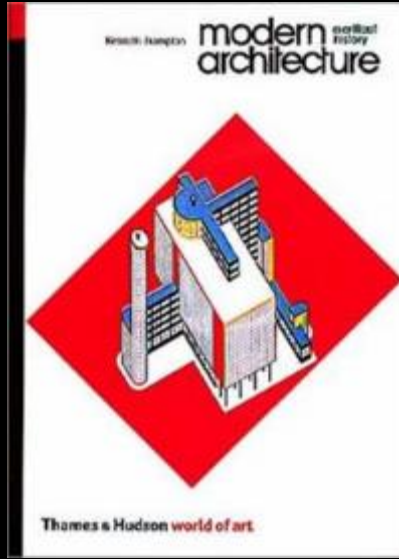


The Architecture of Assembly:

The Advent of Industrialized
Construction Methods and the Impact on
the Design Process



causes of the change in the way of
building things...

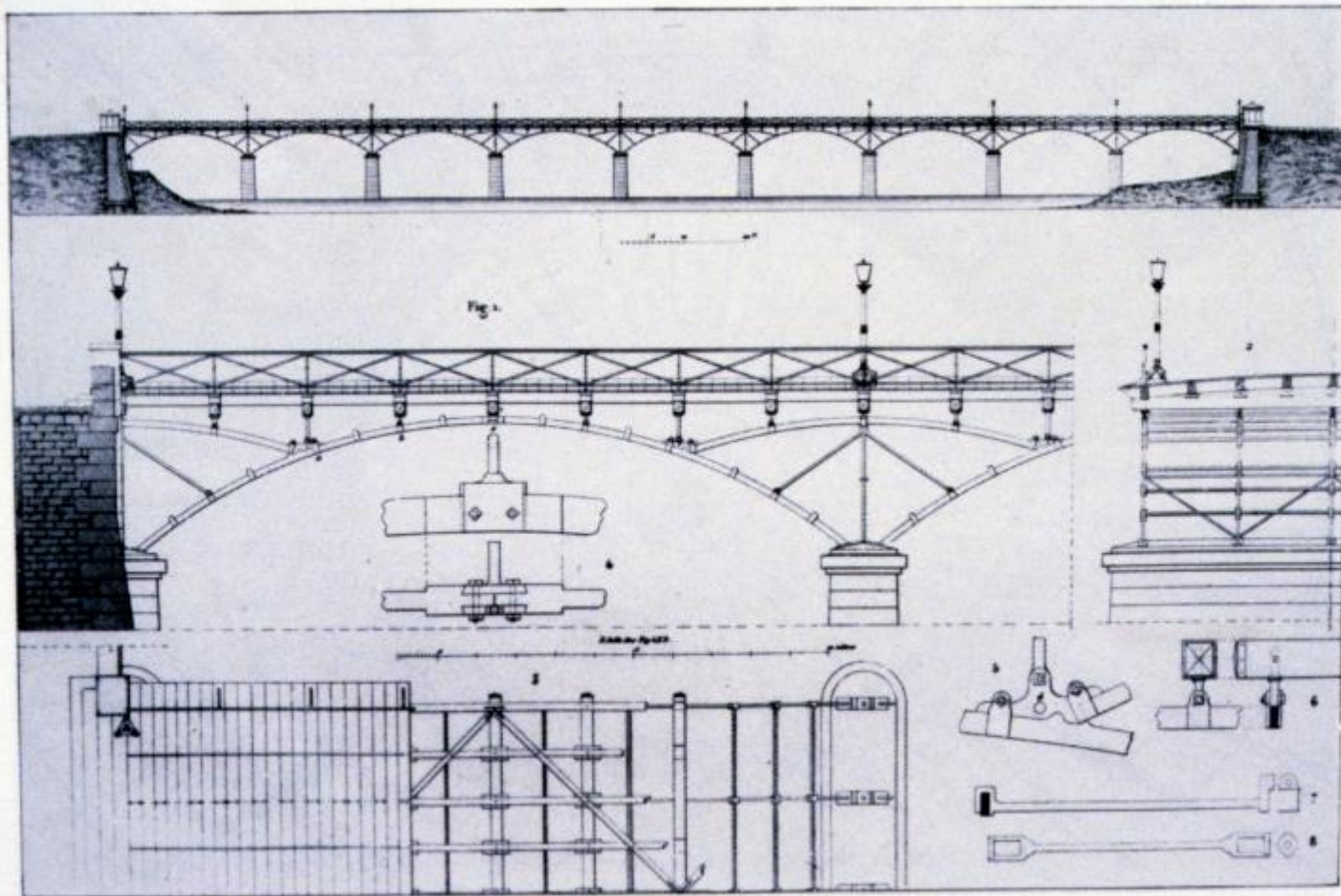
"cultural transformations"
human ability to exercise control over
nature



"territorial transformations"
increase in population and general
urbanization and demand for buildings



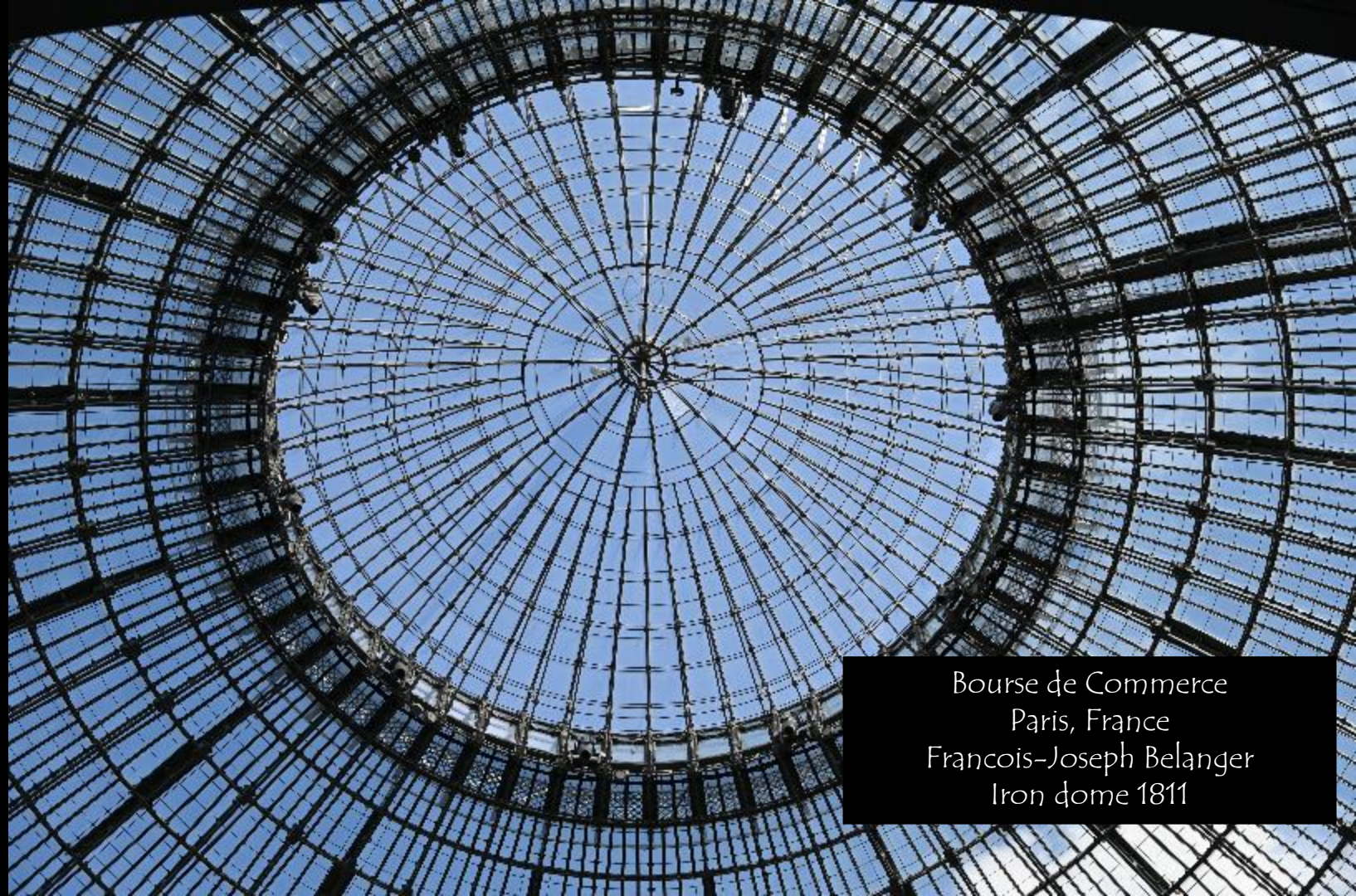
“technical transformations”
advances in mathematics, physics and
structural engineering



Pont des Arts
 Louis-Alexandre de
 Cessart and Jacques
 Dillon
 Paris, France
 1804
 original 9 arch bridge
 rebuilt 1984 with 7
 arches

Plate 7. Delon de Cessart and Dillon. Pont des Arts, Paris, 1803 (Rondelet, *L'Art de bâtir*, pl. 159)





Bourse de Commerce
Paris, France
François-Joseph Belanger
Iron dome 1811

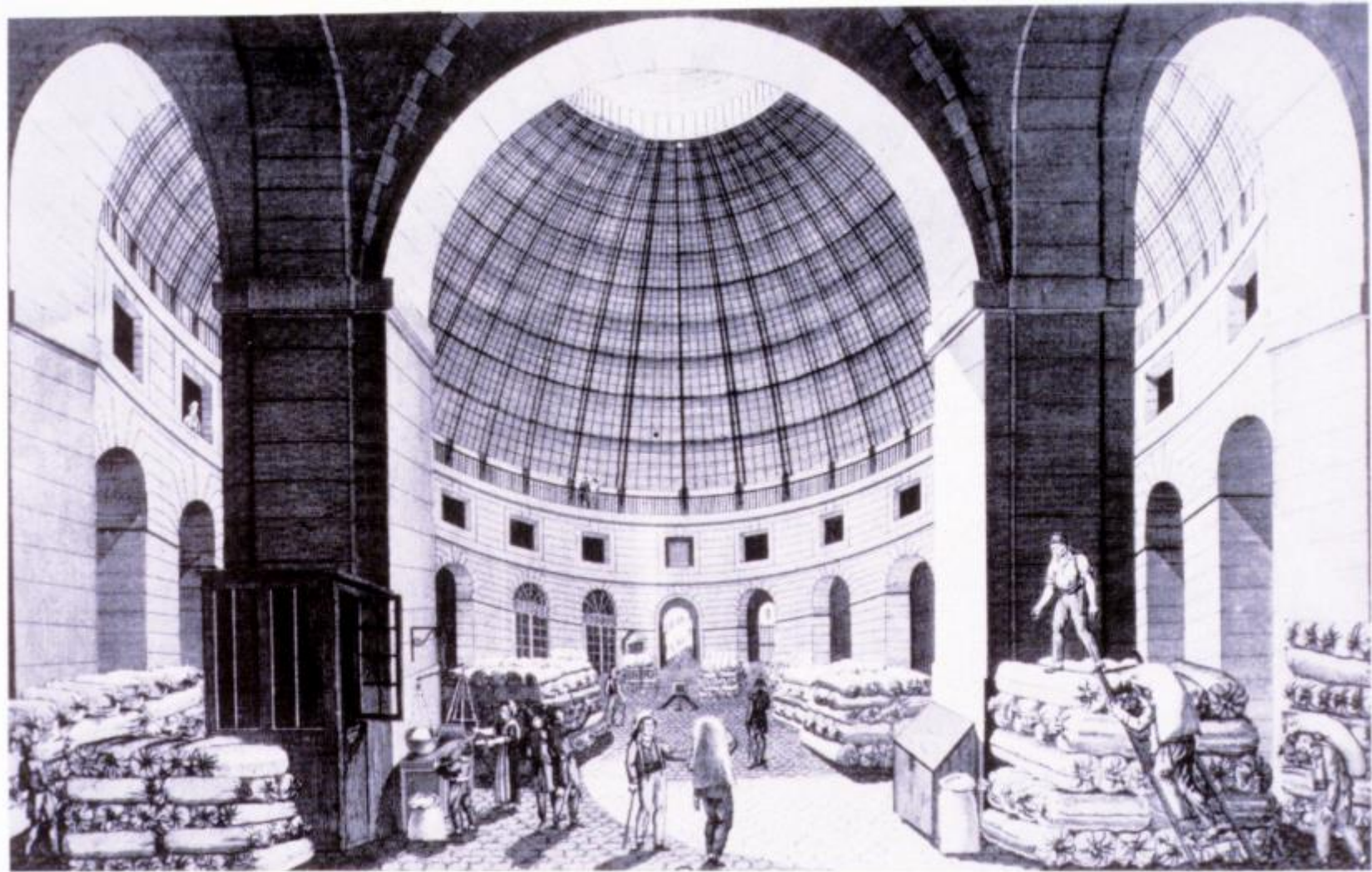




Plate 19. Passage des Princes, Paris, 1860 (Frances H. Steiner)

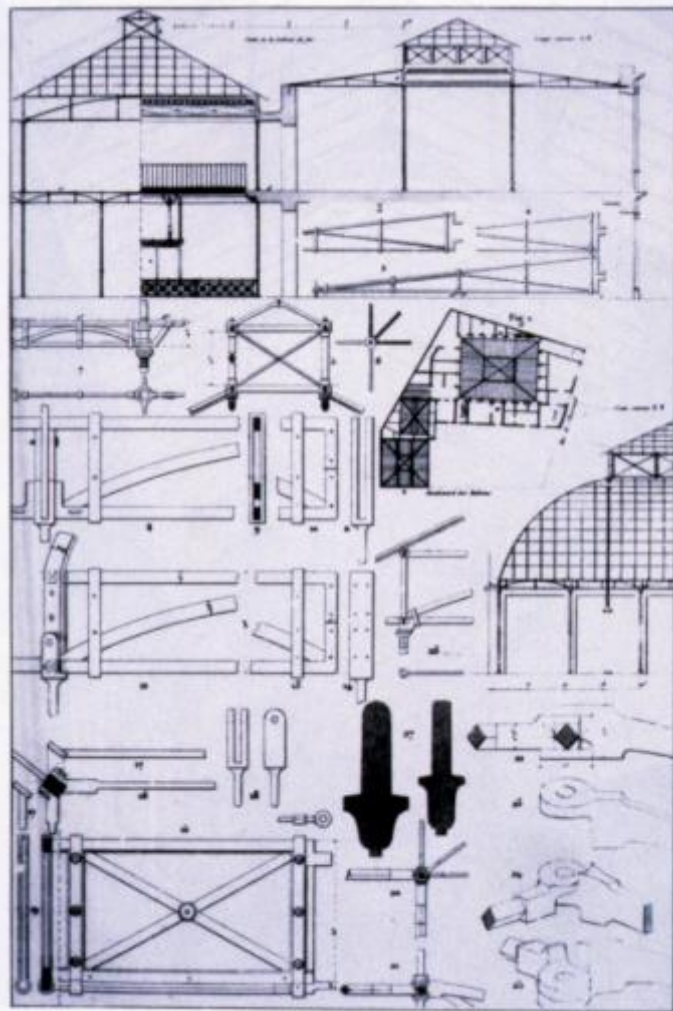


Plate 20. Tavernier. Galerie de Fer, Paris, 1829 (Thiollet, 1832, pl. 26)

P R É C I S
D E S L E Ç O N S
D'ARCHITECTURE

D O N N É E S :

A L'ÉCOLE POLYTECHNIQUE,

PAR I. N. L. DURAND,

ARCHITECTE ET PROFESSEUR D'ARCHITECTURE.

SECOND VOLUME

CONTENANT TRENTEDEUX PLANCHES.

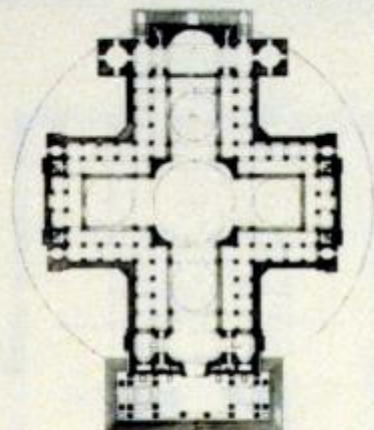
Prix, 40 francs.

A P A R I S,

Chez { AUTEUR, à l'École polytechnique,
et BERNARD, Libraire de l'École polytechnique,
et de celle des Ponts et Chaussées, quai des Augustins,
n.º 31, au premier, près la rue Gît-le-Cœur.

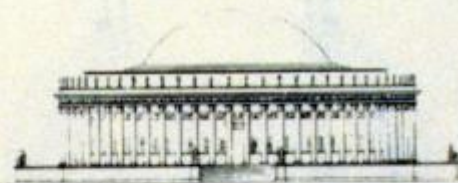
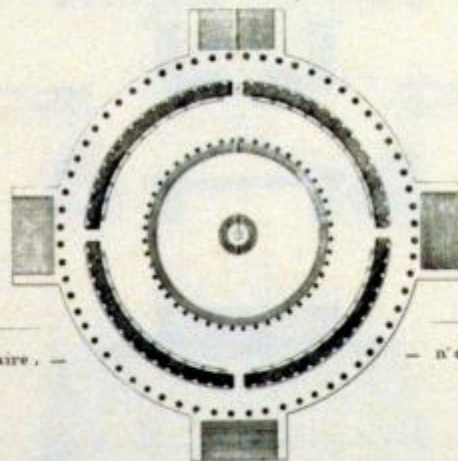
à X III, (1803.)

Jean-Nicolas-Louis Durand
French Architect
1760 - 1834



Eglise de S^t Genevieve, ou Panthéon Français, tel qu'il est. —

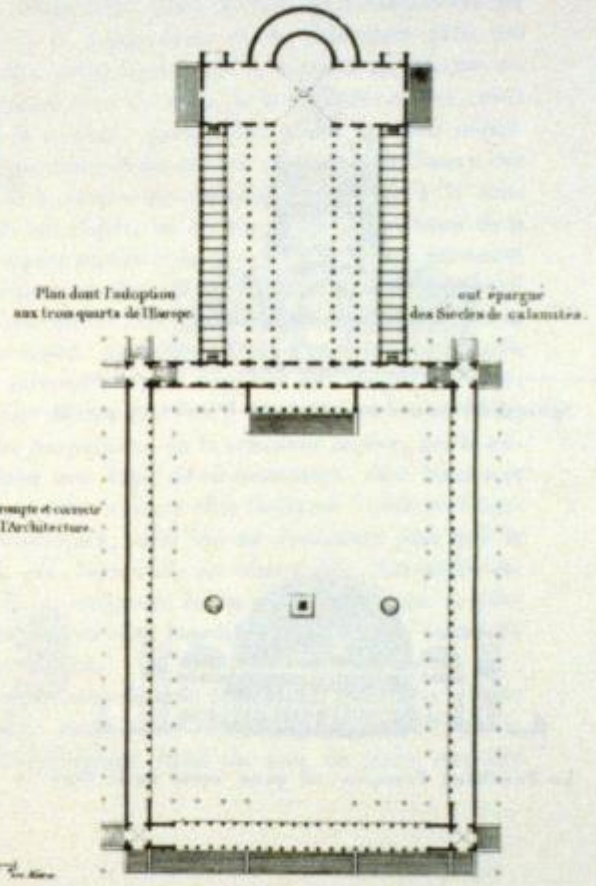
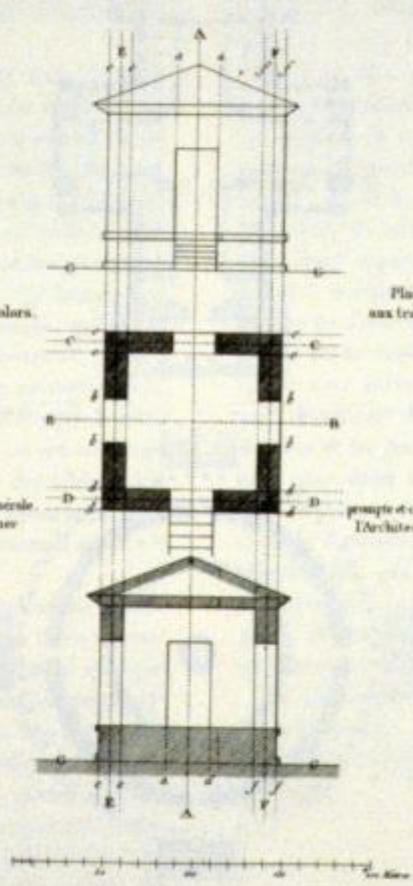
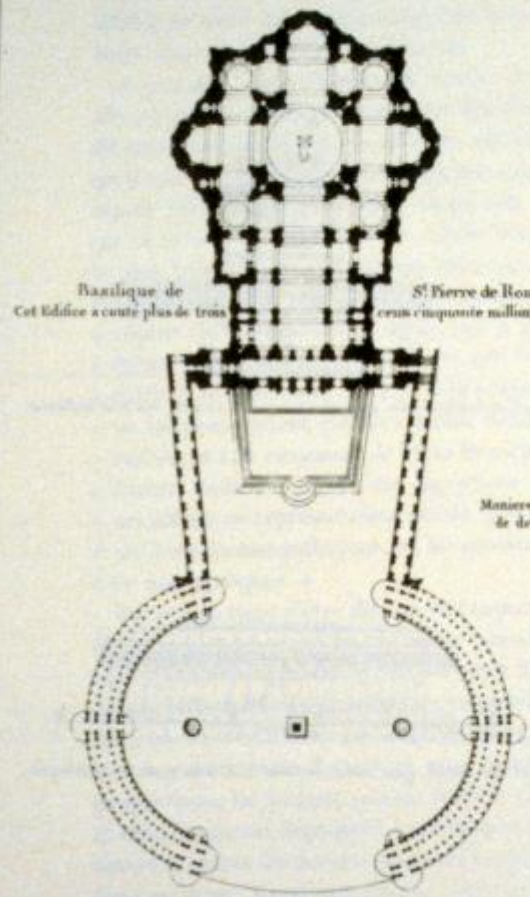
— Cet Edifice quoi qu'assez resserré, a coûté dix huit millions.



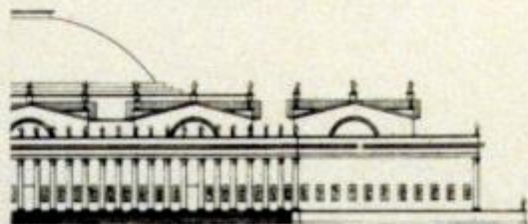
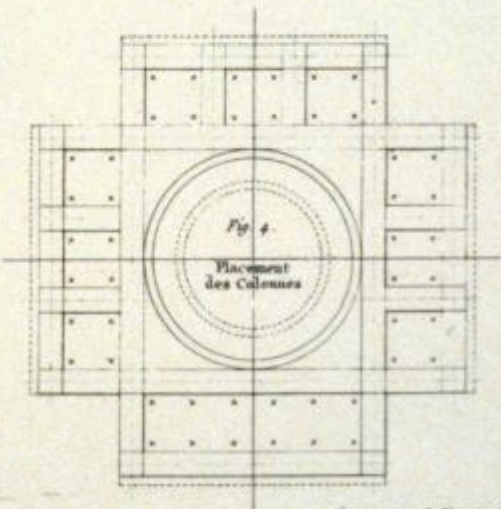
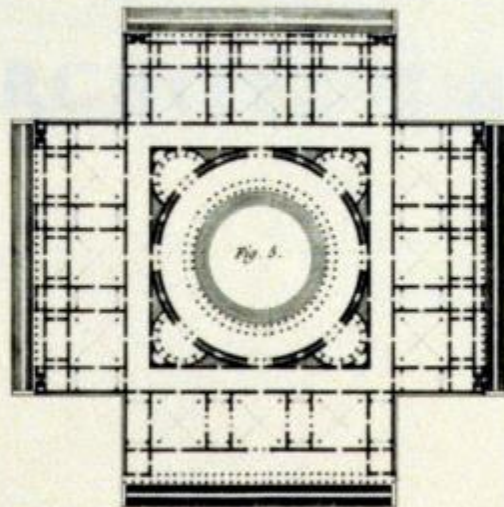
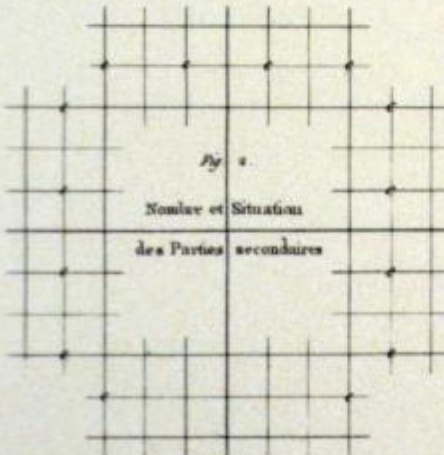
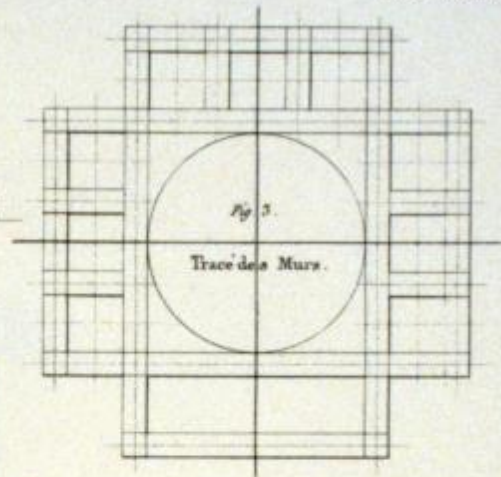
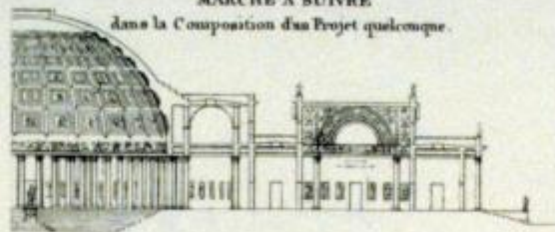
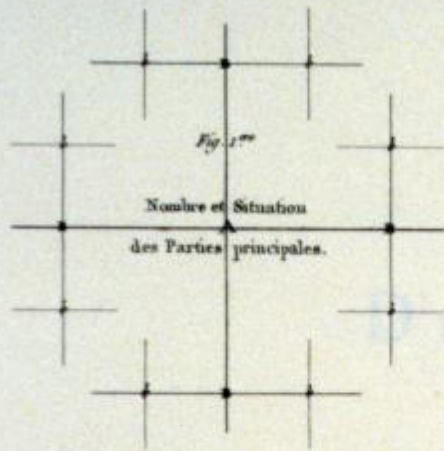
Le Panthéon Français, tel qu'on auroit dû le faire. —

— n'en eût coûté que neuf, et eût été vaste et magnifique.

EXEMPLE DES FUNESTES EFFETS
qui résultent de l'ignorance ou de l'indobservation des vrais Principes de l'Architecture.



Ans la Composition d'un Projet quelconque.



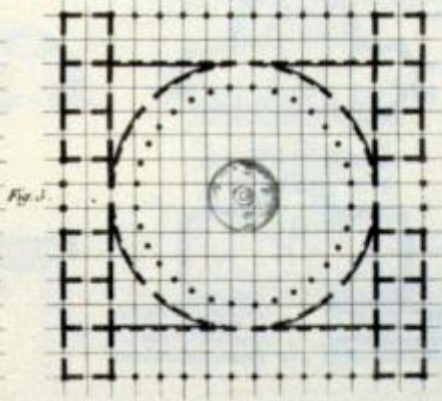
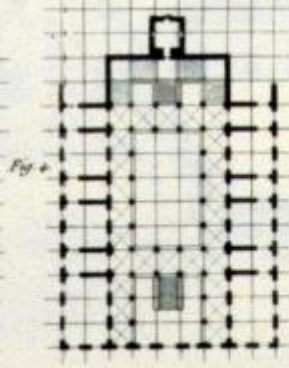
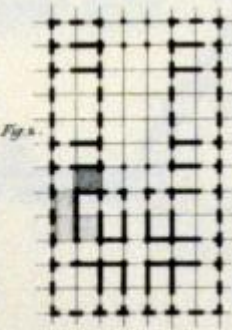
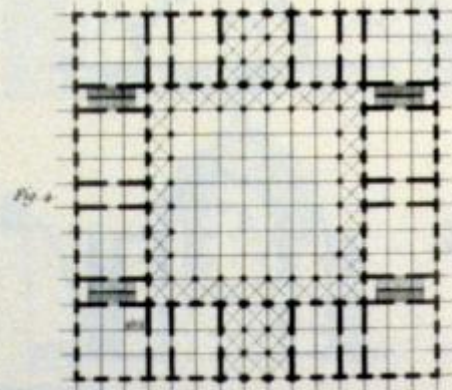
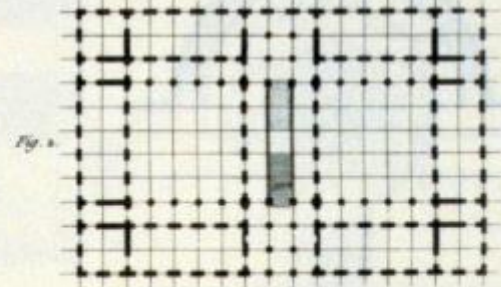
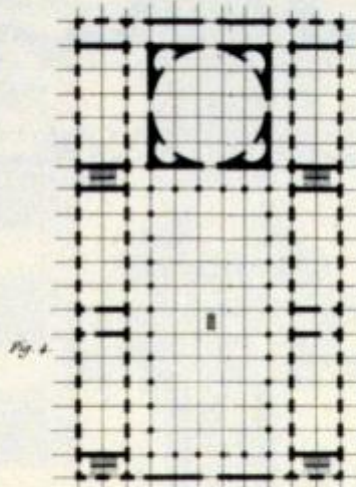
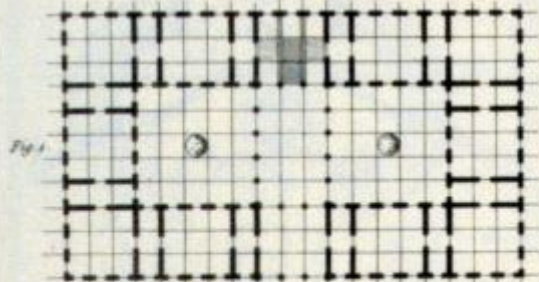
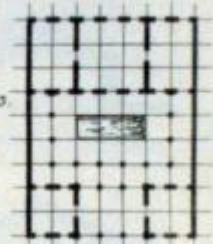
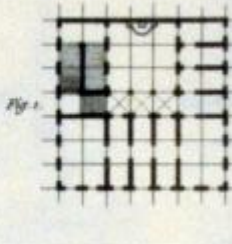
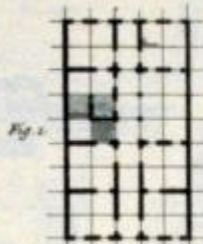
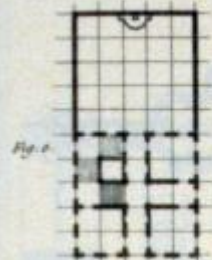


Fig. 1.

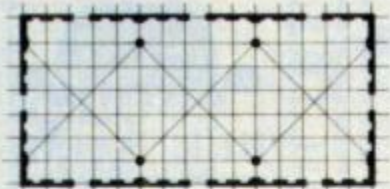


Fig. 2.

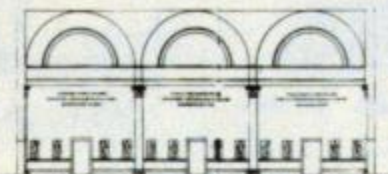


Fig. 3.

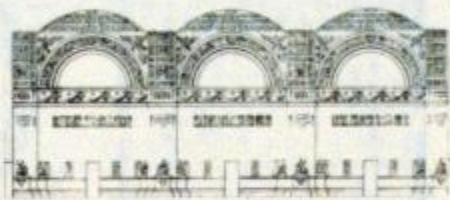
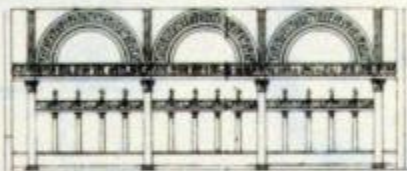
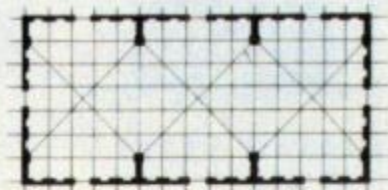


Fig. 4.

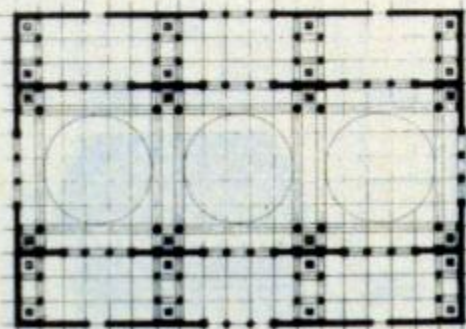


Fig. 5.

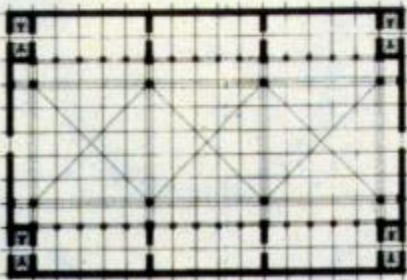
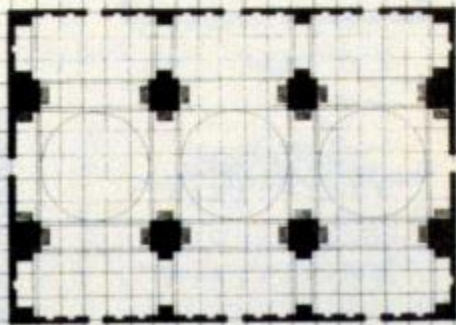
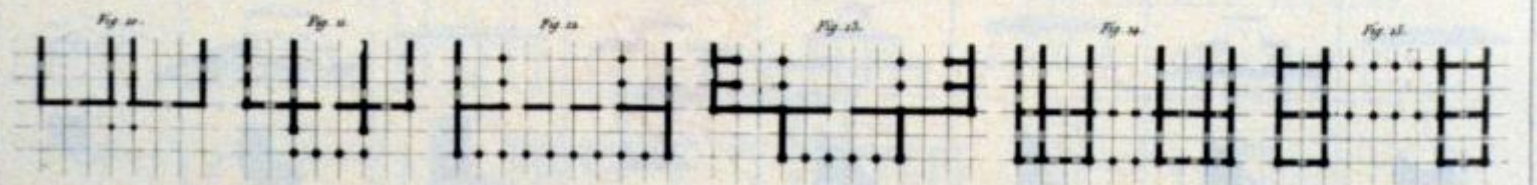
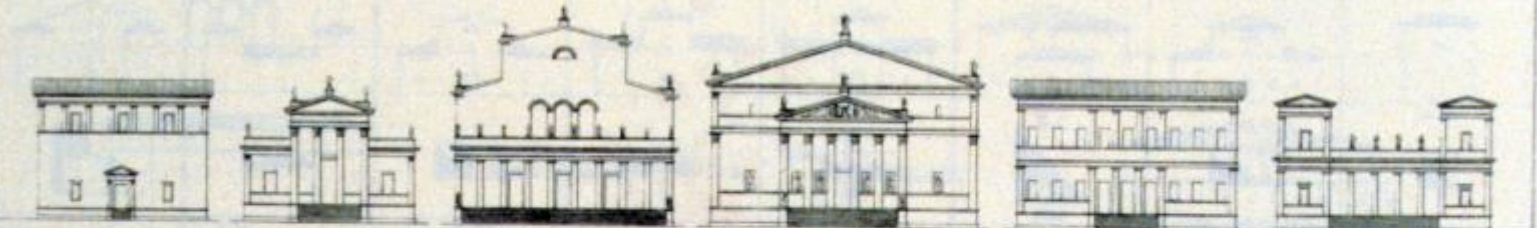
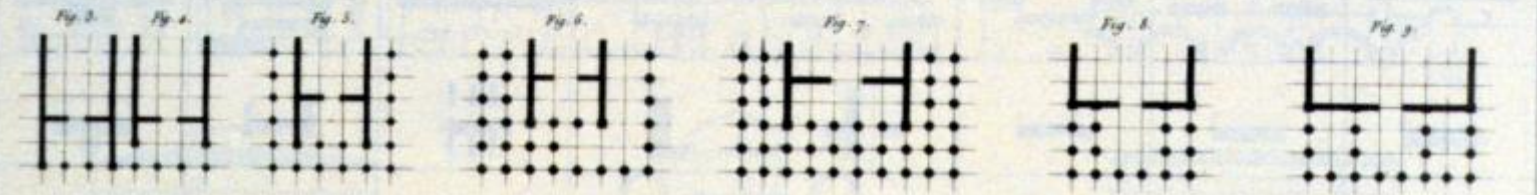


Fig. 6.



PORCHES ouverts par des entrecroisements.



COMBINAISONS HORIZONTALES,
de Colonnes, de Pilastres, de Murs, de Portes et de Croisées.

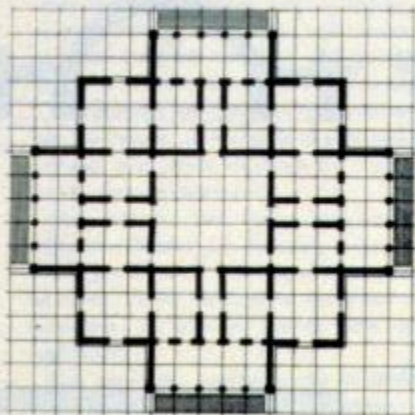


Fig. 1.

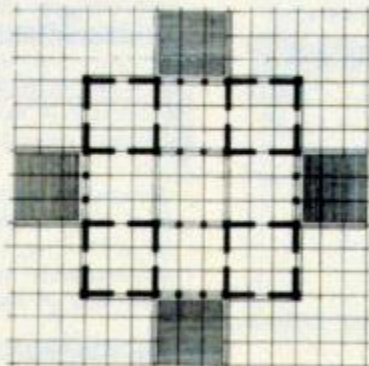


Fig. 2.

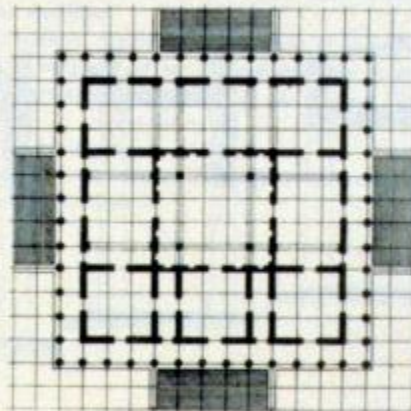
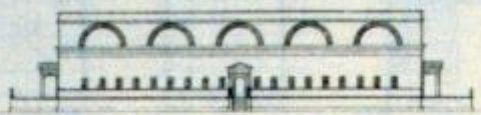


Fig. 3.

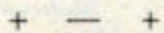
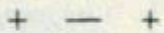


ENSEMBLES D'EDIFICES

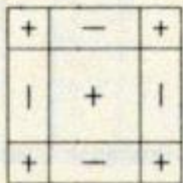
formés par la combinaison de parties de cinq entrées axes de largeur.



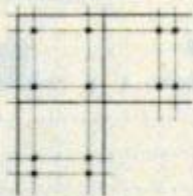
marche à suivre -



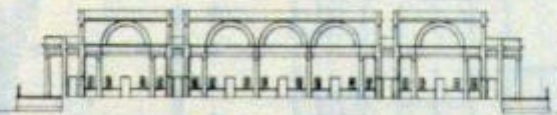
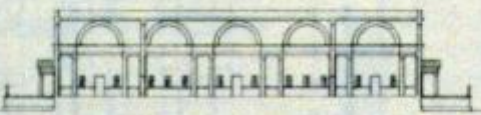
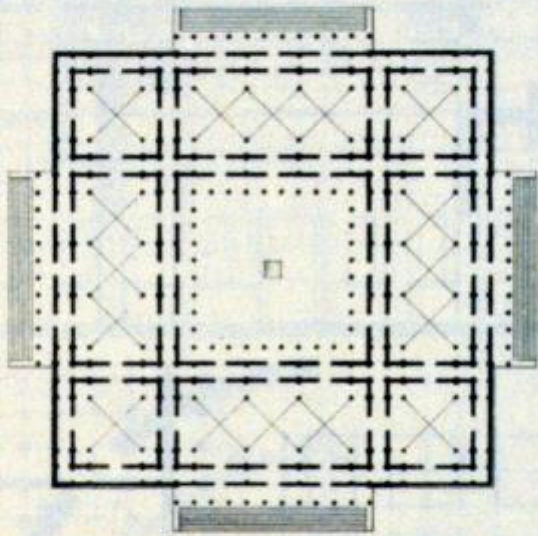
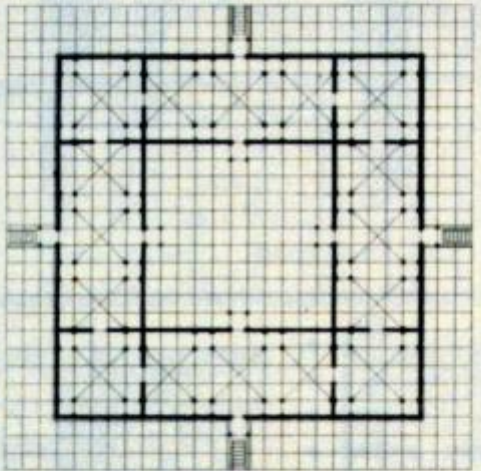
- lorsque l'on compose -



- ou même -

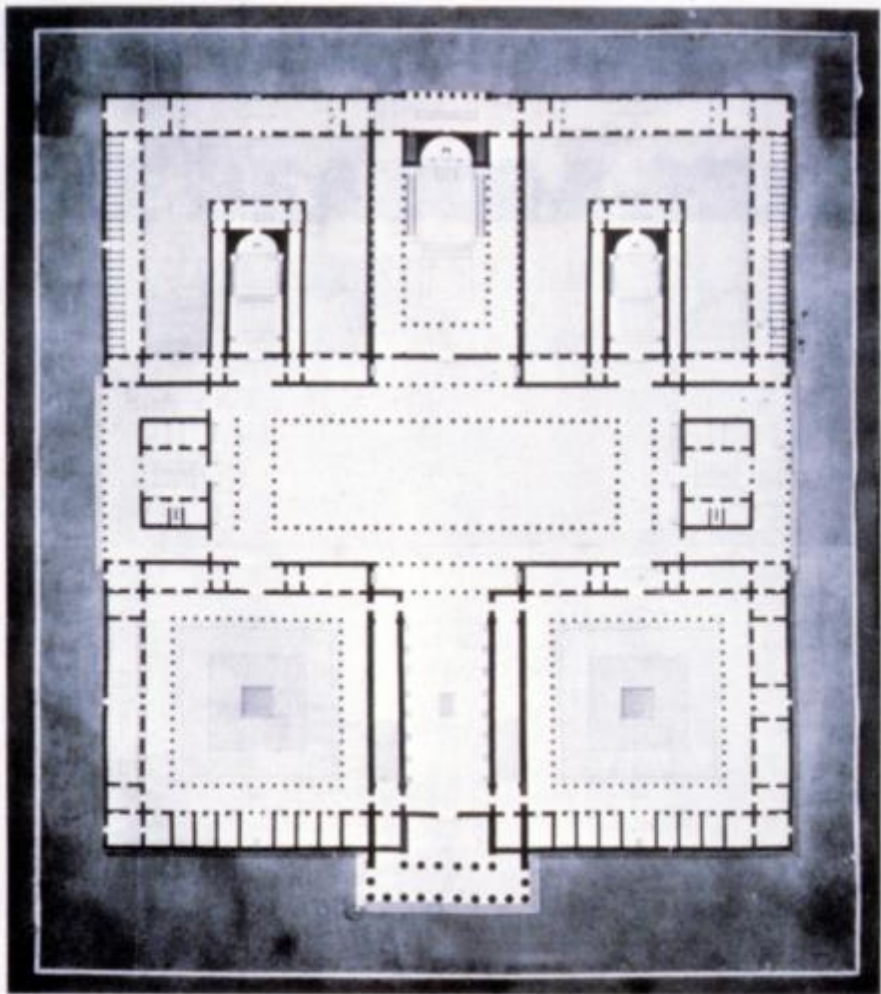


lorsque l'on copie.



Henri Labrouste
Ecole des Beaux Arts
1801 to 1895

Structural Rationalism

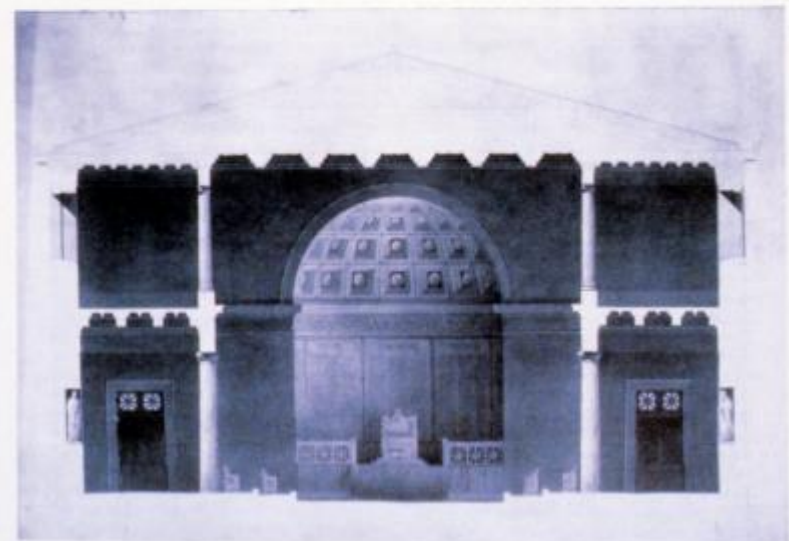


3 Henri Labrouste, plan of the Tribunal de Cassation, 1er Grand Prix, 1824

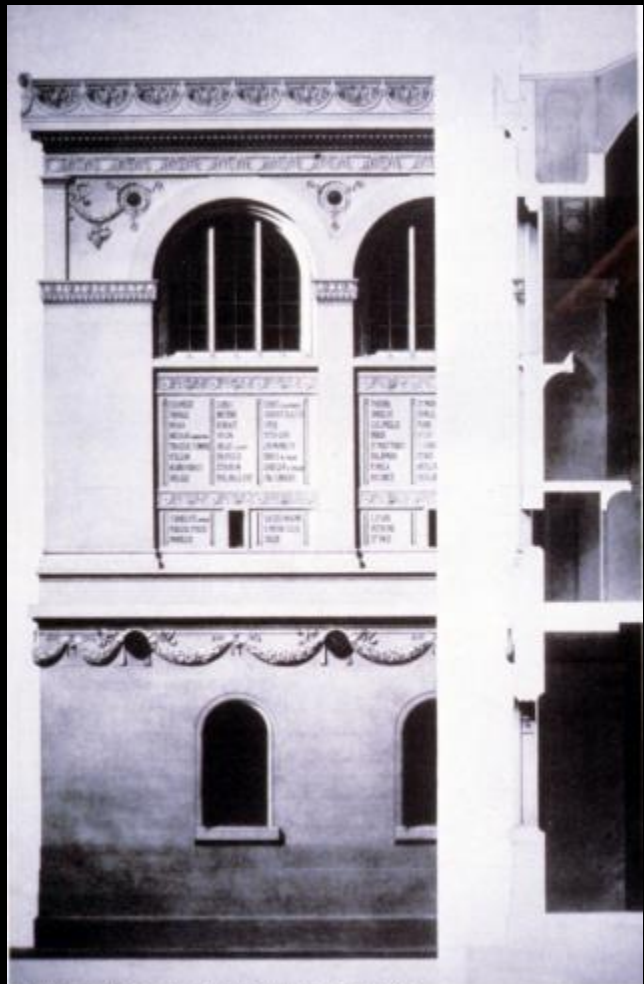
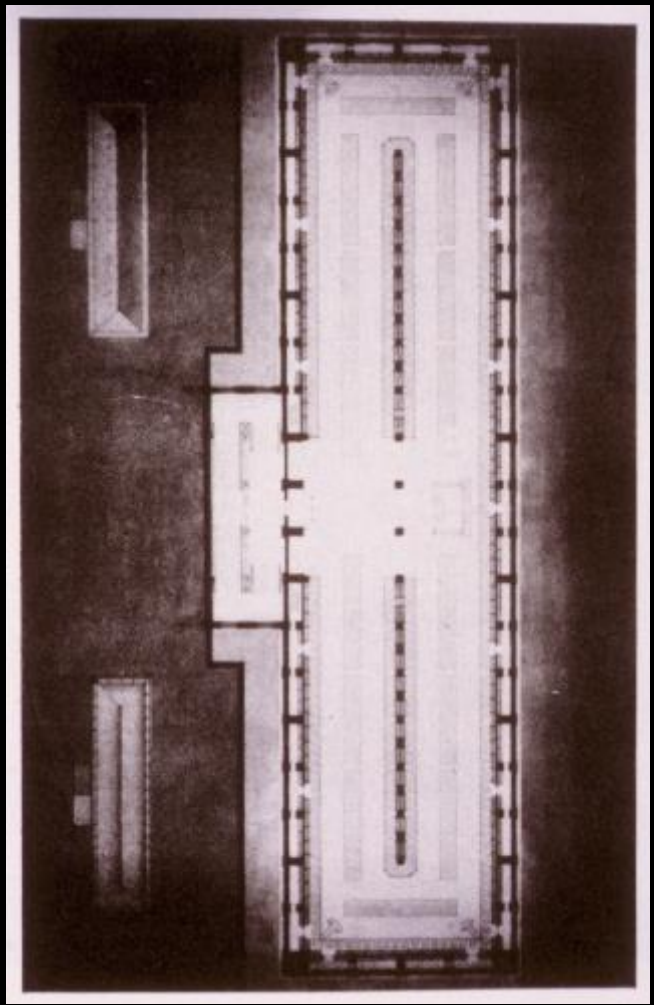
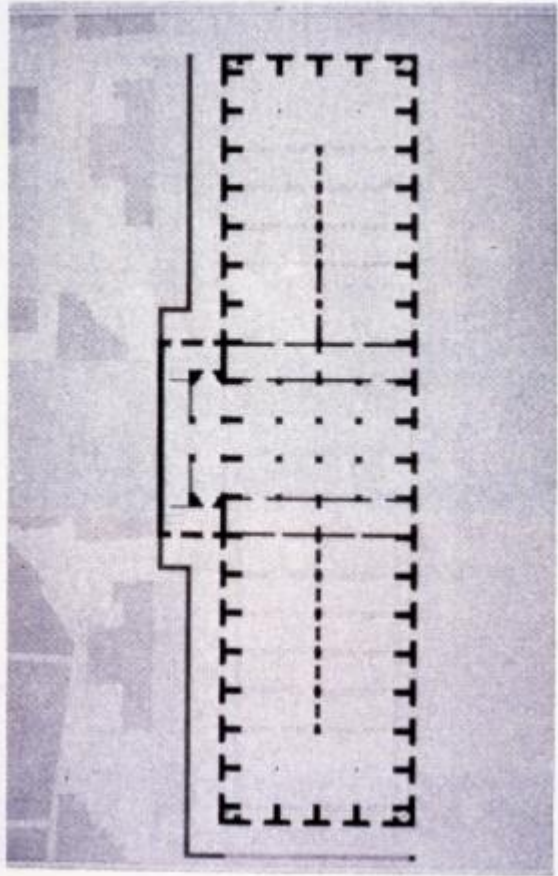
3 Henri Labrouste, plan du Tribunal de Cassation, 1er Grand Prix, 1824.



84, 85 H. Labrouste. Cour de Cassation, 1824: rendered elevation and longitudinal section (above), and rendered cross-section of main courtroom. (Beaux-Arts)

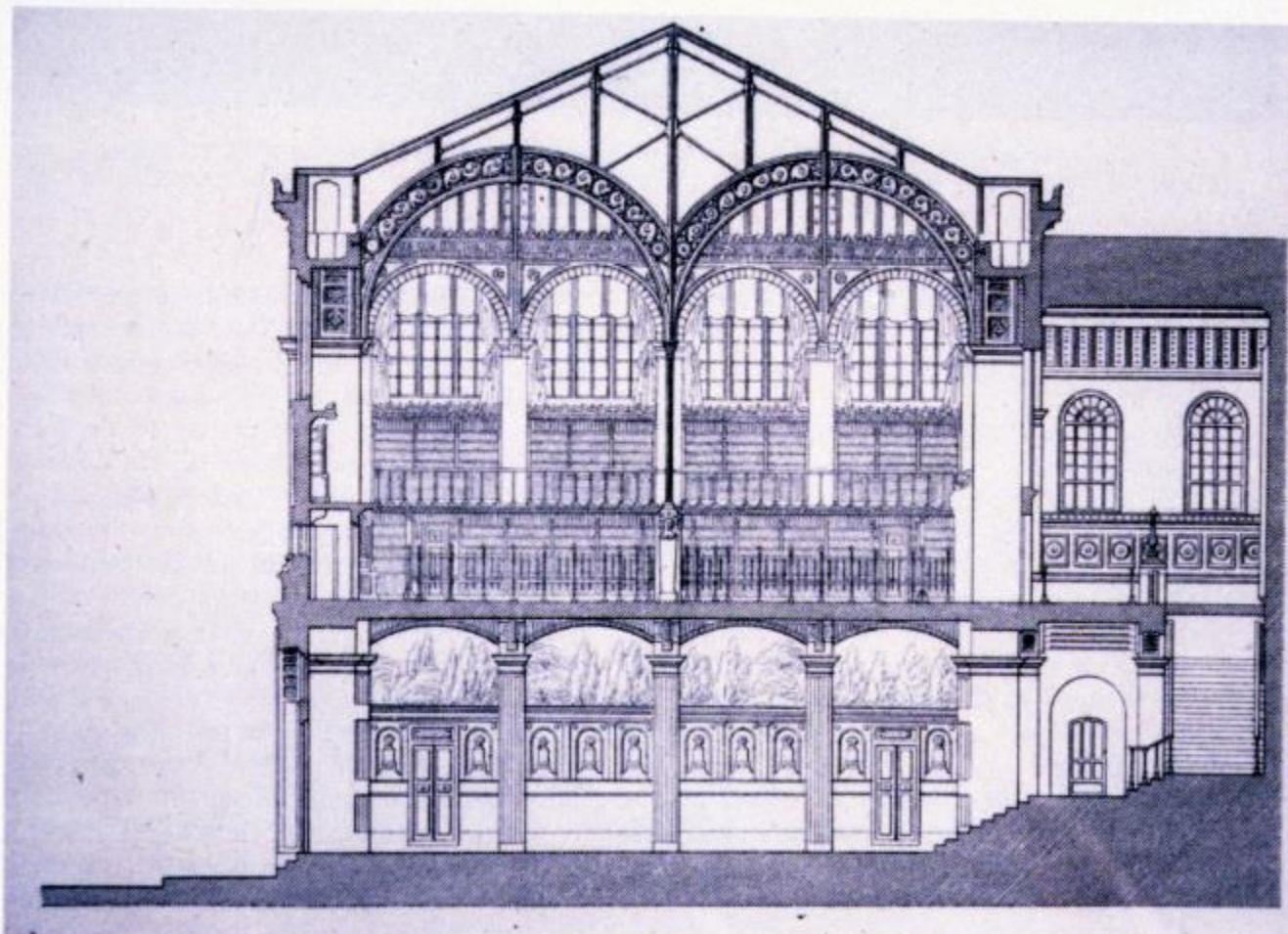


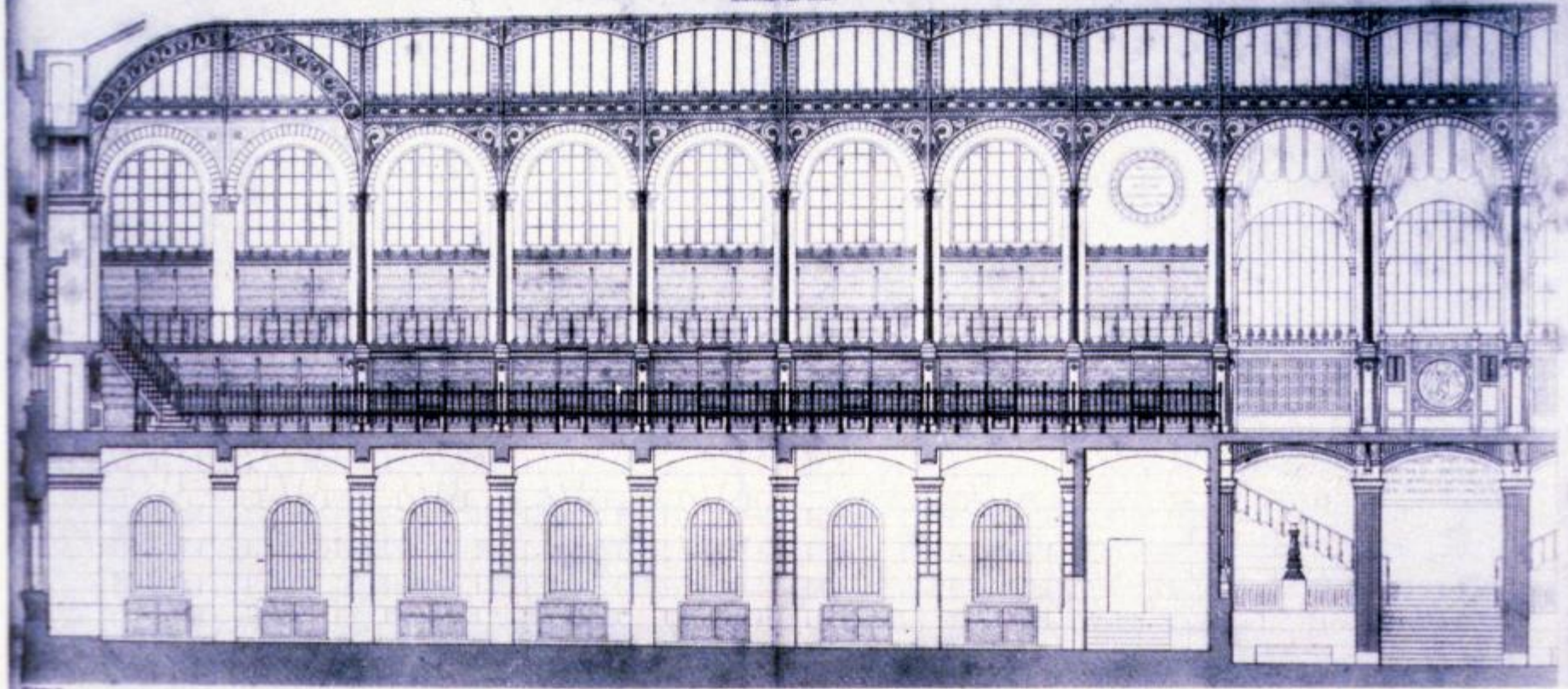
*Henri Labrouste's Bibliothèque Sainte-Geneviève,
Paris, 1838-50*



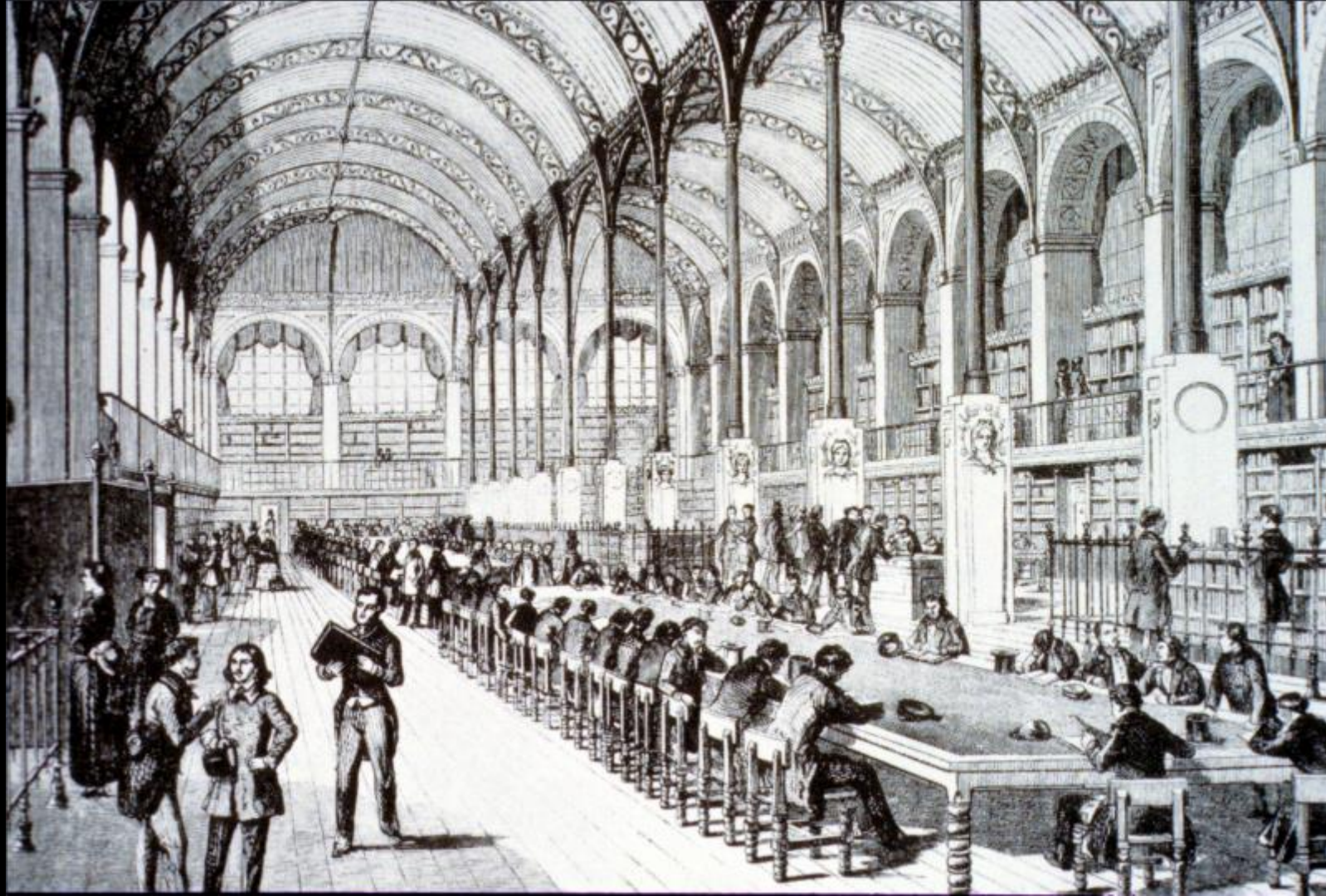
Bibliothèque Sainte-Geneviève d'Henri Labrouste à Paris (1838-50)







143 Bibliothèque Ste-Geneviève: longitudinal section of western half. Engraved after a drawing by Labrouste. (From the *Encyclopédie d'architecture*, V, 1855)





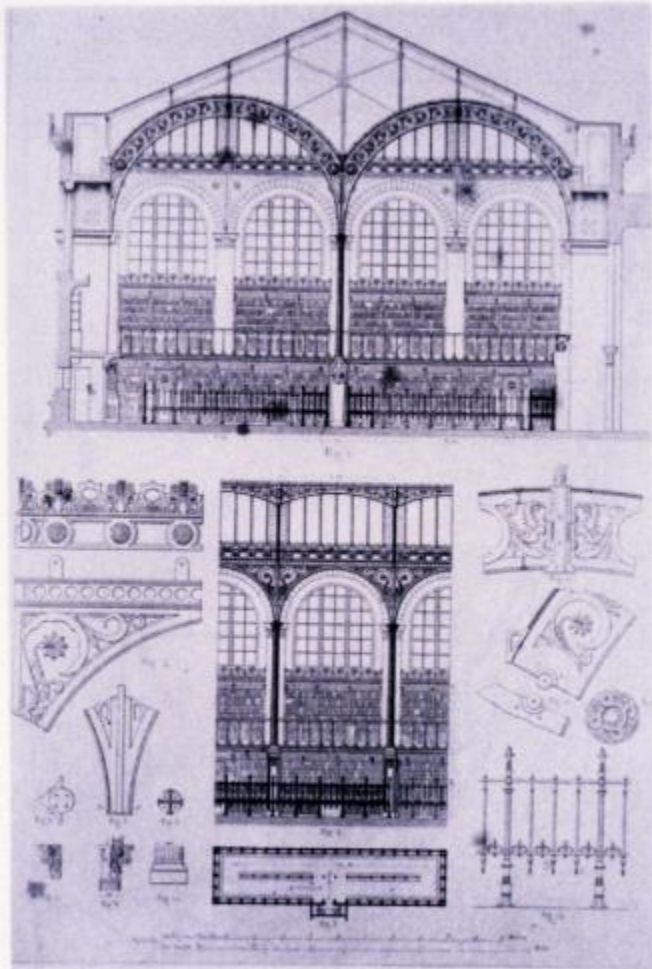
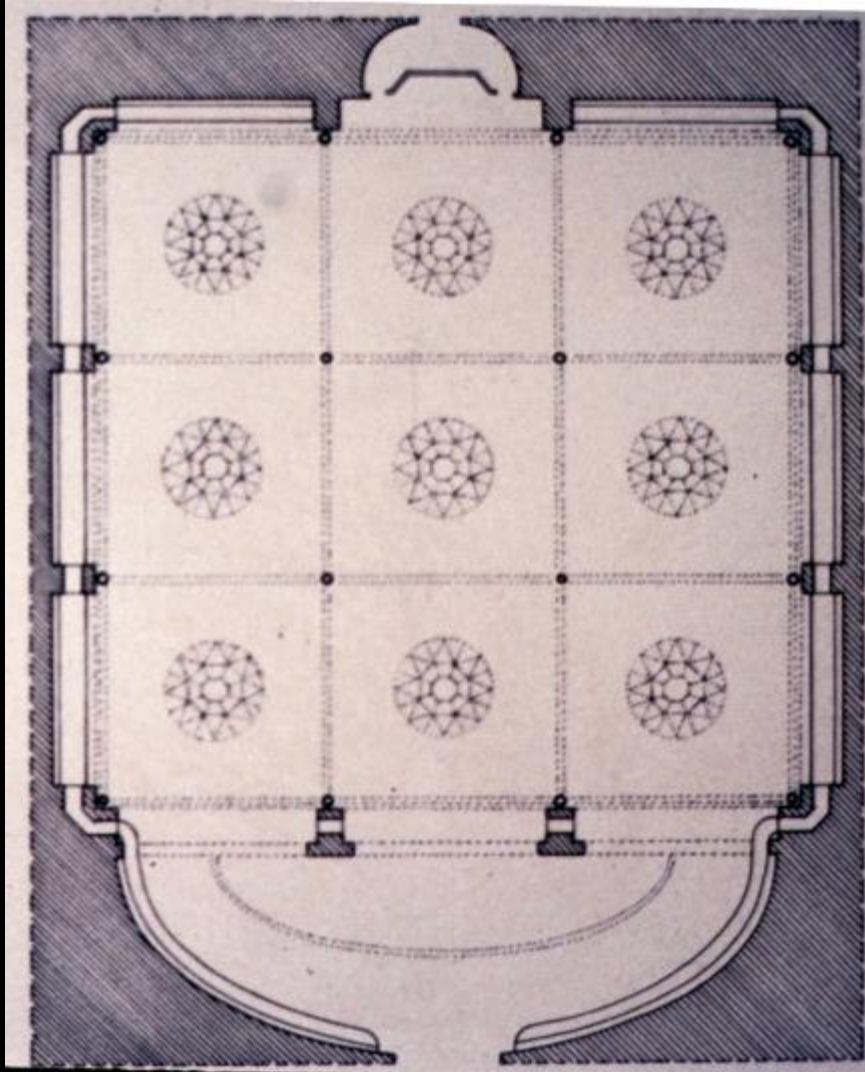
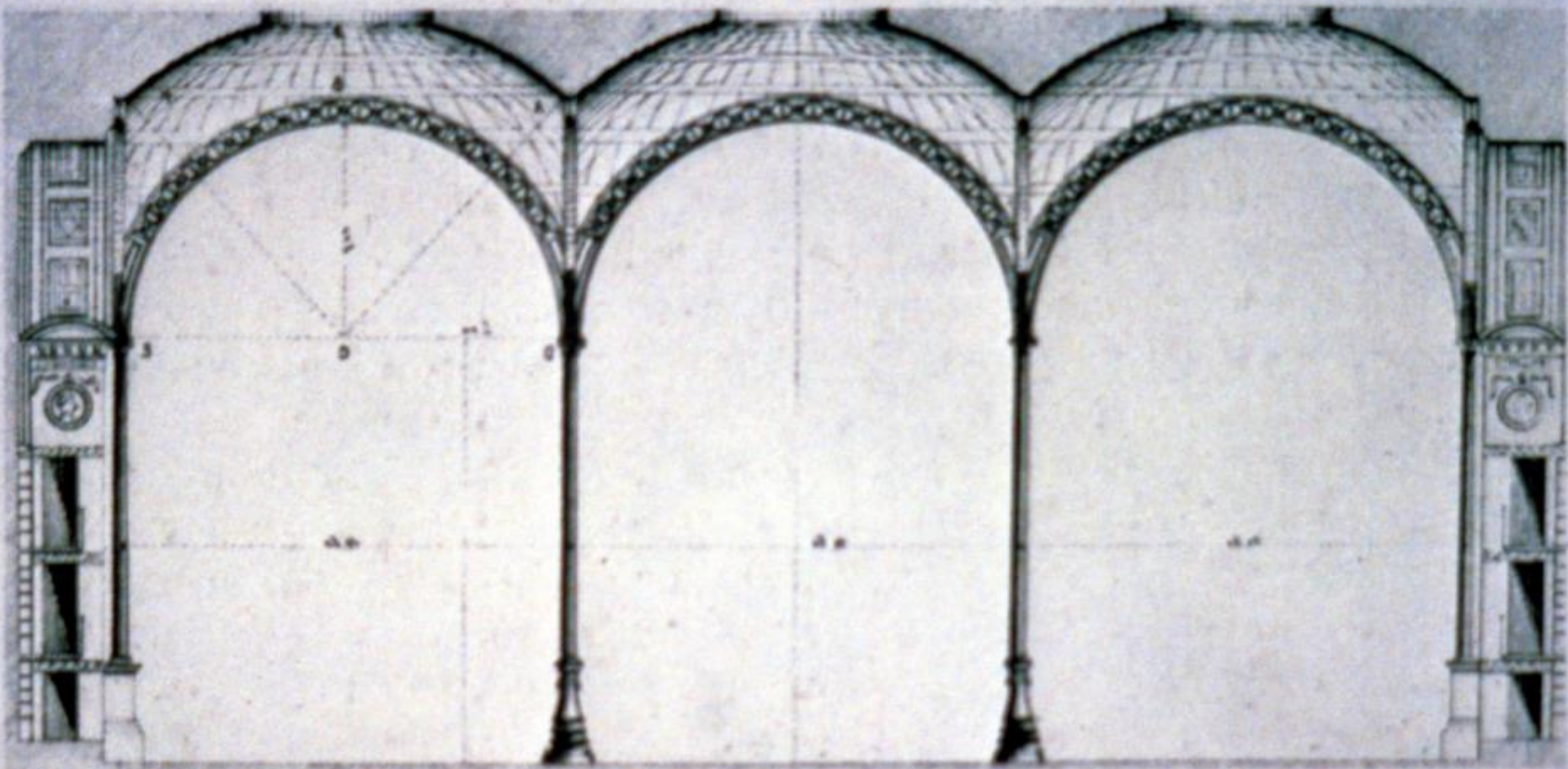


Plate 44. Henri Labrouste. Bibliothèque Saint-Geneviève, Paris, 1843-50. Section, plan and details (Reynaud, 1860-63, Pl. 80)



Bibliothèque Nationale de
France
Paris, France
Henri Labrouste
1862 to 1868









The Great Exhibition 1851
Hyde Park, London, England

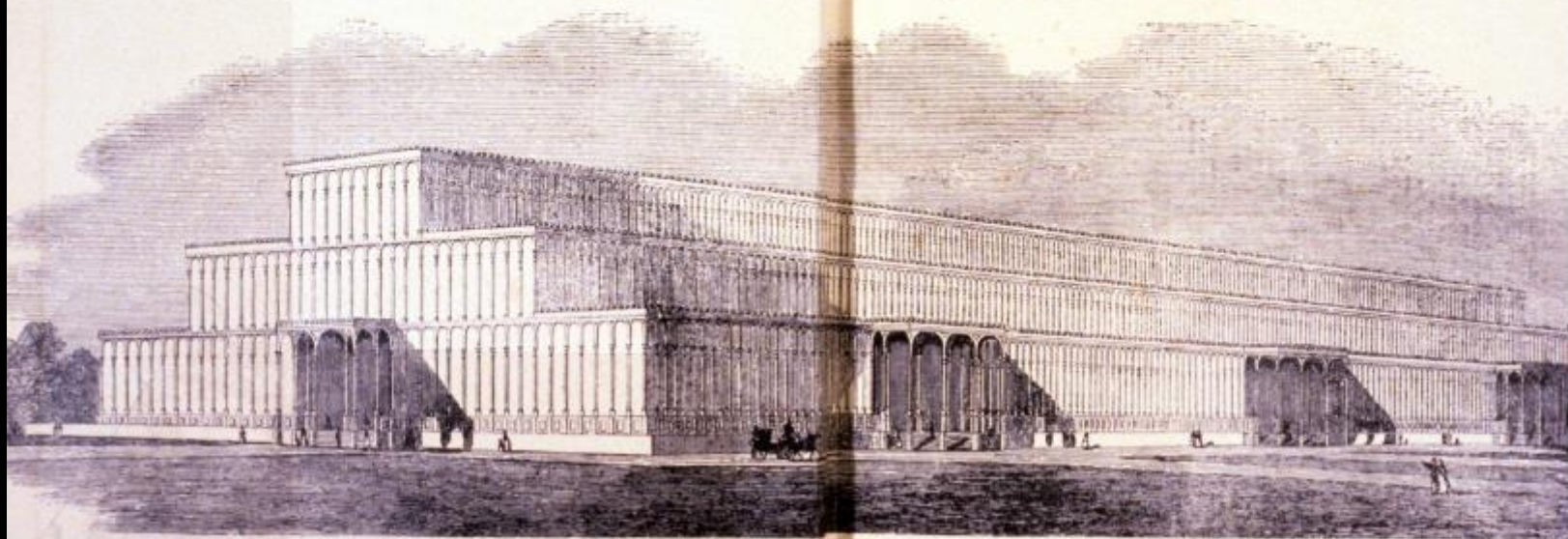
Sir Joseph Paxton



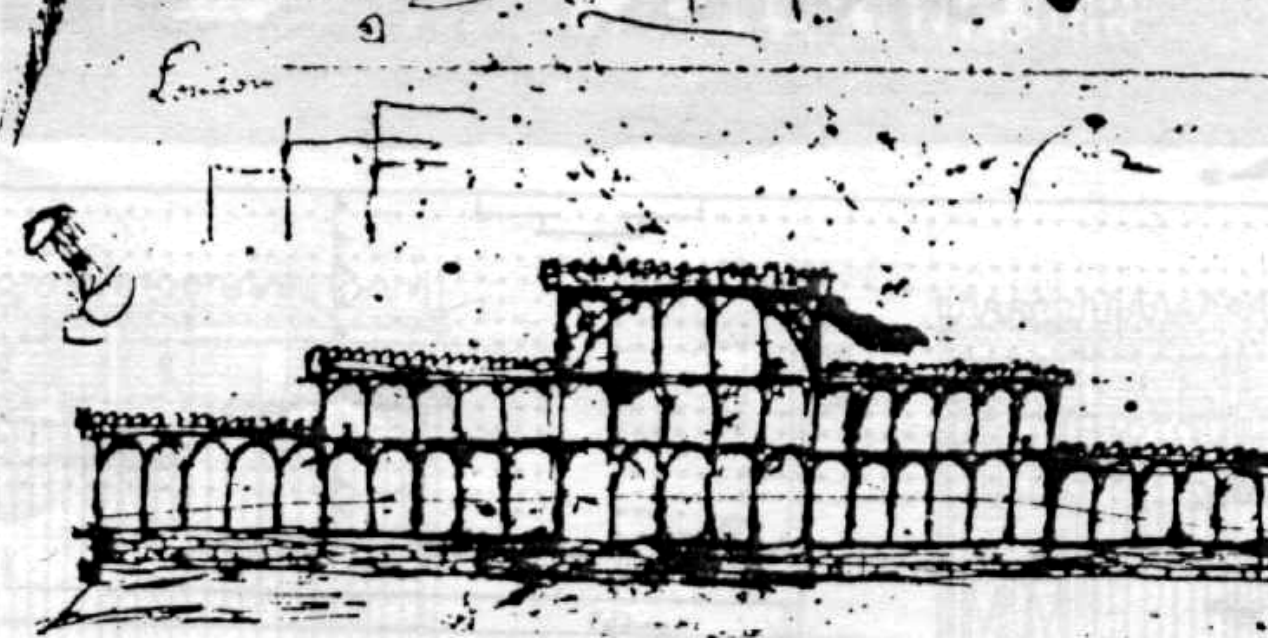
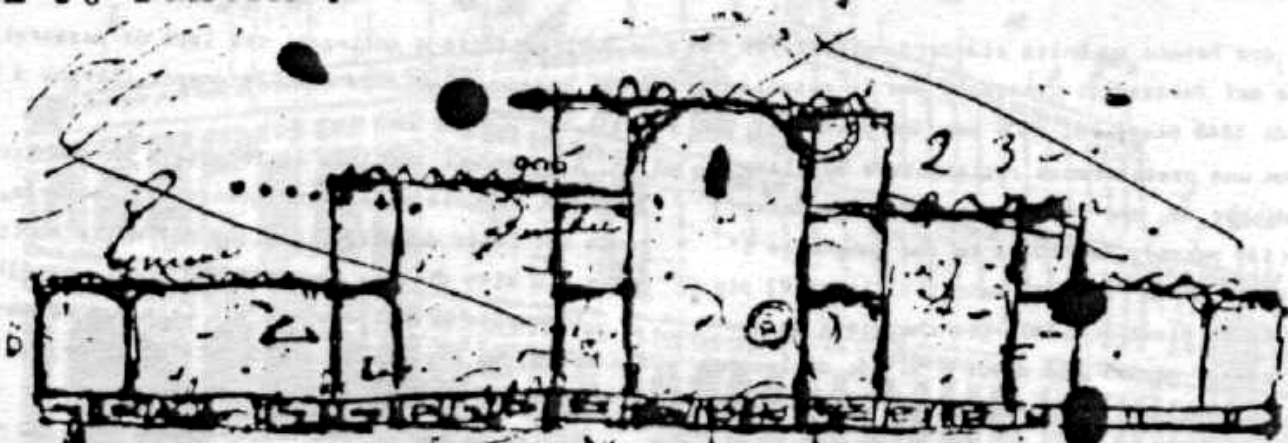
The Great Exhibition 1851
Hyde Park, London, England
Sir Joseph Paxton

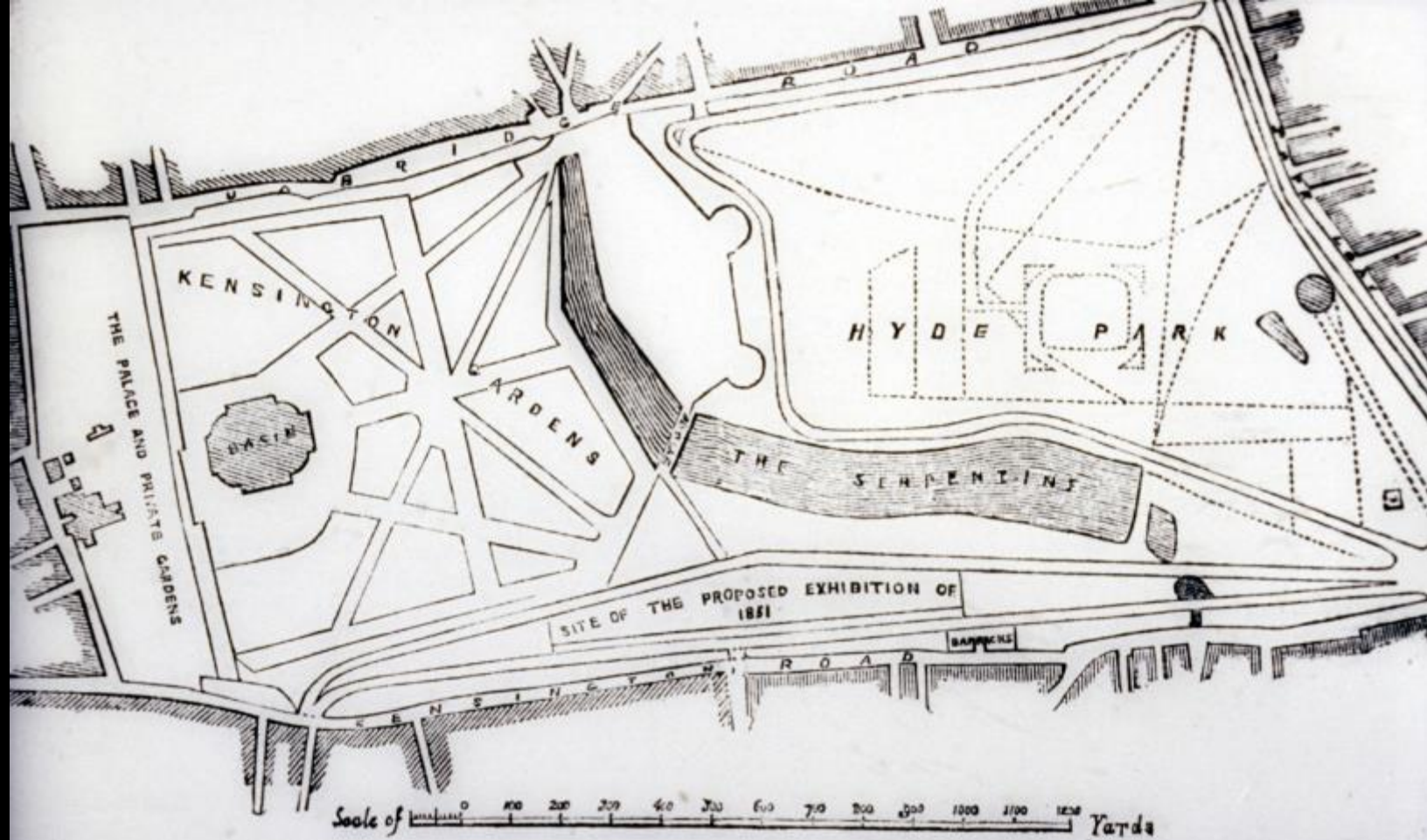


THE OFFICIAL DESIGN.

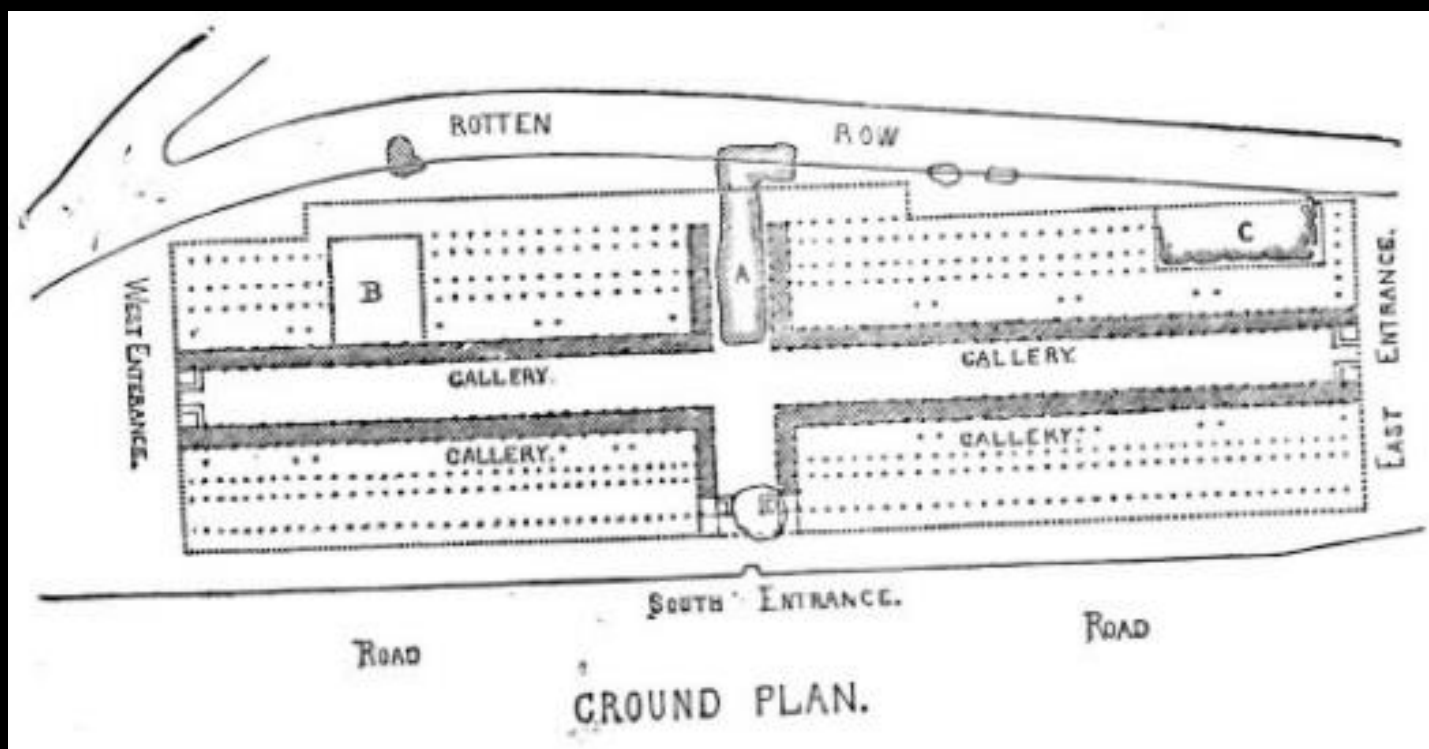


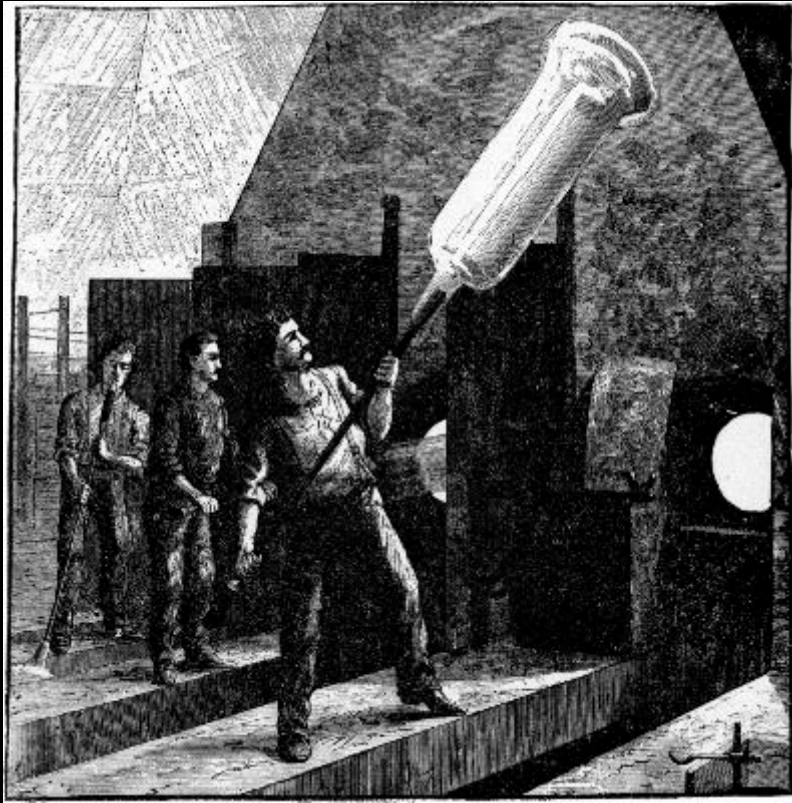
FAXTON'S DESIGN.





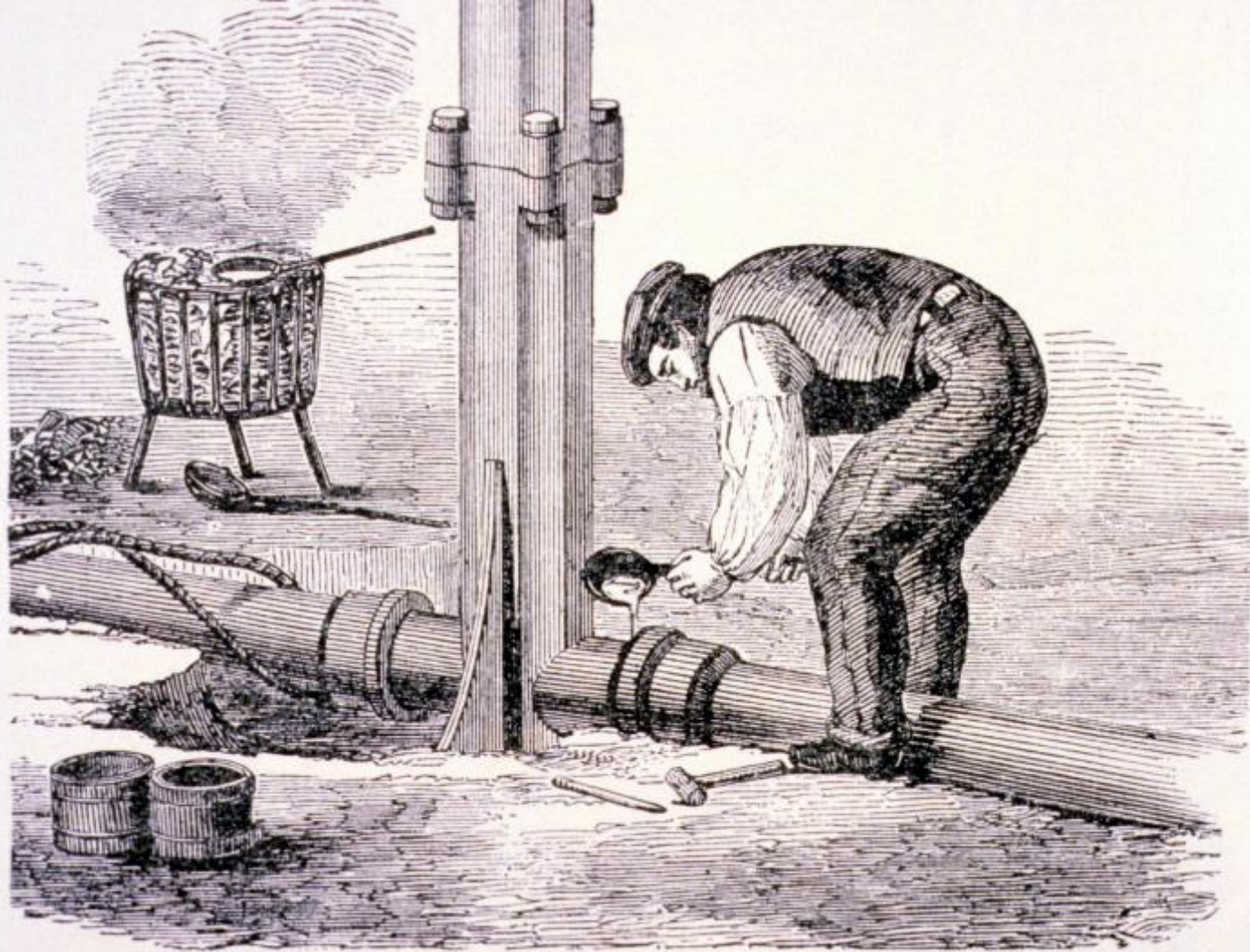
PLAN OF HYDE PARK.

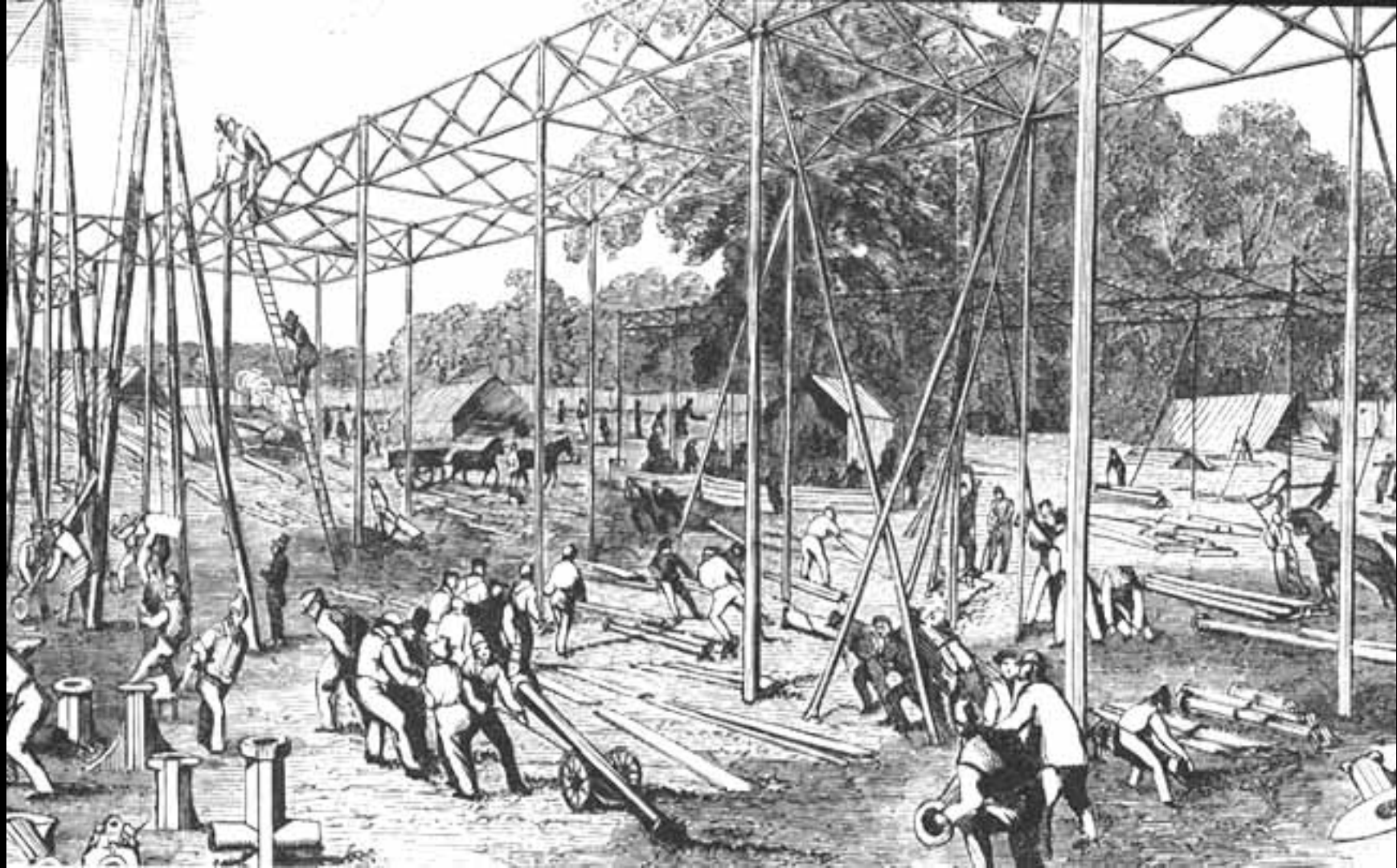


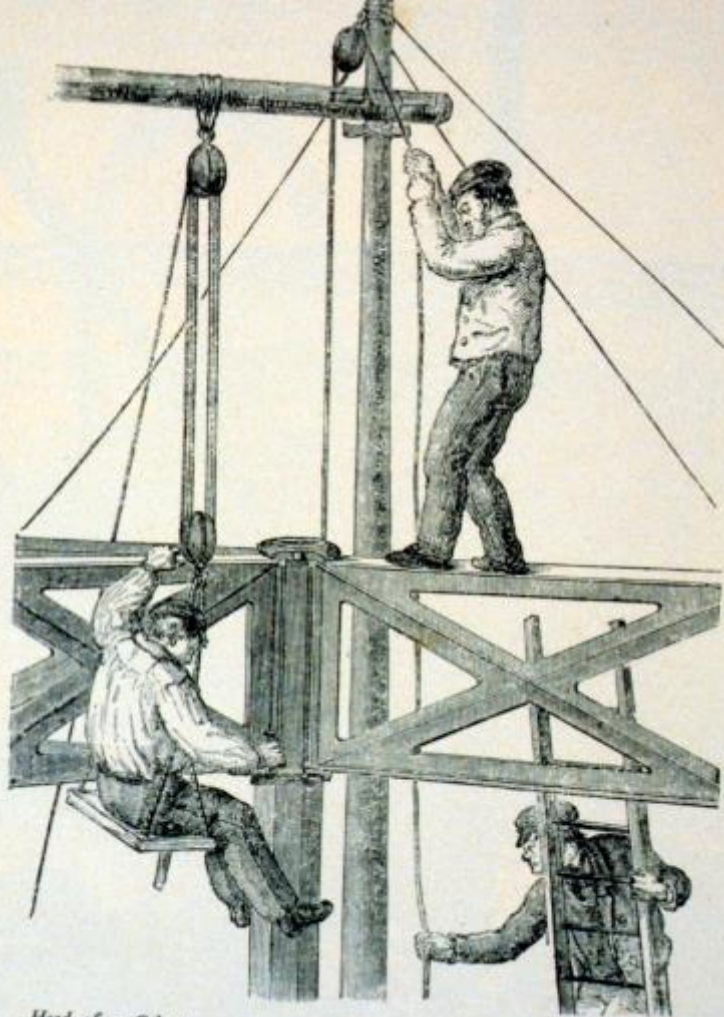


Cylinder glass is made by swinging a long hollow tube of glass in a long pit. It folds out to 30" x 49".

It was cut into 3 panes of 10" x 49" and this formed the basis of the modules for the building – combined with the slope required so that the condensation on the roof glass would not drip, but rather cling to the glass and end up in a condensation gutter at the base of the sloped glass.

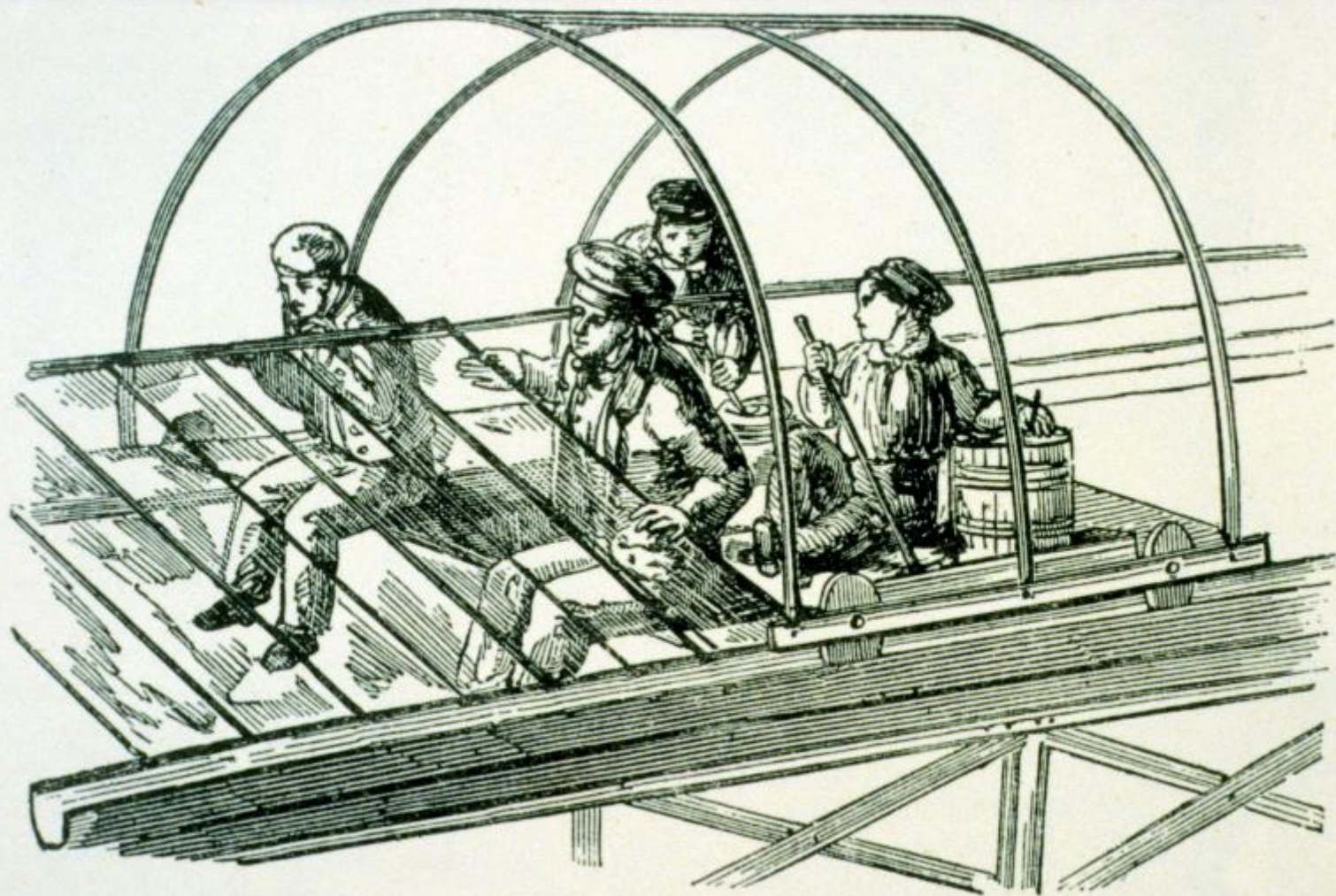




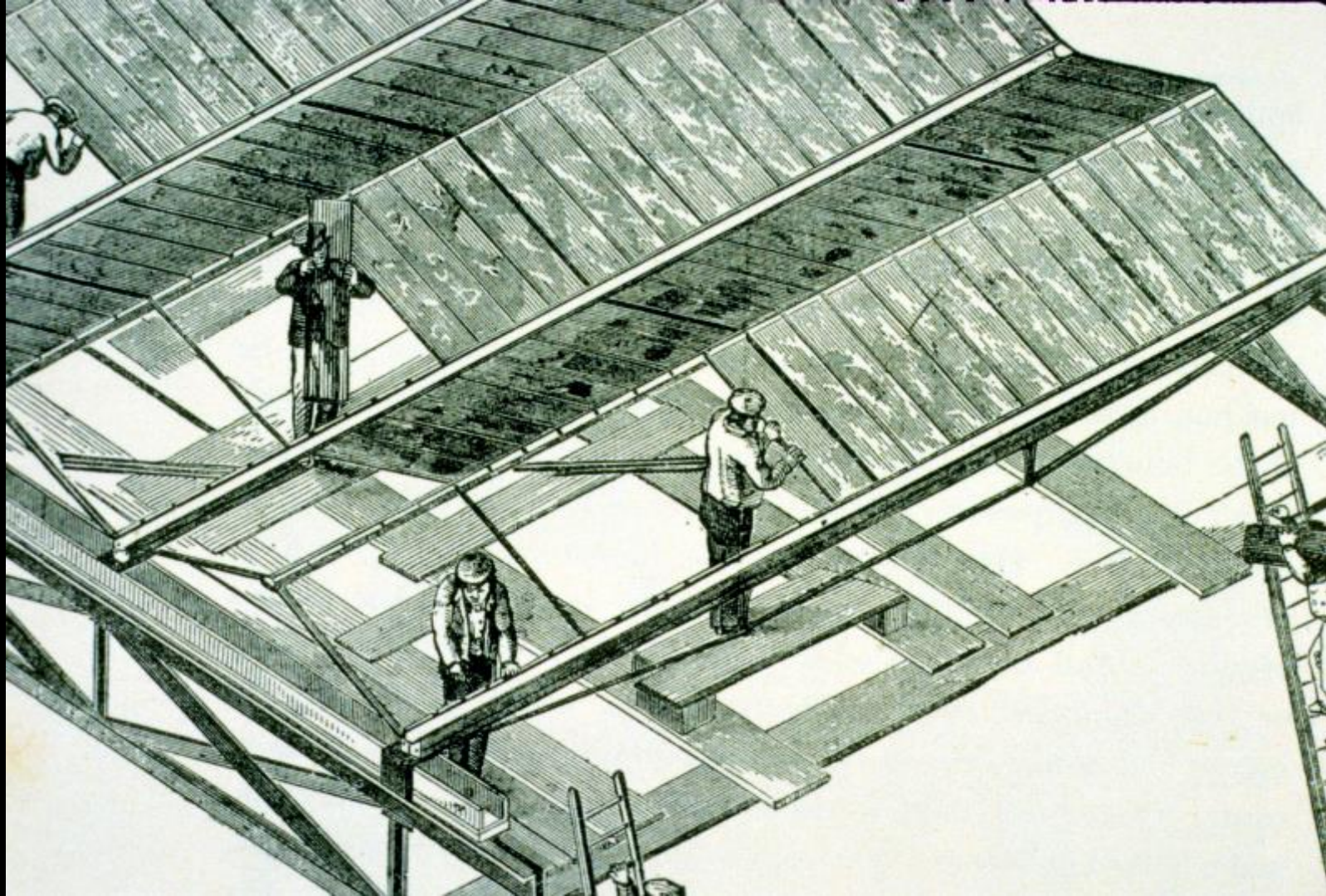


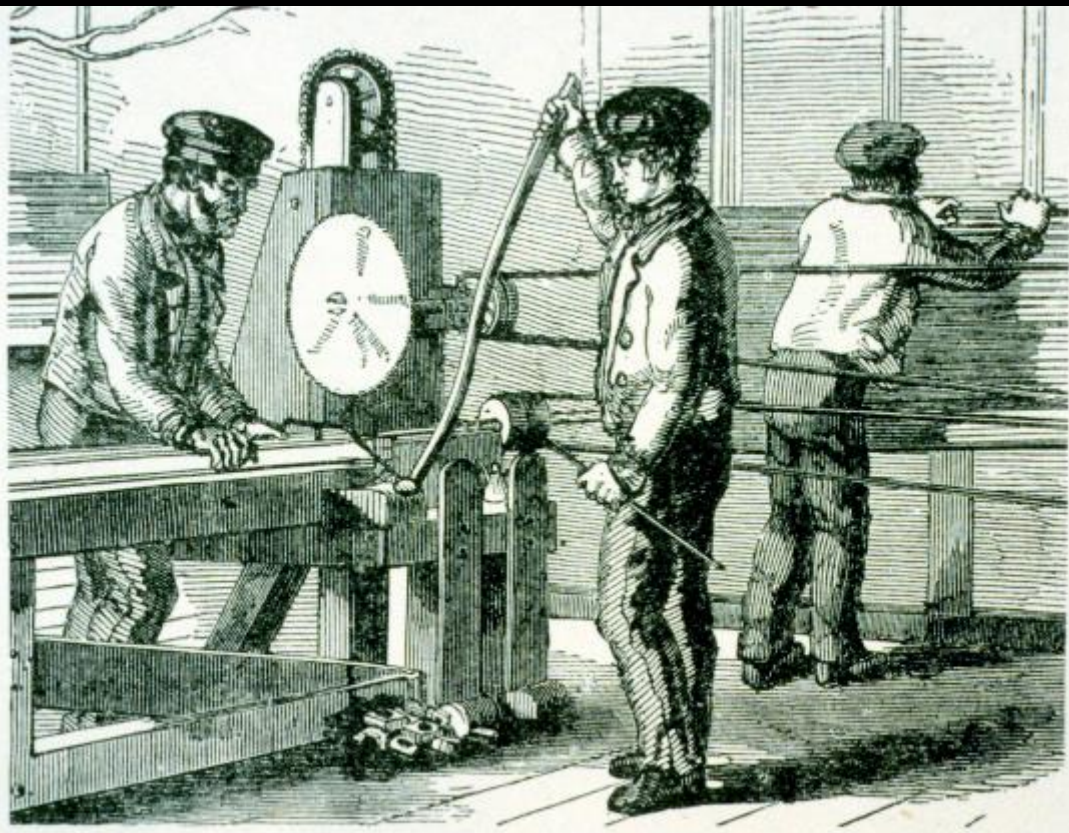
Head of a Column.





Glazing Waggon.





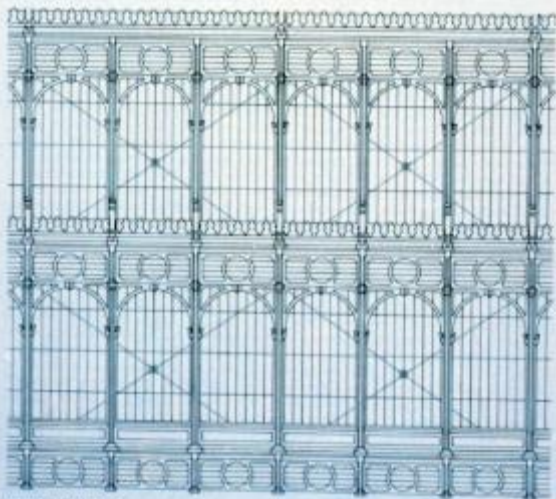
The Sash-bar Finishing Machine.



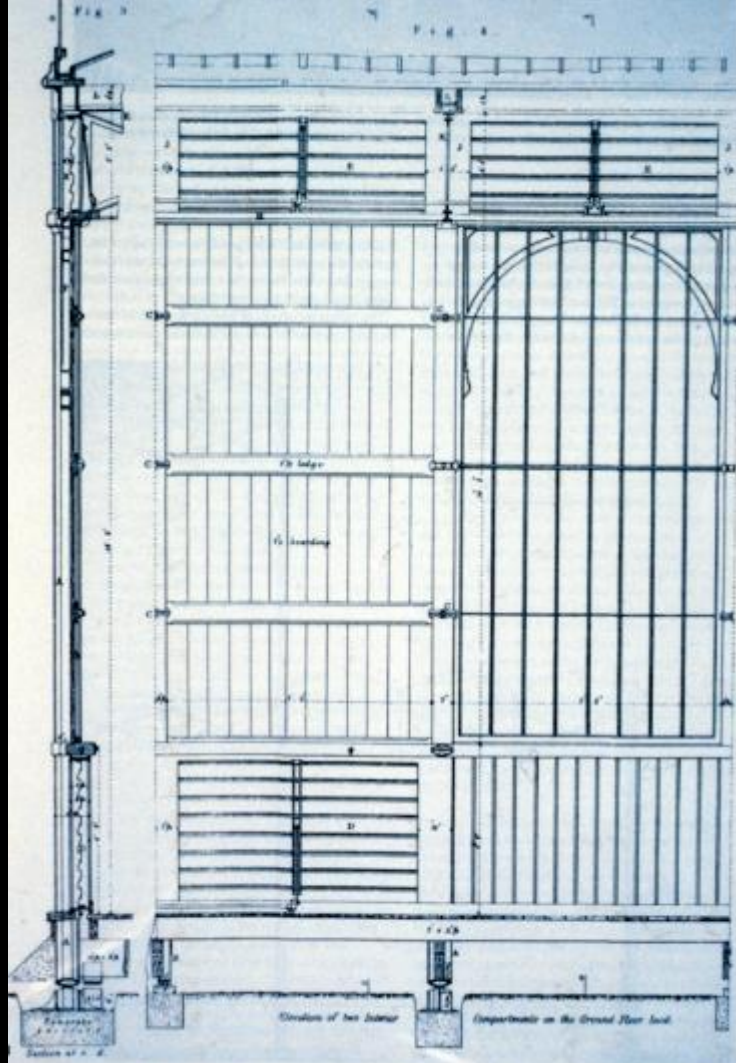
Punching Machine.

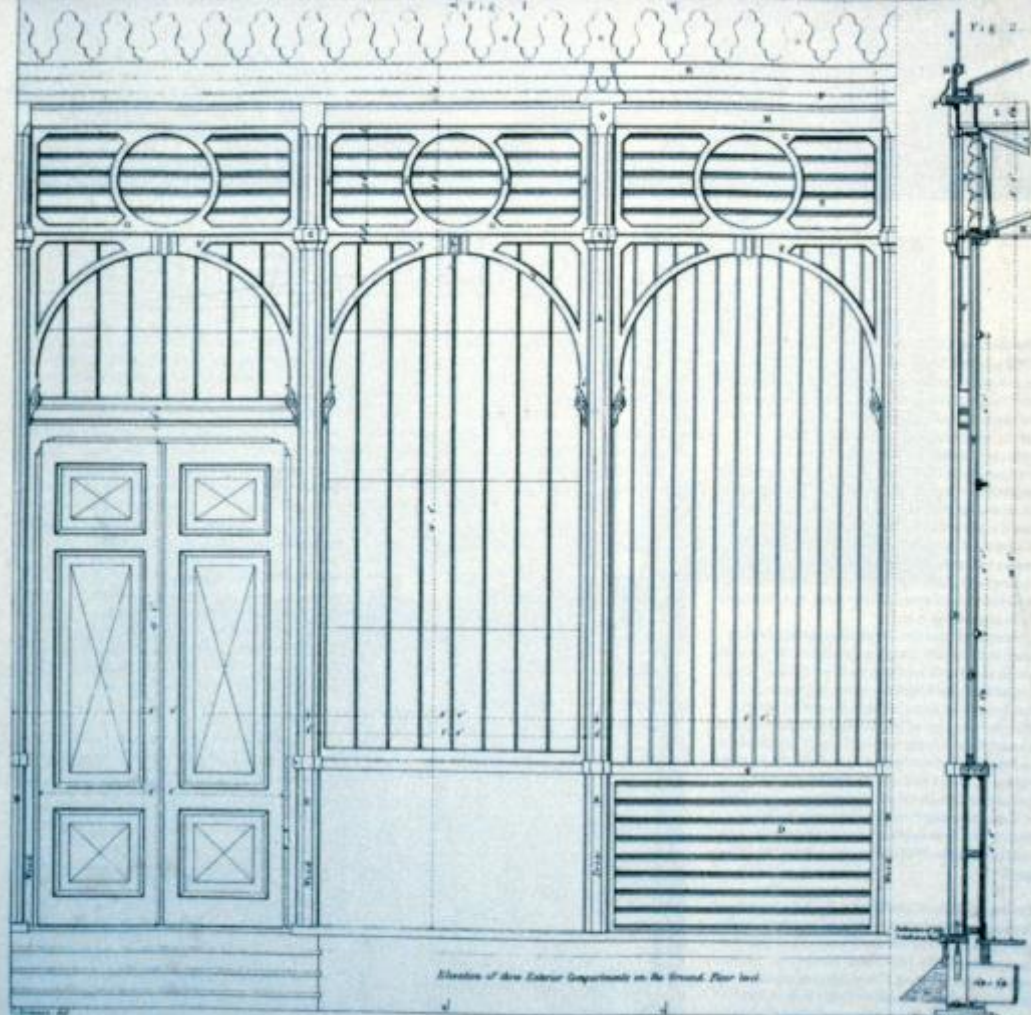


WROUGHT-IRON RODS provided a rigid support for the exterior walls of the Crystal Palace, which had no internal walls to stiffen it. Visible from inside and out (the interior view is shown here), these cross braces added to the building's strikingly contemporary appearance.

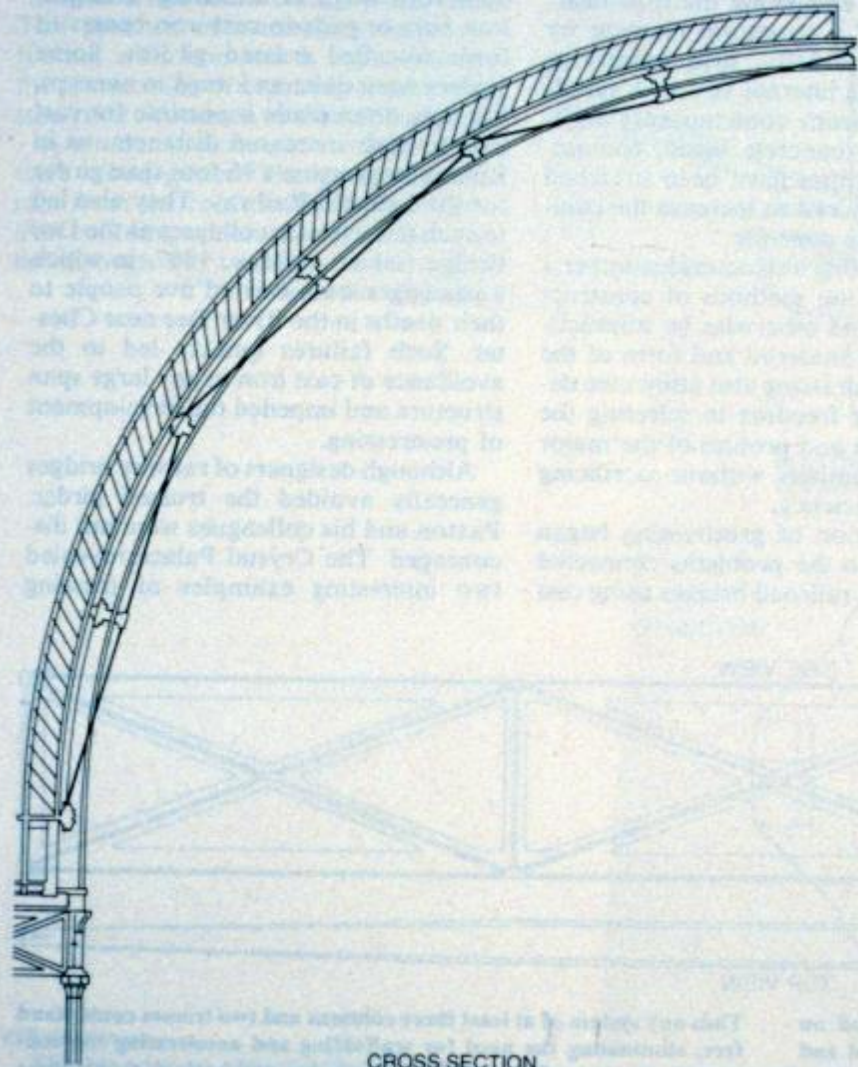


CLEAR WALLS

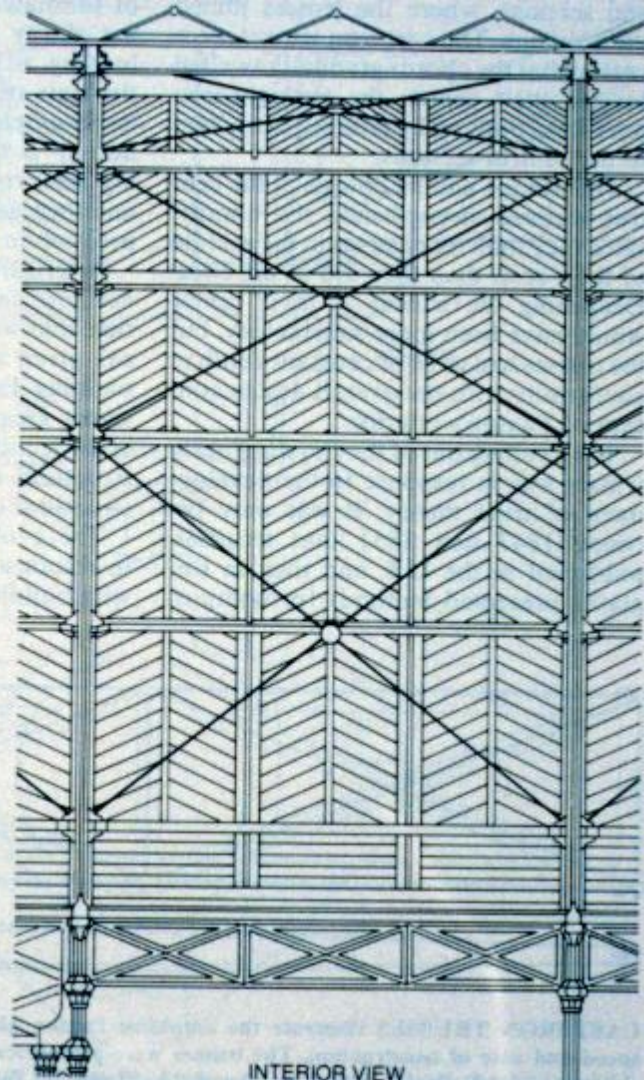




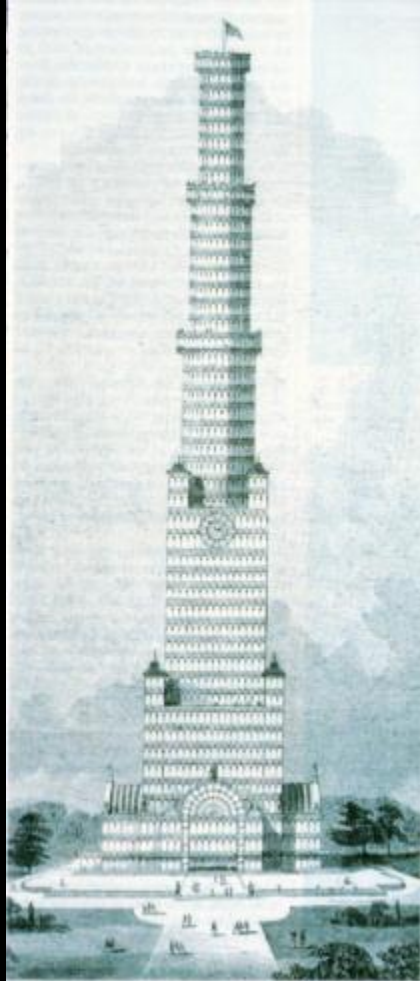
Elevation of three Exterior Compartments on the Ground Floor level



CROSS SECTION



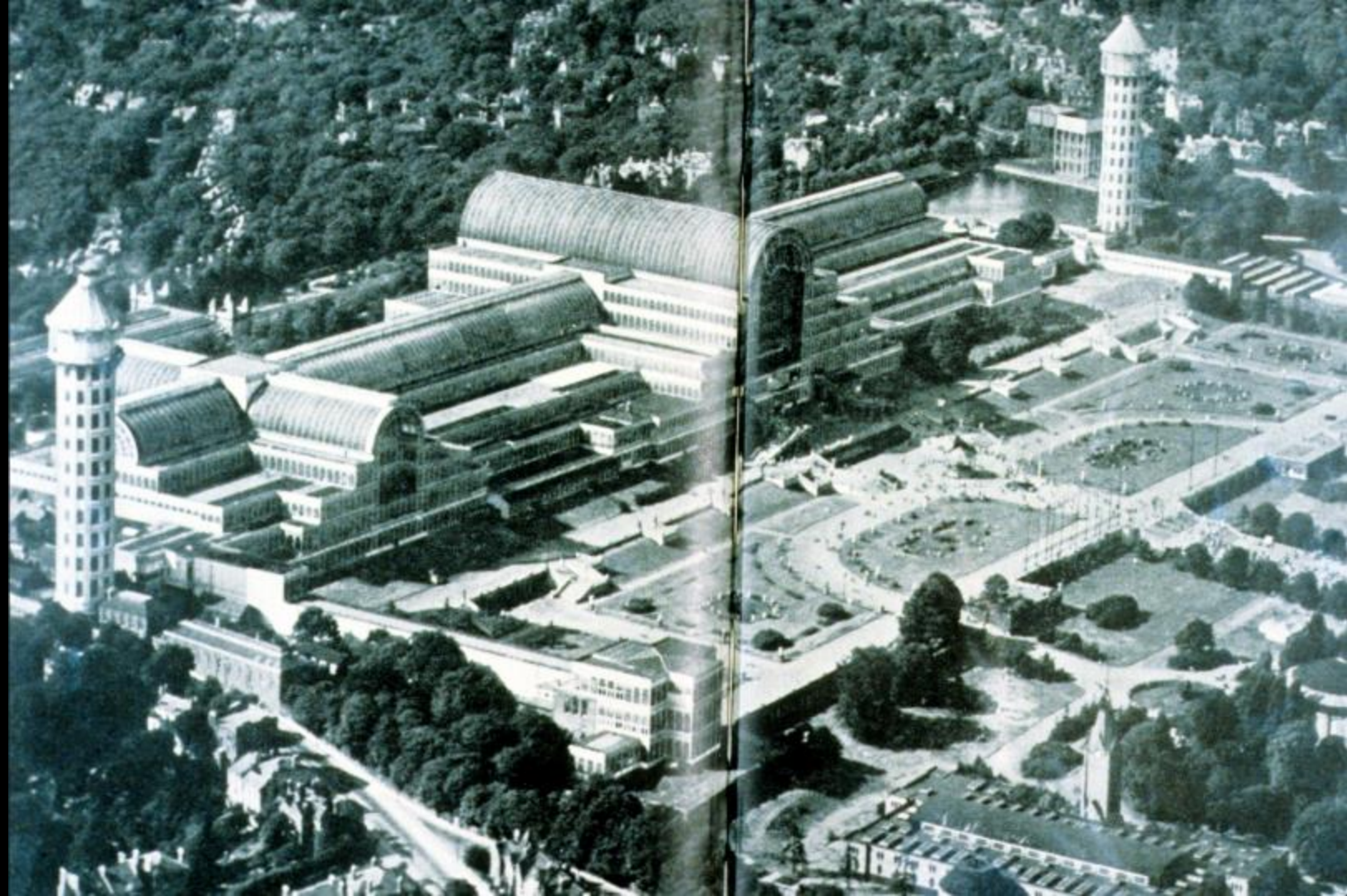
INTERIOR VIEW

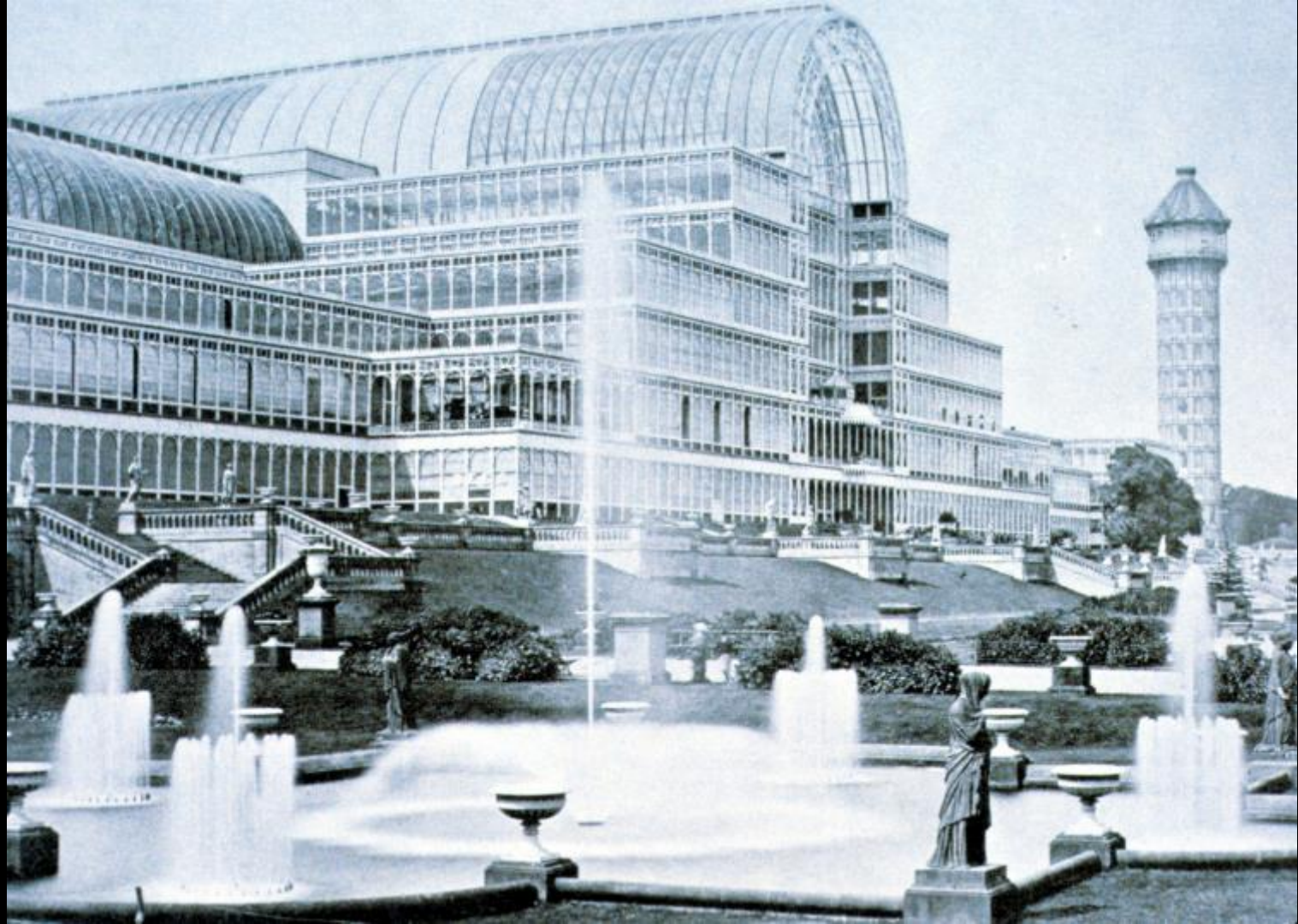


MODULAR CONSTRUCTION of the Crystal Palace prompted a contemporary of Paxton's to suggest that the modular units of the building be rearranged to form a 1,000-foot tower (left). A vertical



Crystal Palace would have been too heavy for its cast-iron columns; now steel beams make such buildings possible. At right is Skidmore, Owings & Merrill's Sears Tower, built out of stacked modular units.

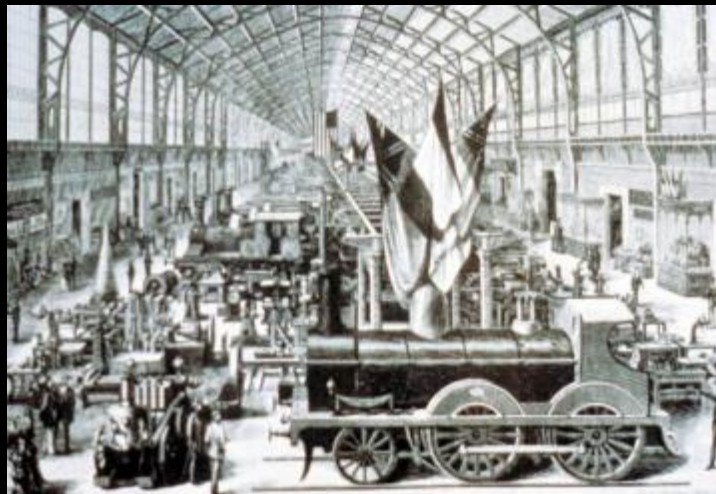












Plan Circulaire



Plan Elliptique

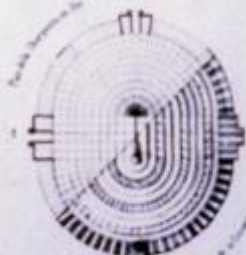
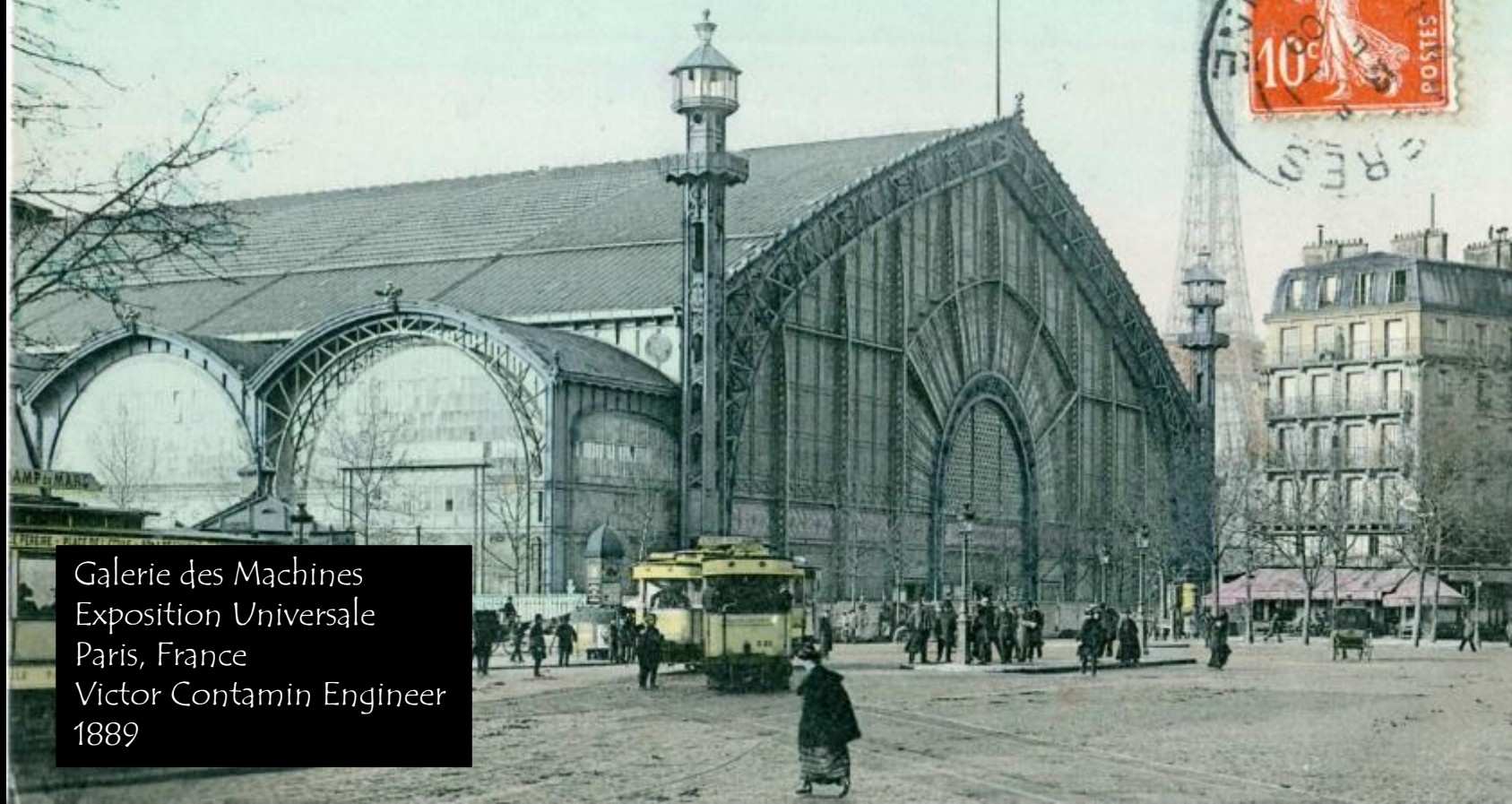
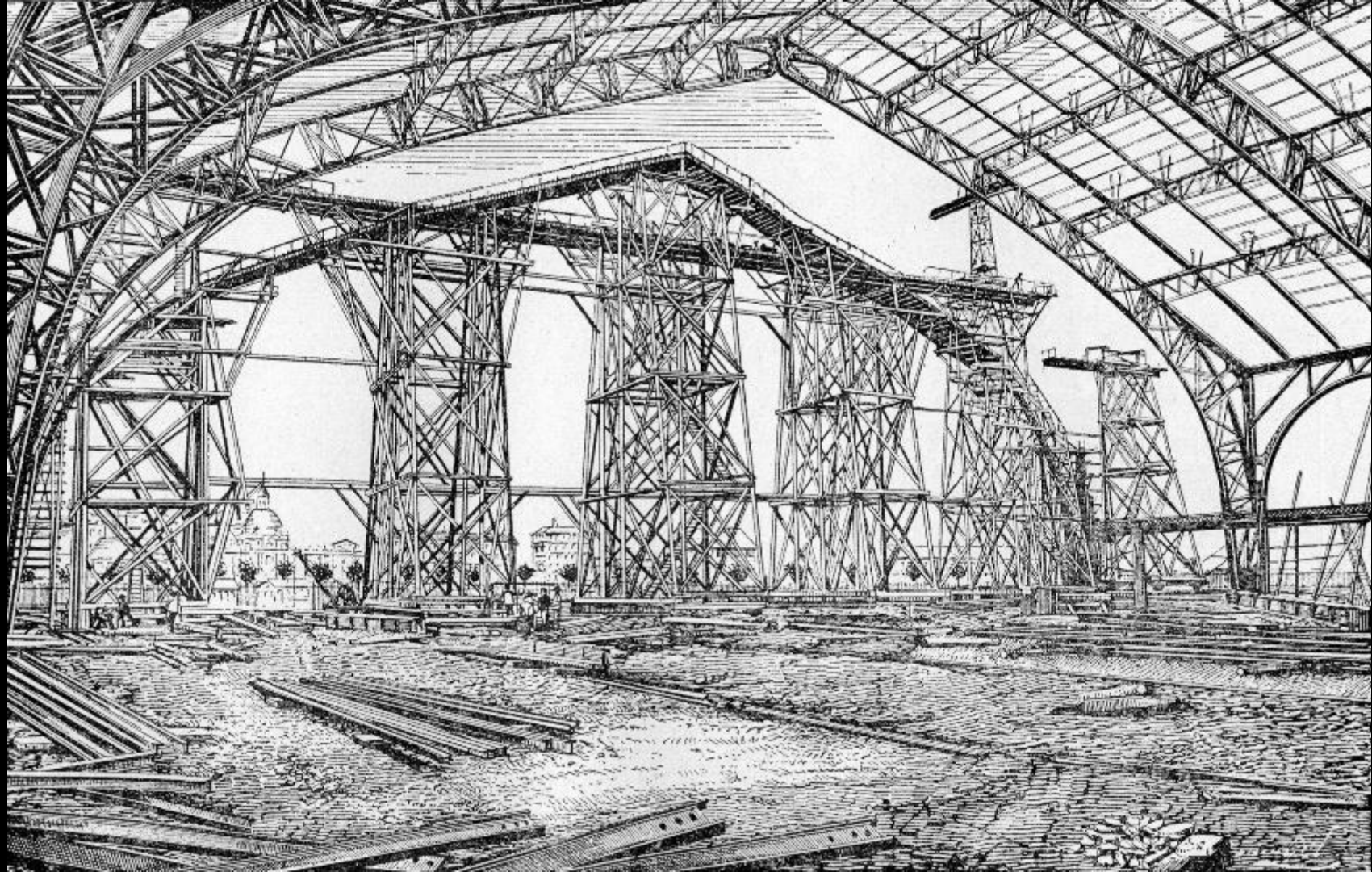


Plate 41. Paul Gricemard. Project for the International Exhibition Building of 1867, published in 1865 (Gricemard, pl. 1)

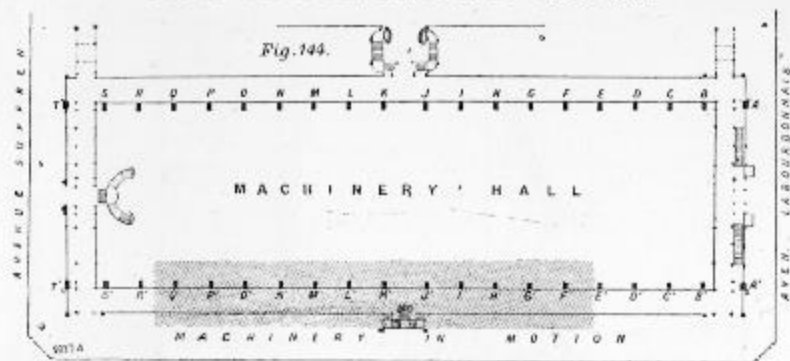
528. PARIS — Galerie des Machines C. L. C.



Galerie des Machines
Exposition Universale
Paris, France
Victor Contamin Engineer
1889



THE MACHINERY HALL.



PLAN SHOWING POSITION OF PIERS AND STAIRCASES. (See page 453.)

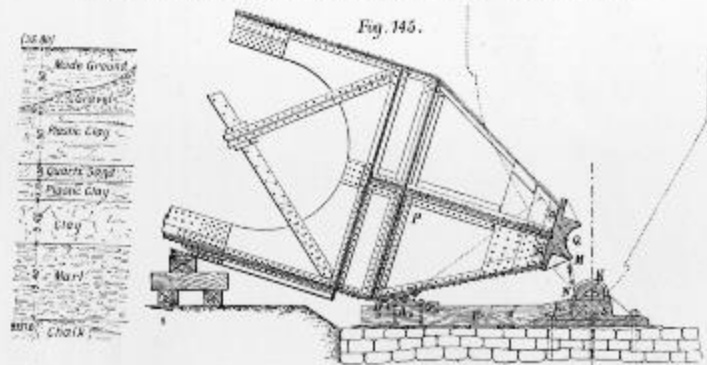
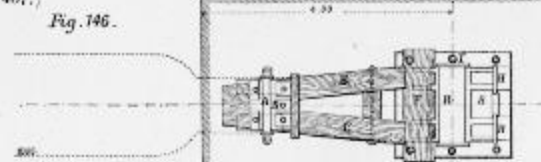
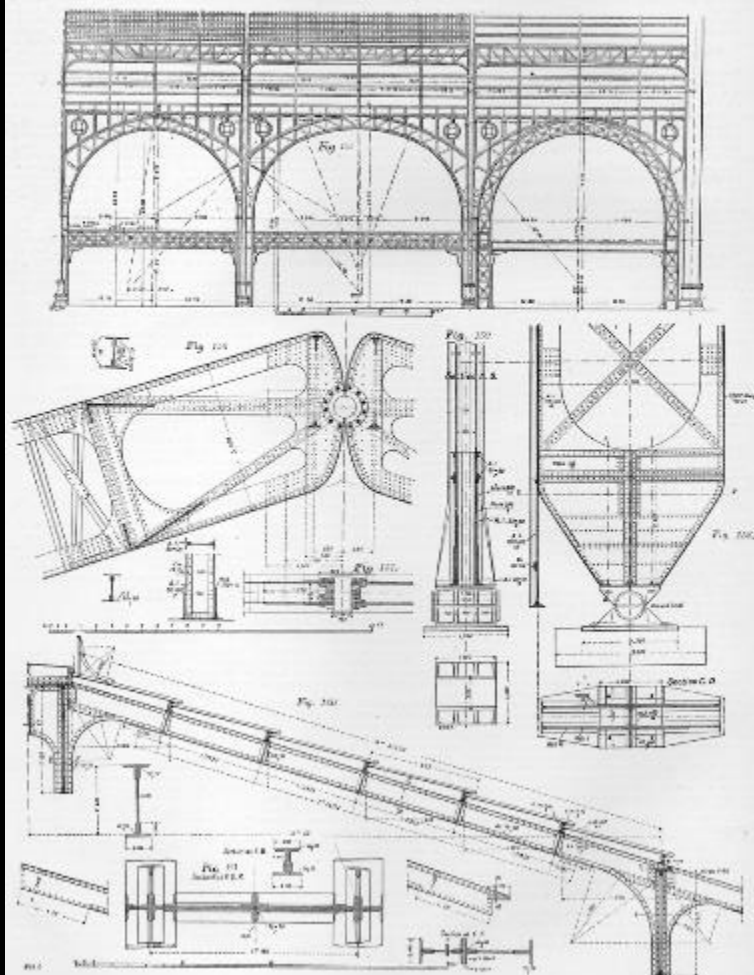
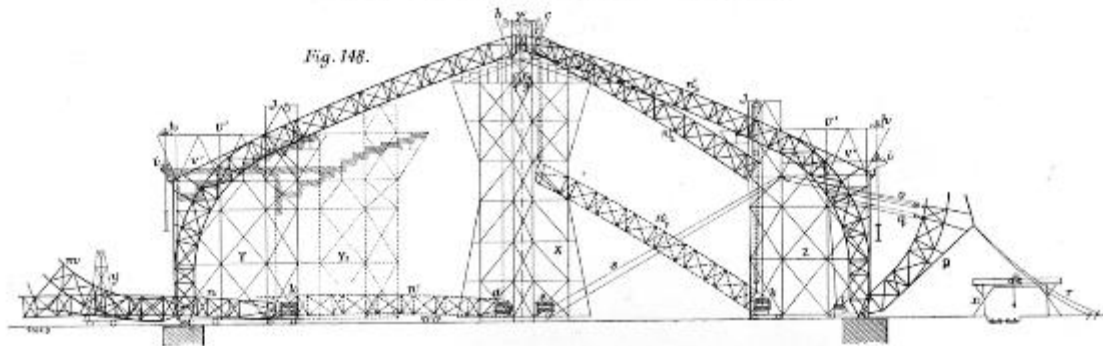


FIG. 147. (See page 457.)

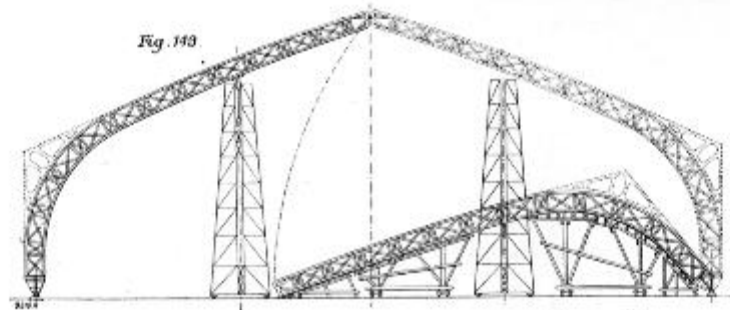


MODE OF ERECTING PRINCIPALS. (See page 458.)

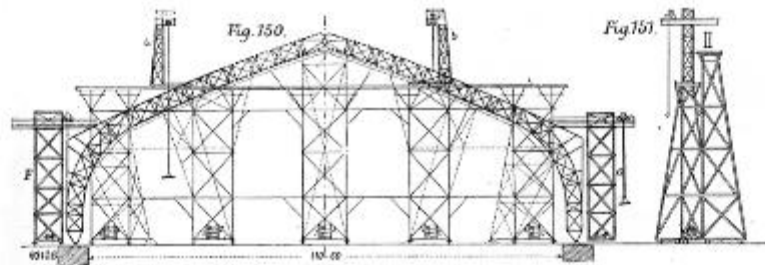
DETAILS OF ROOF OF MACHINERY HALL AND OF SIDE GALLERIES.
(See Description, on page 452.)



MODE OF ERECTING MACHINERY HALL ROOF; THE FIVES LILLE COMPANY. (See page 457.)



PROPOSED MODE OF ERECTING MACHINERY HALL ROOF. (See page 457.)

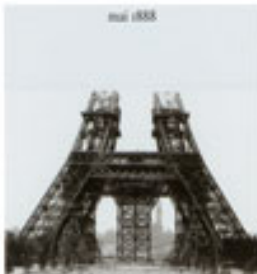


MODE OF ERECTING MACHINERY HALL ROOF; N.M. CAIL ET C^{IE}. (See page 458.)



Eiffel Tower
Great Exposition 1889
Paris, France
Gustav Eiffel
324m

mai 1888



juillet 1888



septembre 1888



mai 1889



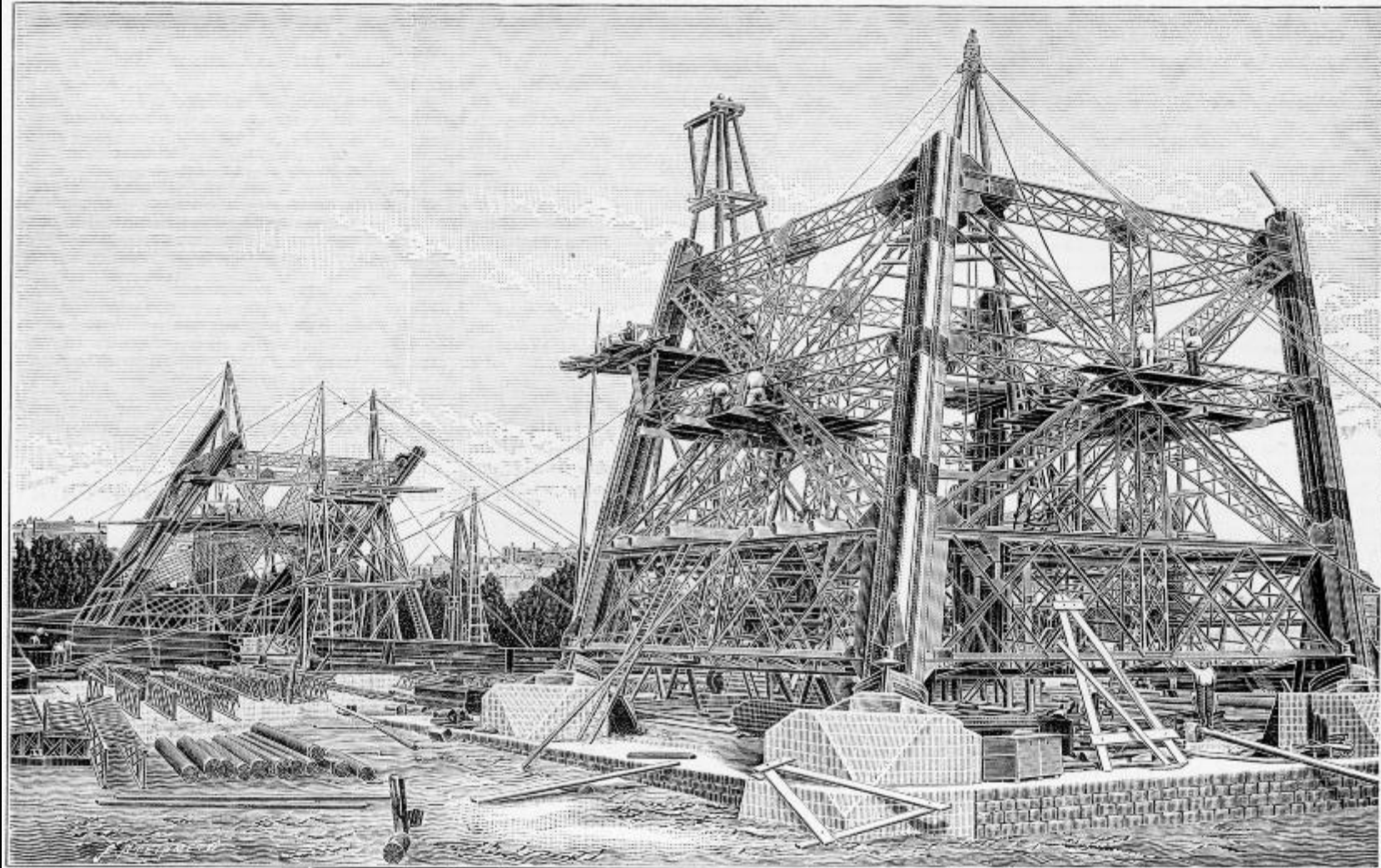
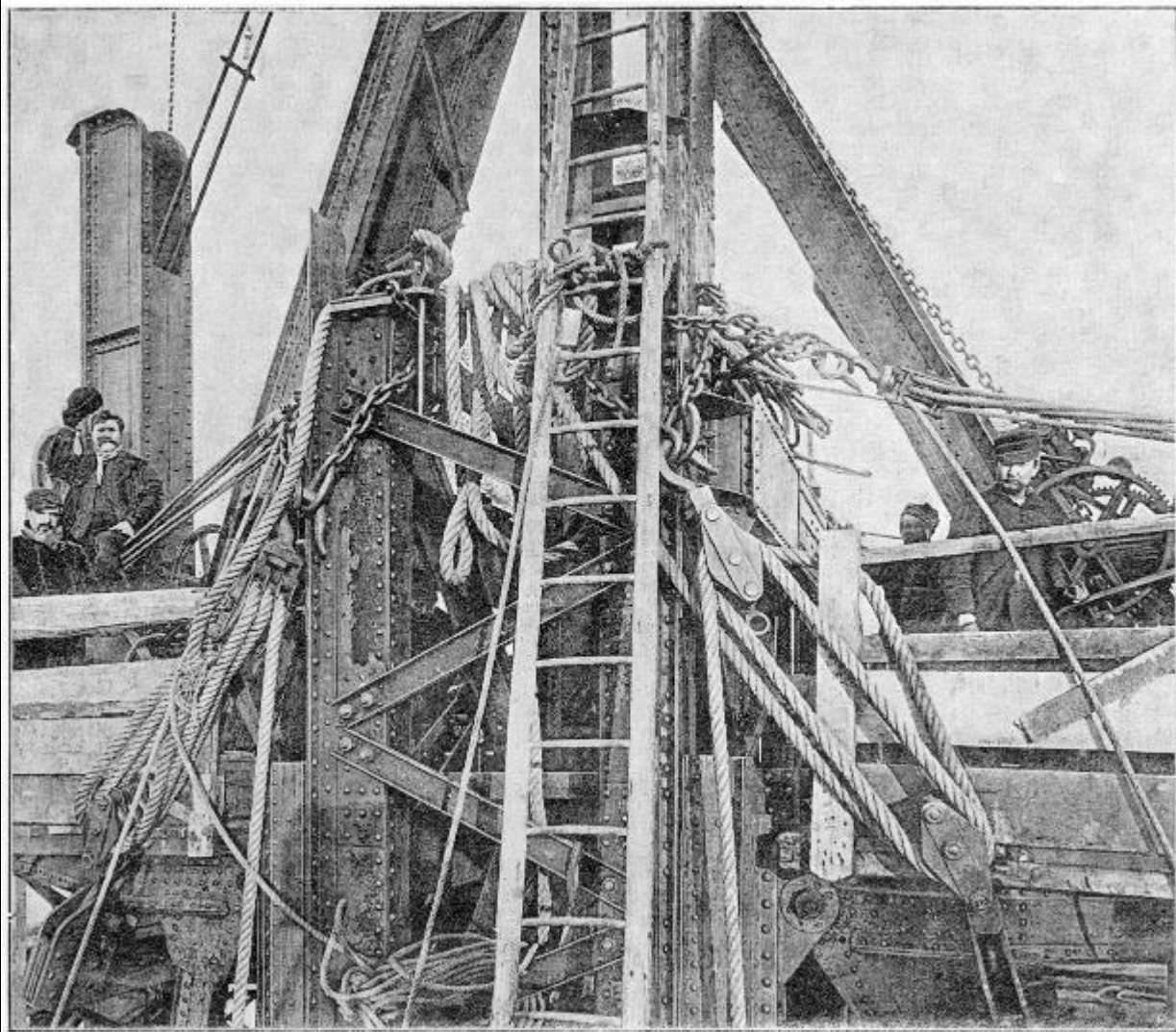
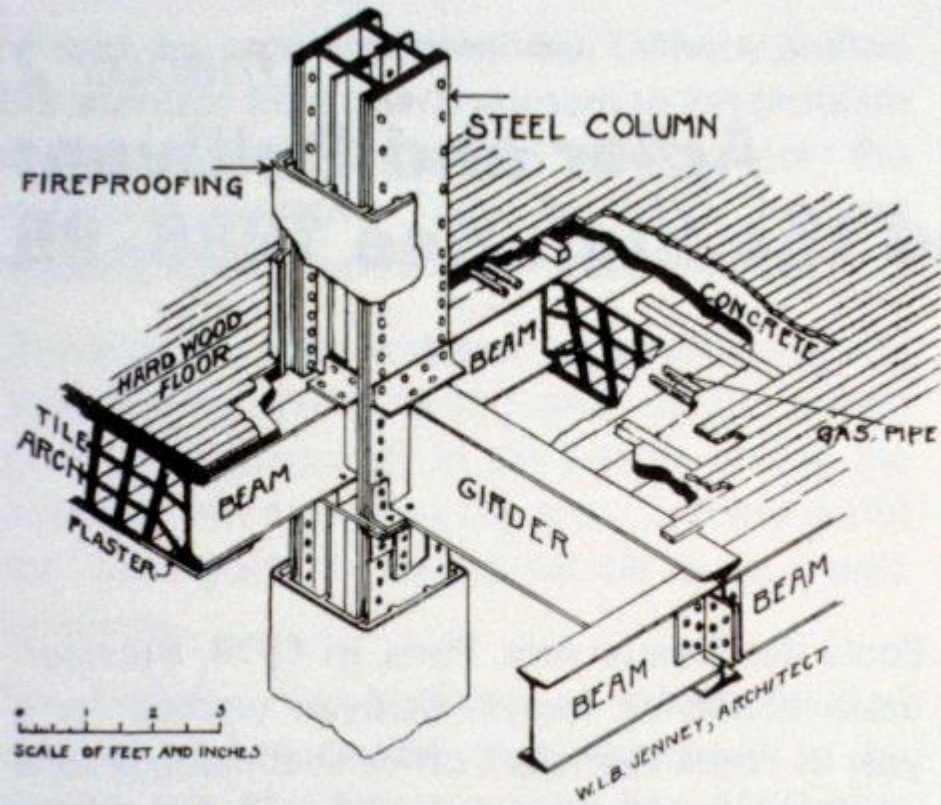
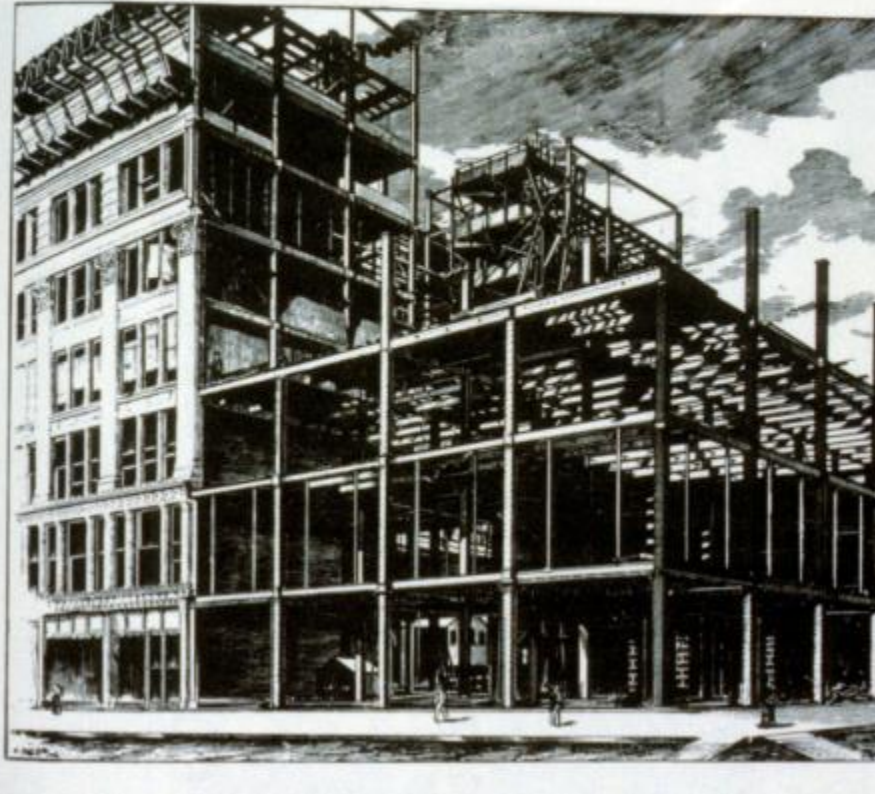


FIG. 37. THE EIFFEL TOWER, COLUMN NO. 4; SEPTEMBER, 1887.





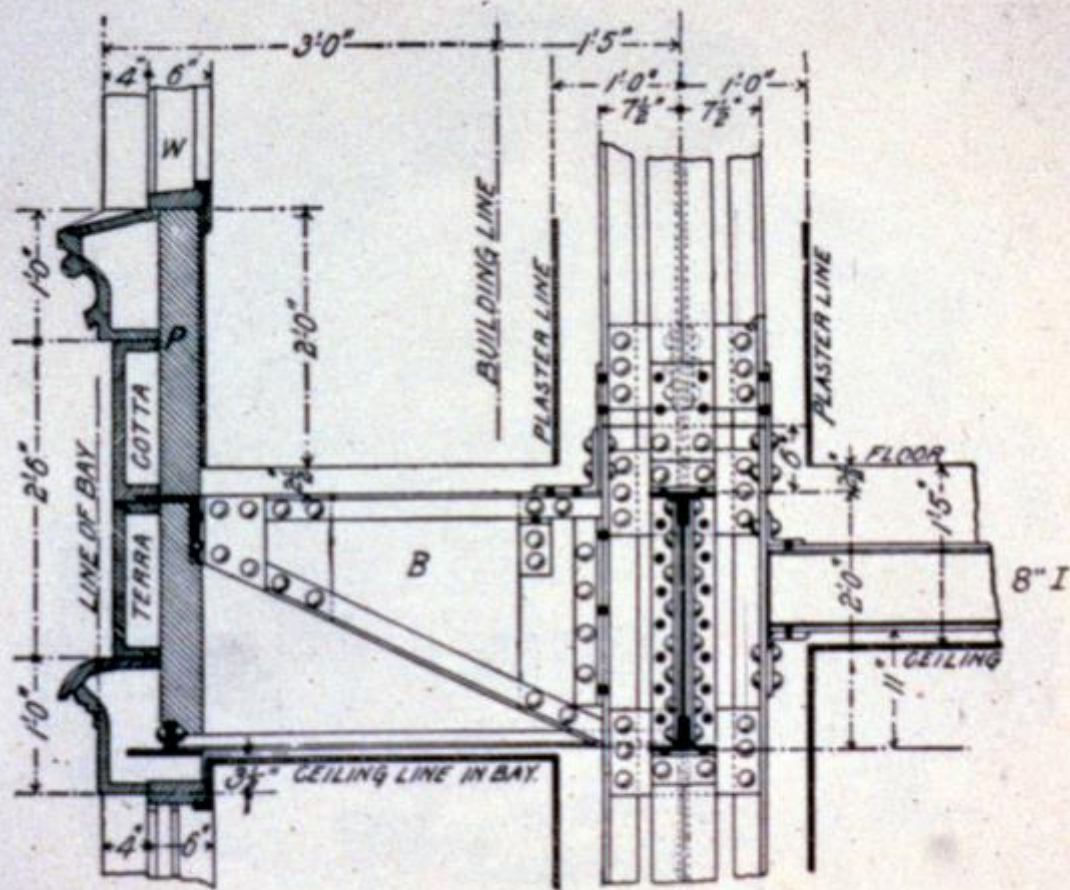
44. Fair (Montgomery Ward) Store, Chicago, Ill., 1890-91. William Le Baron Jenney, architect. Part of the steel and wrought-iron frame during construction.



32 Jenney, Fair Store, Chicago, 1890-91. Detail of fireproof steel-frame construction.



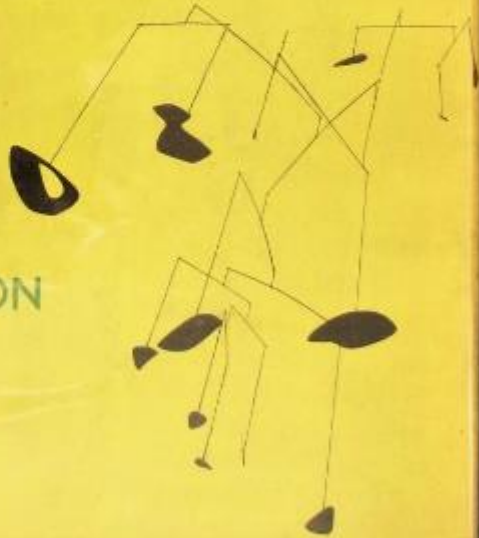
Reliance Building
Chicago, Illinois
Burnham, Root & Atwood
1895
First real curtainwall skyscraper



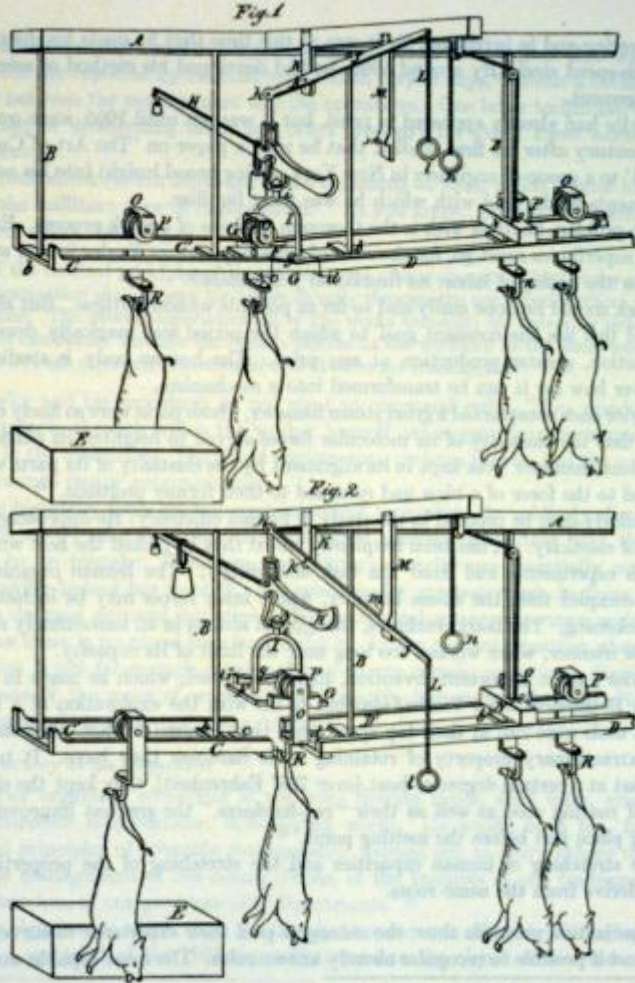
27 Atwood and Burnham, Reliance Building,
Chicago, 1890/94-95. Cross section of window bay.

MECHANIZATION
TAKES
COMMAND

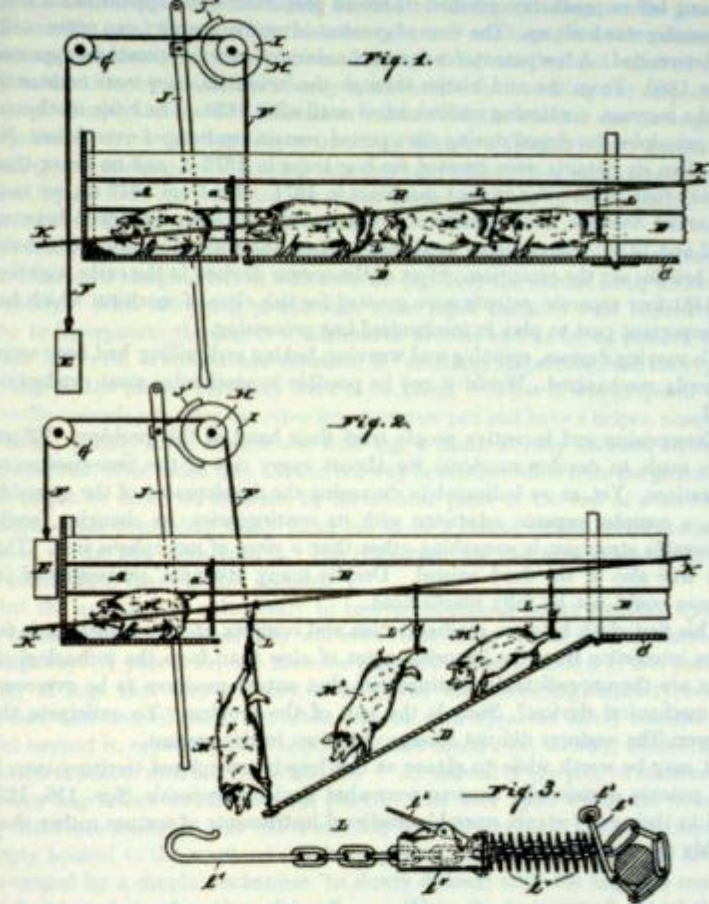
S. GIEDION



The Effects of
Industrialization



50. Automatic Hog-Weighing Apparatus for Use in Packing Houses. Cincinnati, 1869. This device invented by a Cincinnati shows that the late 1860's had considerable practice in combining the overhead railway with sections of the assembly line. (U. S. Patent 92,083, 29 June 1869)

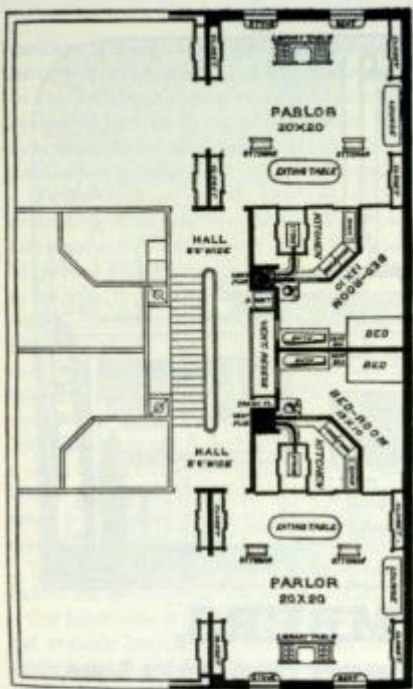


117. Apparatus for Catching and Suspending Hogs, 1882. Here the living animal must be introduced into the 'disassembly' line. From the 1870's on when stunning was found too slow, devices were proposed to hoist the hog to the overhead rail without struggle: 'The hog M acts as a decoy for the others, and much time and labor are thus saved. The brake is manipulated to allow the trap D to slowly descend until the hogs are completely suspended, when they slide off on the bar K to the place where they are to be killed.' (U. S. Patent 252,112, 10 January 1882)

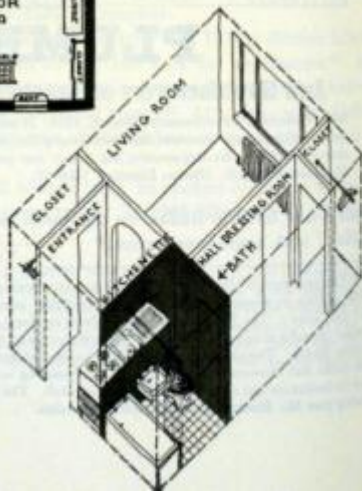
Residential Initiatives



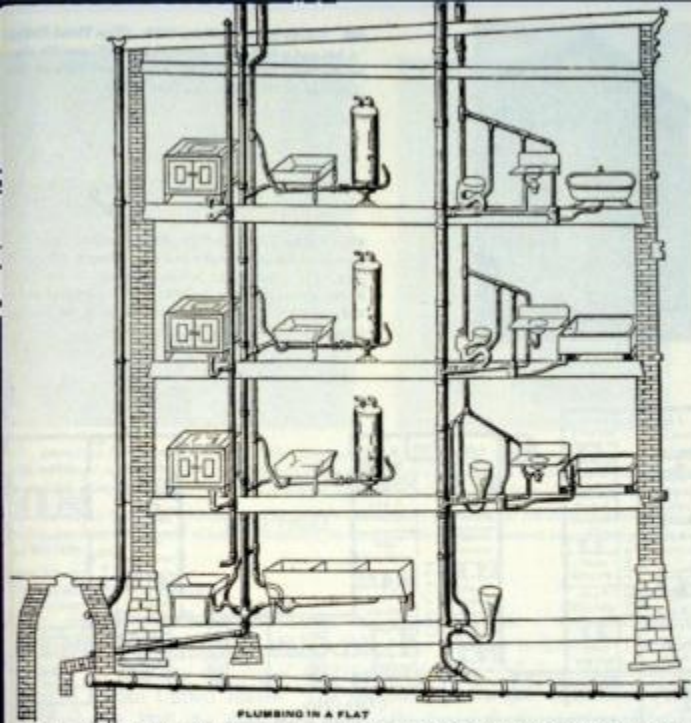
Prince Albert's Model Houses.



409. CATHERINE BEECHER: Plan of a City Flat, with Built-in Bedroom, Kitchenette, and Bath, 1869. Just as Catherine Beecher's kitchen anticipates the present-day kitchen in its arrangement (fig. 338), her layout of a city flat realizes, in primitive form, the unit of bathroom, bedroom, and enclosed kitchenette. (The American Woman's Home, 1869)



490. One-Room Apartment with Kitchenette and Bath Back to Back, 1930's. Left of the entrance, a closet; to its right, an open kitchenette, which a wall separates from the bathroom. This wall carries the fixtures for both. (850 Seventh Avenue, New York. Sketch by Florence Schust)



491. Chicago Apartment-House Plumbing, 1891. The Chicago apartment houses of the 'nineties, which incorporated the most advanced standards, already show the fixtures aligned along one wall, but not in the most compact way. The bathtub is still set against the long wall. Later it will be turned 90°, as will the toilet. (Industrial Chicago, 1891)

Like Pullman's sleeping car *The Pioneer* (1865), this marked an important step toward the democratization of comfort, when a middle-class hotel was built around a standard living unit of bedroom, bath, and closet. In Europe, even today, the combination of a room with private bath borders on luxury. Putting into practice the maxim 'a bath to every bedroom' immediately influenced the whole plan (figs. 492-4), and was as decisive for the hotel as the organization of the bath and kitchen for the plan of the private house. At once the standard American layout had appeared: The bath is a cell and an appendage to the bedroom.

Le Corbusier's 5 points of Architecture

2. Free Facade

non-supporting walls that could be designed as the architect wished

4. Roof Terrace

compensate for the green area consumed by the building and replace it on the roof

3. Ribbon Window

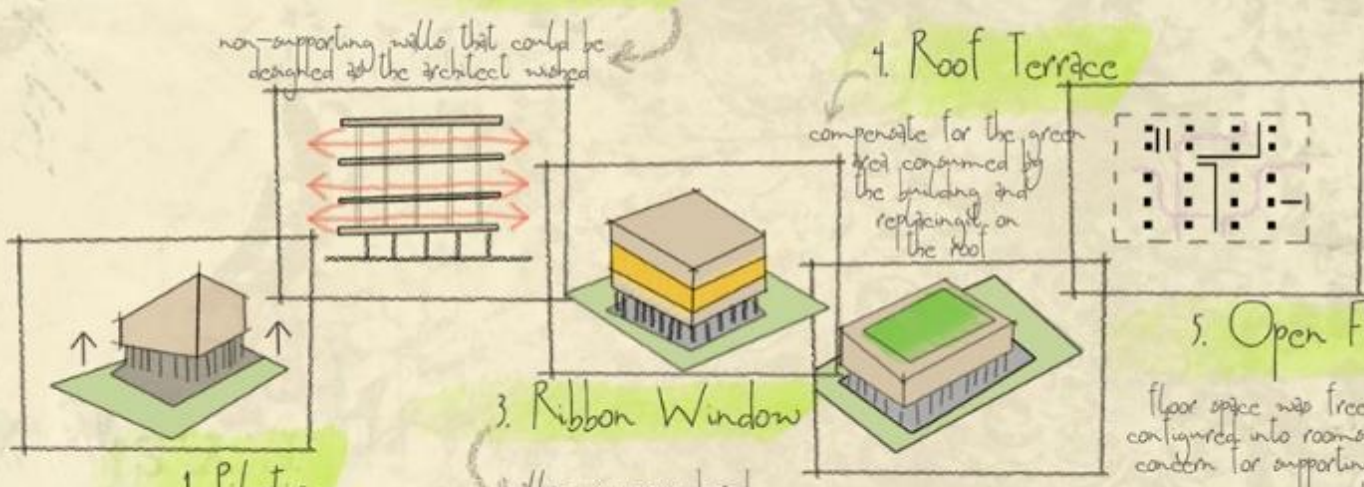
allow unobstructed views of the large surrounding

5. Open Floor Plan

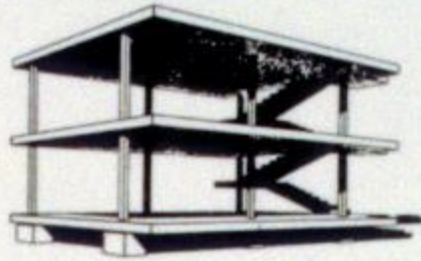
floor space was free to be configured into rooms without concern for supporting walls.

1. Pilotis

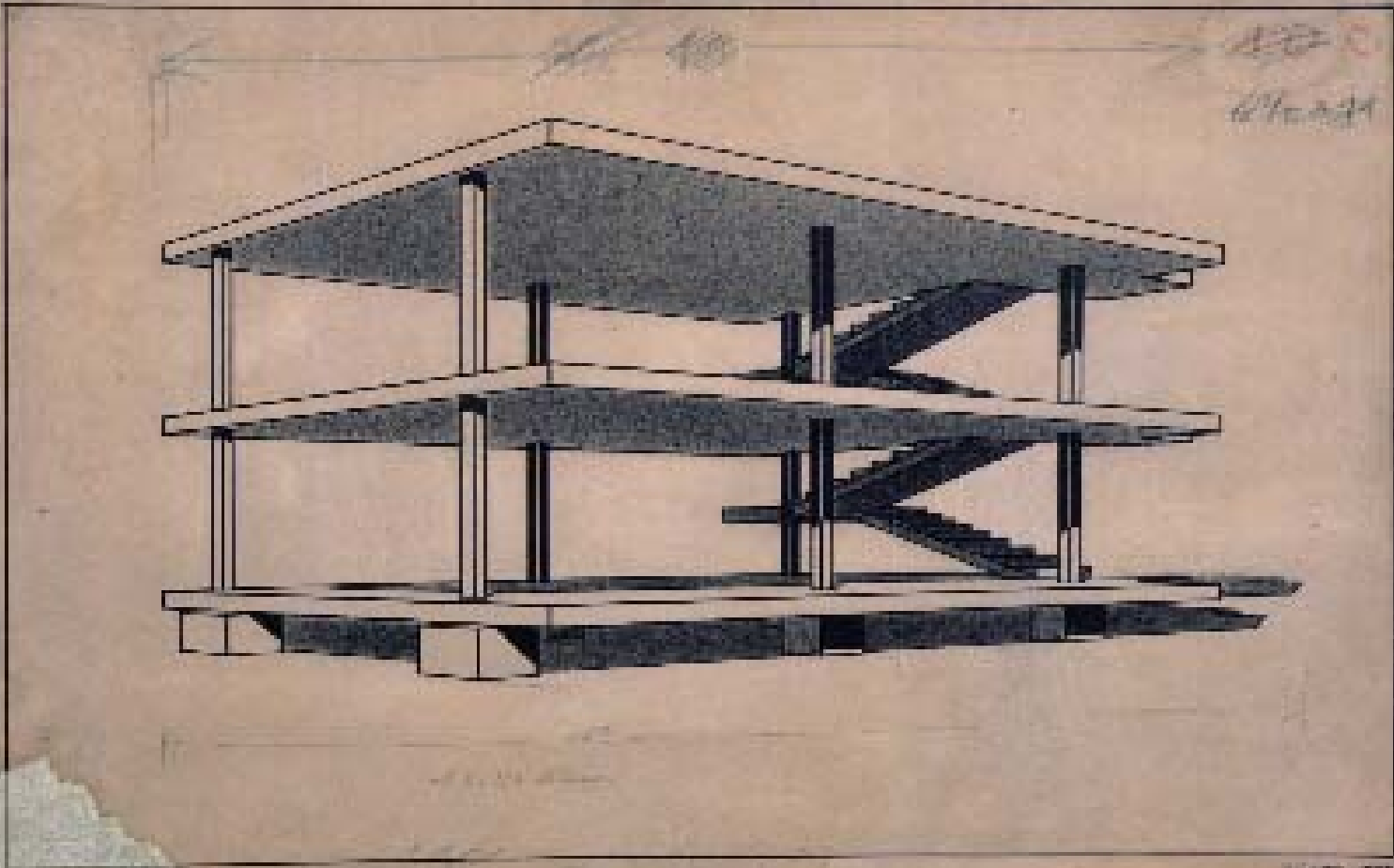
provides structural support



Le Corbusier
Swiss/French Architect
1887 to 1965



“In the next twenty years, big industry will have co-ordinated its standardized materials . . . technical achievements will have carried . . . methods of rational construction far beyond anything we are acquainted with.”
—Le Corbusier, 1914

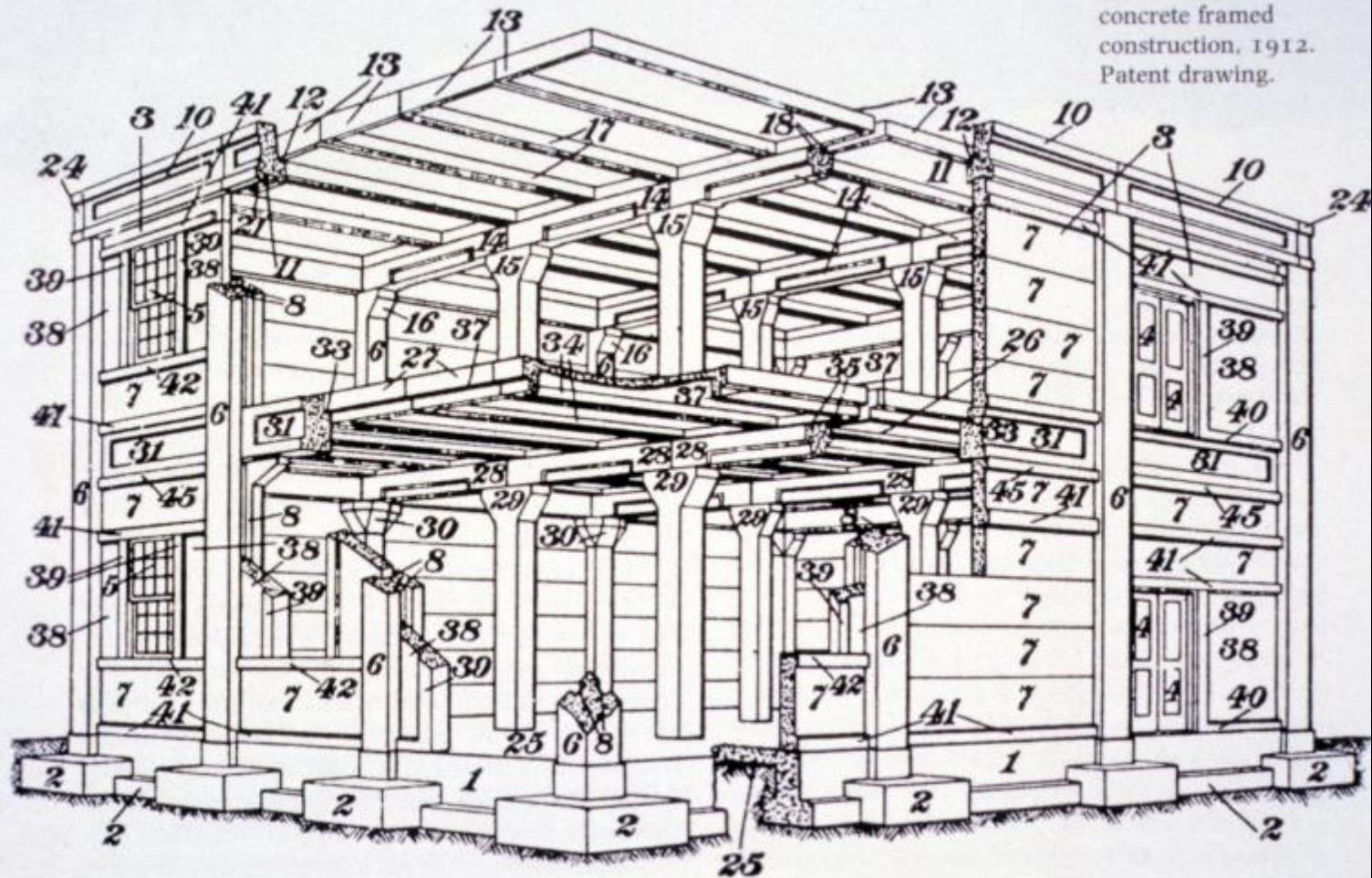


(C) FLC

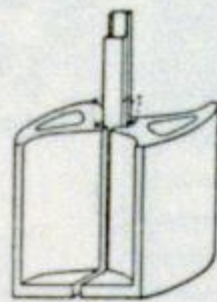
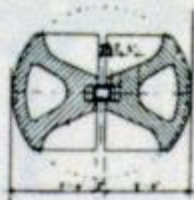
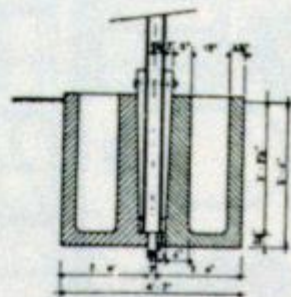
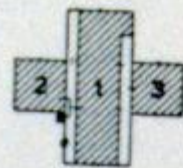
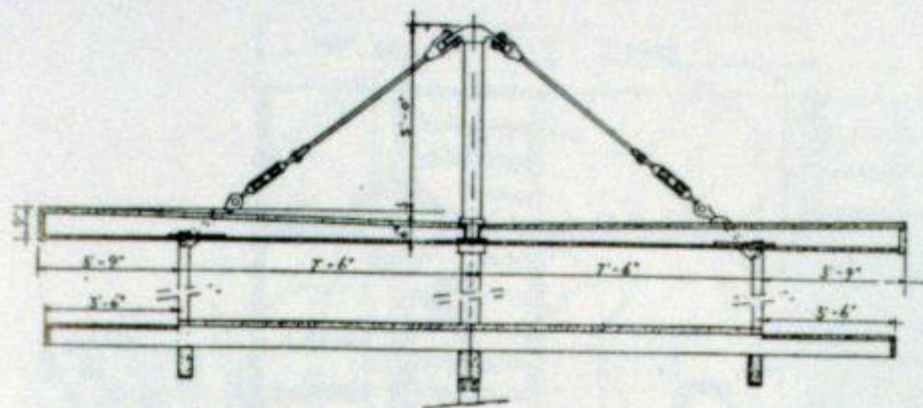
10209

FLC ARCHITECTS

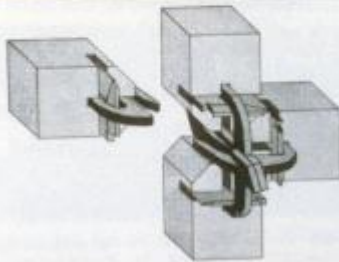
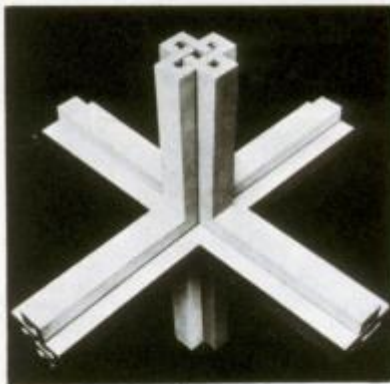
4.10 Conzelman
system of precast-
concrete framed
construction, 1912.
Patent drawing.



The Birth of Modular Design



155 Neutra, One-Plus-Two prefabricated extendable family house, 1926.
 Details of structural support and assembly pattern.



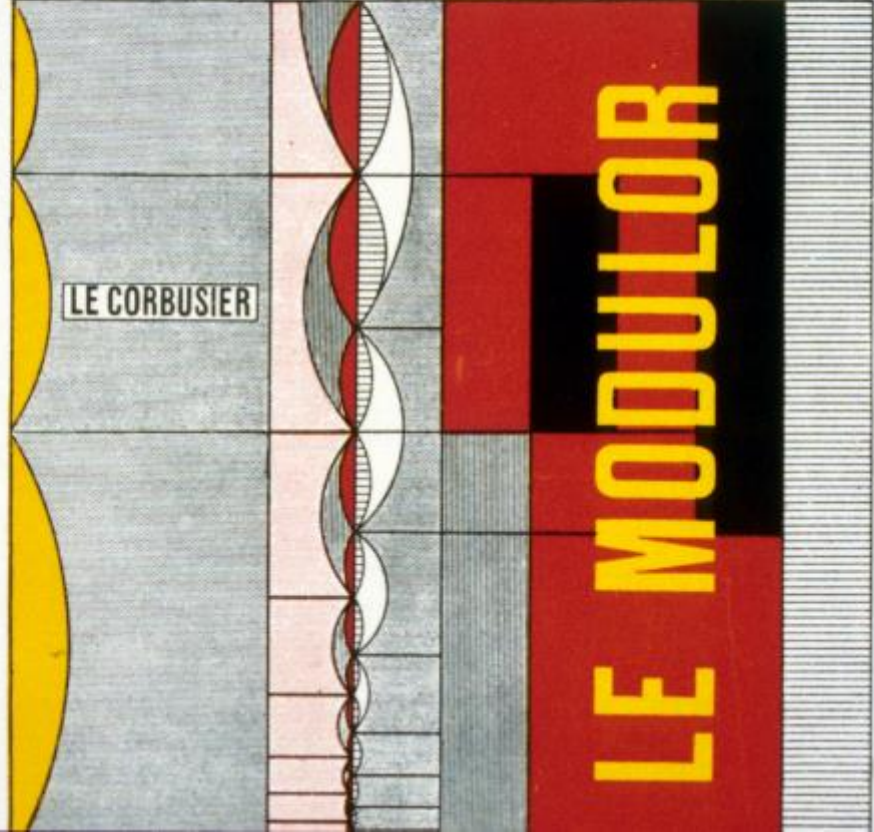
819-822 Details of the packaged house system worked on by Gropius and Wachsmann in 1942 for the General Panel Corp. (from K.W. The Turning-point of Building)

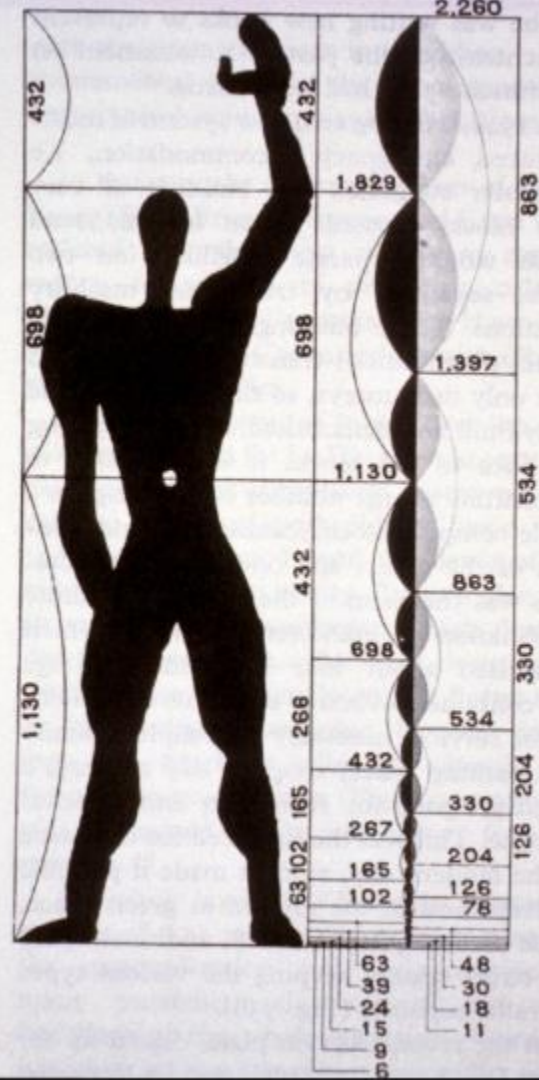
Le Corbusier

LE CORBUSIER

LE MODULOR

THE MODULOR





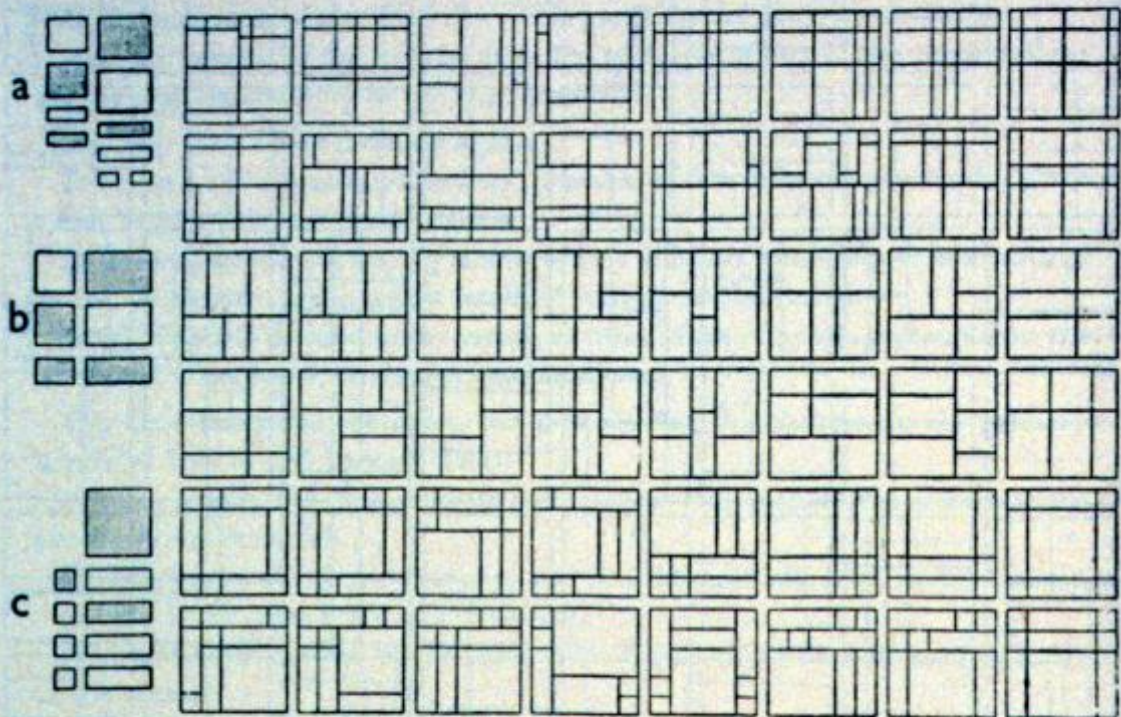
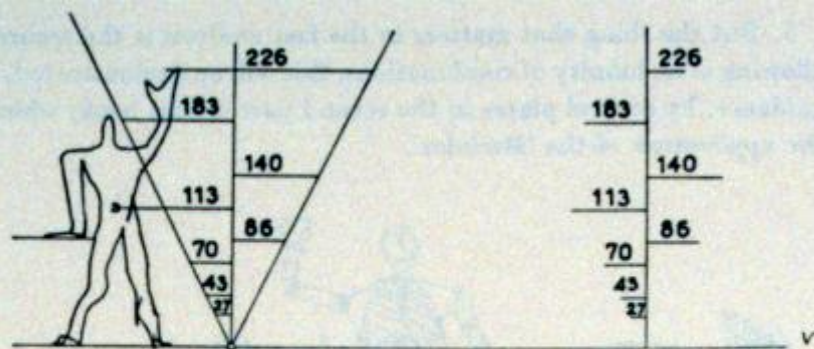


FIG. 40

FIG. 25



They may be drawn as follows:

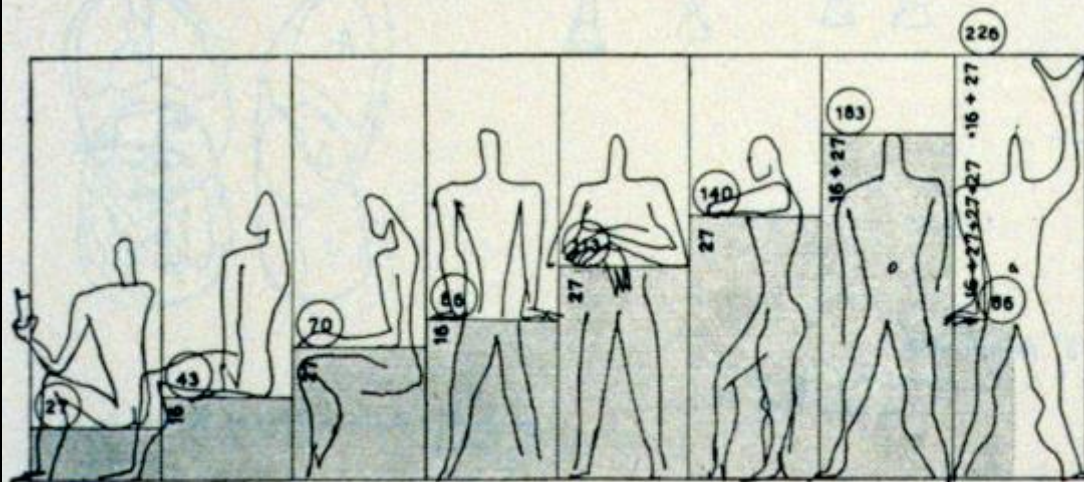
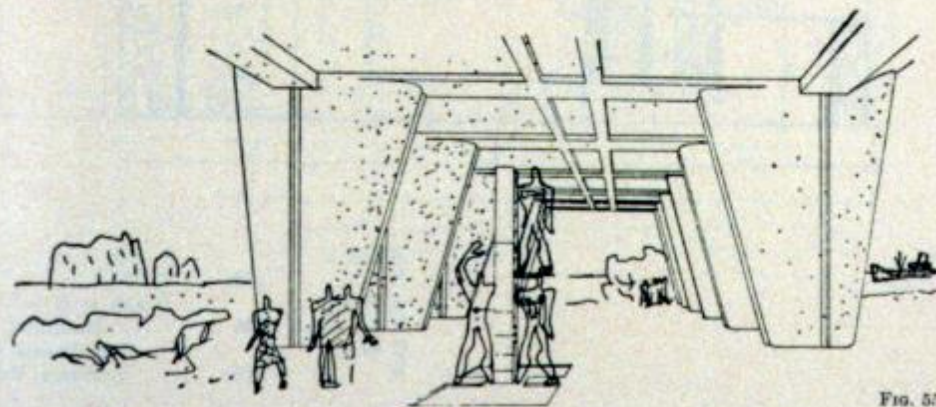
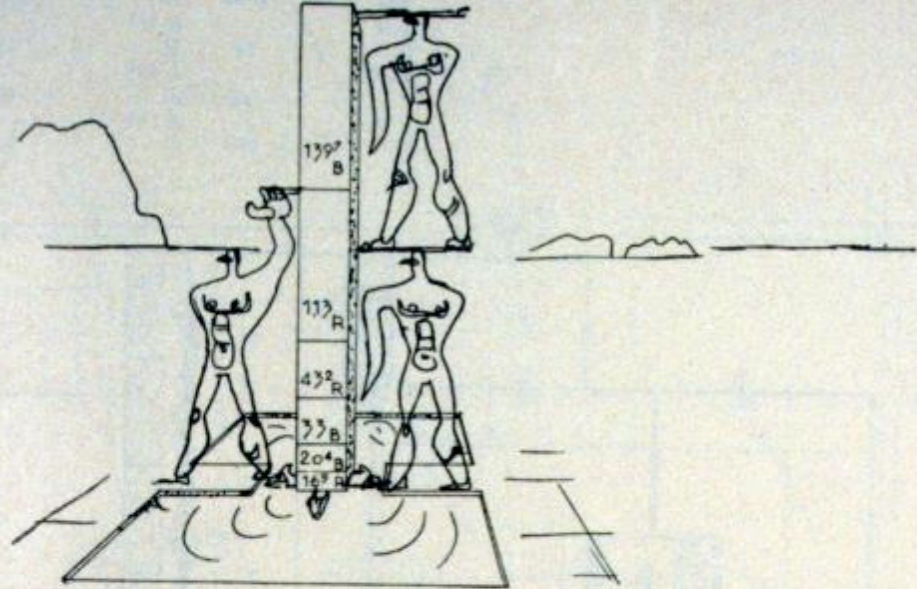



FIG. 26

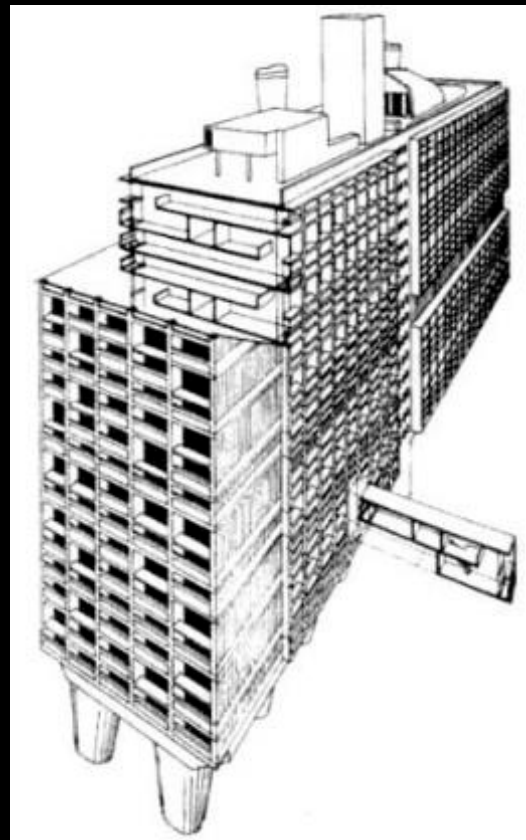
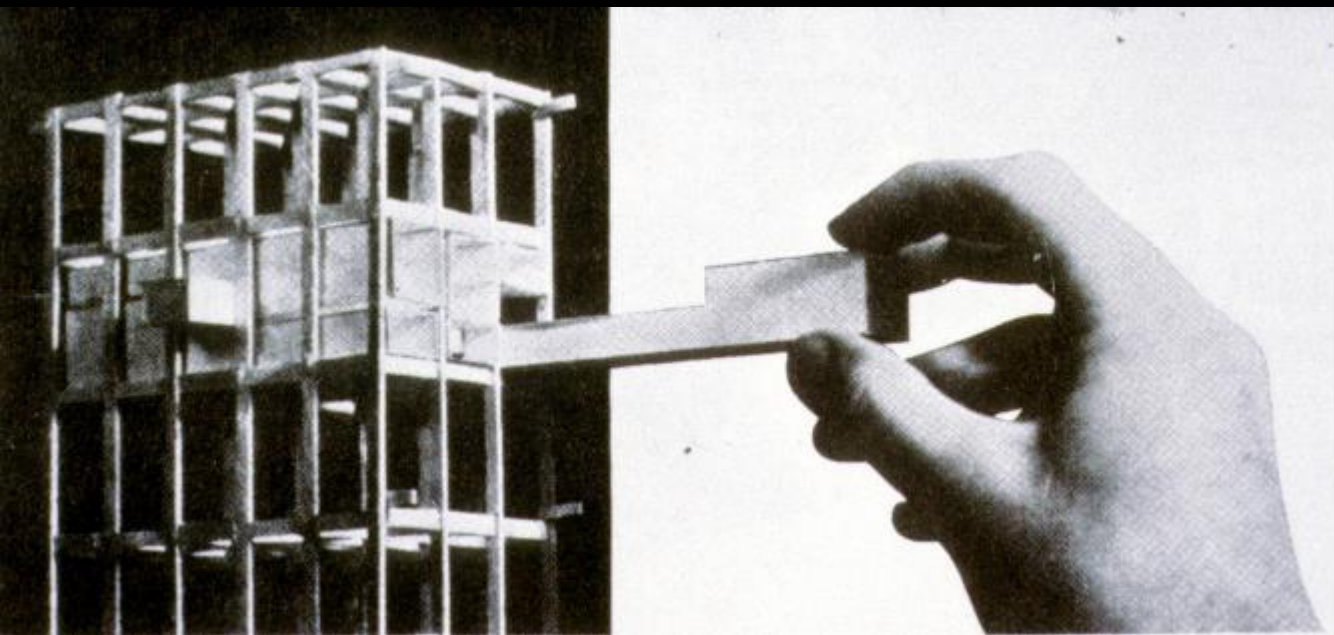




Unité d'habitation
Marseille, France
1947 to 1952
Le Corbusier

L'Unité d'habitation, Marseille





| Series | |
|--------|------------------|
| Red | Blue |
| A | 65 ^s |
| B | 165 ^s |
| C | 20 ^s |
| D | 33 |
| E | 43 |
| F | 53 |
| G | 70 |
| H | 86 |
| I | 113 |
| J | 226 |
| K | 296 |
| L | 336 |
| M | 419 = L + F |

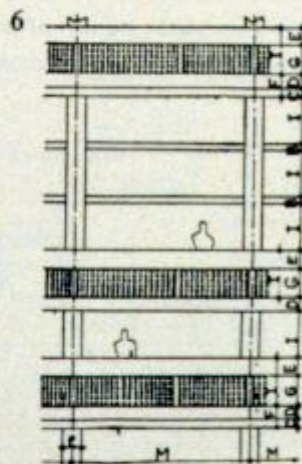
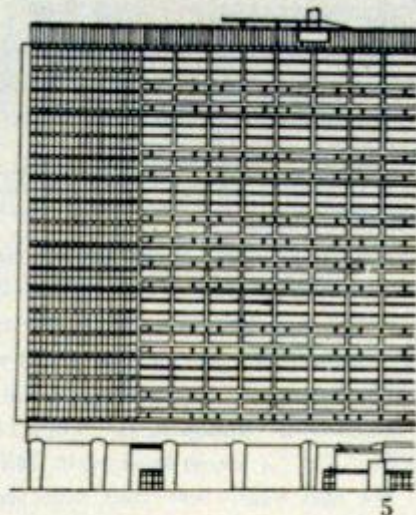
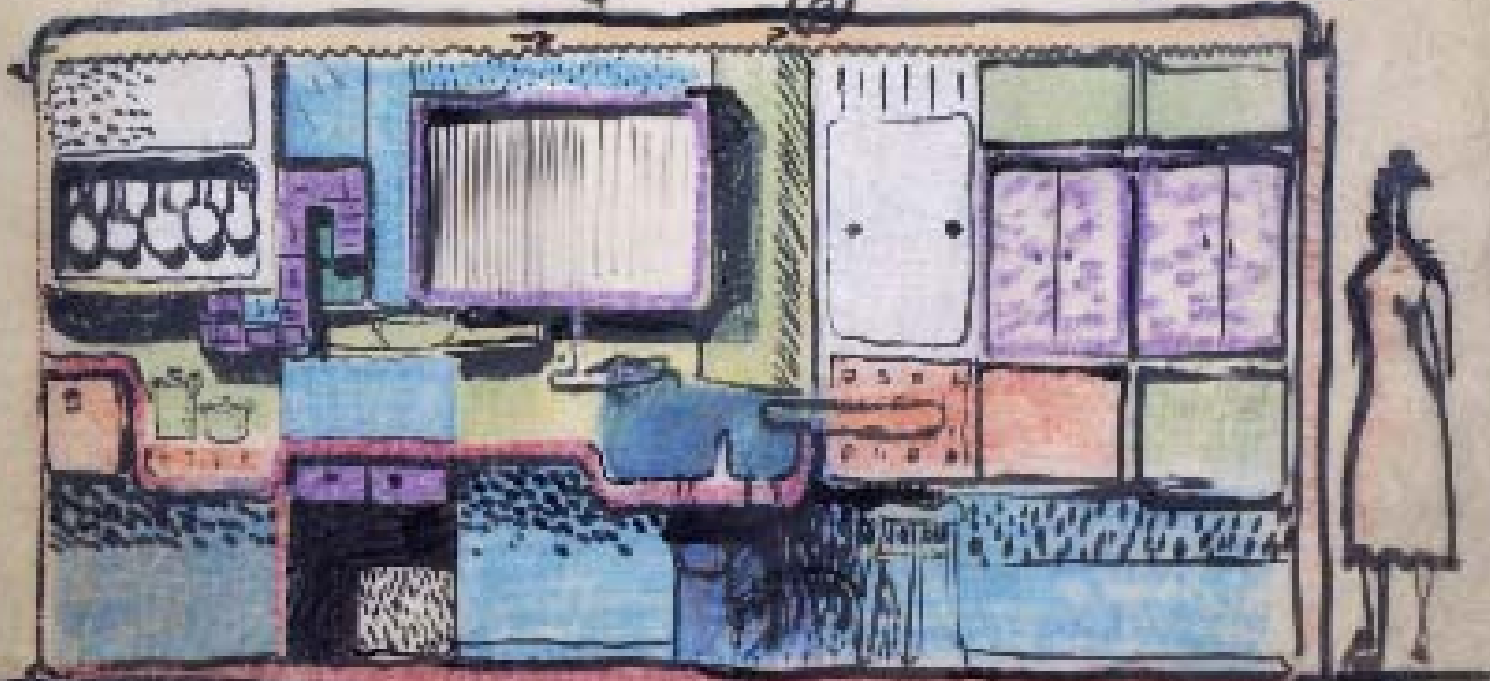


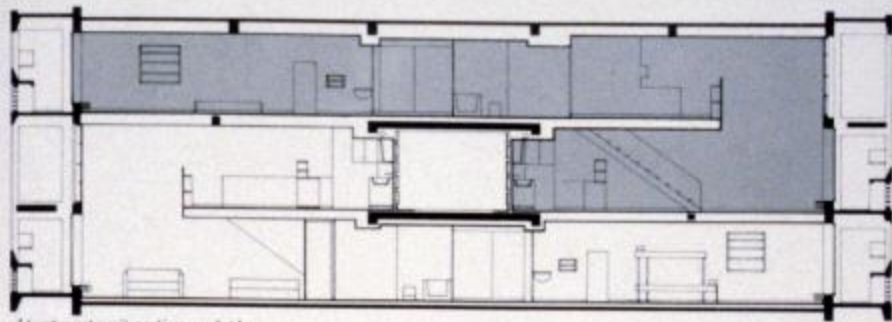
FIG. 50

Development. Cuisine

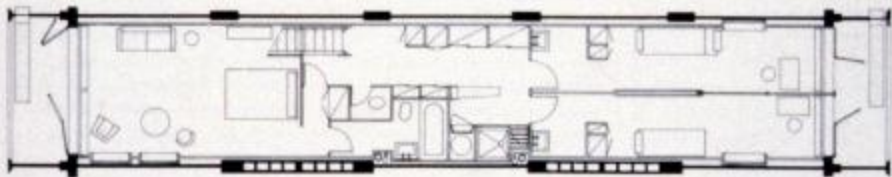
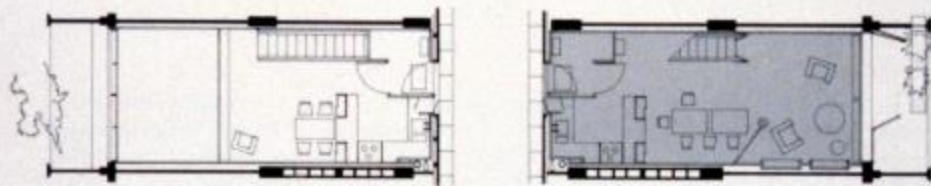
2 3 5 1 6



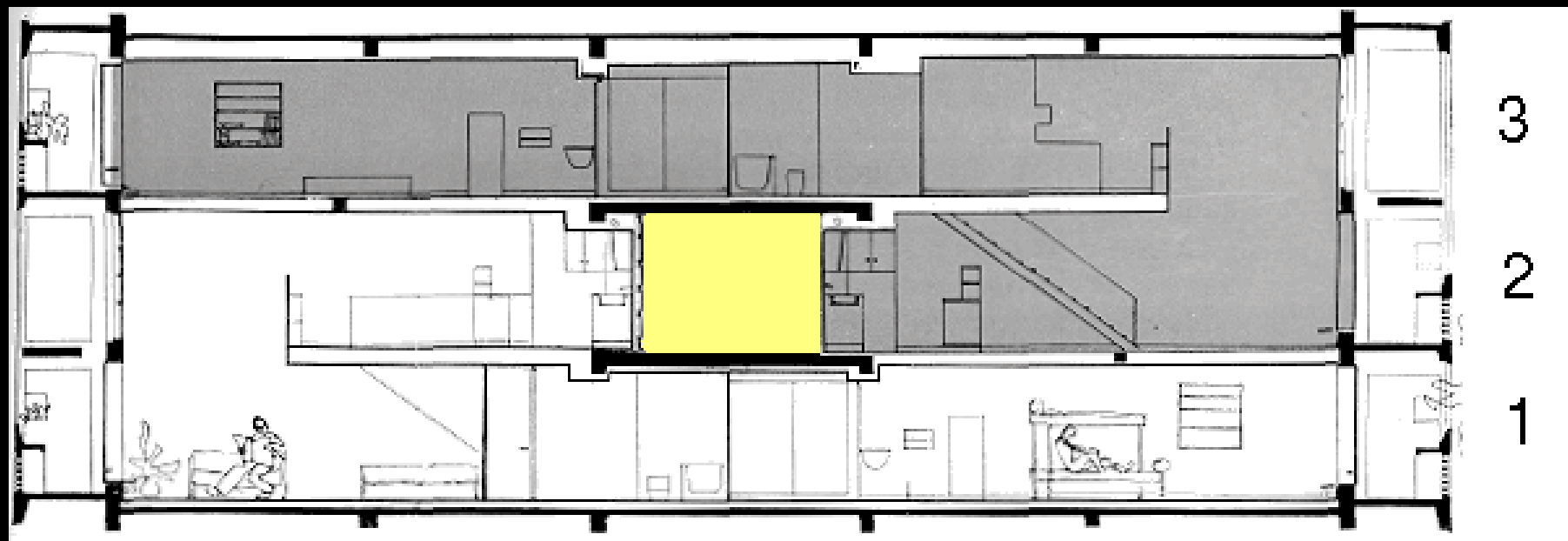
* LA CUISINE (table cassable - empilable) (boiler) (placards) (placards) (porte) *
 Placards et rangement (Table de préparation) (Refrigerator) (Frigidaire)
 6



Apartment unit section and plans.



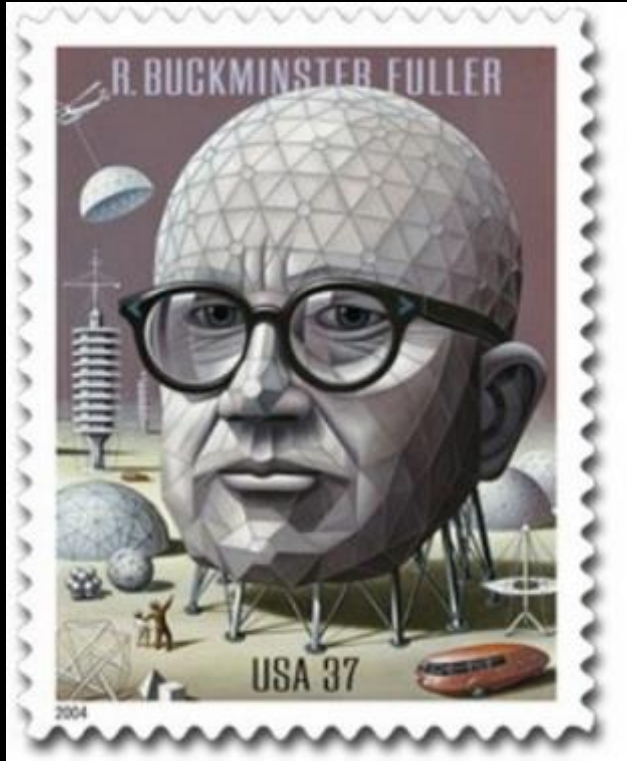
L'Unité d'habitation in Berlin



3

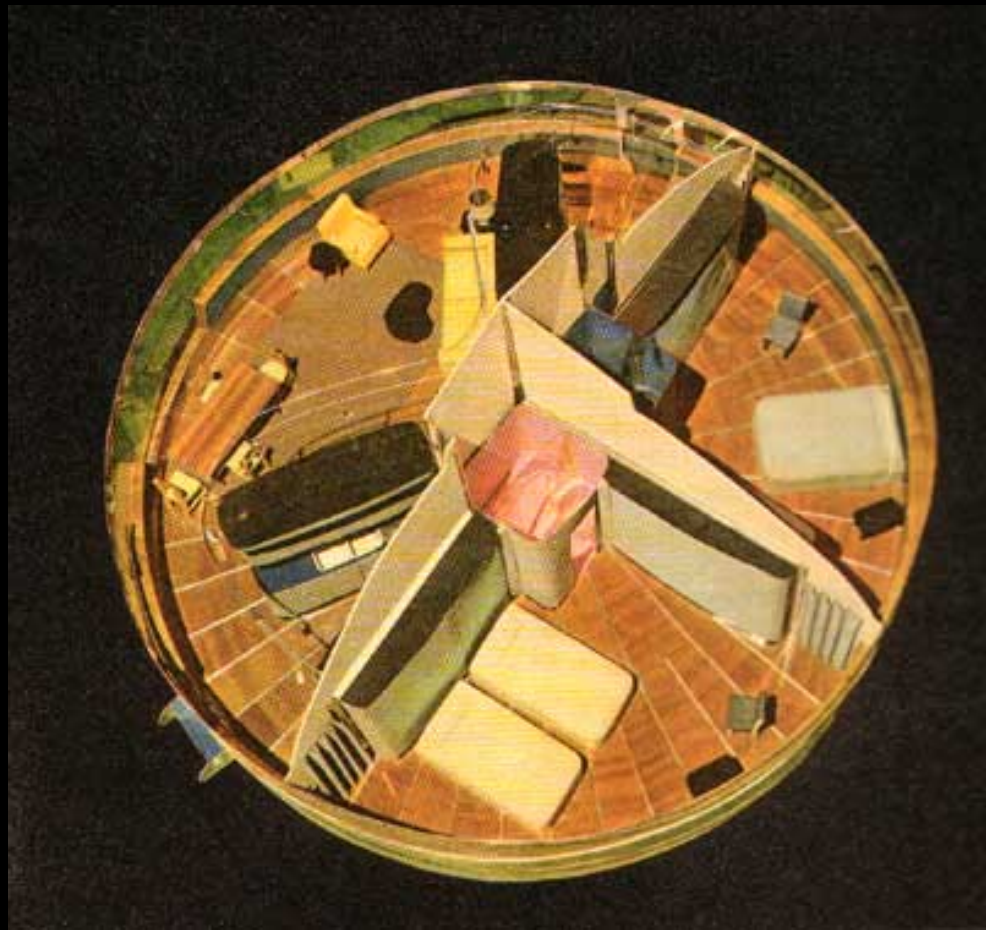
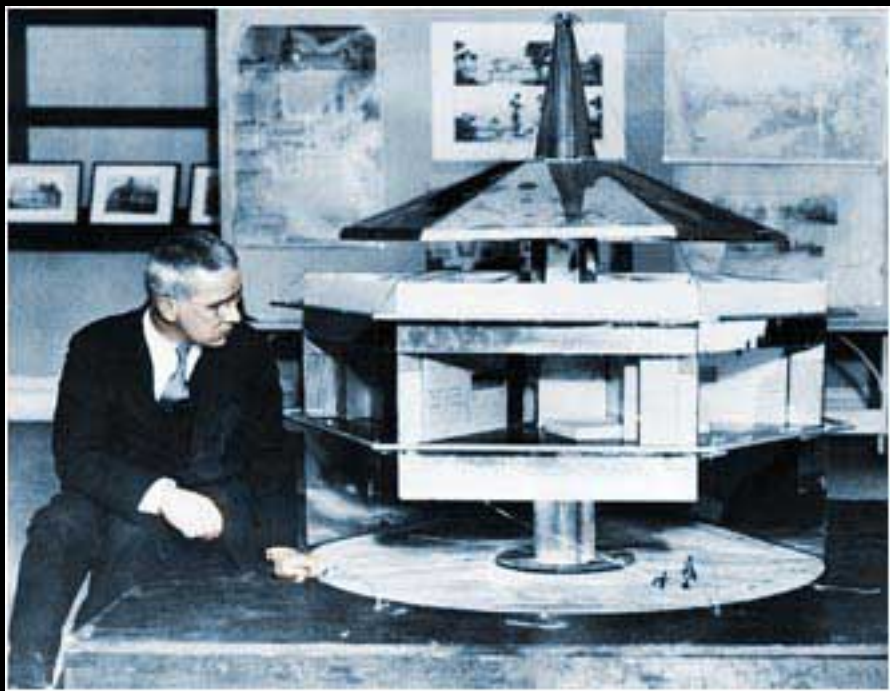
2

1



Buckminster Fuller
American Architect
1895 to 1983

Buckminster Fuller's dymaxion principles
signified "dynamism plus efficiency"











236 Fuller, prefabricated bathroom, patented 1938-40.

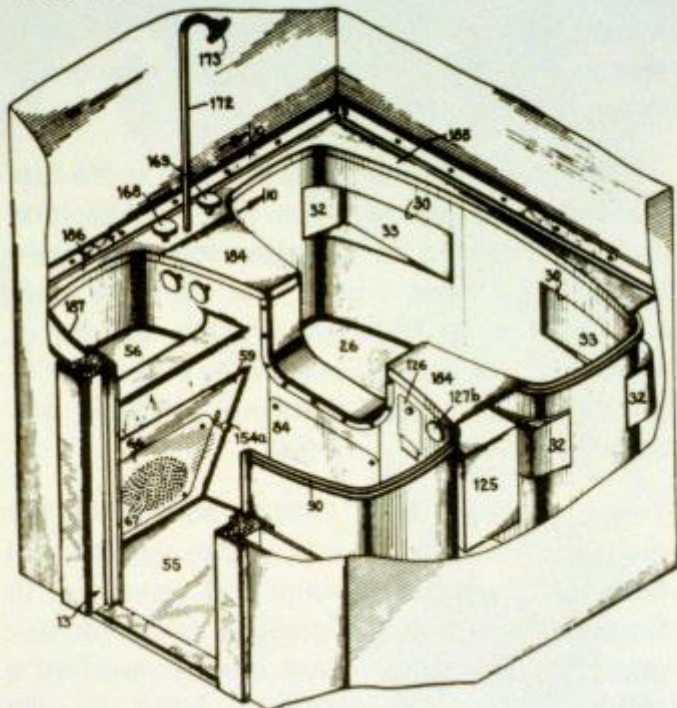
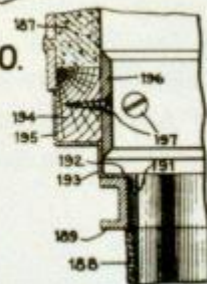


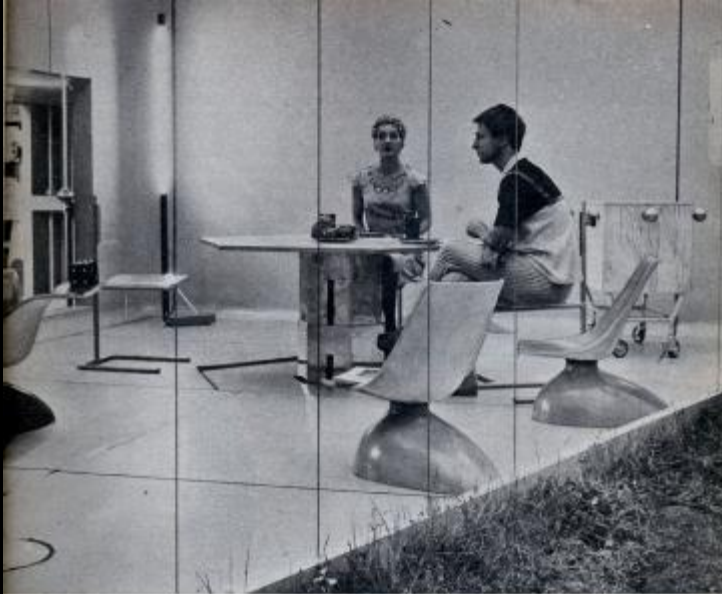
FIG. 10.



INVENTOR
RICHARD BUCKINGHAM FULLER

BY
F. Charles Churchill
ATTORNEY





Main room of 1980 home adjoins central garden. The dining table can sink into floor.



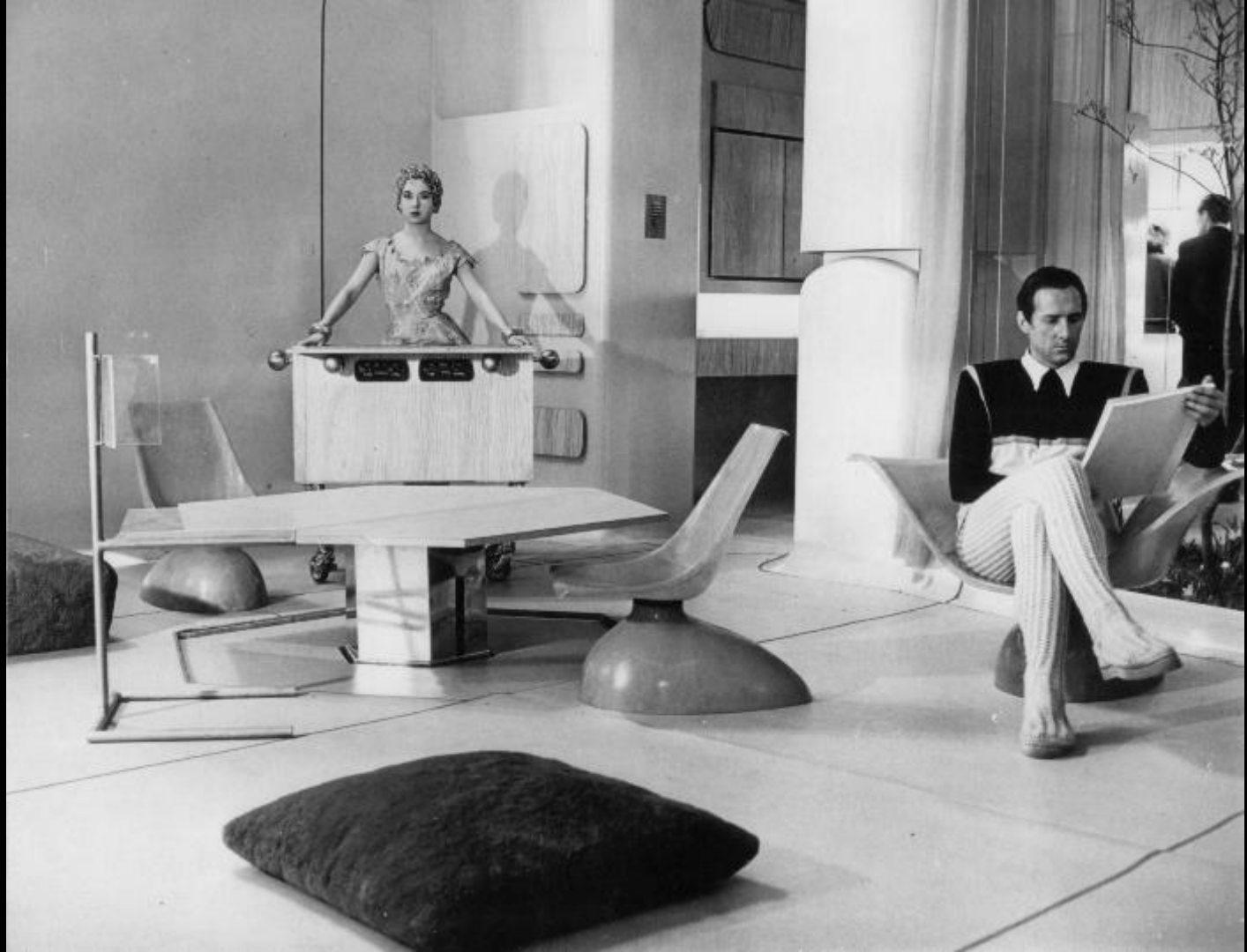
Short-wave transmitter with push buttons controls radio-phonograph-color TV set.

This is a House?

British architects have designed this Home Of The Future to prove that living will be much easier in the brave new world of tomorrow.

STAR of the London Daily Mail Ideal Home Exhibition of 1956 was this eye-opening Home Of The Future designed by architects Alison and Peter Smithson. It is a one-bedroom town house that contains a garden within it. The shell is moulded of plastic-impregnated plaster and the roof is covered with aluminum foil to reflect the sun's

1956 – Peter and Alison Smithson's
"house of the future"









The Jetsons
1963



"custom" vs "off-the-shelf"
repeated elements

LIFE IN A CHINESE KITE

Standard industrial products assembled in a spacious wonderland



Designed by Eames about flexibility of frame, every area of contrasting kinds of pattern

The sparkling construction shown on these pages happens to be the place where one of America's foremost young designers and his wife are living the ease of their lives. More important, it is also one of the most advanced house structures built in this country to date.

So far as Charles Eames is concerned, there is no room why a house should not be:

- ▶ Spacious—space being the greatest luxury there is;
- ▶ A sophisticated industrial product;
- ▶ And as light and airy as a suspension bridge—as skeletal as an airplane fuselage.

Having got this straight in his own mind, Eames asked himself these questions: How cheap is space? How industrial is our building industry? How light is steel?

LOCATIONS: Santa Monica, Calif.
 CHARLES EAMES, Designer*
 SYMPHONY CATHCOTE SHELTON, INC., General Contractor

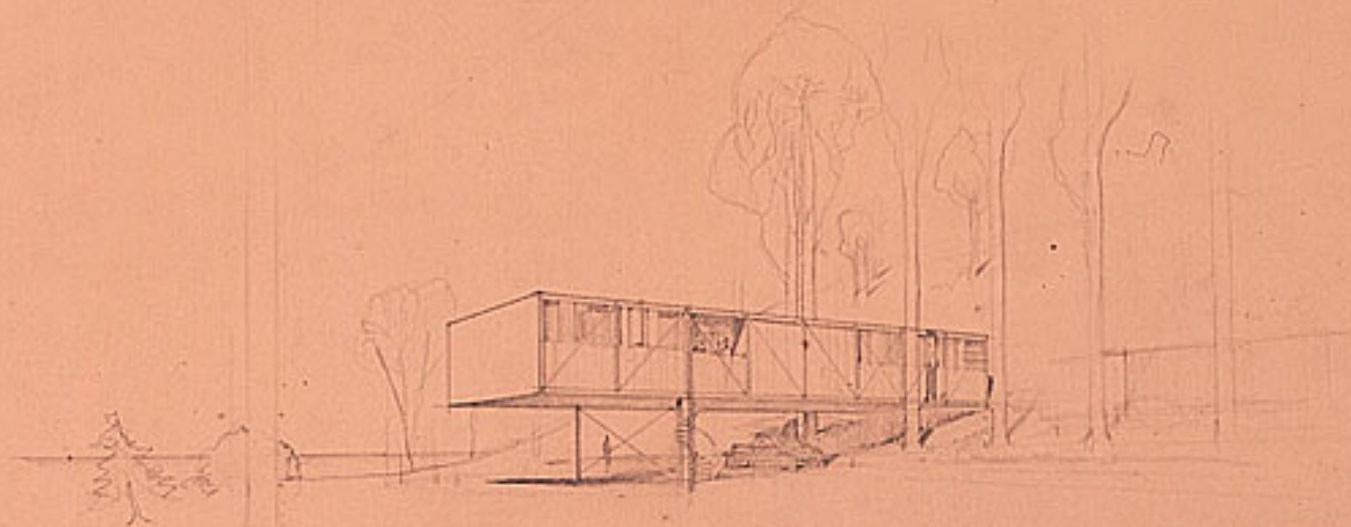


Flexibility being given suspended frame work over Eames-designed upholstery as light is sought in opening partition and, standing up, to achieve better balance.

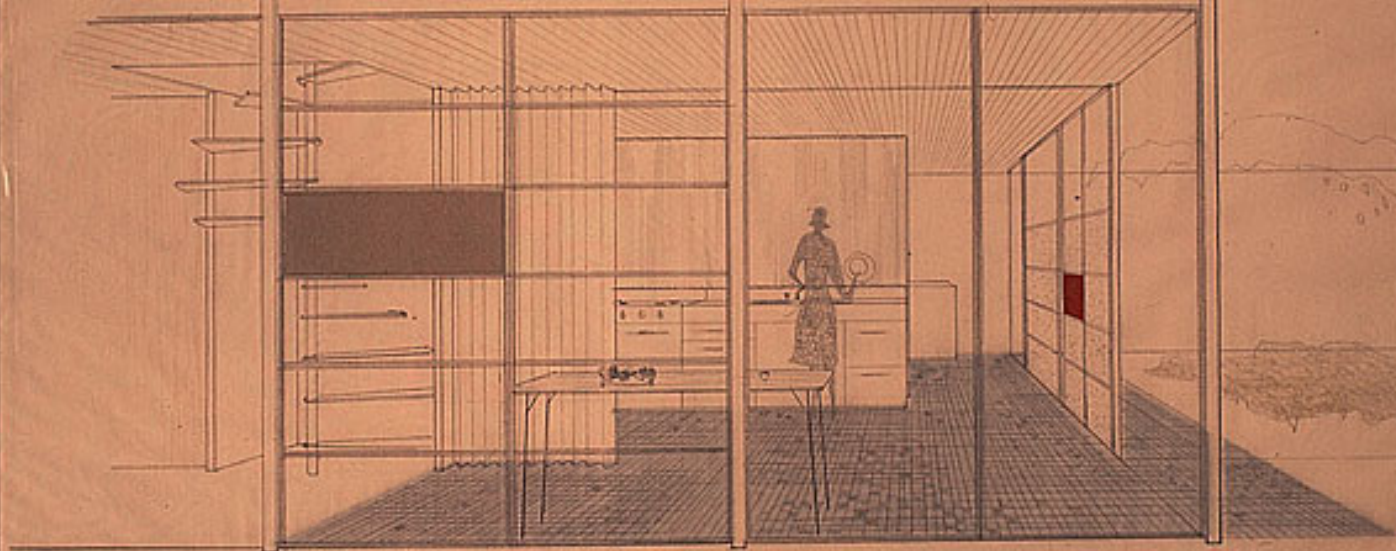
Panel in rear lower end of No. 8 (left) is made without 1/2" x 2" minimum wall. Lumber is 200 lb. long, recommended for large amount of building material.

*Designed and built by the Eames Studio. House picture on the opposite (Case No. 8) cover.

Case Study House No. 8
 Pallisades, California
 Charles and Ray Eames
 1949



Bottom Page 9

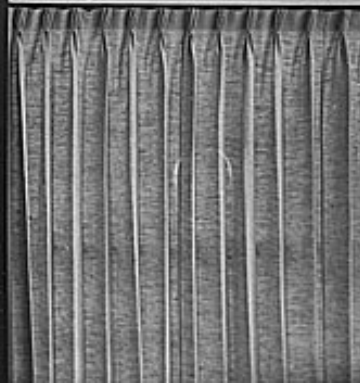


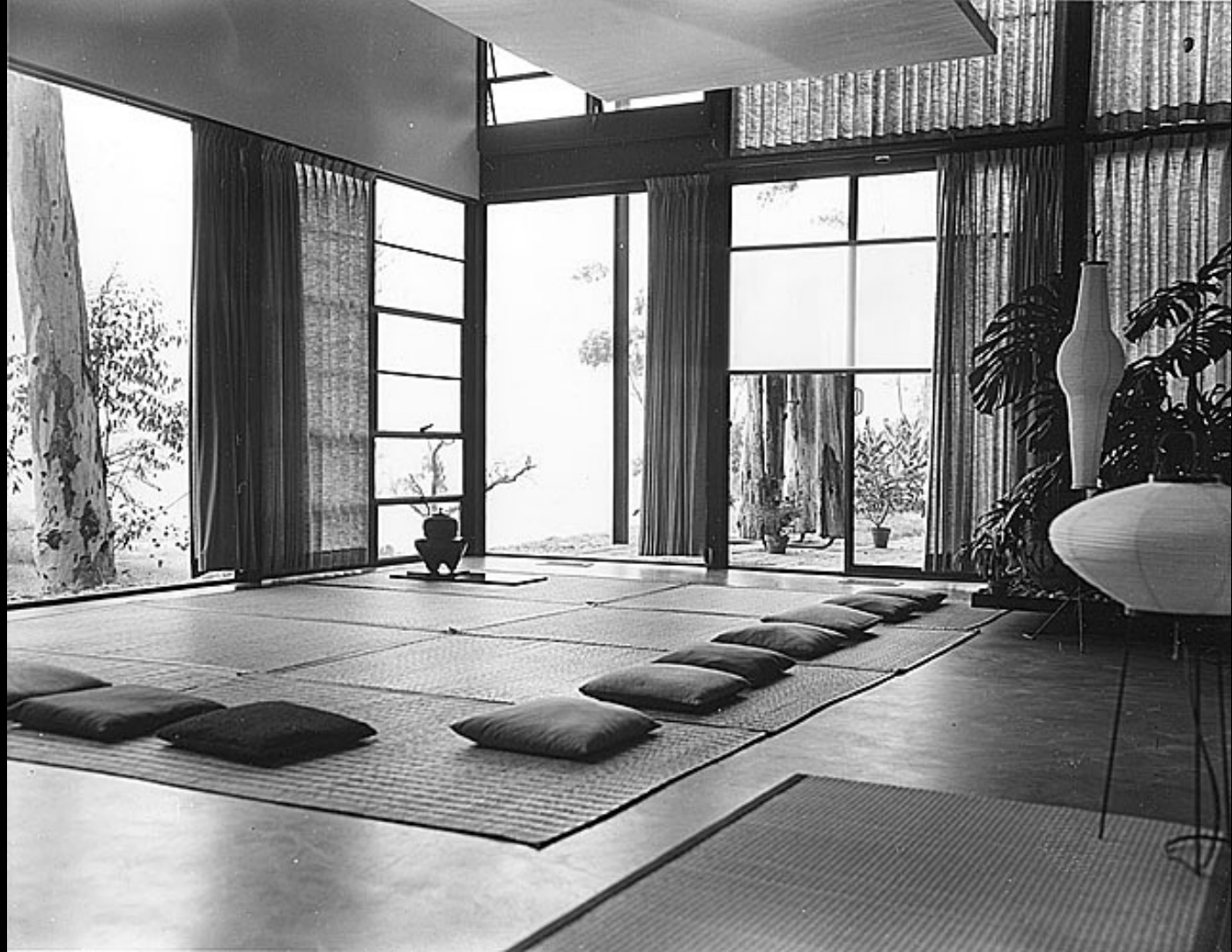
KITCHEN-DINING AREA OF CASE STUDY HOUSE NO. 8
2 3/16" UNGLAZED CERAMIC TILE EXTENDS FROM
DINING AREA INTO KITCHEN AND TO UTILITY AREA
EXTEND.







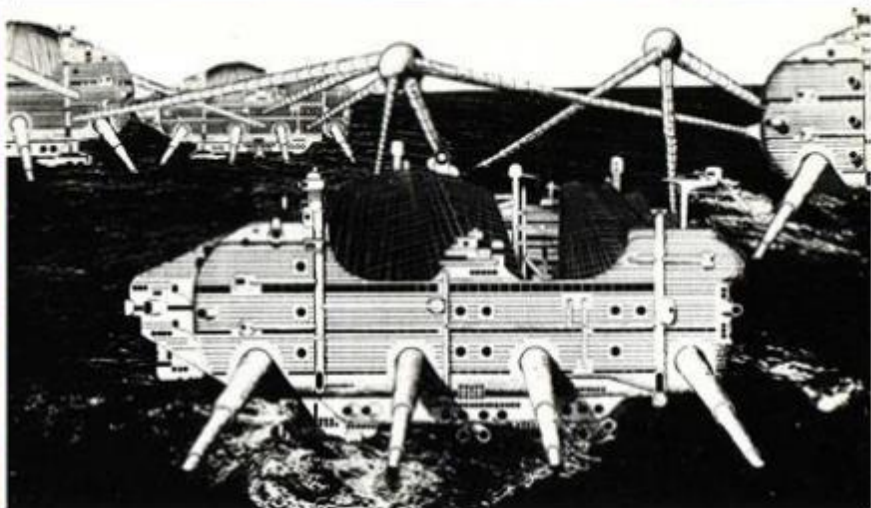
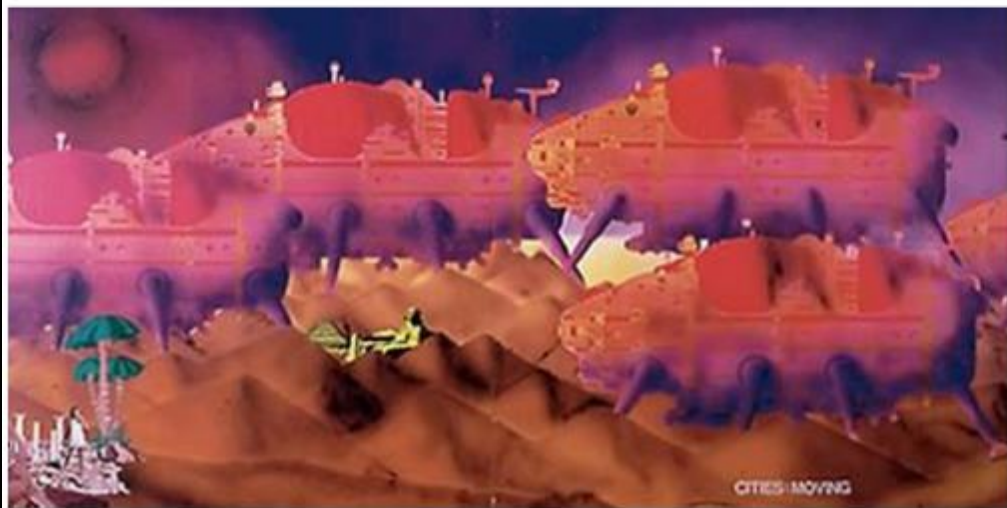
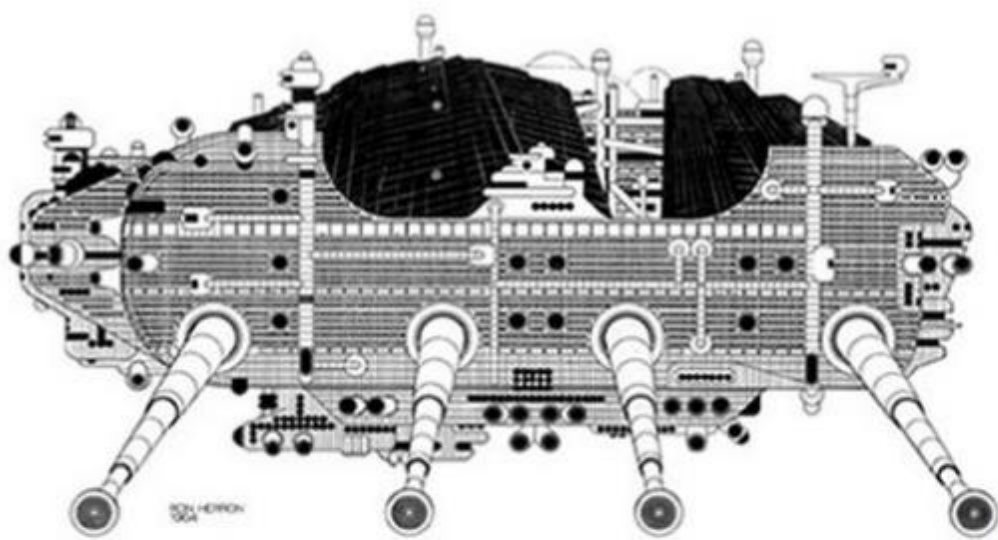








Archigram
Avant-garde British Design Group
1960s





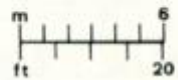
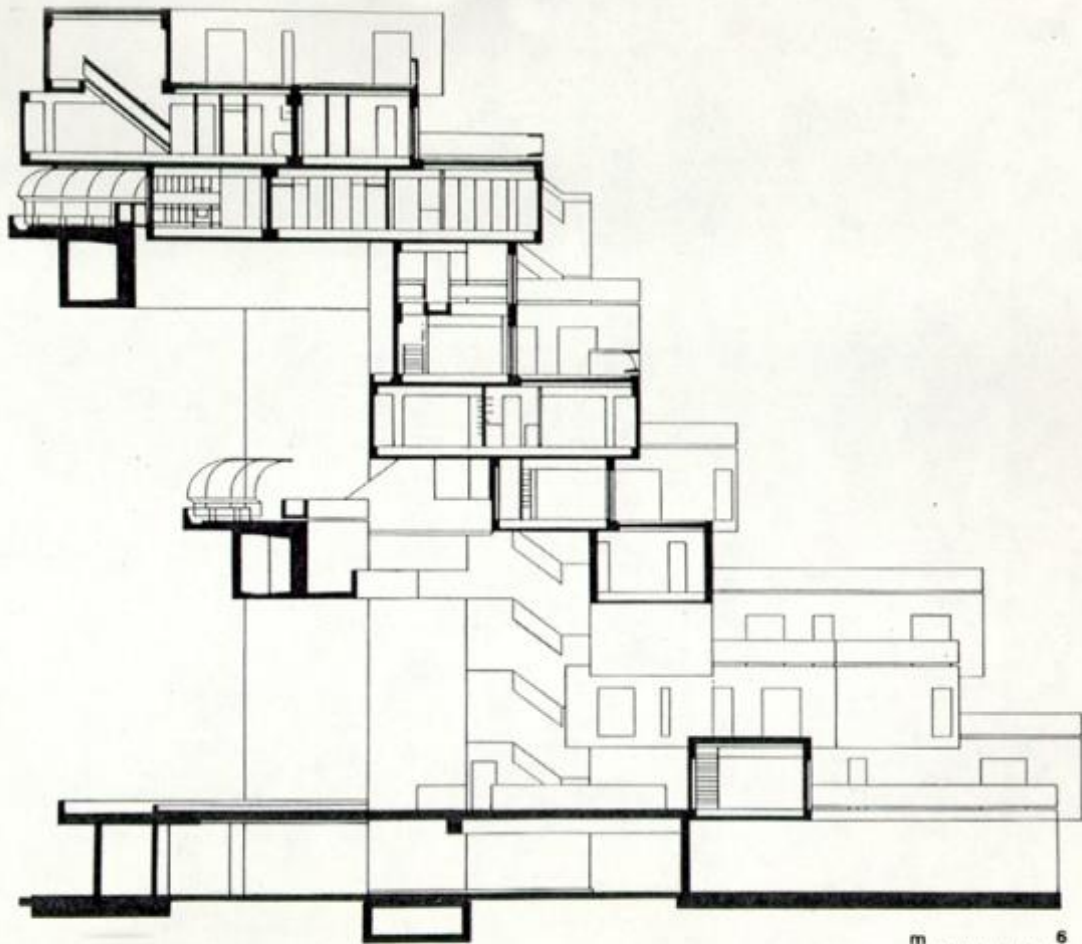
EACH WALKING UNIT HOUSES NOT ONLY A KEY ELEMENT OF THE CAPITAL, BUT ALSO A LARGE POPULATION OF WORLD TRAVELLER-WORKERS.

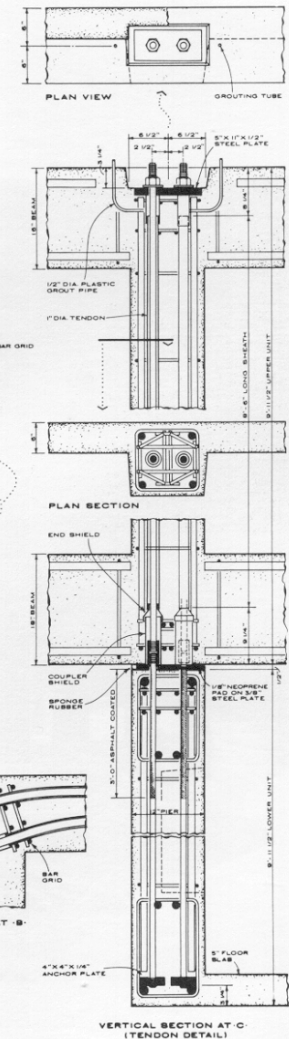
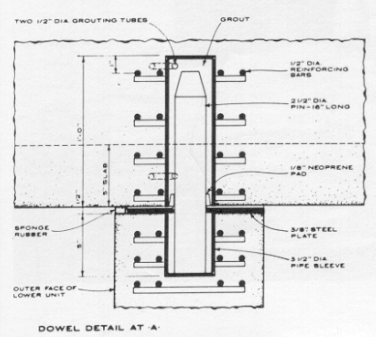
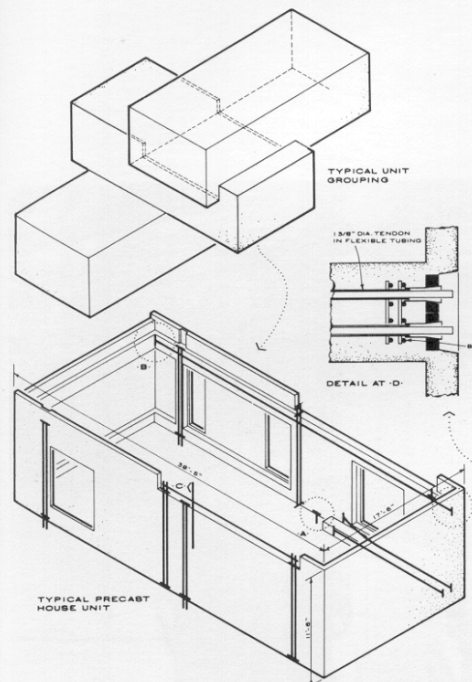
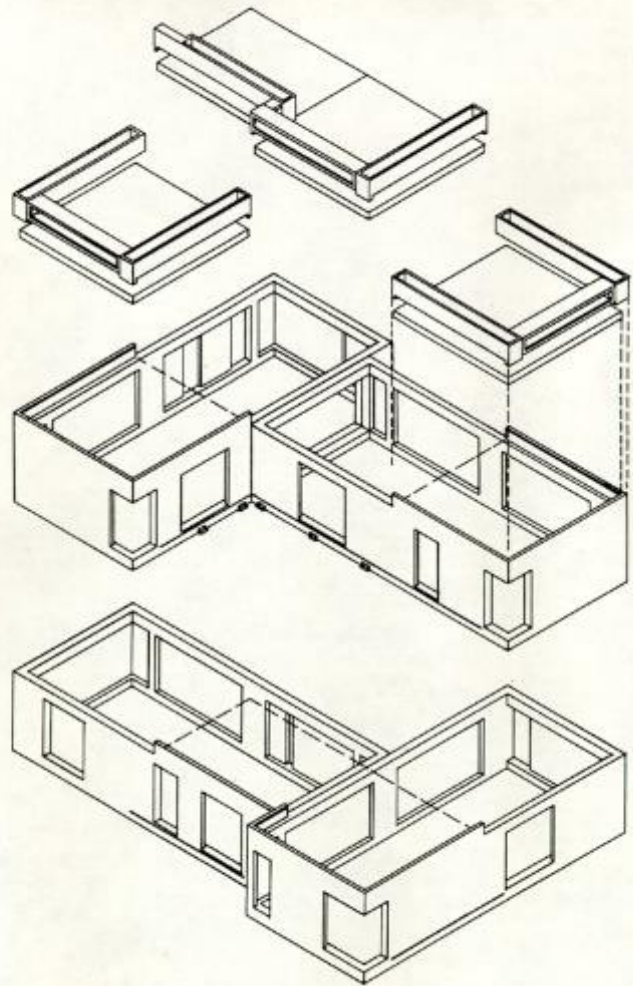
A WALKING CITY

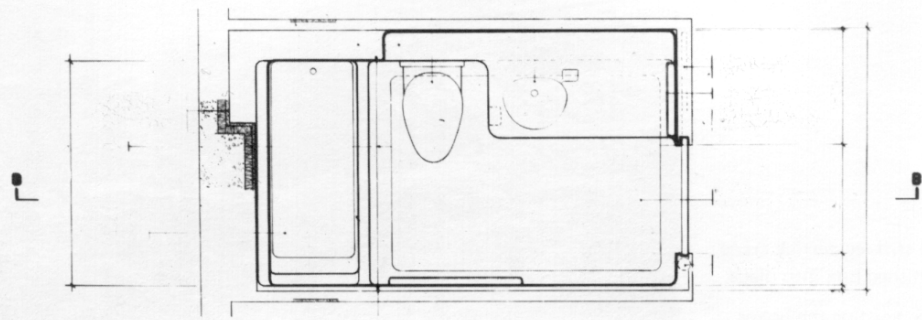


Habitat '67
Montreal Expo Residences
Moshe Safdie Architect
1967

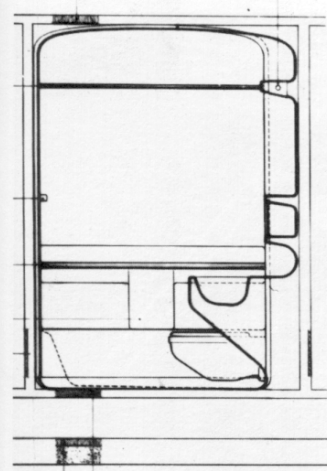




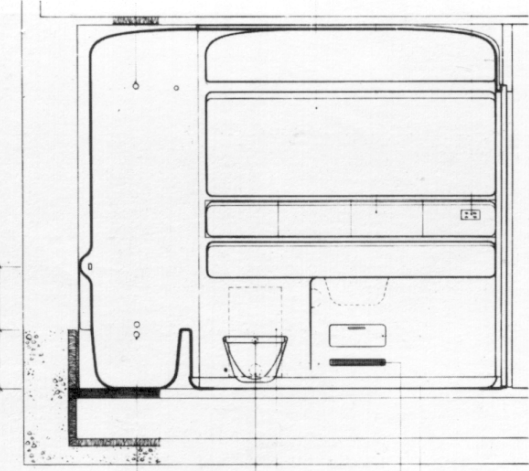




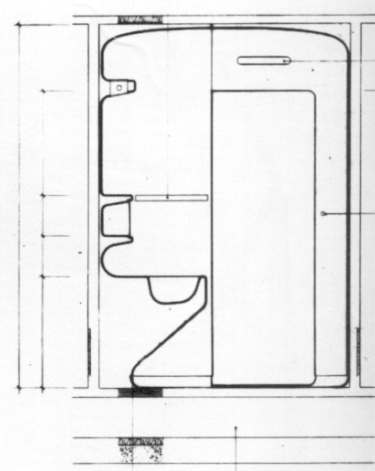
A-C
PLAN



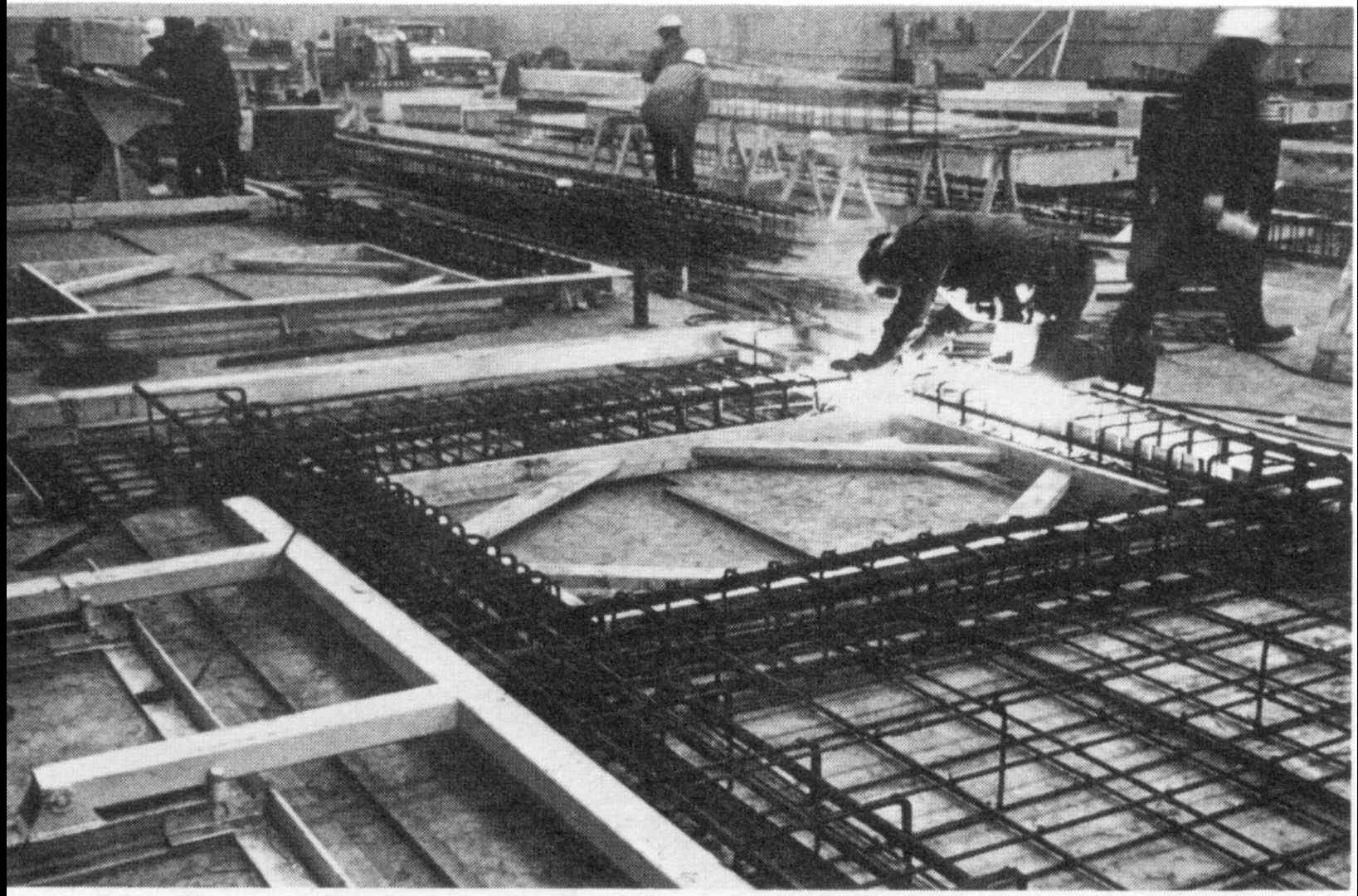
SECTION A-A
COUPE

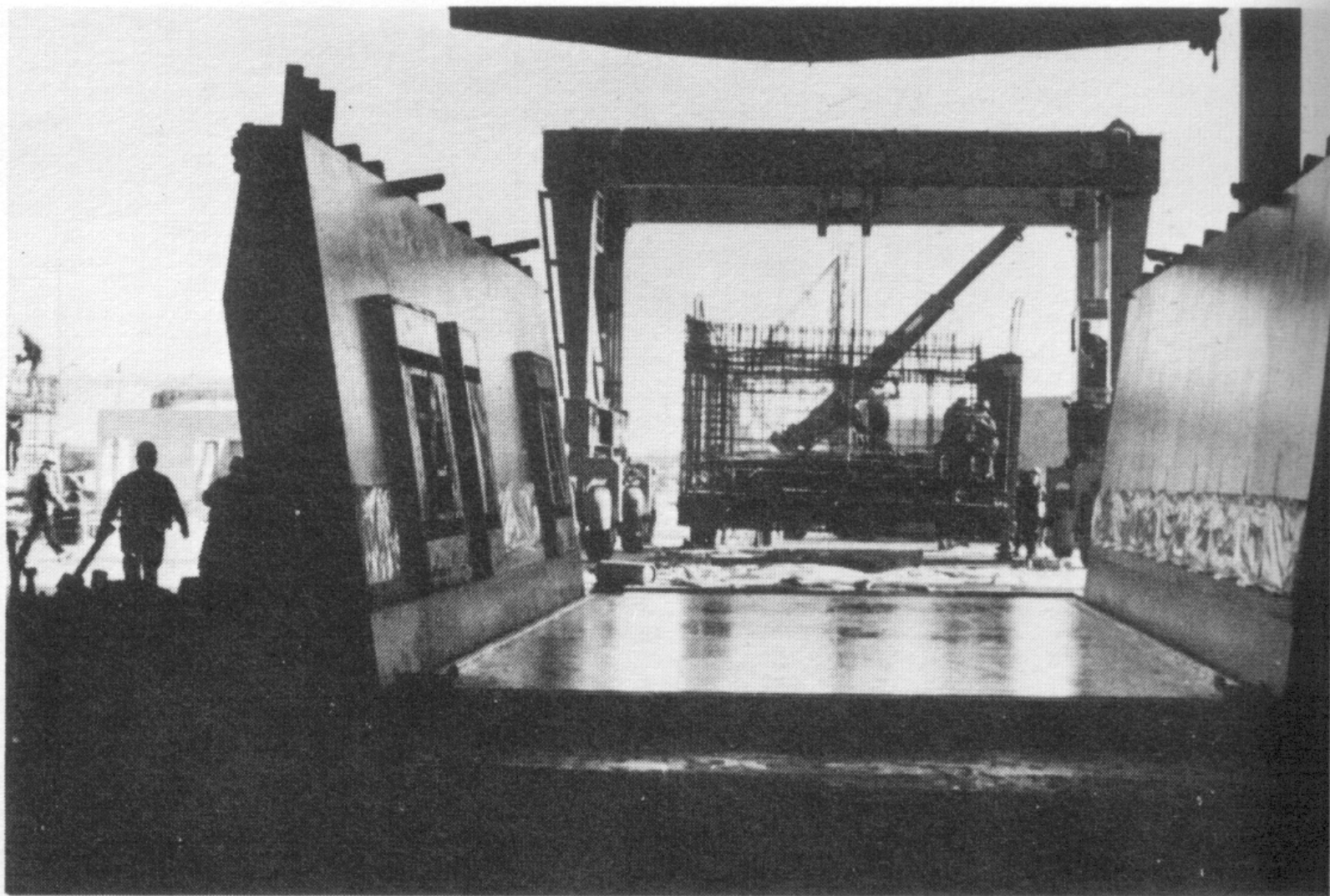


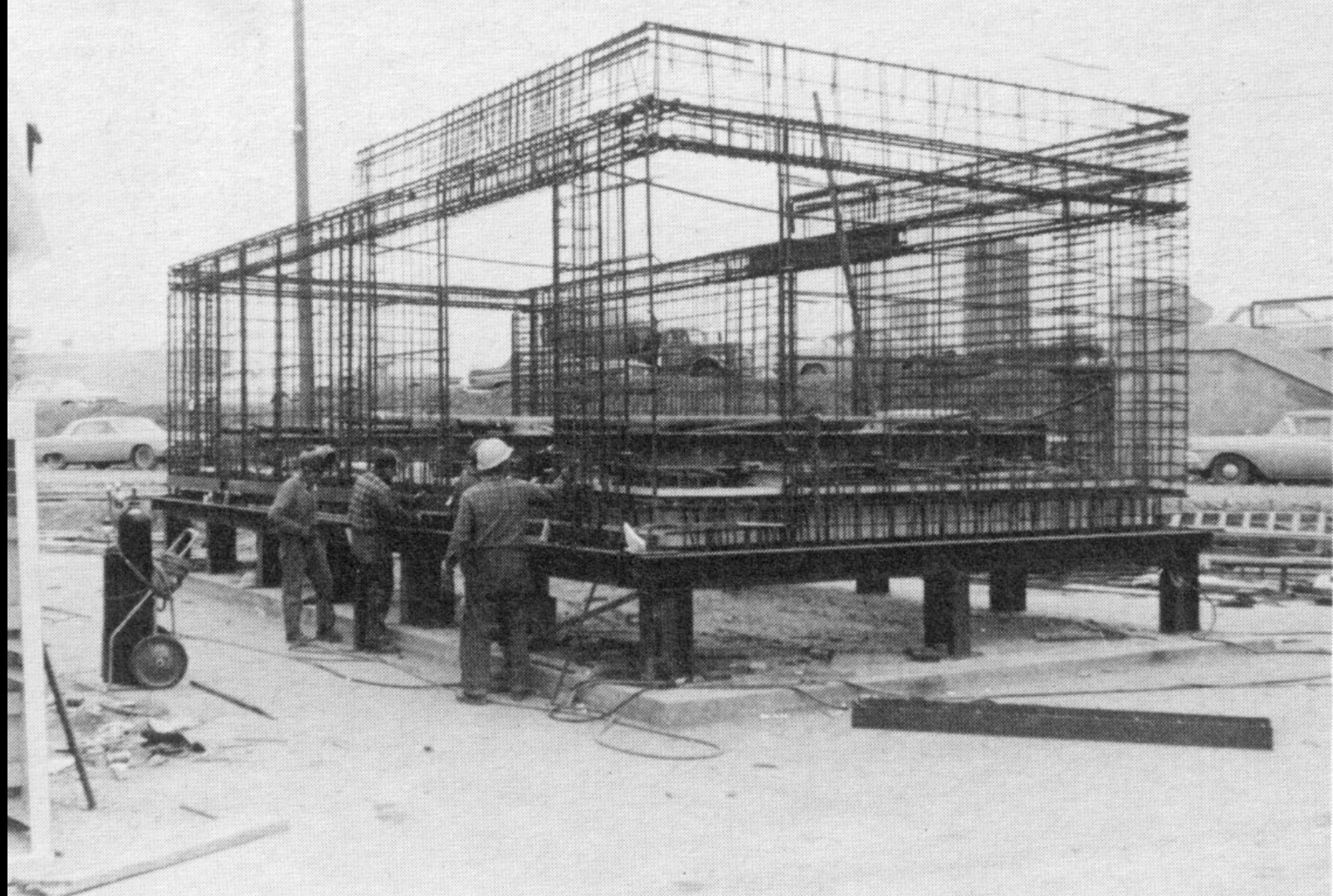
SECTION B-B
COUPE



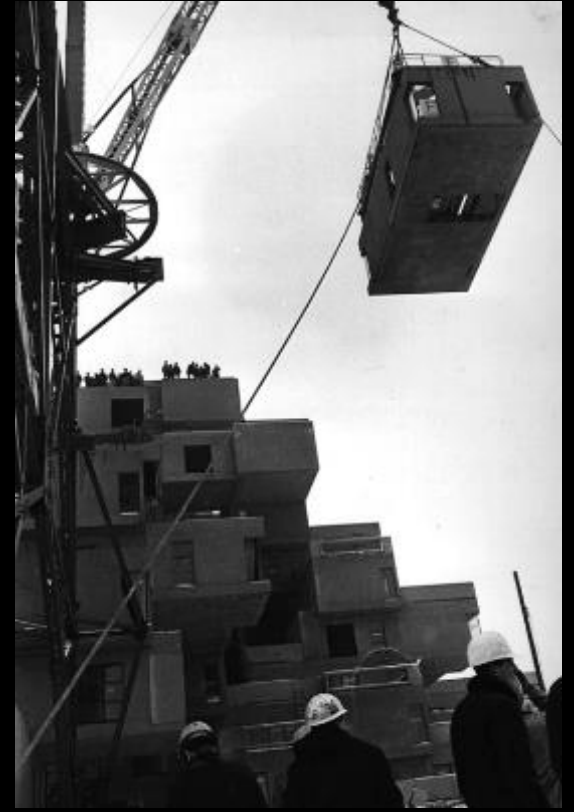
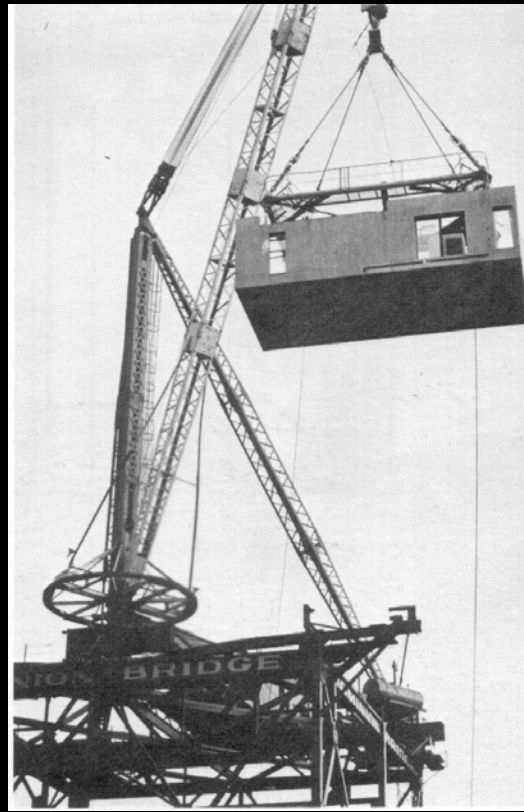
SECTION C-C
COUPE

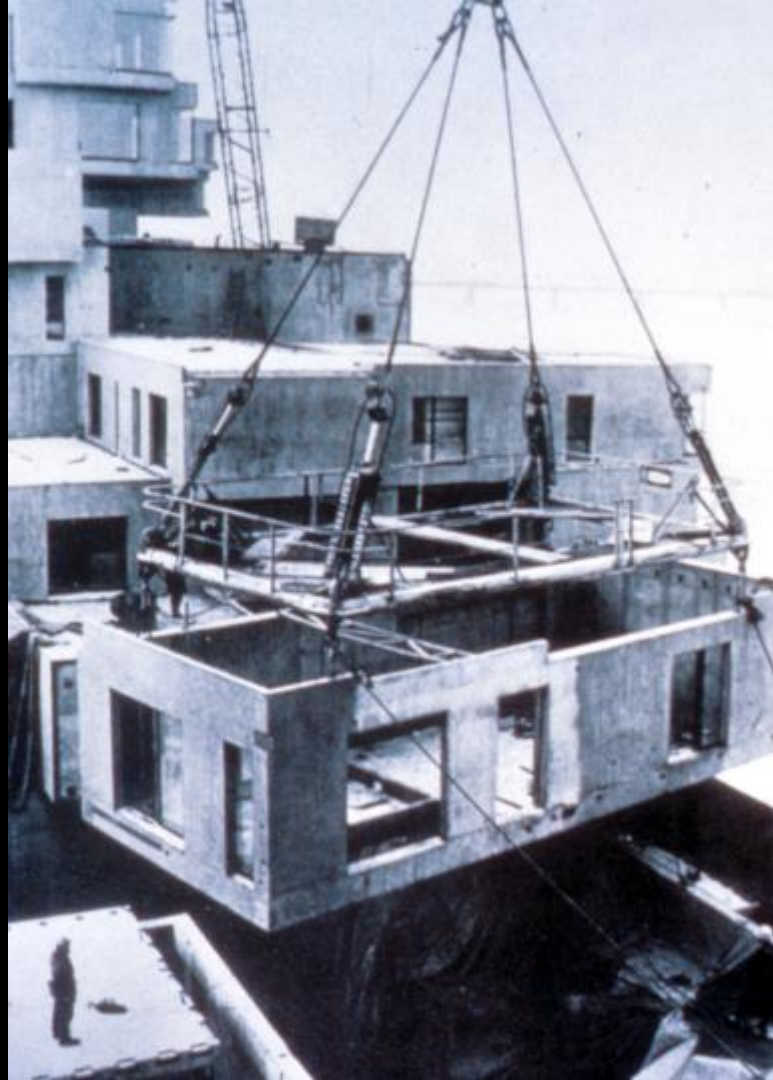














American Pavilion
Expo 1967
Montreal, Quebec
Buckminster Fuller

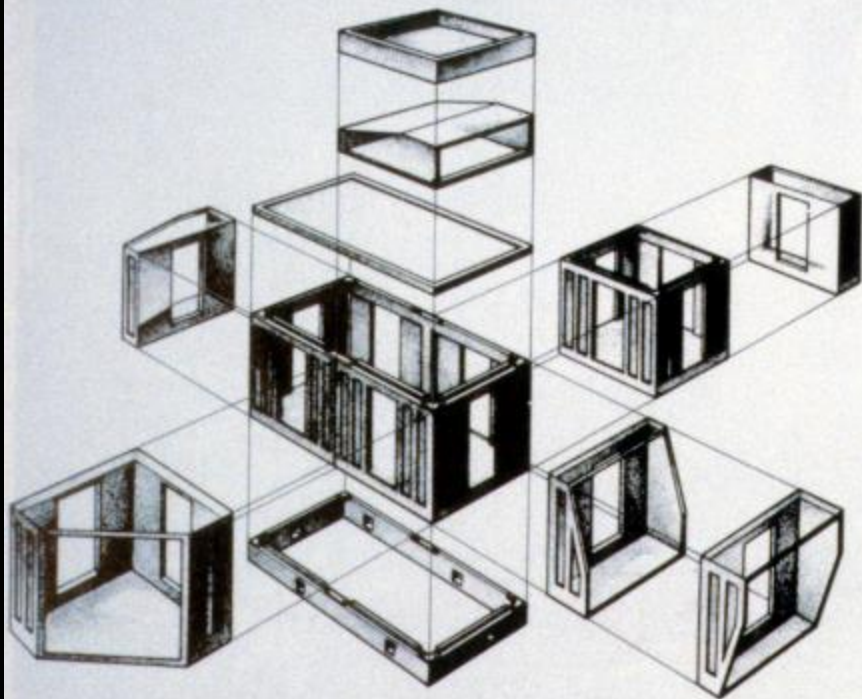


Geodesic dome



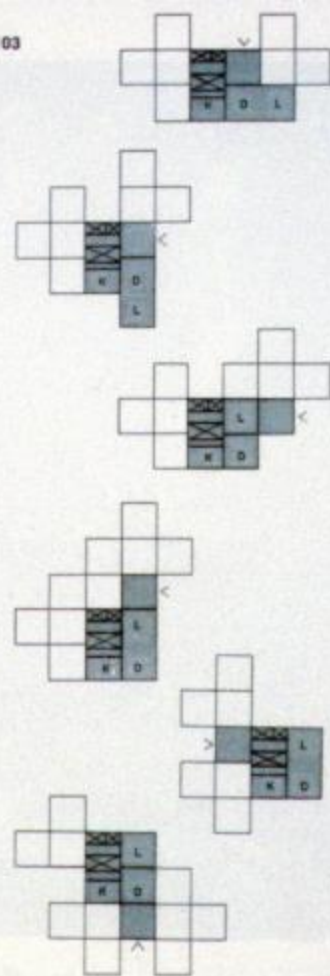


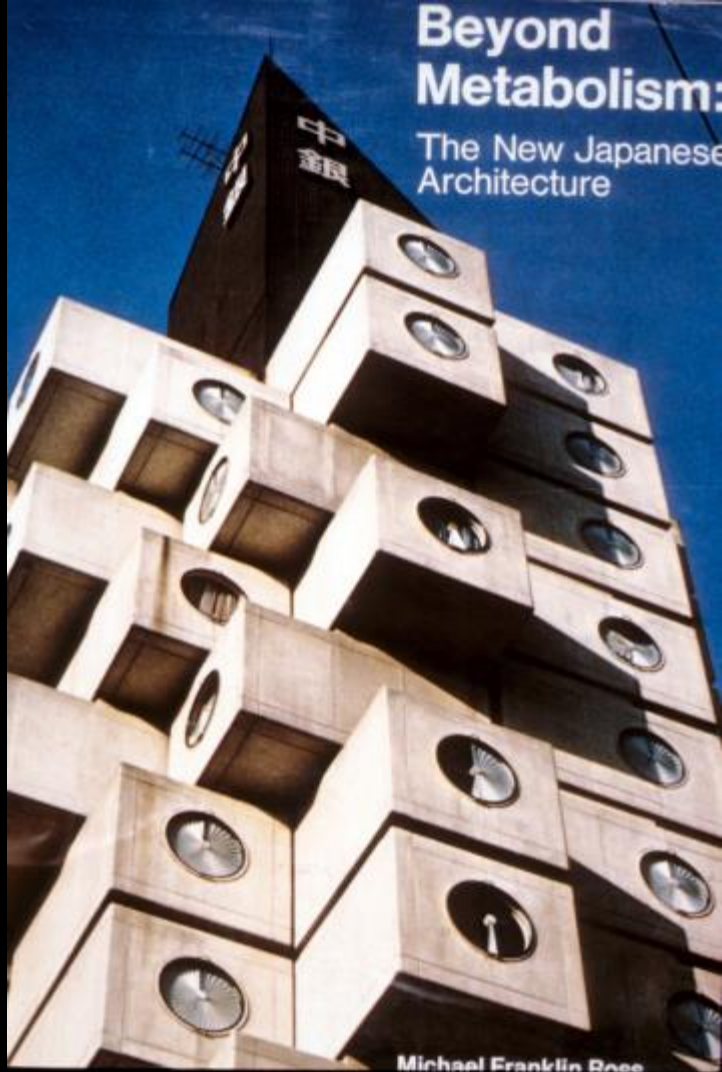
Economy is achieved through
repetition of the elements and mass
production



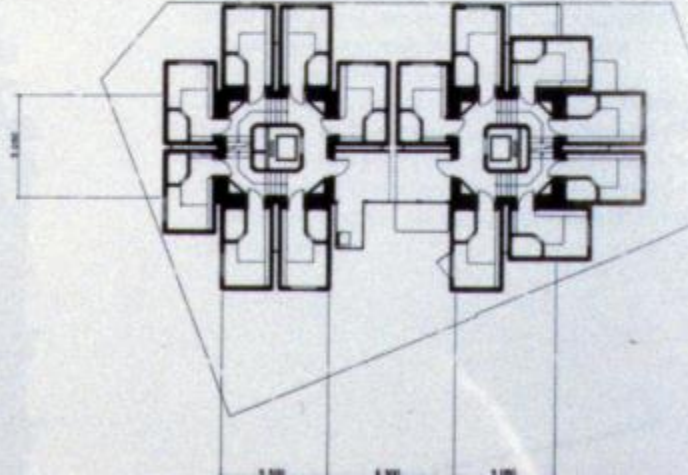
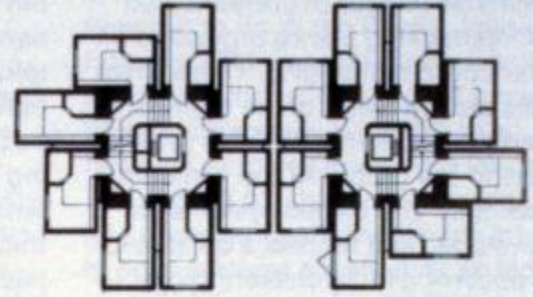
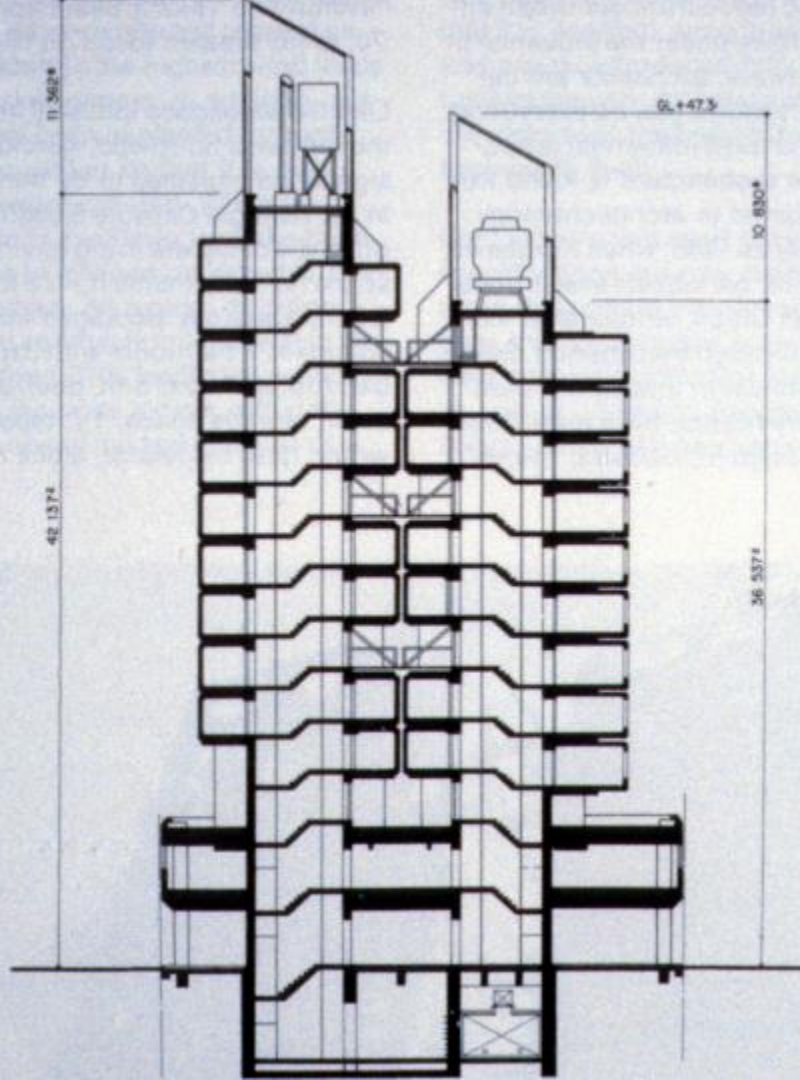
102, 103.

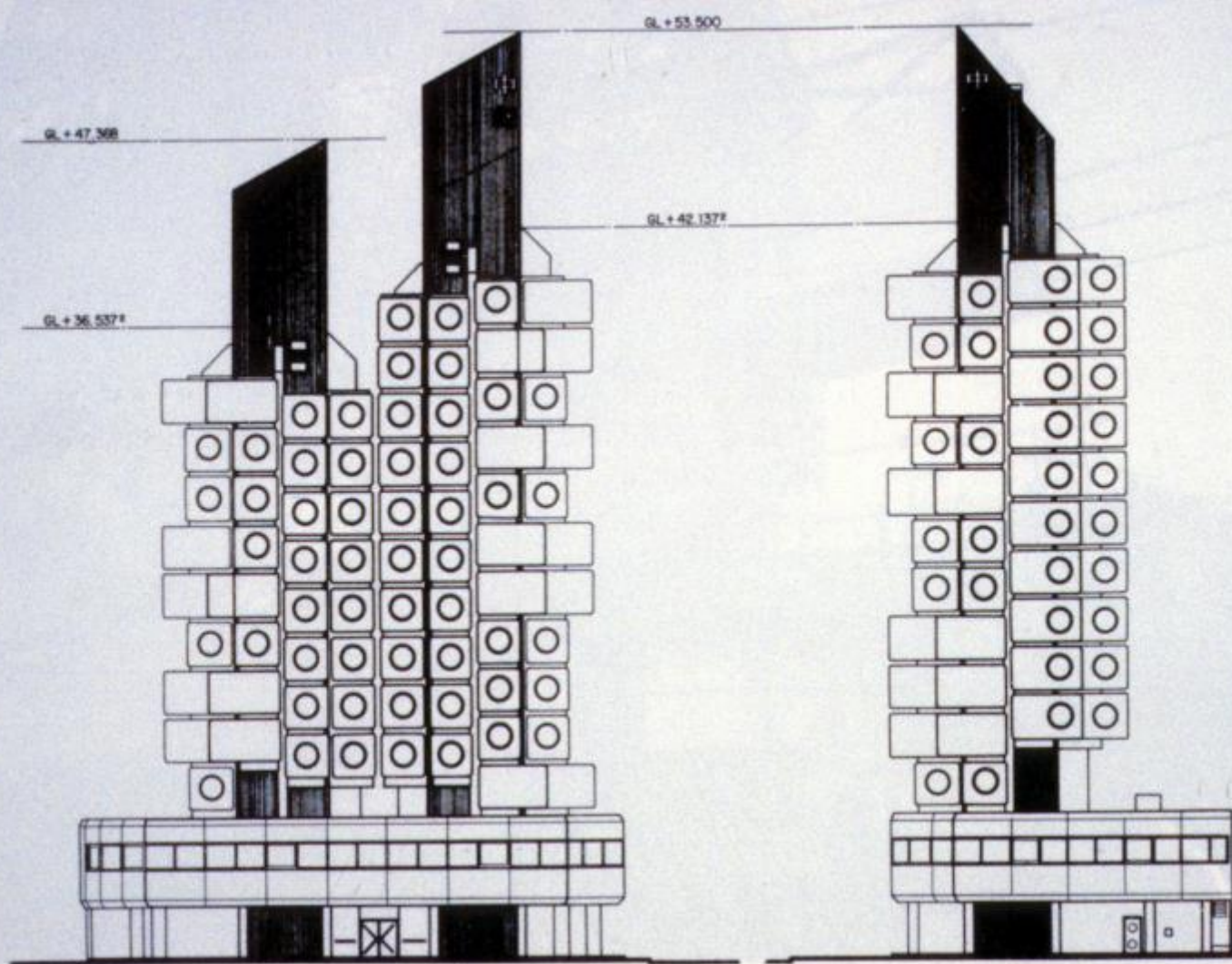
Taisei Overseas System, Design Prototype, Kisho Kurokawa, 1971: This closed system of prefabricated concrete elements fits together like the traditional Japanese puzzle. A variety of floor-plan clusters are available.

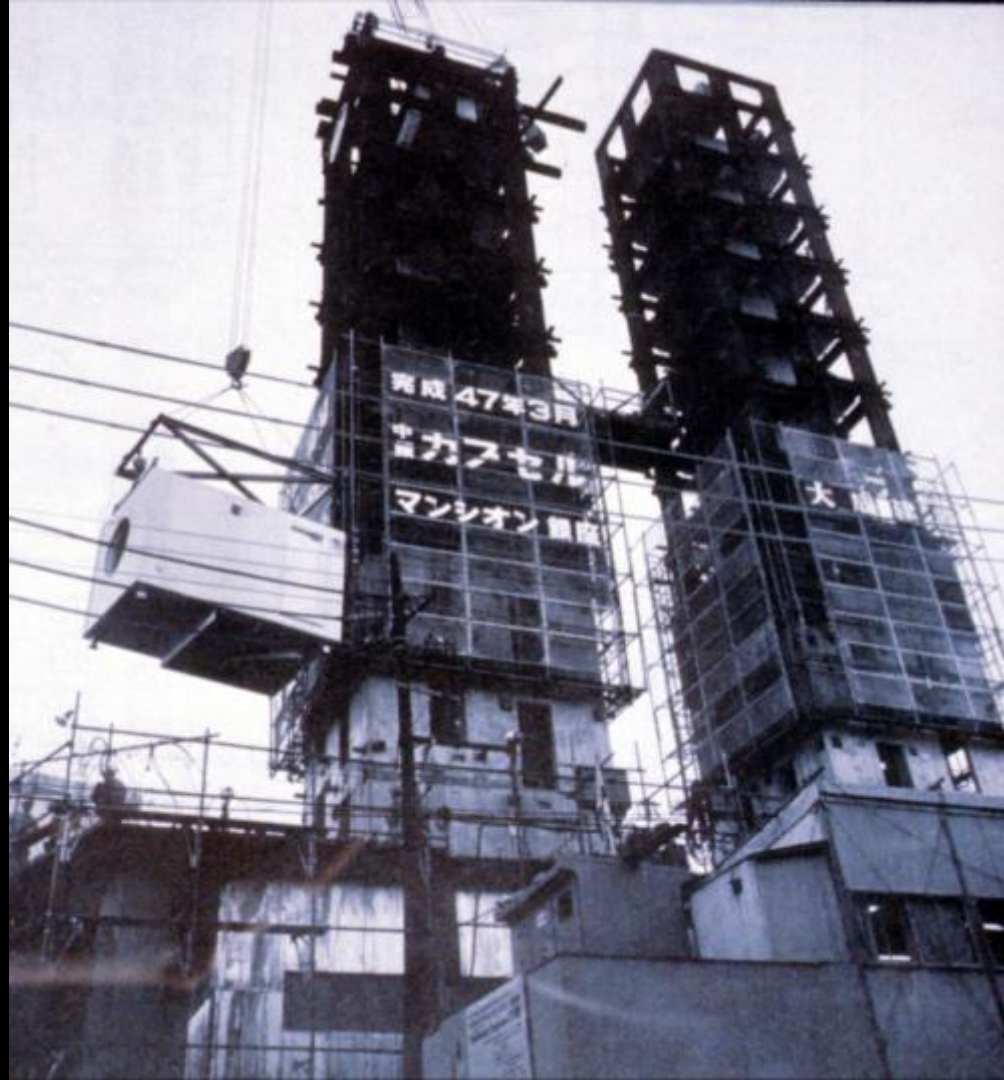


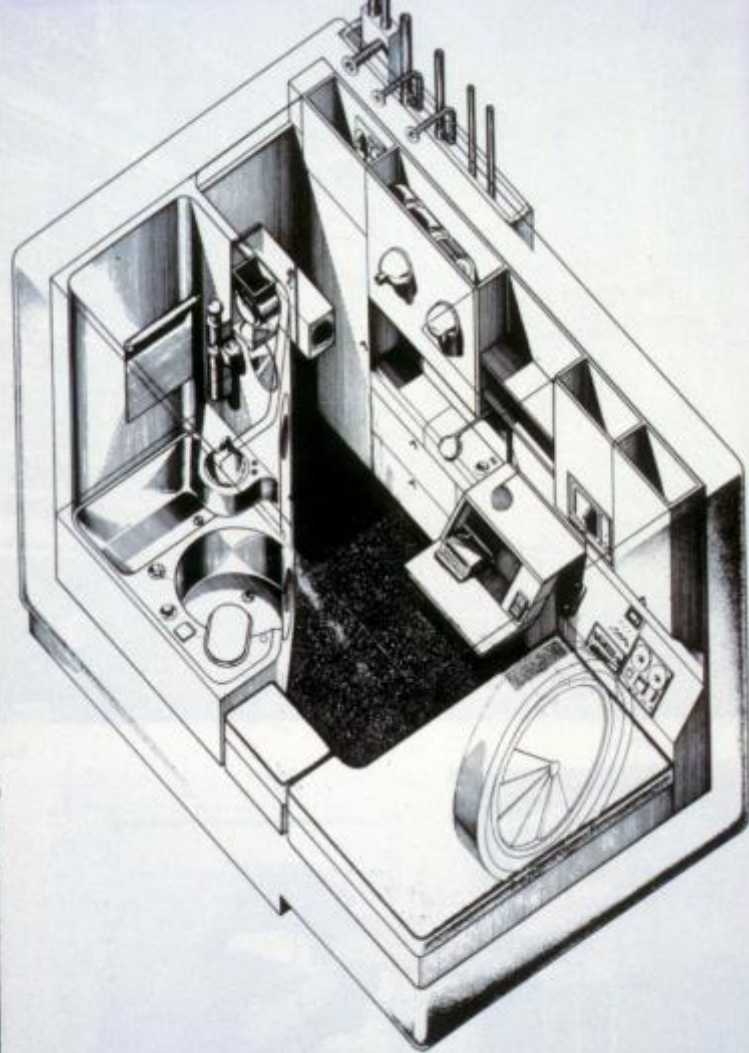


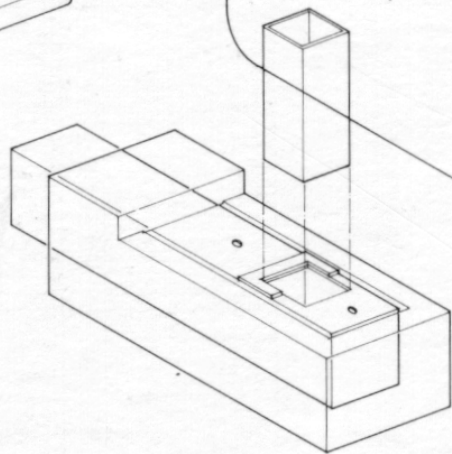
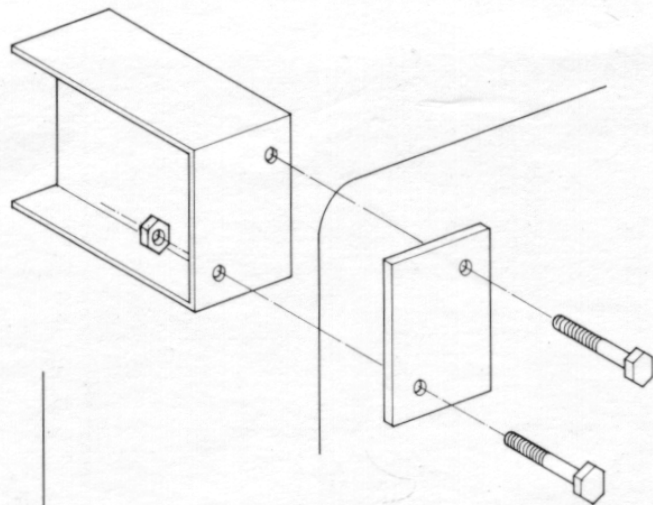
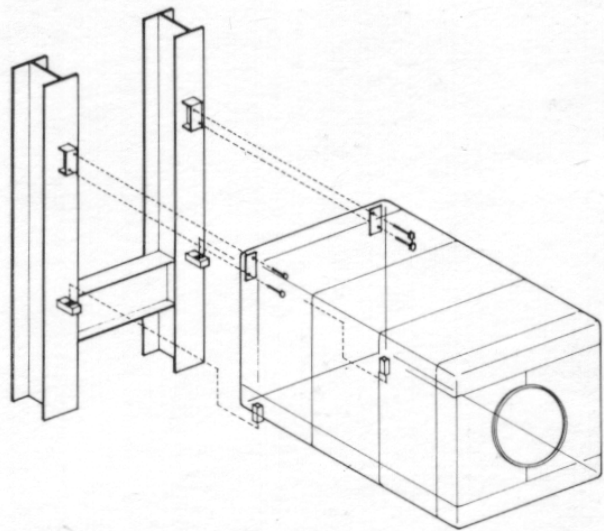
Nakagin Capsule Tower
Tokyo, Japan
Kisho Kurokawa
1972



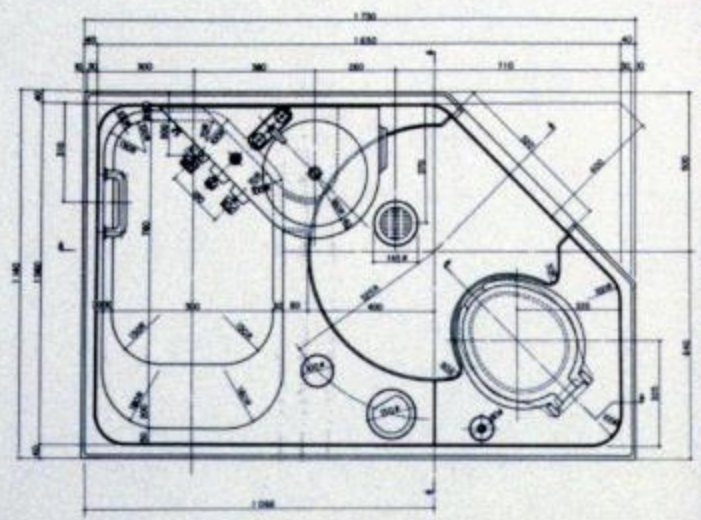
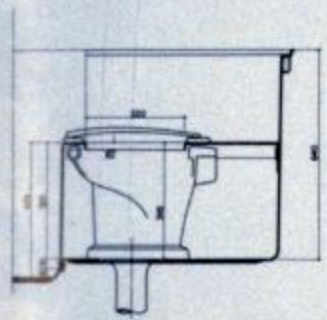
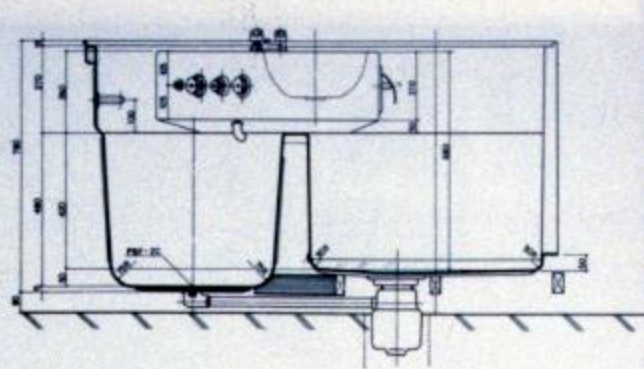
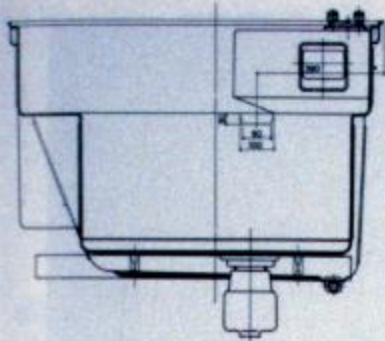






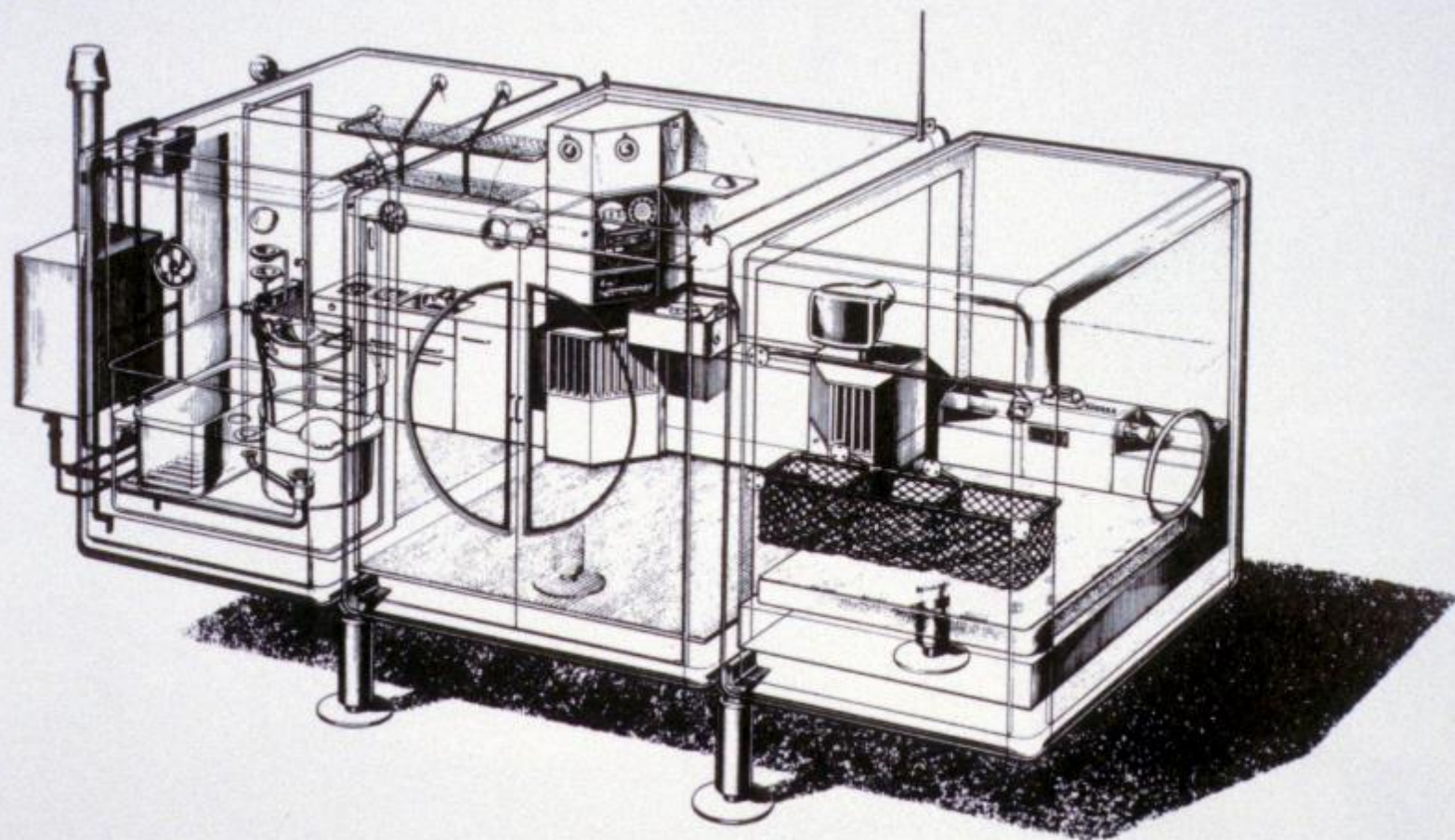


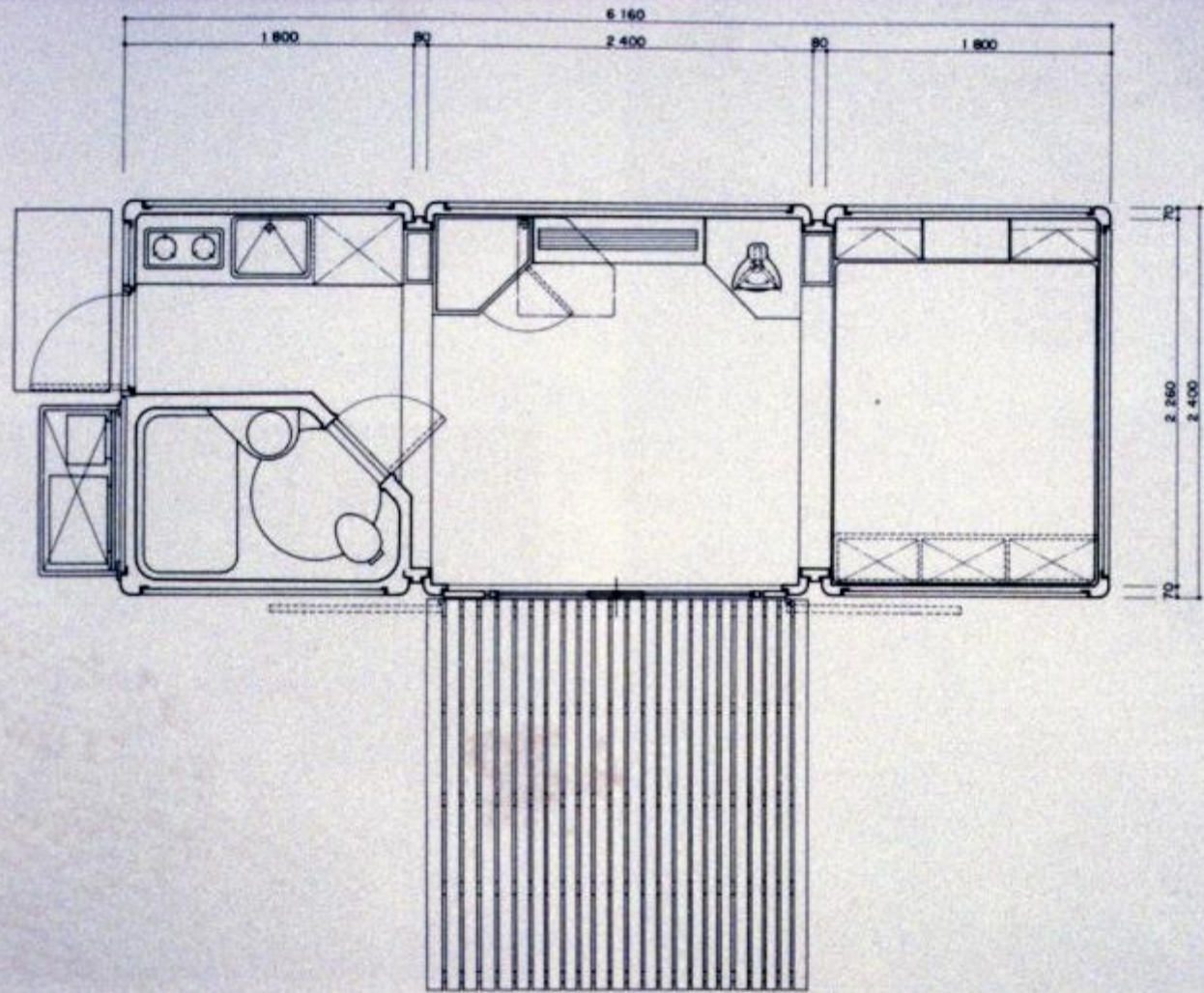
Detail of system of joining capsule to shaft



131. Plans, Section and Elevations, Nakagin Capsule Building. As the drawings illustrate, the twin service towers are connected by bridges on every third floor, reminiscent of the megastructures of the 60s. This building is considered by Kurokawa as a prototype for a larger urban community.

132. Bathroom, Nakagin Capsule: Evolved from the toilet capsules that Kurokawa created for the Celestial Theme Pavilion at Expo '70, this piece of industrial design is in itself a modern-day Japanese puzzle, integrating all sanitary functions into 21 sq ft (2m²).









タワーヒル

銀グループ 2F



VICTORY SERVICE STAND









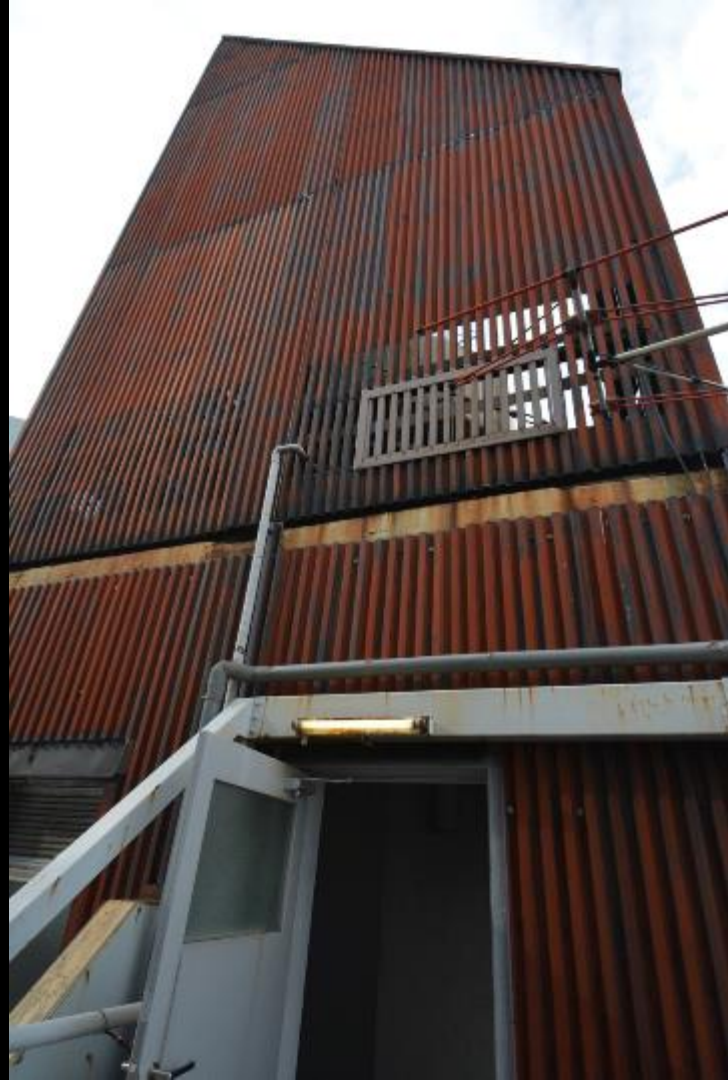


























nakagin
LEGENDA TOWER

PROJECT DATA
Project Name: LEGENDA TOWER
Location: [illegible]
Client: [illegible]
Architect: [illegible]
Structural Engineer: [illegible]
Interior Designer: [illegible]
Construction Period: [illegible]
Completion Date: [illegible]

DESIGN CONCEPT
The design concept for LEGENDA TOWER is based on the idea of a vertical community. The building is designed to be a place where people can live, work, and play. The design is inspired by the traditional Japanese concept of a 'machi' (town) and the modern concept of a 'vertical village'. The building is designed to be a place where people can live, work, and play. The design is inspired by the traditional Japanese concept of a 'machi' (town) and the modern concept of a 'vertical village'. The building is designed to be a place where people can live, work, and play. The design is inspired by the traditional Japanese concept of a 'machi' (town) and the modern concept of a 'vertical village'.

ARCHITECTURAL FEATURES
The building features a unique facade with a grid of windows and balconies. The interior is designed to be a place where people can live, work, and play. The design is inspired by the traditional Japanese concept of a 'machi' (town) and the modern concept of a 'vertical village'. The building is designed to be a place where people can live, work, and play. The design is inspired by the traditional Japanese concept of a 'machi' (town) and the modern concept of a 'vertical village'.



WELCOME!

PLEASE TIGHTEN THE FAUCET IF IT LEAKS.

DO NOT USE THE TOILET.

IF YOU NEED ANYTHING, CALL MASATAH BAE: 080 9575 5192

Gracias!!!
Luz y Ray
Tips: Valencia 20th - Spain
There's a public bath (Sento) nearby.
If you need anything, call Masatah Bae: 080 9575 5192

Enjoy 東京!
There's a public bath (Sento) nearby.
If you need anything, call Masatah Bae: 080 9575 5192

PLEASE TIGHTEN THE FAUCET IF IT LEAKS.

DO NOT USE THE TOILET.

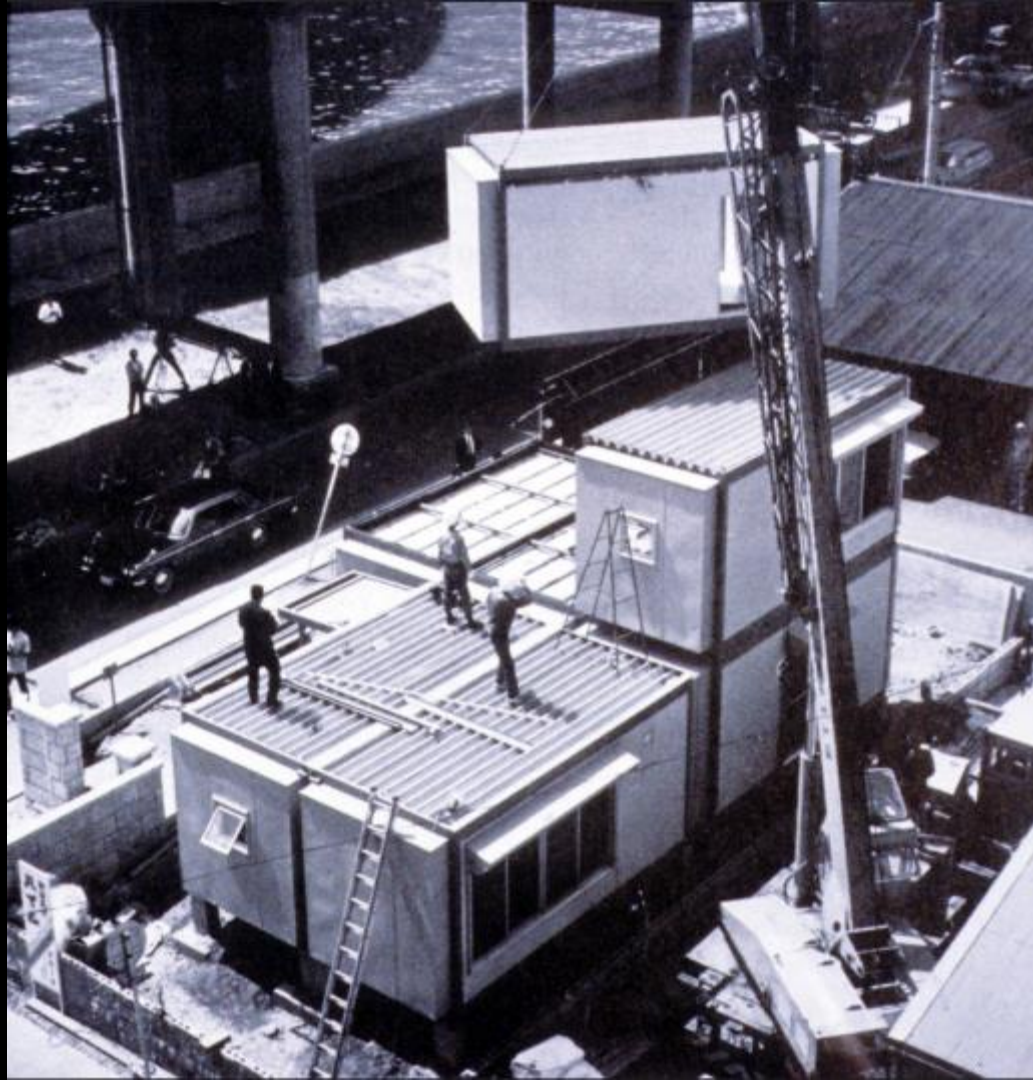
IF YOU NEED ANYTHING, CALL MASATAH BAE: 080 9575 5192



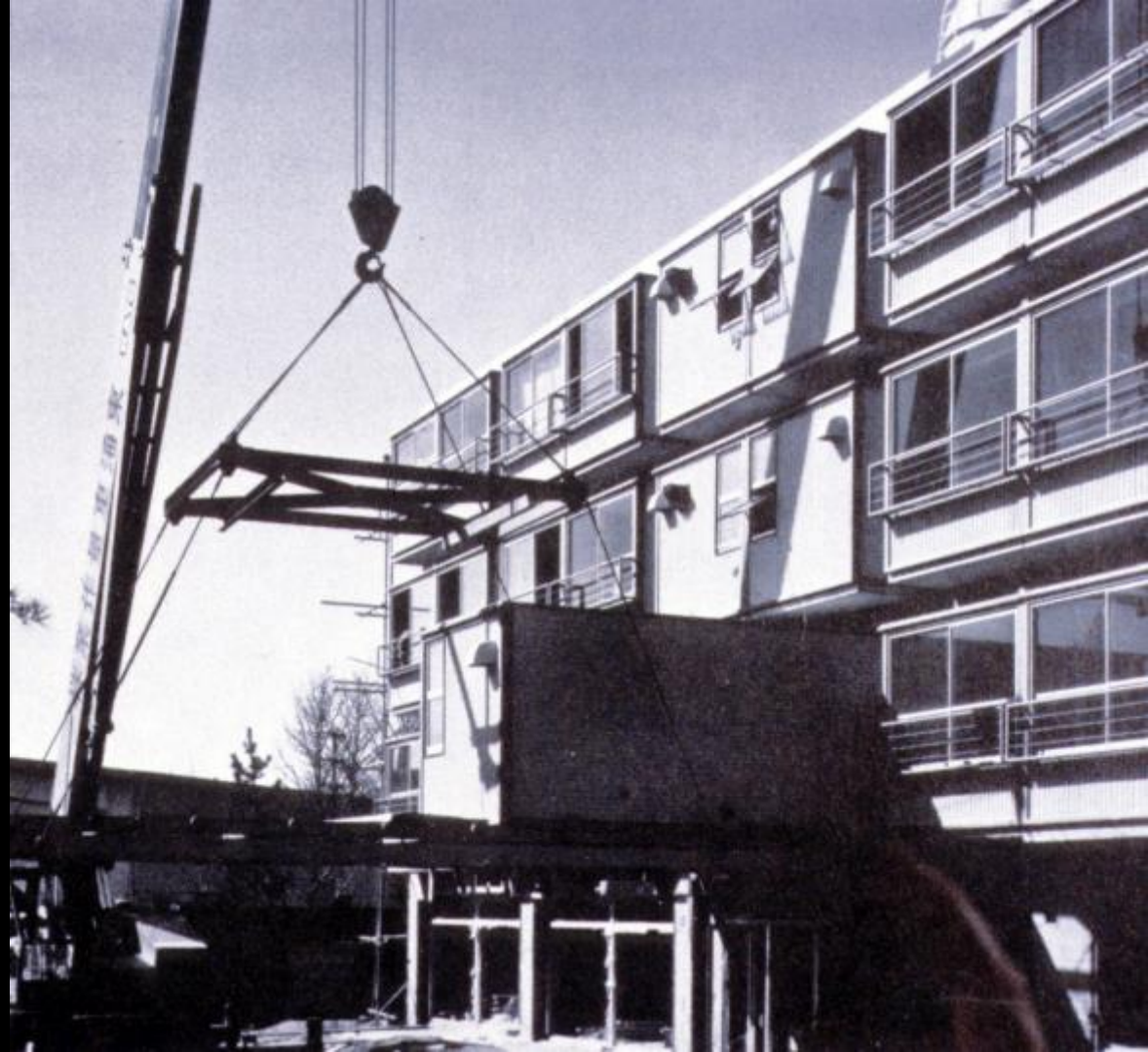














816, 817 Two types of American prefabricated houses: the "colonial cottage" produced by the American Houses Inc. at \$7,500 and the "Catalina" house produced by the U.S. Steel Houses Inc. at \$11,500



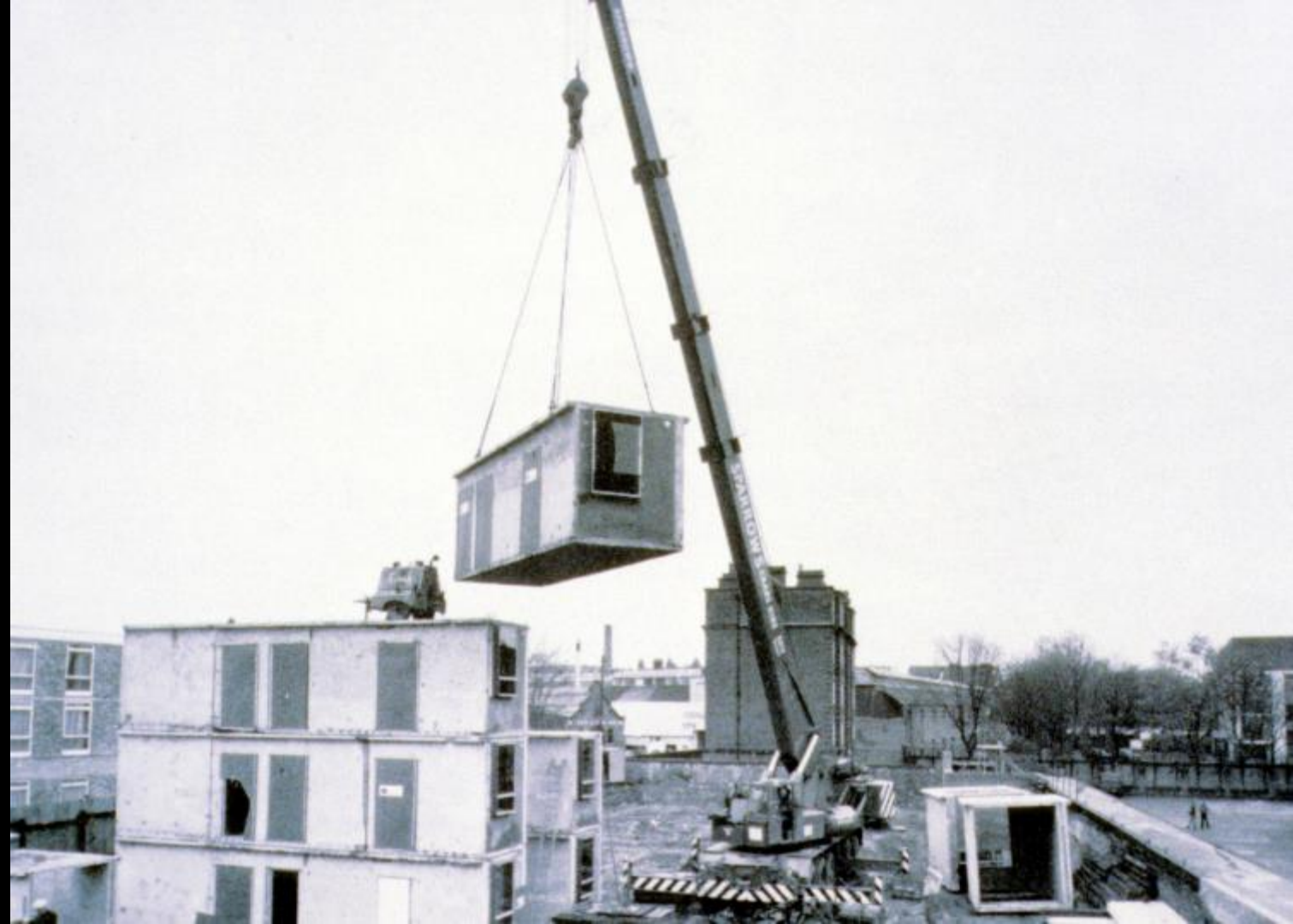
Very good—14 hours flat—but they're all upside down!



845 (above, left) New York, One of the façades of the U.N. building

846 (below, left) Cartoon from the Architectural Record, April 1955

847 (right) Pittsburgh, A.L.C.O.A. building (Hamison and Abramowitz, 1952)





The High Tech Movement



HIGH-TECH?

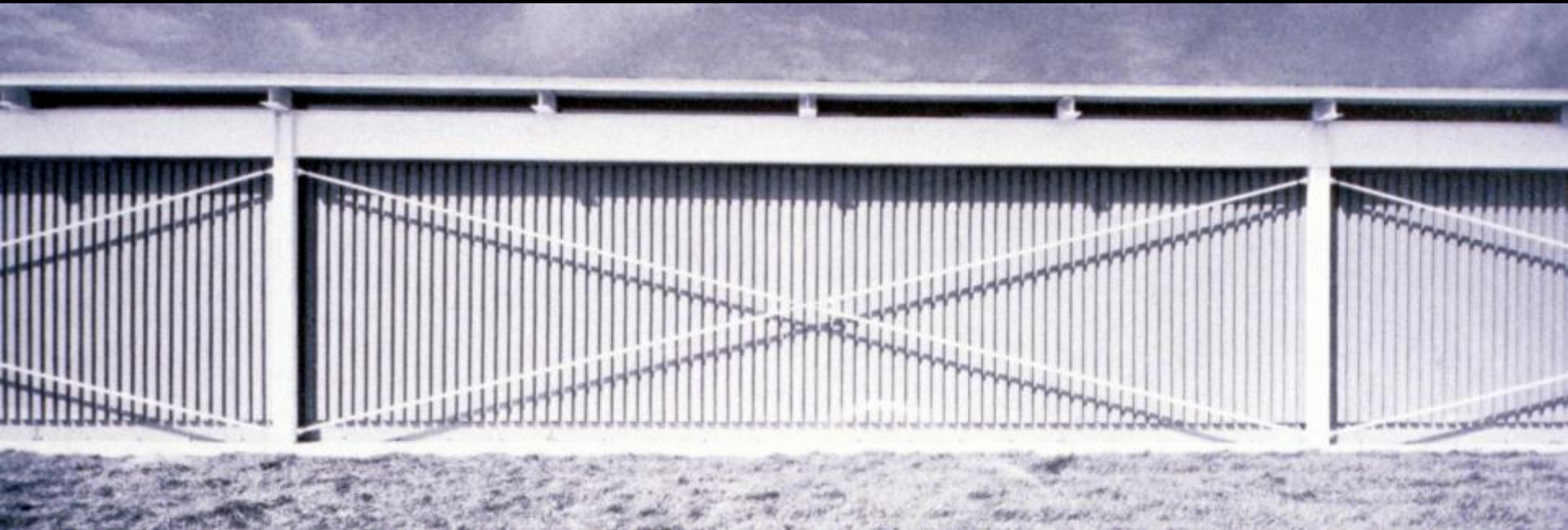
TECH-BLINDS!

TECHNICAL BLINDS LTD.
Innovators of solar shading systems
Woburn Town, High Wycombe, Bucks. 1062851 2431

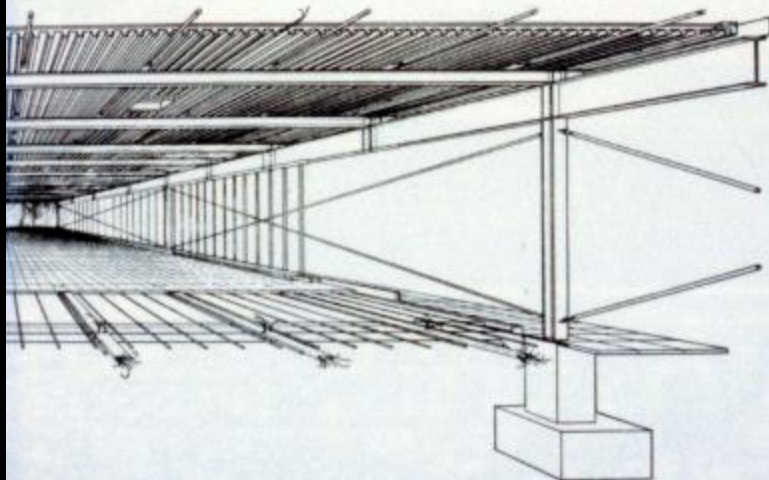
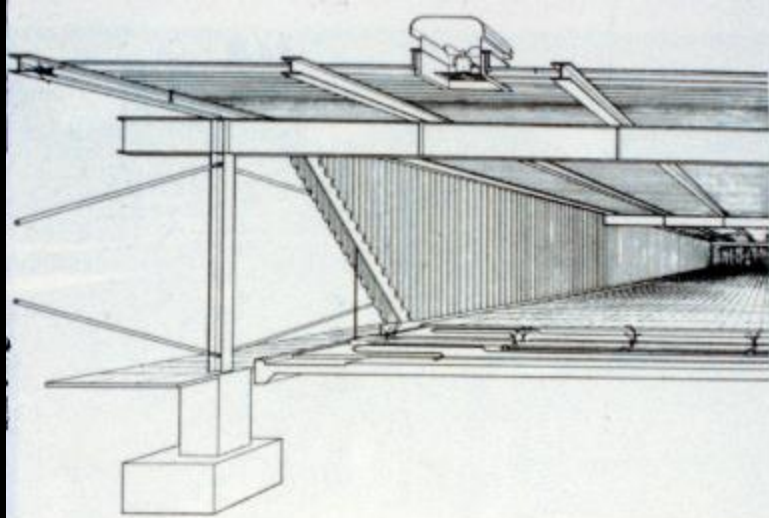
Renault Centre, Swindon.

Architects: Foster Associates.

The image is a photograph of the Renault Centre in Swindon, designed by Foster Associates. The building is a prime example of high-tech architecture, with its structural elements exposed. A prominent yellow-painted steel frame supports a large, multi-faceted glass facade. The frame consists of a central vertical column and several horizontal beams that branch out to support the roof and the glass walls. The glass panels are held in place by a dark metal grid. The building is set against a clear blue sky. The text 'HIGH-TECH?' is written in large, bold, yellow letters in the top left corner, and 'TECH-BLINDS!' is written in the top right corner. Below the latter text is the name and contact information for Technical Blinds Ltd. At the bottom of the image, the name of the building and its architects are listed.



Reliance Controls
Swindon, UK
Team 4 (Wendy and Norman Foster +
Richard and Sue Rogers)
1967



2 Team 4, Reliance Controls Factory, Swindon, 1966

Characterized by components that
express their forces

-

Tension vs. Compression

-

Skinny vs. Fat



Pompidou Centre
Paris, France
Piano and Rogers
1977









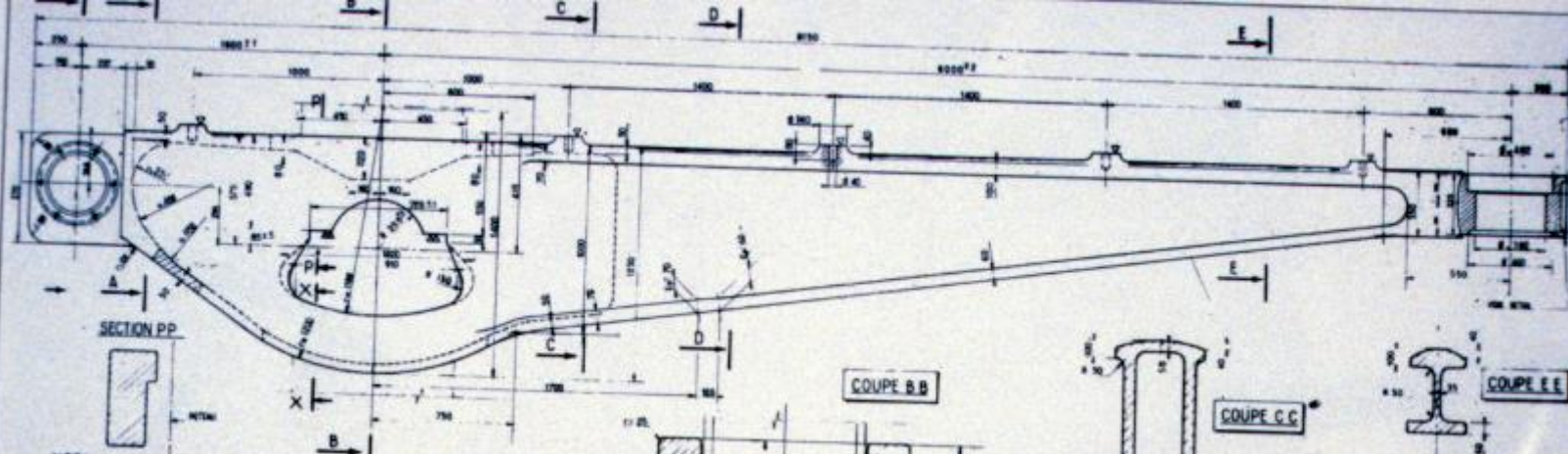












SECTION PP



NOTA

MATIERE
 AVOIR TRAVAILÉ SUIVANT CARTE DES CHARGES
 LIMITE DE RUPTURE MIN. 33.500/CM²
 LIMITE ELASTIQUE MIN. 14.500/CM²

TOLERANCES
 SAUF INDICATION CONTRAIRE POUR
 LES DIMENSIONS LES TOLERANCES
 SERONT CONFORMES AUX NORMES
 ET A 30000 CLASSE A

LA TOLERANCE DE RECTITUDE DE L'AXE (DISTANCE A-D)
 SERA DE 0.10MM

REFERENCES PLANS N° 14.10.22
 TYPE A
 TYPE B

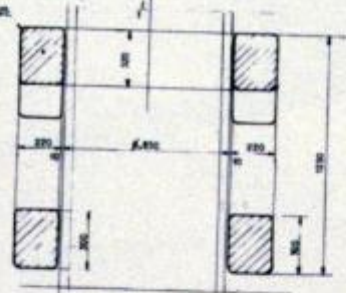
NOTA (suite)

INDICATIONS D'USURE CONFORMES
 A LA NORME NF 104.01

APRES MISE EN PLACE DES APPUIS
 LES ESPACES LIBRES SERONT REMPLIS
 DE COUPELLE SERRÉE

COTE APPROXIMATIVE - 0.5 TOLANCE
 Carte des Normes 2 et B
 Technologie Générale Mécanique

COUPE B.B



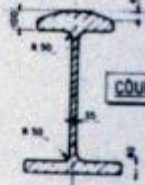
COUPE C.C



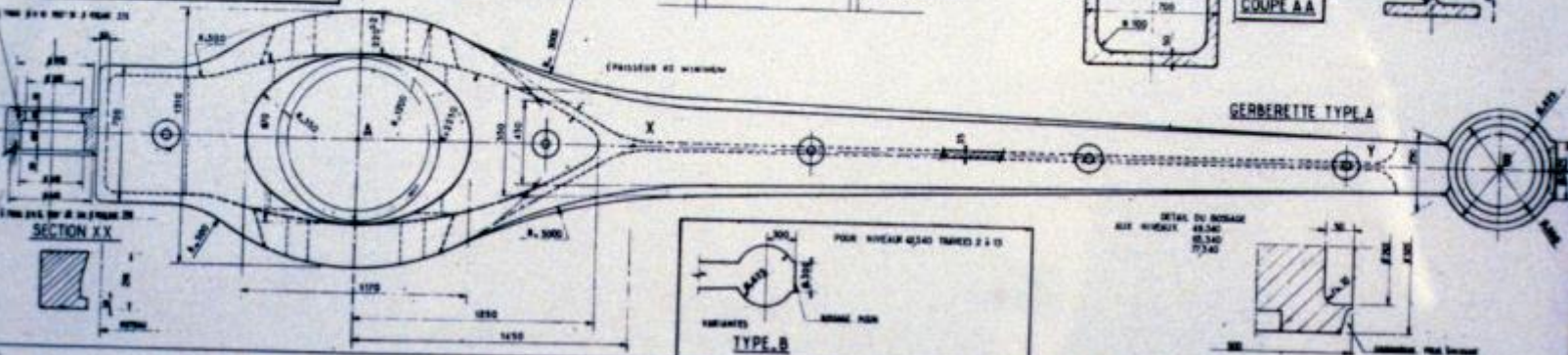
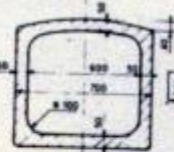
COUPE E.E



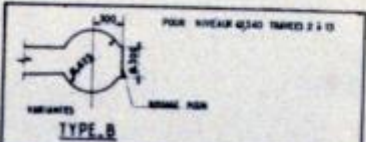
COUPE D.D



COUPE A.A



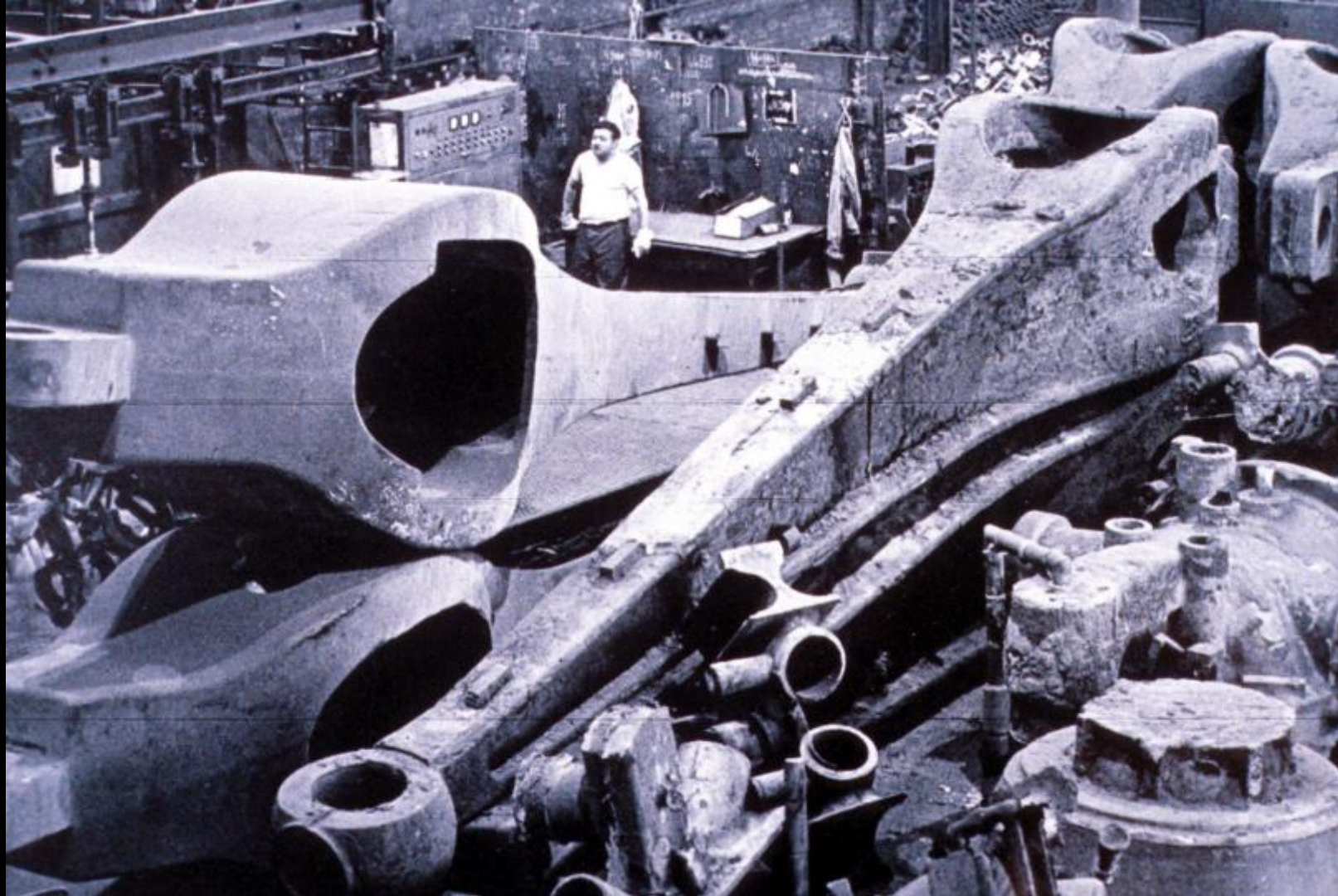
SECTION X.X



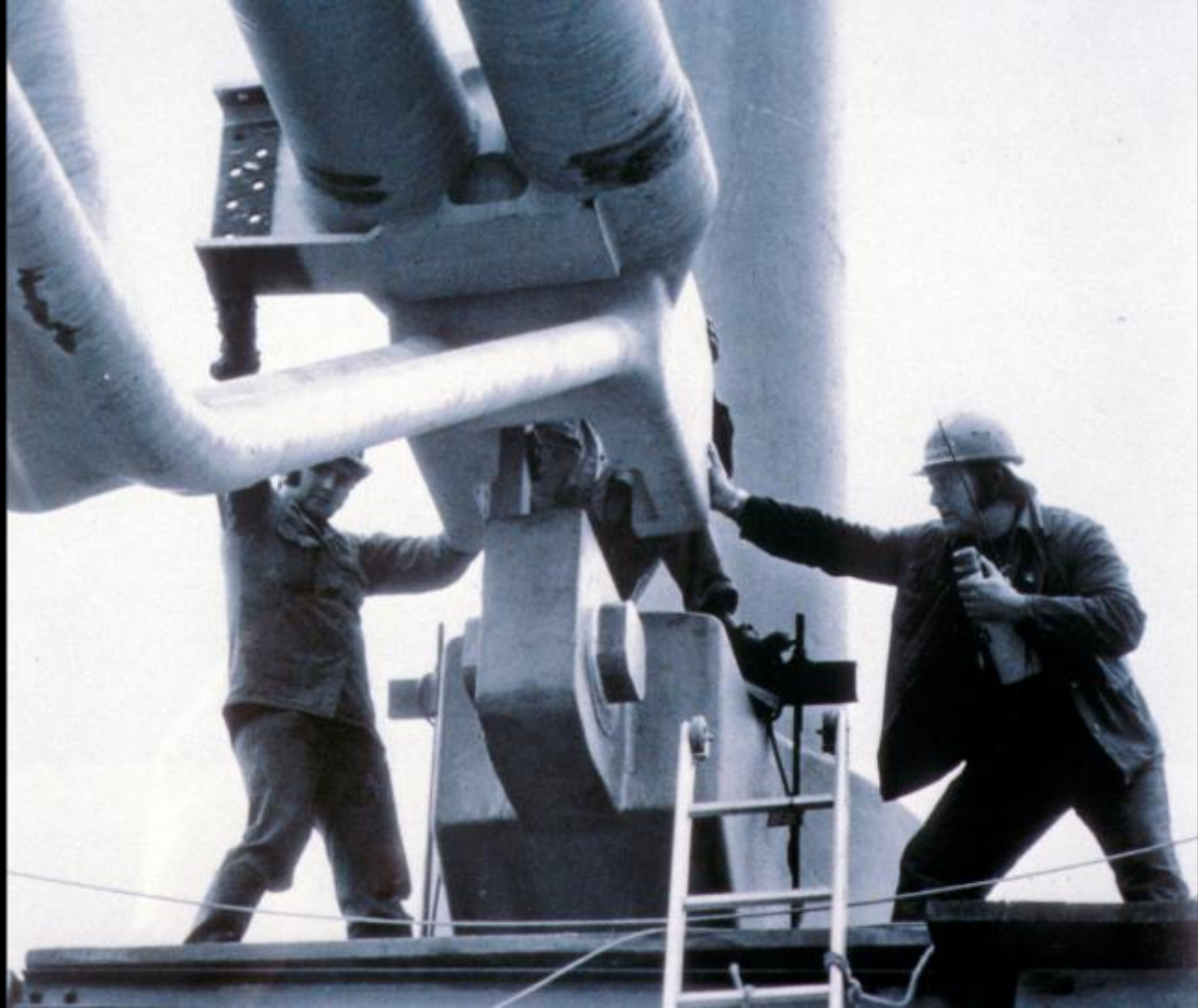
DETAIL DU BORD
 AUX NIVEAUX 10.540
 10.540
 10.540



GERBERETTE TYPE A










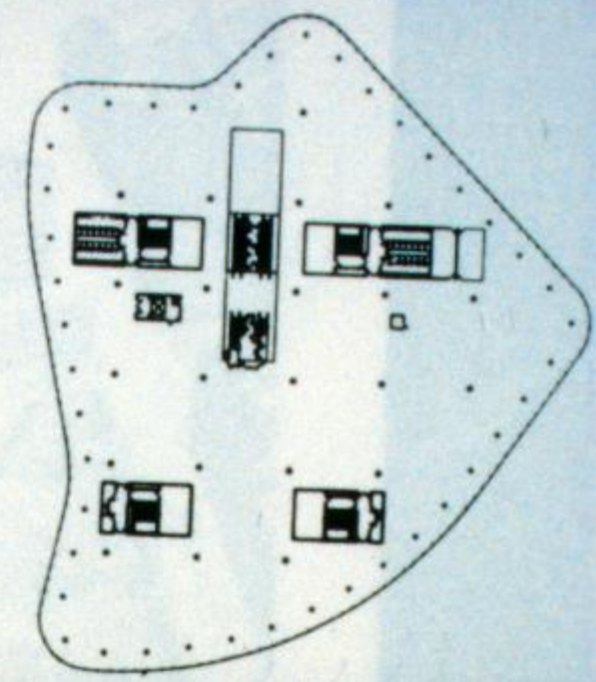
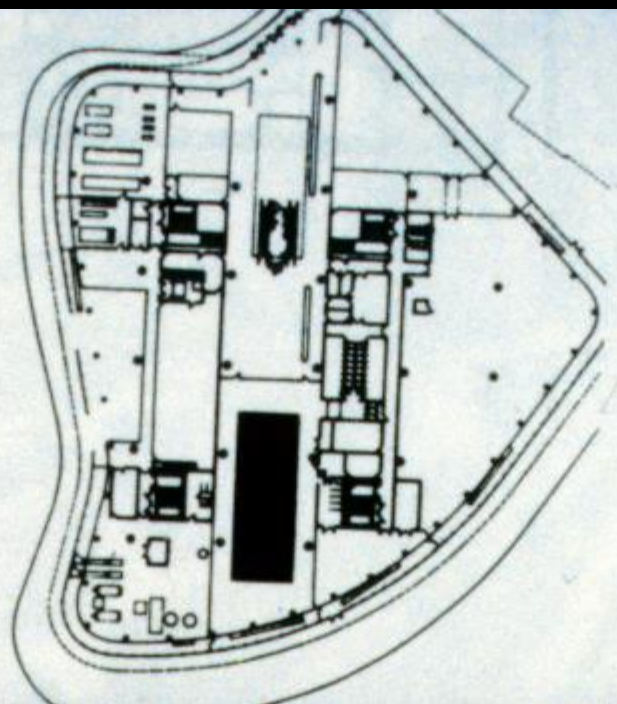
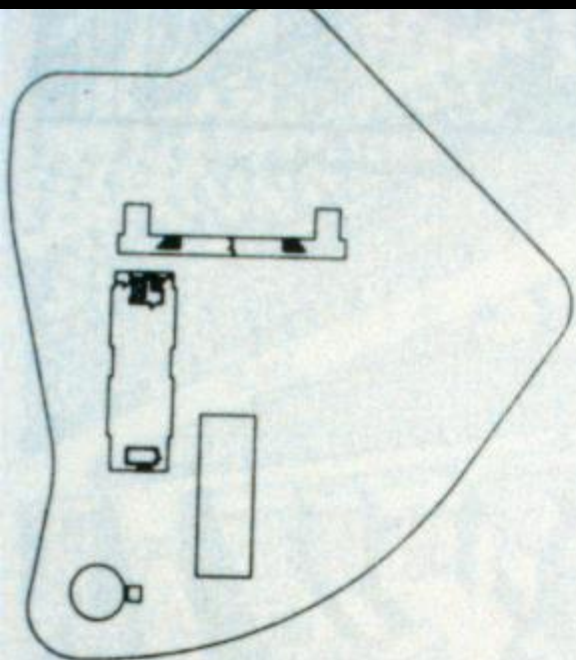


A photograph of the Willis Building in Ipswich, England. The building is a large, curved structure with a dark, reflective glass facade. It features a prominent green roof with a railing. The building is situated in an urban environment, with a brick building and a street sign visible in the foreground. The sky is blue with scattered white clouds. In the foreground, there is a landscaped area with green grass, bushes, and flowers. A road sign with three arrows pointing left and a circular sign with a left arrow is visible. A small sign with the word 'Willis' is also present.

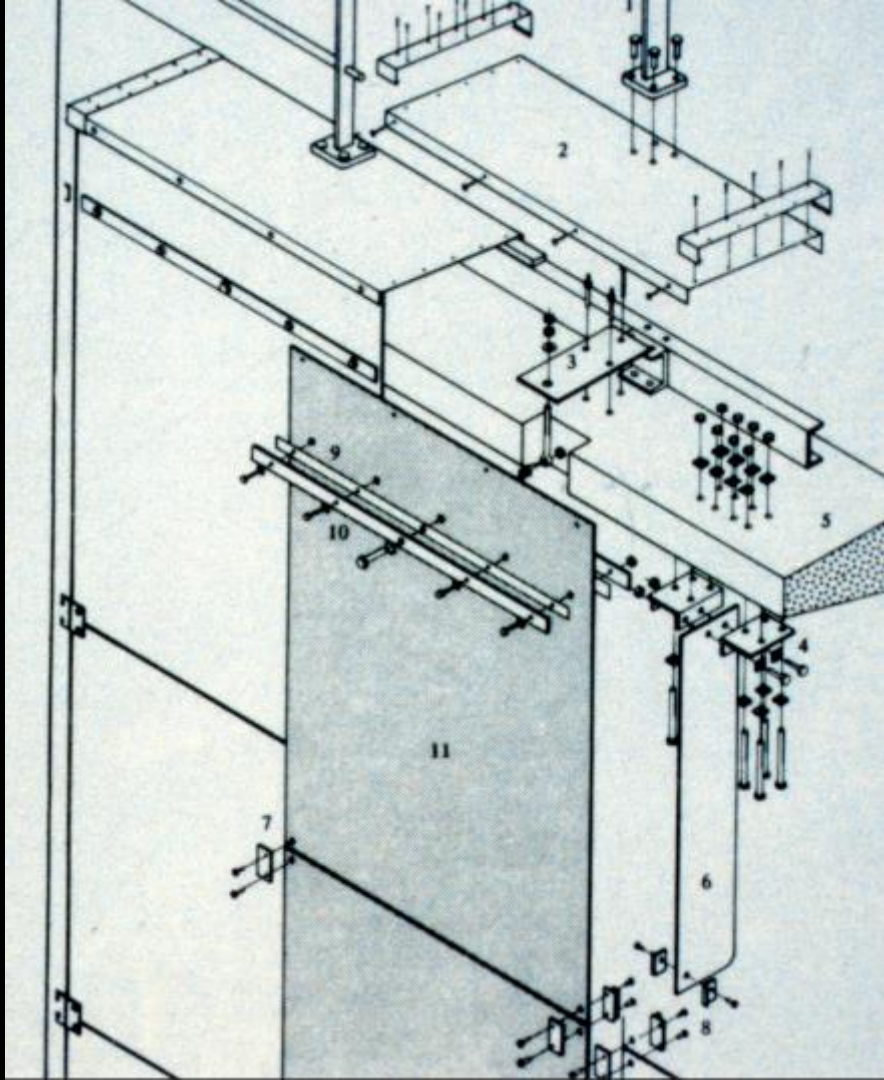
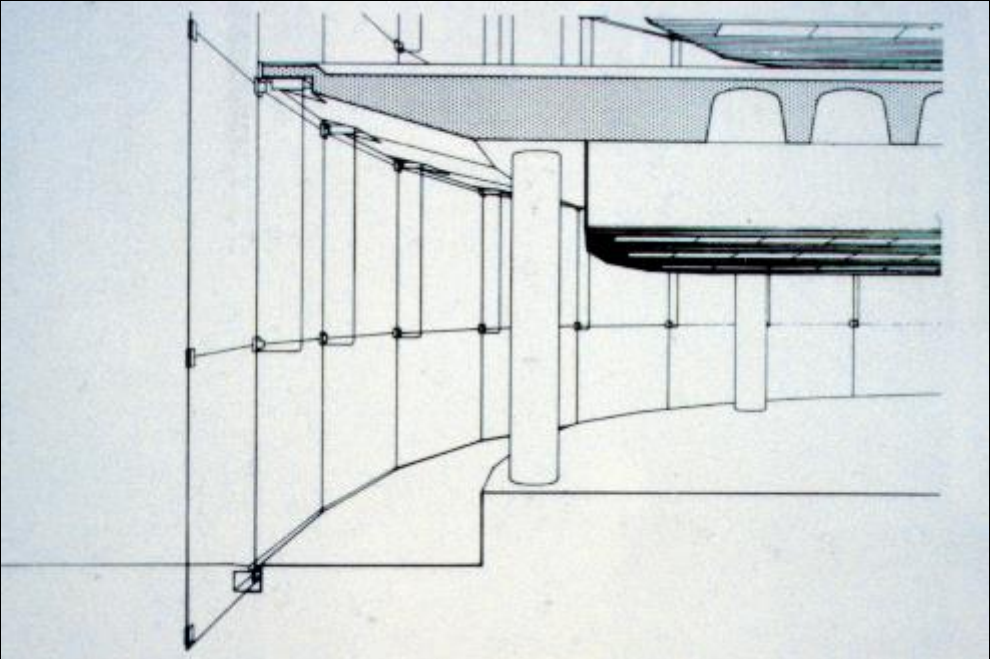
Willis Building (Willis Faber Dumas)
Ipswich, England
Norman Foster and Michael Hopkins
1975









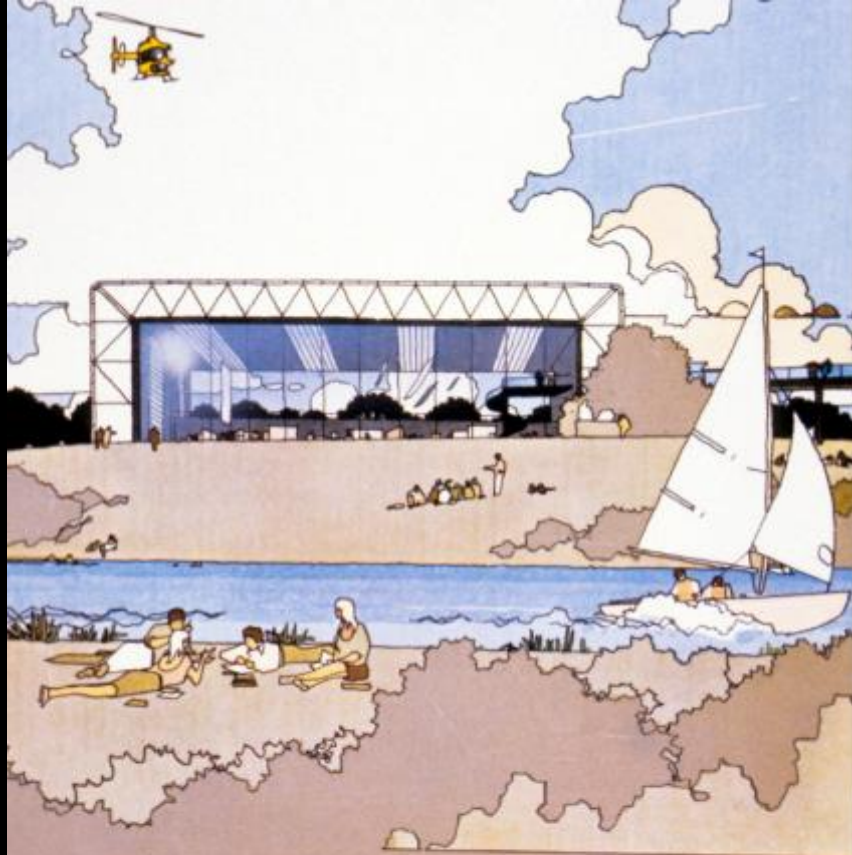




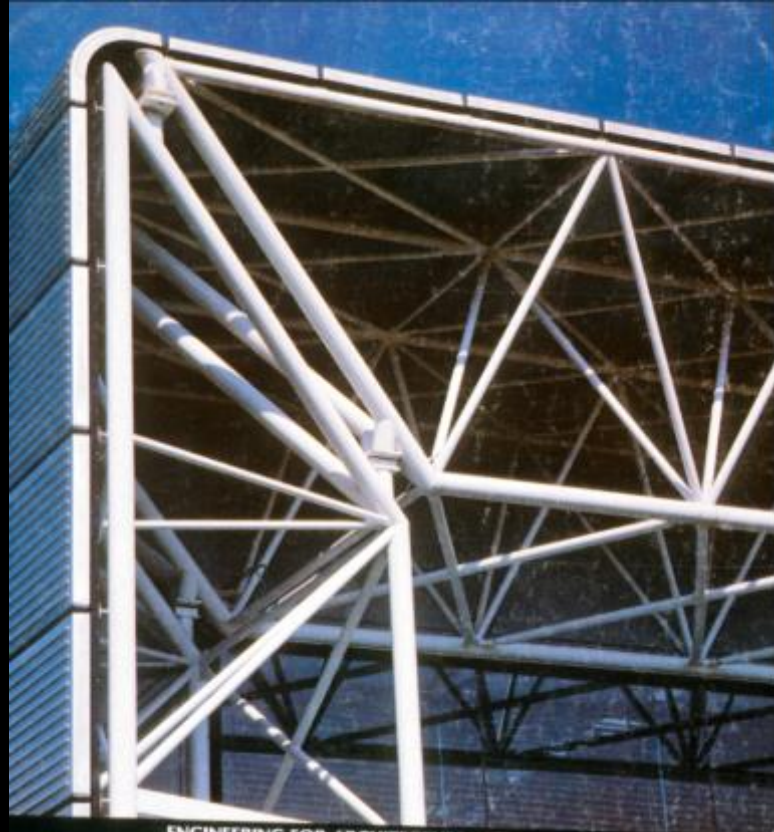




Sainsbury Centre for the Arts
England
Foster and Partners
1977



FOSTER ASSOCIATES'
SAINSBURY CENTRE



ENGINEERING FOR ARCHITECTURE 1979

ARCHITECTURAL RECORD

MID-AUGUST 1979  A MCGRAW-HILL PUBLICATION \$5.50 PER COPY

THE BUILDING AS SERVICING MECHANISM (TECHNOLOGY)



Given the progressive highly serviced and technological 'Sheddy' that has tended to be associated with Foster Associates' buildings in the past, the Laboratory Centre can either be seen as a special case (as a laboratory case building) or alternatively making a change in emphasis of Foster's use of advanced technology. The diagrammatic concept shows around a concrete to exploit the 2.1m deep, spectacular, free-spanning structural system eventually chosen, as a consistent service case around the entire envelope of the building (since the original proposal to expose the structure externally was dropped).

This case - that on one side with the glazed, solid (insulating) or louvre cladding system, and on the other, internally, with adjustable perforated aluminium louvres - is able to seasonally manage the environmental conditions within the building, by filtering or generating light, insulating and extracting air, and alternatively buffering or absorbing sound. It houses service rooms at ground level and provides outside access across the roof to the lighting system and roof panels. Rather than the commonplace of decentralised servicing of Wills Faber, which is displayed as part of the building yet justified by its efficiency, the servicing of the Laboratory Centre, decentralised in a similar manner, is deliberately low key - optimised by the established network service lines in the external elevation, internally the service entrances are similarly disguised as part of the overall consistent louvre network finish. As Foster points, the servicing is sensed rather than visible - magically responding to the changing light levels.¹⁸

The concept of the building as machine has recently favoured architects in the 20th century. The Centre's visible response to the changing external environment brings the building close to re-asserting the Constructivist ideal of an objective architecture of technical function; bearing a striking, if pragmatic, similarity to Maki's Nagai's vision of a 'light architecture'.¹⁹

Foster's container for culture conditions its internal environment discreetly, as a 'seasonably controlled box' - its camera and security system revealed into perforated walls. This stress on security, it could be argued, has had a not insignificant influence both on the siting and organisation of the building (the security system extends into the university grounds). The 'living' area for the collection site atop a concrete retained, excavated basement, whose presence speaks of the immense facility of the infrastructure. Foster, talking of his visit to Louisiana museum outside Copenhagen (with the Laboratory while researching the project), was impressed by the 'social ingredient' of the place: 'everybody was there, everybody was enjoying it, the kids were there, the old age pensioners were there. It was a great flat place - when you was also very exciting were the displays, which were not over-prominent, were really enjoyed...'.²⁰ While enjoying the relaxed atmosphere, he deplores the lack of attention to servicing and security:

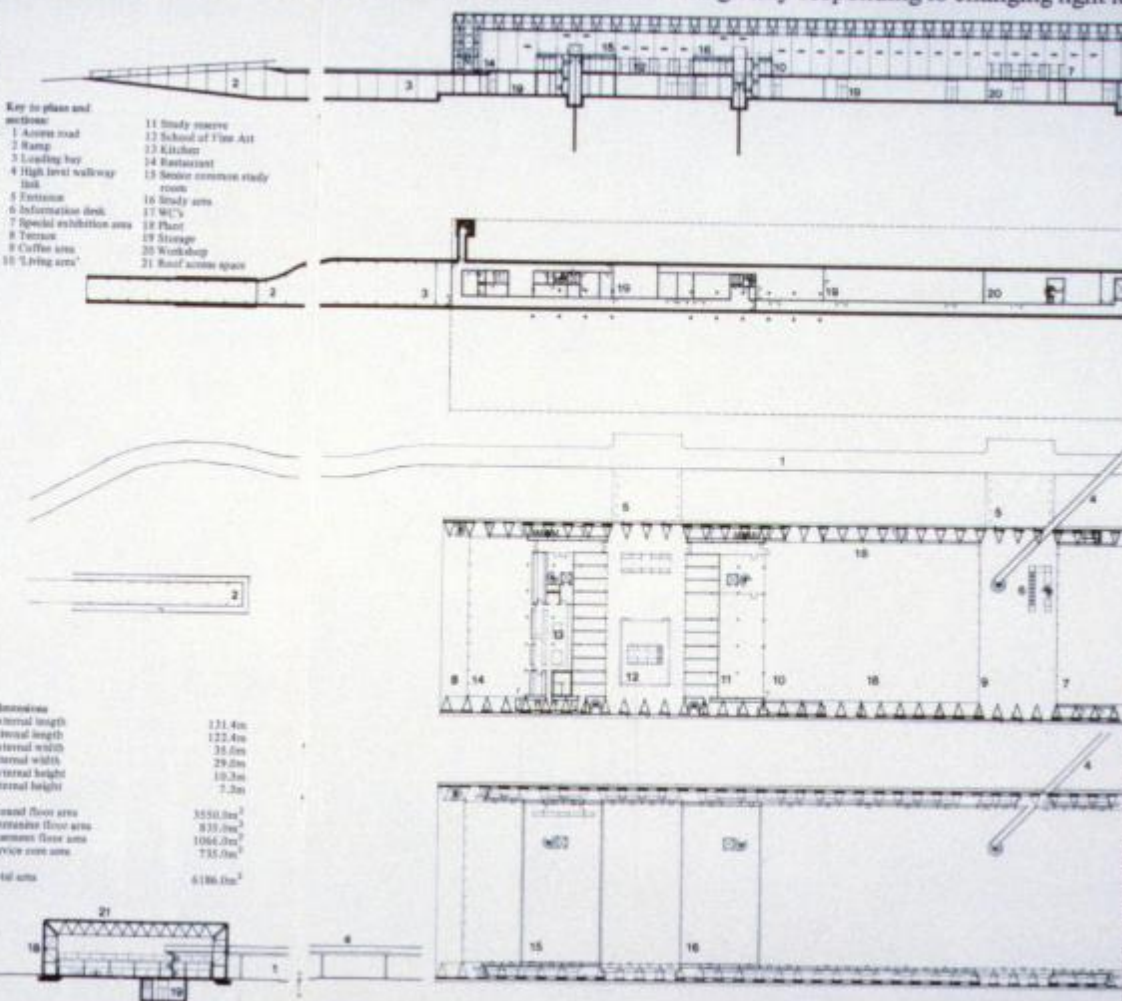
... their negative facilities - if you almost never, you really get that with a screw driver you could have repaired the whole place up and where whatever was in storage away... if they had a Japanese exhibition which was due to come that week, and they were in a terrible state, they were going to have a container truck outside in the street and they were wondering how to get security between the street and this particular display how in such a way they can move their position across from the container into the building itself!²¹

The Laboratory Centre solves the dilemma by taking underground its service entrance for moving

ing is sensed rather than visible - magically responding to changing light levels

Key to plans and sections

- | | |
|---------------------------|--------------------------------|
| 1 Access road | 11 Study reserve |
| 2 Ramp | 12 School of Fine Art |
| 3 Loading bay | 13 Kitchen |
| 4 High level walkway | 14 Restaurant |
| 5 Hub | 15 Service entrance study room |
| 6 Entrance | 16 Study area |
| 7 Information desk | 17 WC's |
| 8 Special exhibition area | 18 Plant |
| 9 Terrace | 19 Storage |
| 10 Coffee area | 20 Workshop |
| 11 'Living area' | 21 Roof access space |



Dimensions

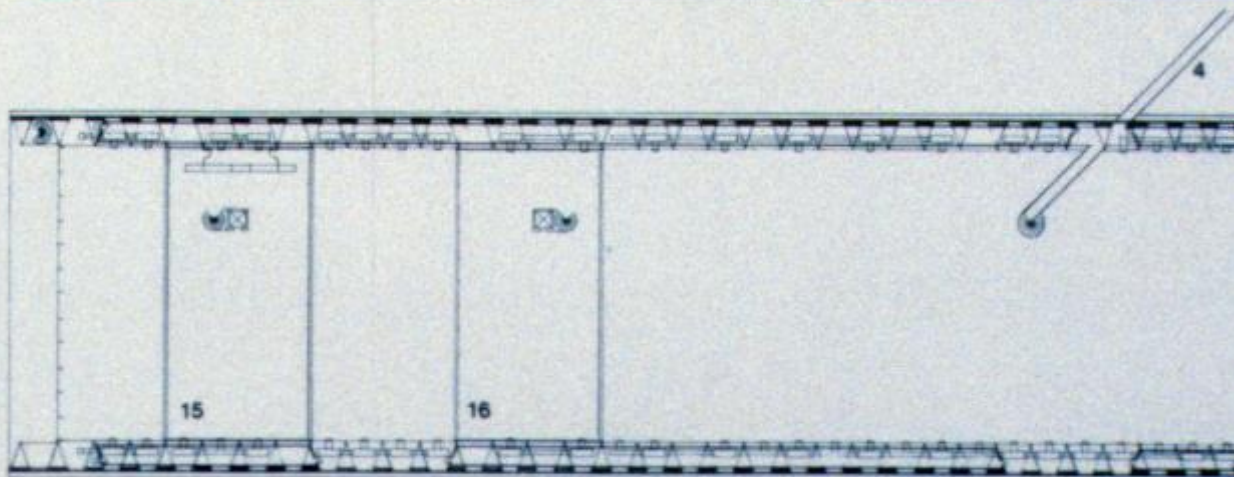
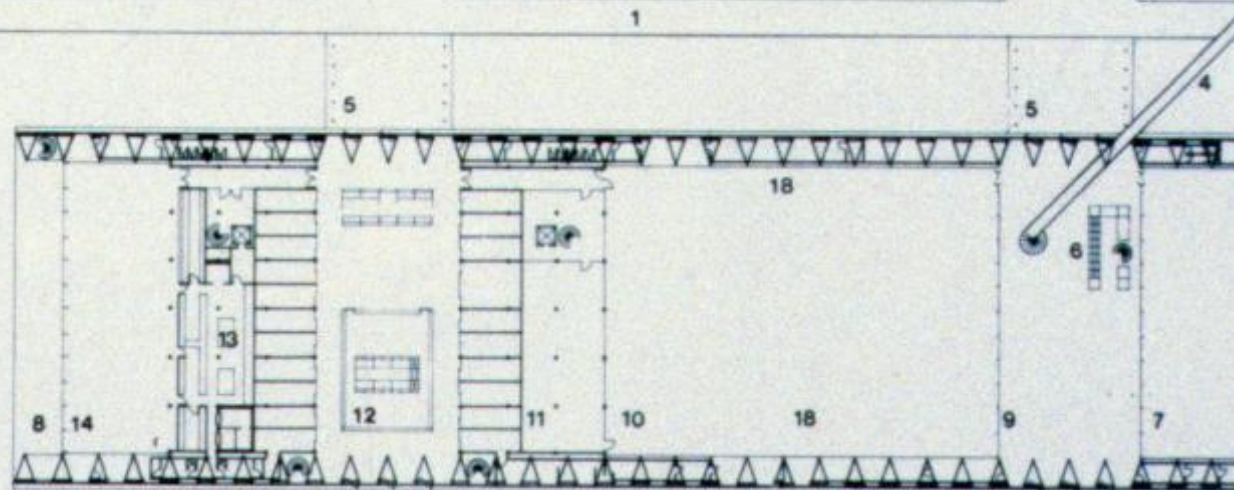
| | |
|-----------------|--------|
| External length | 121.4m |
| Internal length | 122.4m |
| External width | 35.6m |
| Internal width | 29.0m |
| External height | 10.2m |
| Internal height | 7.2m |

Ground floor area

| | |
|---------------------|----------------------|
| Maximum floor area | 3550.0m ² |
| Business floor area | 830.0m ² |
| Service core area | 1064.0m ² |
| Service core area | 735.0m ² |

Total area

| | |
|--|----------------------|
| | 6186.0m ² |
|--|----------------------|

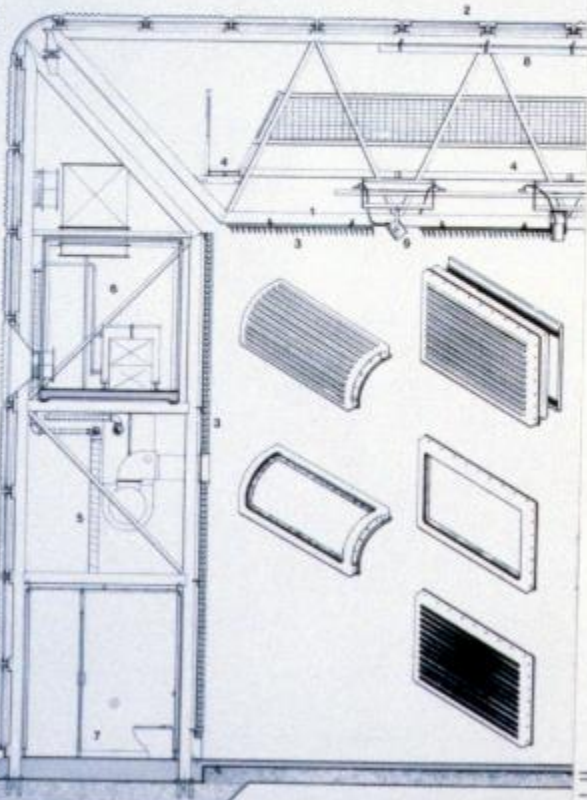
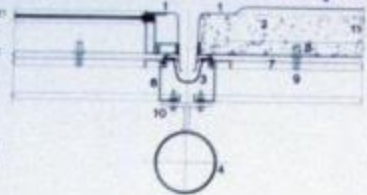


strained by an insistence on discreet hidden services in the spirit of a living room environment rather than a climate controlled vault for works of art

...ing exhibitions and deliveries. From the end a spiral staircase is cut into the ground away from the building, and ramped down to the basement. Lined with proper landing systems, doors have many of the characteristics of insulation - indeed with 1.5 million ft. lb. is not entirely a trivial compulsion - back up against a half-level landing deck only in front of the works down. Behind, the basement corridor, capable of being cut off way along its length, provides access to working works of art, to a hydraulic lift at the end of the building (concealed as part of the temporary exhibition space). The basement is linked to the world above by transport lifts and linked around. However it functions quite as a security device ensuring the safe of valuable works of art - it is not intended for long-term storage, as the items are in the main exhibition area are kept in the security program in the adjacent study. It is only security areas, perhaps, since the security comes in the 'bring' sense that the domestic aspect of this space holds different physical organization and security that are linked into the building. Some mundane level the main service building is the restaurant kitchen located on the 1st floor. It is the one major internal space of storage in the gallery with a view of the building. Efficiently serviced in terms of its somewhat restricted and interconnected plan (compared with the apartment) is provided on the roof of Faber, apparently constrained by an extensive location serving as a whole, however, the spirit of a living room environment in a climate controlled vault for works of art is substituted, and relies on the engineering of the ventilation system, the broad diameter of floor angles, and the screens, reflective and highly insulated in the building envelope.

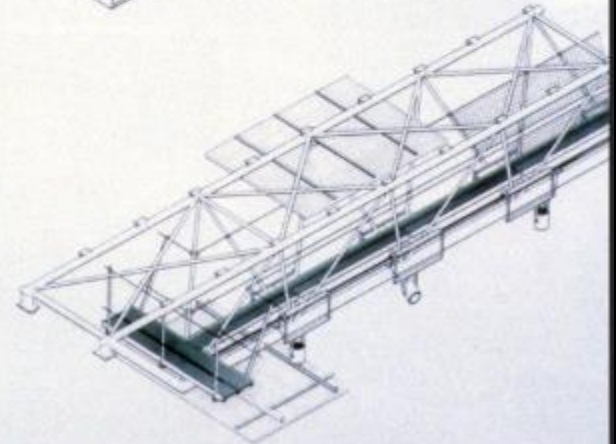
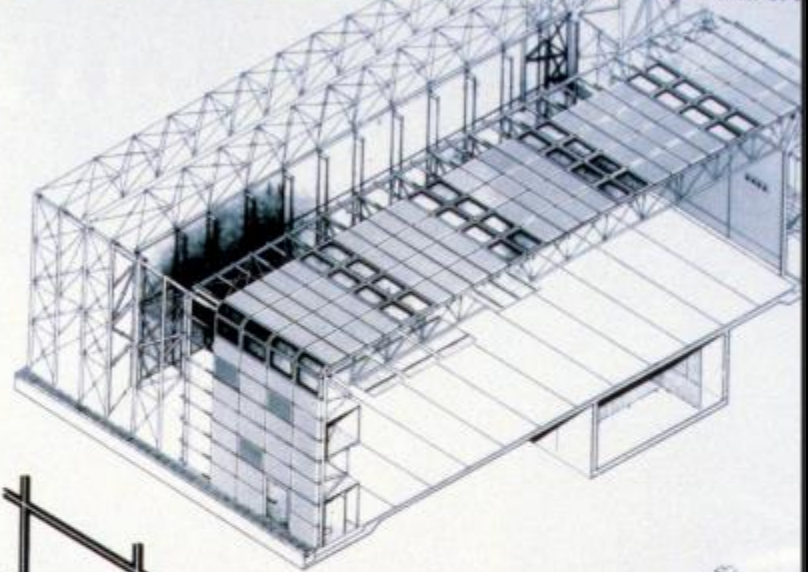
... a limitation of efficient and separate of delivery and security, measured by and discreetly requiring land trying on environment, the location appears as an (local environmental modification) of the space viewed through the glazed end of the art installation environment of the building. Significantly the drawings for the work based not in the open, or the (humble) security house). Notably the working mechanism is not a fixed or it is open to modification and change for the building's climate system, but the of that flexibility has to take account the organization and use of the building.

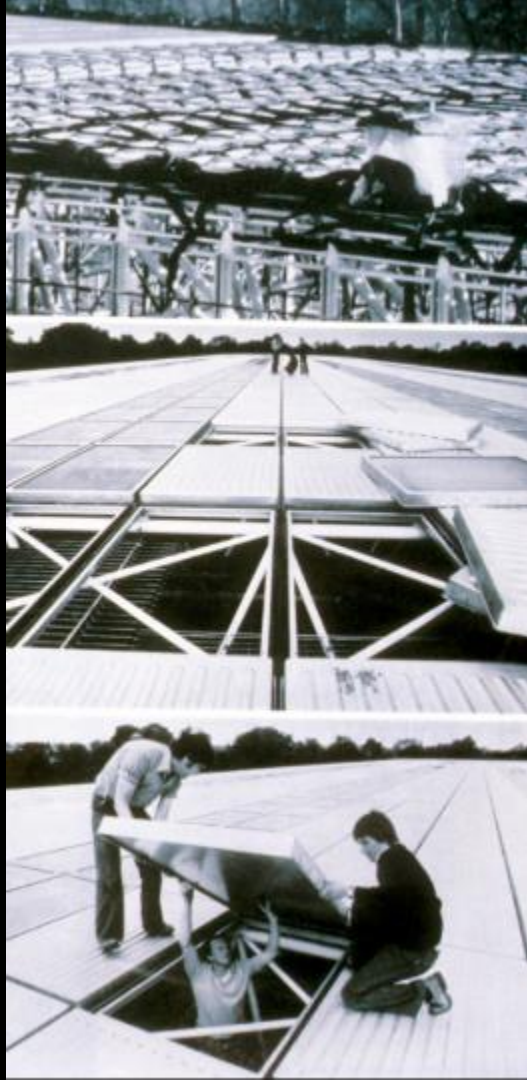
- Typical cladding panel key:
- 1 Aluminium outer skin
 - 2 Insulation core
 - 3 Suspense ladder gasket
 - 4 Tubular steel frame
 - 5 Laminated glass
 - 6 Expanded extruded aluminium substrate
 - 7 Aluminium inner skin
 - 8 Nut and bolt fixing
 - 9 Stainless steel screws
 - 10 Stainless steel nuts and bolts
 - 11 Aluminium channel stiffener



- 1 Plant
- 2 All services plant, darkrooms, WC's, store
- 3 Security
- 4 Solar controlled aluminium louvers
- 5 Combined artificial and natural top light
- 6 Cast aluminium grille
- 7 Gutter
- 8 Display screens
- 9 Display cases

ing room environment rather than a climate controlled vault for works of art

















Maret Mellis

in Colour

true downstairs →

ing Norfolk

g...The Art of Creation





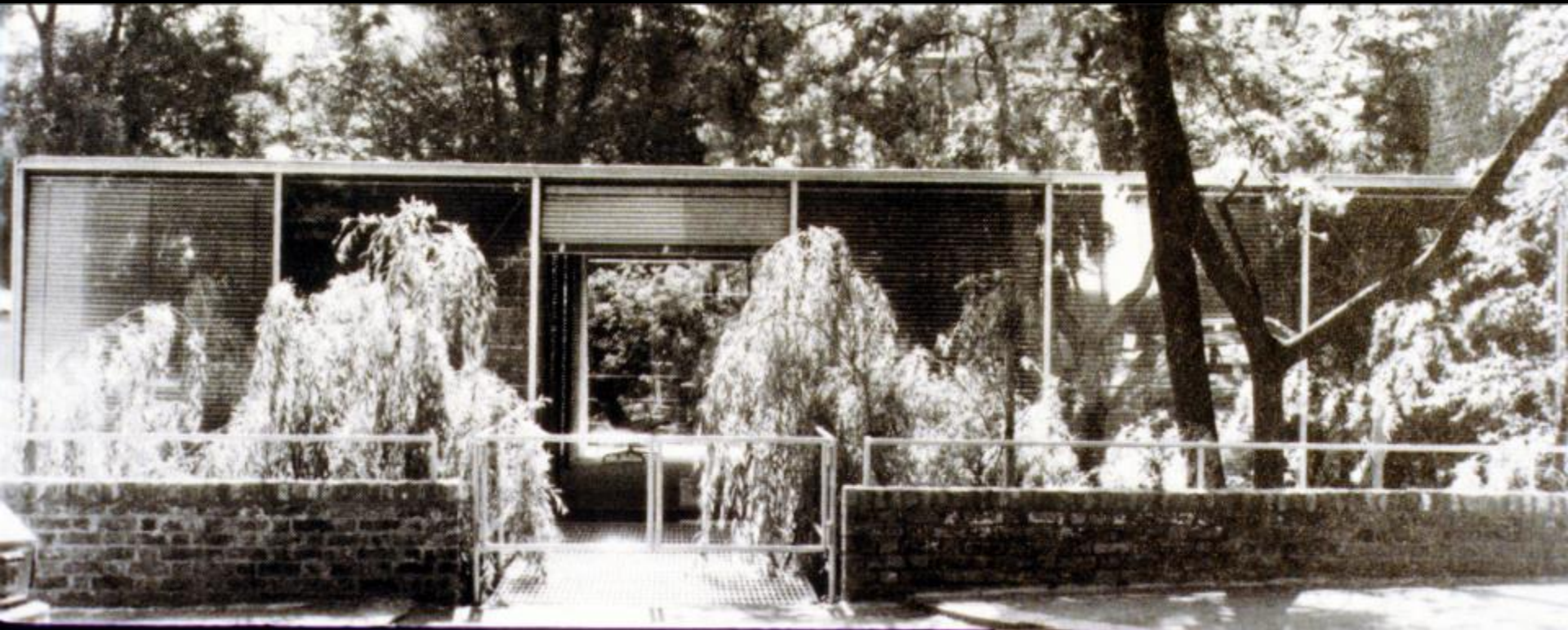






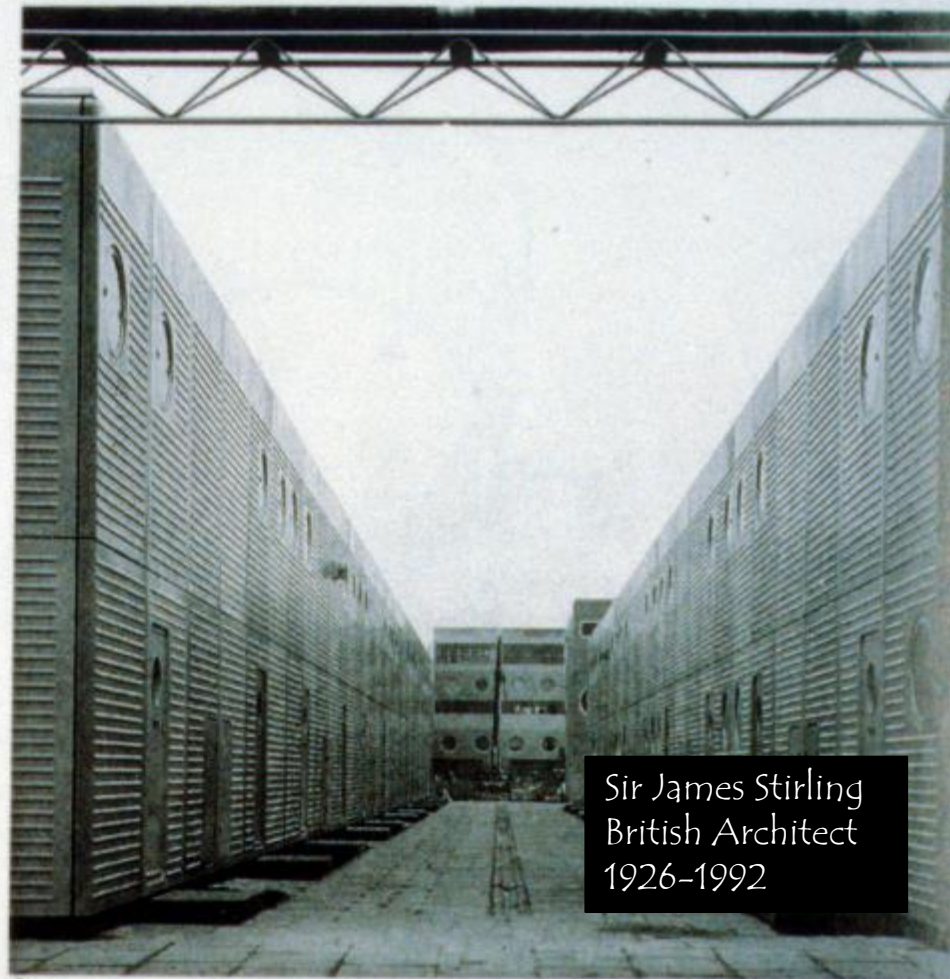
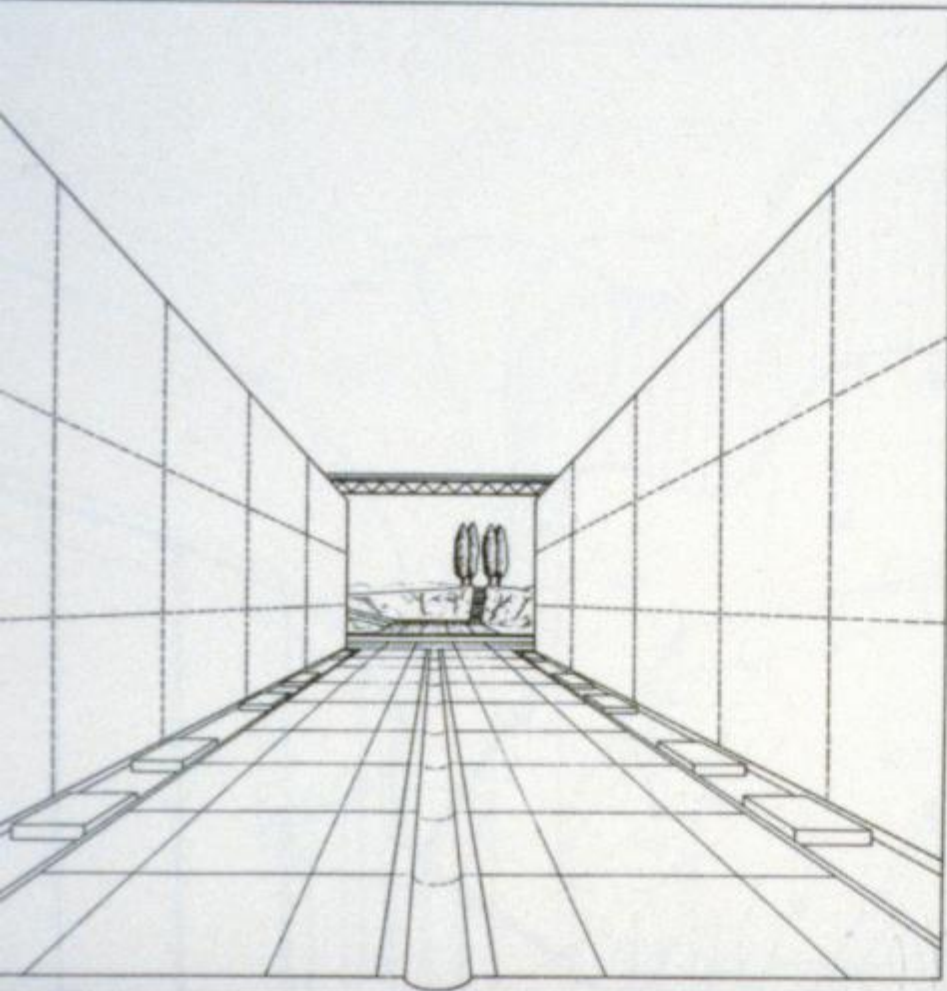
High Tech design approaches vary based on the choice to create custom components or use standard off-the-shelf materials

The historian Reyner Banham referred to these early buildings as "serviced sheds" as they exposed the structure and also all of the mechanical systems.

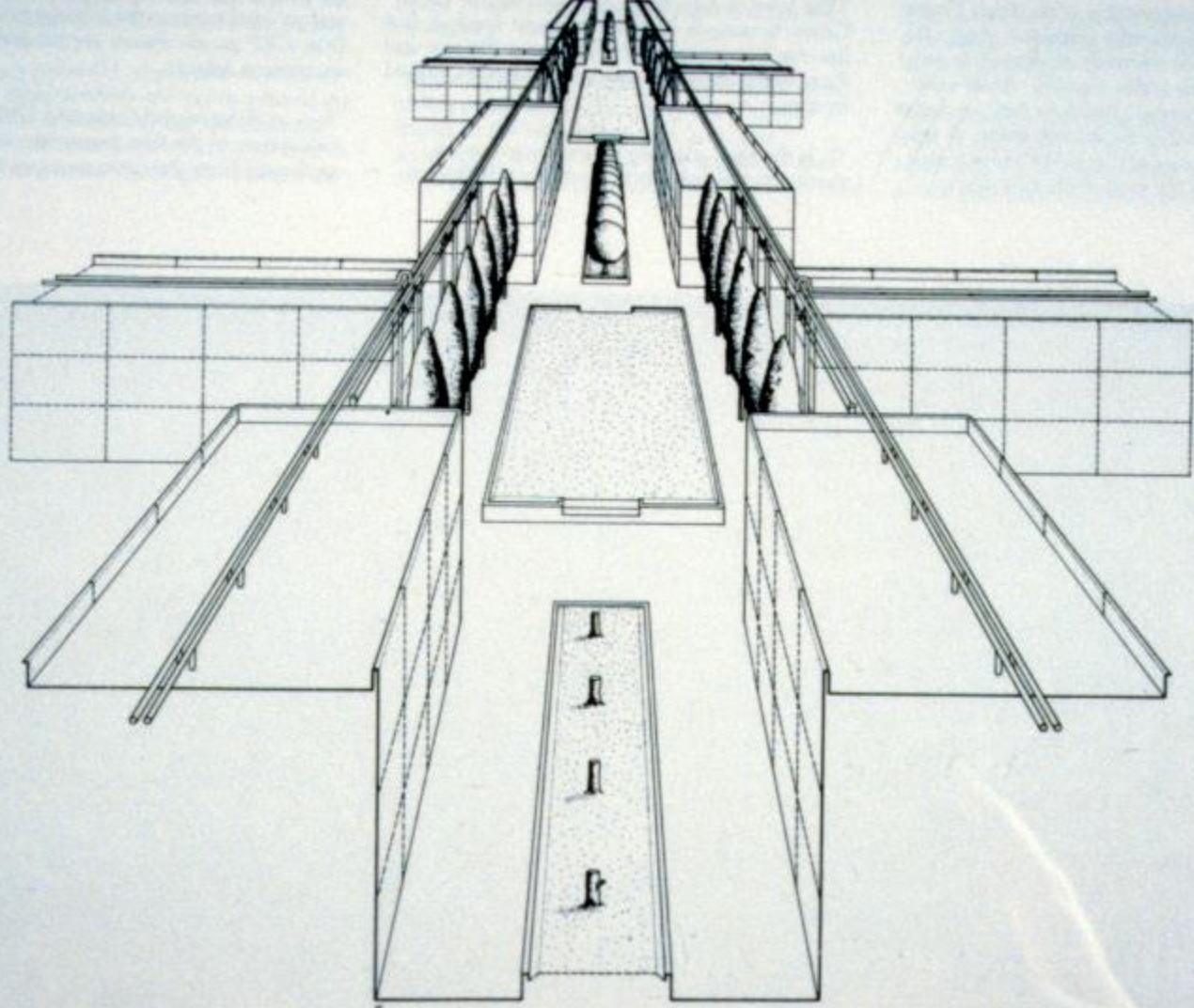


Residence
Michael Hopkins
1976





Sir James Stirling
British Architect
1926-1992

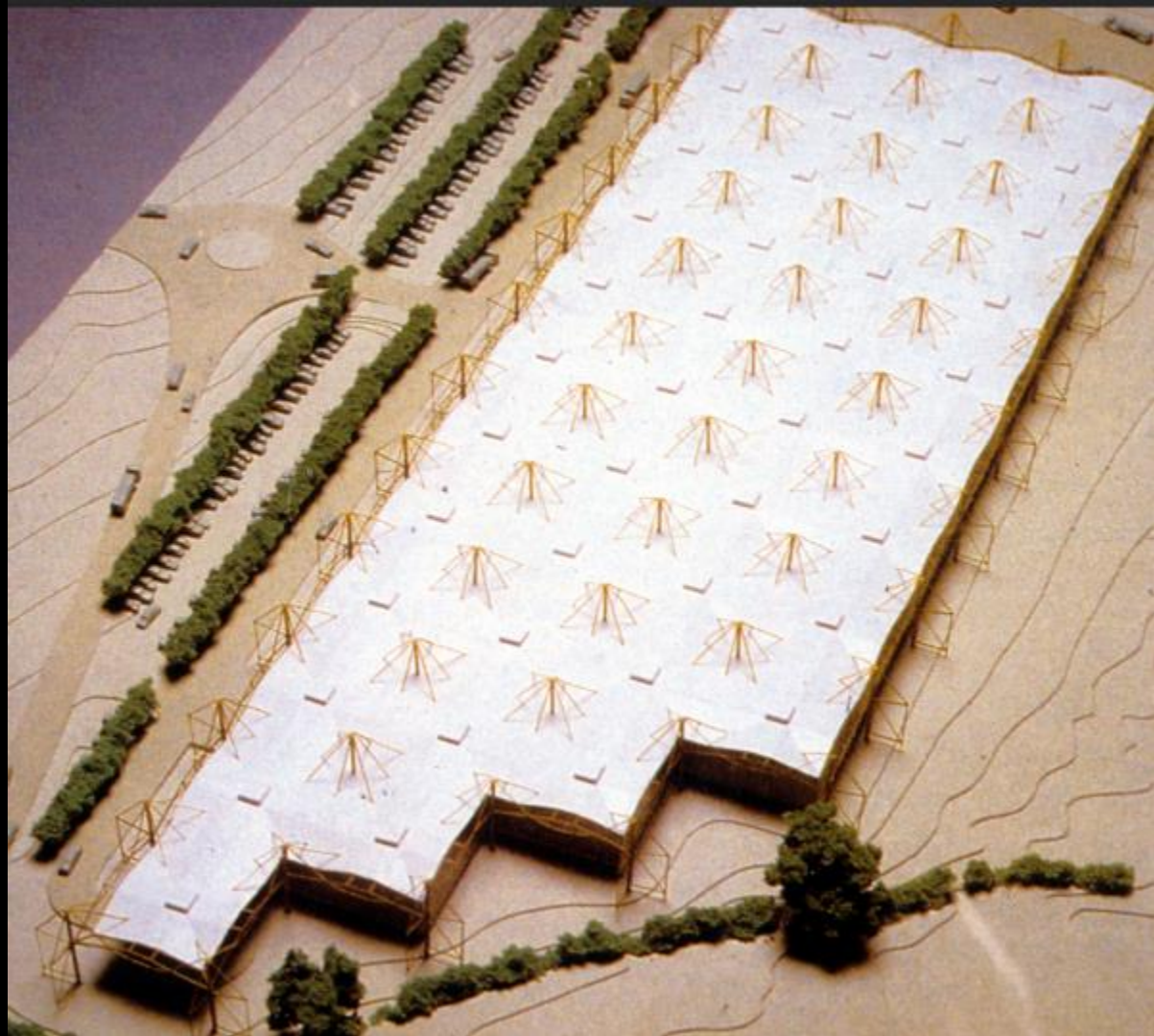


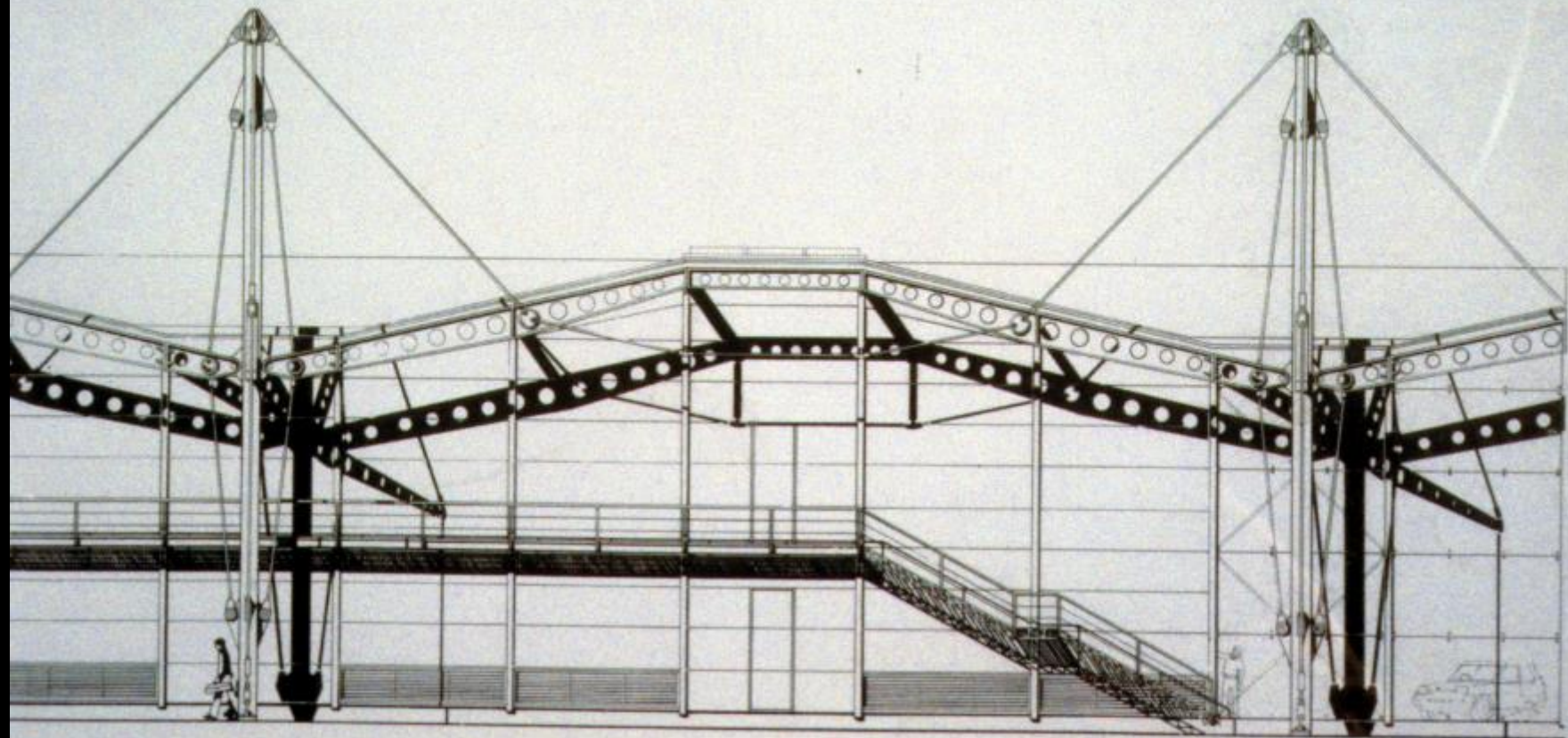


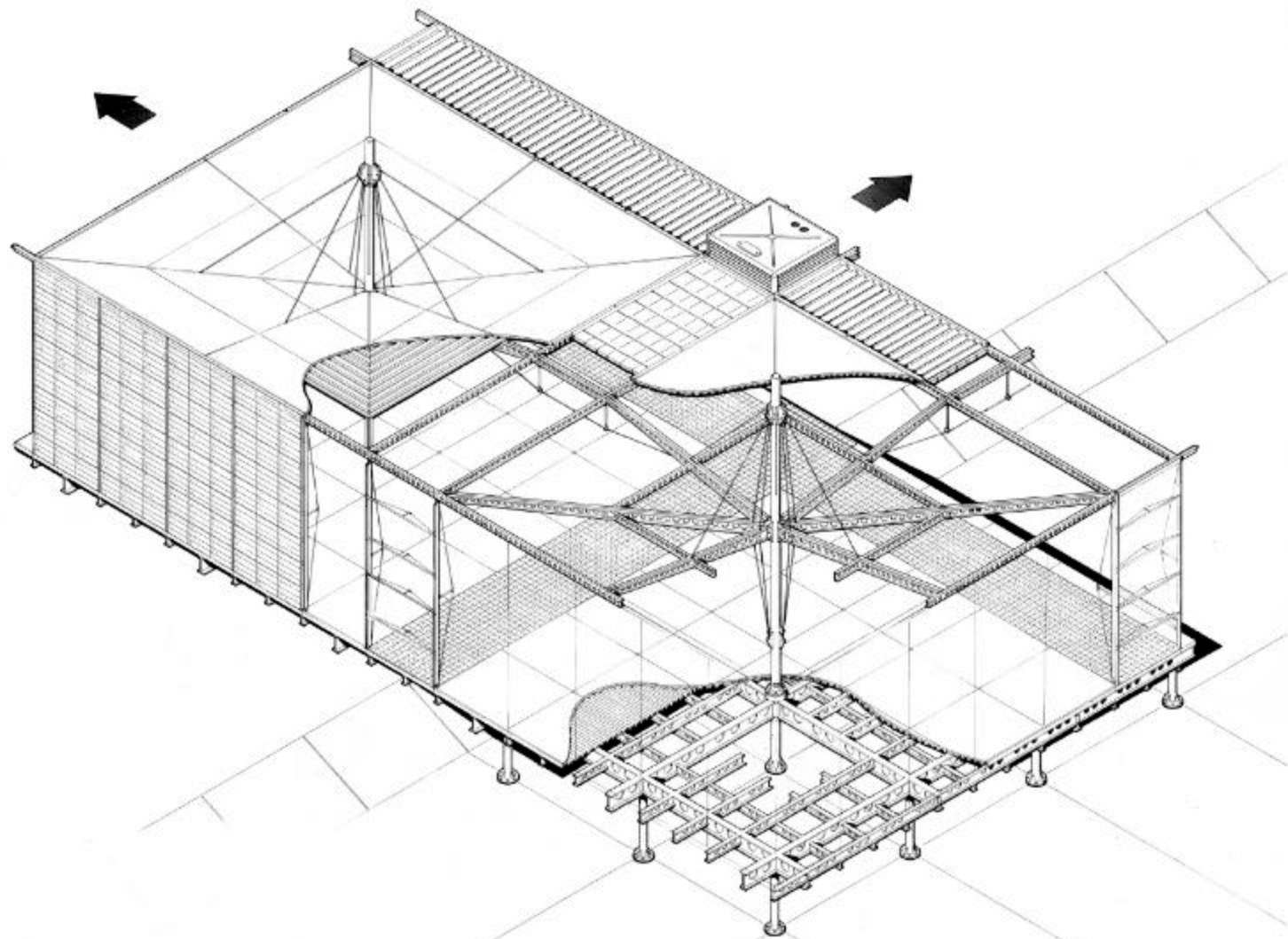


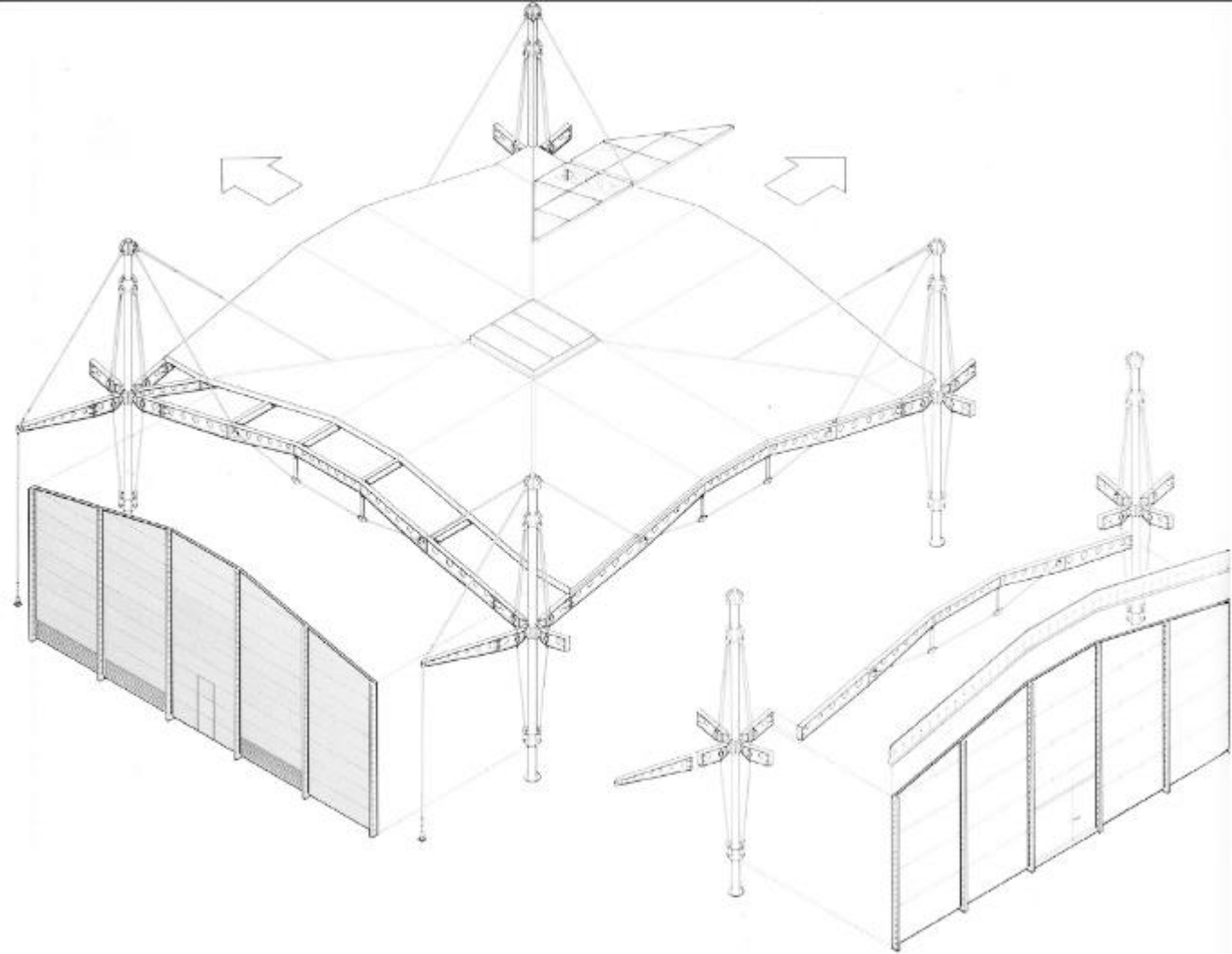


Renault Centre
Swindon, UK
Foster Associates
1982





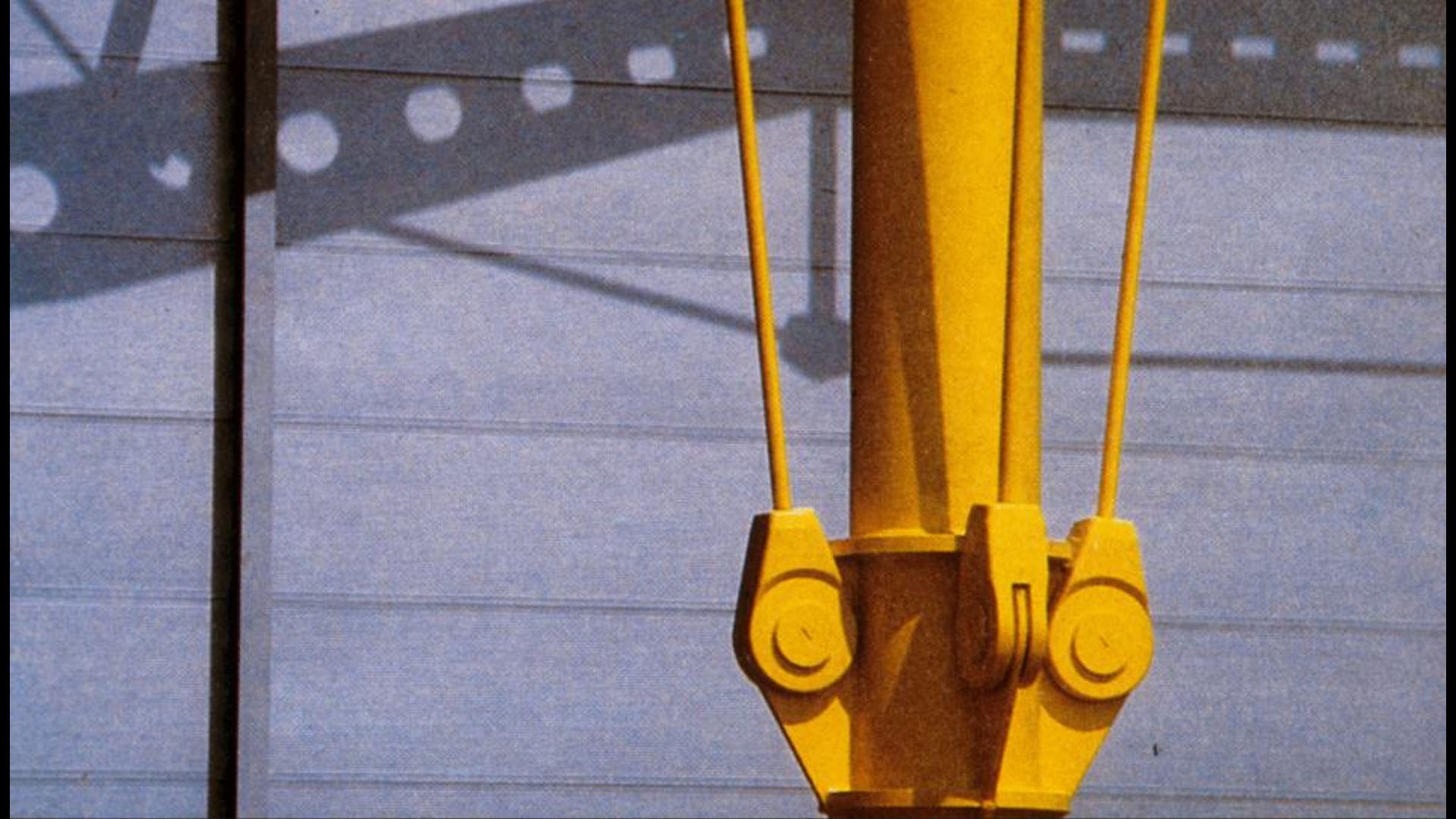












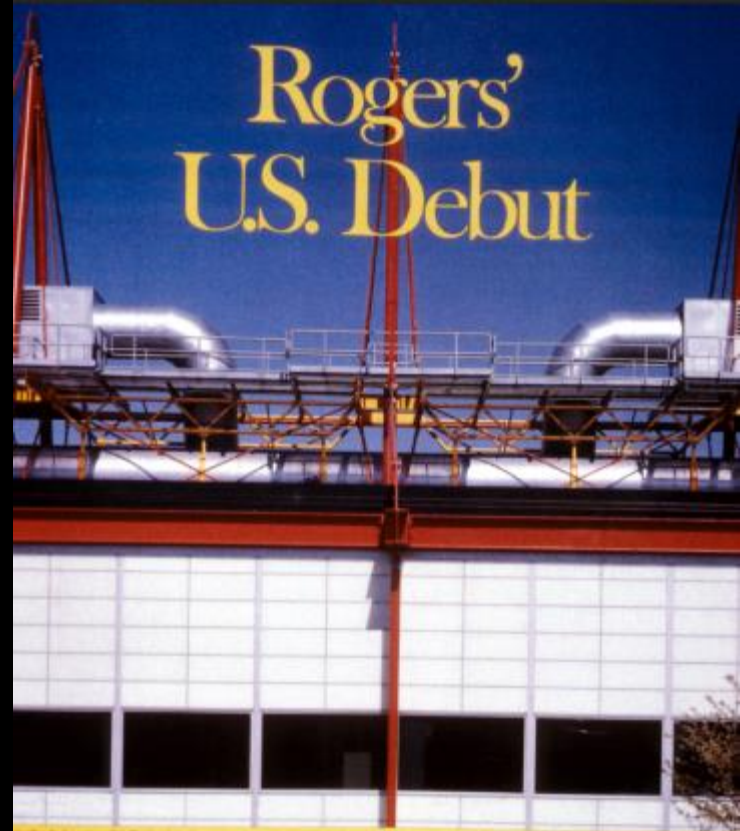
Progressive Architecture

AUGUST 1988



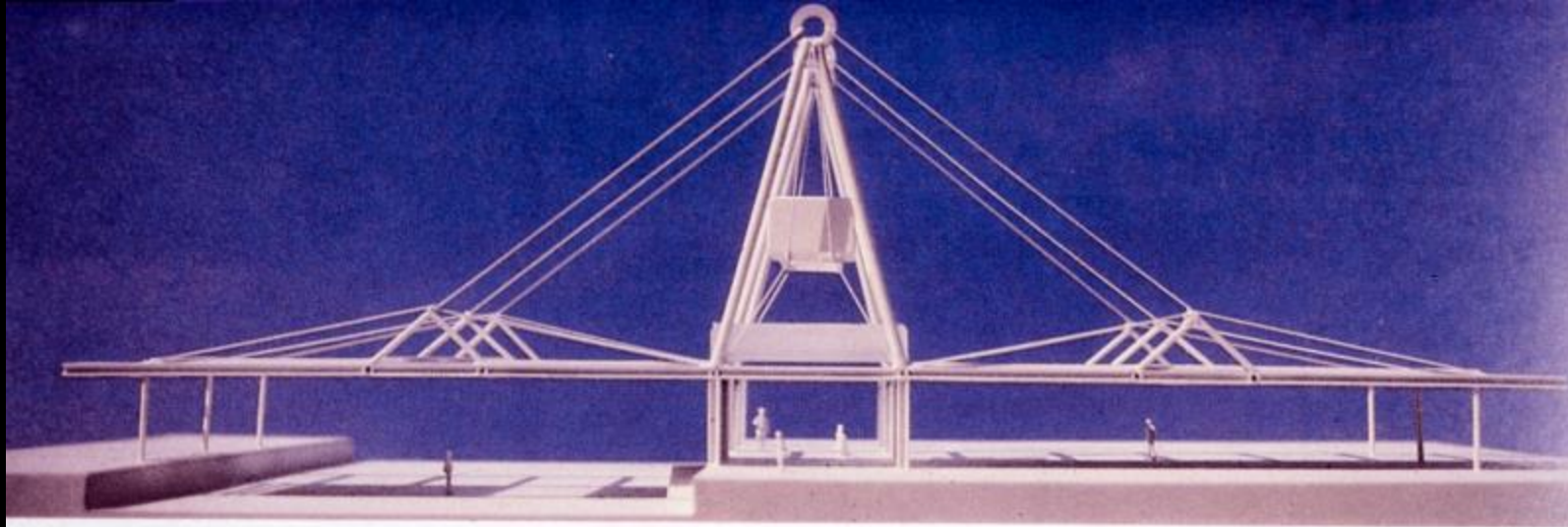
PA Technology
Hightstown, NJ
Richard Rogers
1985

Rogers' U.S. Debut

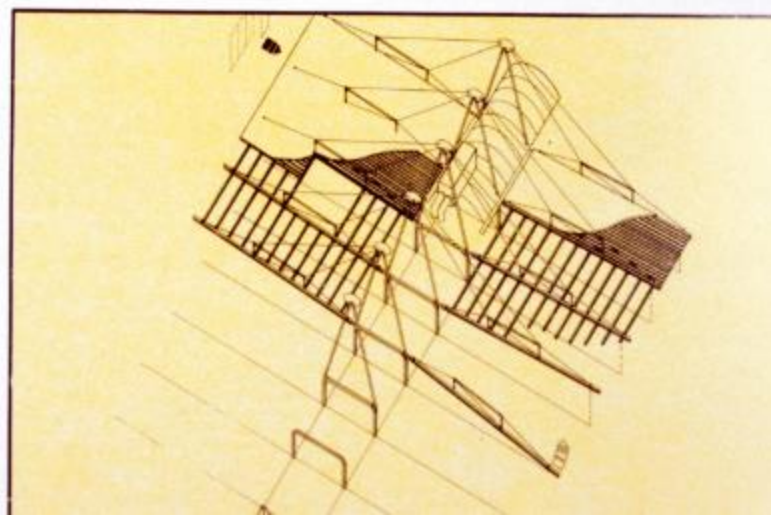


Continued discussion, PA Technology Covers.

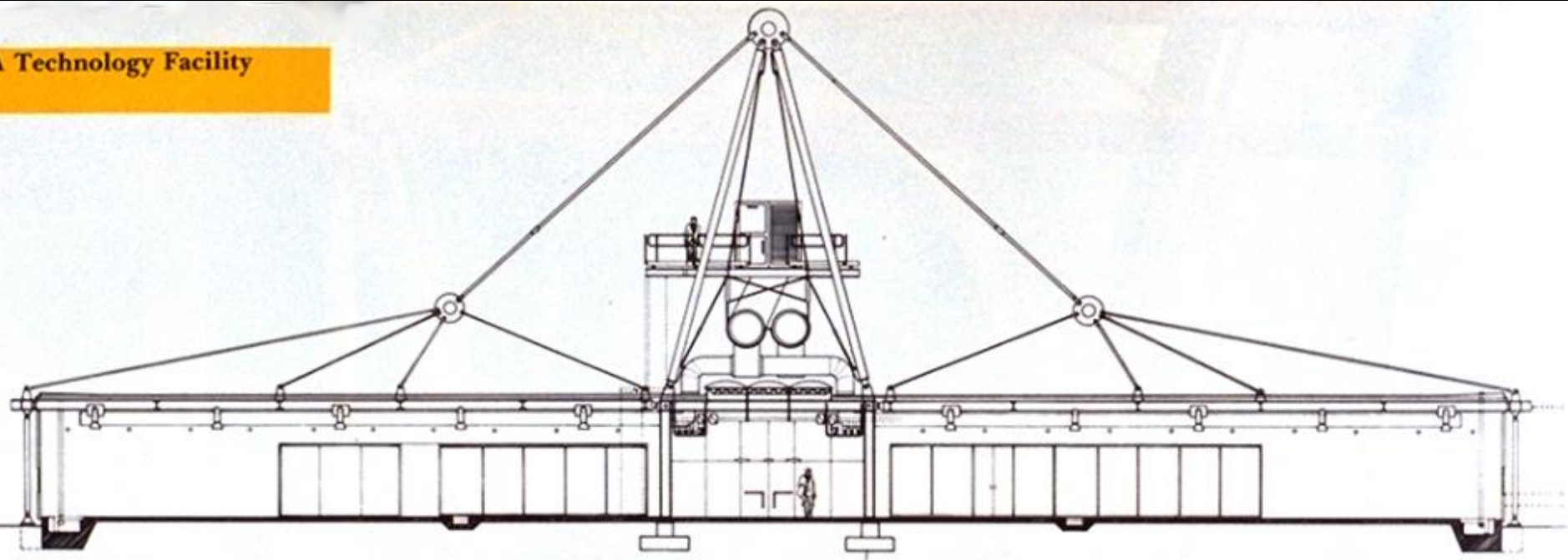
The PA Technology Facility in Hightstown, N.J. is the first work in the U.S. by British architect Richard Rogers, with Kelbaugh & Lee of Princeton, N.J.



Model of structure

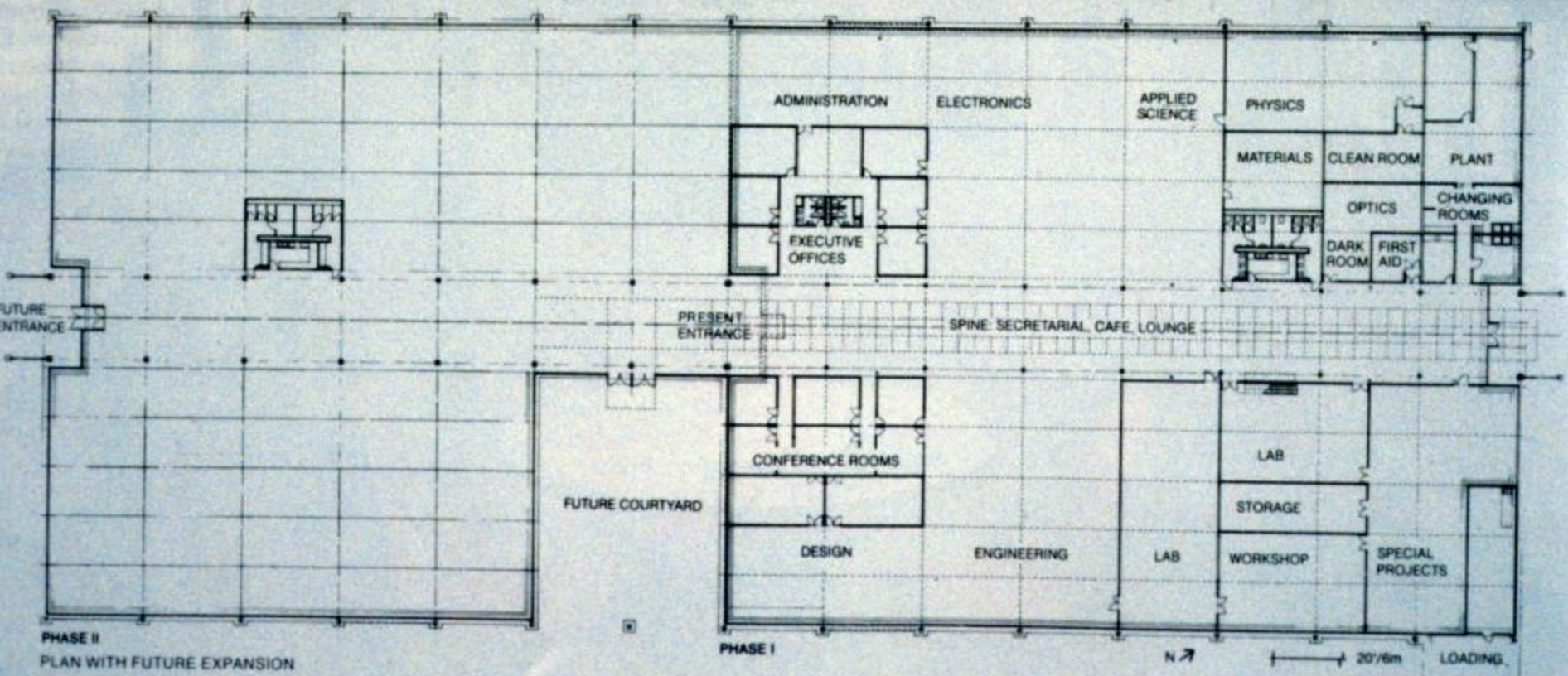


PA Technology Facility



CROSS SECTION

40' 10"



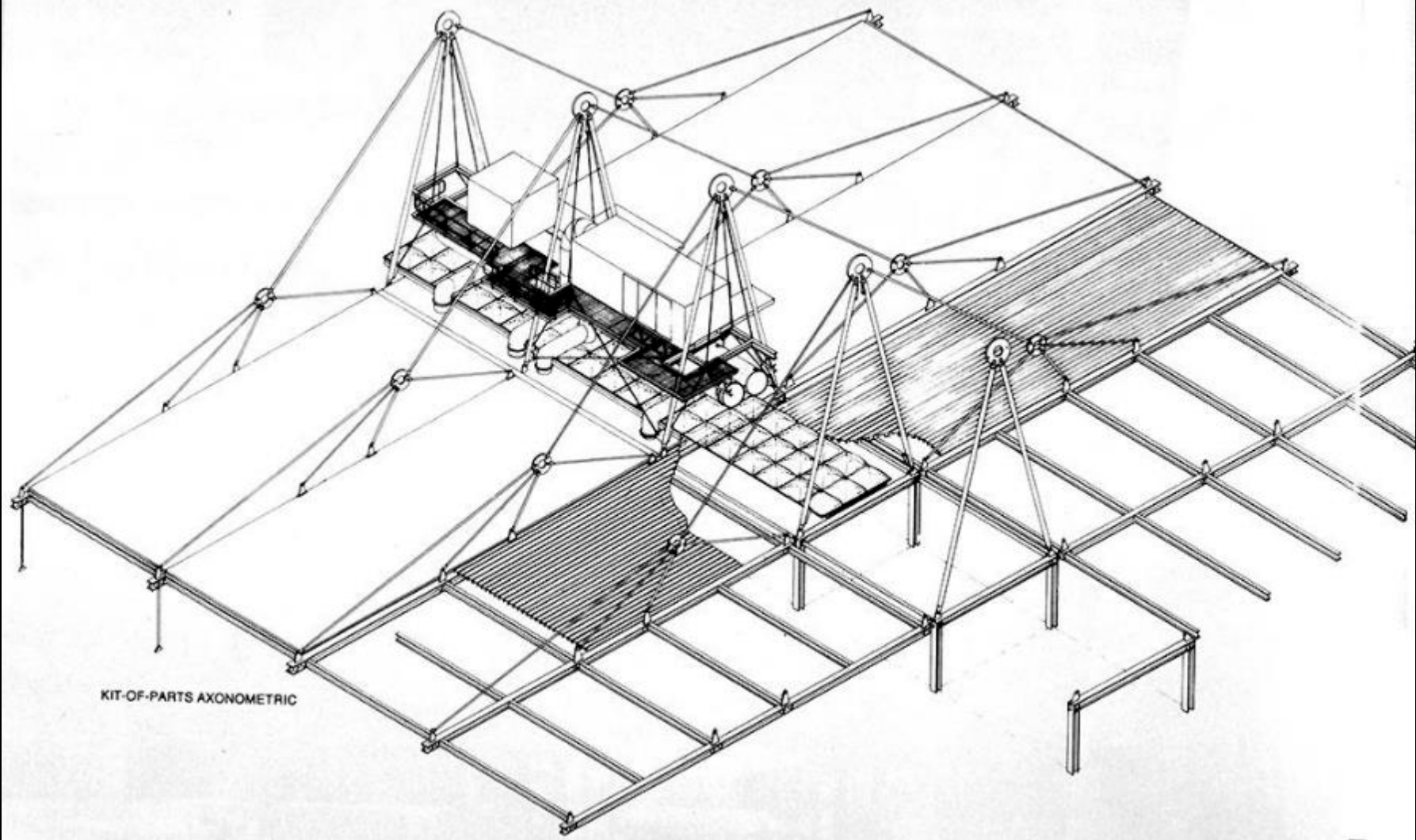
PHASE II
PLAN WITH FUTURE EXPANSION

PHASE I

N ↗

20/6m

LOADING



KIT-OF-PARTS AXONOMETRIC

Hightstown, NJ

Building a modern, state-of-the-art facility for the production of a finished product is the challenge of the modern manufacturer. The design and construction of a modern facility, and the integration of modern systems, and equipment is a challenge. The design and construction of a modern facility, and the integration of modern systems, and equipment is a challenge. The design and construction of a modern facility, and the integration of modern systems, and equipment is a challenge.



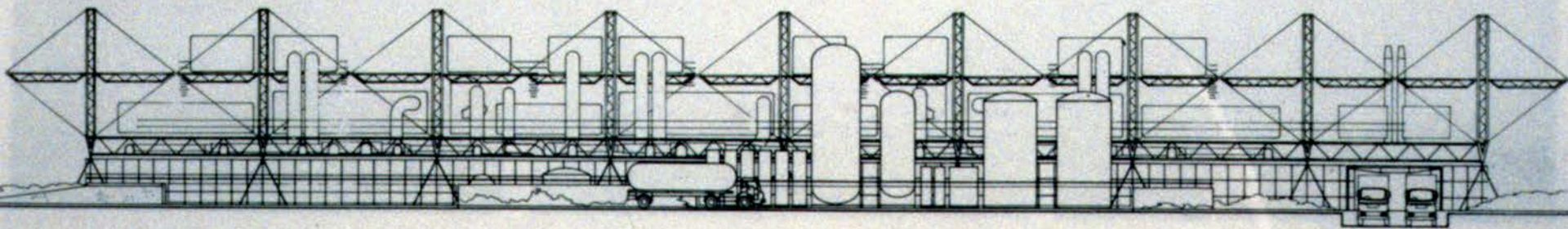
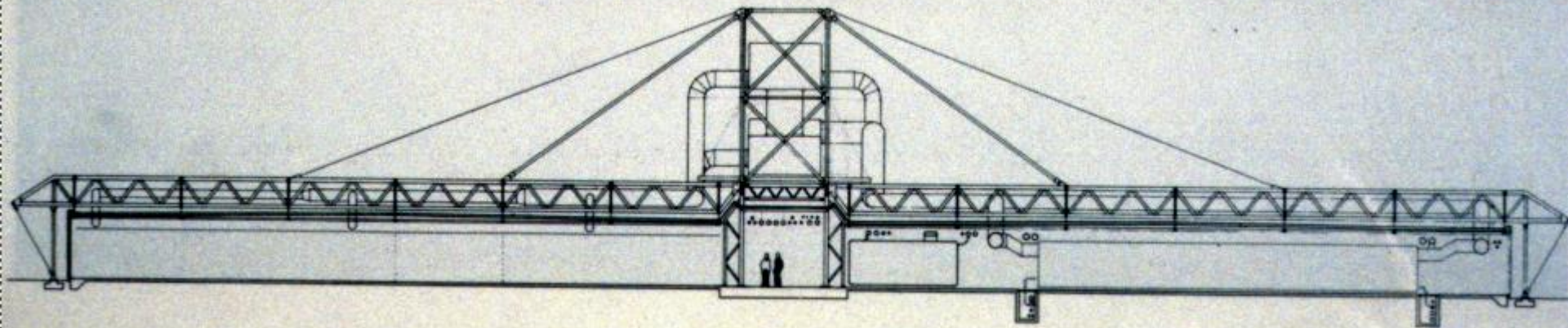


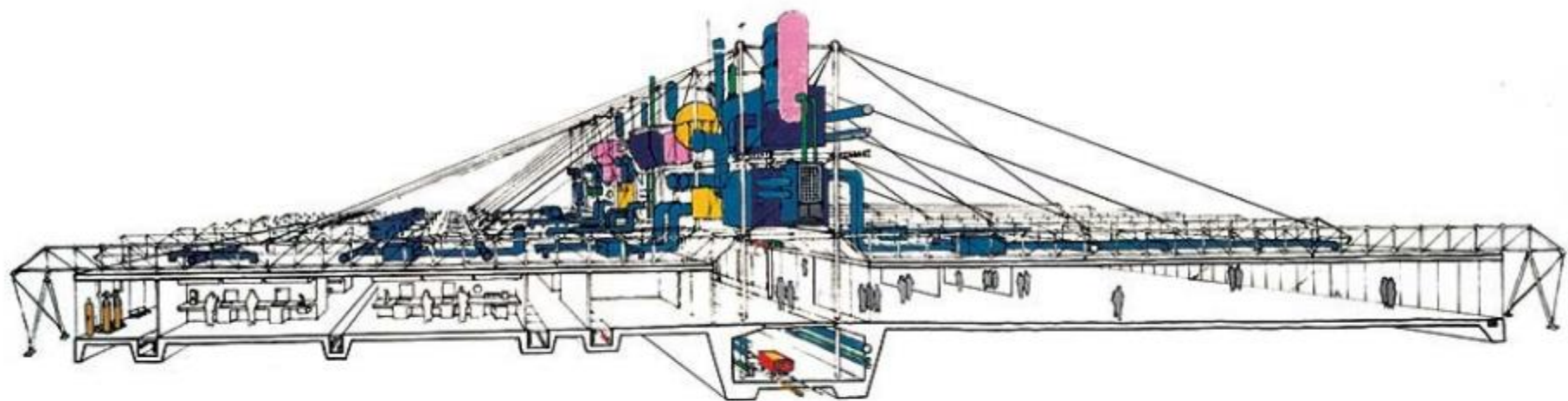


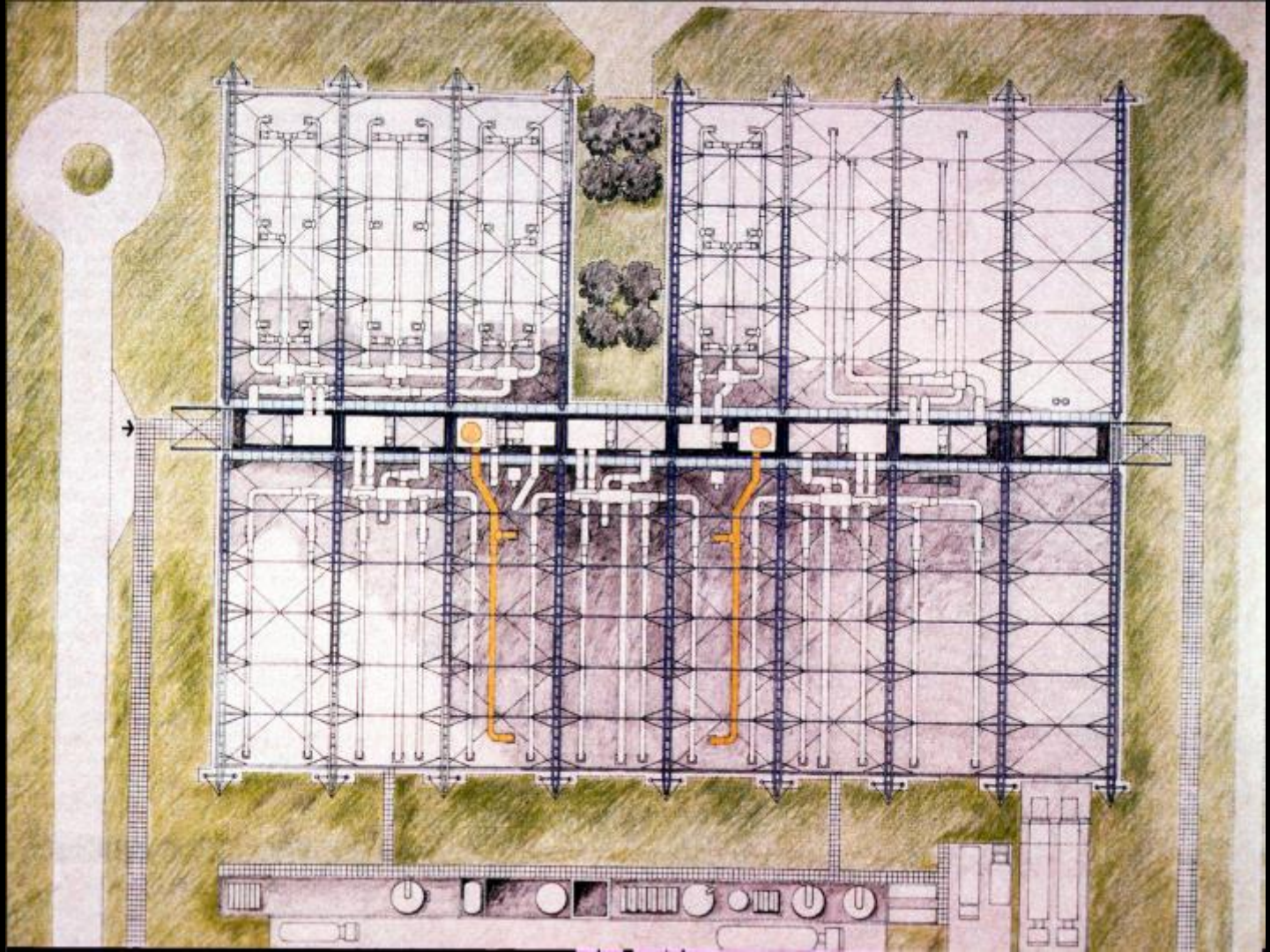


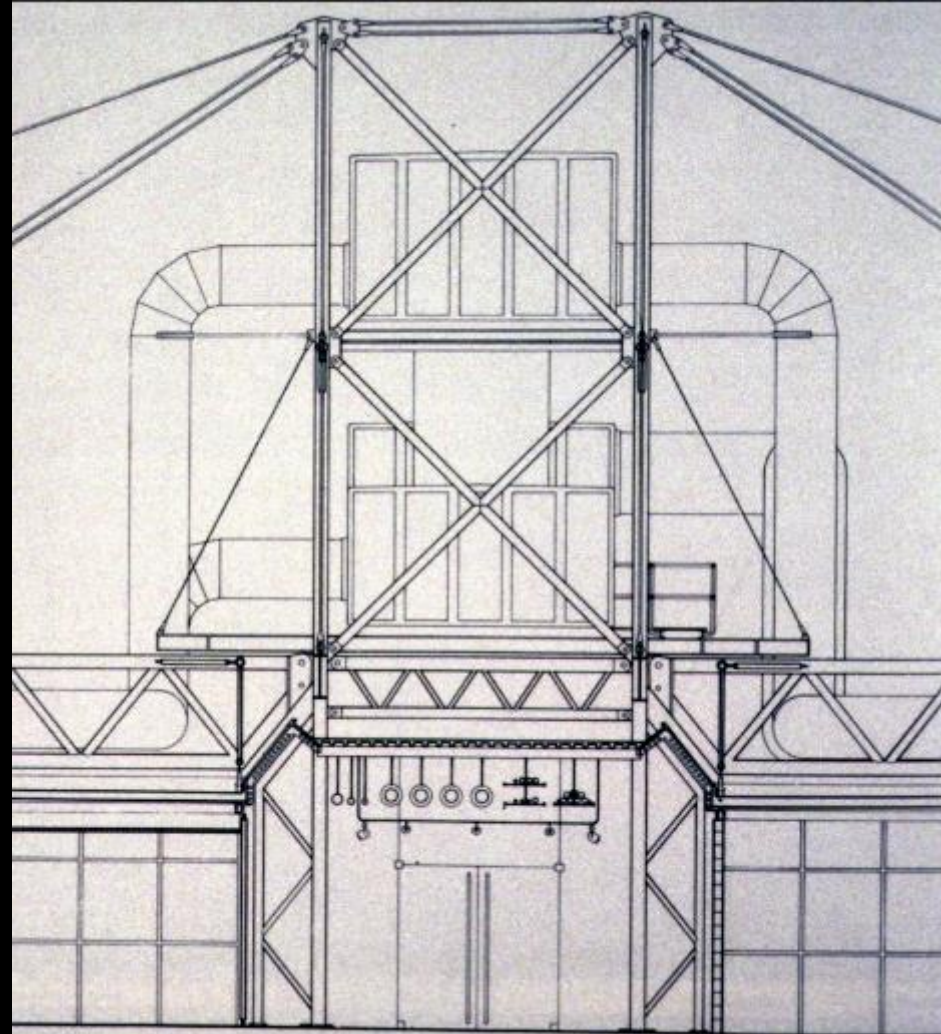


Inmos Technology
Newport, Wales
Richard Rogers
1982

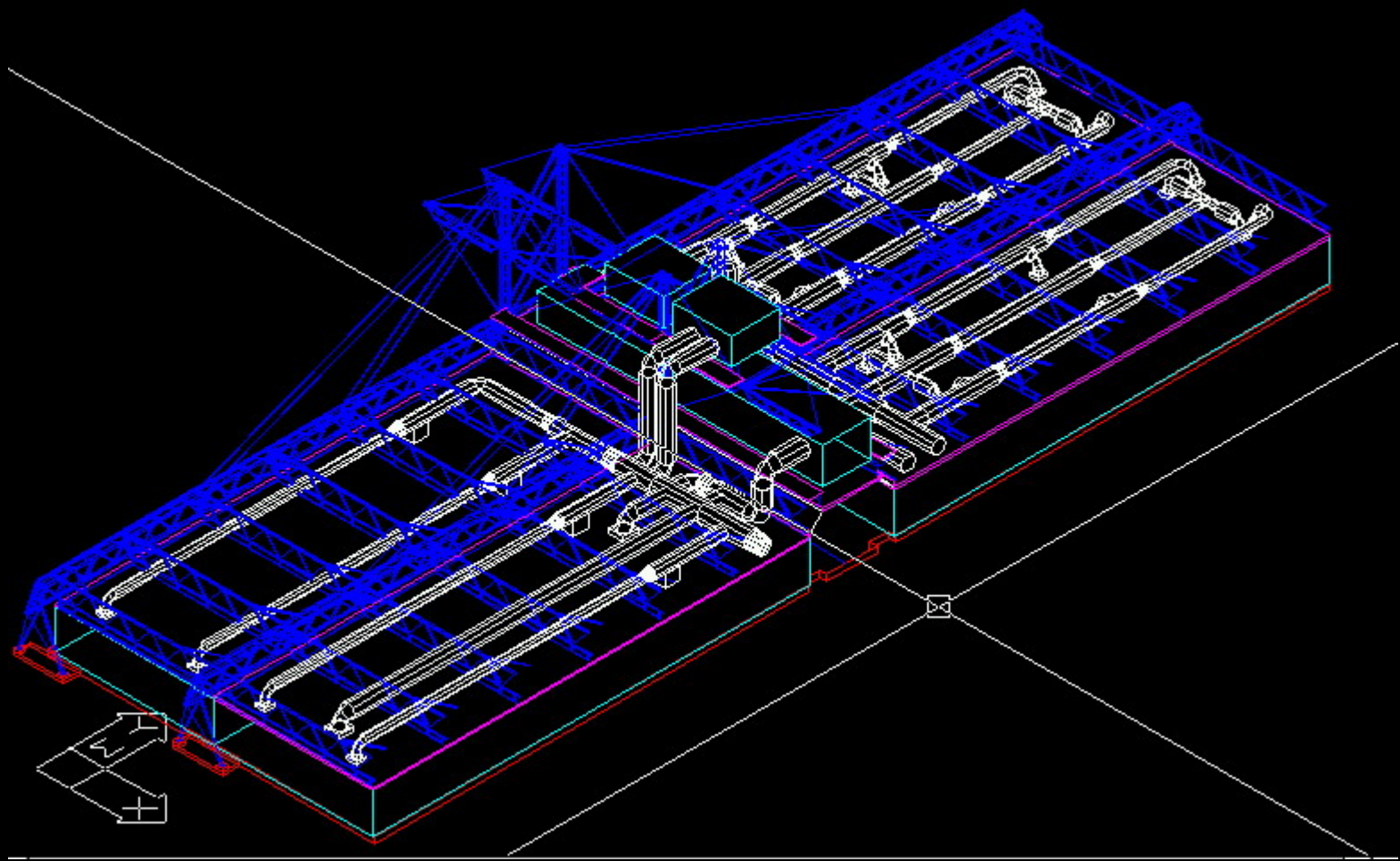


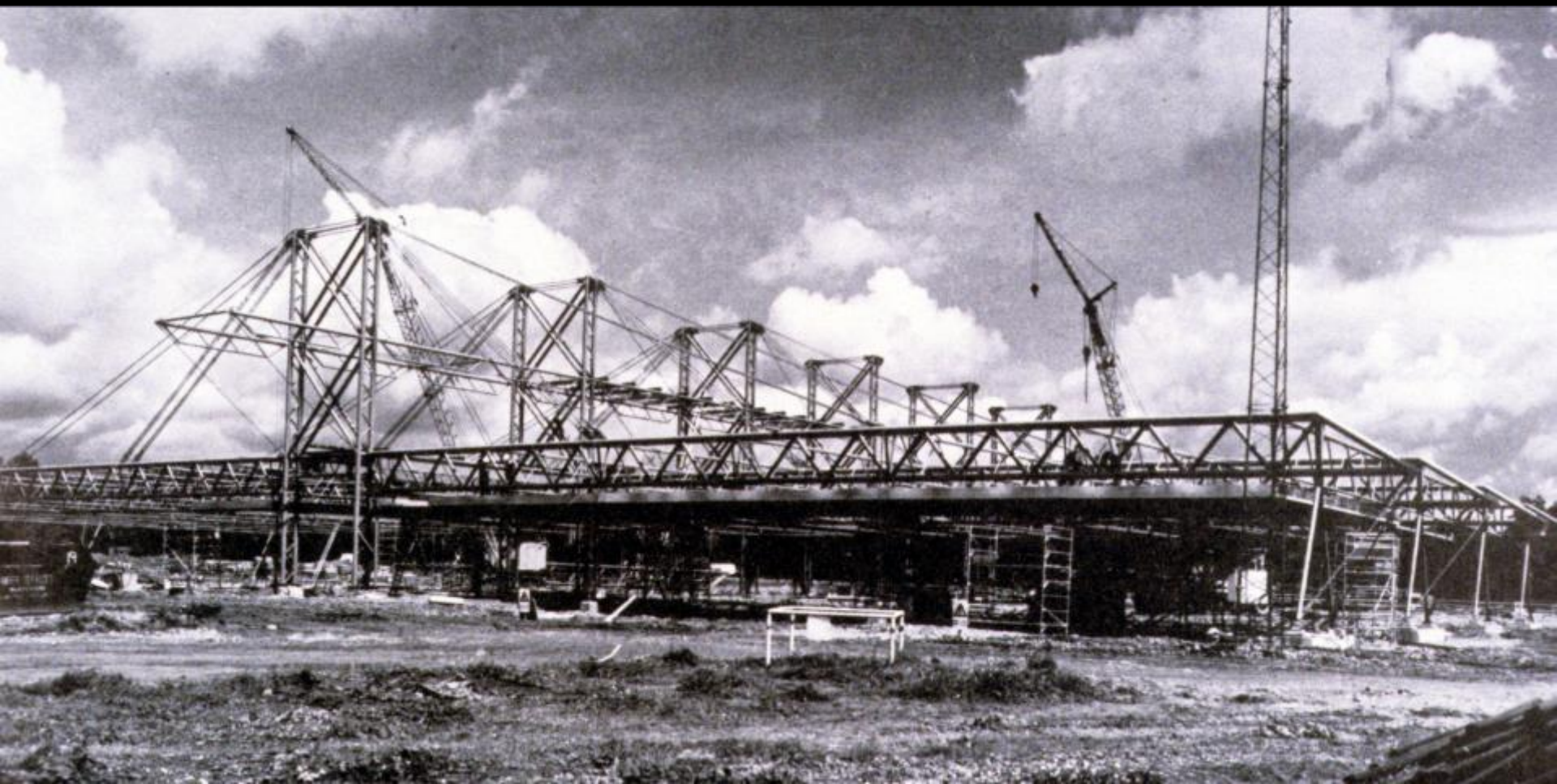






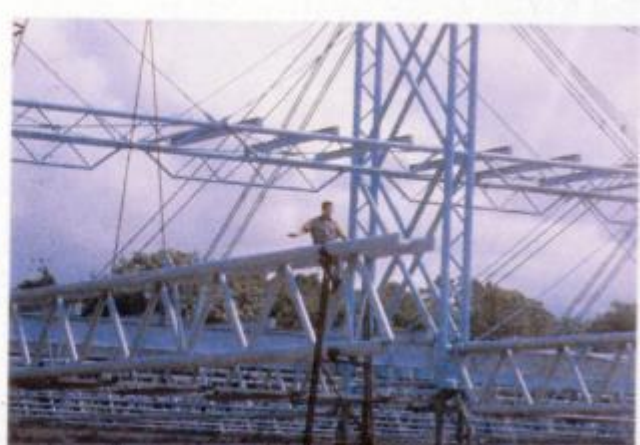
Detail of elevation



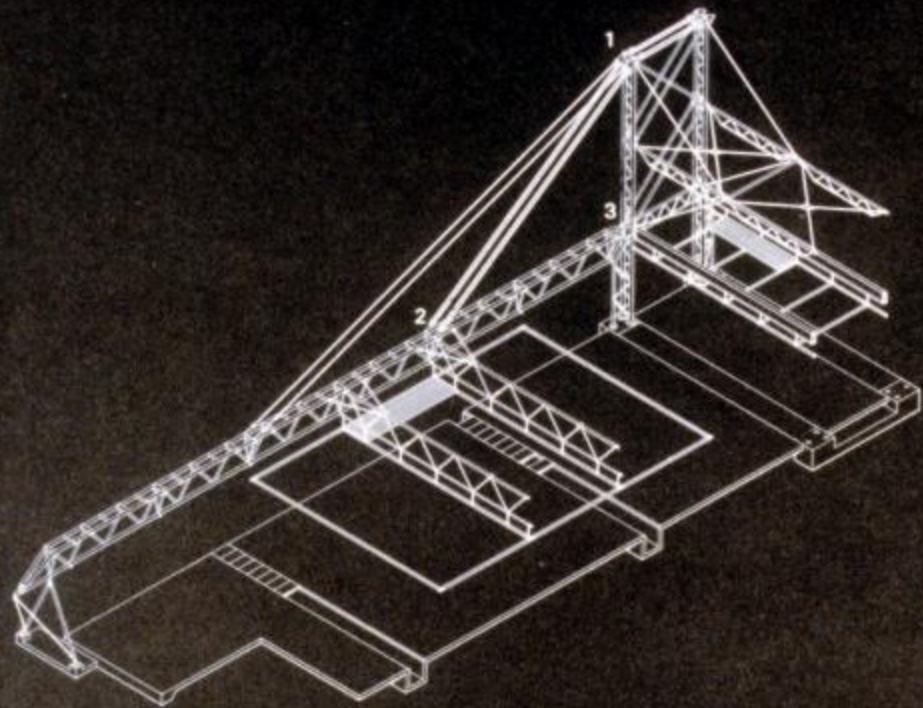




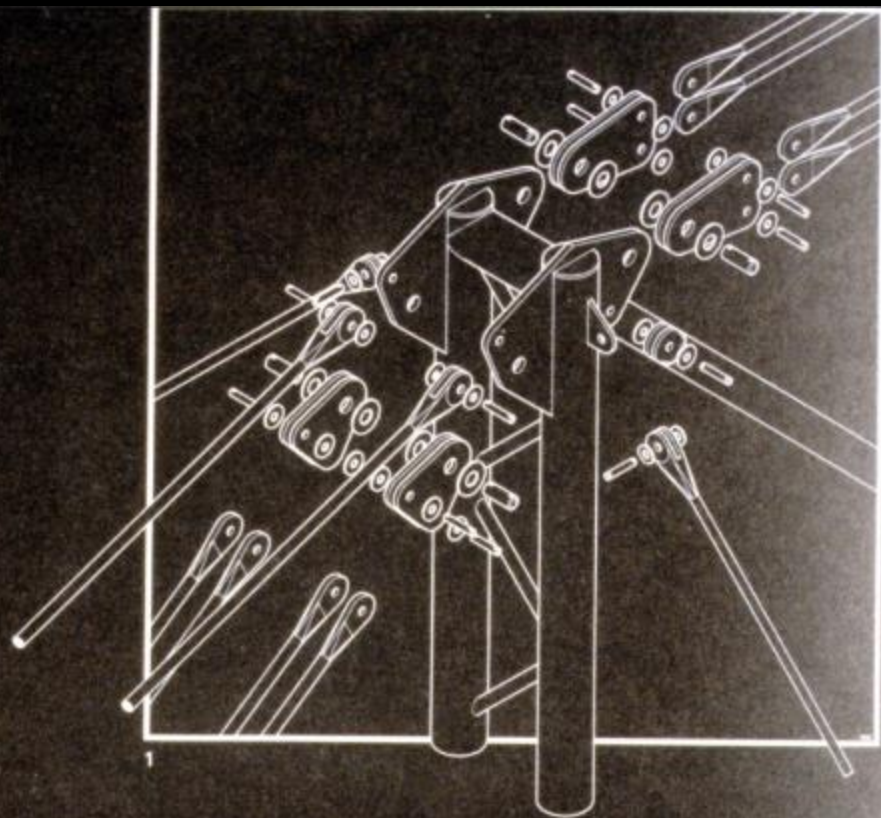
CONSTRUCTION SEQUENCE

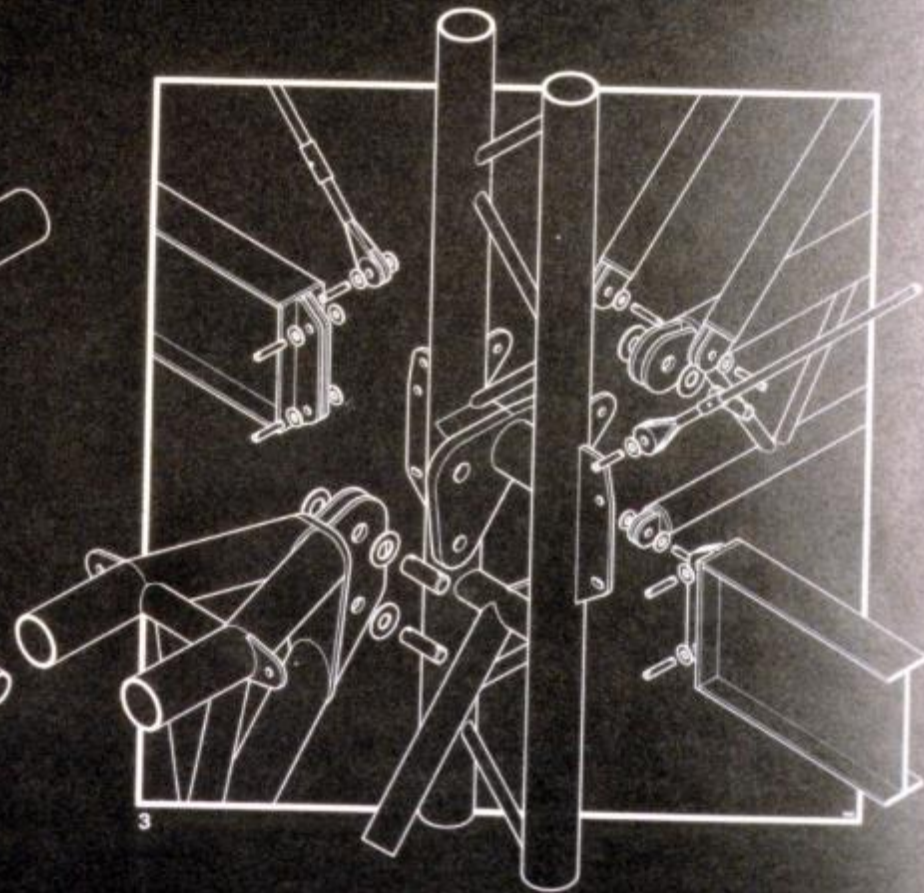
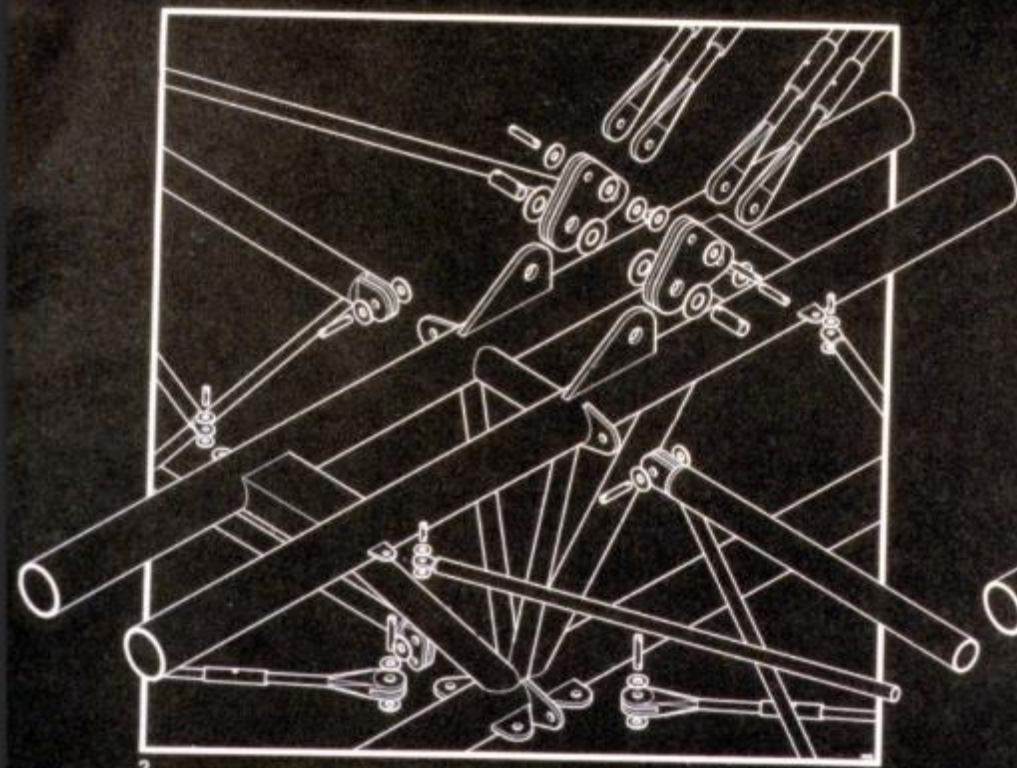


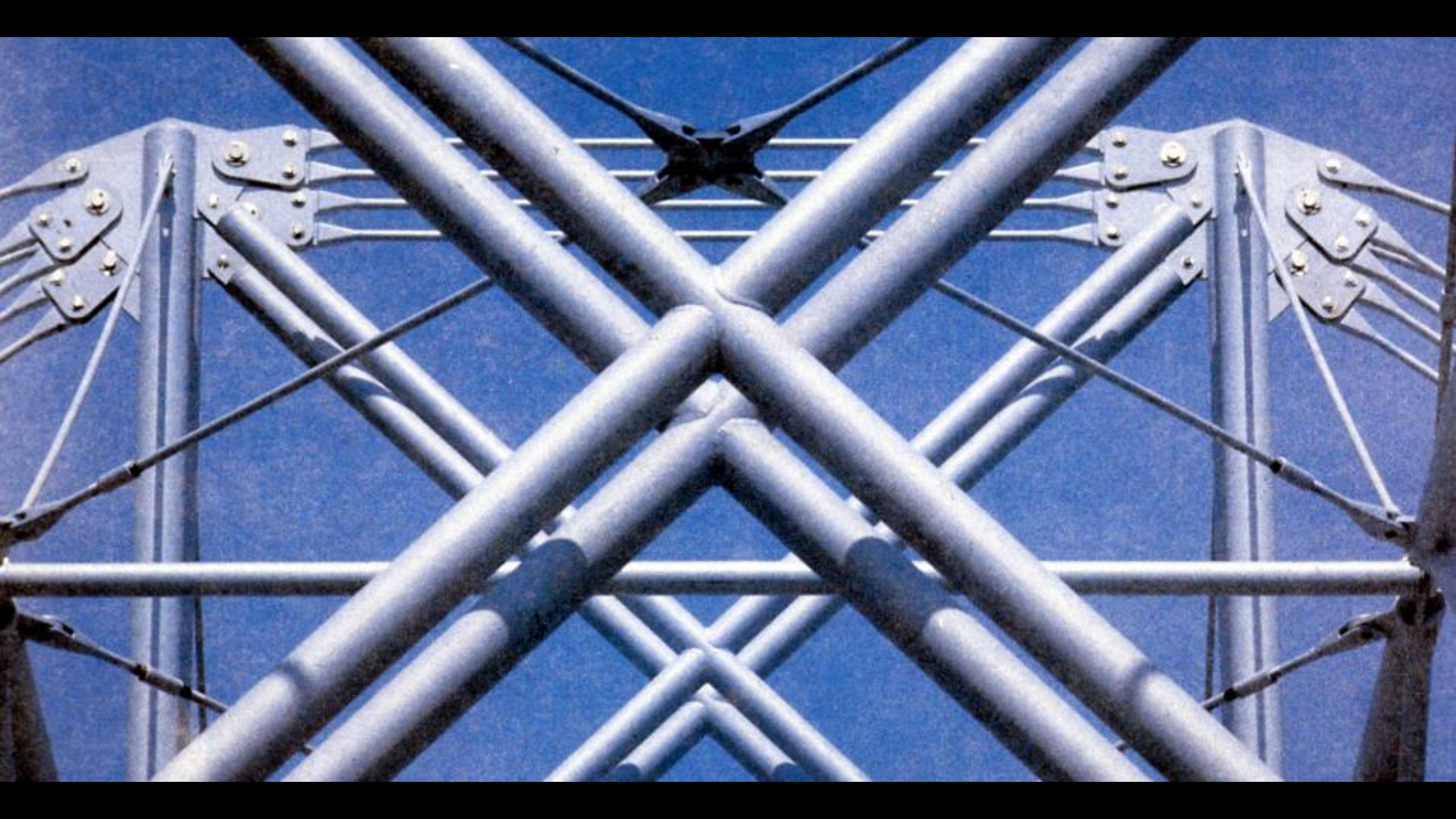




Structural axonometric with junction details











Oxford Ice Rink
Oxford, England
Grimshaw Architects
1984

















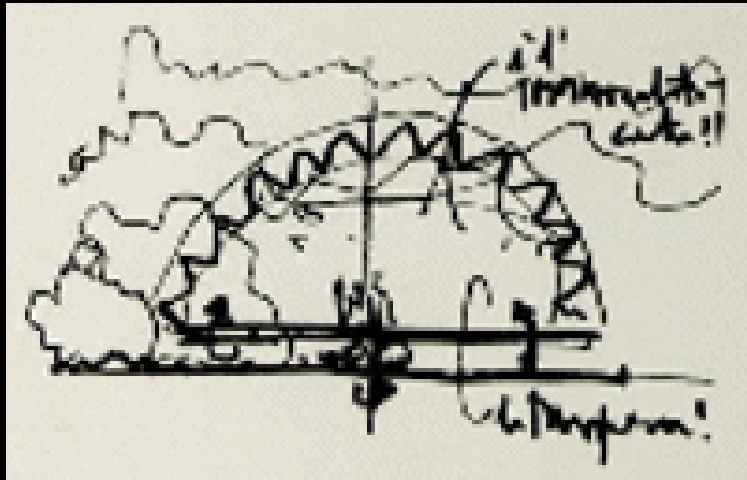






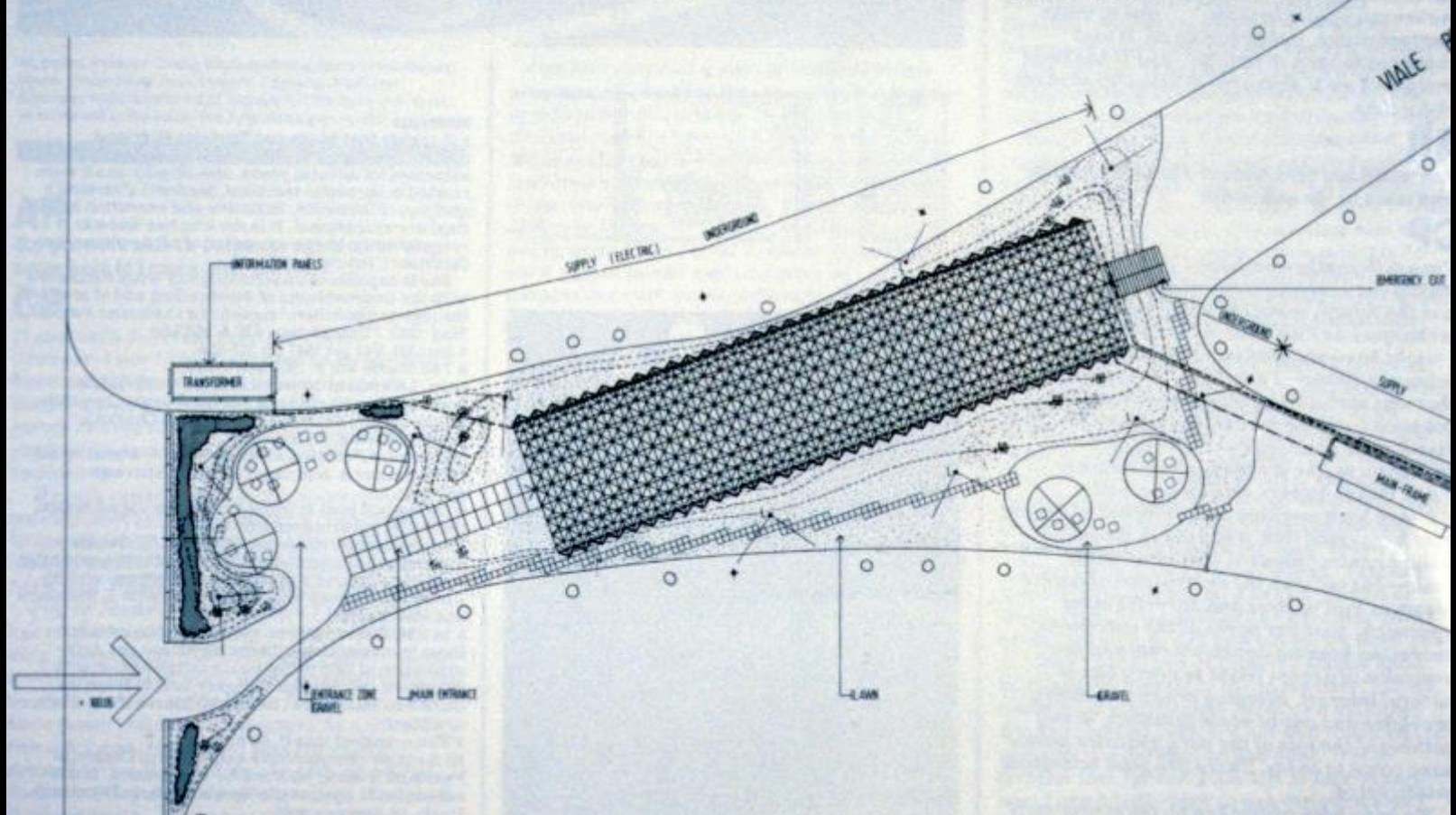




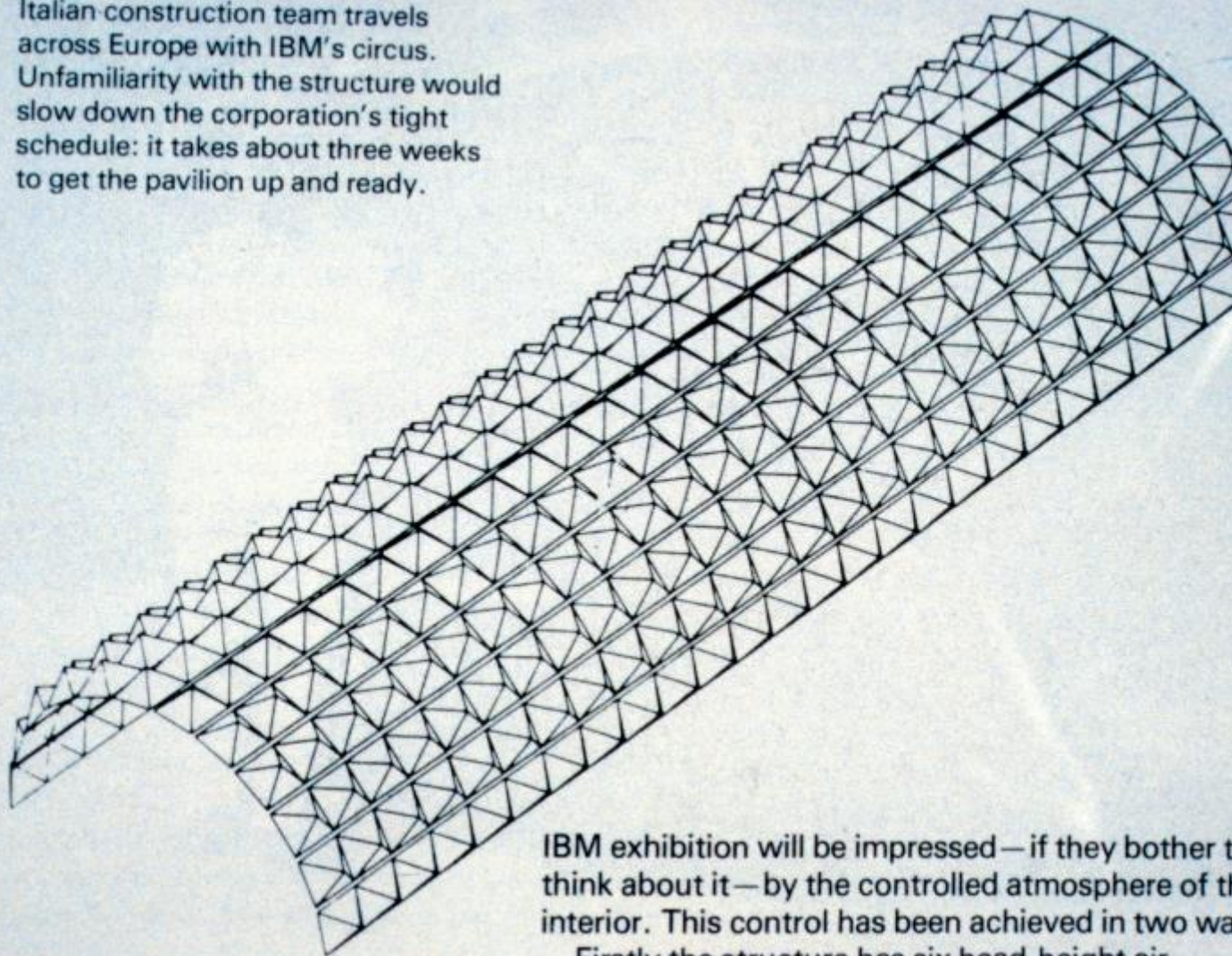


IBM Traveling Pavilion
All over Europe
Renzo Piano
1982-1986

IBM's intriguing exhibition for children and students has just opened in the grounds of the Natural History Museum, London. Designed by Renzo Piano, this pre-packed portable structure has travelled across the Channel from Paris and Milan. But treating a sophisticated building as a product for the export market was not as straightforward as the architects had imagined, as Jonathan Glancey found out.

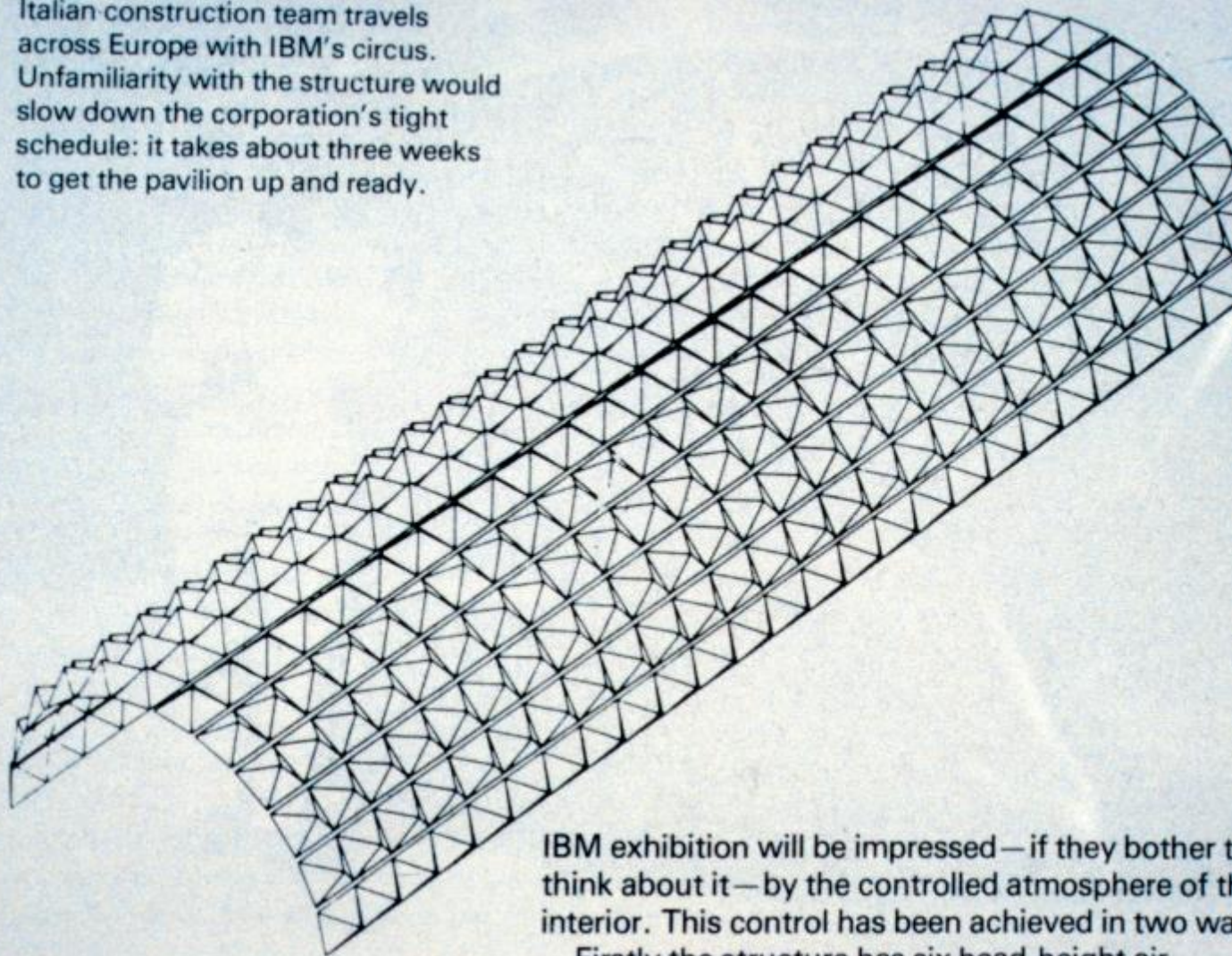


Italian construction team travels across Europe with IBM's circus. Unfamiliarity with the structure would slow down the corporation's tight schedule: it takes about three weeks to get the pavilion up and ready.

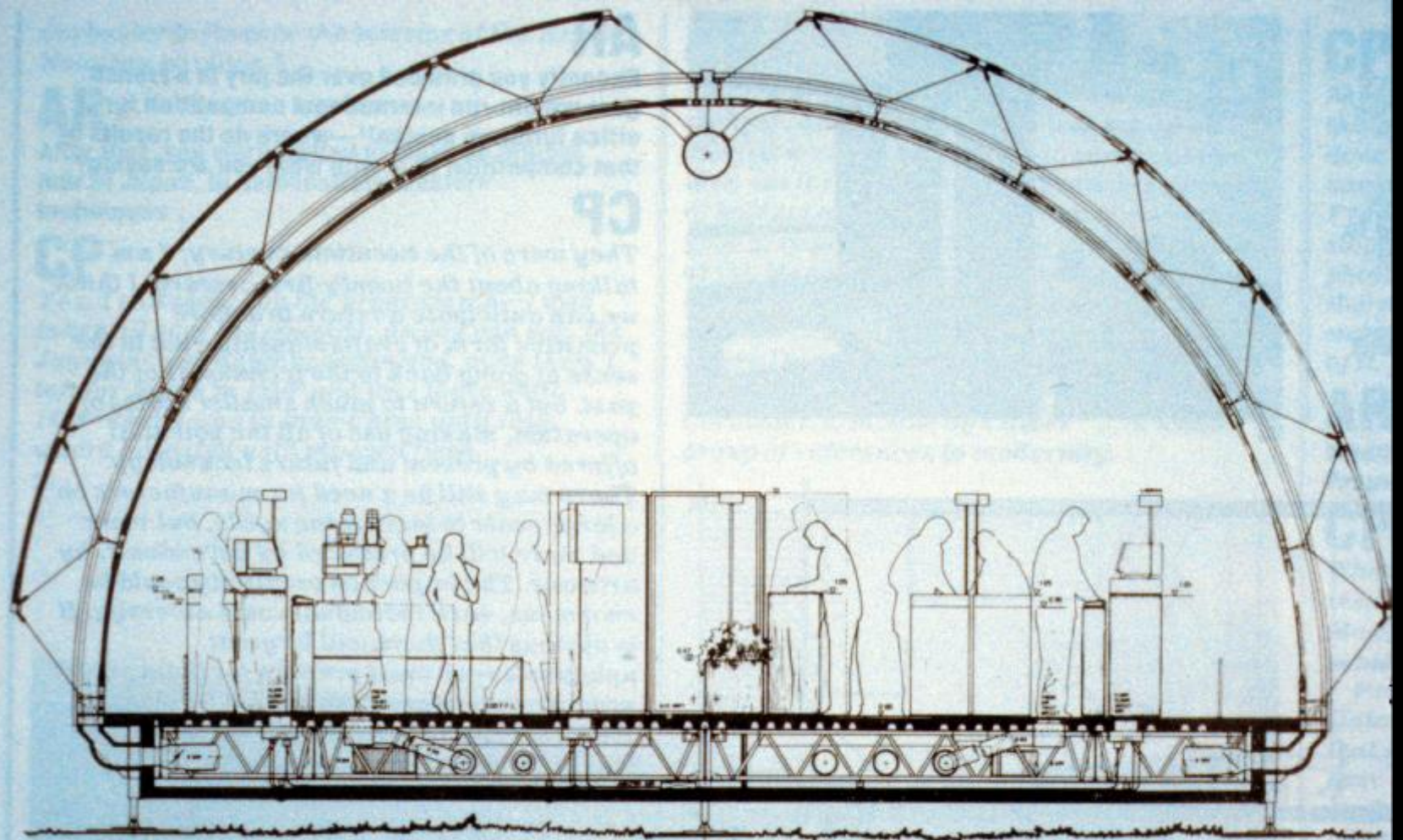


IBM exhibition will be impressed — if they bother to think about it — by the controlled atmosphere of the interior. This control has been achieved in two ways. Firstly the structure has six head-height air-

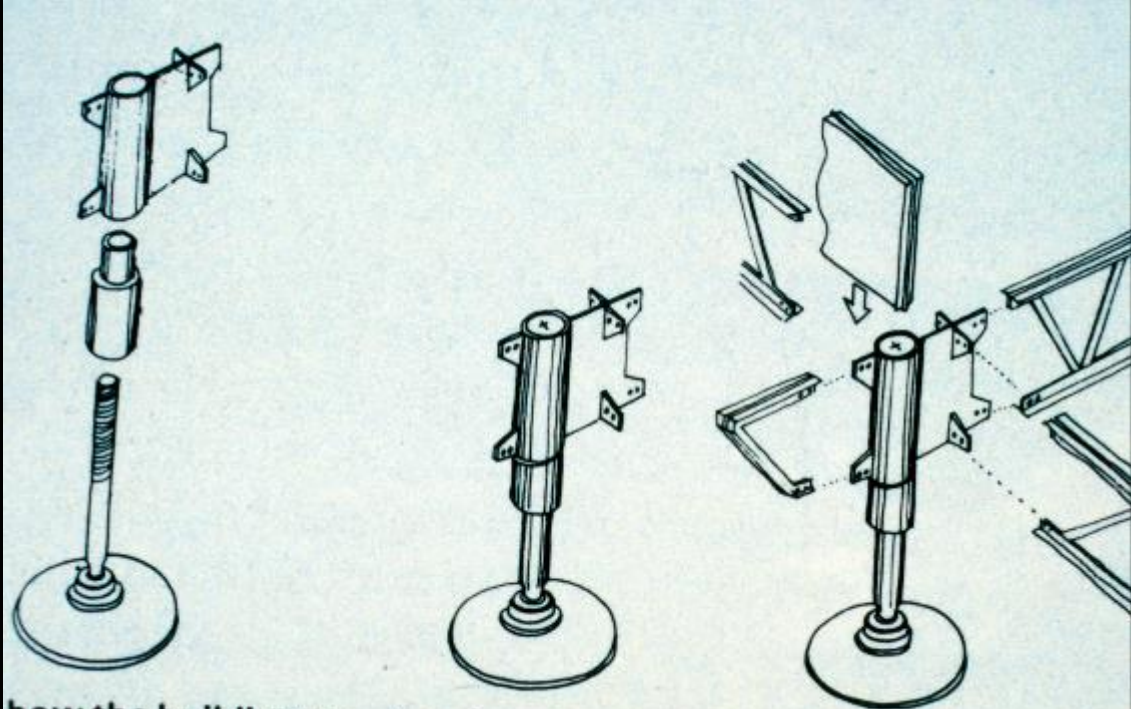
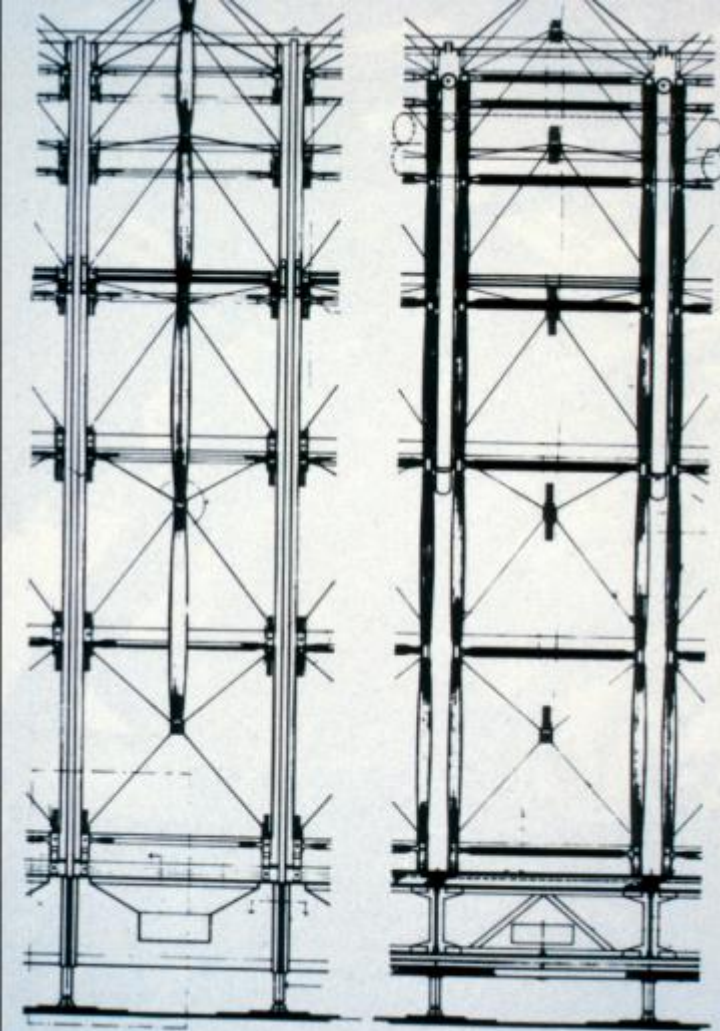
Italian construction team travels across Europe with IBM's circus. Unfamiliarity with the structure would slow down the corporation's tight schedule: it takes about three weeks to get the pavilion up and ready.



IBM exhibition will be impressed — if they bother to think about it — by the controlled atmosphere of the interior. This control has been achieved in two ways. Firstly the structure has six head-height air-



section showing structural and air-conditioning systems



how the building touches down: adjustable feet





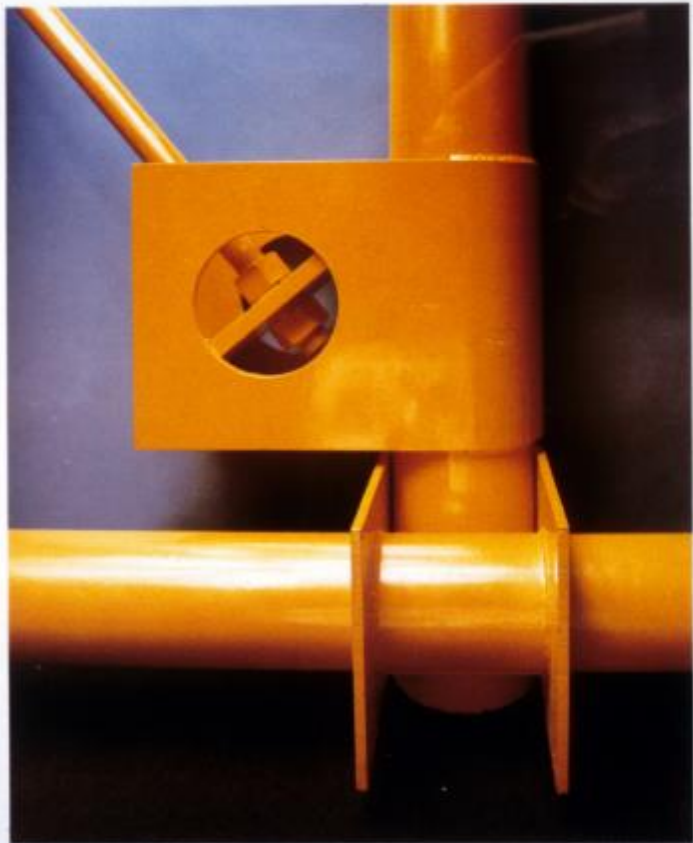


IKOY Architects
Founded 1968

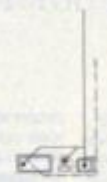
Was interested in "systems buildings"
A combination of custom components
and off-the-shelf

Ron Keenberg, one of the principles,
taught at UWSA in the late 1980s

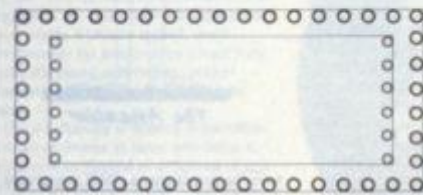
ARCHITECTURAL
TECHNOLOGY
 FALL 1984 THE AMERICAN INSTITUTE OF ARCHITECTS



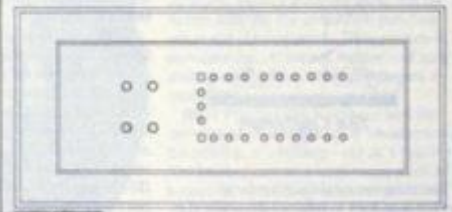
IROY'S INDUSTRIALIZED BUILDINGS



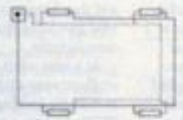
Plumbing



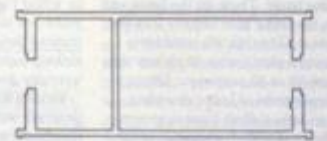
Structural



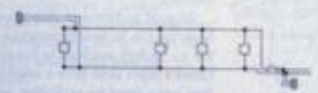
Fitments



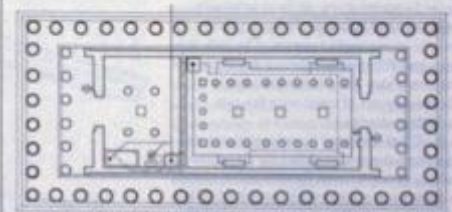
Mechanical



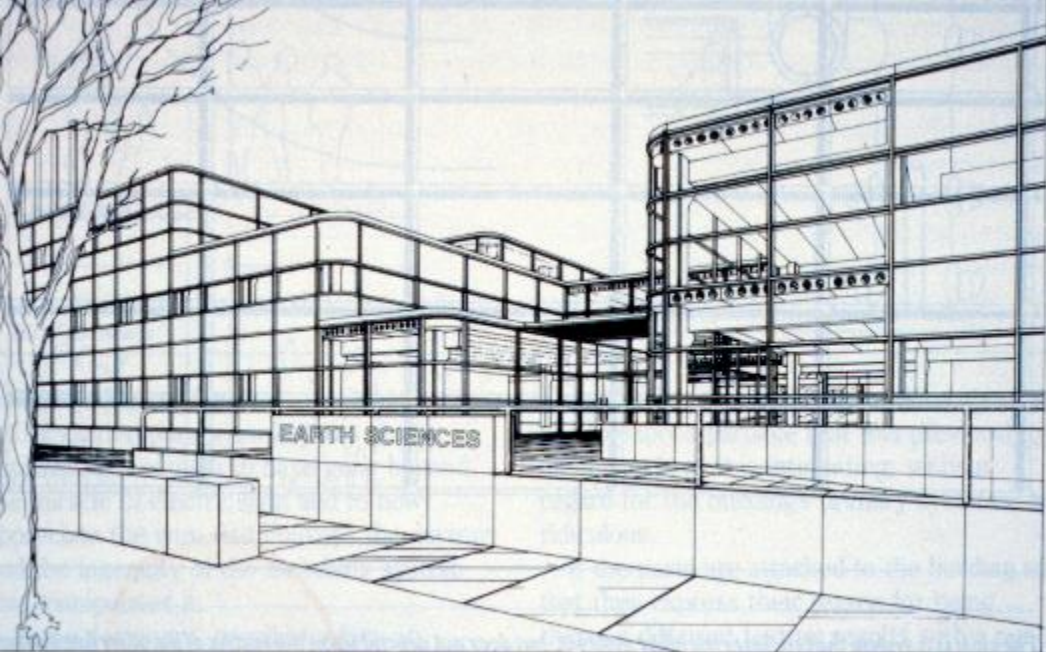
Enclosure



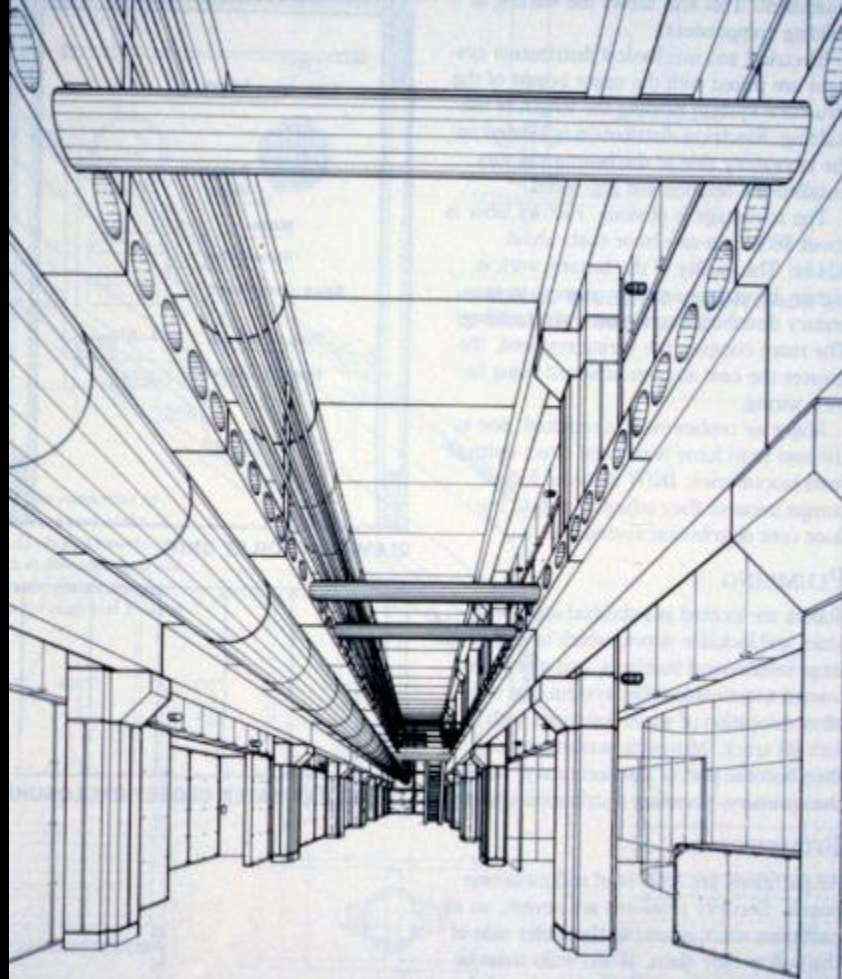
Electrical



Parthenon, Acropolis, Athens 448-432 B.C. Plan



IKOY Architects





























Intumescent fire
protective coating



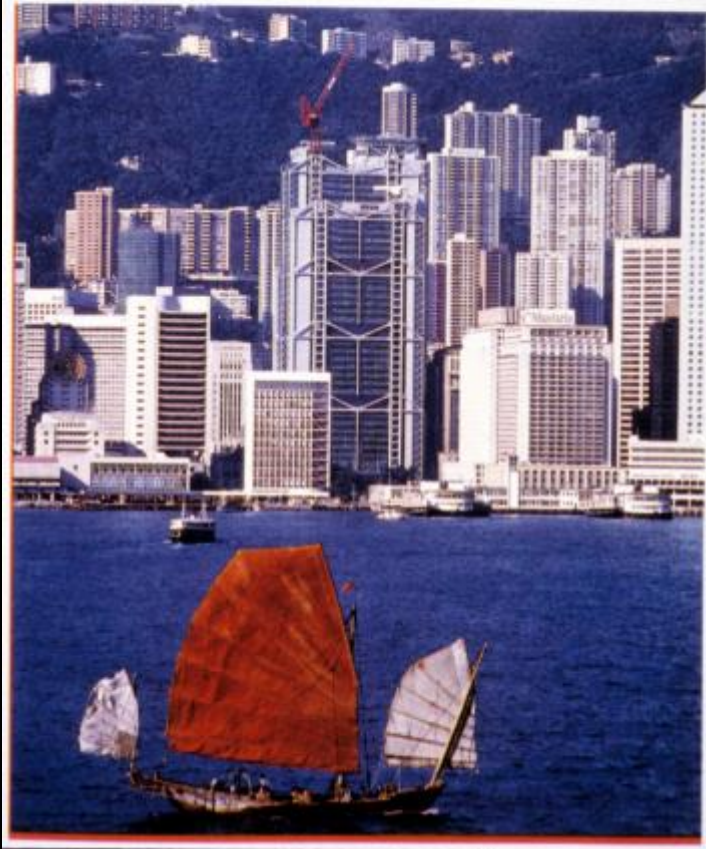






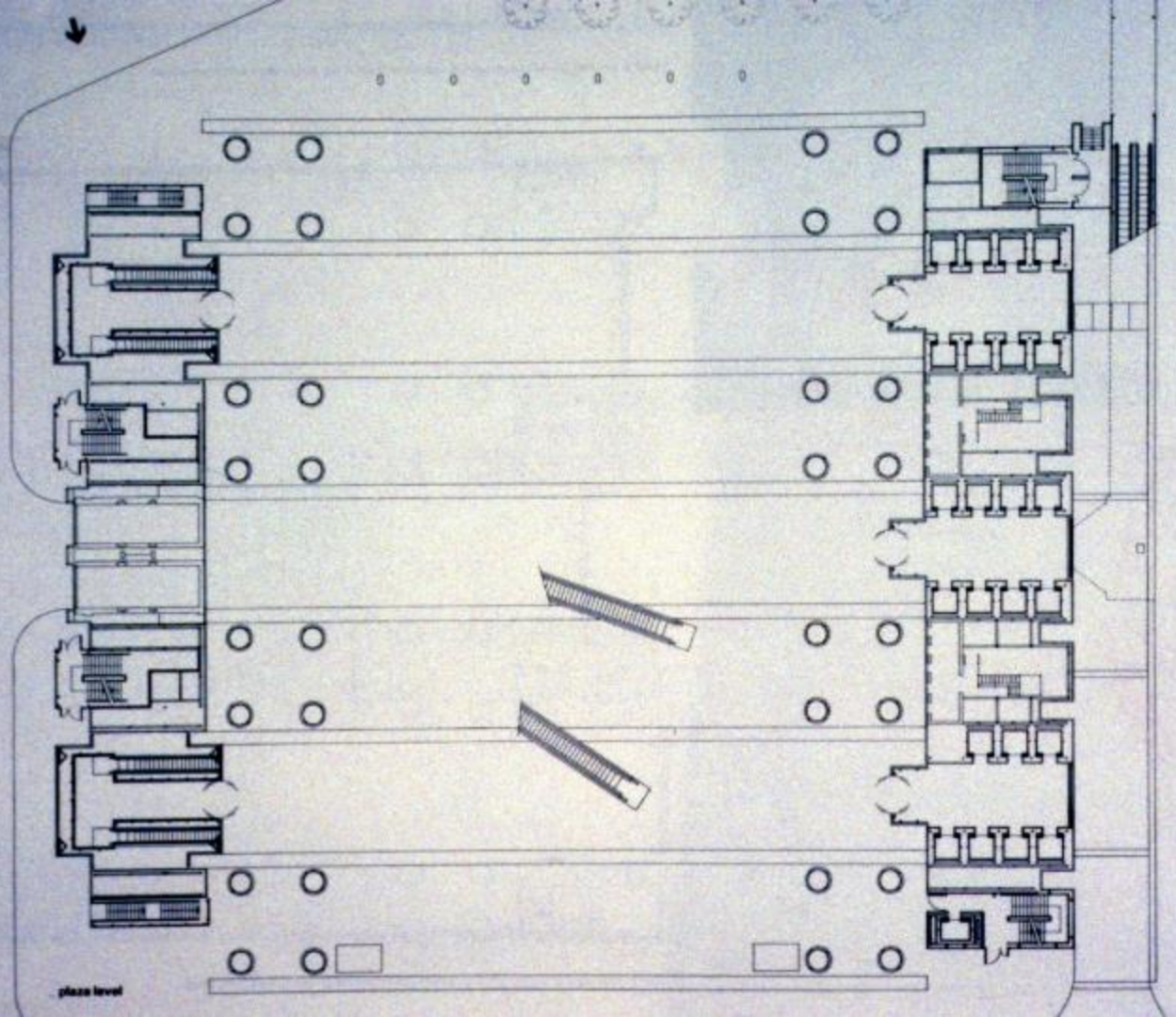
The Hong Kong
and Shanghai Bank
Hong Kong
Foster + Partners
1985

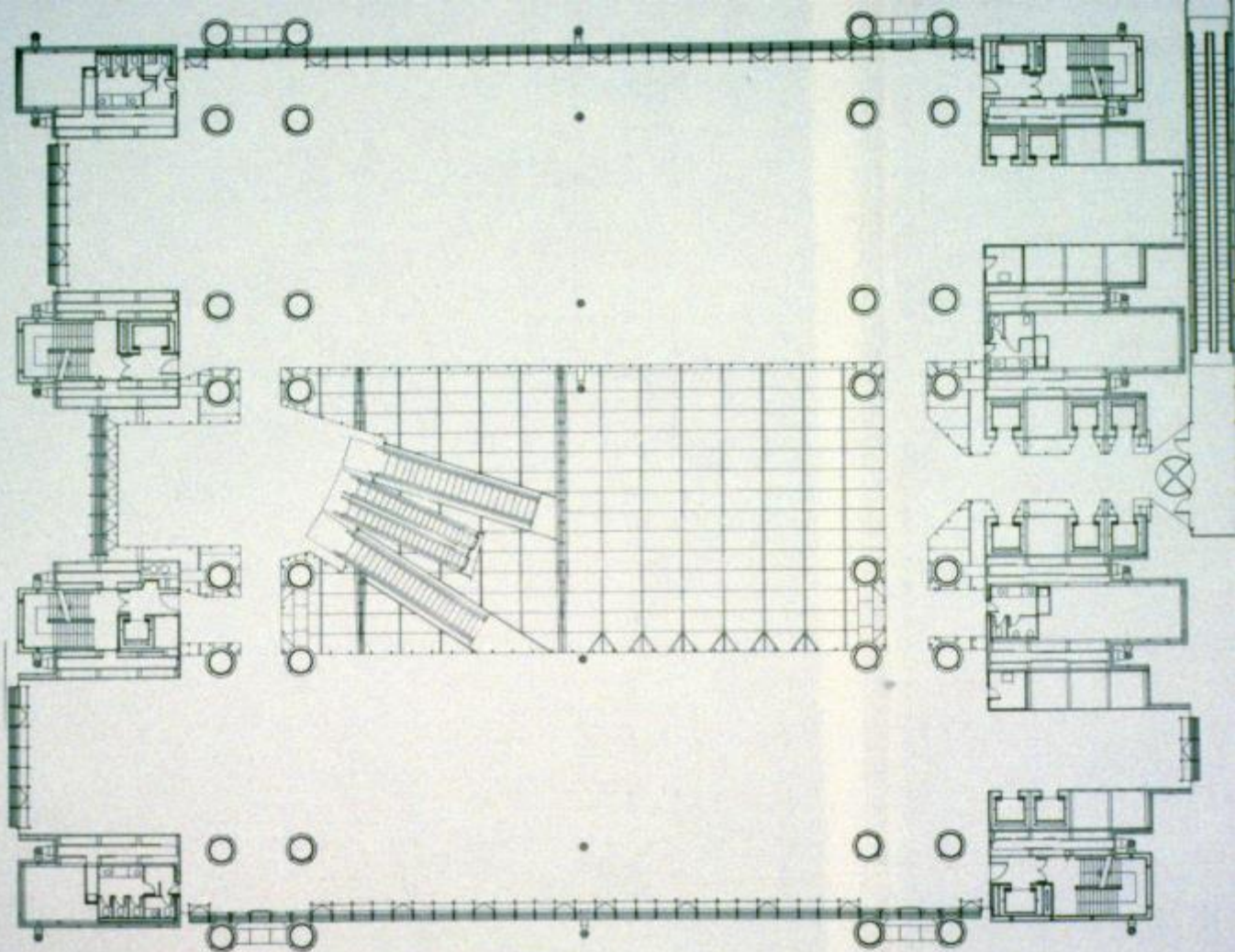
滙豐銀行



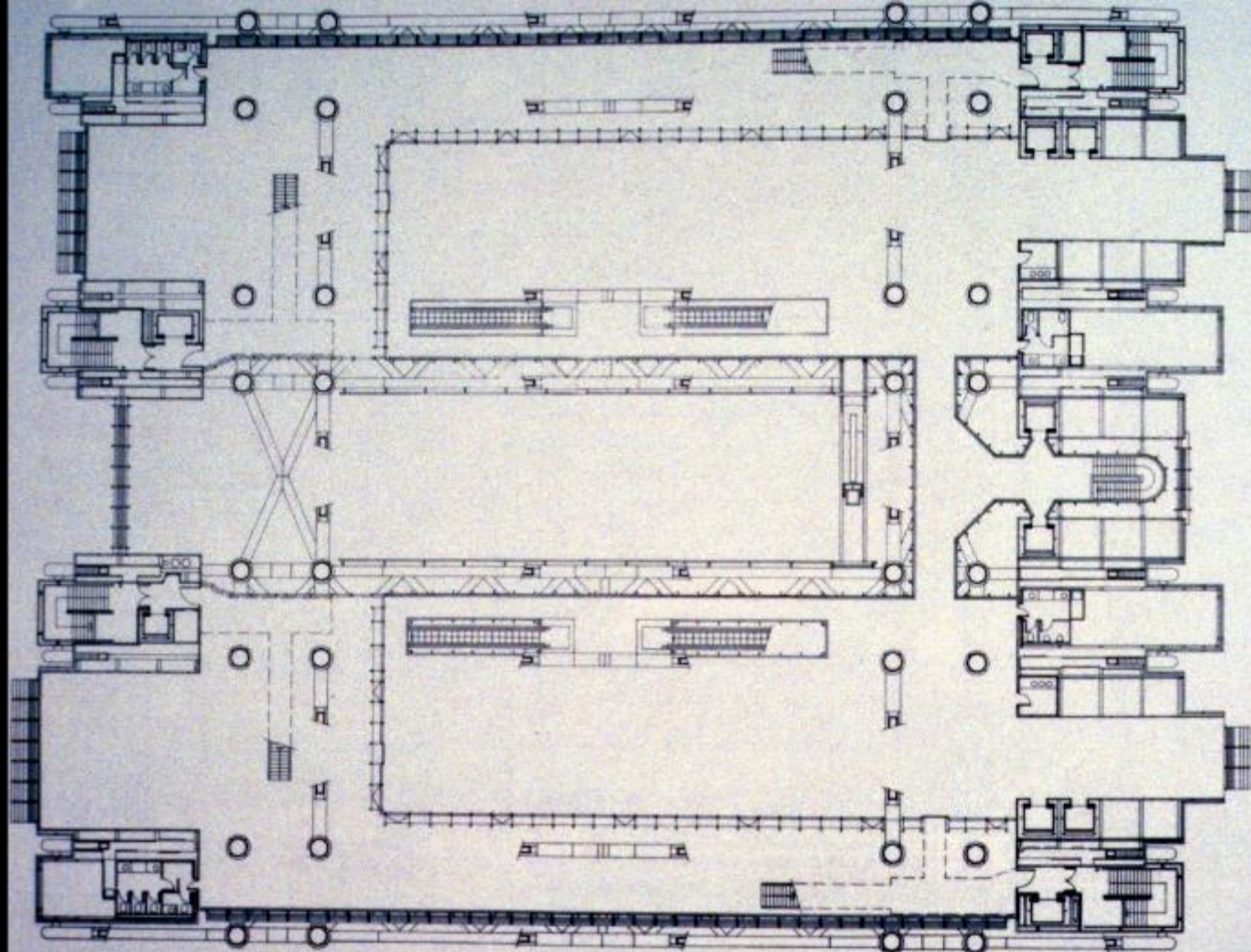




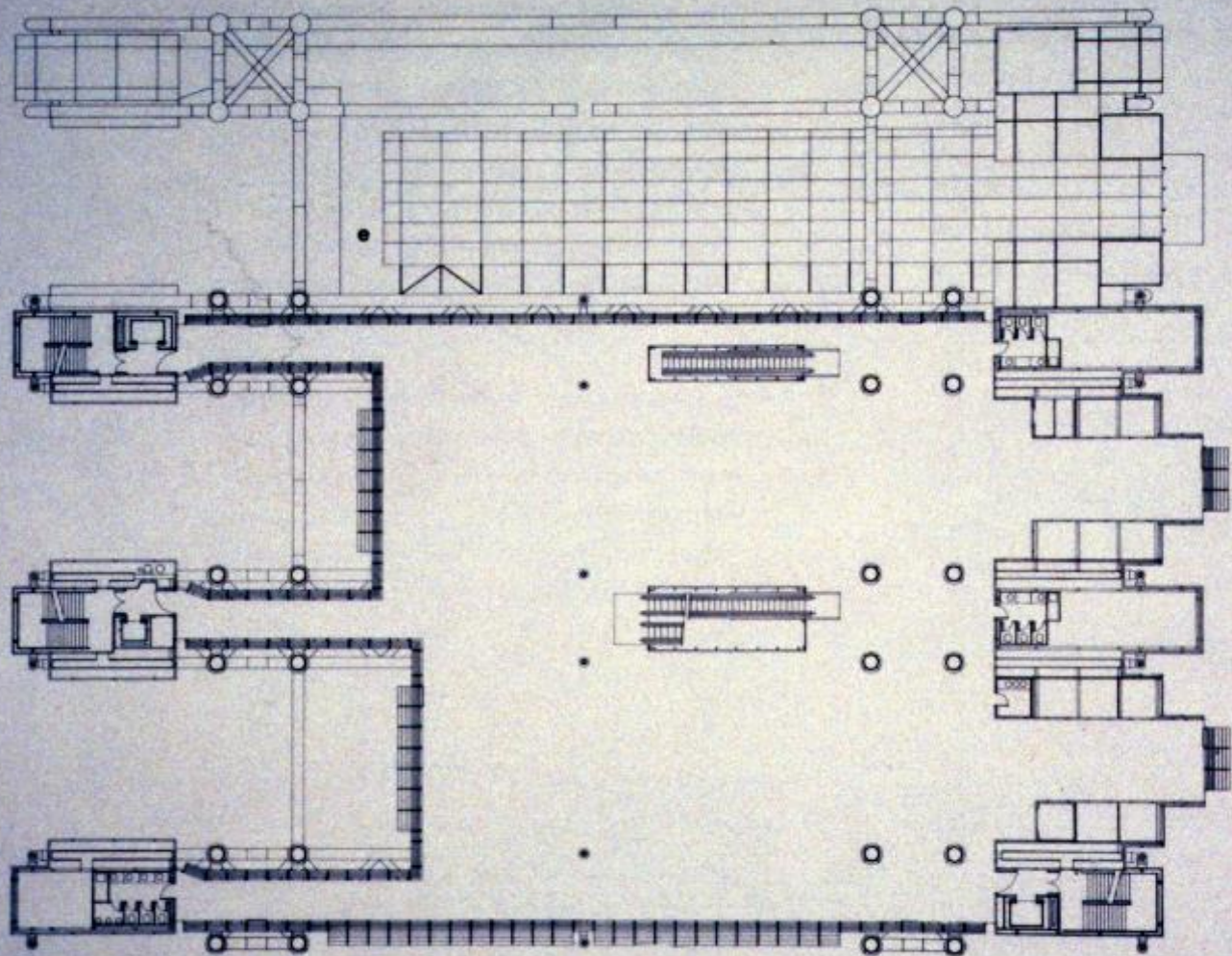




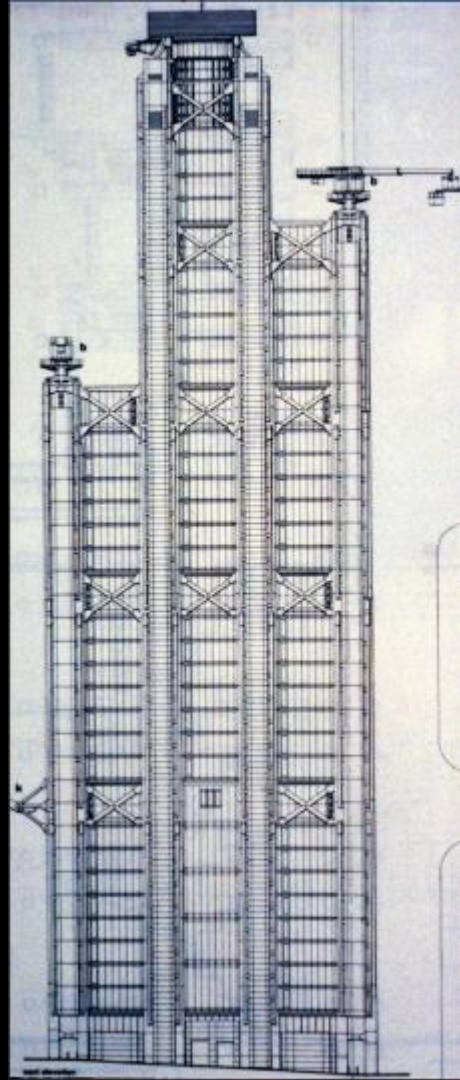
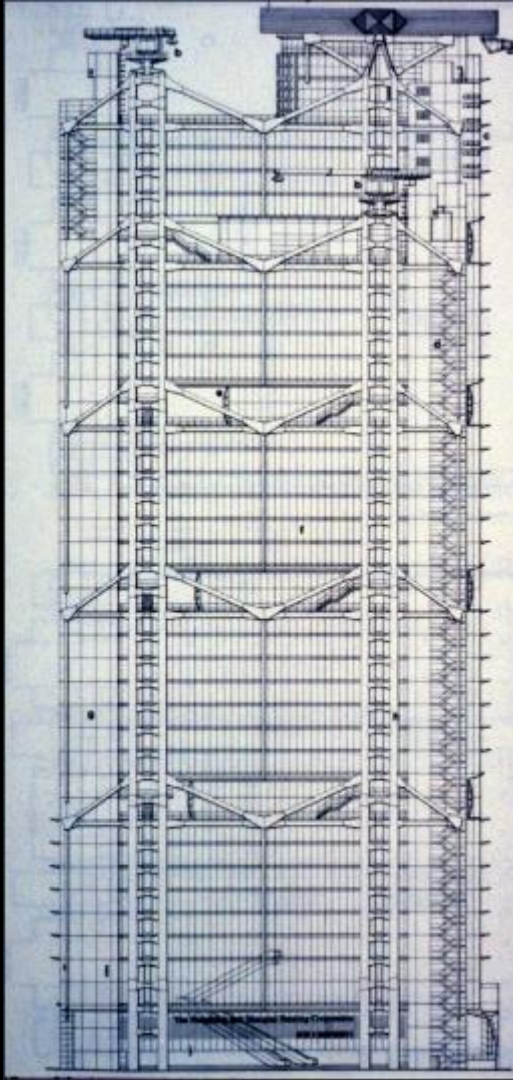
level 3: first level of banking hall at which public arrives on escalators from plaza



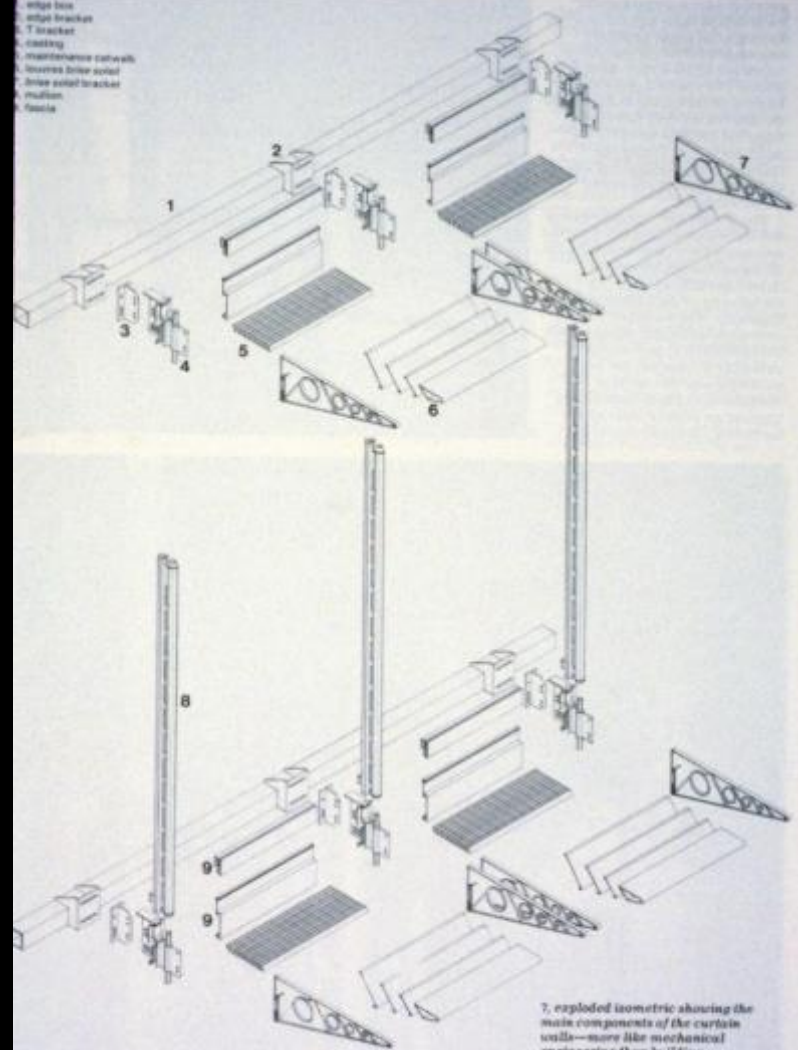
level 11: double height at top of atrium



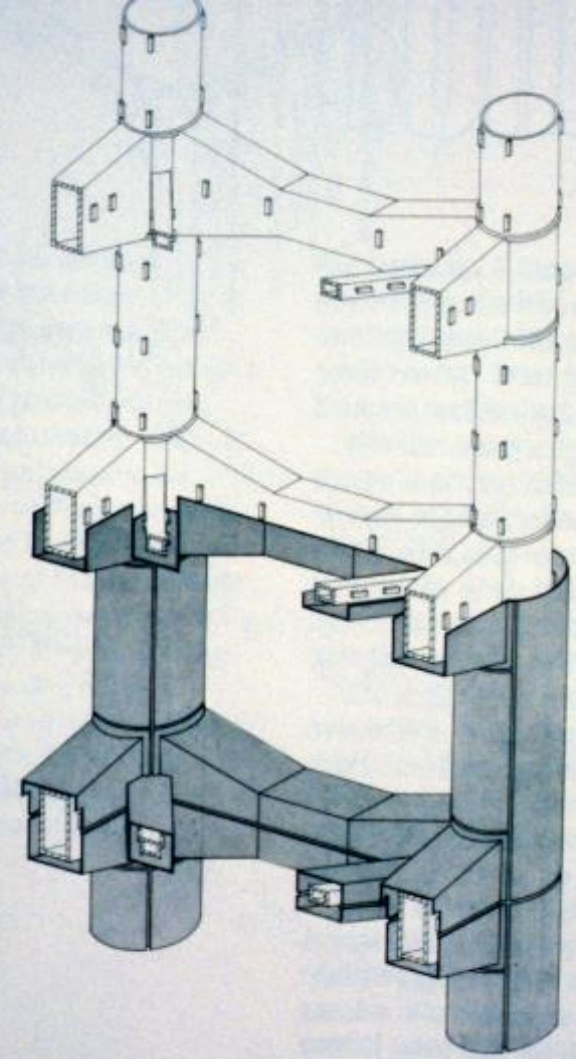
level 30: bulk of building is eroded by light angle requirements



- 1 edge box
- 2 edge bracket
- 3 T bracket
- 4 cladding
- 5 maintenance catwalk
- 6 service ladder catwalk
- 7 drive pulley bracket
- 8 mullion
- 9 fascia



7, exploded isometric showing the main components of the curtain wall—more like mechanical engineering than building



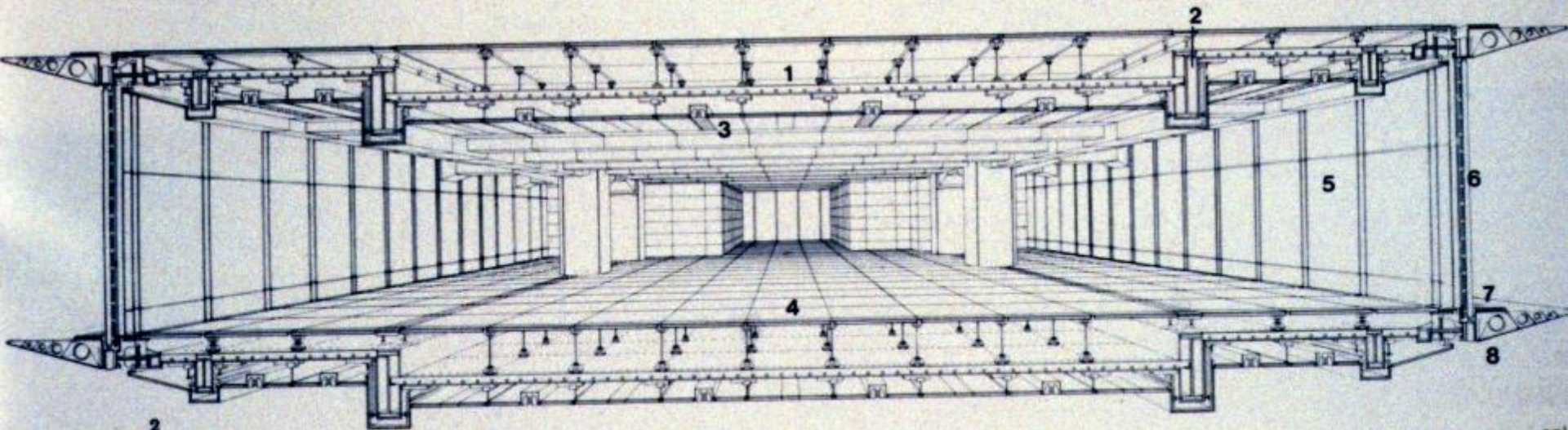
1

1, isometric section showing the floors cut back between masts on the east side of the building.

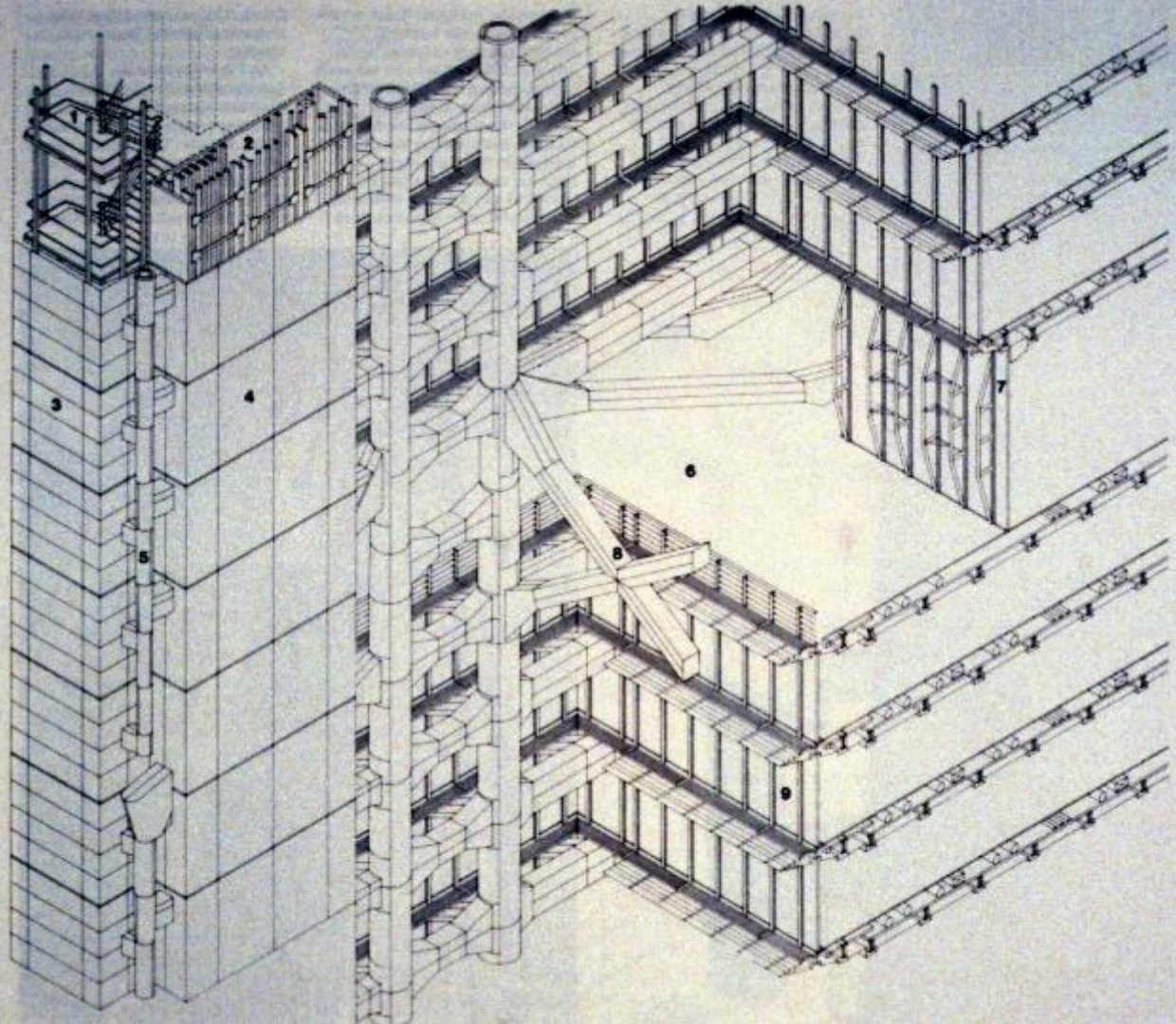
- | | |
|--------------------|-------------------------|
| key | 5, outer hanger |
| 1, stairs | 6, terrace |
| 2, risers | 7, trussed mullion |
| 3, glass grid wall | 8, n/s cross bracing |
| 4, panel wall | 9, typical curtain wall |

2, section through a one-bay wide floor.

- | | |
|-------------------------|-------------------------|
| key | 5, back-up wall |
| 1, 100 mm concrete slab | 6, typical curtain wall |
| 2, primary beam | 7, catwalk |
| 3, lighting | 8, brise soleil |
| 4, raised floor | |



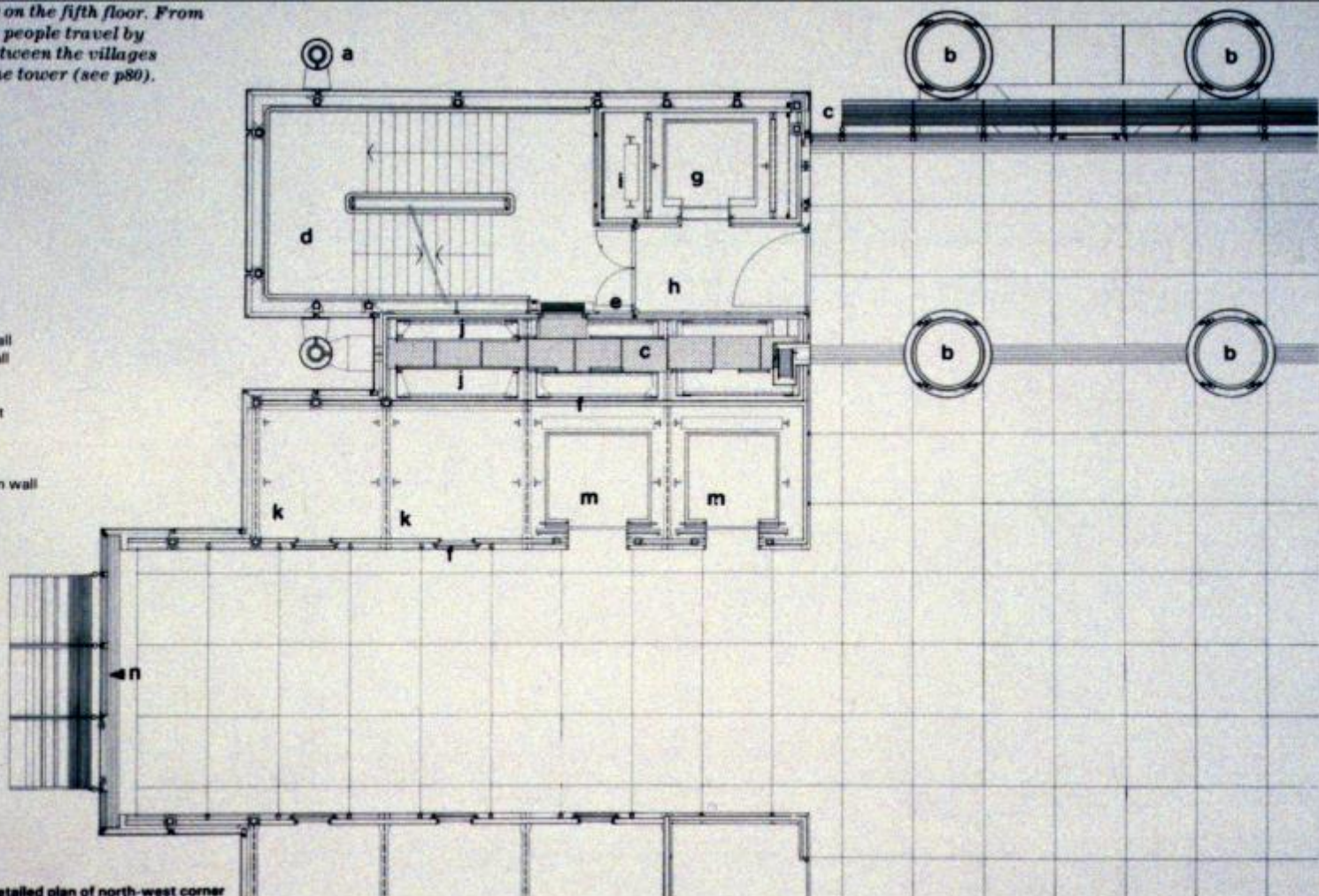
2



20. lift lobby on the fifth floor. From such lobbies people travel by escalator between the villages stacked in the tower (see p89).

key

- a, hanger
- b, tubular mast
- c, catwalk
- d, stairs
- e, 1-hour fire wall
- f, 2-hour fire wall
- g, goods lift
- h, escape lobby
- i, counterweight
- j, riser
- k, lift shaft
- m, lift
- n, typical curtain wall



detailed plan of north-west corner

























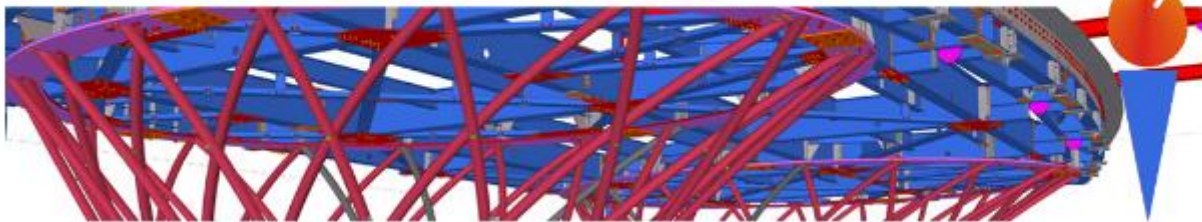
To be continued....

If you take Arch 570: Architectural Steel Design as an elective later on!

<http://tboake.com/SSEF1/index.shtml>

Fun is in the Details: Innovation in Steel Connections

[CISC](#) [Home](#) [Basic Connections](#) [Steel Framing](#) [AESS](#) [Innovative Connections](#) [Historic Projects](#) [Contemporary Projects](#) [Finishes](#)



Fun is in the Details: Innovation in Steel Connections A Curriculum Materials Project

Welcome to "Fun is in the Details: Innovation in Steel Connections"! This curriculum materials project has been funded by the **Steel Structures Education Foundation** the former educational arm of the **Canadian Institute of Steel Construction** (CISC).

The web site is structured into *SEVEN* primary sections on *CONNECTION DESIGN* that will take you through the understanding and development of steel connections. Navigation is accessible at the top of each page, with subheadings for each section available in the left sidebar or through the pull down menu at the top.

HOME SUB MENU

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- [Using the 3D PDFs](#)
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This web based project is designed to increase the understanding of connection design in steel structures to better assist students of architecture and engineering in creating more convincing and compelling structures. The project looks at how to take basic methods of creating connections and transform them into innovative connections, using similar principles. Although Standard Structural Steel connections will be included, the emphasis will be on an exploration of Architecturally Exposed Structural Steel (AESS). The project will reference the new CISC AESS documents, in particular the "Category Matrix" and "CISC Guide for Specifying Architecturally Exposed Structural Steel".

Please check out my [Facebook page for AESS](#) . Many more projects there!