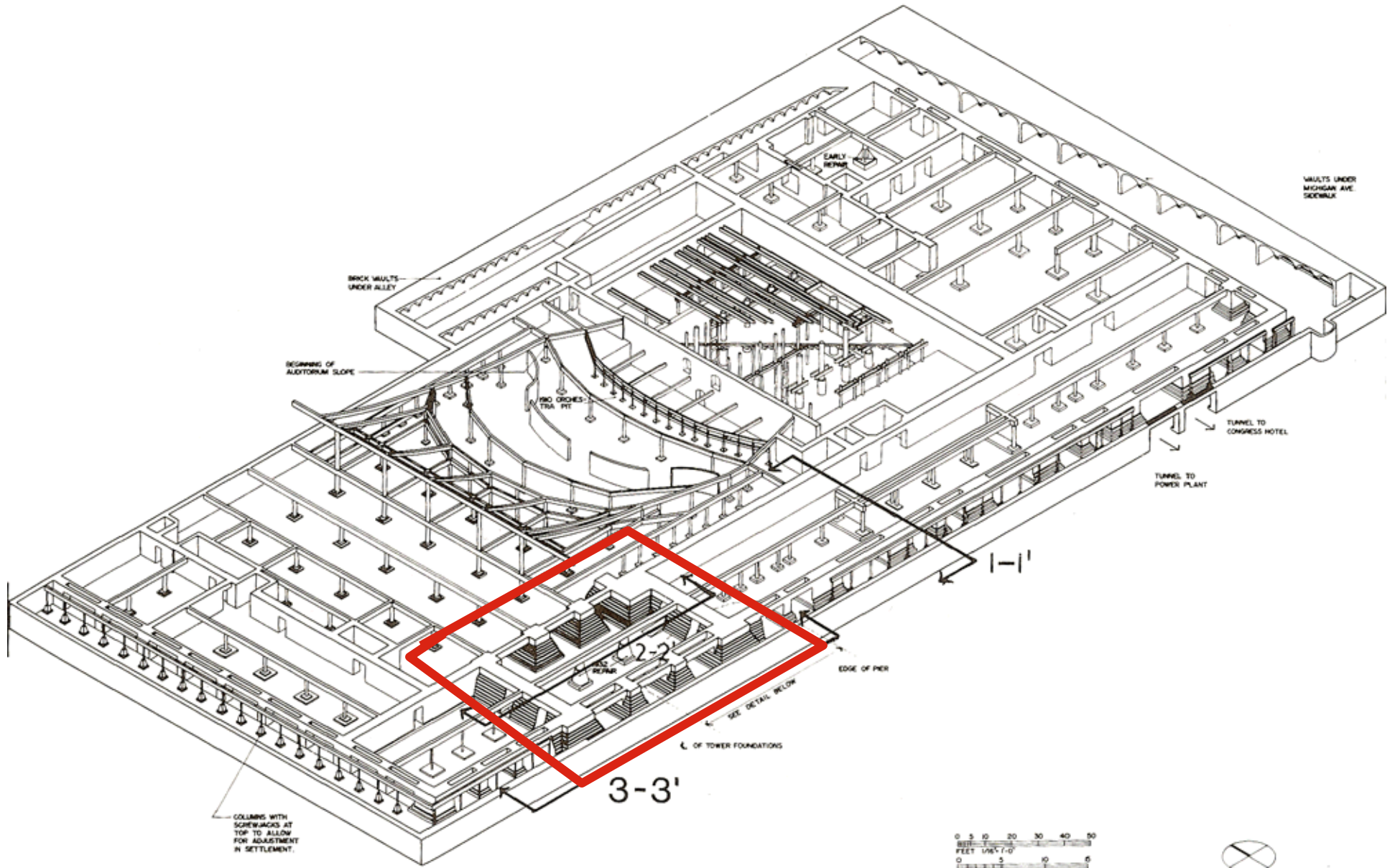
- Preload soil with iron and stone to equalize tower and building settlement



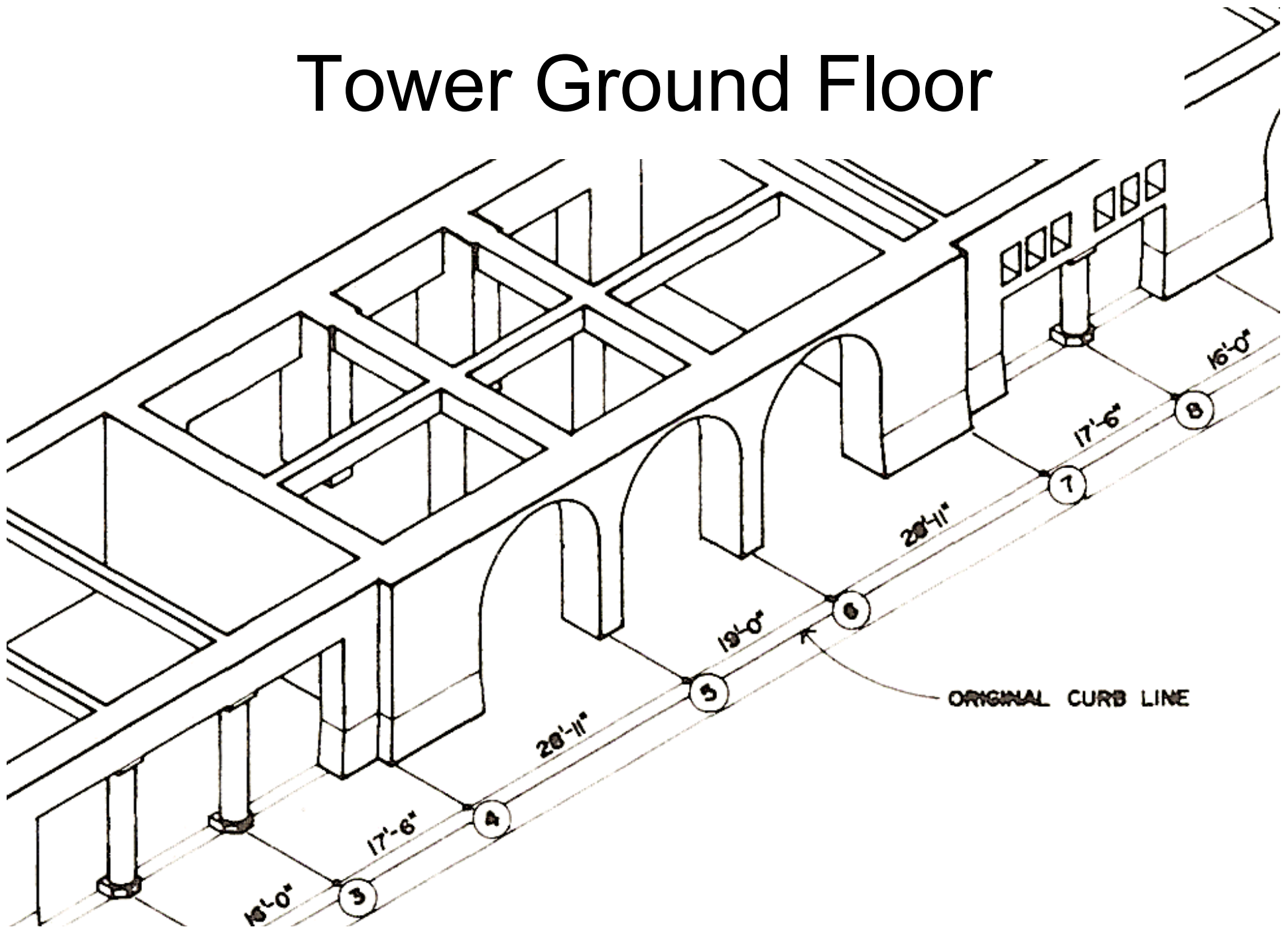
Front Elevation of Tower Footings showing Cantilevers to adjoining Piers.

3-3'

# Basement overall



# Tower Ground Floor



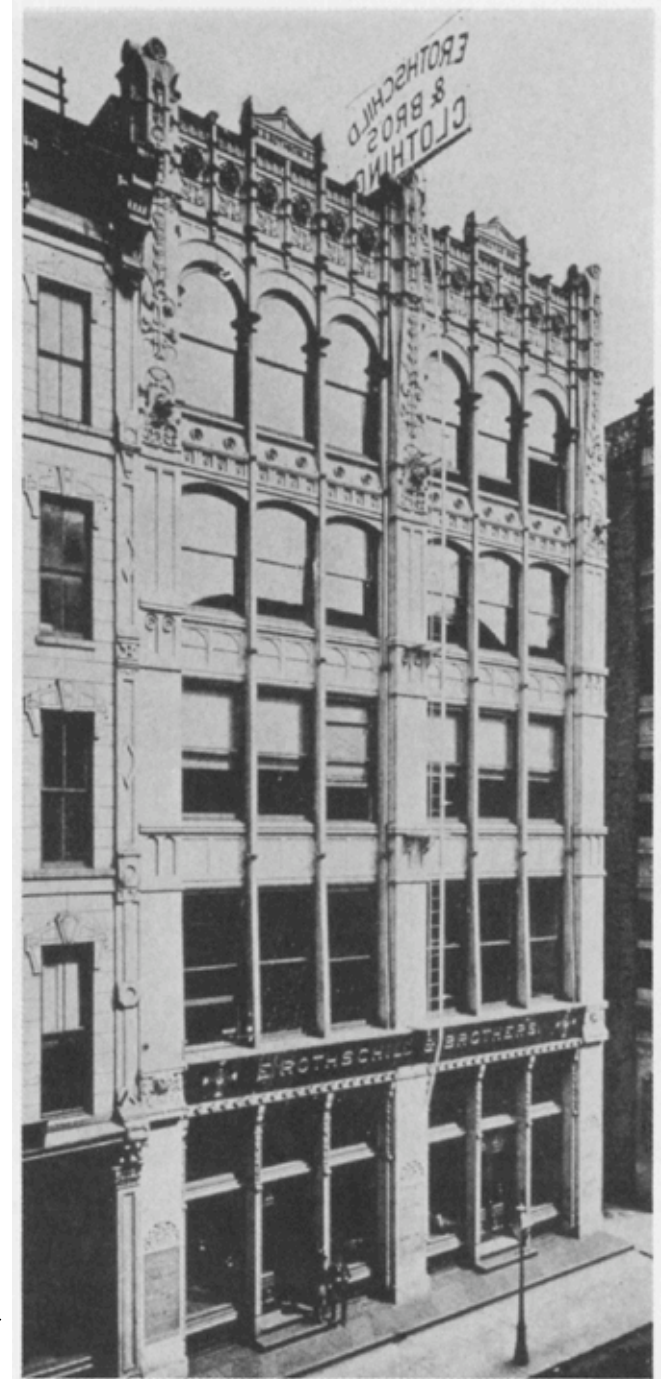
# External Reviews

- By William Ware, MIT Professor
  - Said “add two floors to the tower”
  - Peck agrees
  - This pushes soil loads up over the 4,250 psf the footings are sized for
  - Settlement begins...stops 23 inches later



Home Insurance Building 12 stories, Steel Frame 1883, William L Jenney

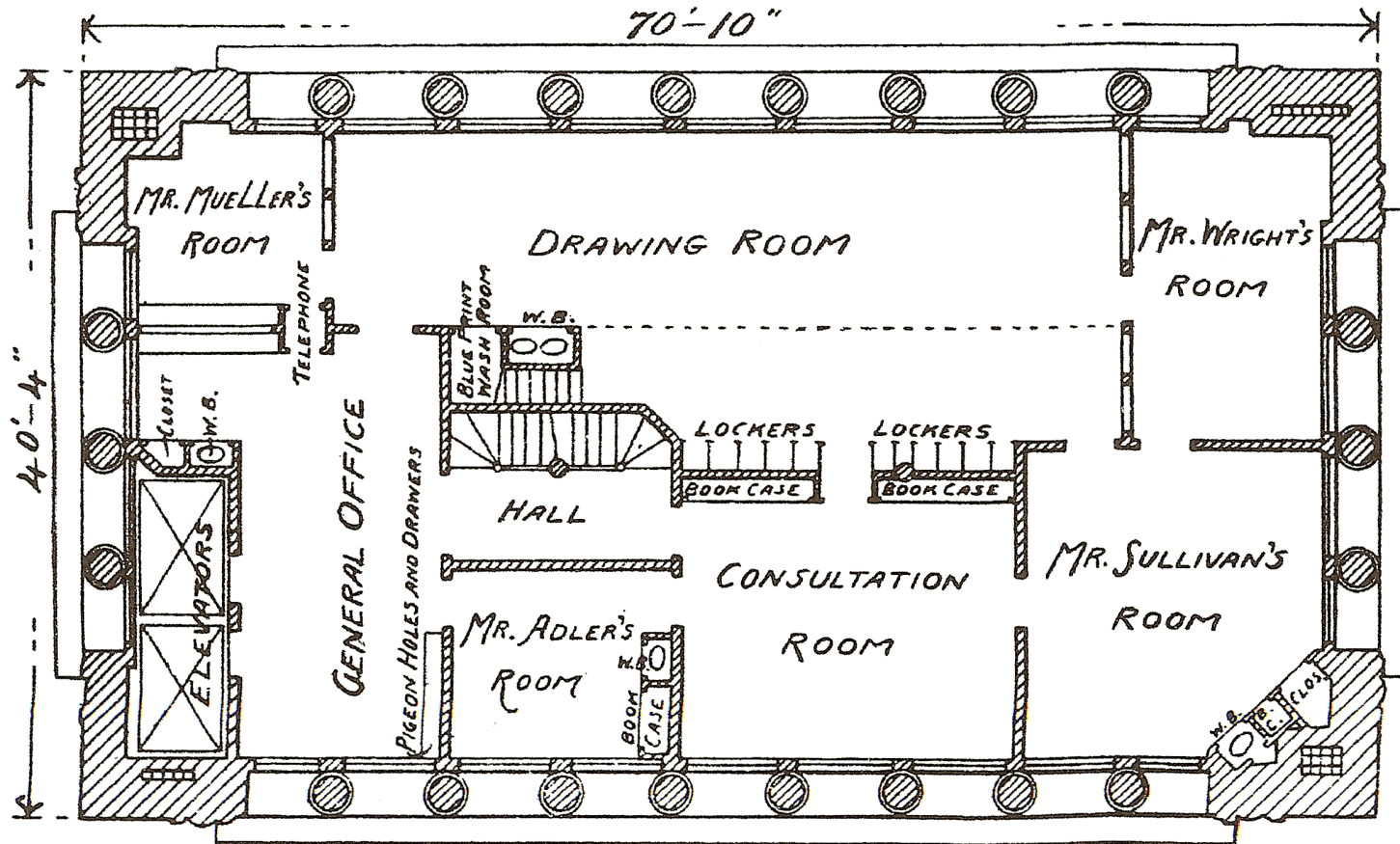
Rothschild Store 1881, Adler & Sullivan



1. Rothschild Store, Chicago. 1880-81. (Fuermann)



# 16th Floor for Architects

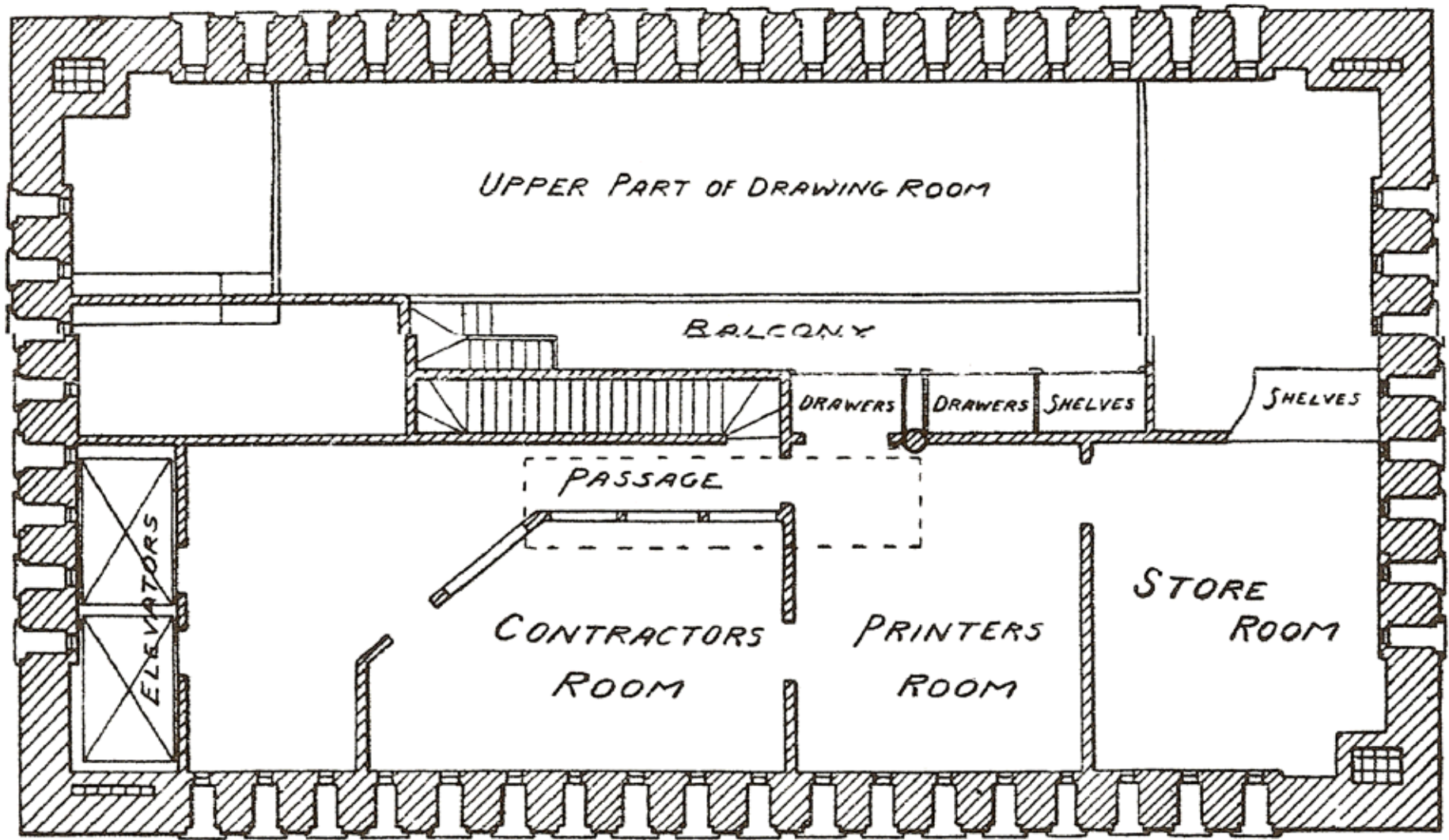


0 5 10 15 20  
Scale of feet.

SIXTEENTH STORY

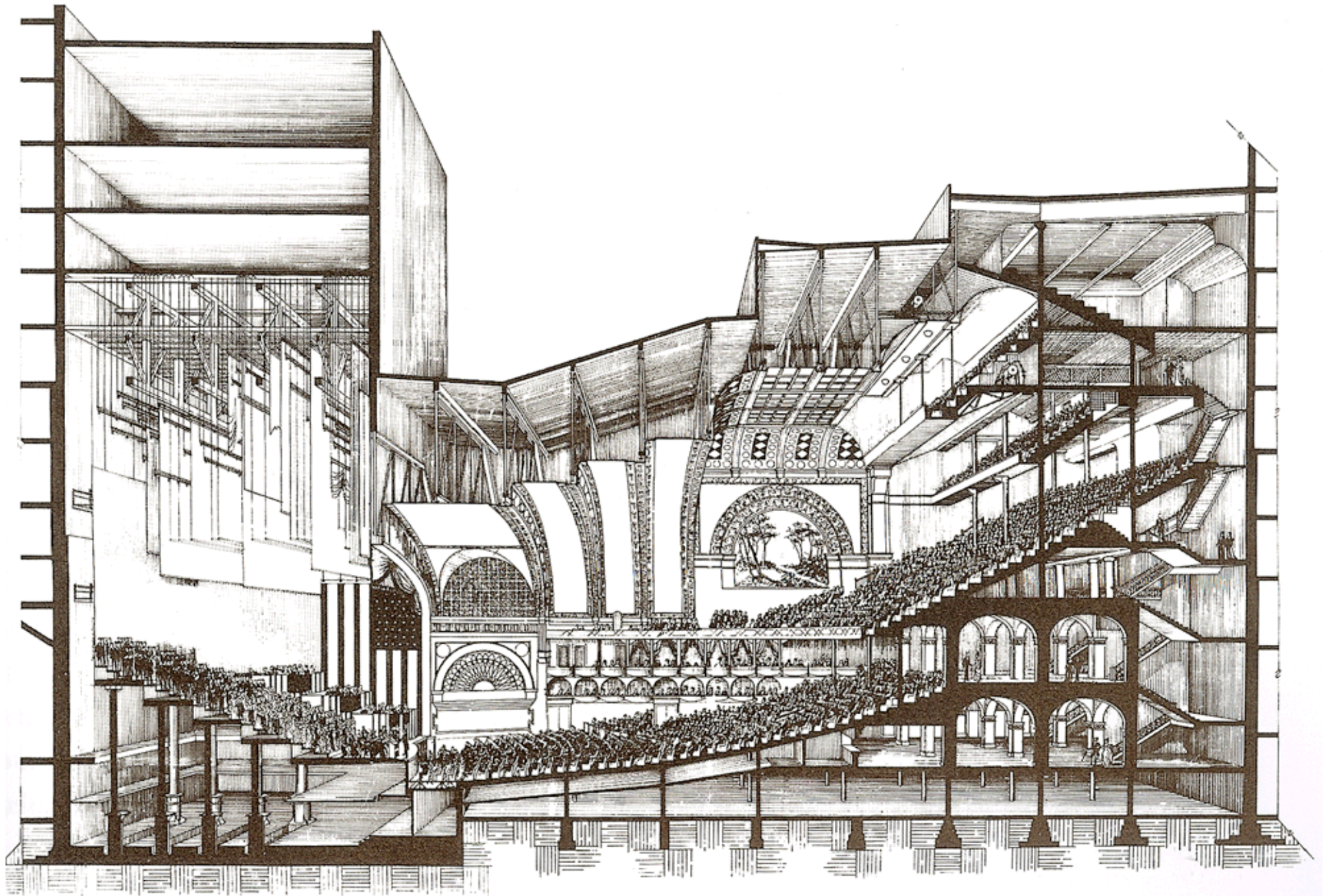
OFFICES OF  
ADLER & SULLIVAN  
AUDITORIUM BUILDING TOWER, CHICAGO.

# 17th floor for contractors



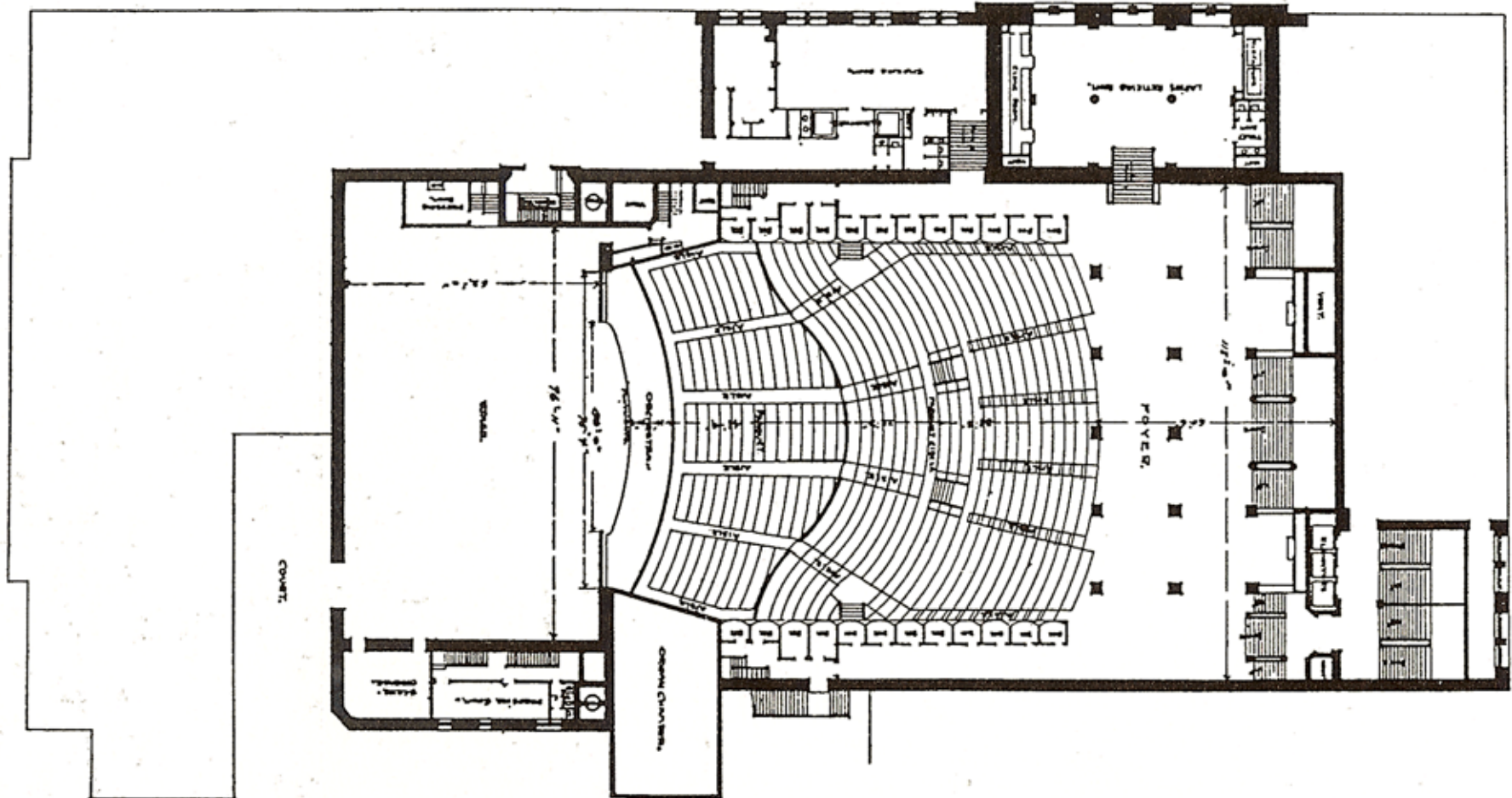
"THE ENGINEERING  
AND  
BUILDING RECORD"

SEVENTEENTH STORY

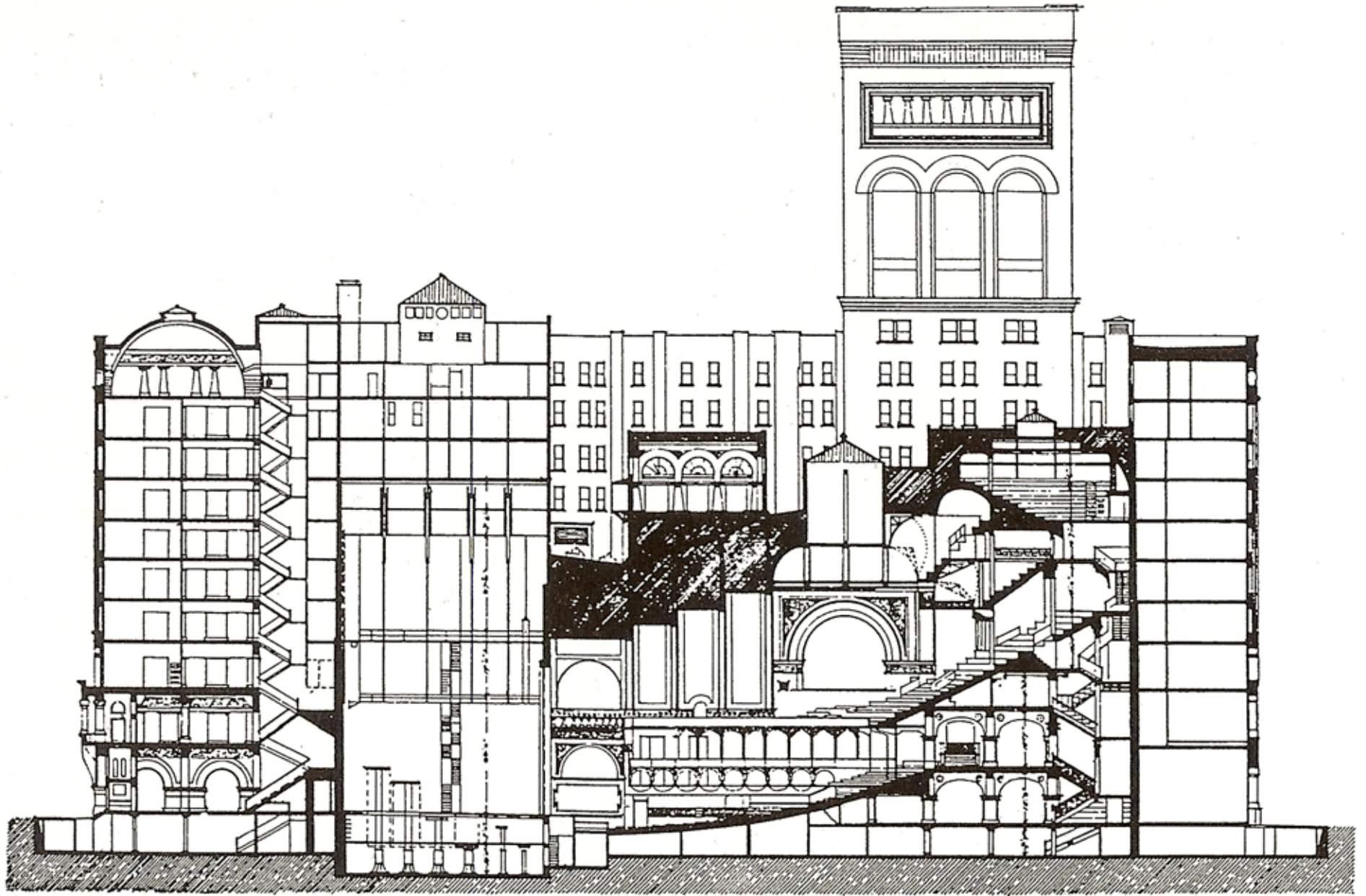


# Flex seating 4,574 concert, 2,574 for recitals, 7,000 for conventions

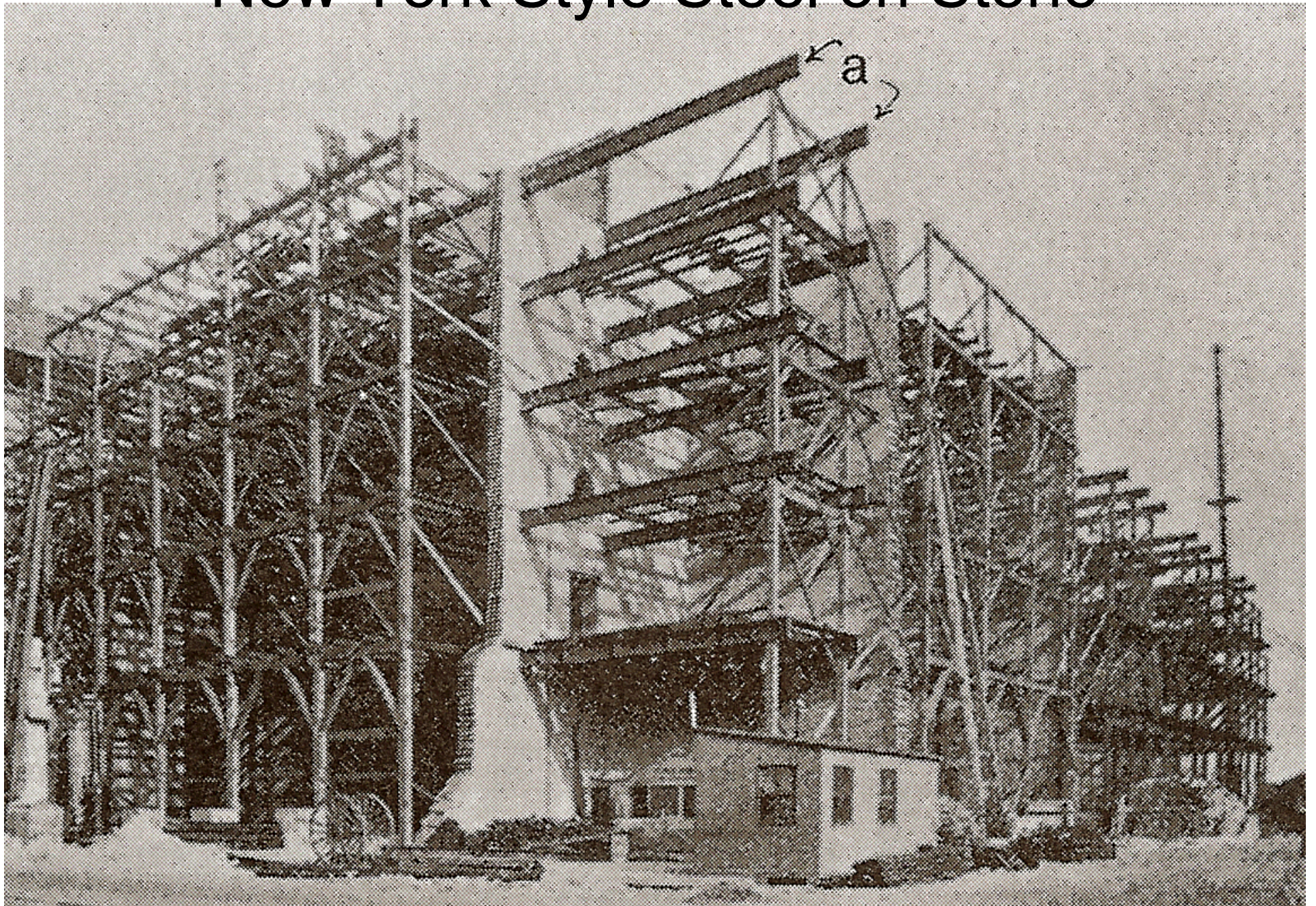
...cooled by 15 tons of ice/day



Overall area of 10 story portion, 673,200 square feet approx

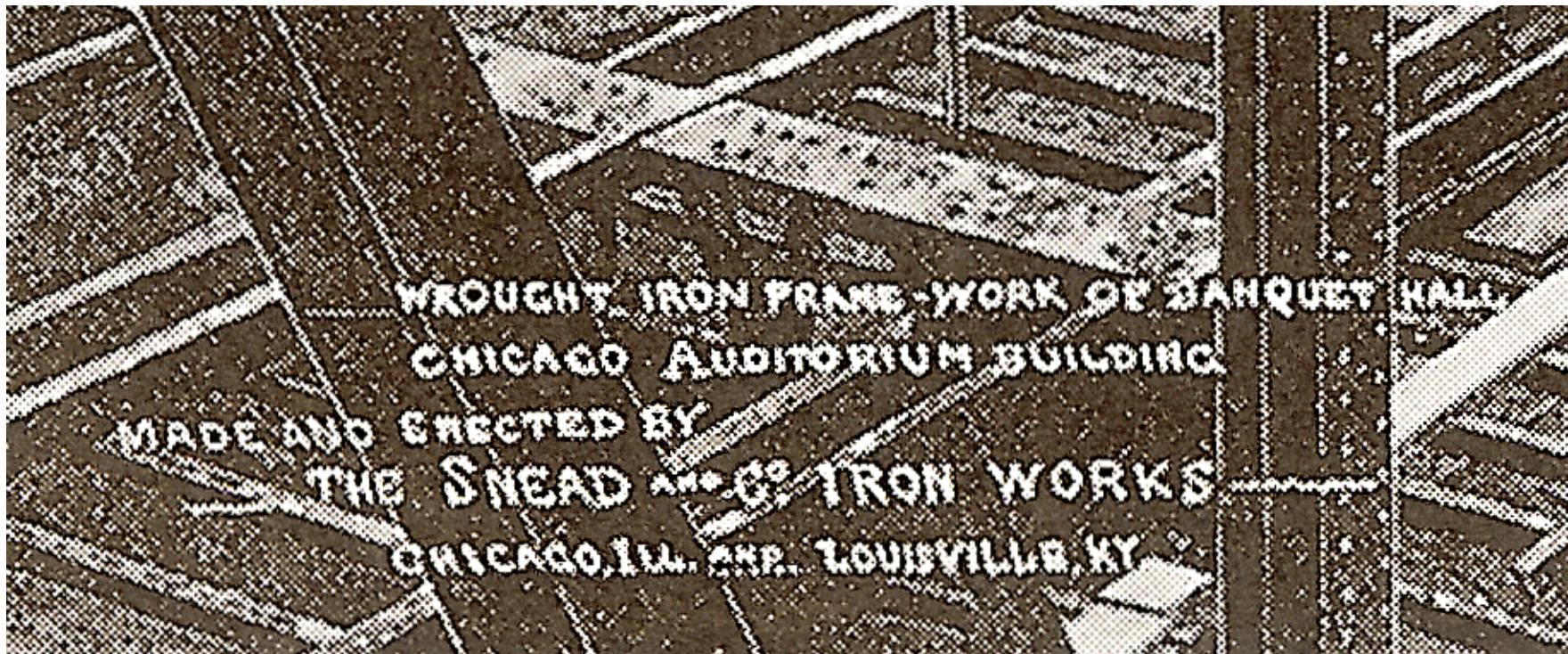


# New York Style Steel on Stone

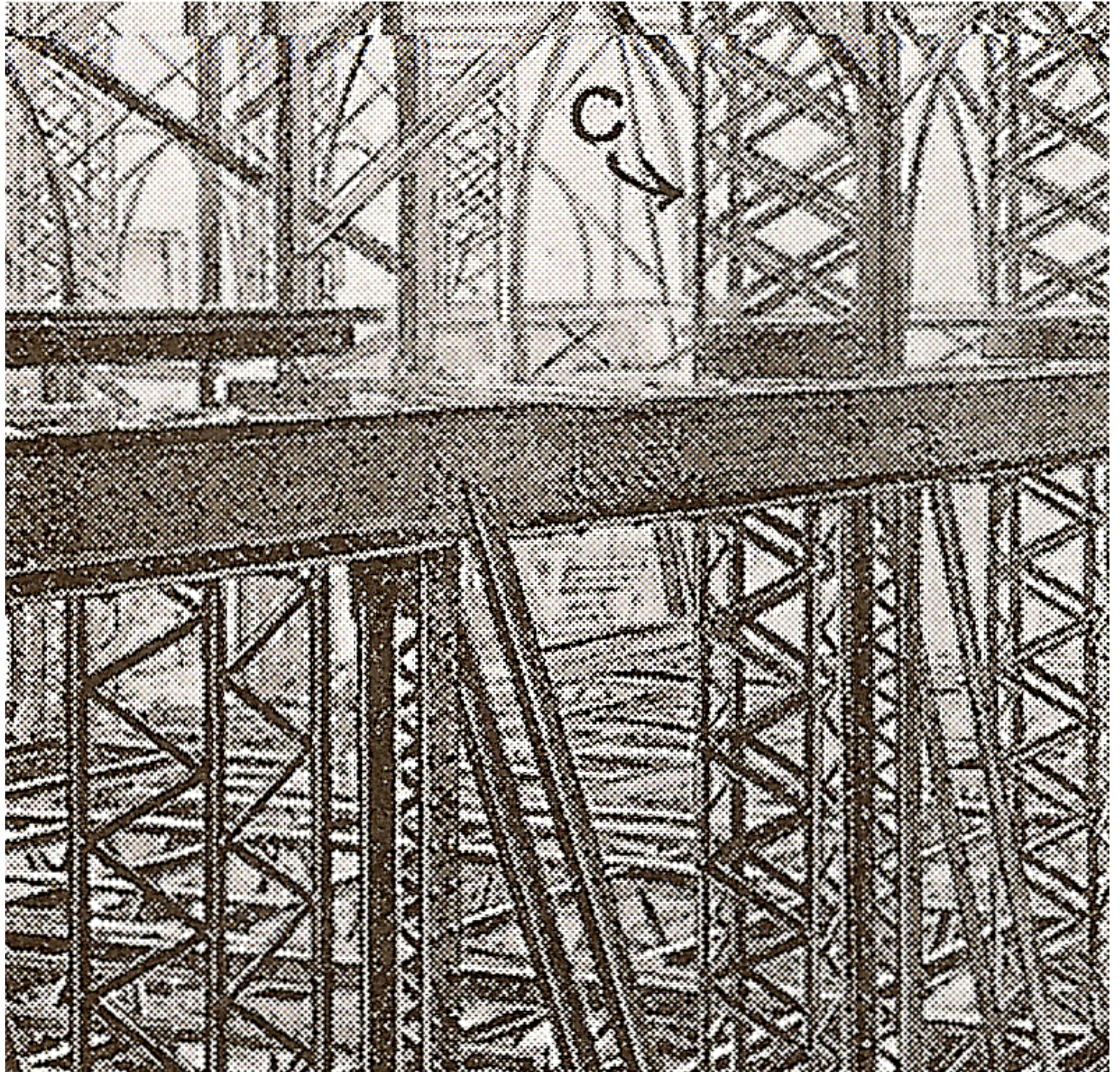


# Kentucky Steel

- Famous Homestead Mill Strike delayed Carnegie's delivery, alternatives found



Mostly  
Lattice  
Columns



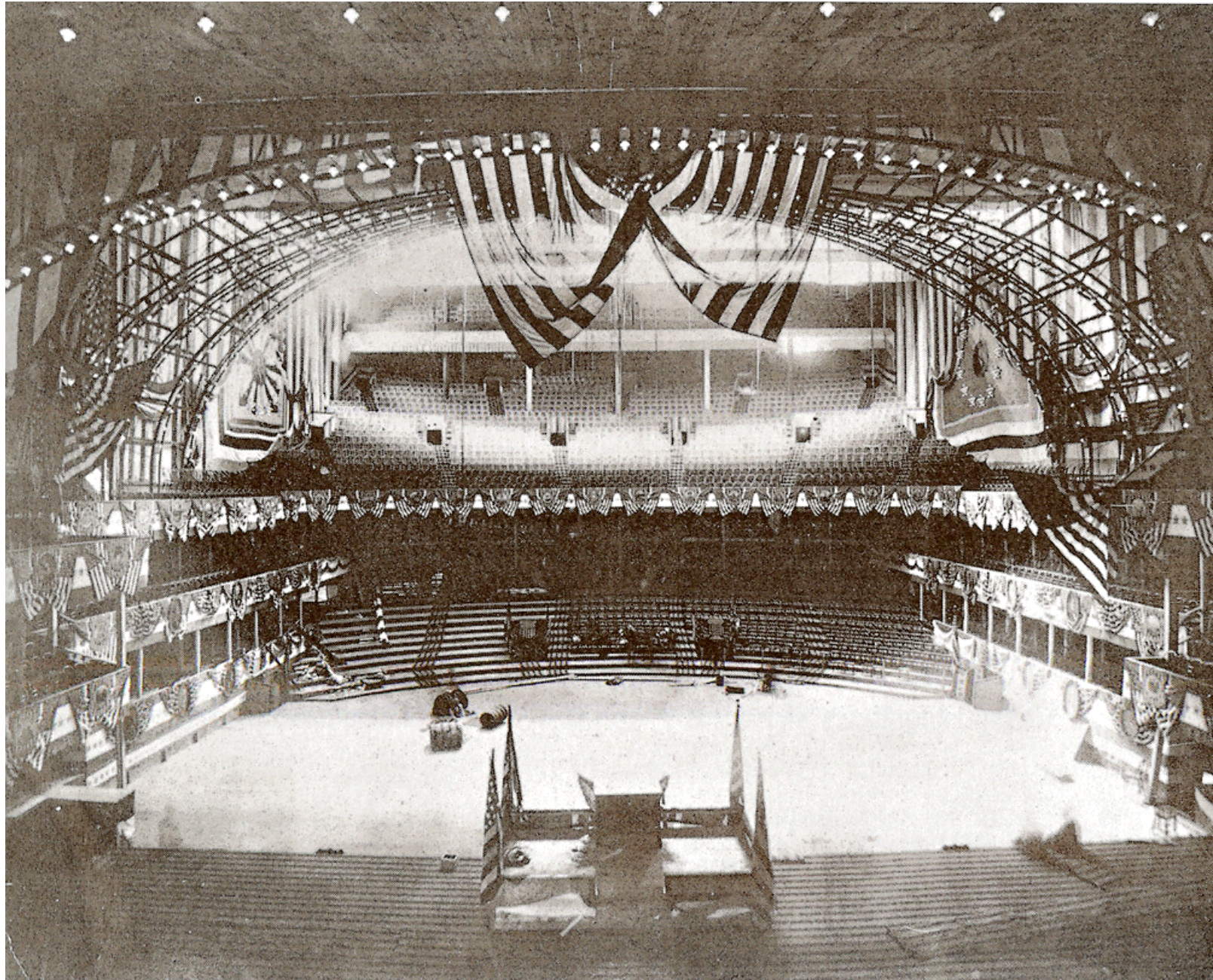
# Income during Construction

- Temporary enclosure rigged to host 1888 Republican National Convention



THE AUDITORIUM BUILDING—THE PLACE OF MEETING OF THE NATIONAL REPUBLICAN CONVENTION.  
DRAWN BY CHARLES GRAHAM FROM SKETCHES BY WALTER BURRIDGE.

1888, not done but ready for the Republicans



# Harrison is RNC Choice in 1888



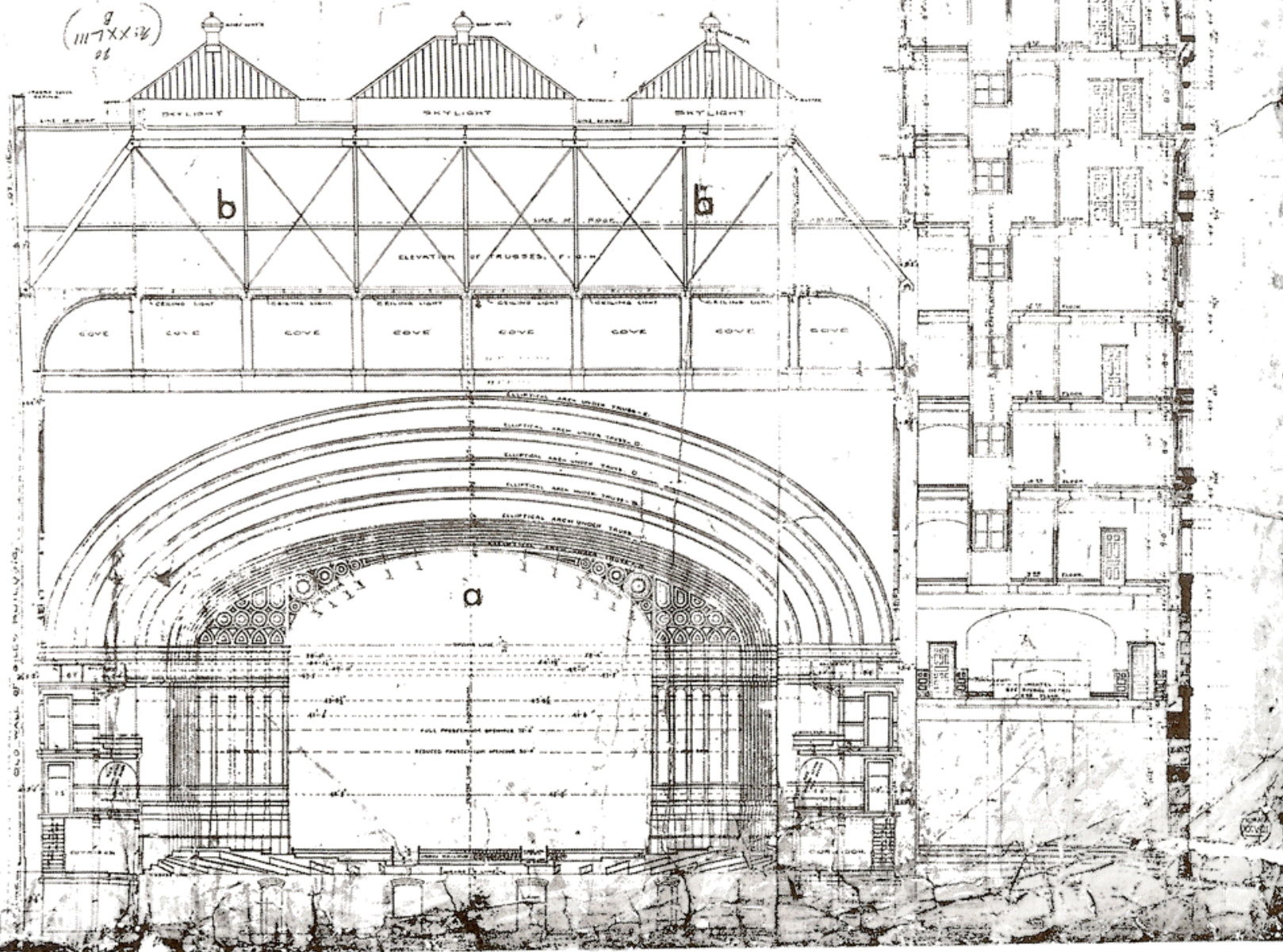
CHICAGO AUDITORIUM BUILDING

TRANSVERSE SECTION LOOKING EAST

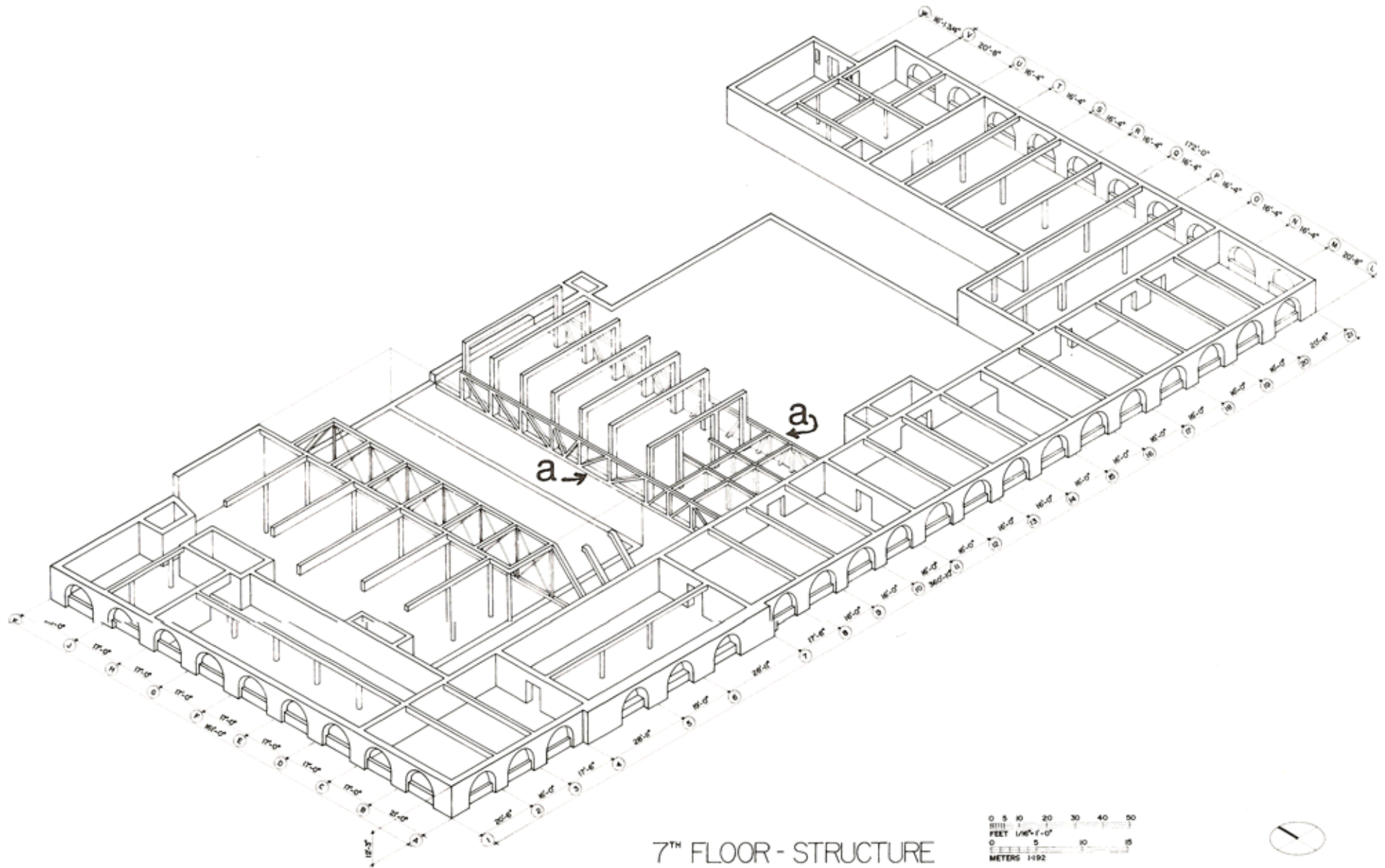
SCALE 1/4" = ONE FOOT

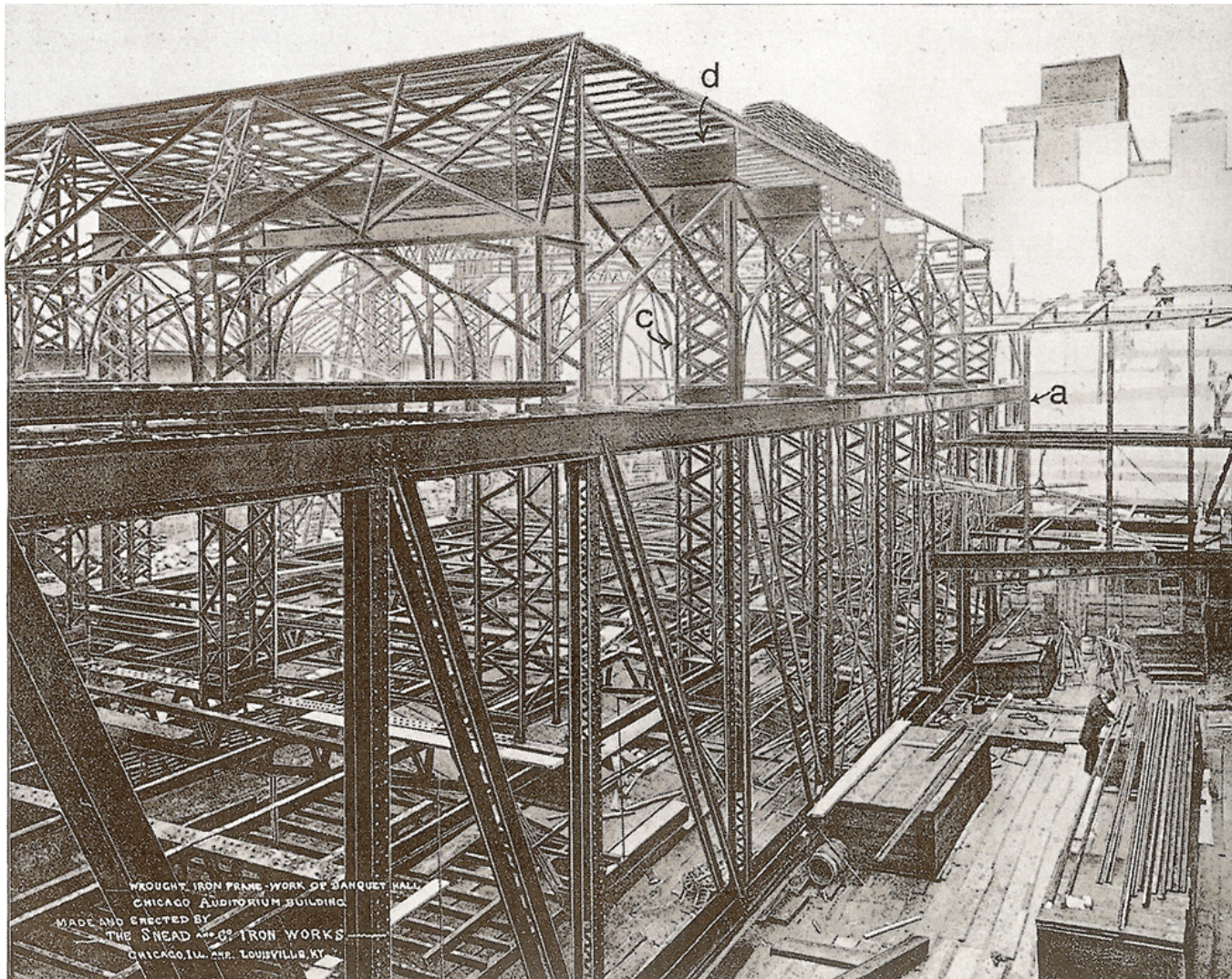
ADLER & SULLIVAN ARCHTS.

(9  
111-XXXV  
06



# 7th floor framing





## Banquet hall trusses span performance hall

THE MOST DARING STRUCTURAL FEATURES OF THE BANQUET HALL ARE THE TWO LONGITUDINAL TRUSSES OF 120' SPAN CARRYING THE HALL'S 660 TONS. THESE TRUSSES TRANSFER THEIR LOADS DIRECTLY ON THE NORTH AND SOUTH BEARING WALLS. THE EASTERN TRUSS 'T' IS ABOUT 24' DEEP, THE WESTERN TRUSS 'U' IS ABOUT 14' DEEP; EACH BEARS

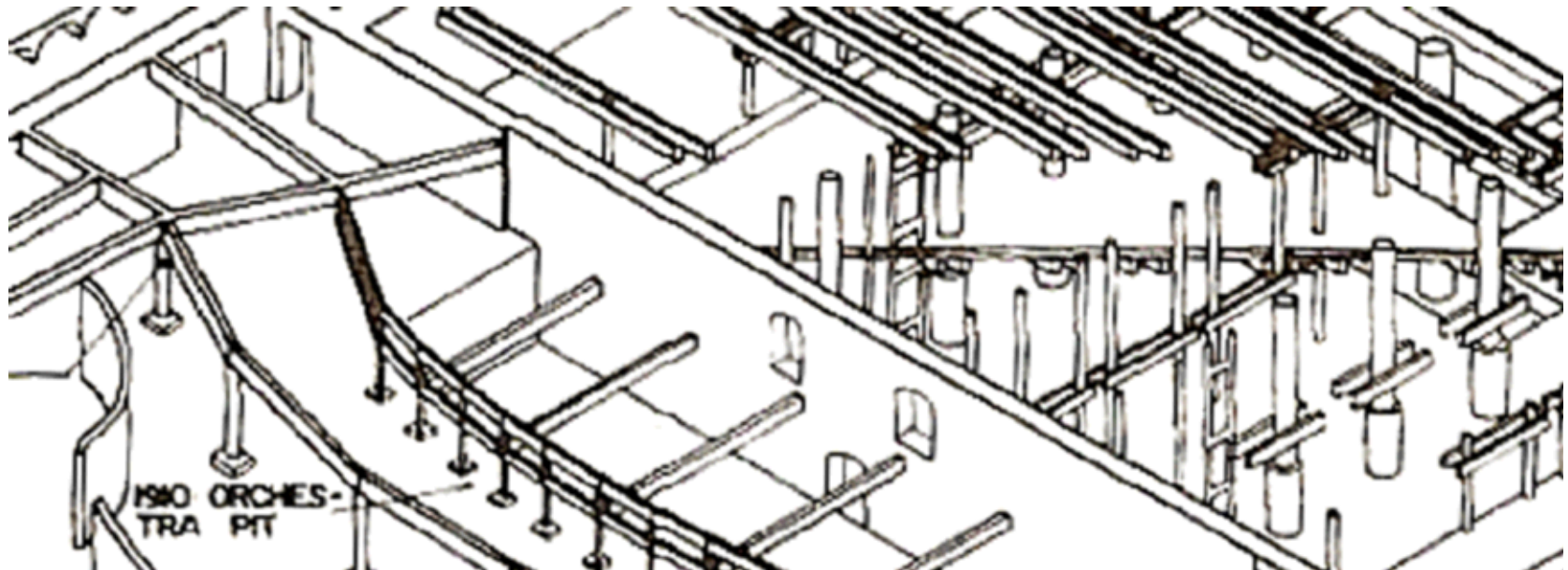
ON A 1 1/2' THICK NORTH WALL AND A 2' THICK SOUTH WALL. THE TWO LONGITUDINAL TRUSSES ARE CONNECTED BY 9 TRANSVERSE TRUSSES (3' DEEP AT MID-SPAN) SPANNING ABOUT 40'. THE ROOF STRUCTURE OF THE BANQUET HALL CONSISTS OF SIX CROSS BEAMS ENCLOSED WITH WIRE LATHE AND PLASTER FORMING SQUARE COFFERS WITH TWO FAKE LONGITUDINAL BEAMS.



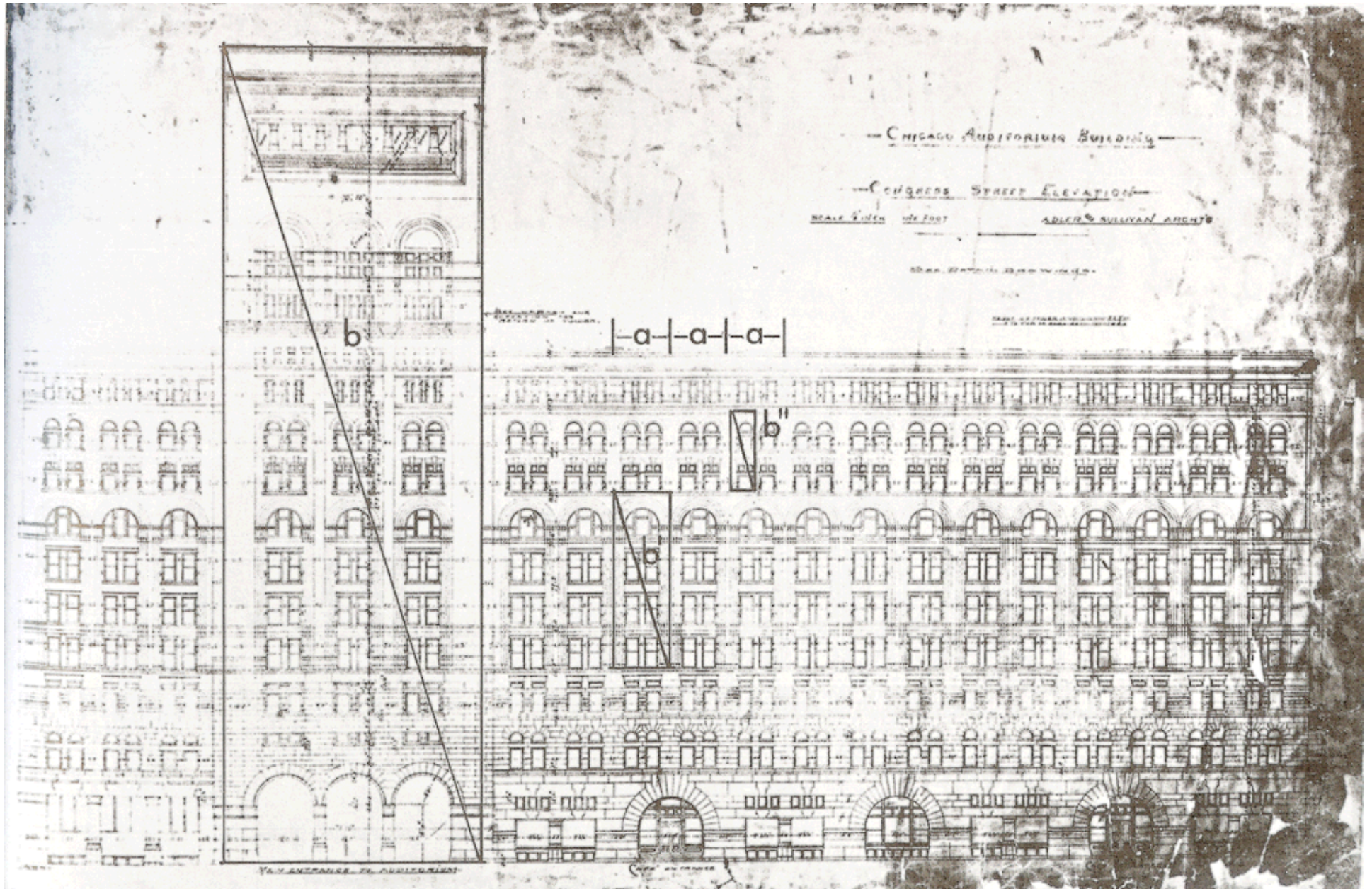
# Masonry Derricks



# Water Powered Hydraulic Stage Lifts



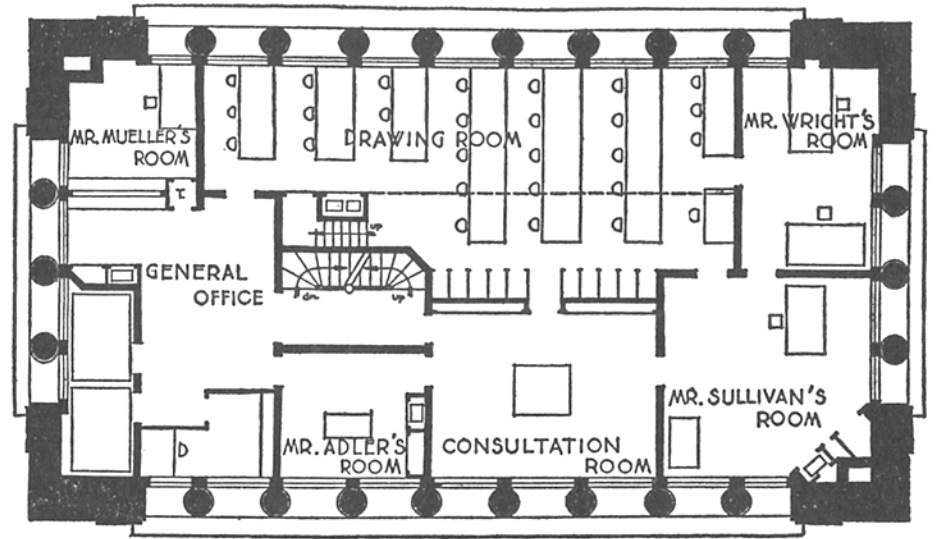
# South Elevation





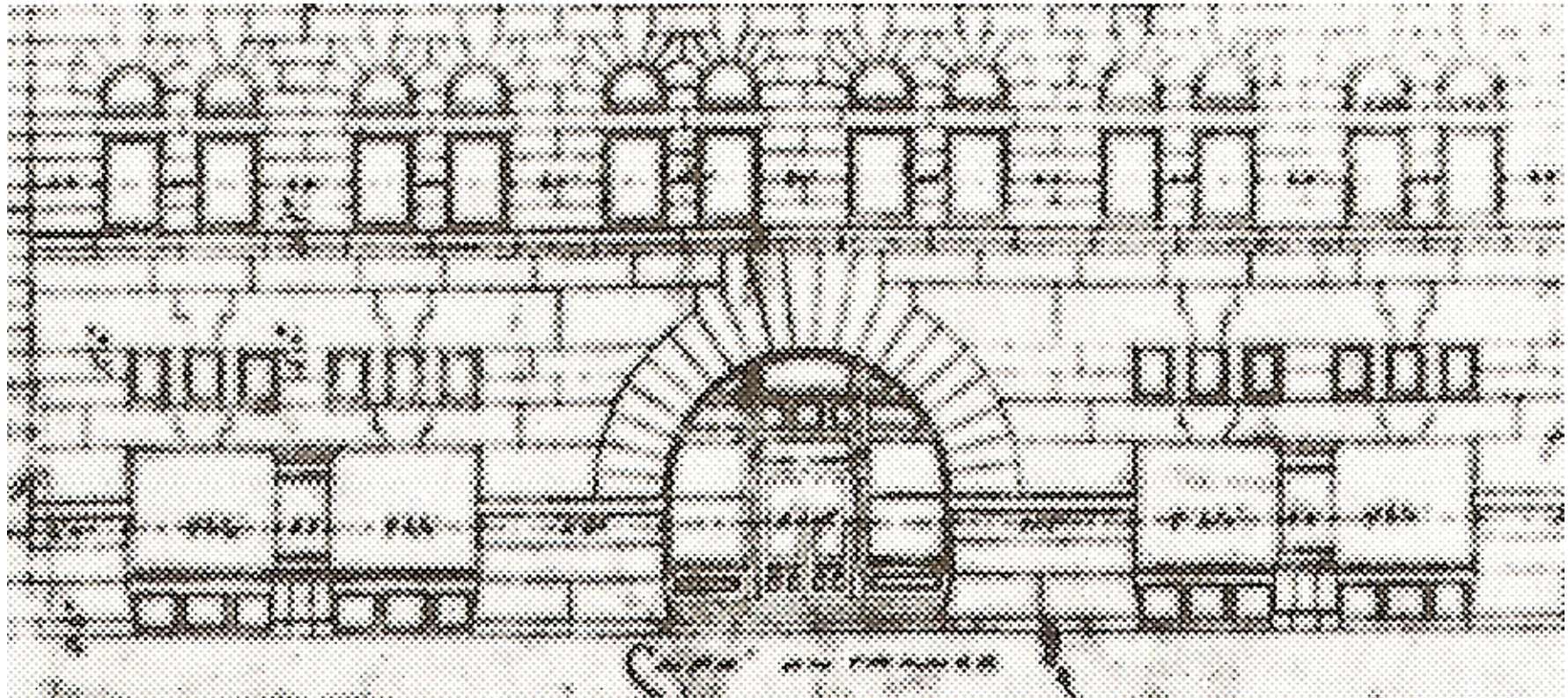
**Auditorium building**

- Building design October to December 1886
- Ornament design July 1888 to July 1890
- Constructed 1887-89





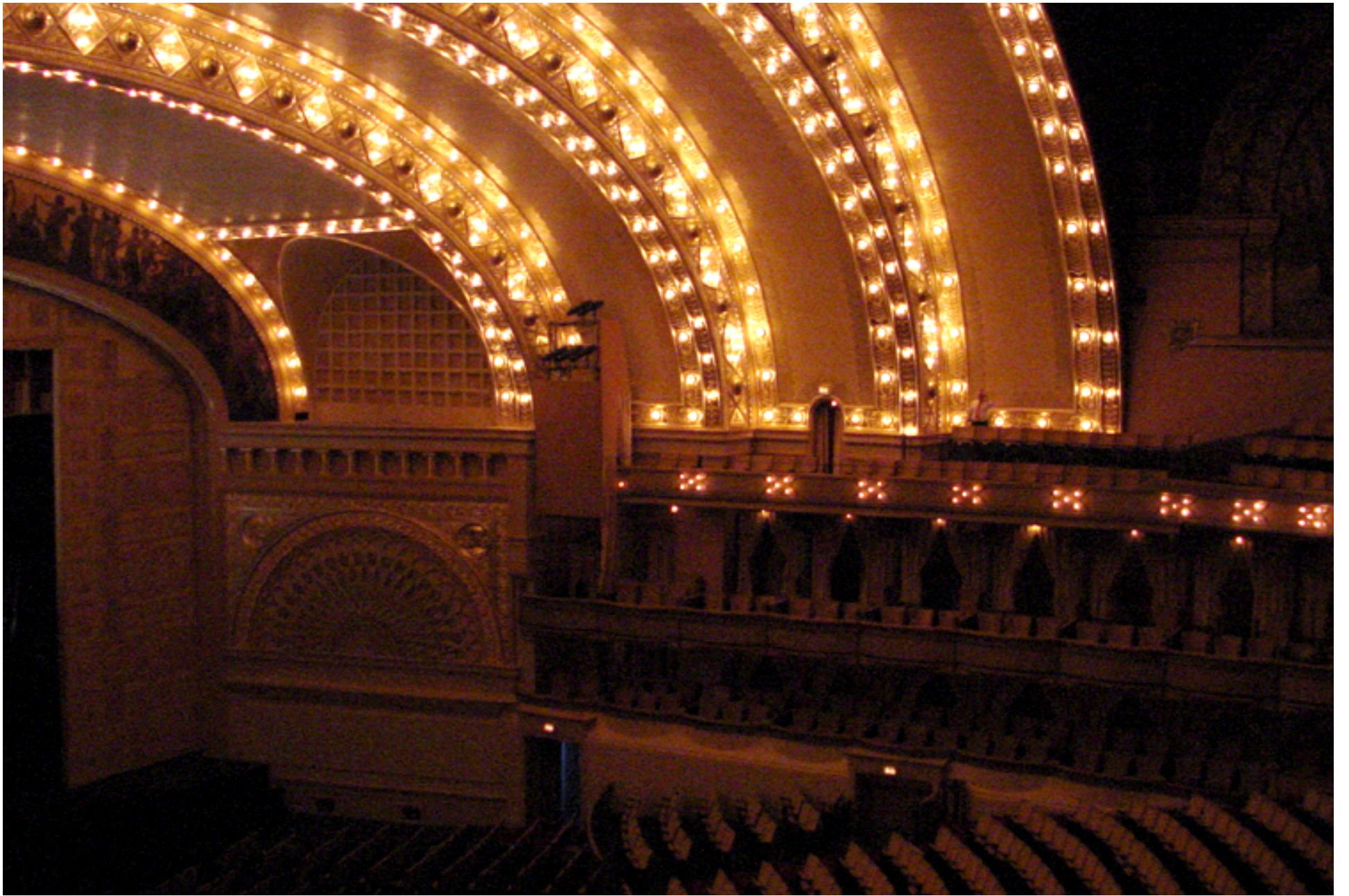
# Arch and Lintel Congress Parkway



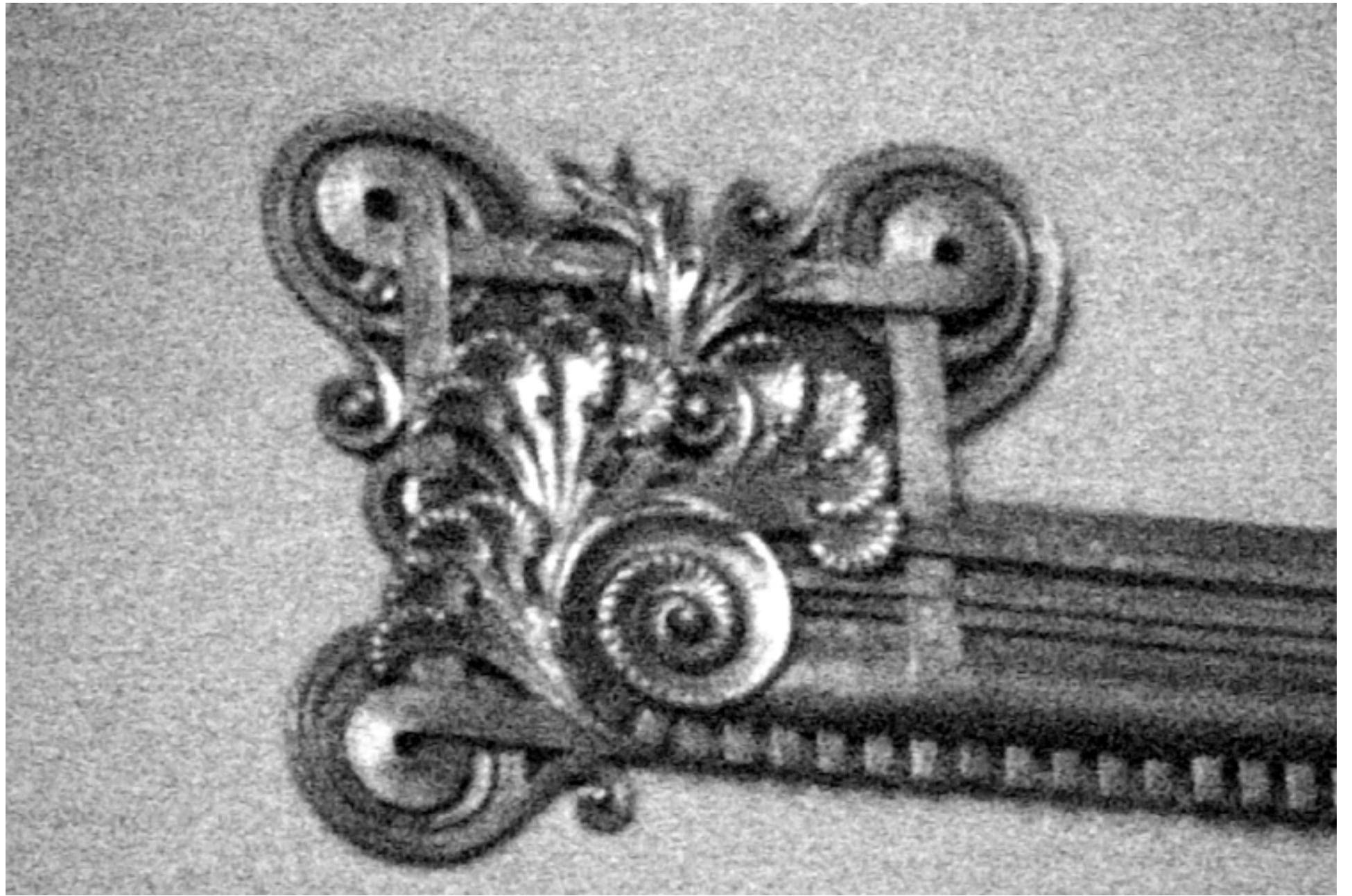






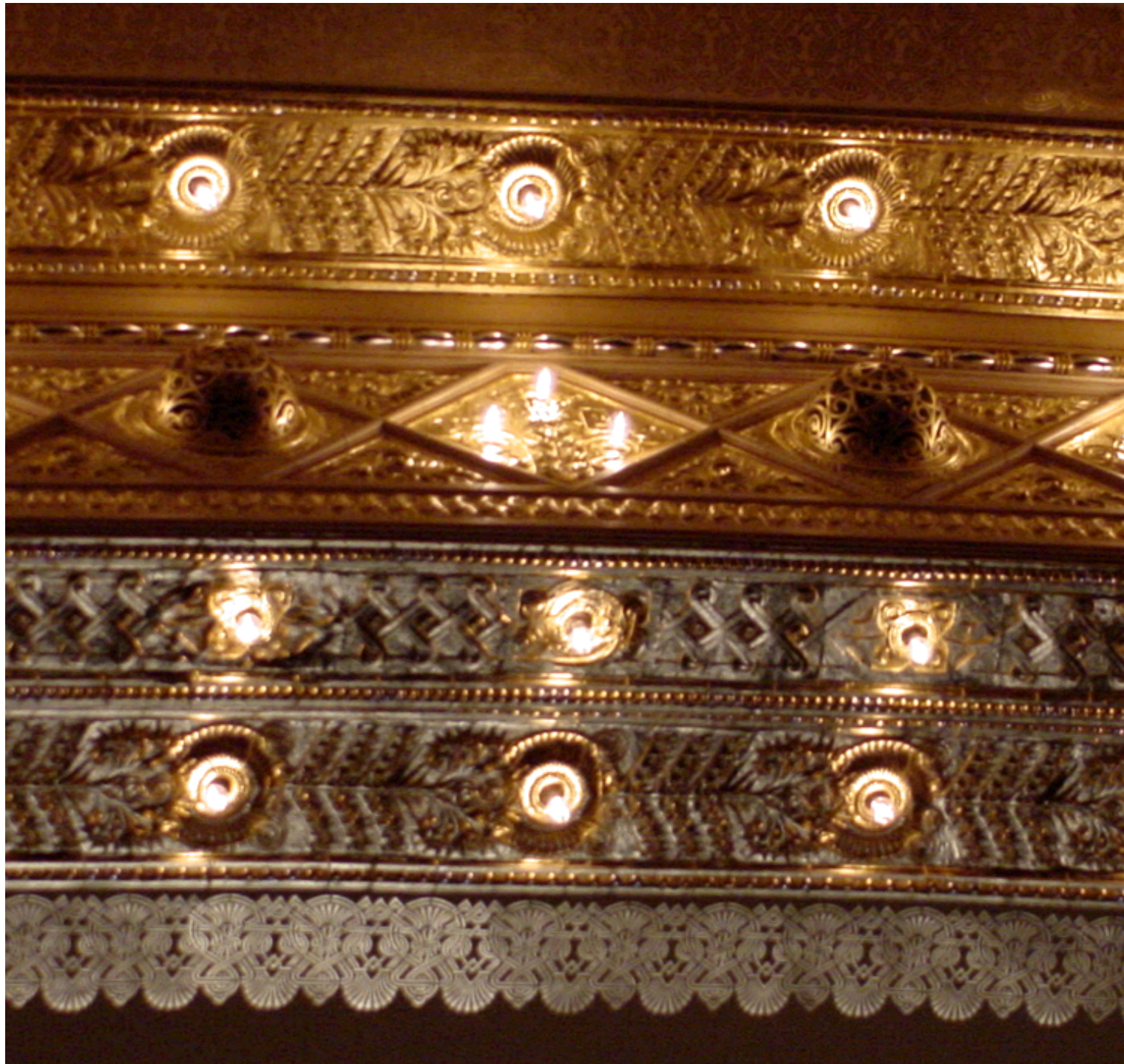














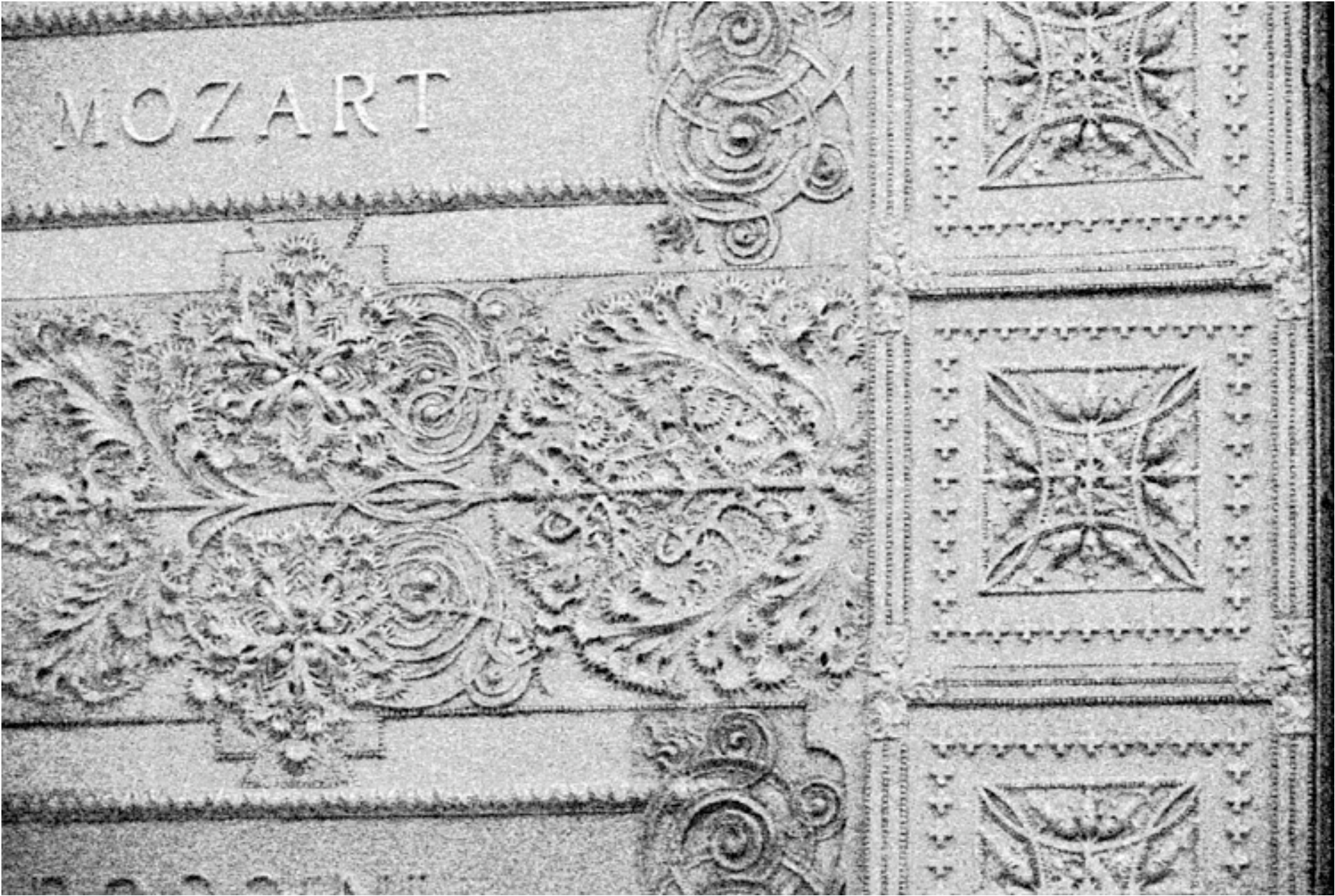




ROSSINI



MOZART



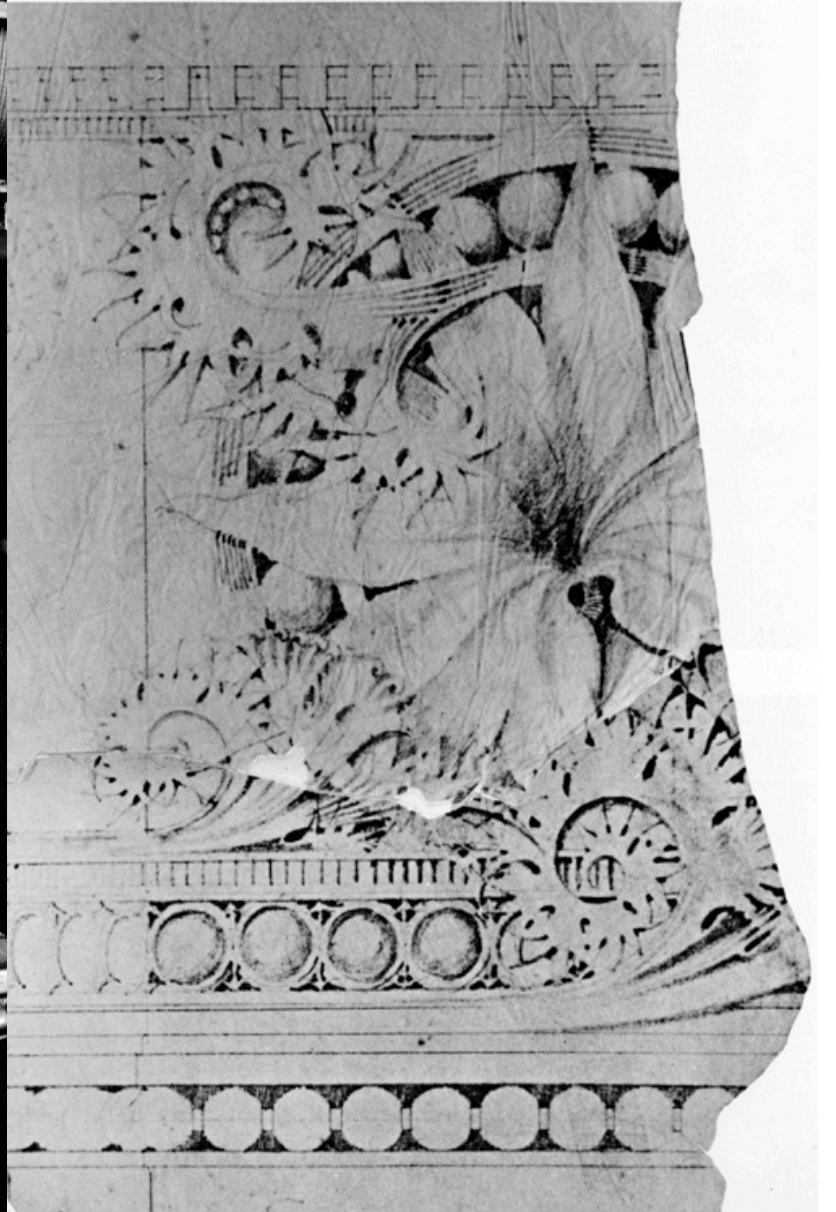












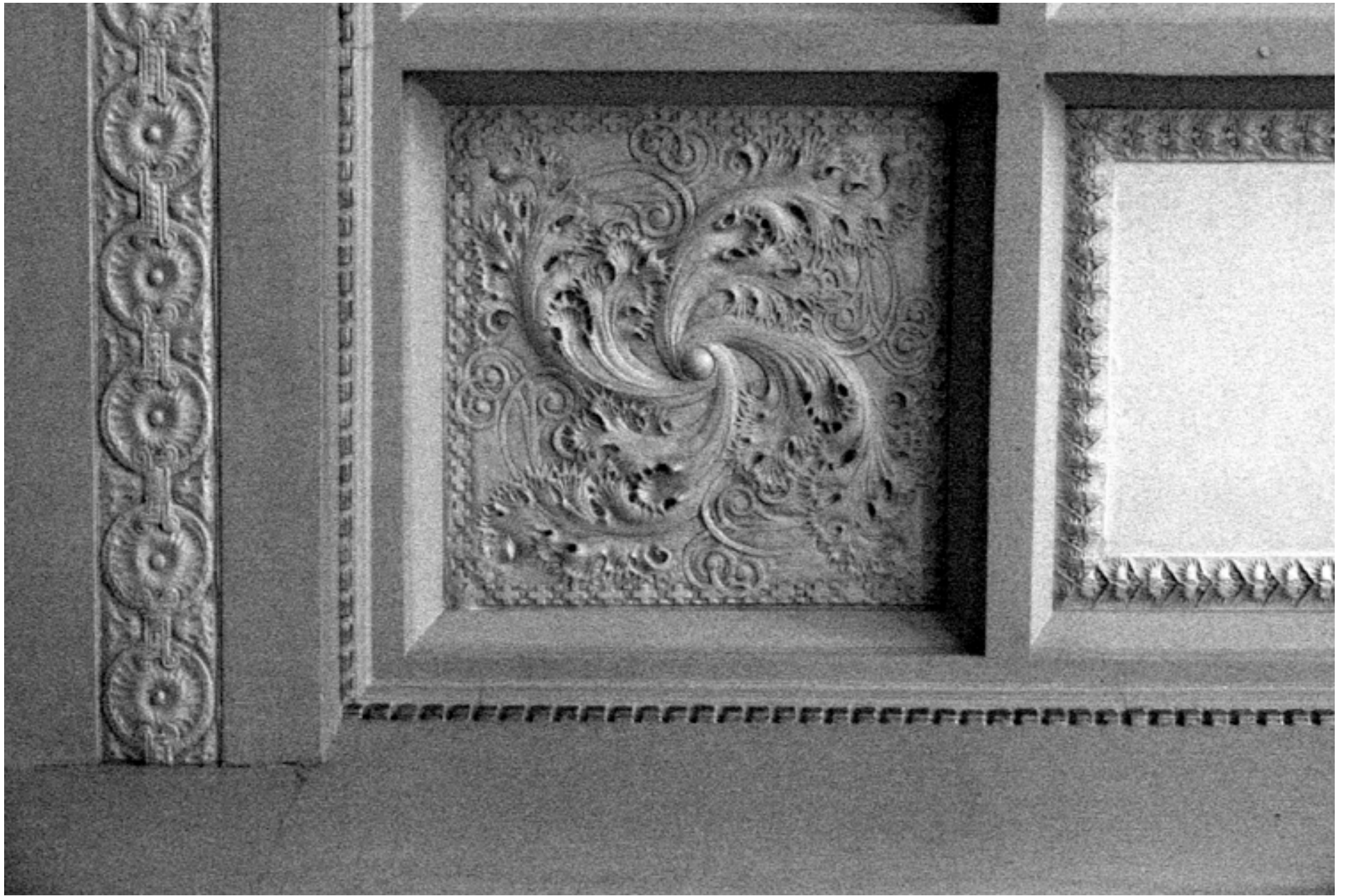






























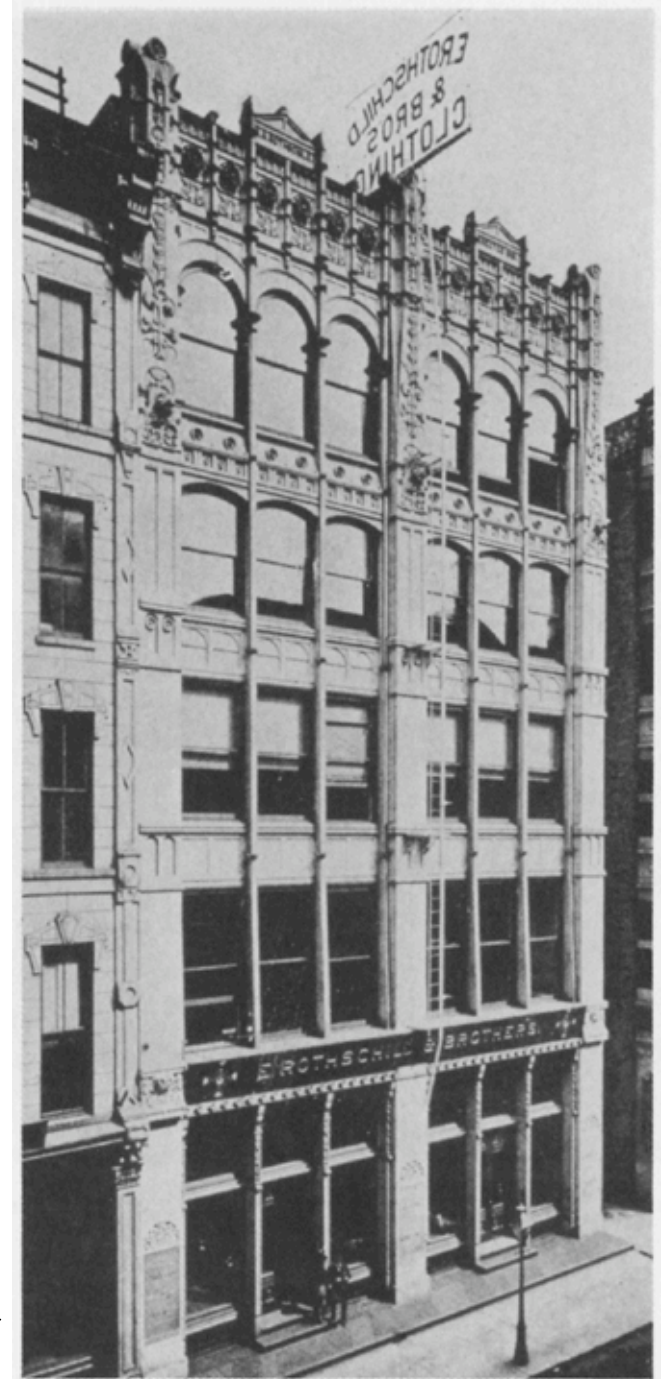






Home Insurance Building 12 stories, Steel Frame 1883, William L Jenney

Rothschild Store 1881, Adler & Sullivan



1. Rothschild Store, Chicago. 1880–81. (Fuermann)

## Home Insurance Building 1883

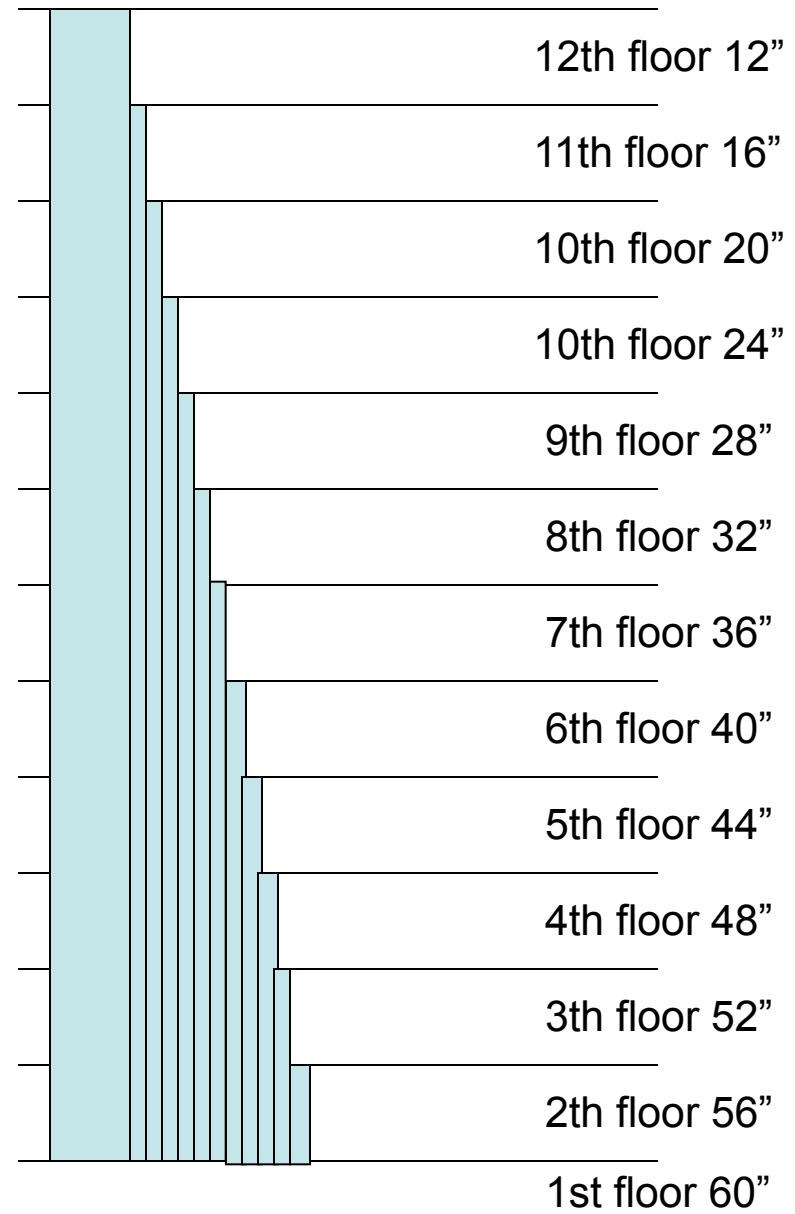
- First skeletal frame = first skyscraper?
- Major William Lebaron Jenney Architect



# Gravity, the end of

## Masonry

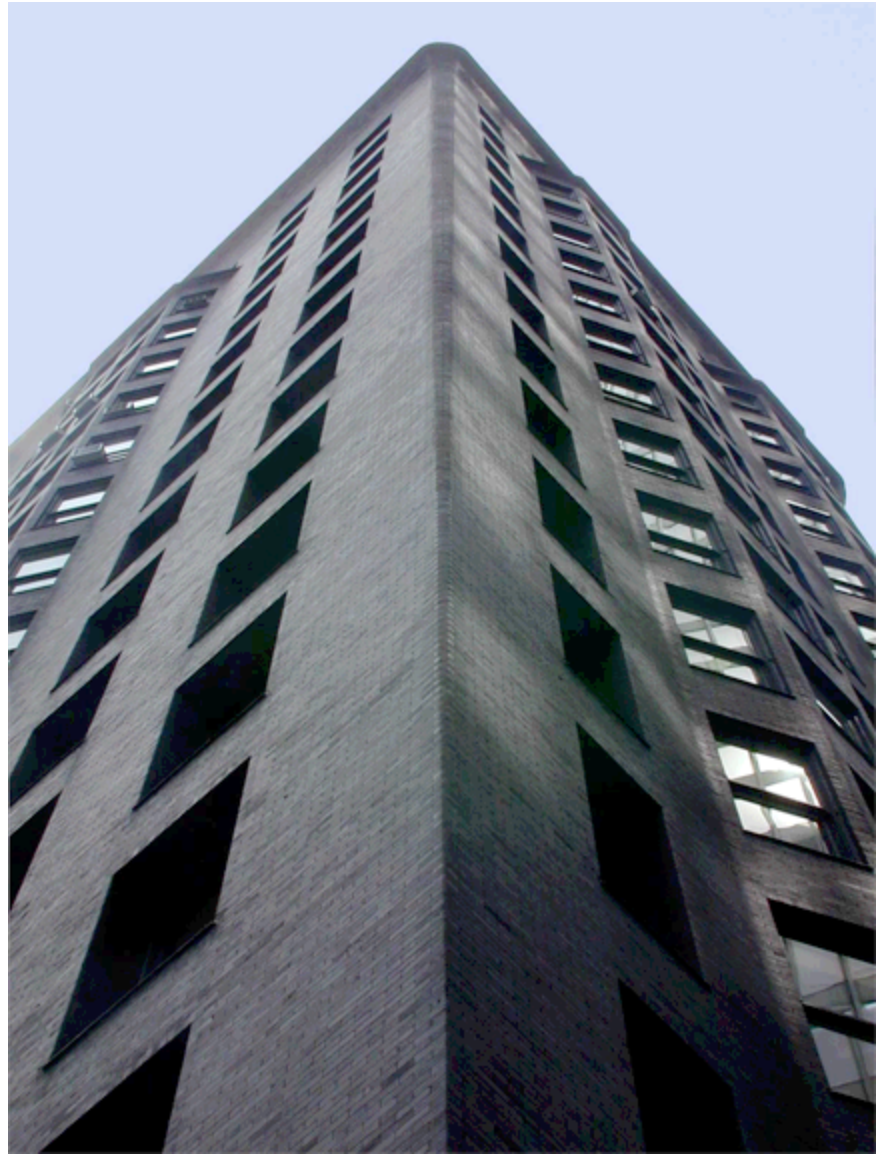
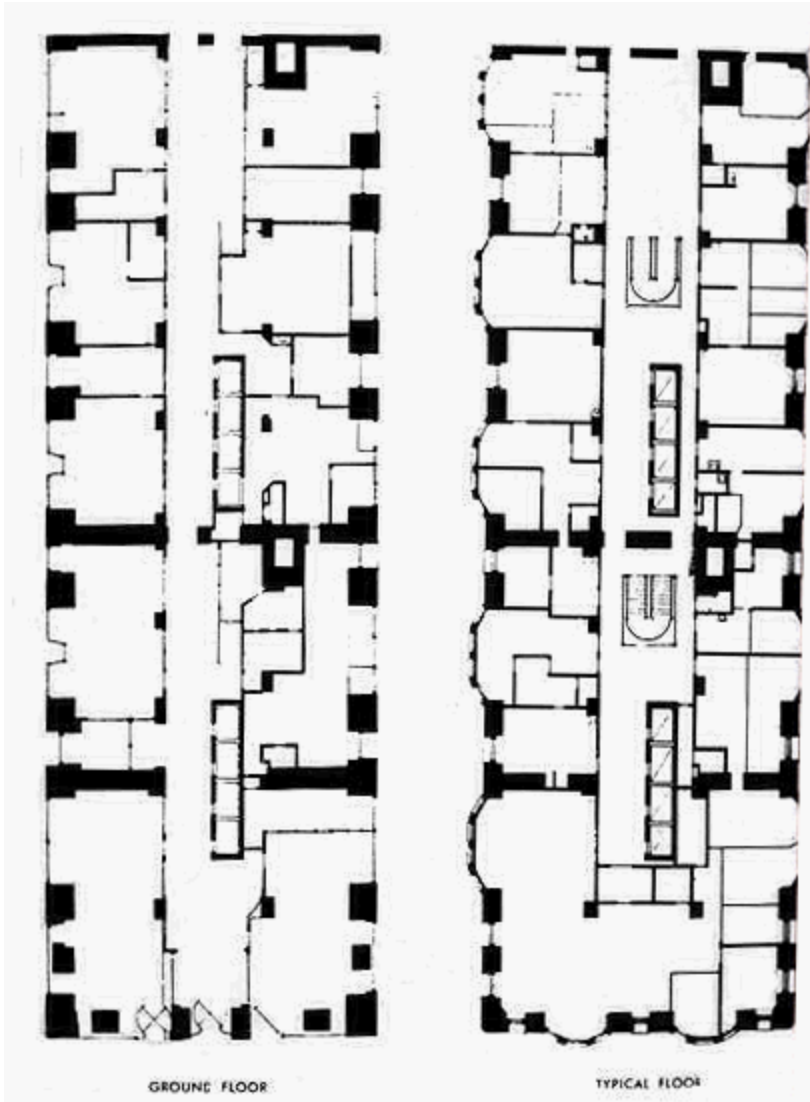
- The rule for masonry wall thickness required a 12" thick wall plus an additional 4" of thickness for every story



## Monadnock Building 1889

- Burnham & Root
- John Root's last project
- Is it tall?





Washington Life Building, NY.  
1889

- Cyrus Eidlitz, N.Y.



WASHINGTON LIFE BUILDING  
From the Northeast.  
Cyrus L. W. Eidlitz, Architect

## Reliance Building 1890

- Charles Atwood for D.H. Burnham
- First non-wall expression
- Ultimate expression of “Chicago window”

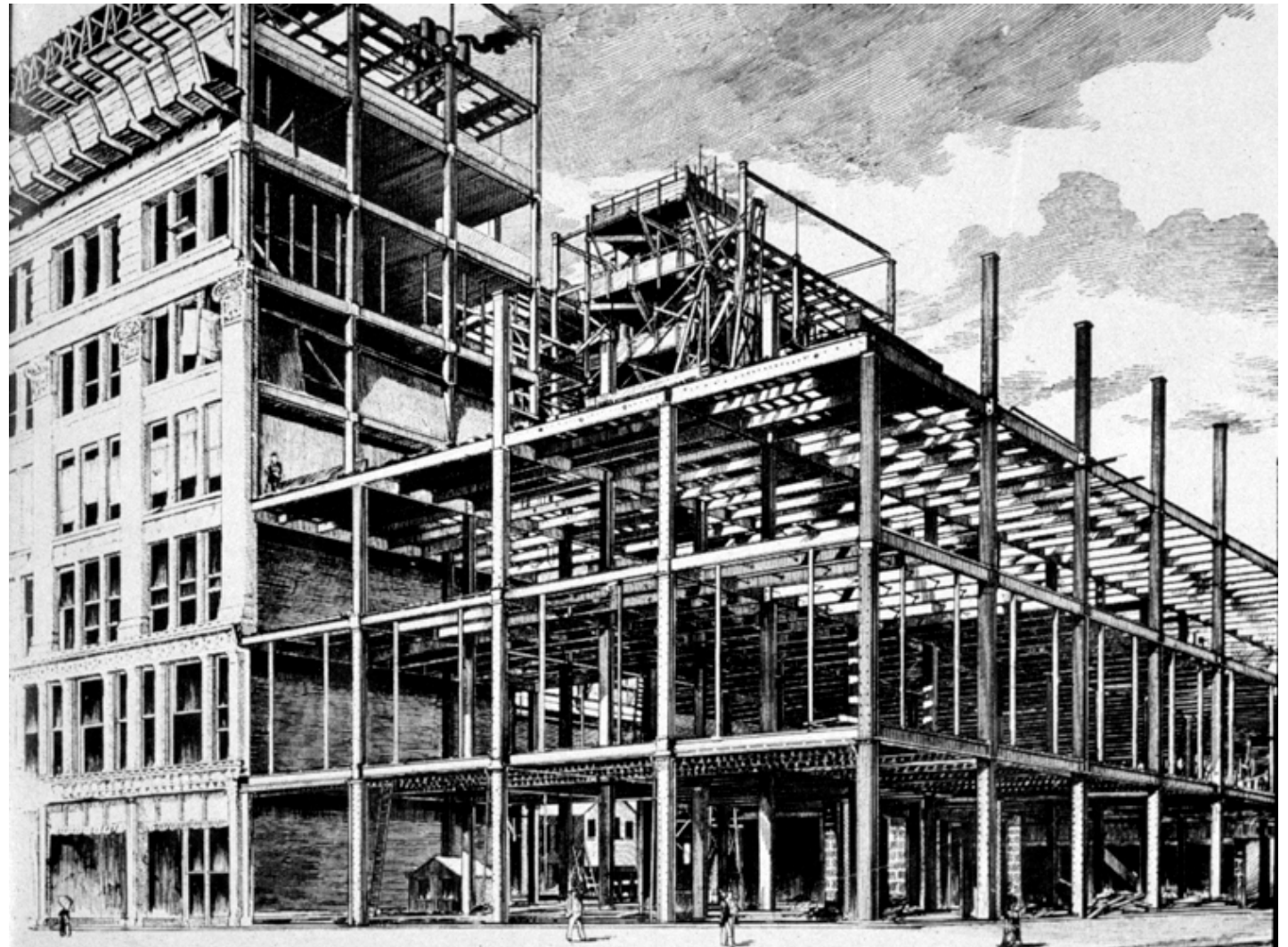
1895

1890



## Fair Store 1891

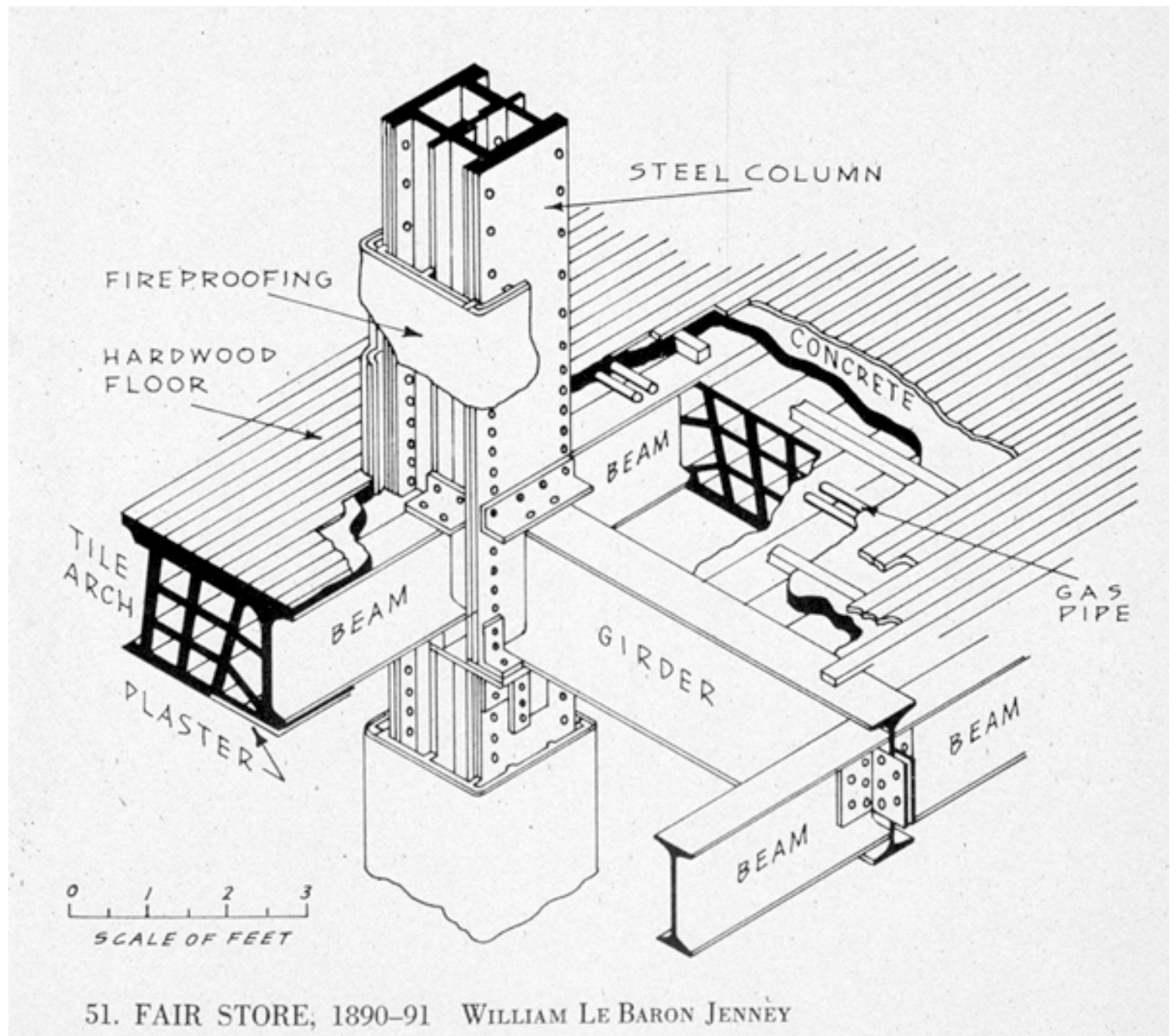
- Major William.  
LeBaron Jenney



## Fair Store 1891

- Major William LeBaron Jenney





Schiller (Garrick) theatre  
1891, Adler & Sullivan



50. Schiller Building, Chicago. 1891–92. Borden Block (1879–80) in foreground. *(Chicago Architectural Photograph Co.)*

# Super size glass 1885-1900

