

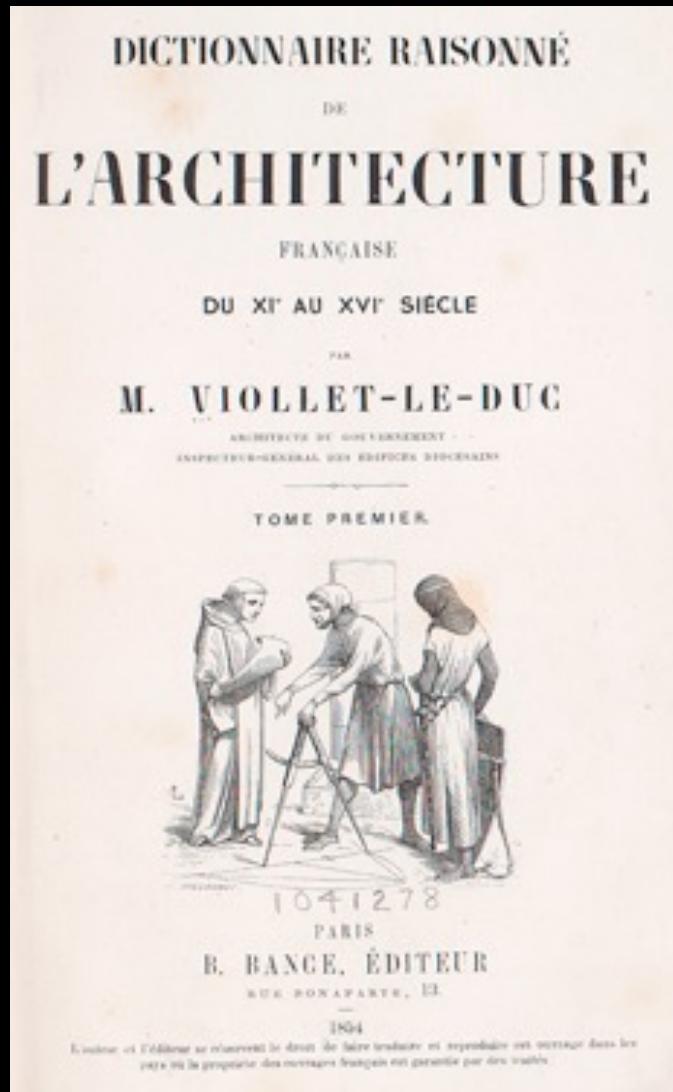
**AHST 3322-001 (29089)**  
**History of Modern Architecture**  
**Dr. Charissa N. Terranova**  
**University of Texas at Dallas**  
**Spring 2022**  
**M-W 1:00-2:15**  
**PHY 1.202**

**Monday February 14 – Wednesday February 16**

**Structural Rationalism and the Influence of Viollet-le-Duc, Art Nouveau,  
and Charles Rennie Mackintosh**

I conduct my lecture today on the land of indigenous peoples, the Wichita, Tawakoni, Kiikaapoi (Kickapoo), and Jumanos.

# Eugène Emmanuel Viollet-le-Duc (1814-1879)



structural  
rationalism



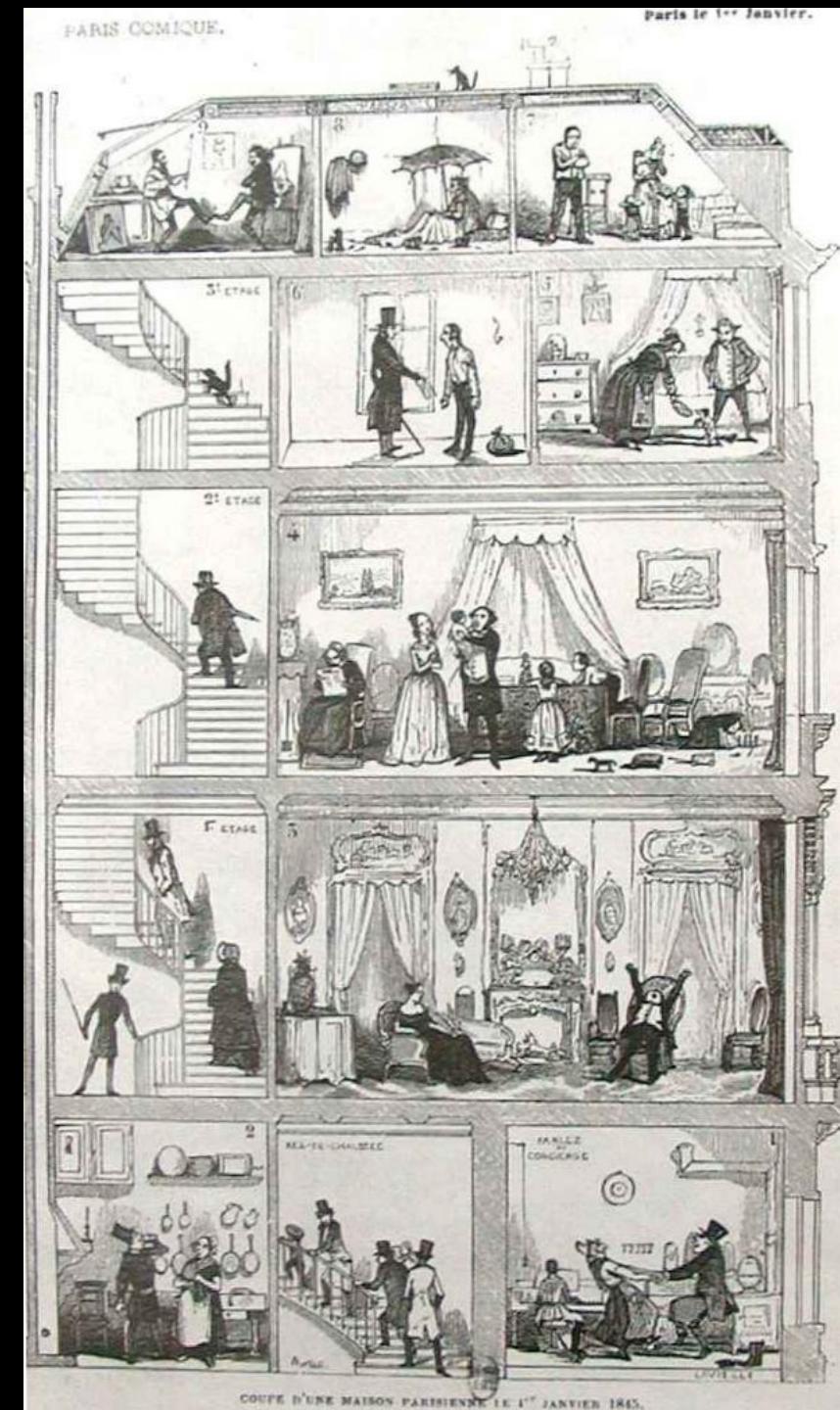
Étienne-Jean Delécluze  
(1781-1863)



Delécluze, The Emperor Augustus Rebuking Cornelius Cinna  
for his Treachery, 1814

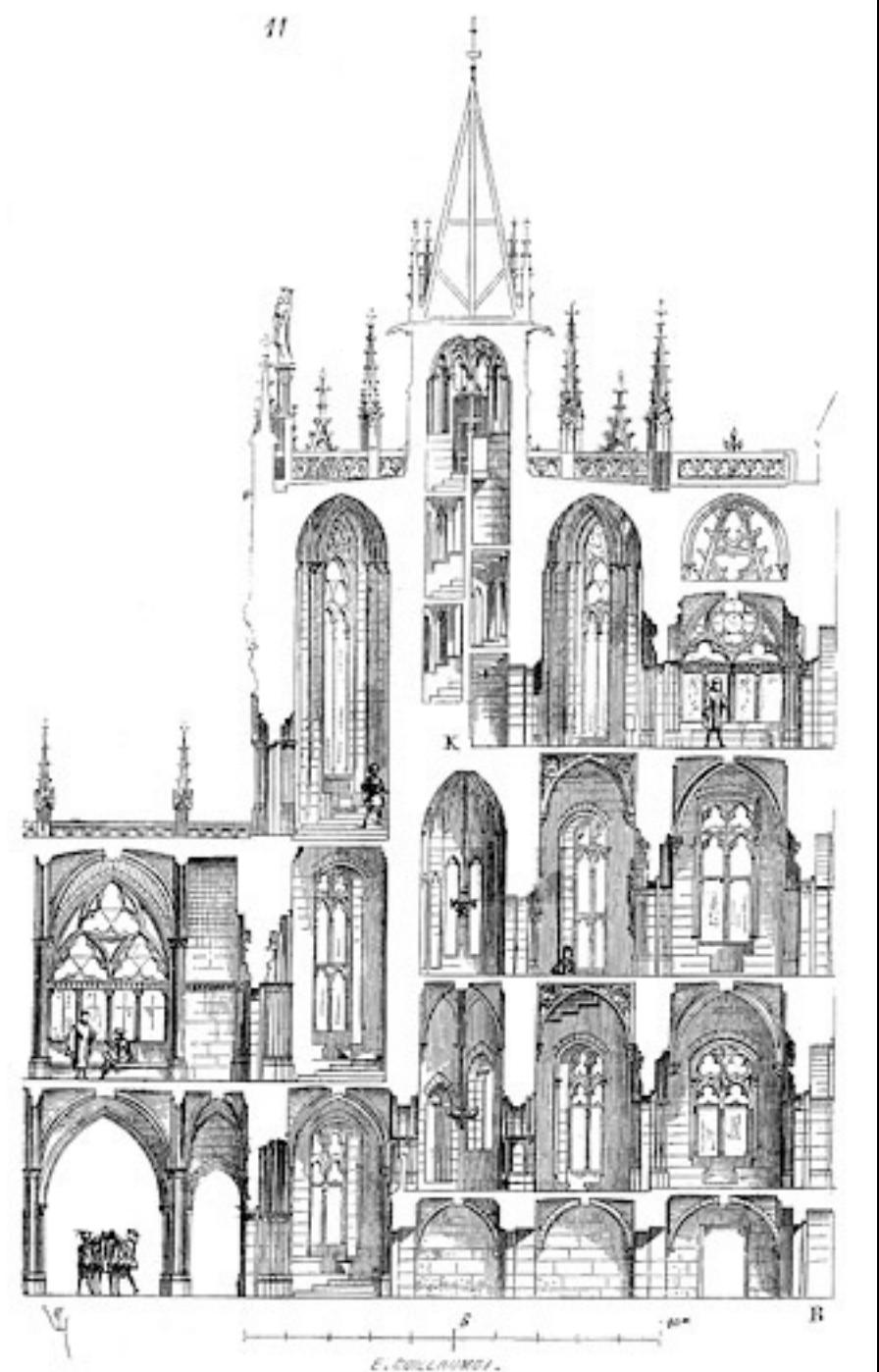


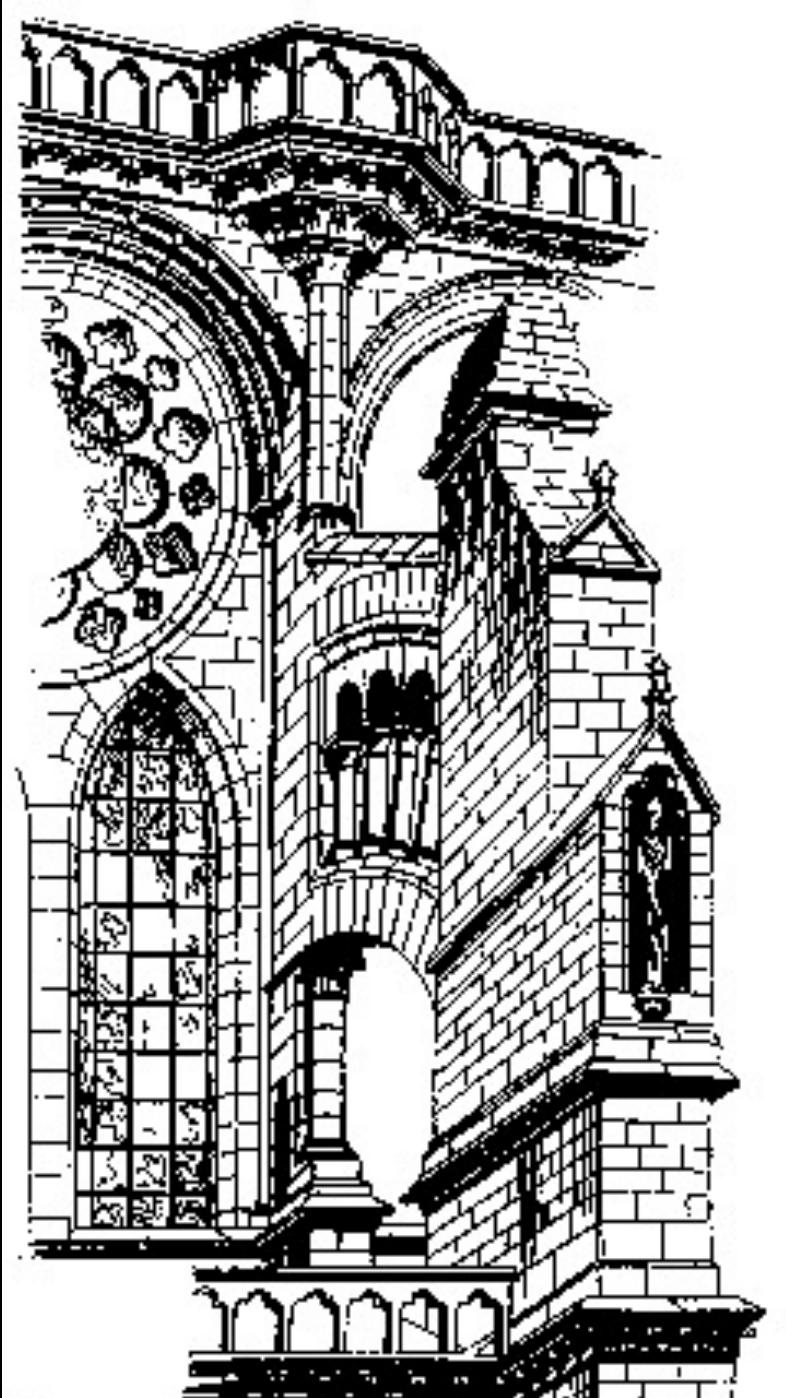
Étienne-Jean Delécluze  
(1781-1863)



Left: Concert hall, 1864, expressing Gothic principles in modern materials; brick, stone and cast iron. *Entretiens sur l'architecture*  
Right: Section through Gothic Castle

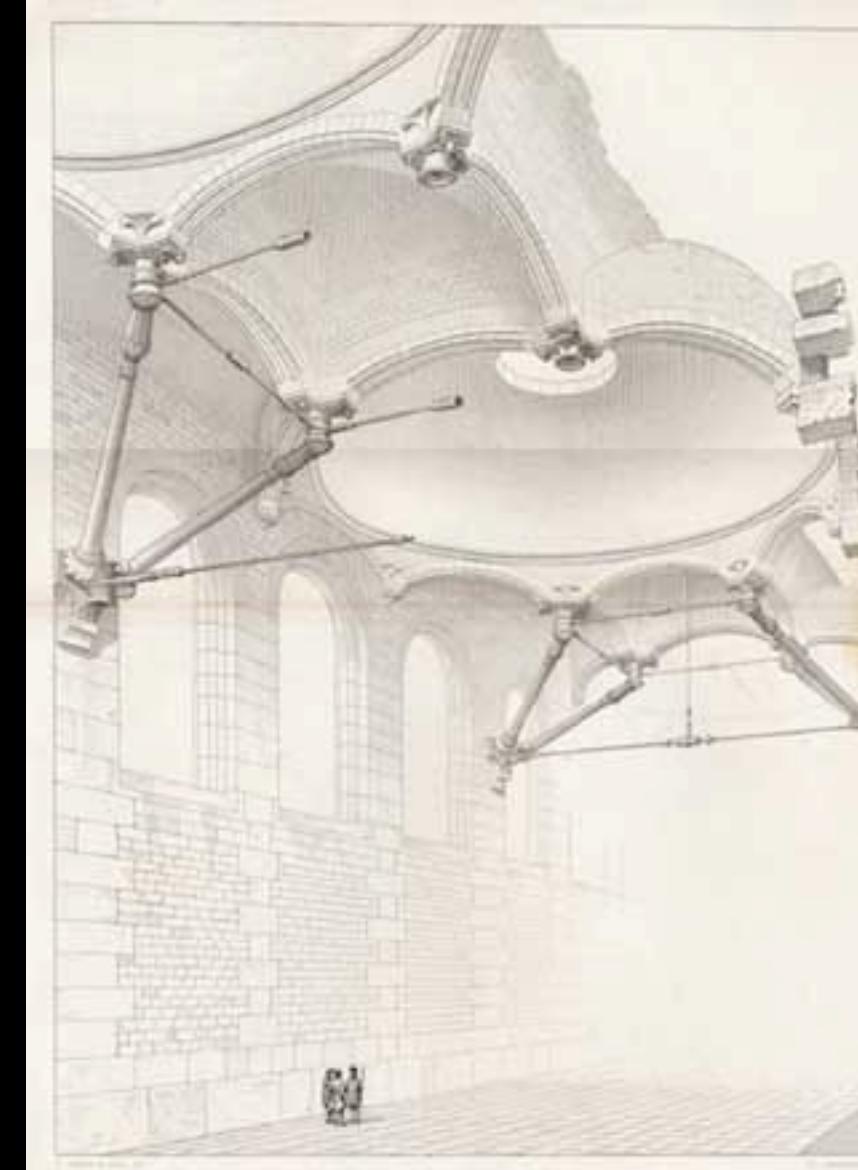
From his wide ranging and thorough study of historic architecture, Viollet-le-Duc recognized that structural and technical means in each age utilized the new materials and best engineering of the day. He repeatedly argued that the honest use of iron in contemporary architecture not only expressed our own era, but was consistent with history.

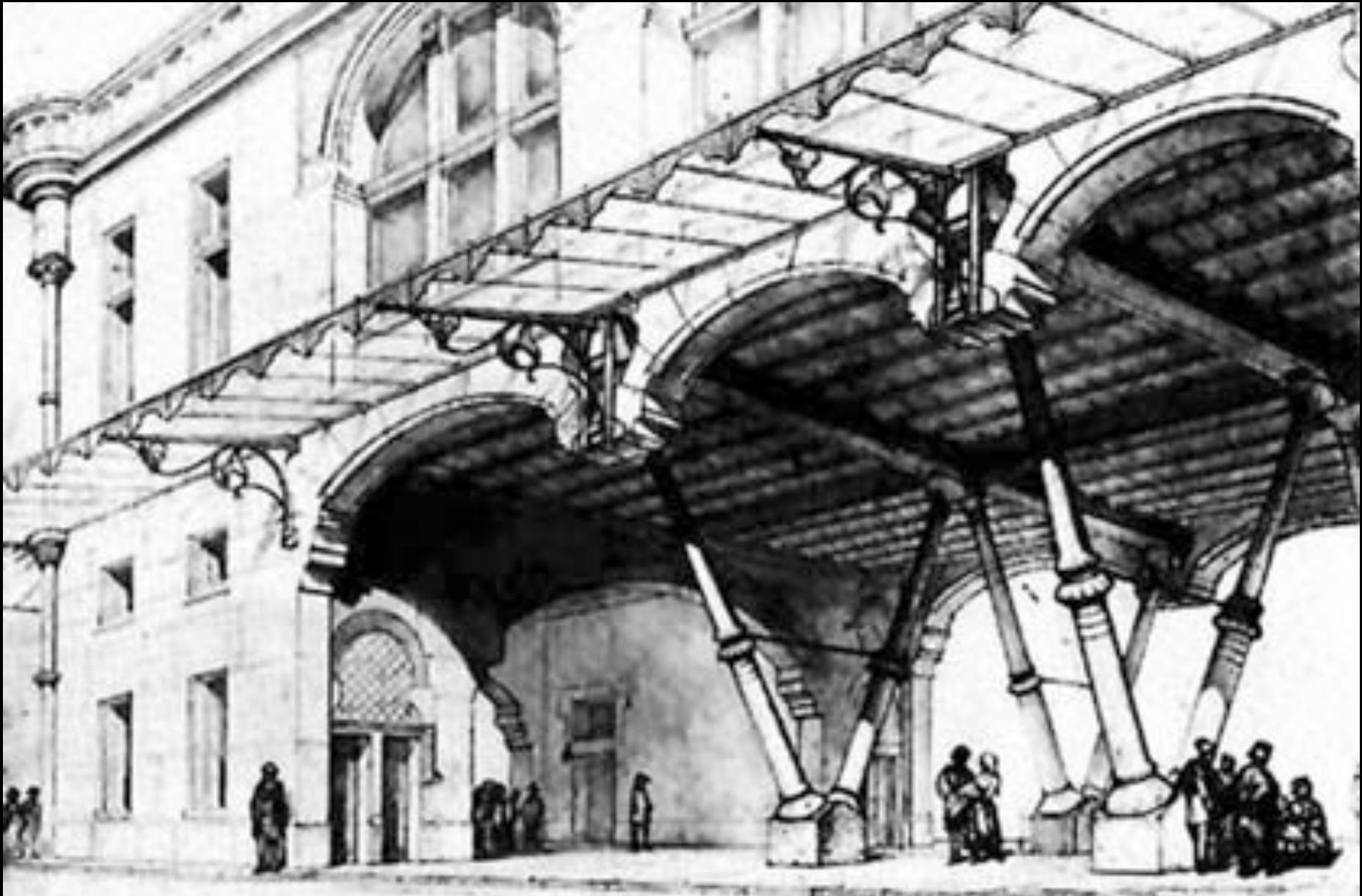




Right: Viollet le Duc, revealed structure, 1864  
Left: Viollet le Duc, detail of Chartres Cathedral flying buttress, 1864

He repeatedly illustrated the use of iron beams, posts, girders columns, tie rods, and decorative features in a rational system of iron and masonry construction. Viollet saved the Gothic from revivalism, i.e., sheer stylistic duplication. He was like a 20<sup>th</sup>-century structural engineer, a structural determinist. With Viollet, architecture shifts from a monolithic state towards a hybrid, composite state – a mixture of materials, a mixture of elements. Basically, it's the true beginning of the modern joint, the joint as a technical problem; prior to this point, it was only an architectural problem. The factory production of components gives rise to the independent joint and the detail.





Viollet le Duc, Design for Open Market, 1864

As a restorer and theorist, Viollet championed the use of new materials both for contemporary architecture and for restorations. Frequently he “bettered” the monuments by using stronger stone or replacing wooden roofs with metal ones. He suggested iron for the framework in order to allow areas of transparency as in Gothic architecture, and designs of various hypothetical iron structures. His restoration was a rationalist approach to architectural history.

Viollet le Duc, Reconstruction of Carcassonne, 1858-1870



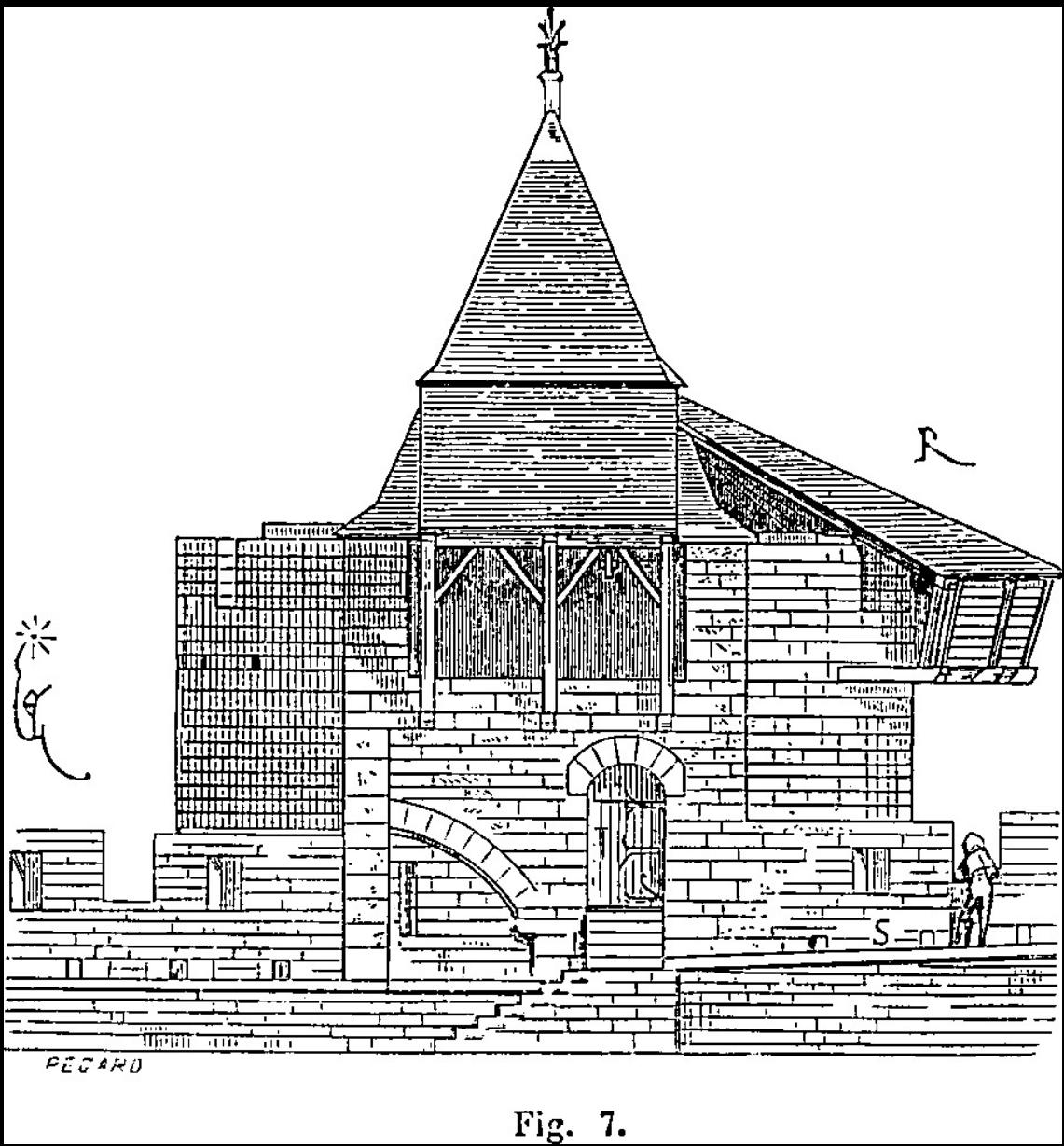
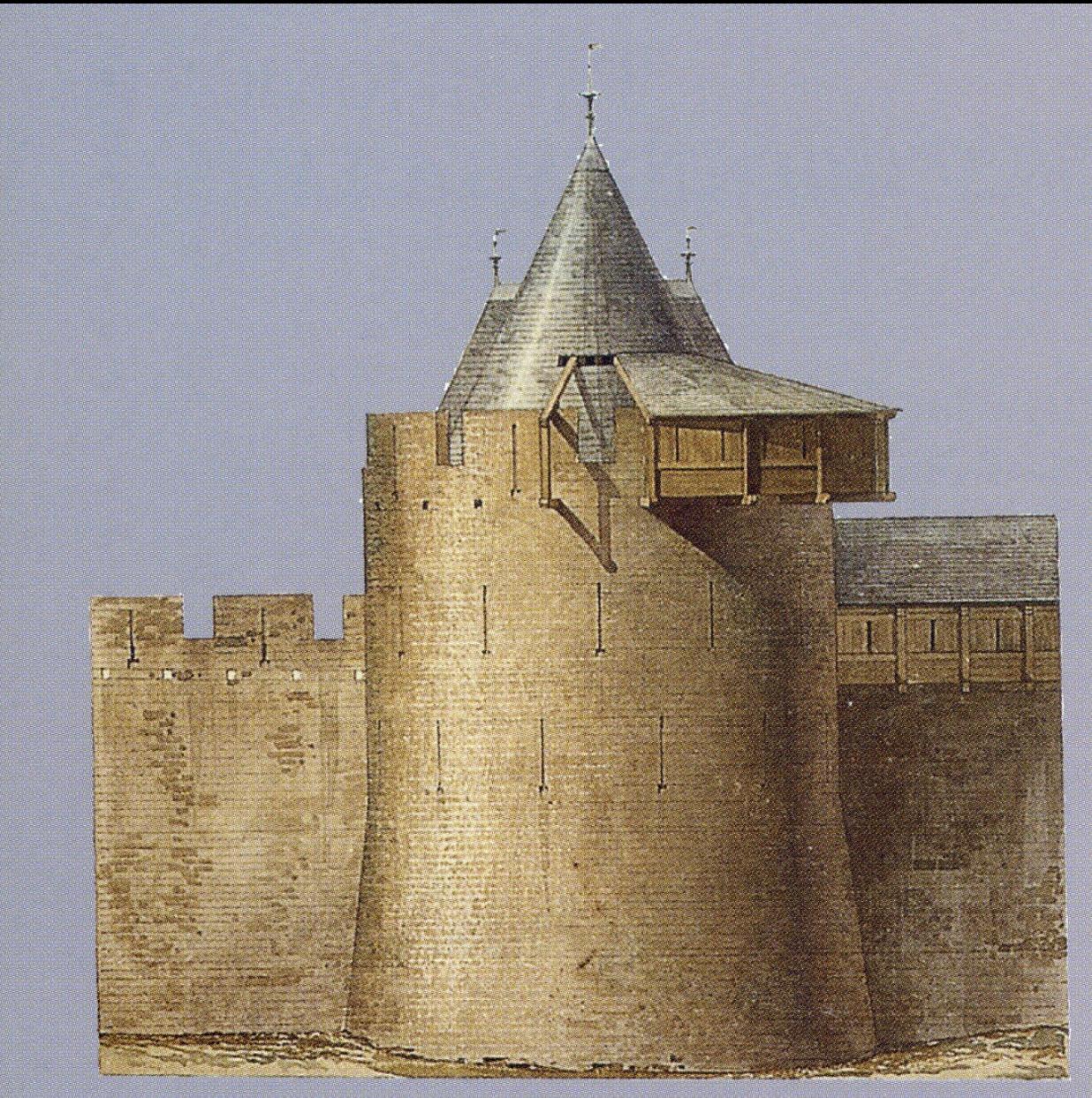
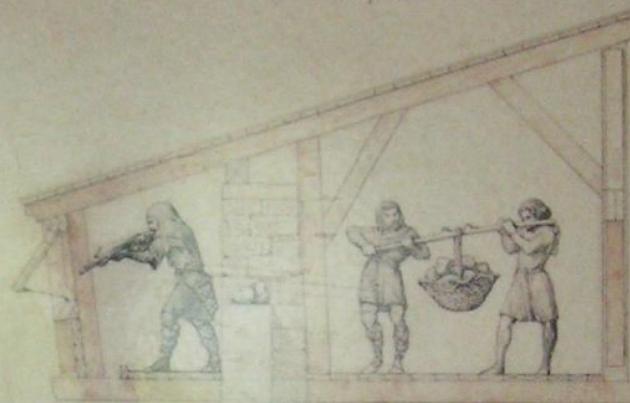


Fig. 7.



Coupe de la Coueline D  
munié de ses hours en bois

Echelle de v. et p. mètres.



Brullem

**STRUCTURAL RATIONALISM**

**HONEST USE OF IRON IN ARCHITECTURE**

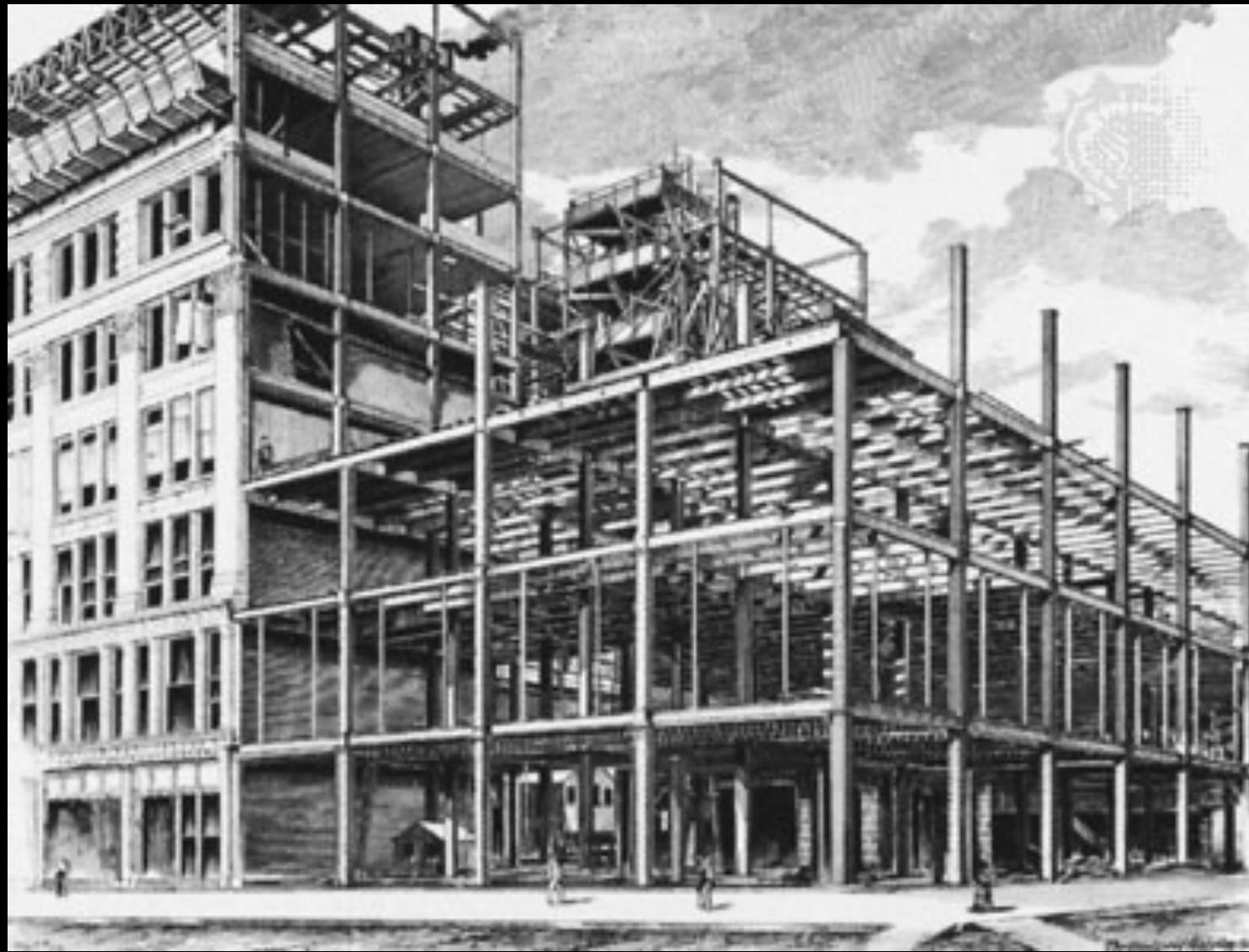
**GOTHIC PRINCIPLES**

**TIME (ZEITGEIST)**

# OTHER EXAMPLES OF STRUCTURAL RATIONALISM

William le Baron Jenney, Fair Store, 1890-91

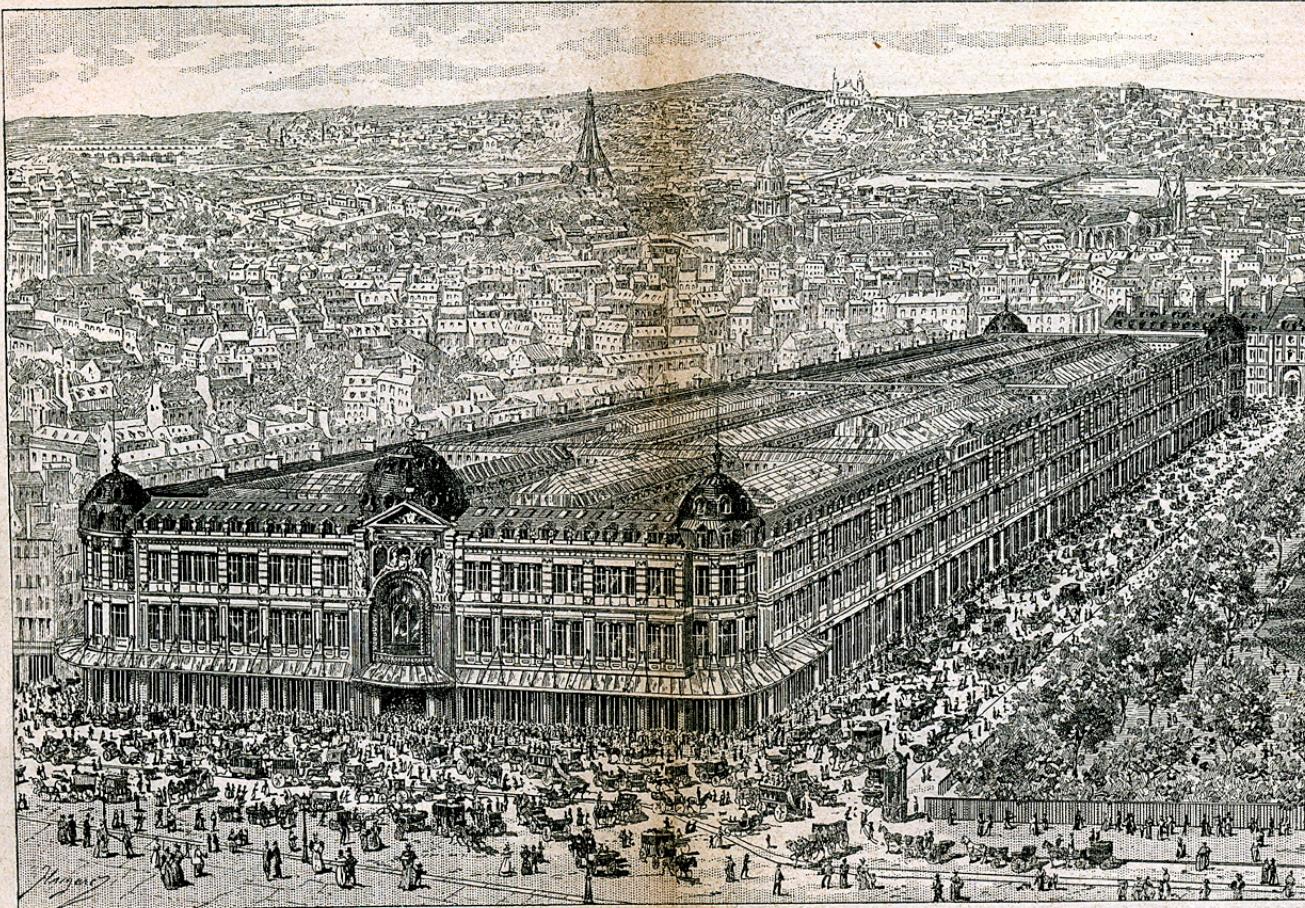




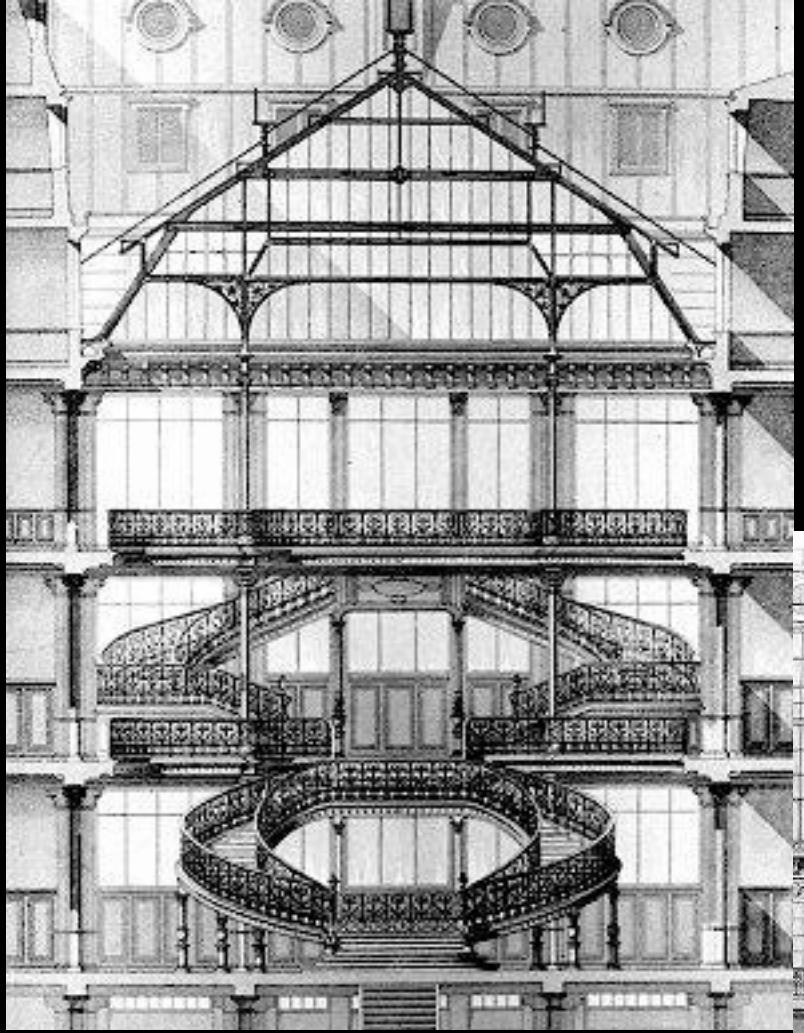
# L.A. Boileau and Gustav Eiffel, Bon Marché, Paris, 1876

## GENERAL VIEW OF THE BON MARCHÉ (PARIS)

Magasins de Nouveautés offering in all its branches the richest, most elegant and most complete choice of all classes of goods.



The Establishment of the *Bon Marché*, specially constructed for a Dry Goods Business, is the largest (*about 12,000 square yards, independent of its accessory premises*), the best organized and the best fitted up in the World; it contains all that experience can suggest for convenience and commodity and is for this reason one of the most remarkable sights in Paris.





Publicité pour « Le Bon Marché » (vers 1865-1870). Paris, Bibliothèque des Arts Décoratifs.

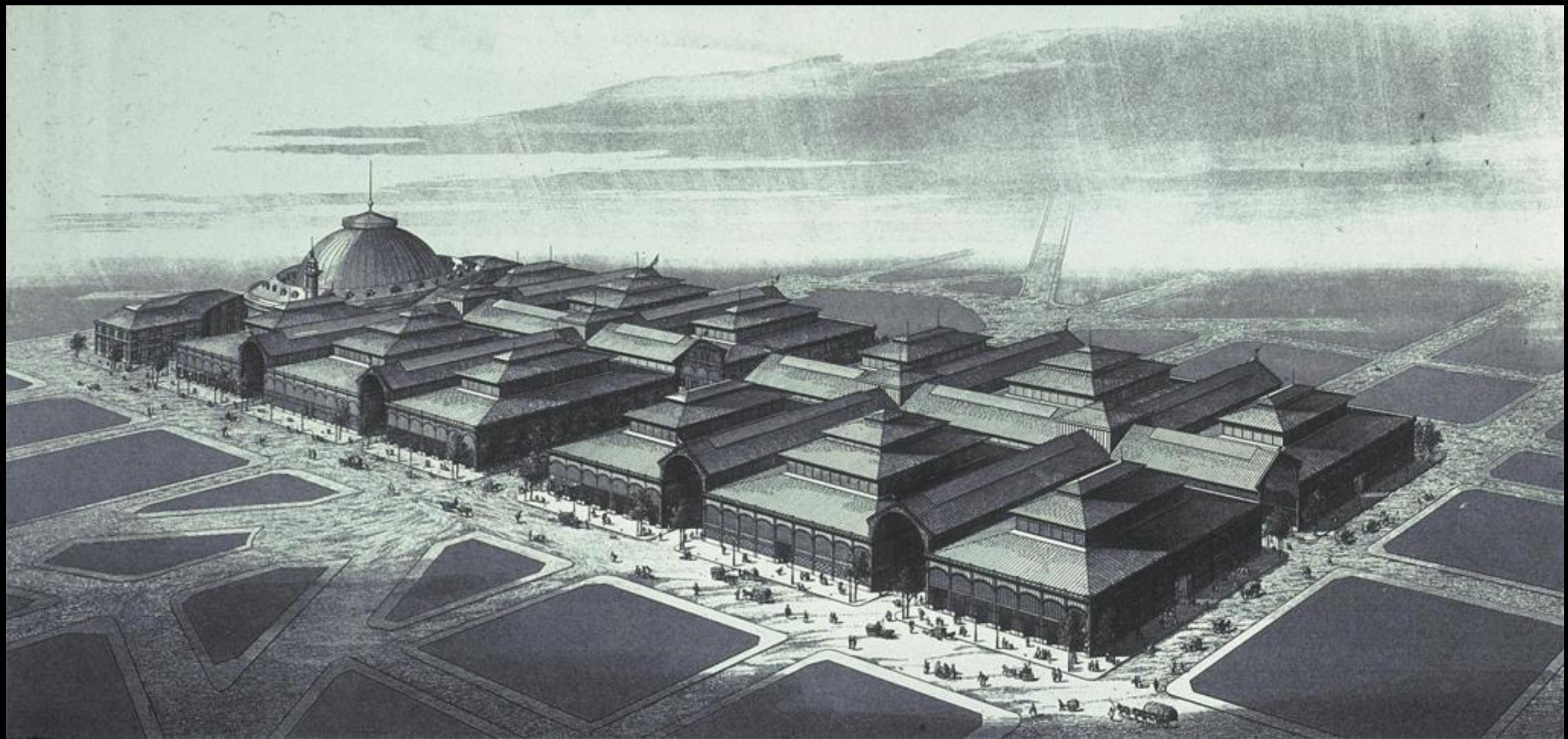
Left: Grand Staircase, Opera Garnier, Paris,  
1861-1875

Right: Grand Staircase, L.A. Boileau and  
Gustav Eiffel, Bon Marché, Paris, 1876

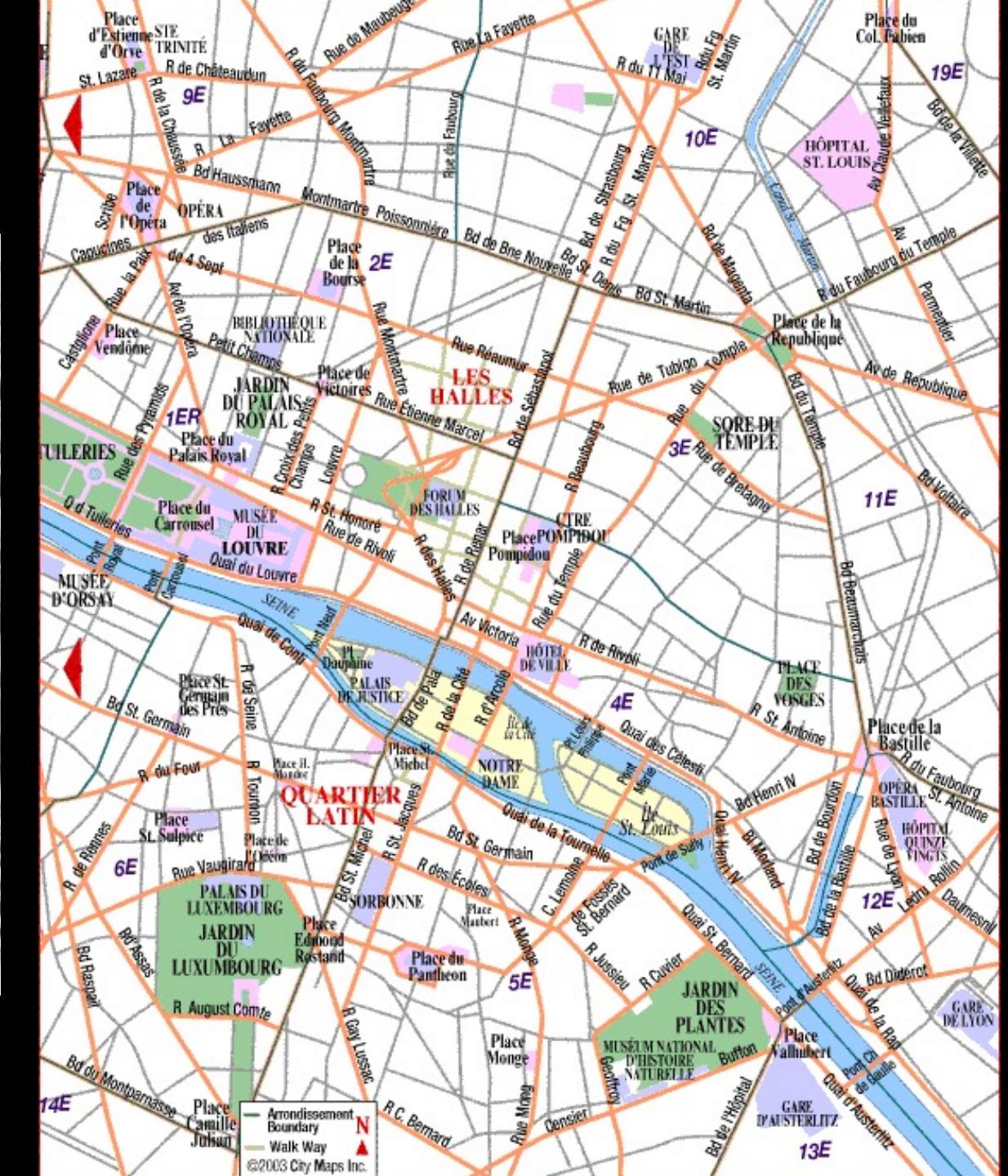


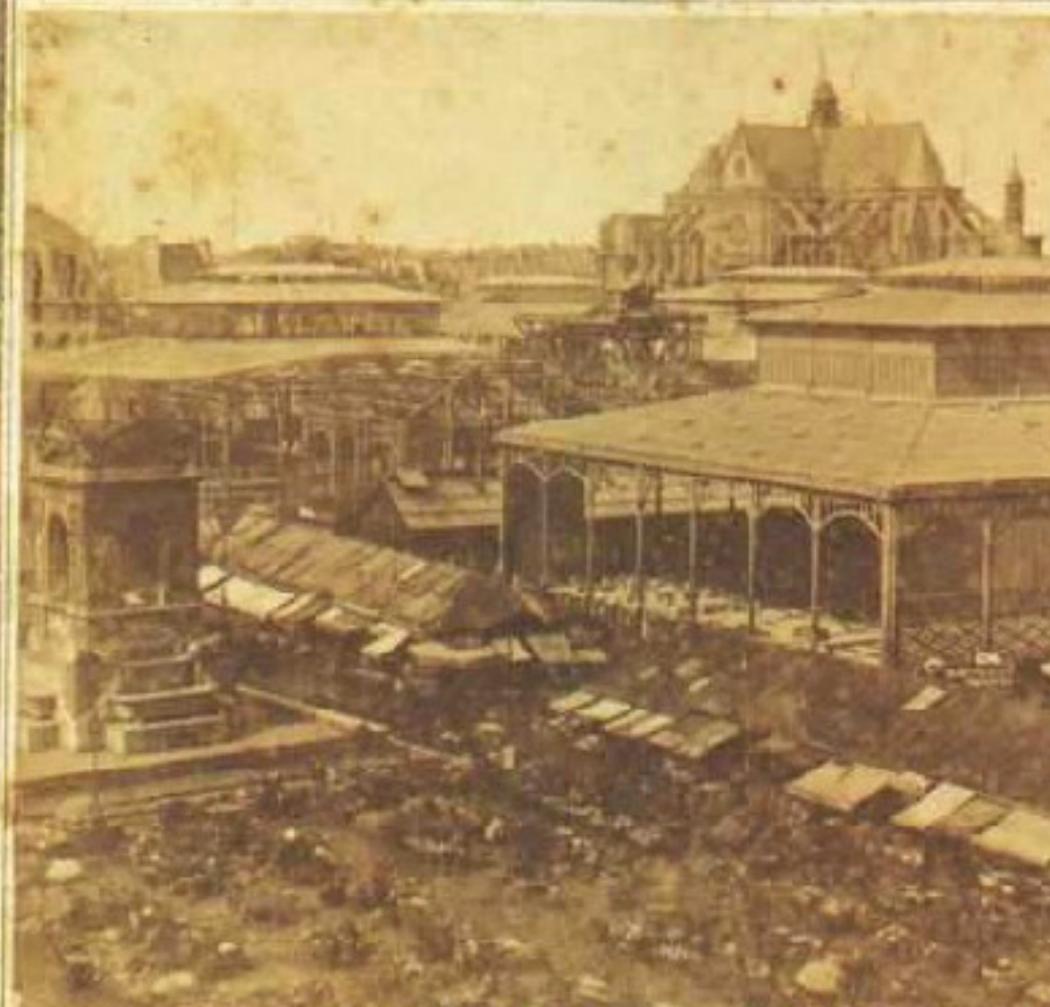
Publié pour « Le Bon Marché » (vers 1865-1870). Paris, Bibliothèque des Arts Décoratifs.

Victor Baltard, Les Halles, 1851-57 (demolished 1971)



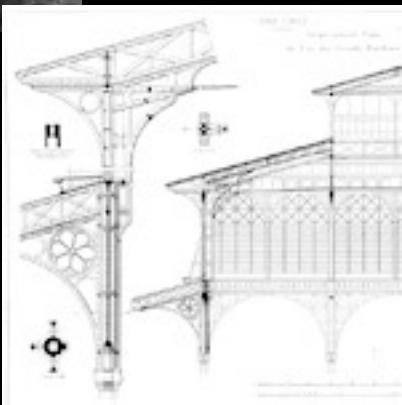






Les Gallois





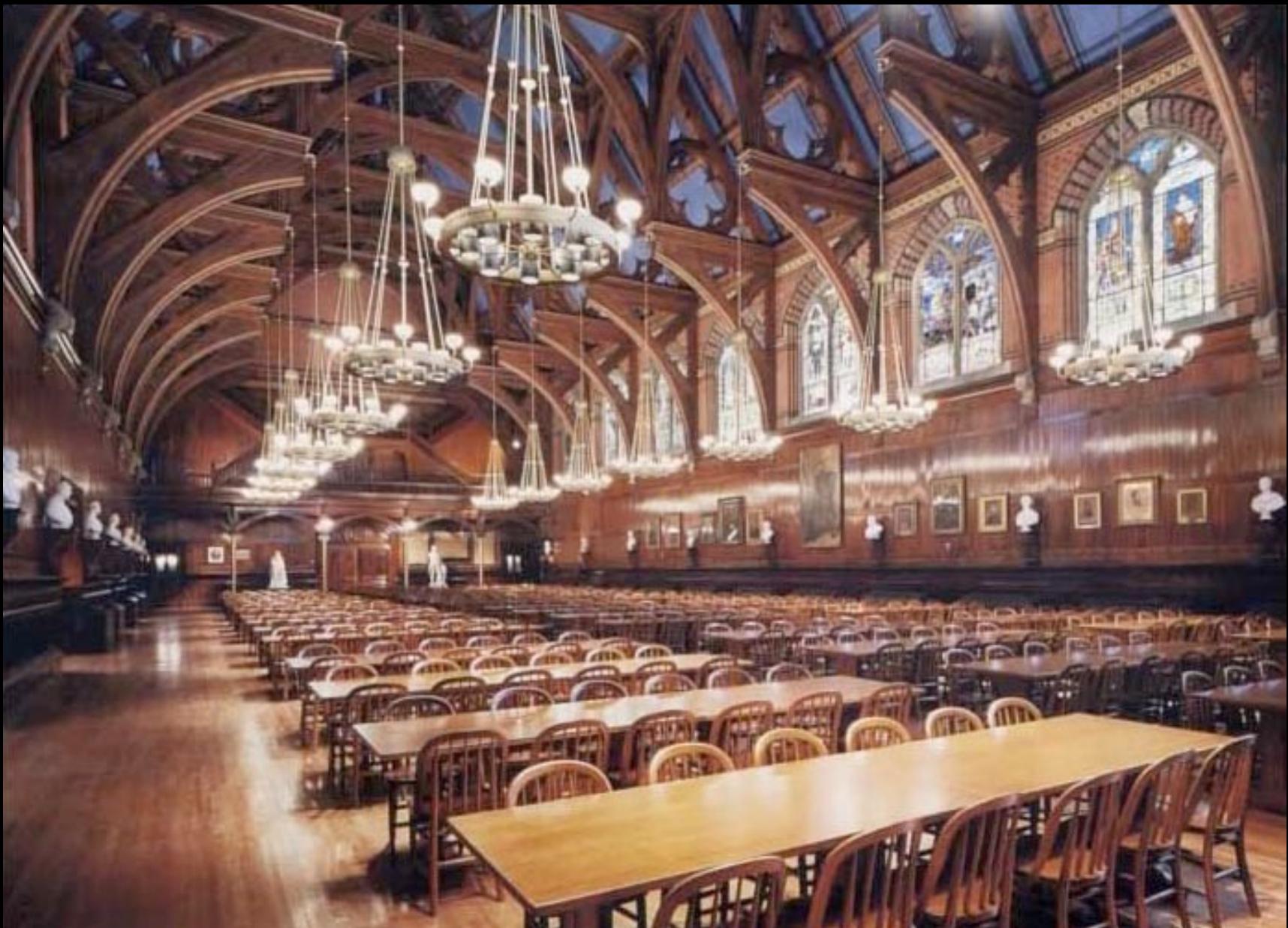
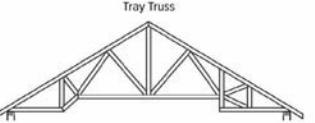
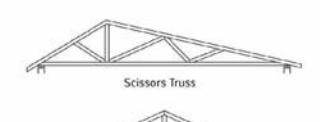
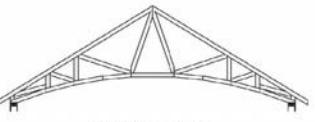
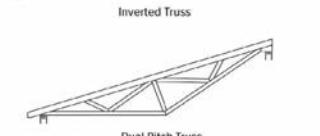
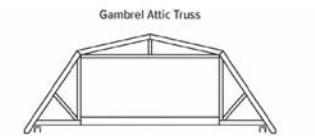
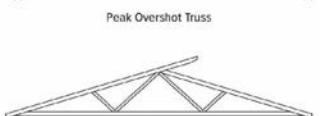
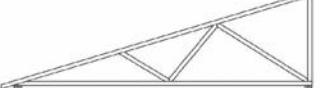
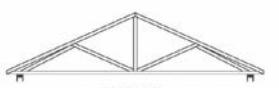
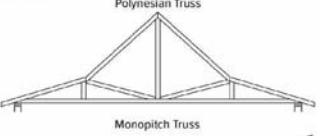
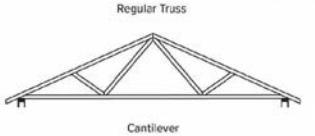


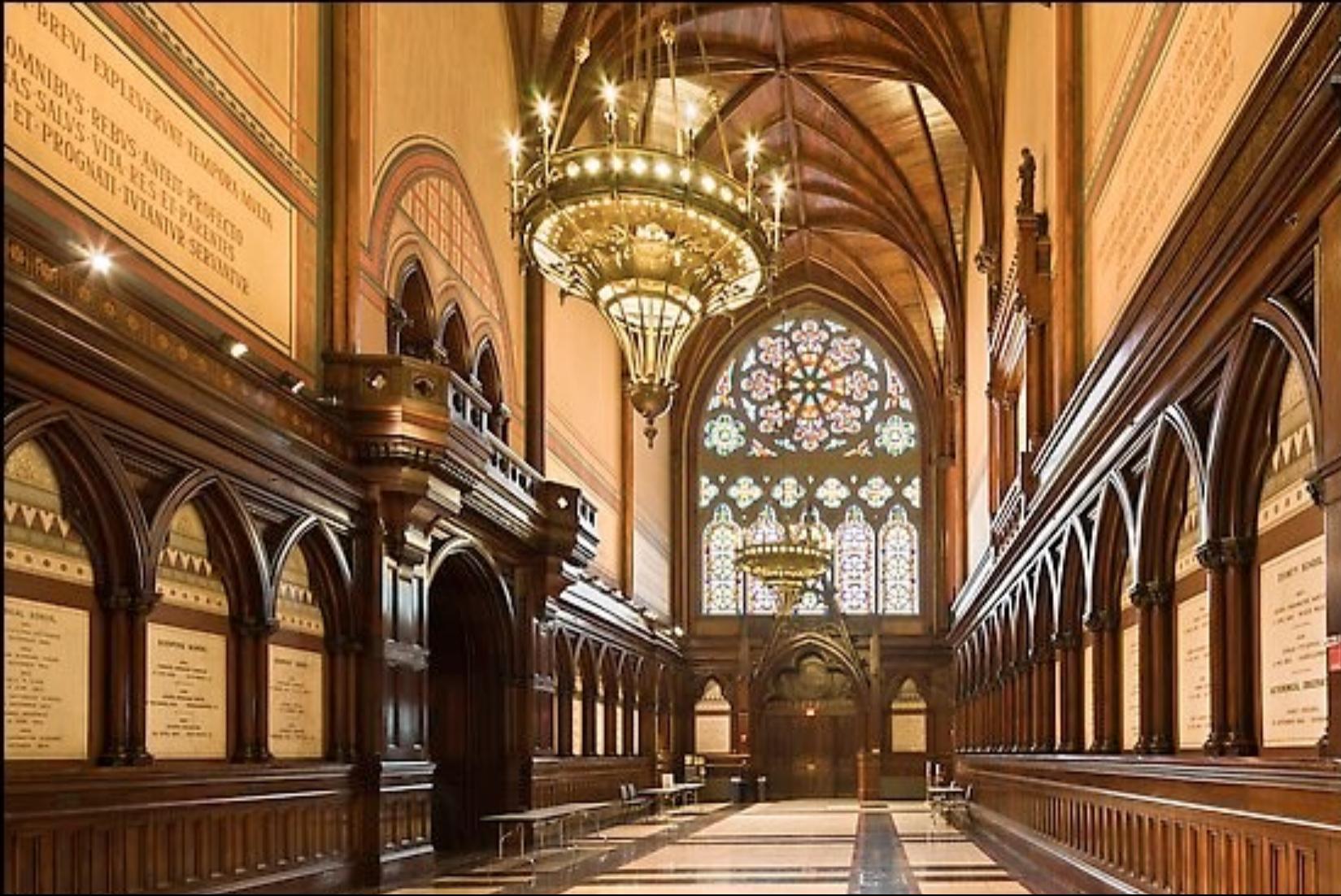


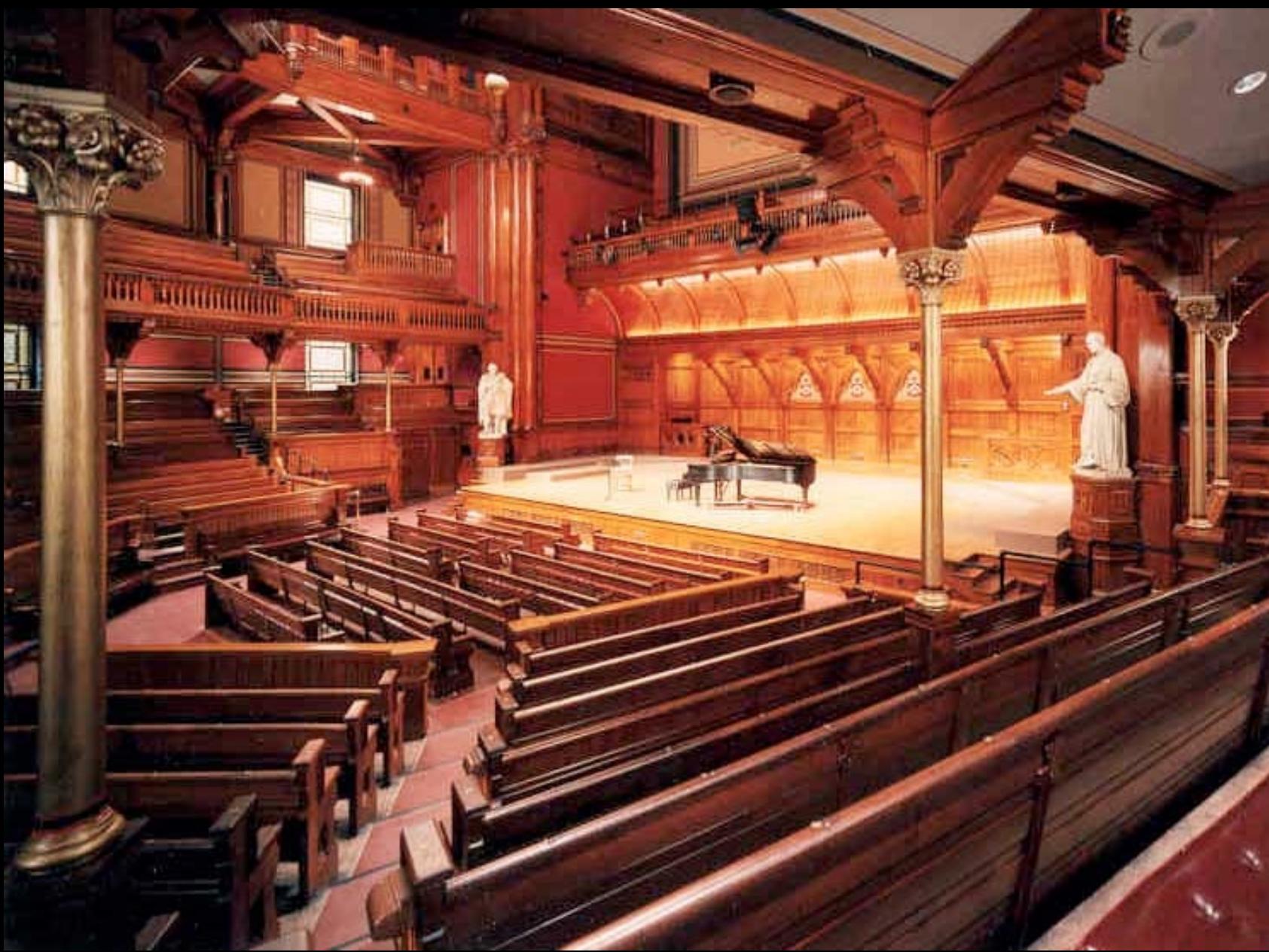


Ware and Van Brunt, Memorial Hall, Harvard, Cambridge, MA, 1870-78

## Truss Shapes

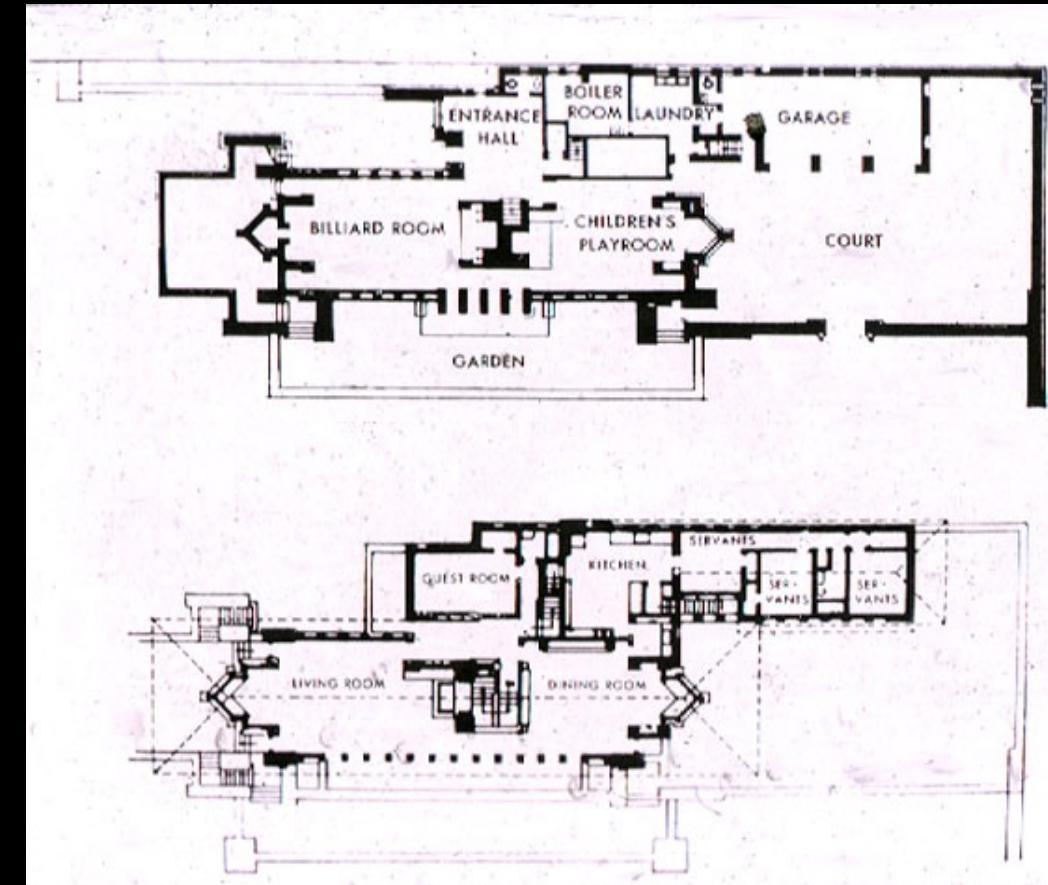






Sanders Theater, Memorial Hall

Frank Lloyd Wright, Stained Glass at Robie House, Chicago, 1909





Frank Lloyd Wright, Tree of Life, Robie House, Chicago, 1909

ART NOUVEAU  
Victor Horta  
Hector Guimard  
organicism  
élan vital – vital  
force  
Henri Bergson



Maison de l'Art Nouveau, Paris, 1895

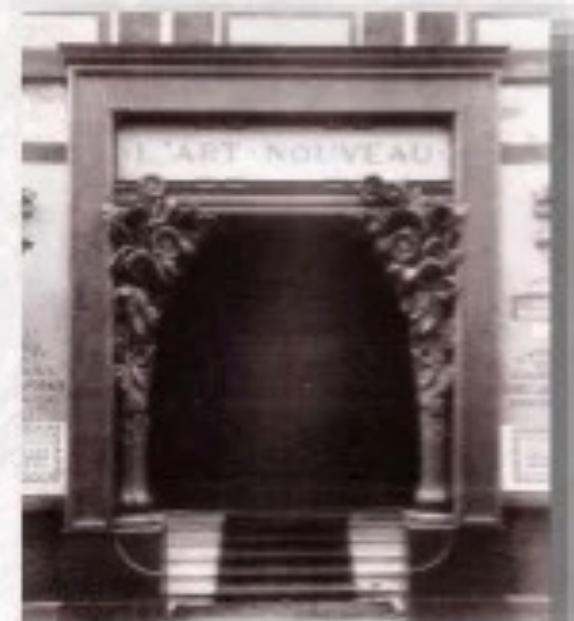
# Maison de l'Art Nouveau

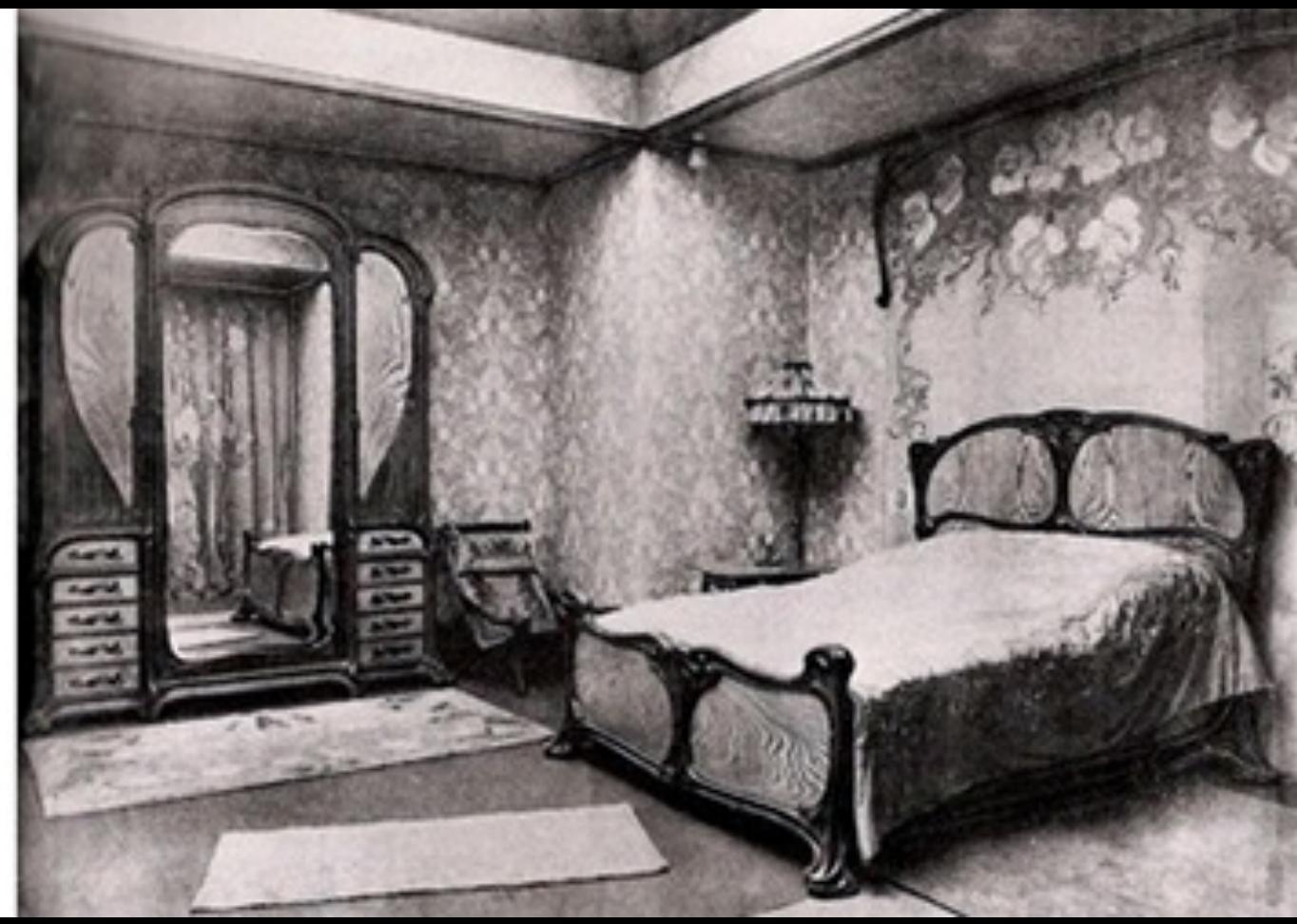
"House of New Art" (1895)

The Franco-German art dealer and publisher Siegfried Bing played a key role in publicizing the style.

Bing opened a new gallery at 22 rue de Provence in Paris, the *Maison de l'Art Nouveau*, devoted to new works in both the fine and decorative arts.

The interior and furniture of the gallery were designed by the Belgian architect Henry Van de Velde, one of the pioneers of Art Nouveau architecture.





Victor Horta, Interior of Tassel House, Brussels, 1893-95





Victor Horta, Tassel House, Brussels, 1893-5

- A large bay window extending over two stories, dominates the front facade.



## DESIGN ELEMENTS

### **1. The narrow, symmetrical front facade**

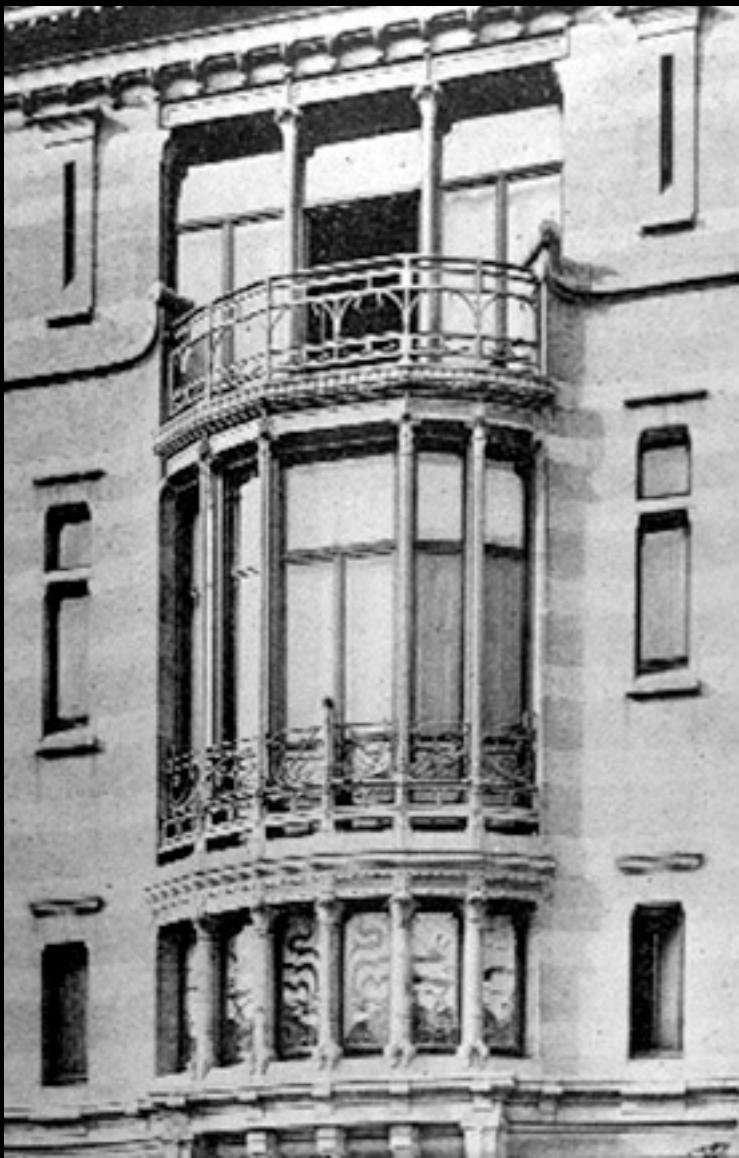
Built for the Belgian scientist Edmond Tassel, this building is considered by some scholars to be the first Art Nouveau building in Brussels. It is certainly Horta's first mature work in this style. Horta made a break with the past here by using stone and the modern material, metal, in domestic architecture. The modernity of the Horta's town house is also signaled by the extensive use of glass, where the window sizes may indicate the function of the interiors.

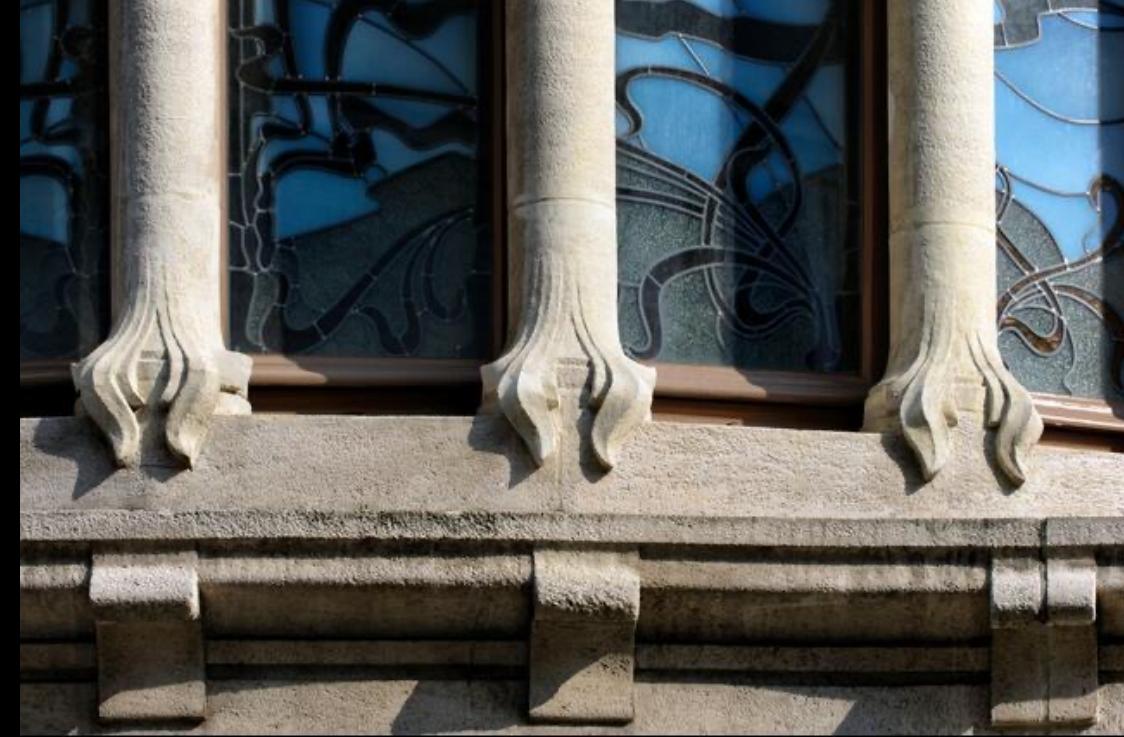
The facade includes classical elements like moldings and columns but here some of the columns are iron, not stone, and the entablature is metal, complete with exposed rivets. In addition, this town house has features that would become characteristic of Horta's domestic architecture:

- an open floor plan;
- a use of natural light;
- a unity of architecture, interior decoration, and furniture.



A large bay window, extending over two stories, dominates the front façade. While the entrance is shaded by the classical overhanging lintel with enormous brackets, the rest of the central bay is glazed and features the lightest and most slender of metal supports.



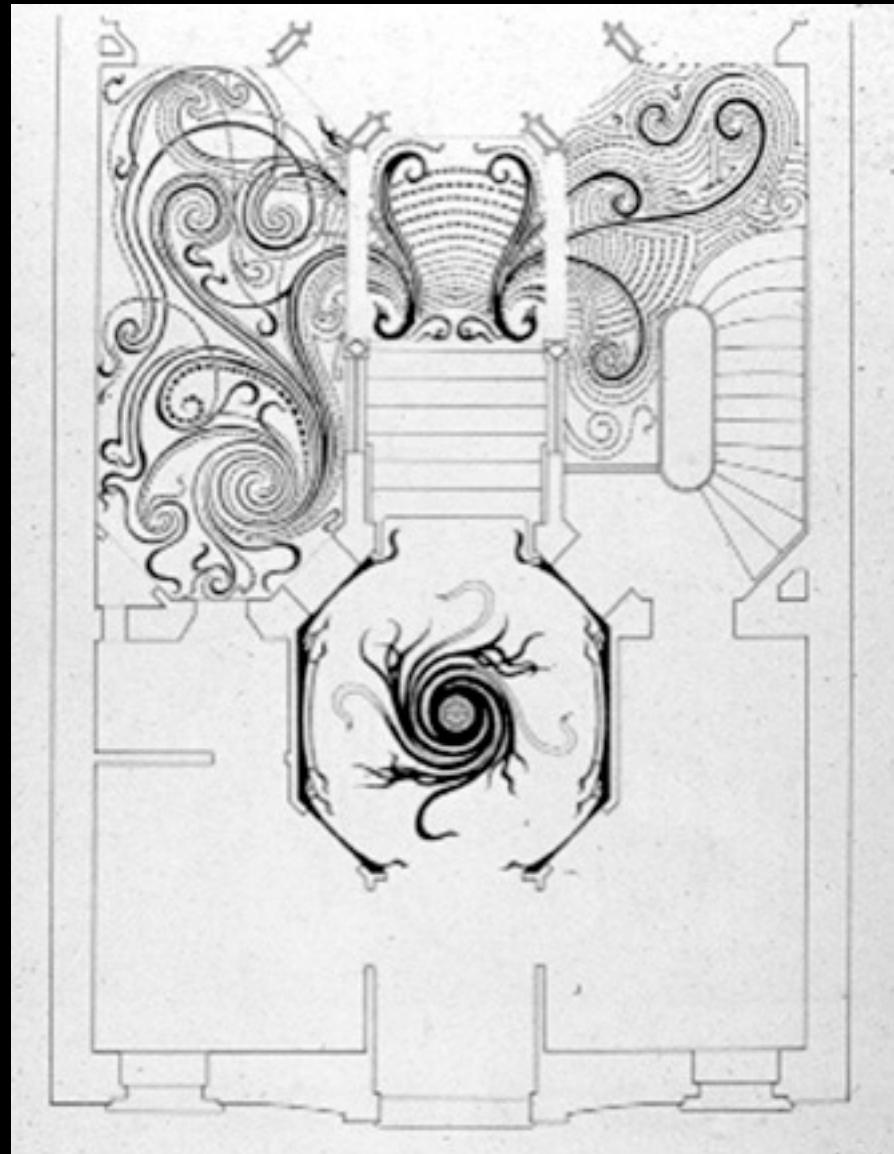


alamy - KP38NN

Vestibule  
“biomorphic whiplash”

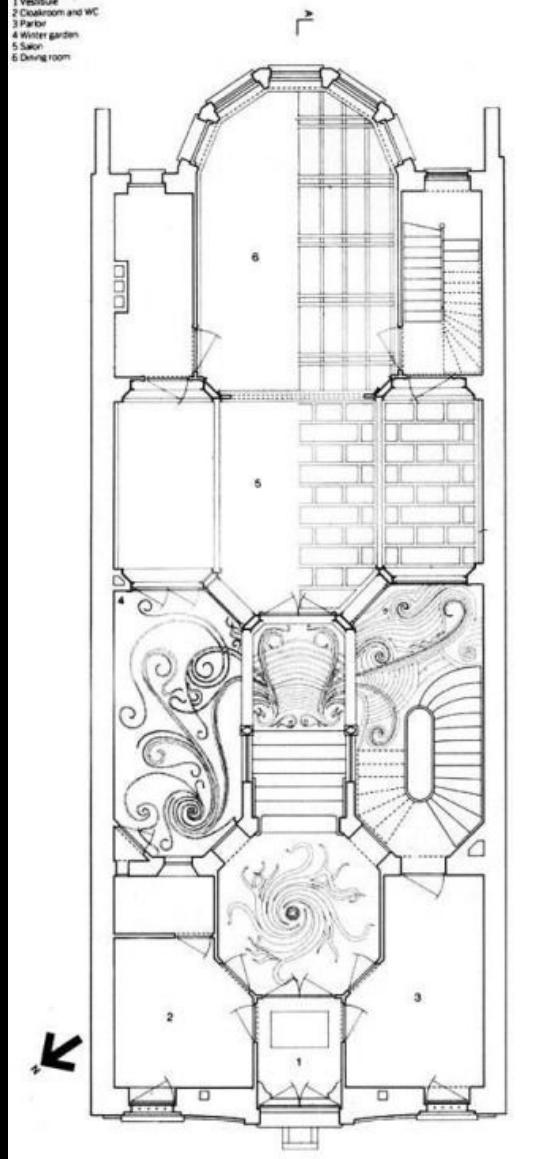


plan of entry and vestibule showing mosaic floors



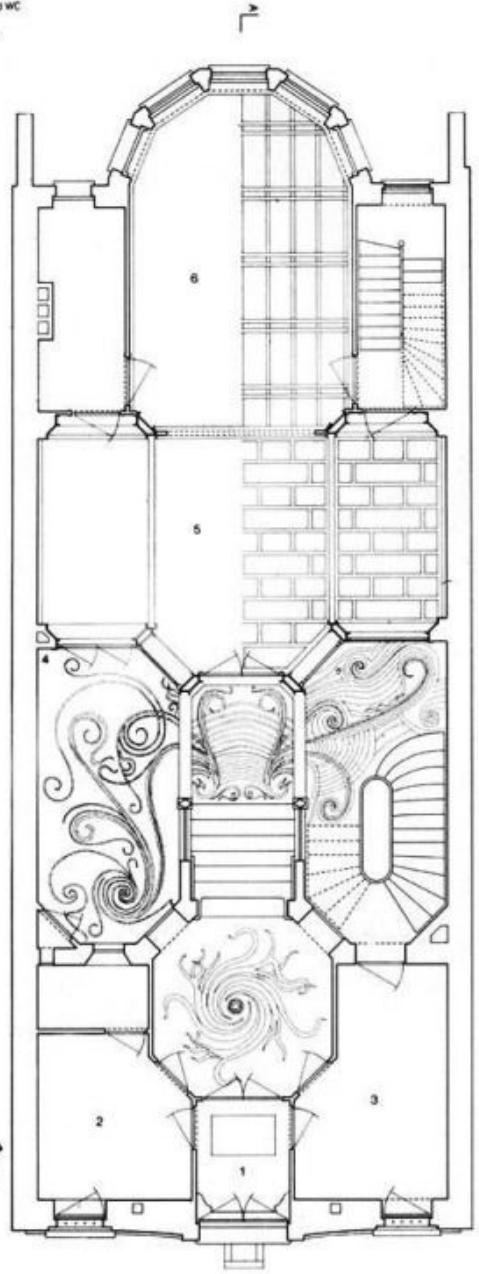
Key to ground floor

- 1 Vestibule
- 2 Cloakroom and WC
- 3 Parlor
- 4 Winter garden
- 5 Stair
- 6 Dining room



# "biomorphic whiplash"

Key to ground floor  
1 Vestibule  
2 Cloakroom and WC  
3 Parlor  
4 Winter garden  
5 Salon  
6 Dining room



SPRB - GOB

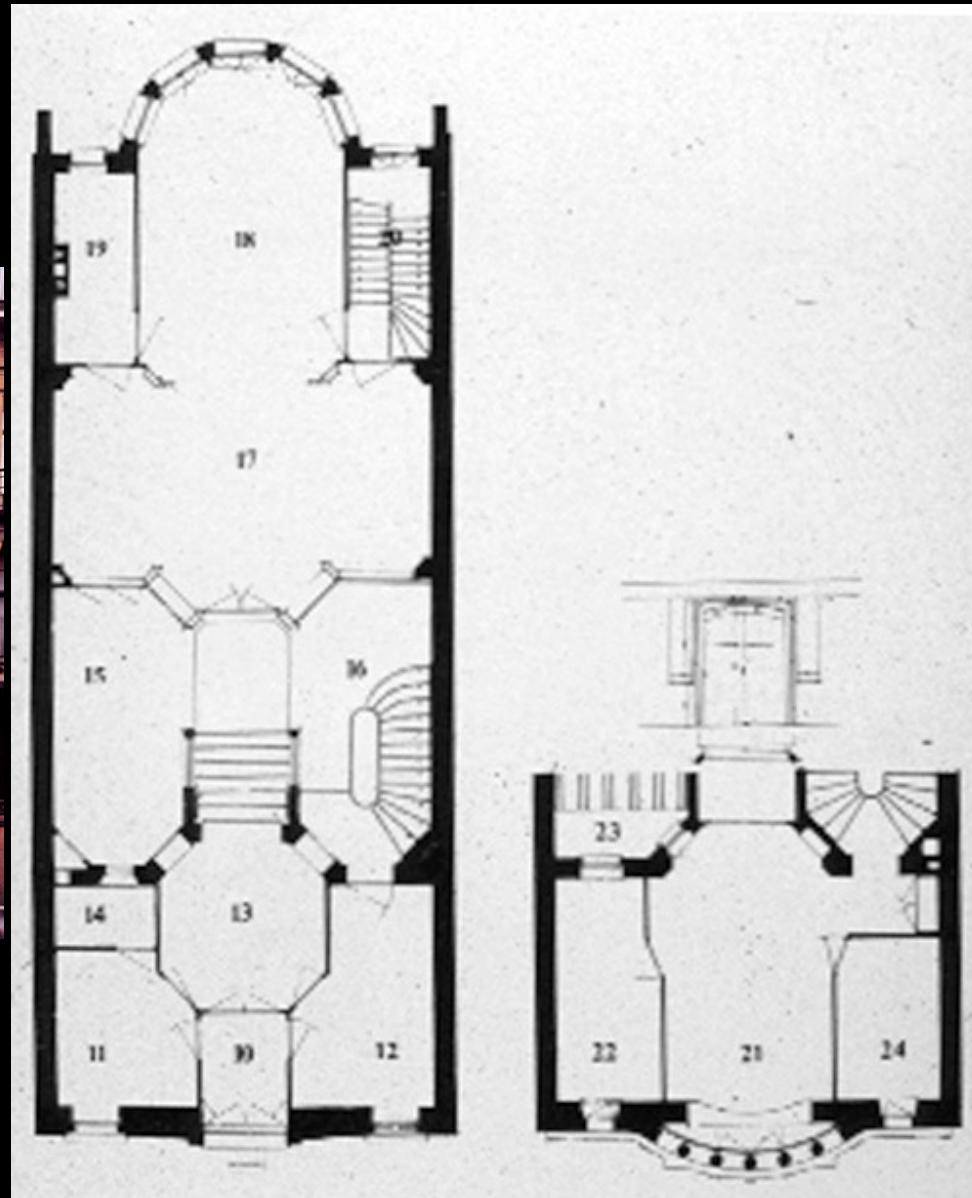




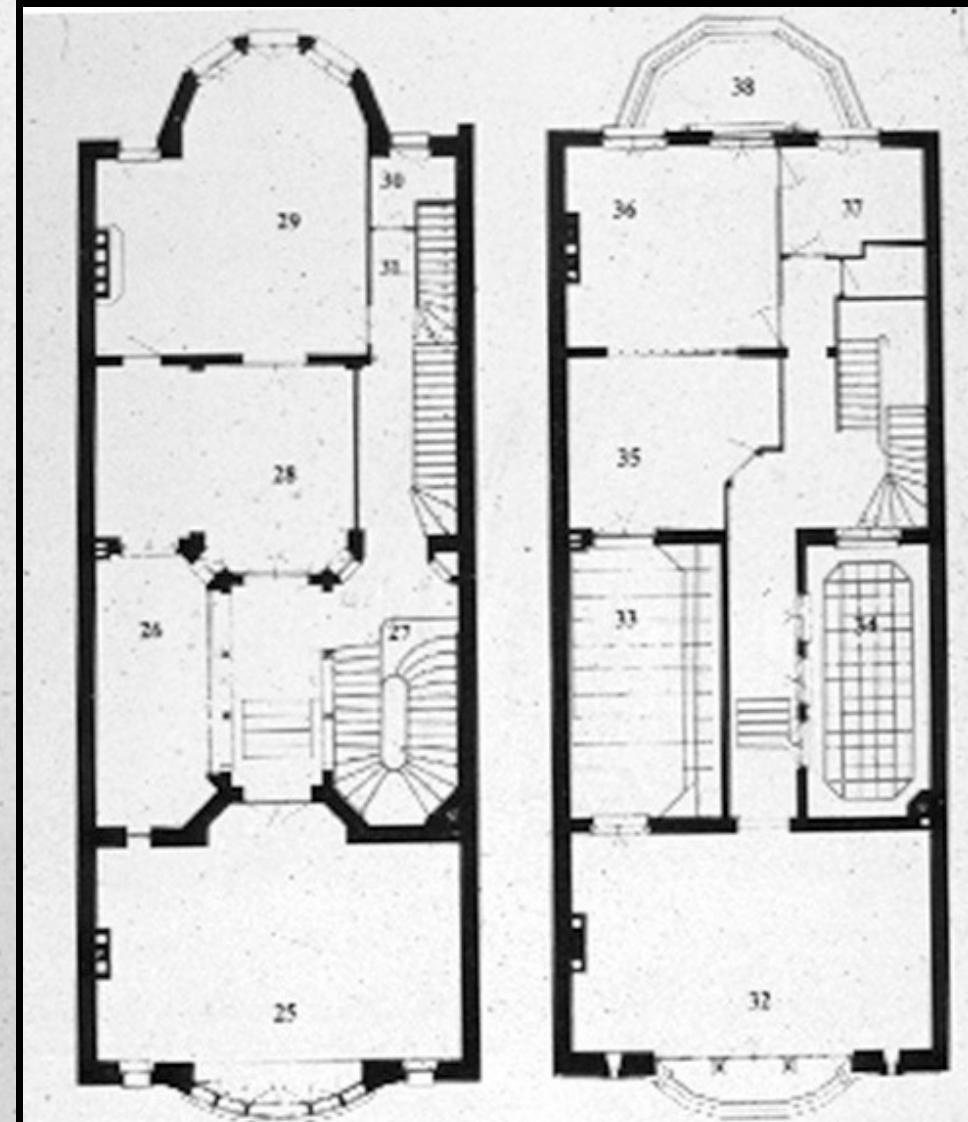




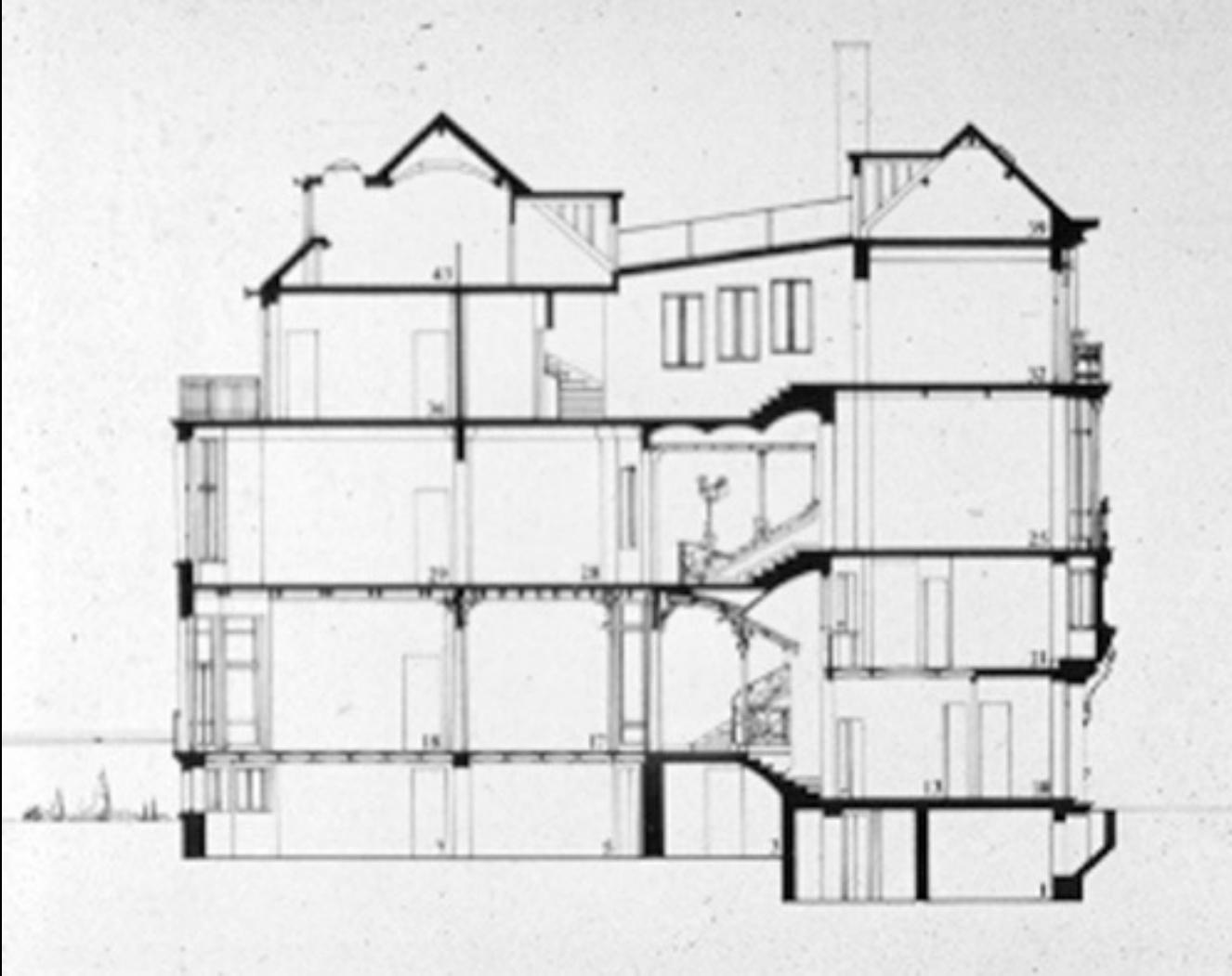
Ground floor and mezzanine plans



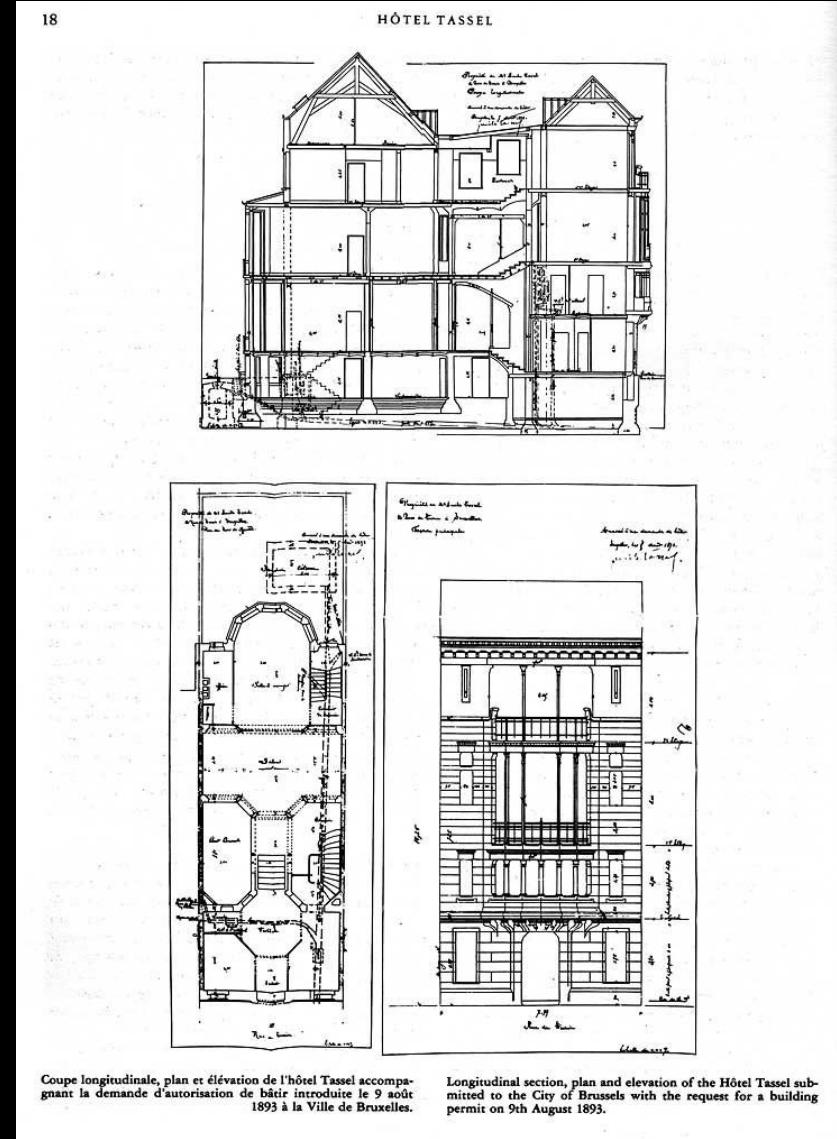
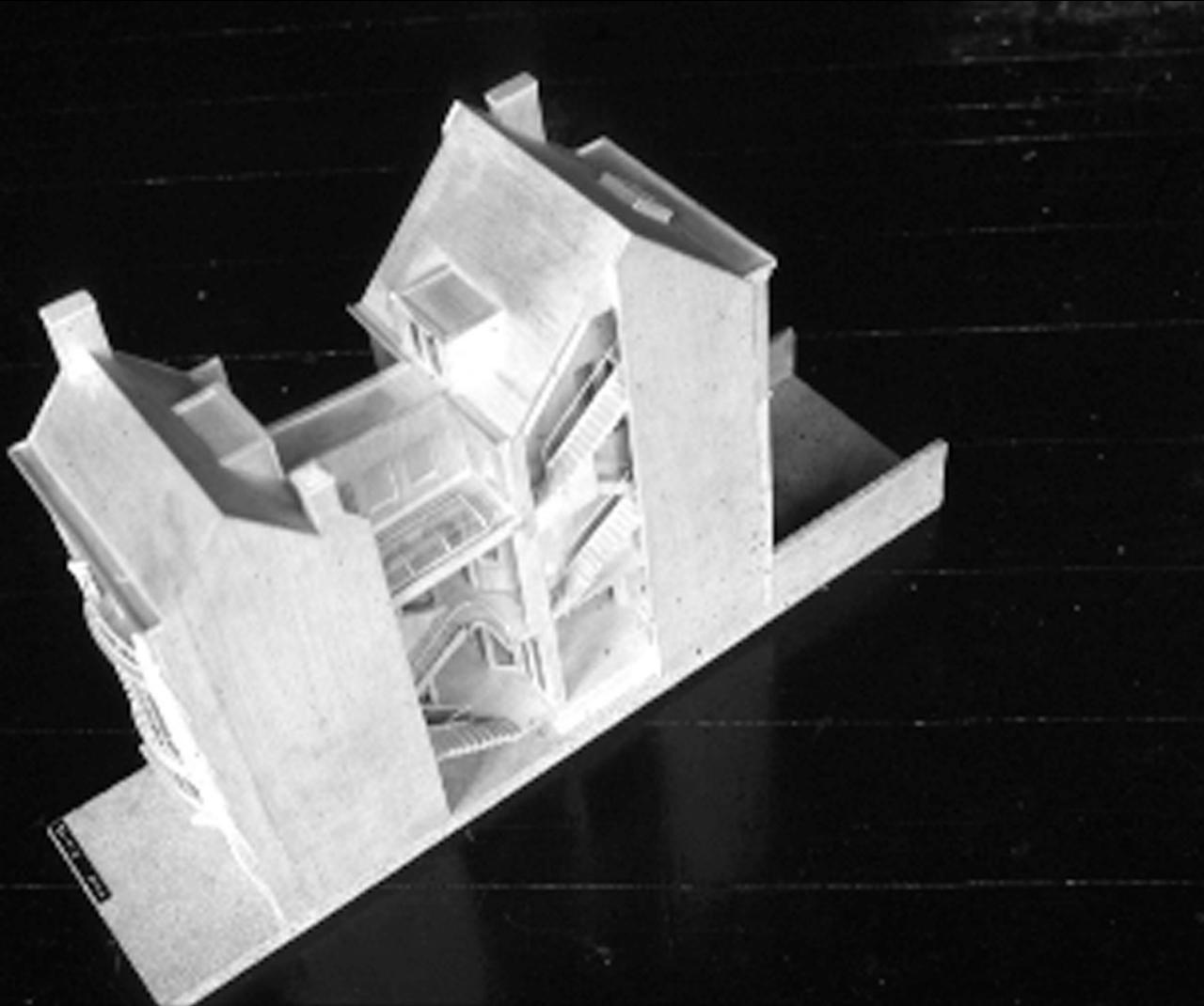
Main floor and second floor plans



- Two rather conventional buildings in brick and natural stone — one on the side of the street and one on the side of the garden — are linked by a steel structure covered with glass.
- It functions as the connective part in the spatial composition of the house and contains staircases and landings that connect the different rooms and floors.

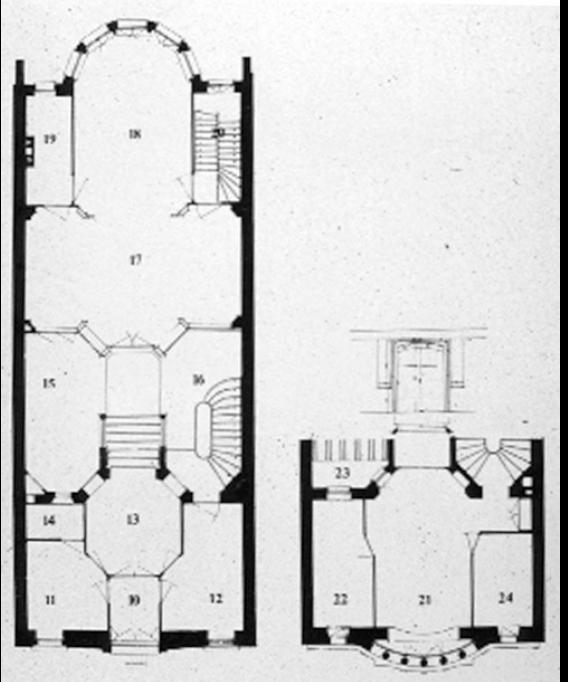


The glass roof functions as a light shaft that brings natural light into the center of the building.

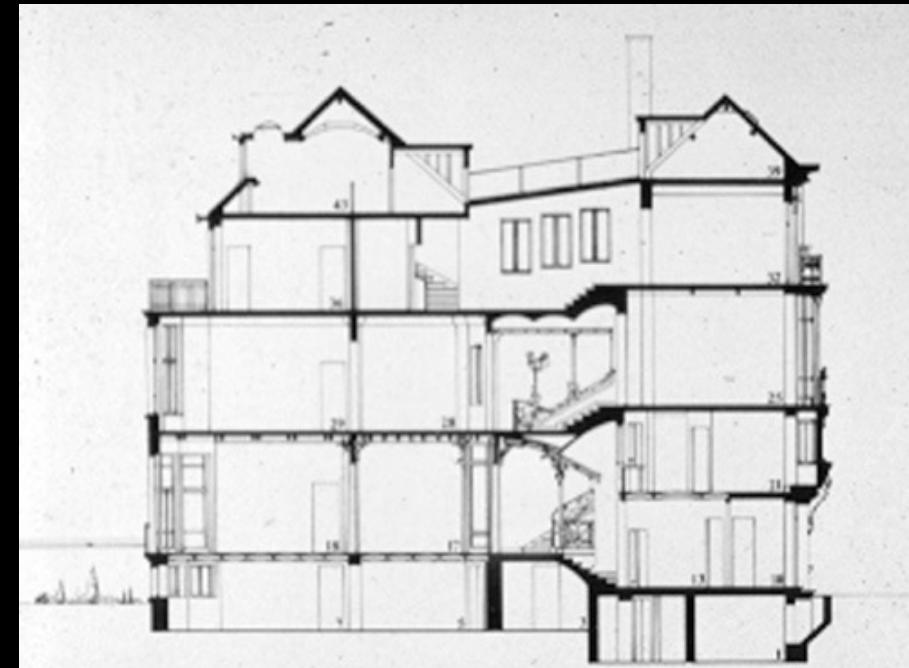
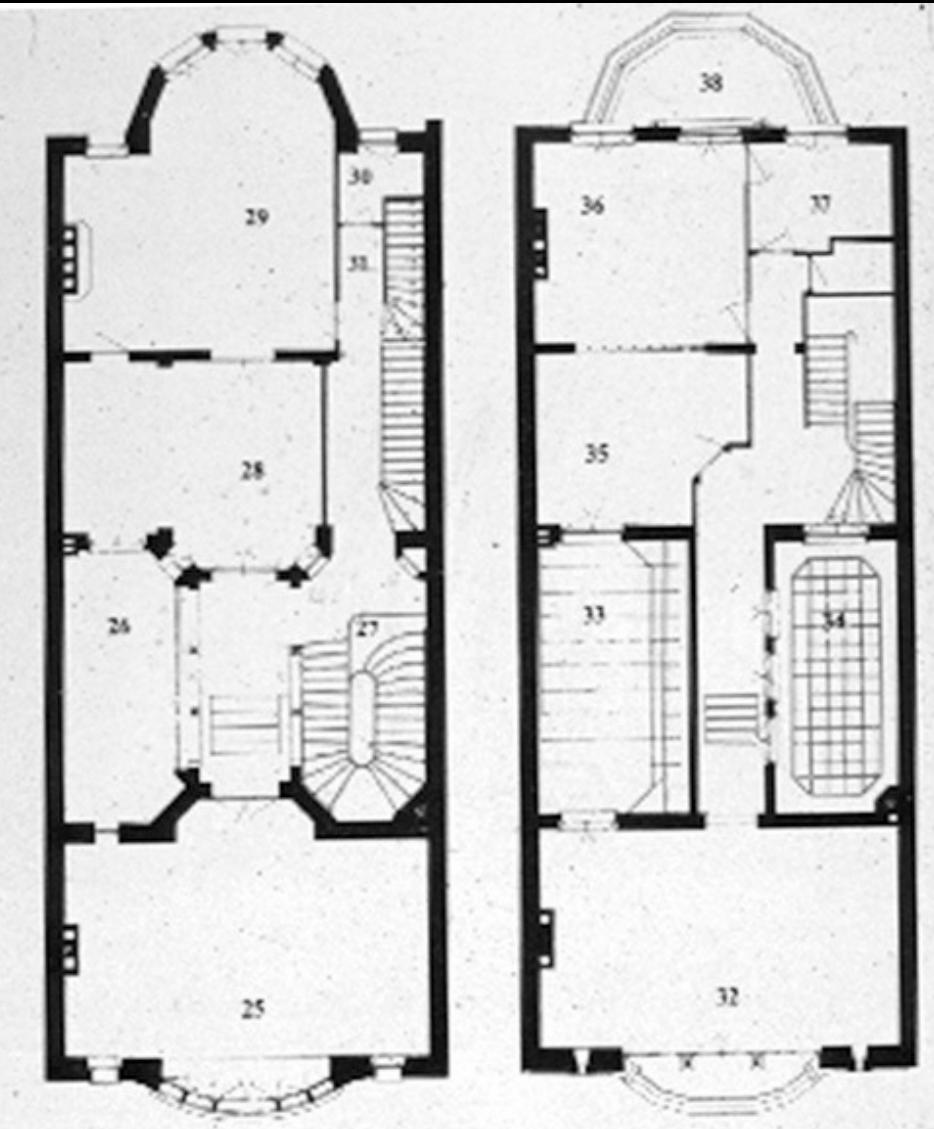




Ground floor and mezzanine plans



Main floor and second floor plans



Victor Horta, Horta House and Workshop, Brussels, 1901







- Studio facade was developed in three levels
- The studio's top floor is sheathed in glass, framed by thin yellow-brown metal columns
- Note play of stone and metal elements



MEMORIAM ARDENTUM

There are five levels in the house and studio: a basement, a ground floor, the bel etage/piano nobile (or second level from the street), and the first and second floors (or third and fourth levels from the street). The mezzanines (or semi-levels) surround the central staircase.

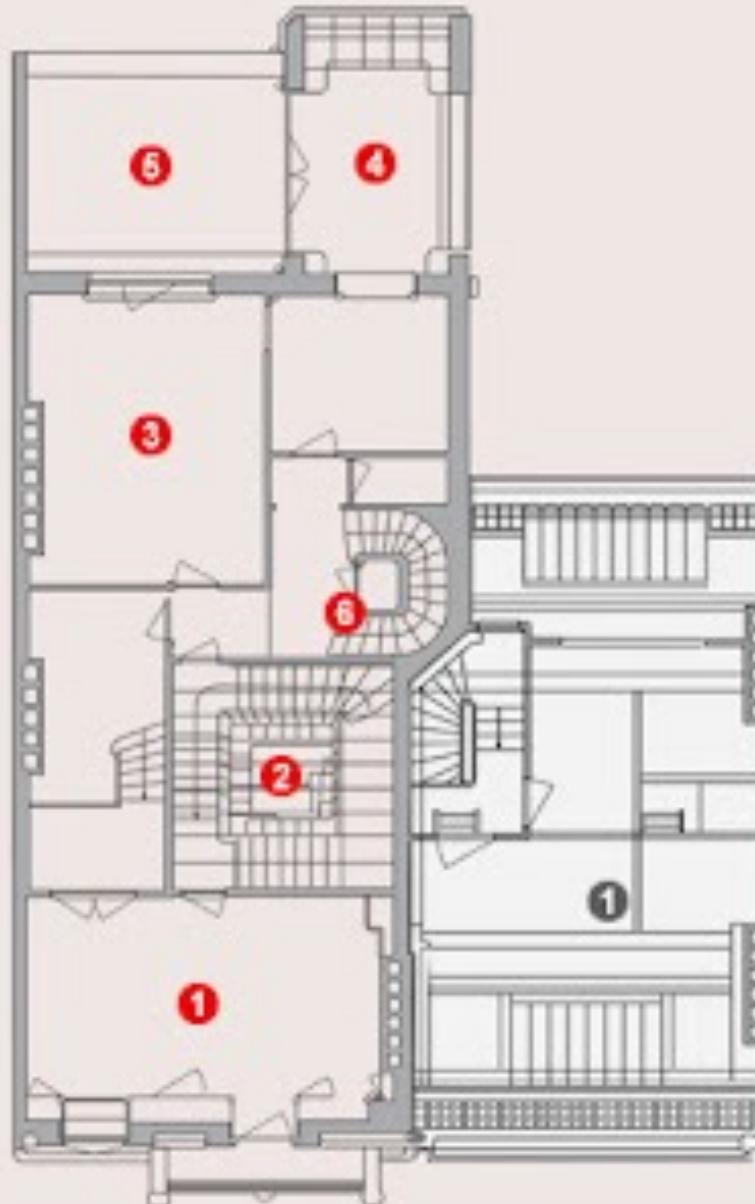
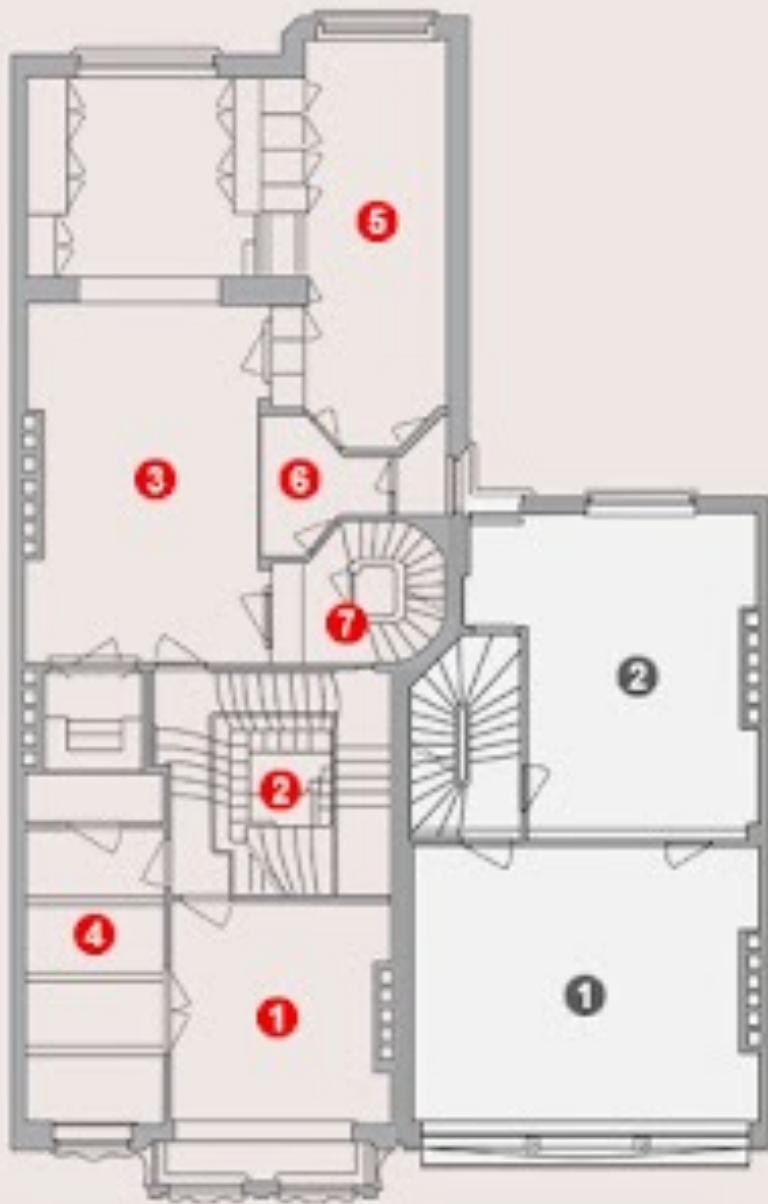


**GROUND FLOOR (Left): House:** 1. Parlor - Cloakroom, 2. Main staircase, 3. Cellar - Kitchen, 4. Servant's staircase. **Studio:** 1. New cloakroom, 2. Bookshop.

**BEL-ÉTAGE (Right): House:** 1. Music room. 2. Main staircase. 3. Dining room. 4. Salon. 5. Servant's staircase. **Studio:** 1. Victor Horta's salon waiting room. 2. Victor Horta's office Bel etage, aka piano nobile, or main floor of house

<http://architecturaloleskine.blogspot.com/2012/05/victor-horta-house-studio-in-brussels.html>



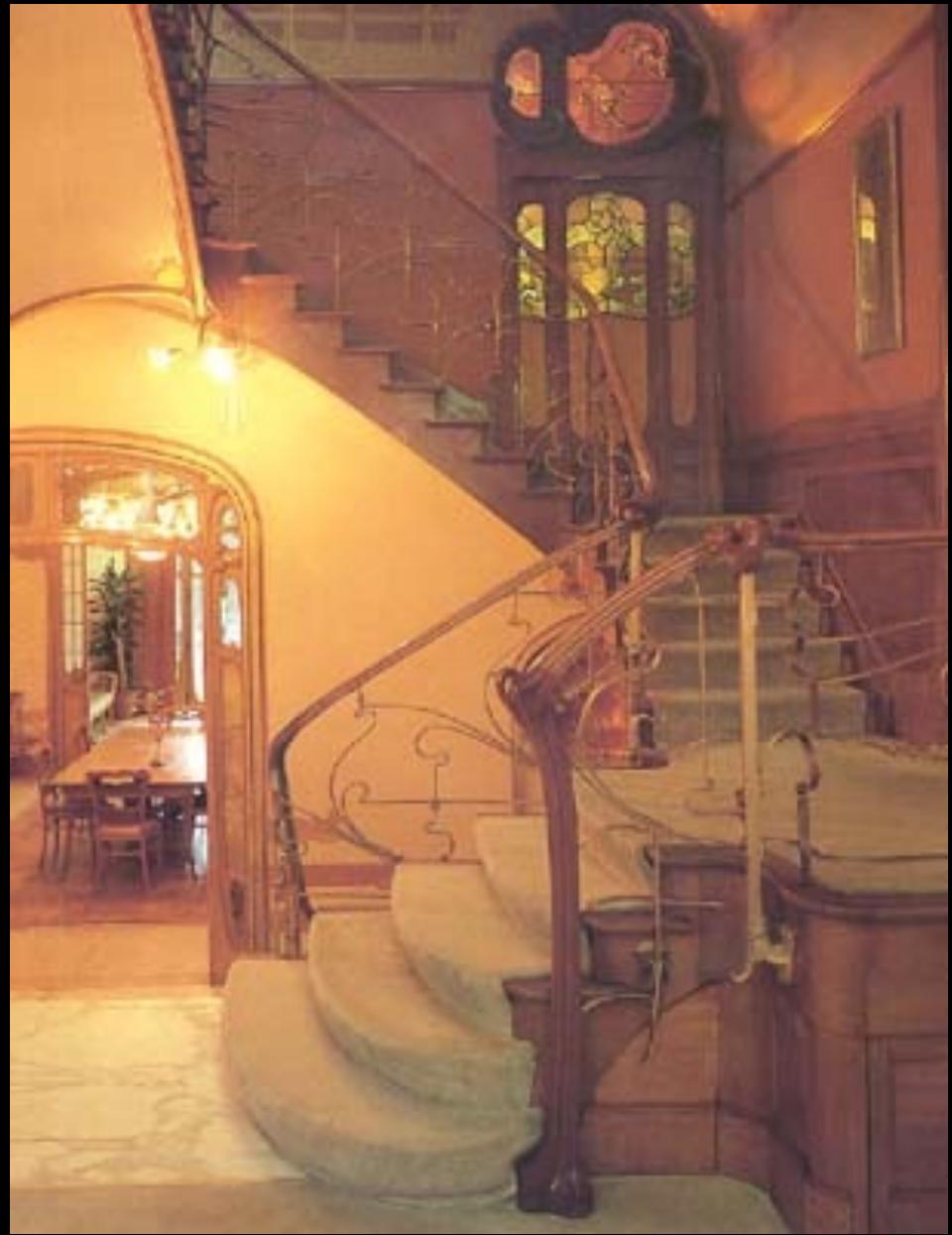


**FIRST FLOOR (Left): House:** 1. Salon- Cloakroom, 2. Main staircase, 3. Bedroom, 4. Boudoir 5. Dressing room, 6. Bathroom. 7. Servant's staircase. **Studio:** 1. Library, 2. Office for museum staff.

**SECOND FLOOR (Right): House:** 1. Guest-room. 2. Main staircase. 3. Simone Horta's room. 4. Winter terrace. 5.Terrace. 6. Servant's staircase. **Studio:** 1. Attic. Office for museum staff.

<http://architecturalmoleskine.blogspot.com/2012/05/victor-horta-house-studio-in-brussels.html>











© OPT / Expedia

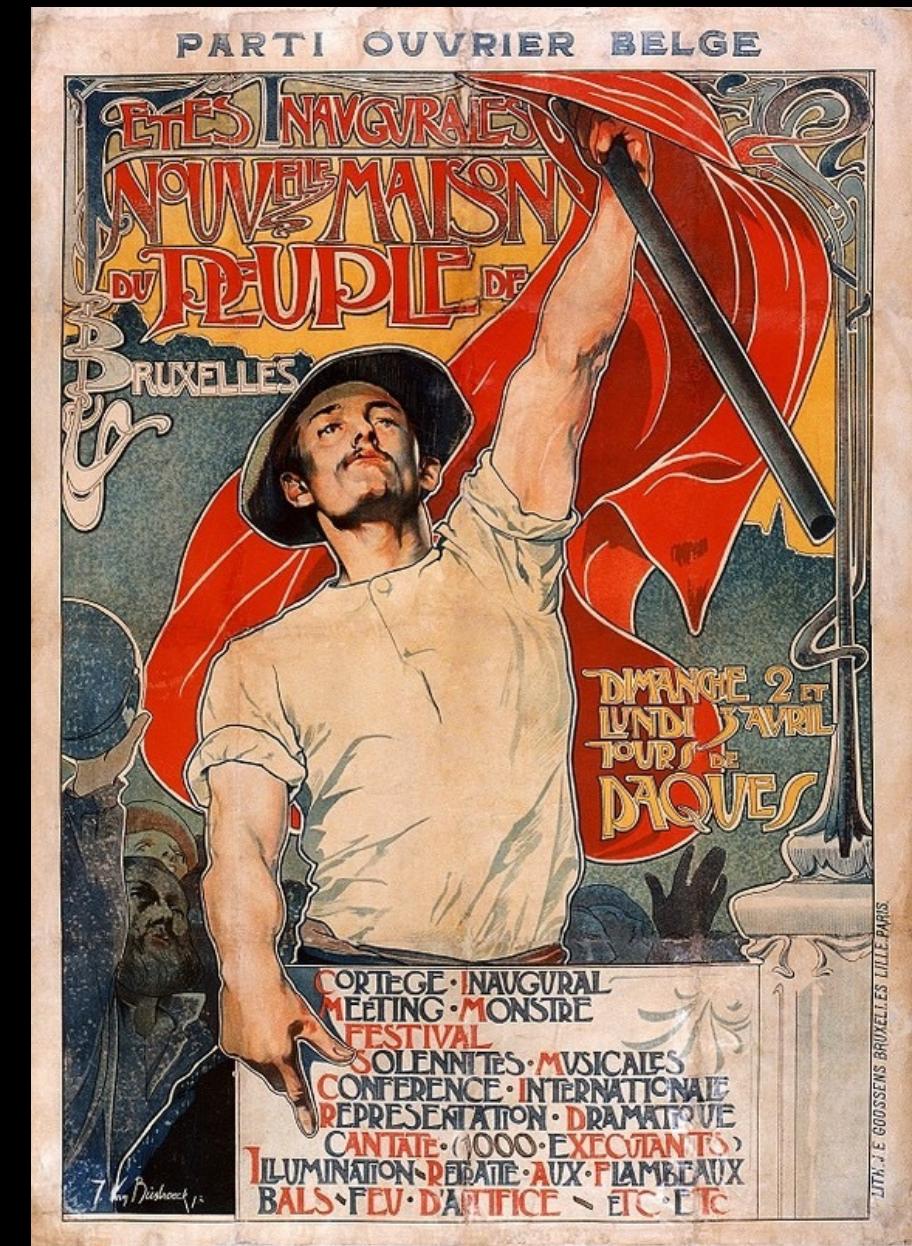
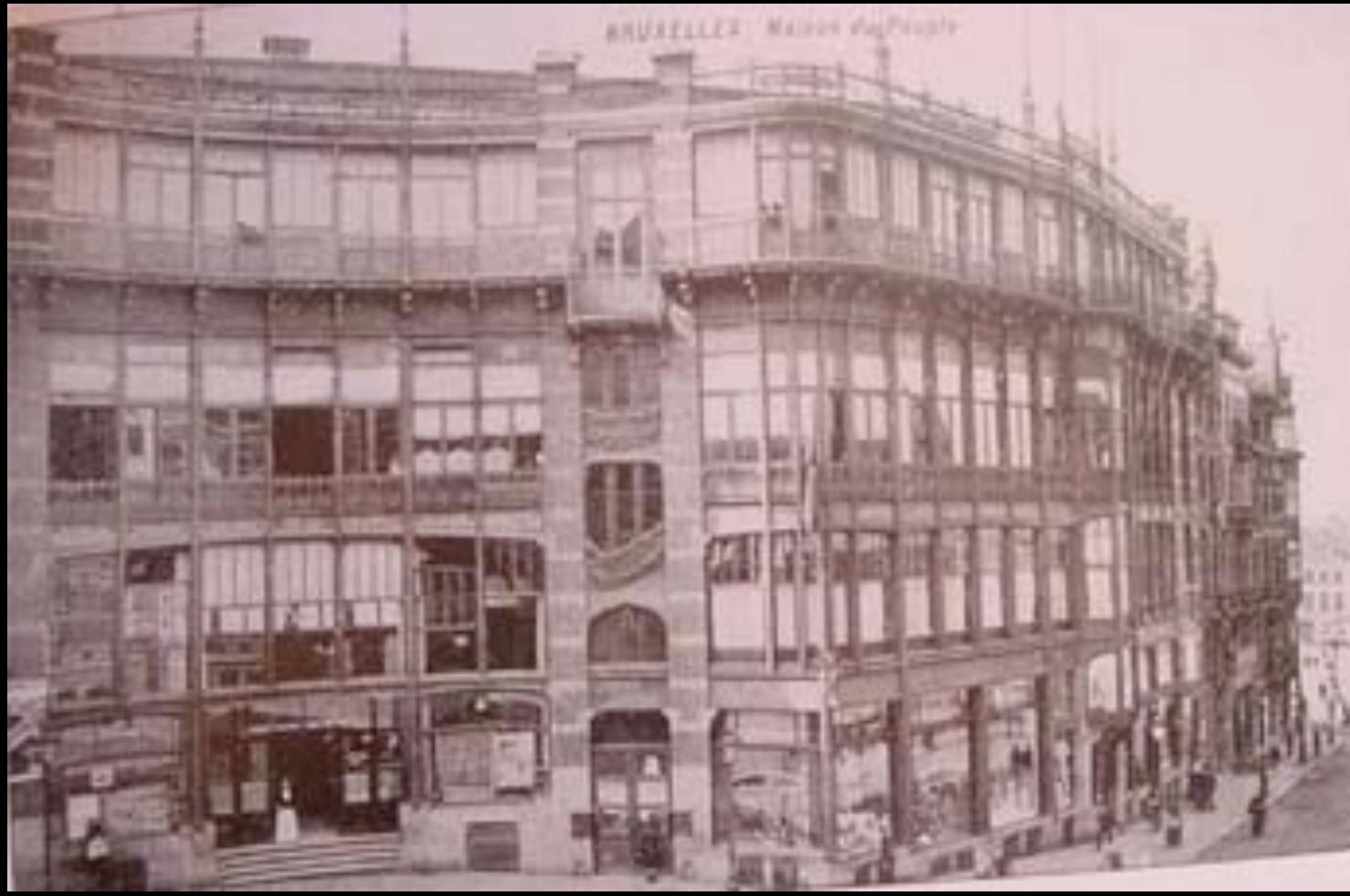


Recursive effects of mirrors on the sides of the staircase – space opens up to infinity



Victor Horta, Maison du Peuple, Brussels, Belgium, 1899

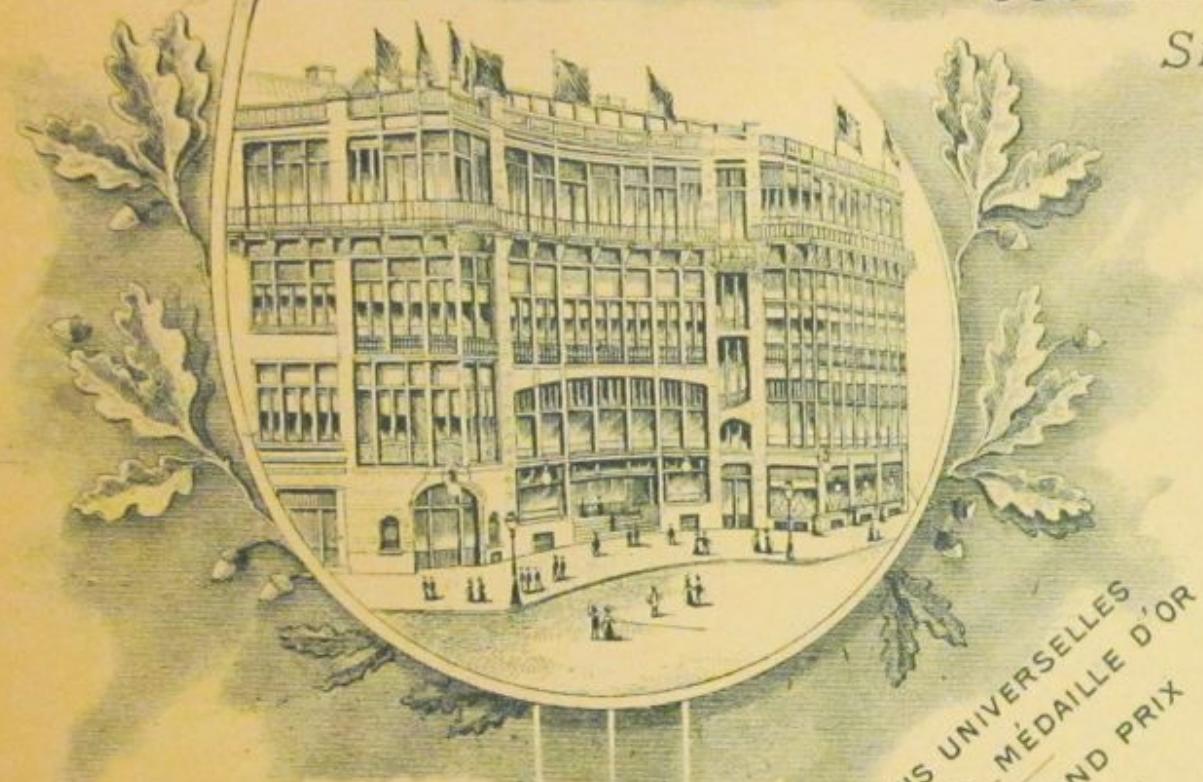




# LA MAISON DU PEUPLE

SOCIÉTÉ COOPÉRATIVE OUVRIÈRE (FONDÉE EN 1882)

Siège Social: Rue Joseph Stevens TÉLPH. A1690

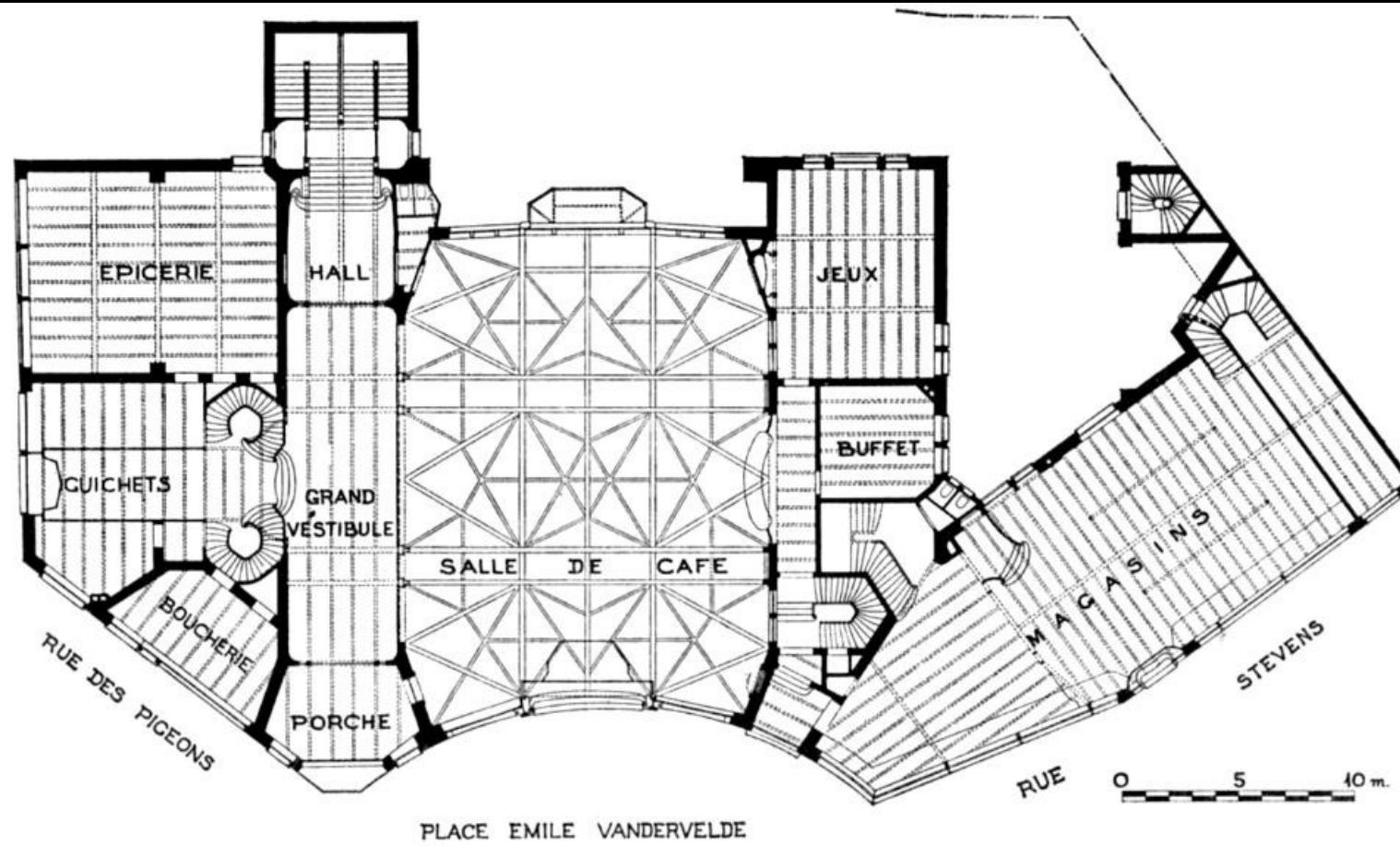


BRUXELLES

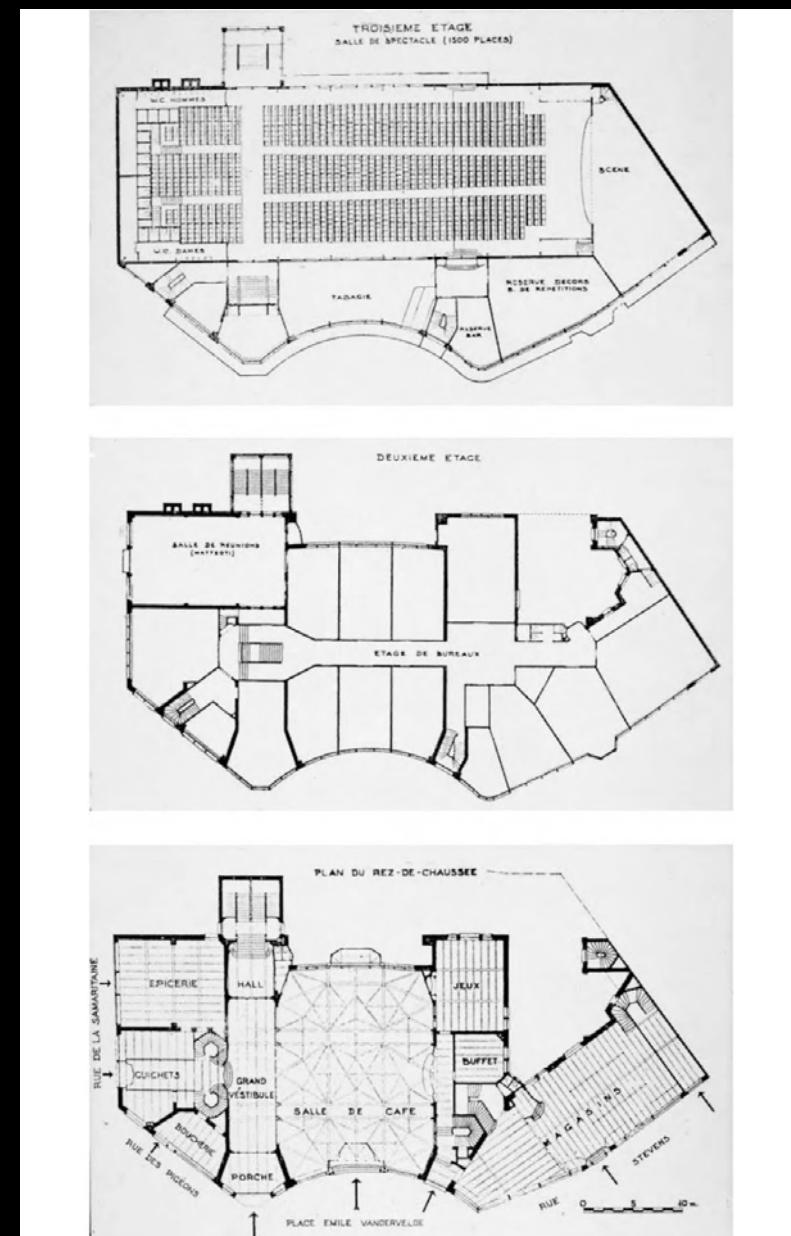
le 28 octobre 1914.- 10

Mr. Becker

RUE DE LA SAMARITAINE



PLACE EMILE VANDERVELDE





# Hector Guimard, Metro Entrances, Paris, 1899-1905

The great majority of the entrances built (154) were unroofed enclosures. Three of the entrances took the form of free-standing pavilions or small stations, such as Bastille (left). 86 of the original Guimard entrances stand today.



## PARIS METRO ENTRANCES



### LOCATION

Paris, France

### DATE

1899 to 1905 timeline

### BUILDING TYPE

Light rail rapid transit stations

### CONSTRUCTION SYSTEM

Iron and glass

### CONTEXT

Urban

### STYLE

Art Nouveau

- Guimard's greatest success here was his famous entrances to the Paris Métro, based on the ornamented structures of Viollet-le-Duc.
- The Métro designs remain among the most recognizable and admired Art Nouveau examples and have been faithfully restored and reproduced in cities and museums outside of Paris.

Ref: <http://www.macklowegallery.com/education.asp/art+nouveau/ArtistBiographies/antiques/Decorative+Artists/education/Hector+Guimard/d/25>

## Hector Guimard, Drawings of Fixtures for Metro Stations, Paris, 1900

### METRO ENTRANCES

OPEN TYPE



Breguet-Sabin Metro Station

COVERED TYPE



Porte Dauphine metro station

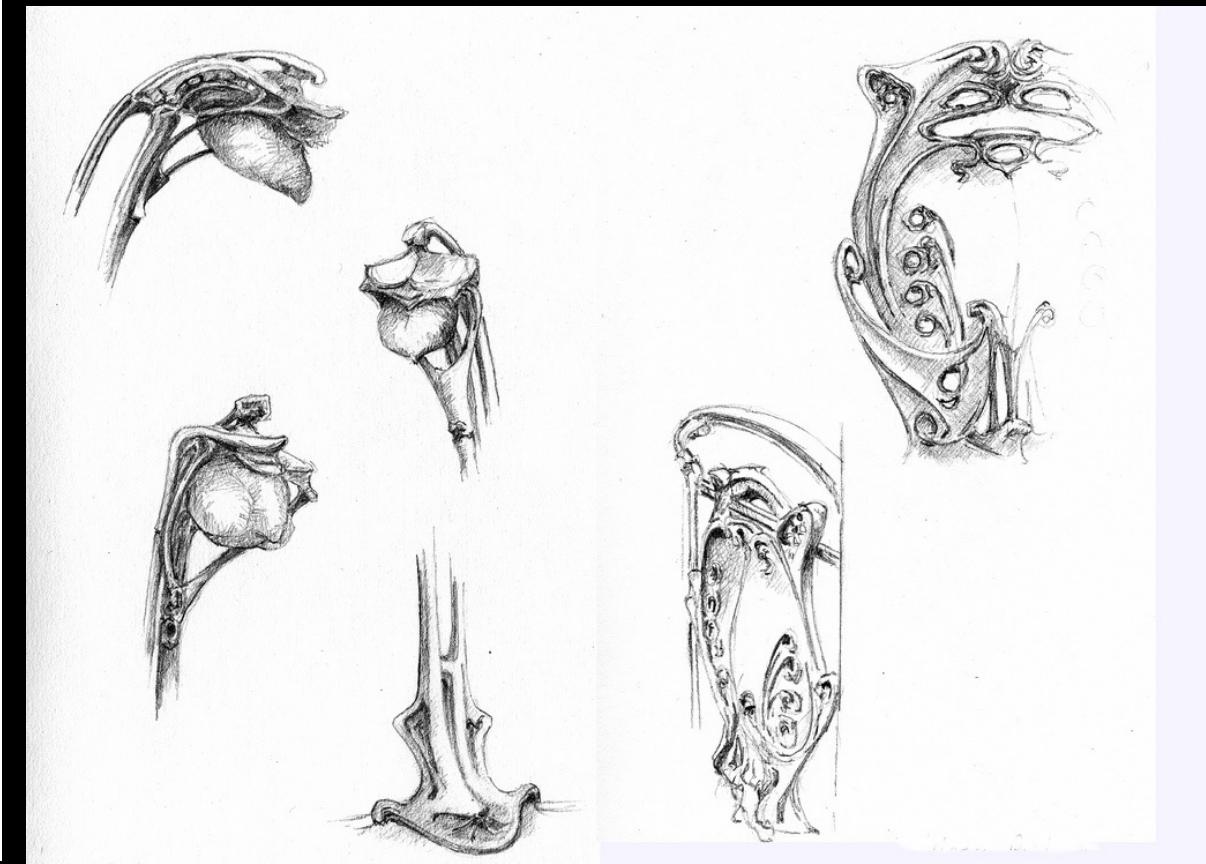
ENCLOSED TYPE



Abbesses metro station

Guimard designed 3 types of entrance. Built in cast iron, they make heavy reference to the symbolism of plants. 141 entrances were constructed between 1900 and 1912, of which 86 still exist.

Ref: <http://viaggiviniecucine.blogspot.in/2011/06/great-free-walking-tours-of-paris.html>

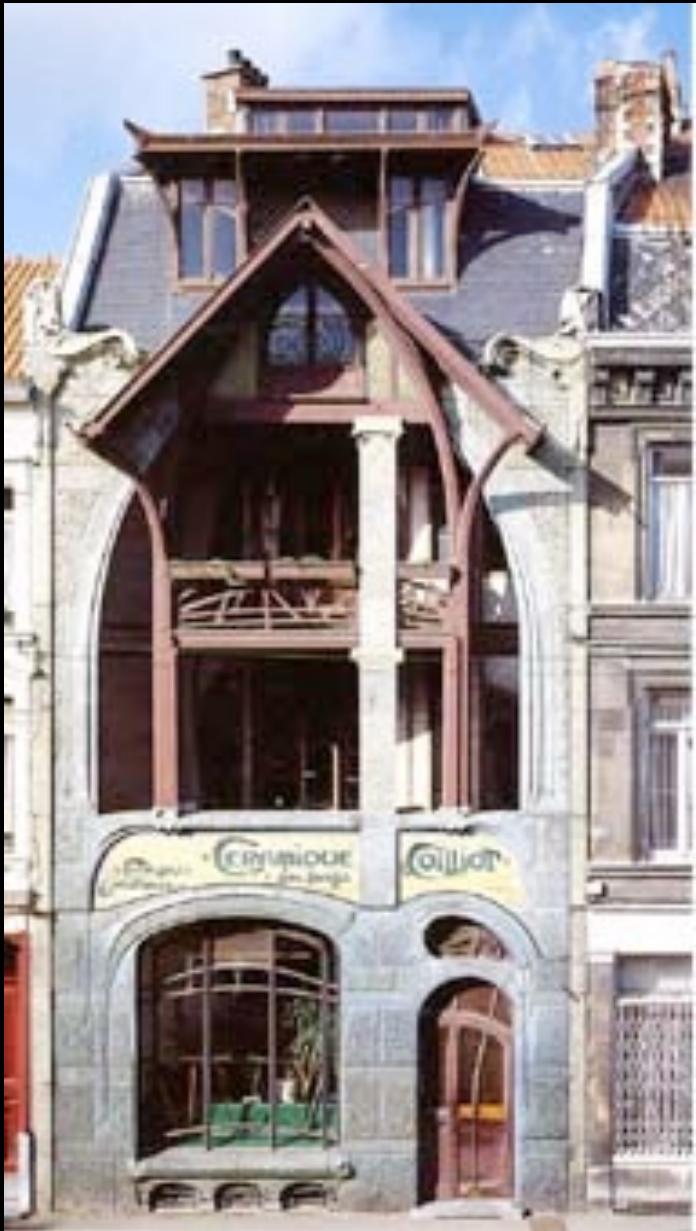




Hector Guimard, Metro Station, Porte Dauphine, Paris, 1902



## Hector Guimard, Maison Coilliot, Lille, France, 1898



- Louis Coilliot was a ceramic entrepreneur
- enameled lava and wanted to popularize the technique
- Enameled lava: Lava stone is a natural volcanic rock that is quarried, cut into slabs, topped with an enamel glaze, and fired at a very high heat.
- apply the technique to his house's façade
- Coilliot's factory and warehouse were located to the rear of his house
- constructed of bricks and cut stone, with decorative elements in wrought iron, ceramic and enameled lava
- shop on the ground floor
- apartments make up the rest of the three upper floors.
- two façades: a street façade aligned with the neighboring buildings and a recessed façade which stands at an angle
- two façades are linked by balconies on the two upper floors
- green tiles of enameled lava flank the street façade with a pediment surmounted by a wooden roof





Charles Rennie Mackintosh  
Glasgow School

# Glasgow Four

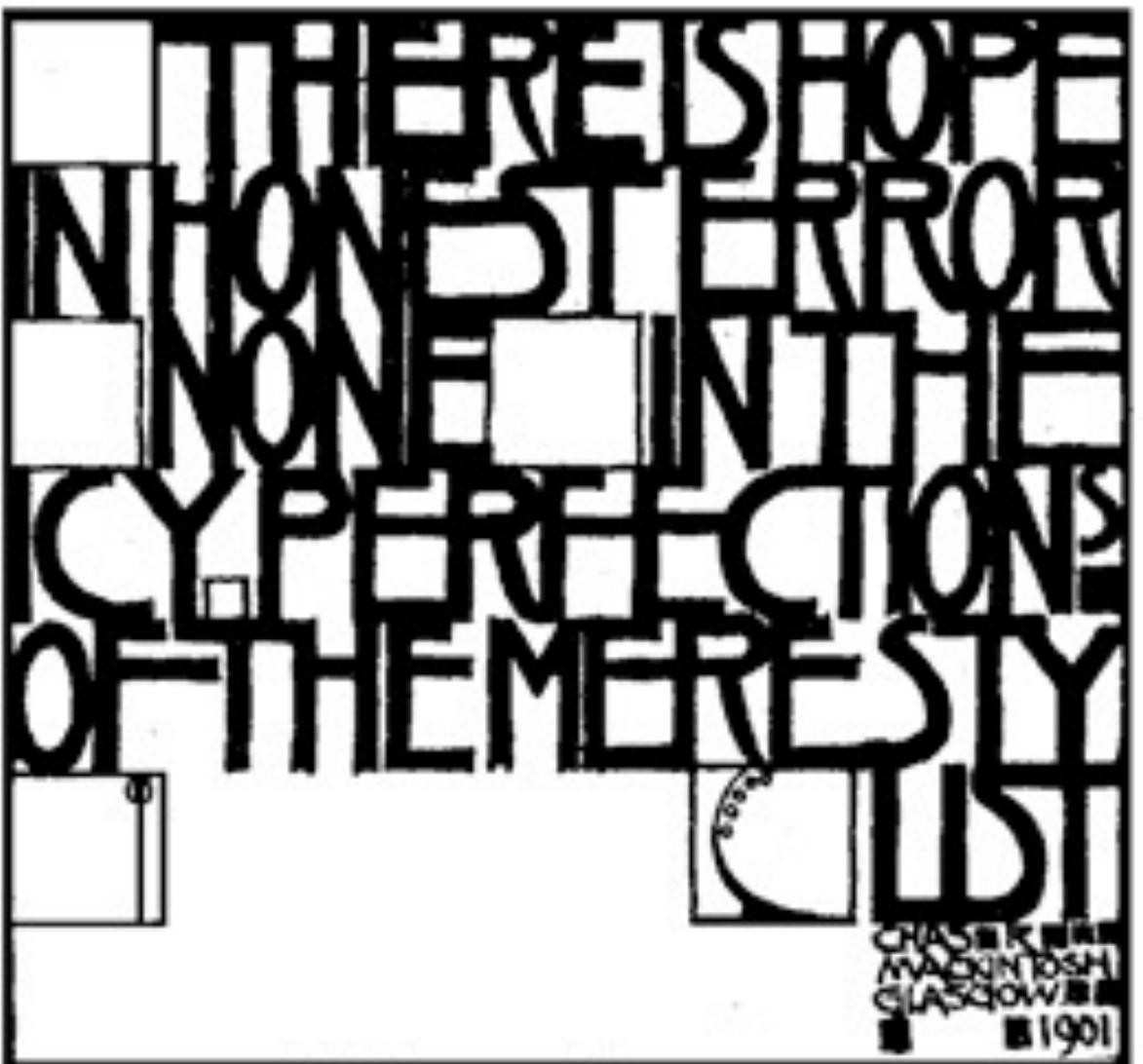


Charles Rennie Mackintosh

Margaret MacDonald



Frances MacNair, above left  
Herbert MacNair, left



There is hope in honest error.  
None in the icy perfections of the mere  
stylist.

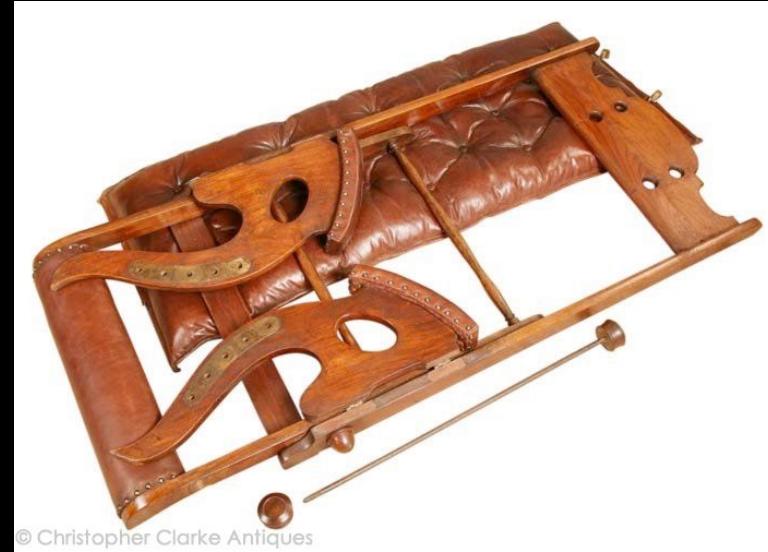
Charles Rennie Mackintosh, Glasgow, 1901



Herbert MacNair, stained wood,  
glass and textile screen designed,  
c. 1899

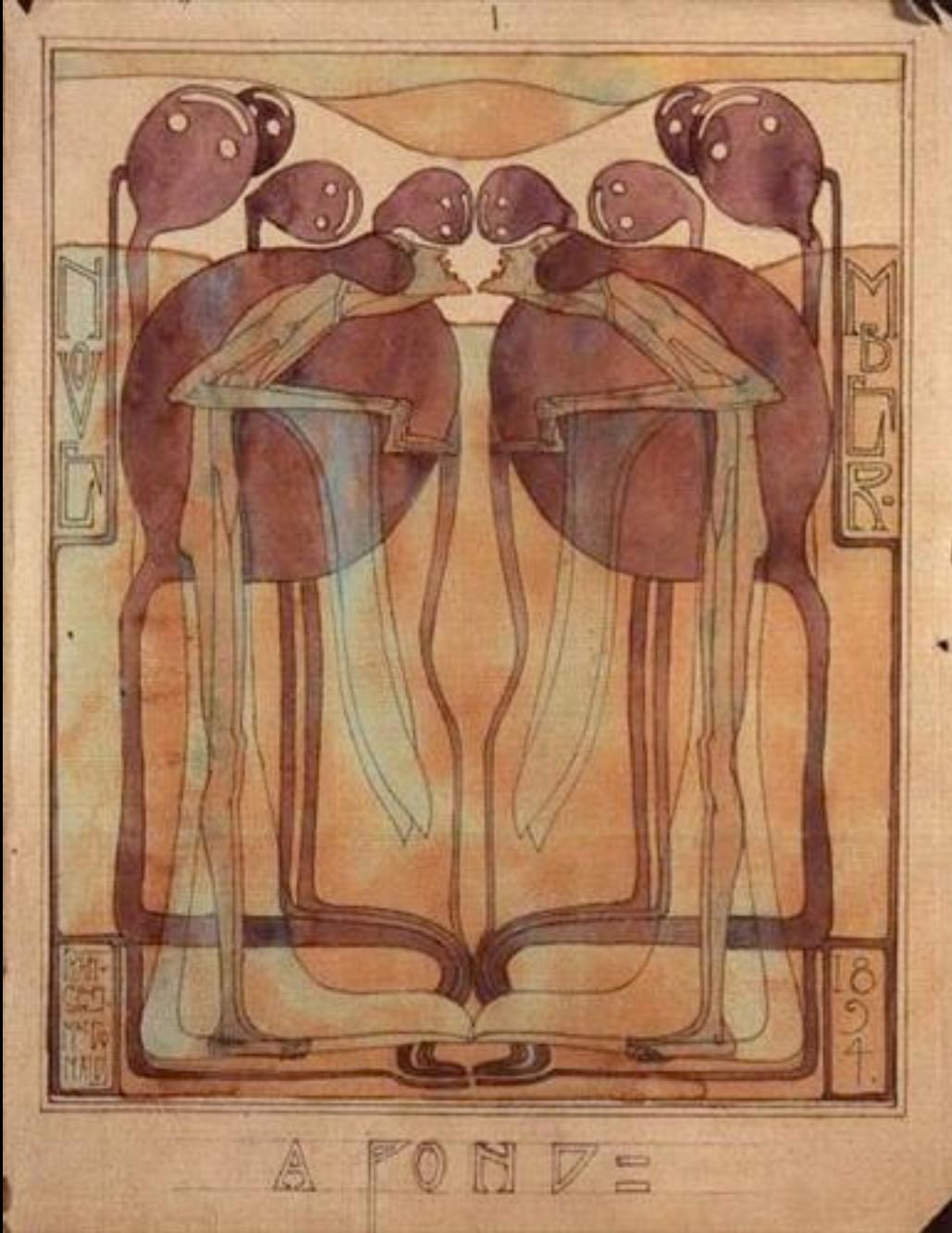


Herbert McNair, Folding Chair, 1900





Herbert MacNair The Gift of Doves, 1904



Frances MacNair, A Pond, 1894



Margaret MacDonald, White Rose and Red Rose,  
painted gesso on hessian (cloth) with glass beads,  
1902



Margaret MacDonald, Opera of  
the Winds, mixed media painting,  
1903

# The Glasgow Girls



Jessie Newbery, linen appliquéd cushion cover, c. 1900



Helen Lamb, embroidery panel, 1909



Ann Macbeth, The Sleeping Beauty, 1902



Ann Macbeth wearing designed  
collar, c. 1900

Ann Macbeth, c. 1910



Dante Gabriel Rossetti, Bocca Baciata, 1859

William Morris  
Pre-Raphaelite Brotherhood  
1850s-1860s



John Everett Millais, Ophelia 1852



Charles Rennie Mackintosh, Hill House, Helensburgh, Scotland, 1902-03



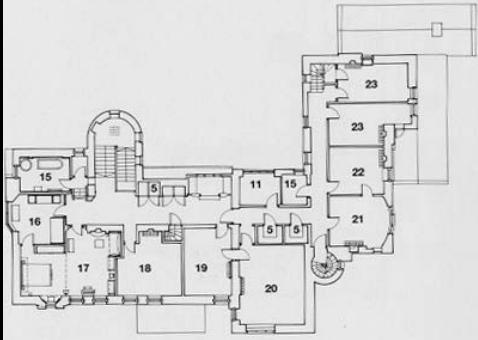




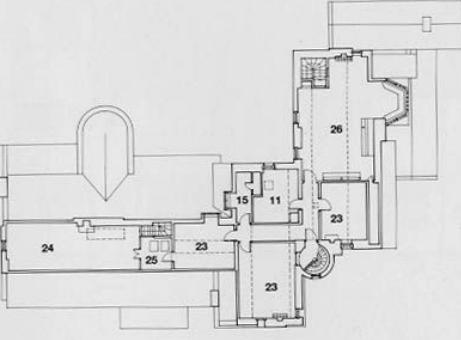


**Plans**

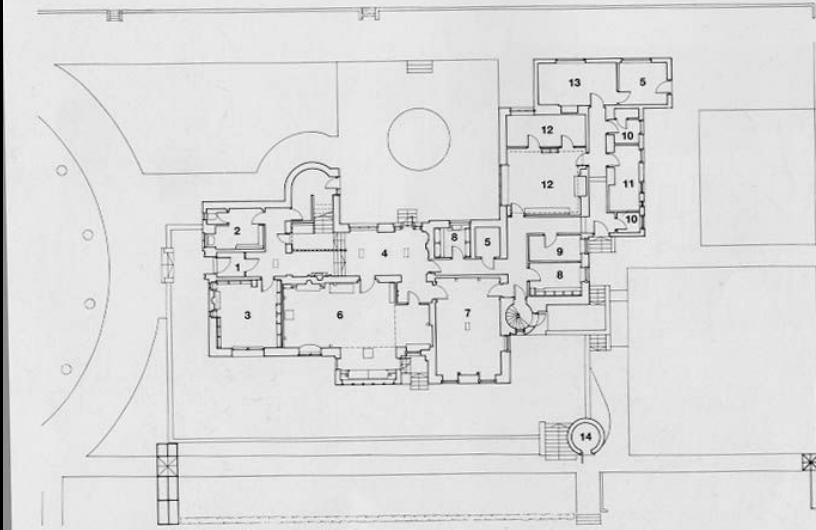
- 1 entrance
- 2 cloaks and wc
- 3 library
- 4 hall
- 5 store
- 6 drawing-room
- 7 dining-room
- 8 pantry
- 9 office
- 10 wc
- 11 kitchen
- 12 tea room
- 13 shop
- 14 garden store
- 15 bathroom
- 16 dressing-room
- 17 master bedroom
- 18 exhibition room/ bedroom
- 19 interpretation room/dressing-room
- 20 living room/night nursery
- 21 study/day nursery
- 22 bedroom/night nursery
- 23 bedroom
- 24 attic
- 25 tanks
- 26 living-room/school room



First floor plan

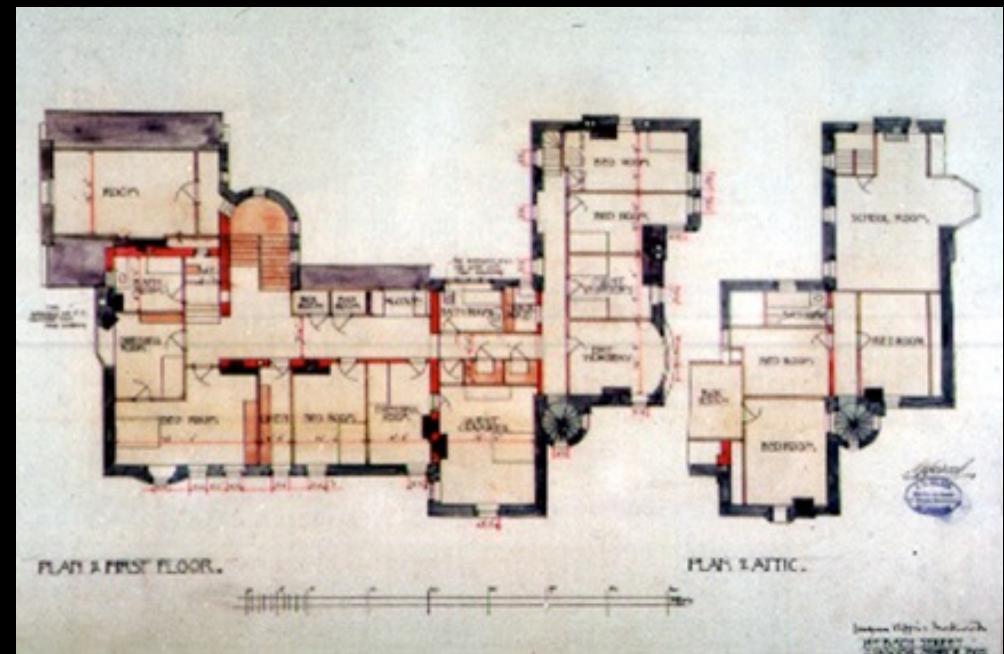


Second floor plan



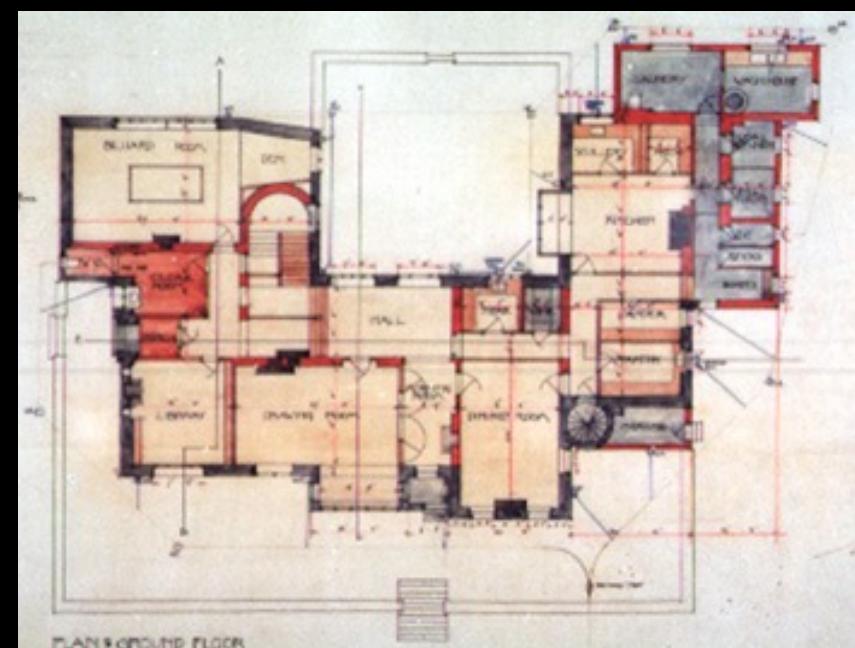
Ground floor plan

Drawings

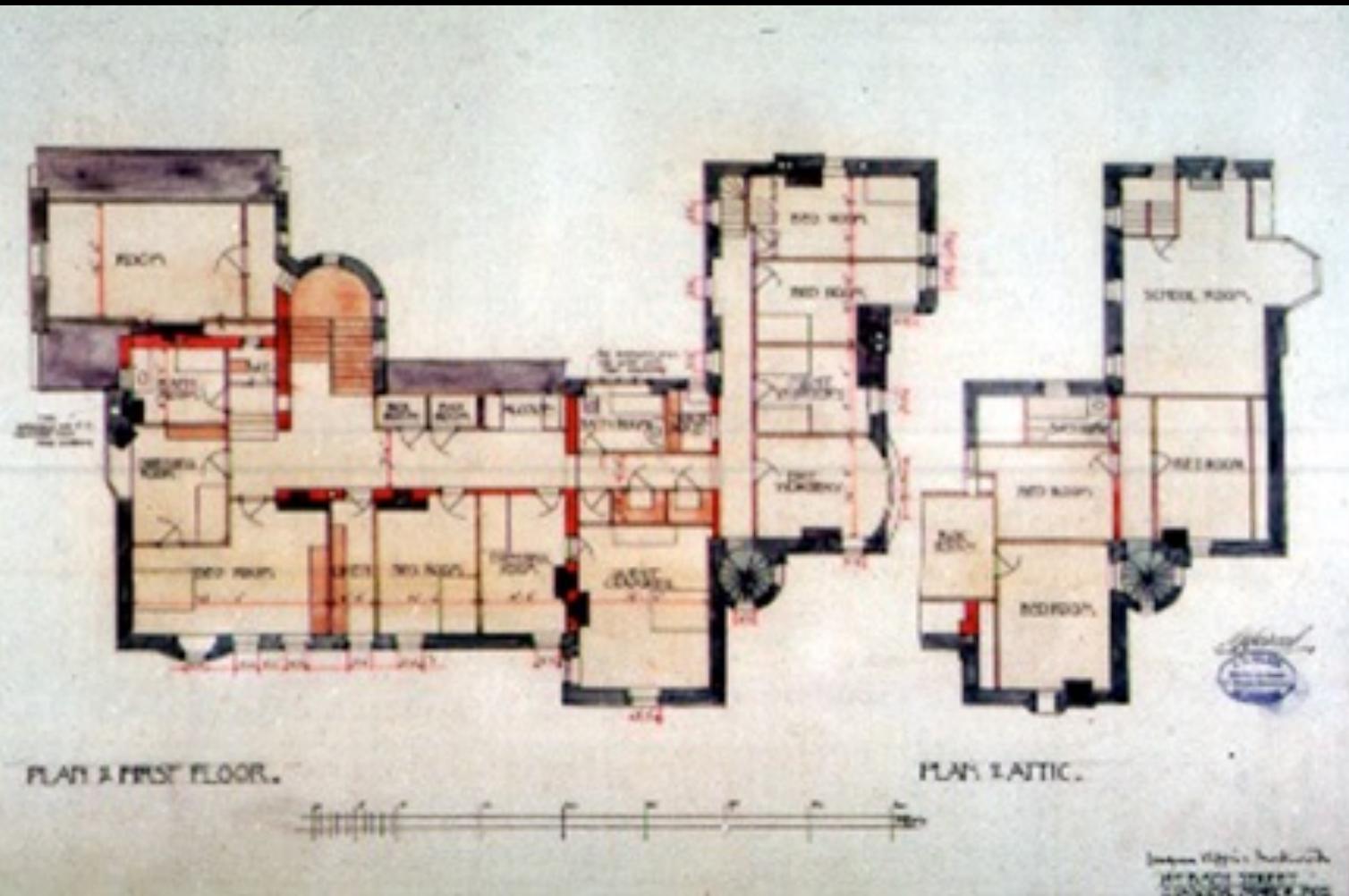


PLAN 1 FIRST FLOOR.

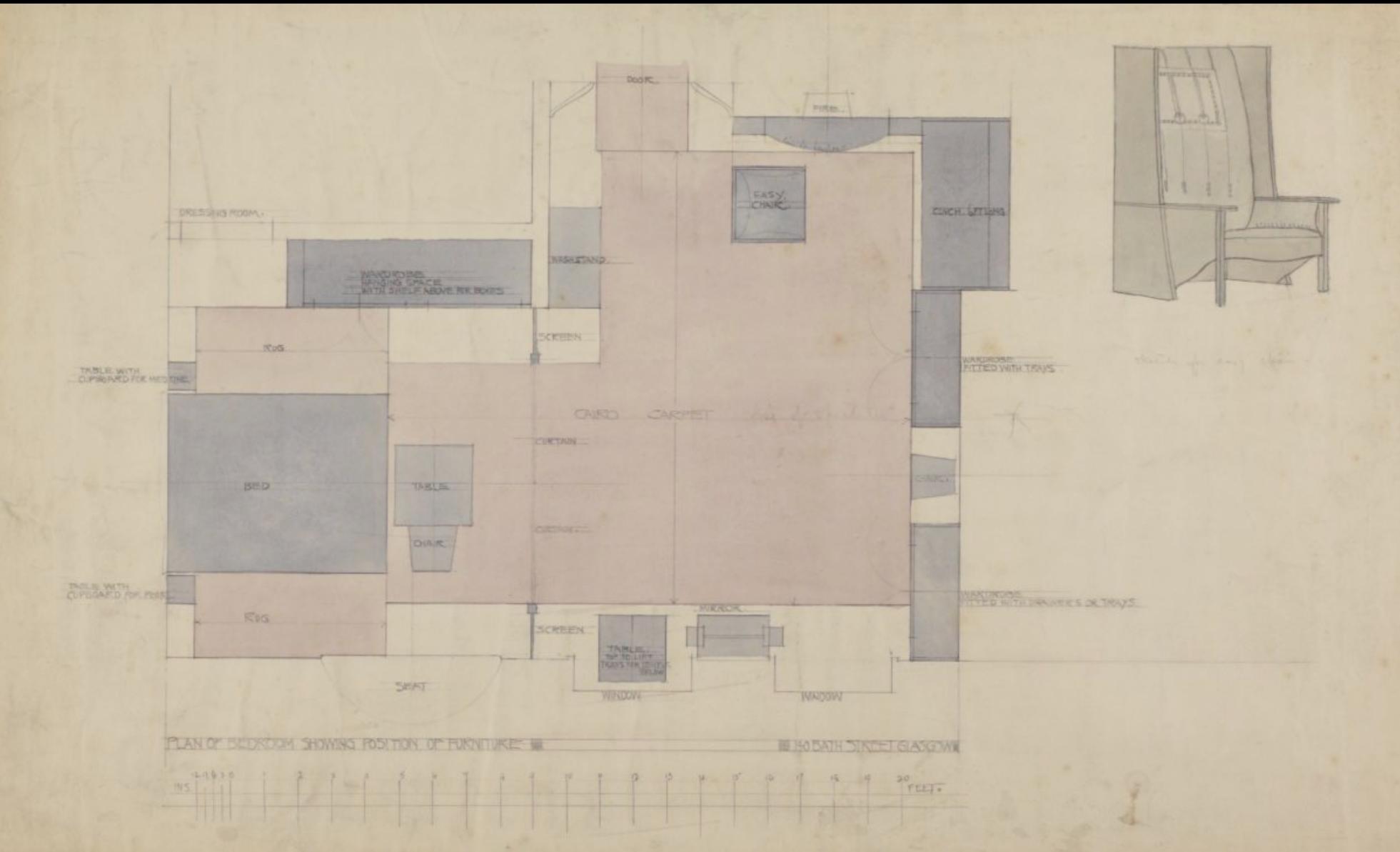
PLAN 2 ATTIC.



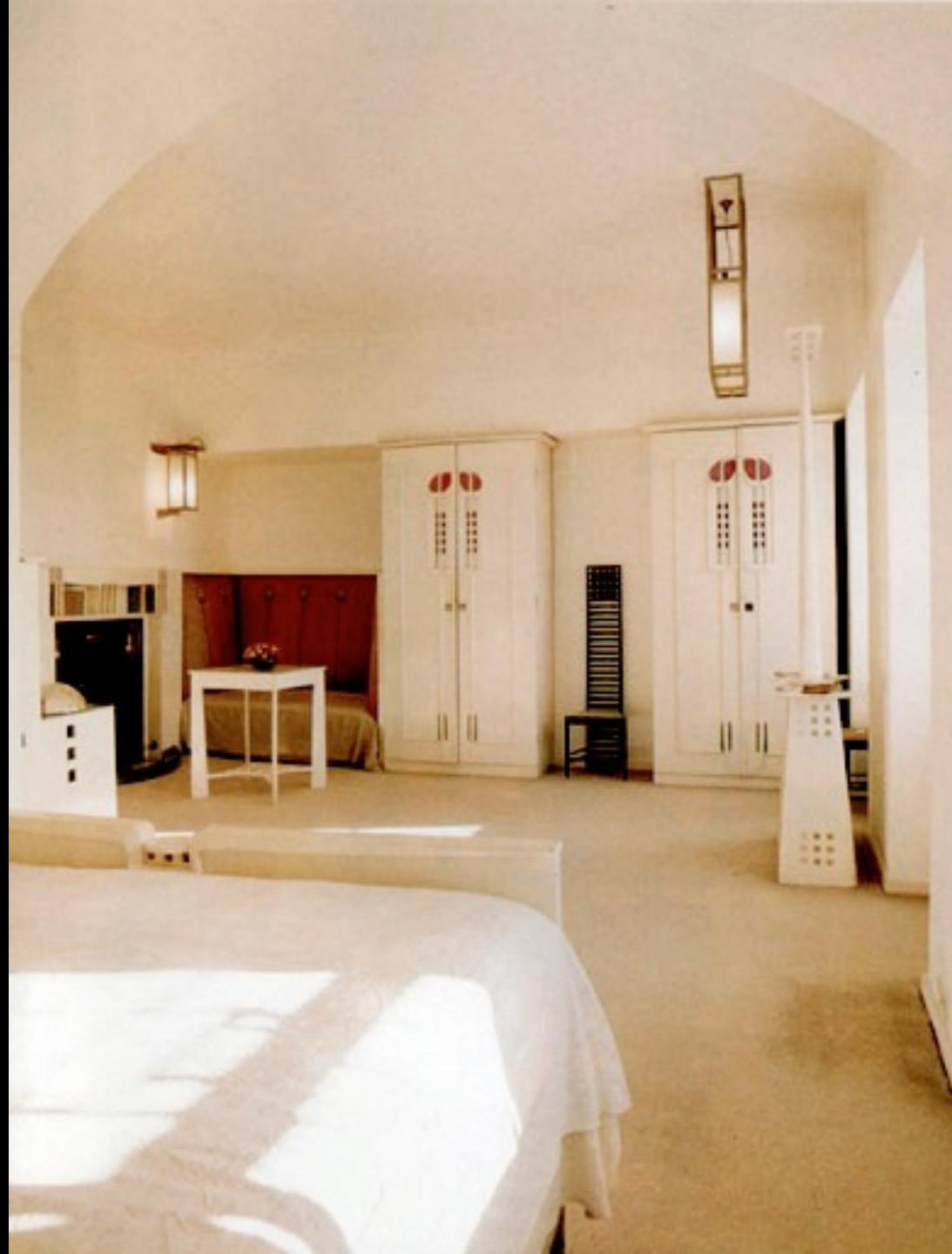
PLAN 3 GROUND FLOOR



Architectural drawing  
COMPTON & CO.













Charles Rennie Mackintosh, Glasgow School of Art, 1896-1909

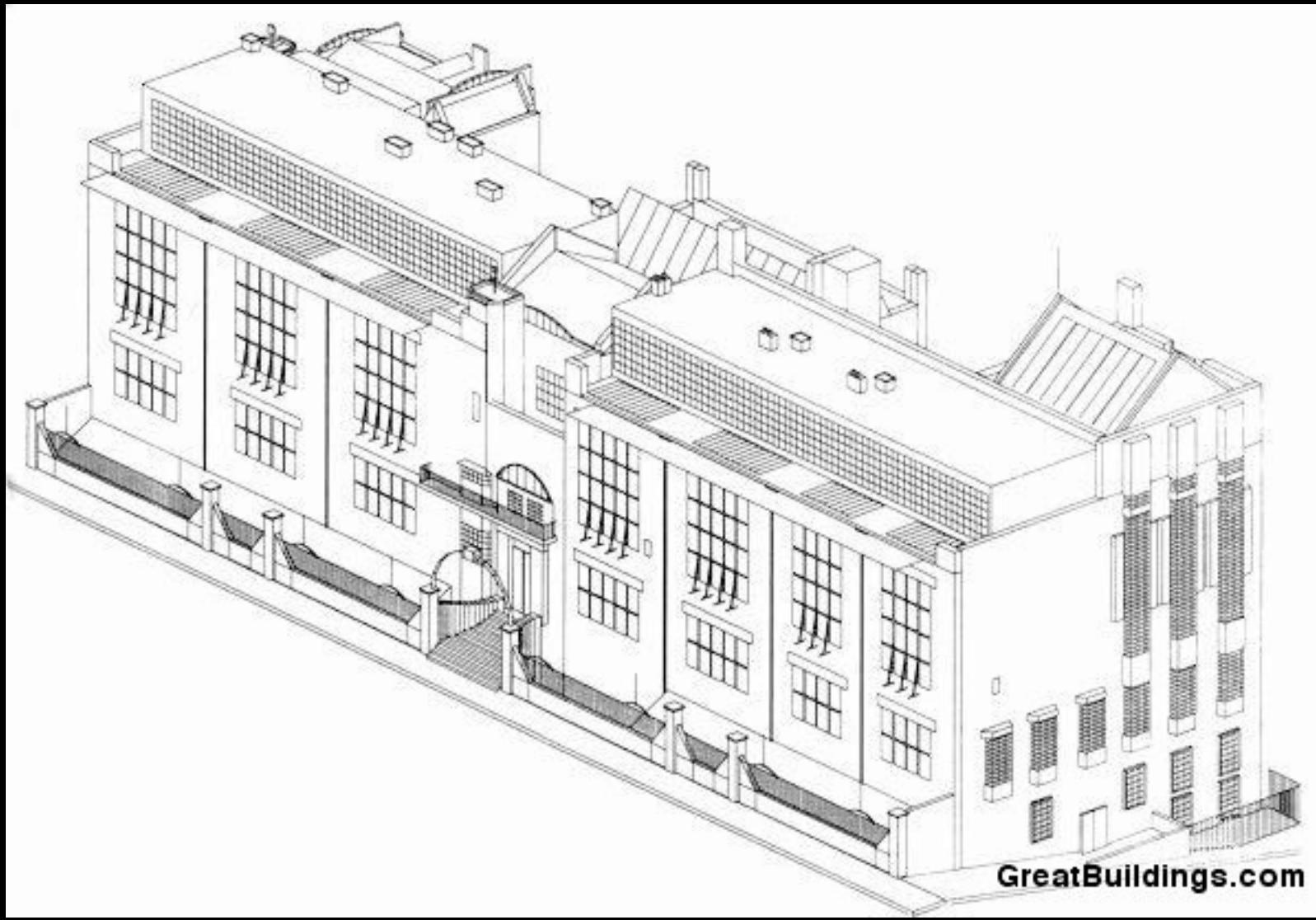
Charles Rennie Mackintosh, Glasgow School of Art, 1896-1909











GreatBuildings.com

# The Glasgow School of Art



The Glasgow School of Art



10:51 / 27:20

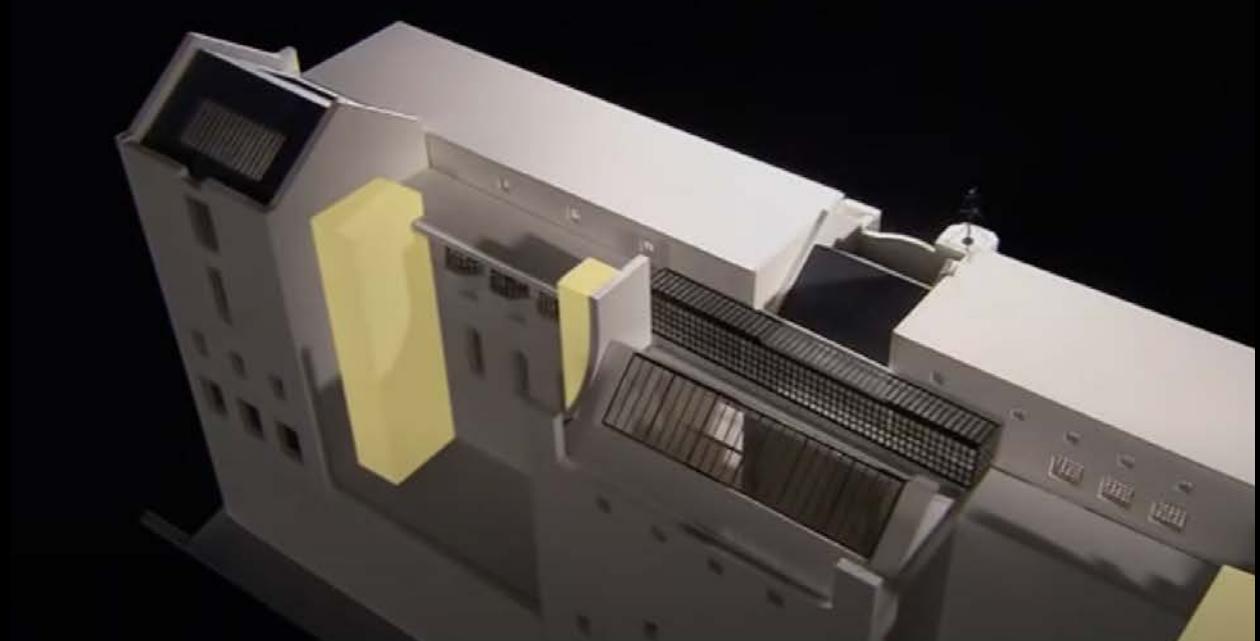
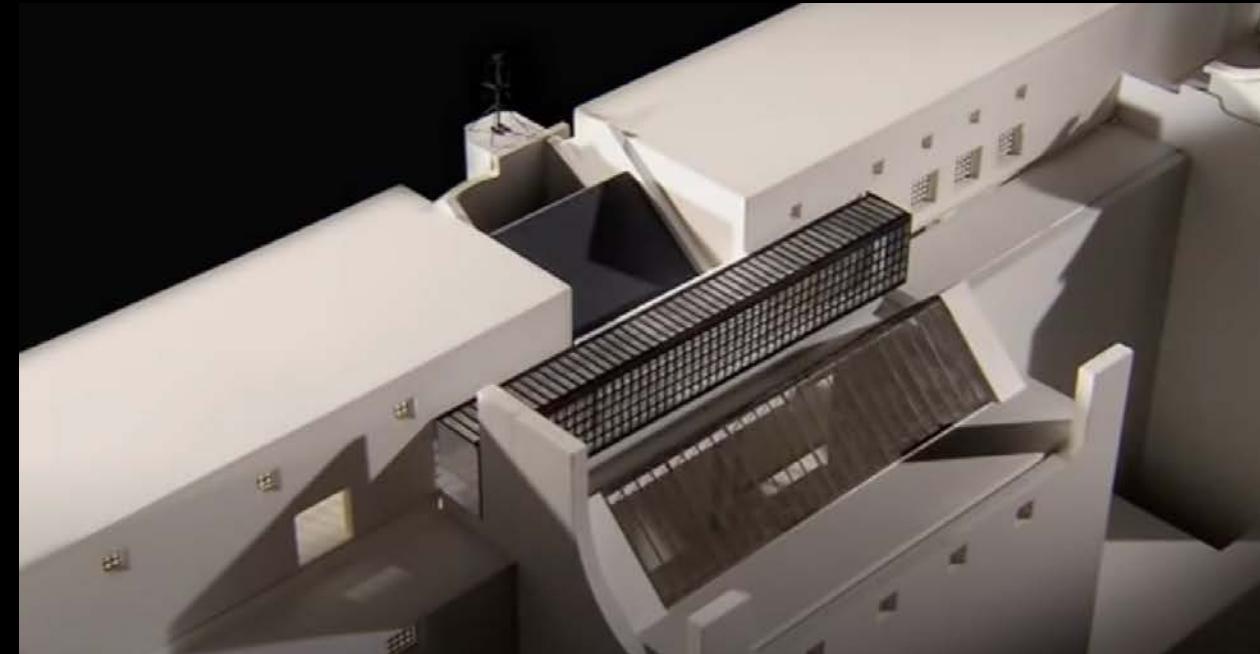


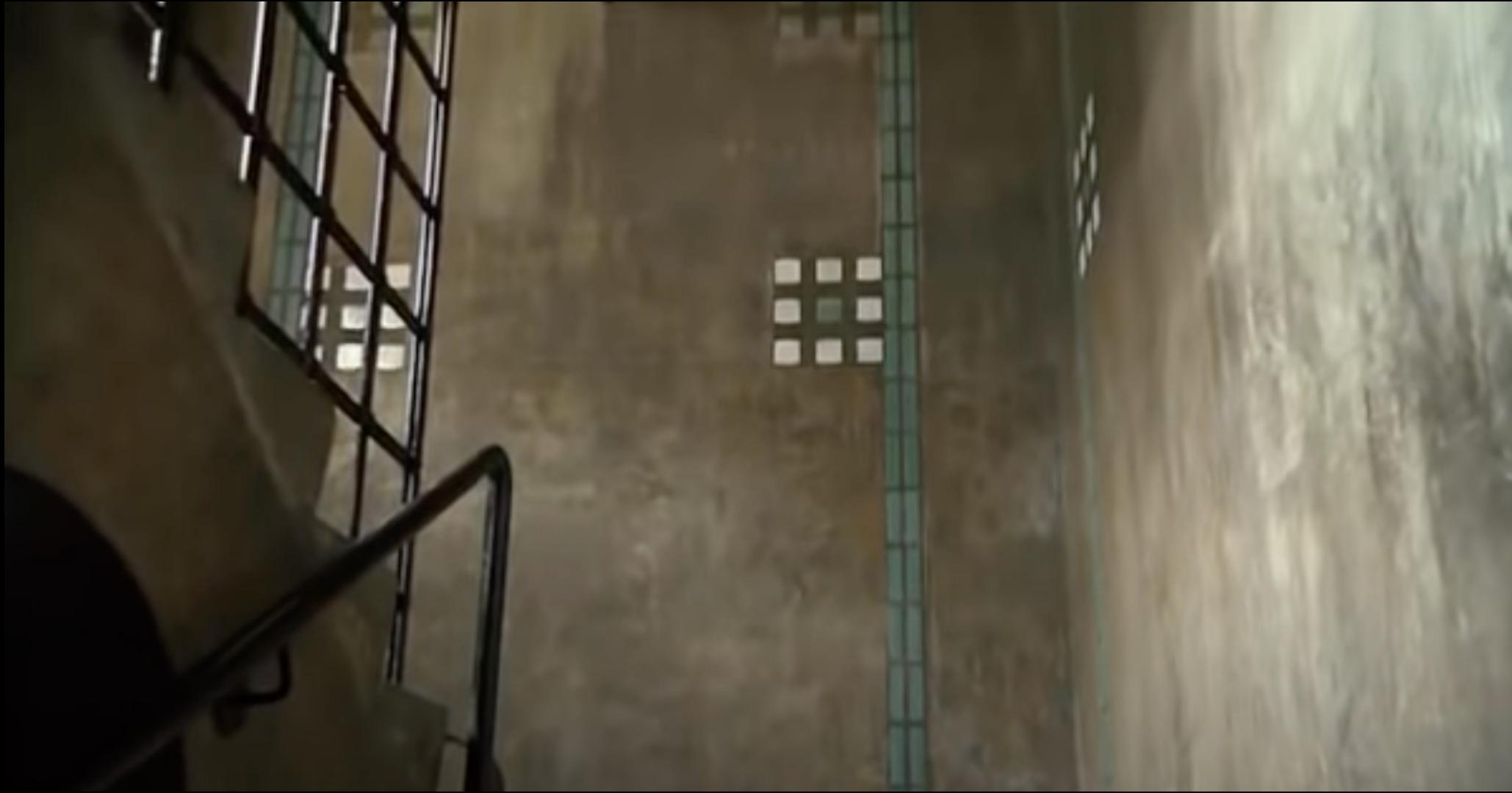
NEXT (SHIFT+N)  
1/2 Glasgow School  
of Art - Climbing  
15:03

Scroll for details

https://www.youtube.com/watch?v=8TOYkWdlwY

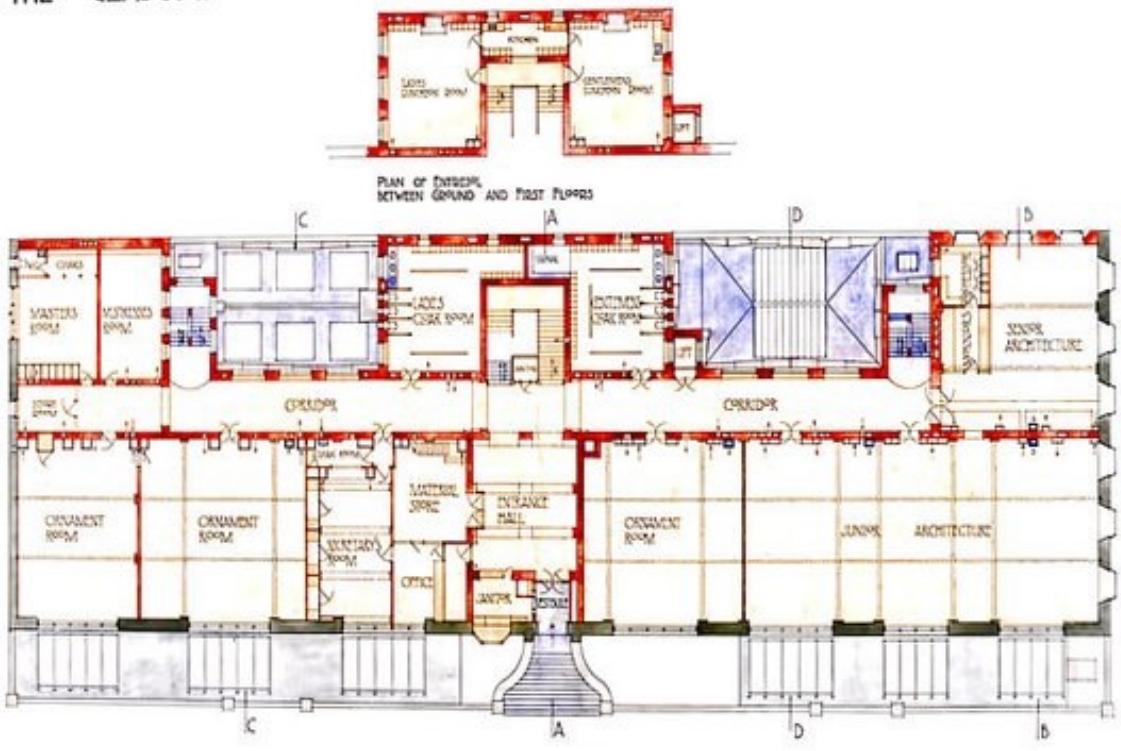








# THE GLASGOW SCHOOL OF ART.



PLAN OF GROUND FLOOR.

SCALE OF 1 INCH = 20 FEET  
1 INCH = 10 FEET

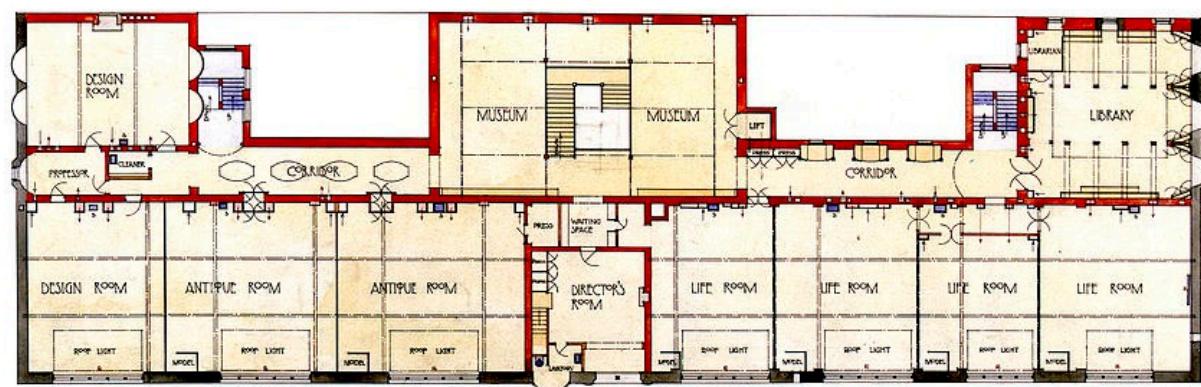
NOTE:  
 1. ROOF LIGHT  
 2. EXTRACT  
 3. RADIATOR INLET

4 BLYTHWOOD SQUARE

# THE GLASGOW SCHOOL OF ART.



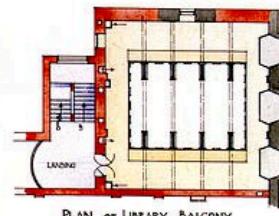
PLAN OF MEZZANINE  
BETWEEN FIRST AND SECOND FLOORS



PLAN OF FIRST FLOOR.

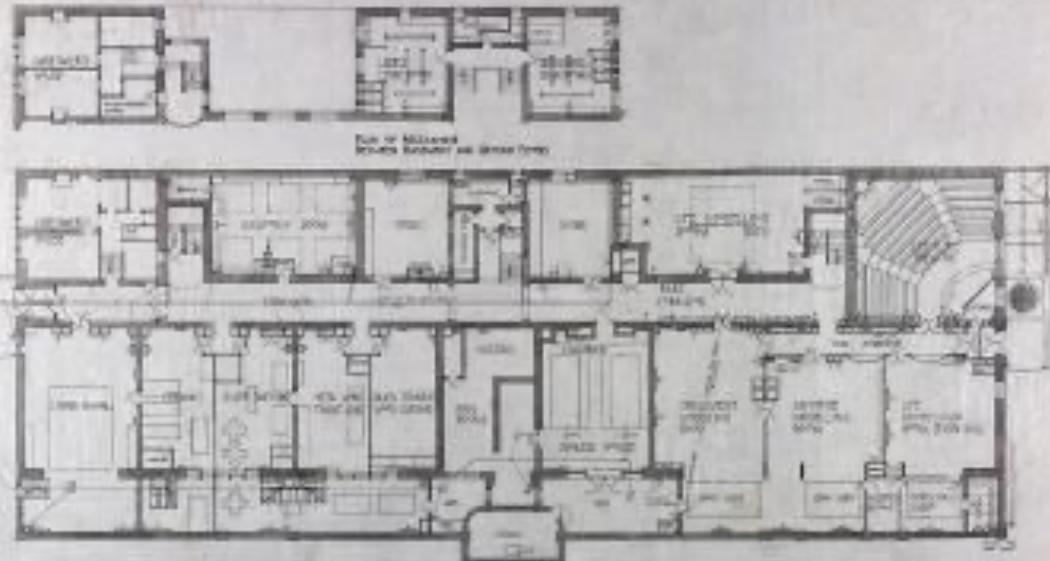
SCALE OF 1 INCH = 20 FEET  
1 INCH = 10 FEET

4 BLYTHWOOD SQUARE  
GLASGOW NOVEMBER 1910



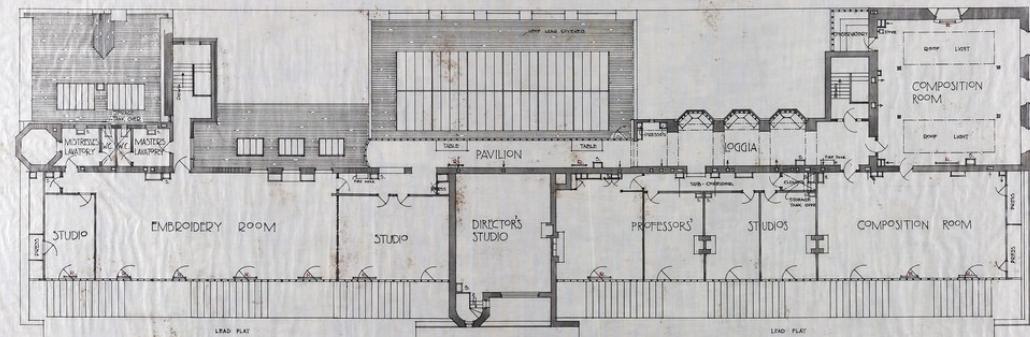
PLAN OF LIBRARY BALCONY

## THE GLASGOW SCHOOL OF ART.



Nº 2

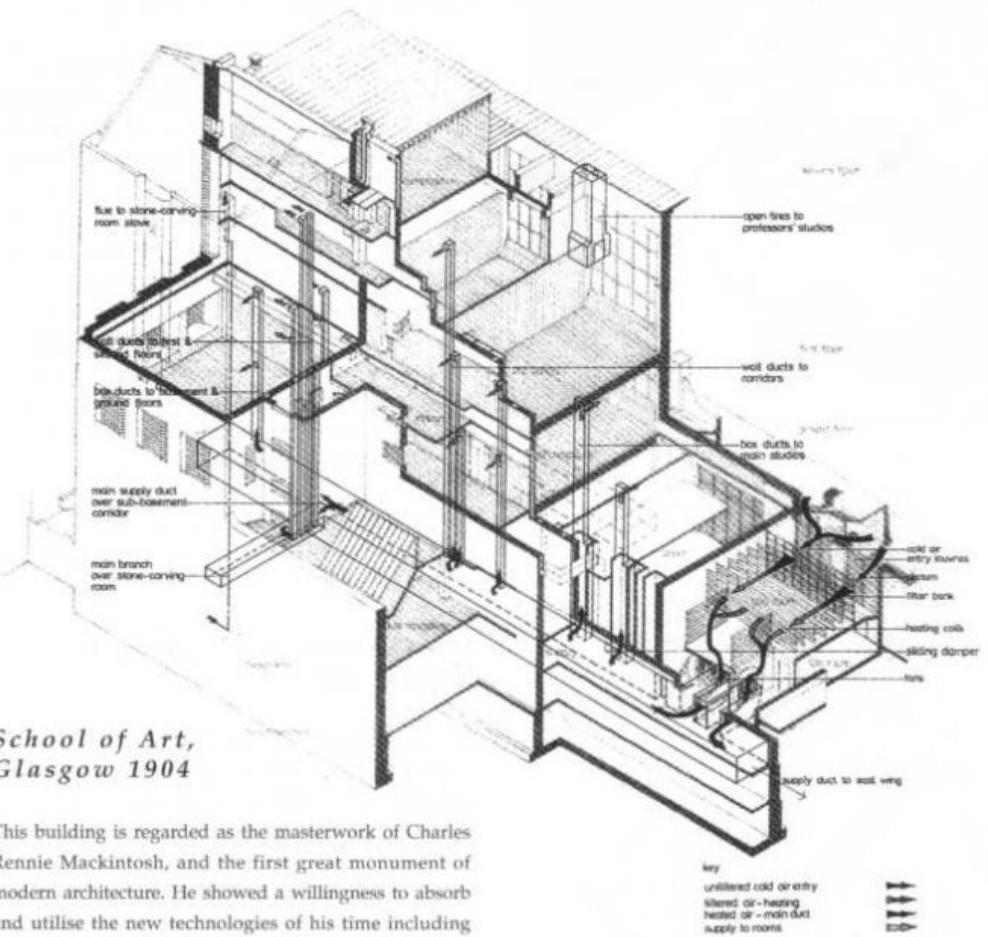
## THE GLASGOW SCHOOL OF ART.



**PLAN OF SECOND FLOOR.**

RADIATORS MARKED THIS → R.  
SINKS ← → S.  
→ ← ARROWS SHOW  
INLETS AND EXTRACTS.

Honeyman Kippins & Mackintosh  
Architects  
4 Blythewood Square Glasgow



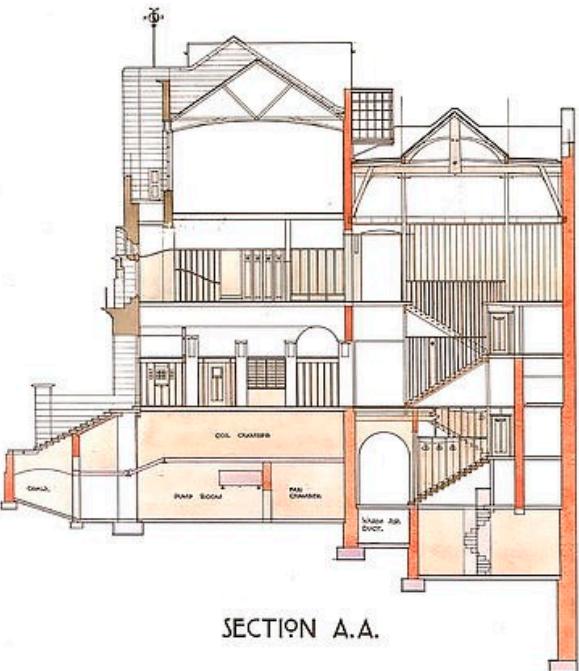
*School of Art,  
Glasgow 1904*

This building is regarded as the masterpiece of Charles Rennie Mackintosh, and the first great monument of modern architecture. He showed a willingness to absorb and utilise the new technologies of his time including central heating, mechanical ventilation and the electric light. Of particular interest now is the decorative manner in which these services were integrated into the overall design of the School. The building incorporates an air treatment plant (possibly a very early air conditioning system) designed by Wm Key, whose patent (1890), included filtration by horse hair or hemp, air heating or cooling by pipe coils, insertion of blocks of ice for air cooling and water sprays for humidity control. Recent surveys have shown the original fans remain with steam heating coils, basement and ceiling ducts and the dampers and grilles largely intact.

*Mackintosh's Masterpiece: The Glasgow School of Art,*  
W Buchanan (Ed), 1994.

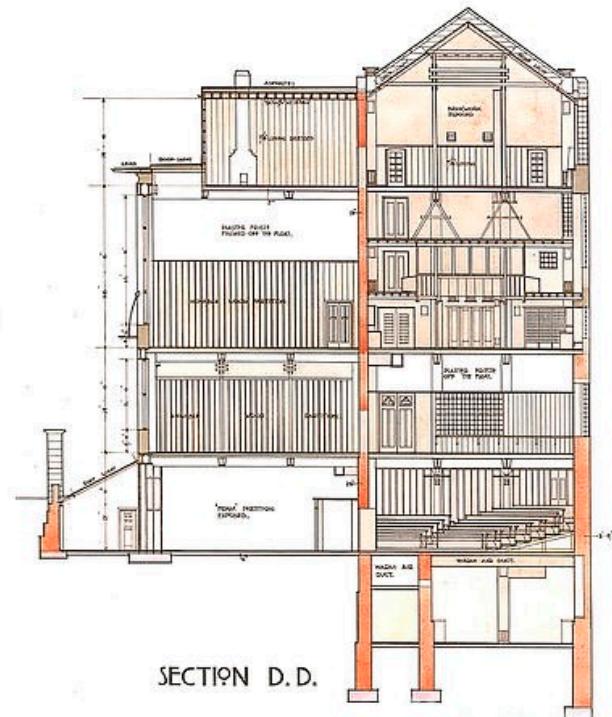
212. Glasgow School of Art.  
*Heating & Ventilation Systems – Supply.*  
*The Glasgow School of Art – More than a Masterpiece,*  
G M Cairns, 1993.

## THE GLASGOW SCHOOL OF ART.



SECTION A.A.

SCALE OF 0' 0" 10' 20' 30' 40' 50' 60' 70' 80' 90' 100' FEET



SECTION D.D.

4 BLYTHWOOD  
SQUARE  
GLASGOW, NOVEMBER 1910.

The Glasgow School of Art



The Glasgow School of Art







Play (k)

▶ ▶ | ⏴ 13:42 / 27:20

Scroll for details

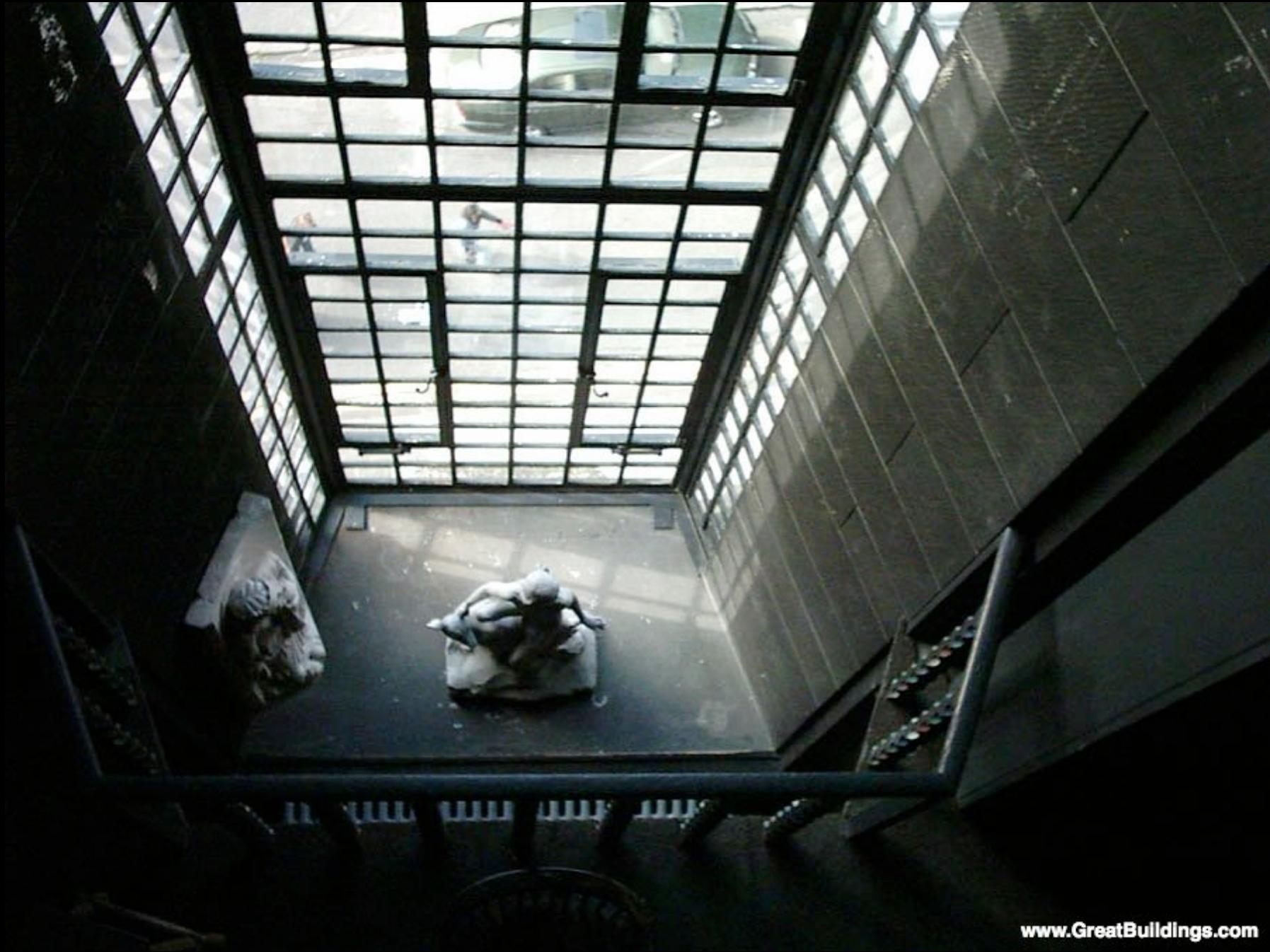
▶ CC ⚙ 🔍

Press **esc** to exit full screen

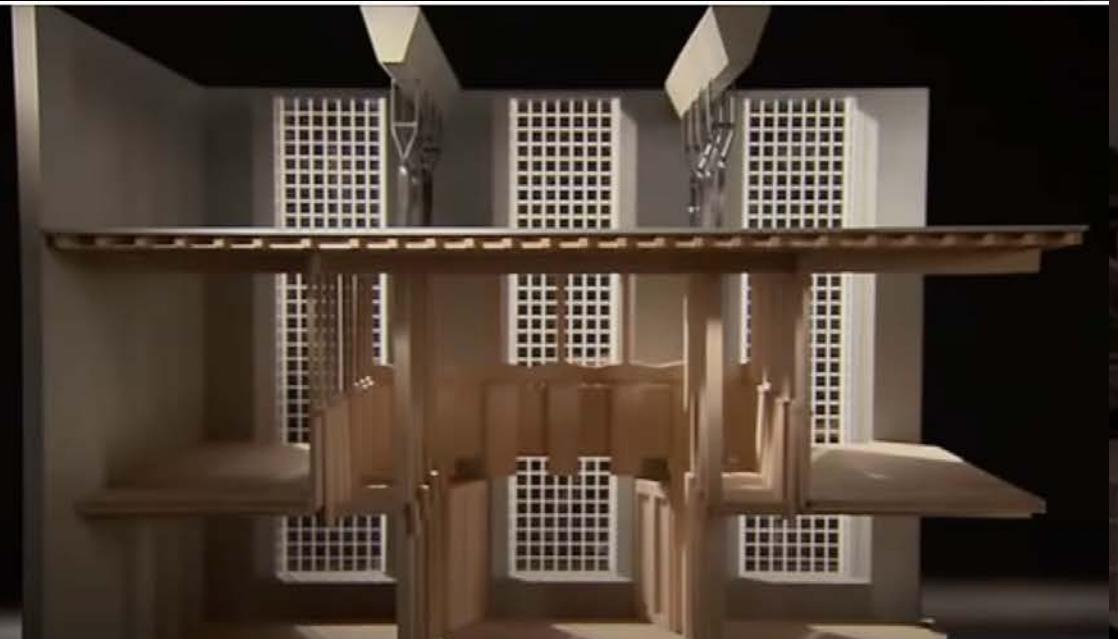














Glasgow School of Art Fires 2014, 2018



# APOLLO

THE INTERNATIONAL ART MAGAZINE

ART NEWS DAILY

## The week in art news – Glasgow School of Art to be faithfully rebuilt after all

Plus: Pompidou renovations postponed until after Paris Olympics | Festival of Brexit art projects announced | and Ahmanson Foundation partners with the Huntington

Art news daily

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