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ALUMINIUM, NOUVEAUX REGARDS SUR LA MATIÈRE

ATLAS: recherche & documentation

ATELIER PROSPECTIF _ Étape 1

Avril 2019

ARC3017F (Montréal) + ARC3015Y (Toronto)
AUTOMNE 2018

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AUTOMNE 2018
ATELIER CONJOINT ÉCOLE D'ARCHITECTURE UNIVERSITÉ DE MONTRÉAL +
DANIELS SCHOOL OF ARCHITECTURE UNIVERSITY OF TORONTO

ATELIER PROSPECTIF EN ARCHITECTURE
Symposium Aluminium + Design, Regards nouveaux sur la matière.

Donné dans le cadre des ateliers thématiques de troisième année du Baccalauréat de l'école d'architecture de l'Université de Montréal, l'atelier proposé s'inscrit en lien avec l'Évènement Aluminium 18_19 de la Faculté et propose une approche conjointe avec l'atelier de première année de Maitrise de la Daniels School of Architecture de l'Université de Toronto dirigé par Manon Asselin.

Intitulé « L'art du gratte-ciel: entre exaltation et économie», l'atelier prospectif explore l'aluminium comme matière à penser l'architecture. En liant les dimensions intuitives, techniques et culturelles de la conception architecturale au travers d'un processus itératif, l'étude du gratte-ciel offre une mise en perspective historique et contemporaine de la typologie aussi bien dans son imaginaire que dans sa technique constructive associée.
La structure pédagogique de l'atelier, à travers ses différentes modalités collaboratives et différentes échelles d'exploration du projet, induit un processus créatif non-linéaire, retroactif et ouvert sur l'autre et l'échange d'idée. Un regard critique non seulement sur la matière mais aussi sur la nécessité d'engager une réflexion sur le processus de conception et sa capacité à produire une architecture d'excellence, durable et responsable.

L'atelier a bénéficié de la collaboration de nombreux professionnels et a culminé dans la réalisation d'une exposition et d'un catalogue.

Les gratte-ciel tels que nous les connaissons n'auraient pas été possibles sans l'aluminium.

Traduction libre, SHELLER Mimi, Aluminum Dreams: The Making of Light Modernity, MIT Press, 2014

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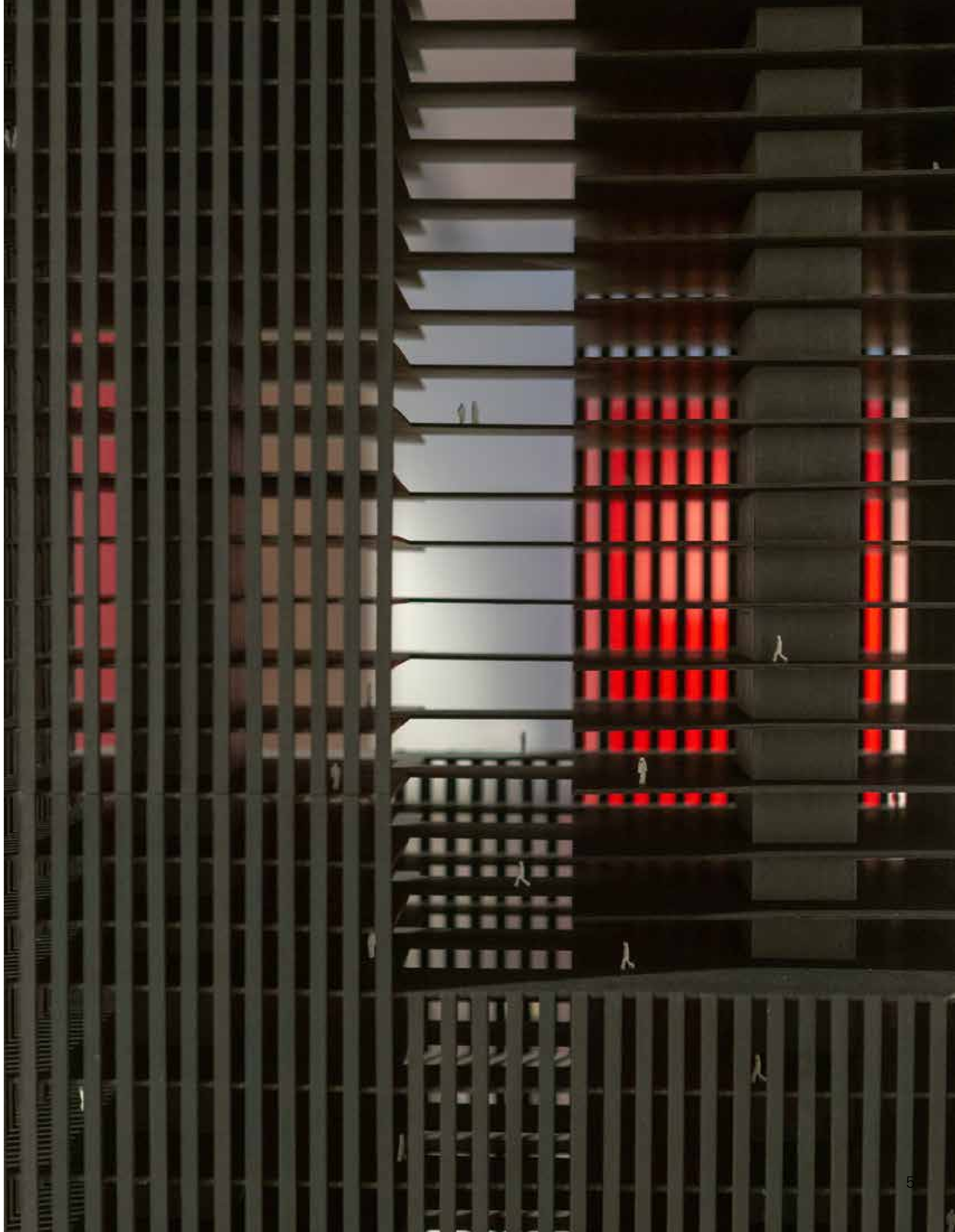
CAPSULE 1 : recherche et précédents : atlas de tours et aluminum
CAPSULE 2 : esquisse conceptuelle: 2a image / enveloppe / structur +2b concept socio-spatial
CAPSULE 3 : détail d'enveloppe et ingénierie de façade
CAPSULE 4 : élaboration du projet et présentation finale

ATELIER PROSPECTIF EN ARCHITECTURE
L'art du gratte-ciel:
entre exaltation et économie

extrait du plan de cours

En janvier 2018, la Banque nationale a lancé un concours d'architecture pour concevoir son nouveau siège social. Rassemblant 7 000 employés sur un même site, la nouvelle tour de 46 étages (200 m) comptera une superficie brute de 102 000 m2 ; un espace à bureaux équivalent à la Place Ville-Marie. La Banque Nationale sera l'unique occupant : le rez-de-chaussée abritera une succursale bancaire, une garderie et d'autres services tels qu'un gymnase, un auditorium et une aire de restauration. Ce nouveau gratte-ciel sera la plus grande tour de bureaux construite dans le centre-ville de Montréal depuis 25 ans.

Le studio propose d'explorer cette commande et de réexaminer la typologie architecturale du gratte-ciel comme terrain d'innovation programmatique et de recherche matérielle. Entre exaltation et économie, l'architecture définit ici l'image de la banque dans un contexte urbain dense tout en répondant au besoin d'une optimisation des espaces intérieurs associés à une économie des ressources. En liant les dimensions intuitives, techniques et culturelles au travers d'un processus itératif, l'étude d'une tour de bureau en 2018 offre une mise en perspective historique et contemporaine de la typologie aussi bien dans son imaginaire que dans sa technique constructive associée.



STEP 1 : atlas
material base research and field trip

extrait du plan de cours

In collaboration with students from the school of architecture of University of Montreal, the proposed studio launches with a short research and documentation period covering subjects that range from skyscrapers typology to the creative use of aluminum in architecture and related fields.

The purpose of this first exercise is to collectively assemble a core documentation that will be used throughout the semester. The group from University of Montreal will be responsible for documenting specific skyscrapers with an emphasis on structure / envelop technology and planning / sustainable strategies. The students from the Daniel's will conduct the material research component of the studio based on the following categories: (please choose one in category 2 and another from either category 1 or 3)

1. Early examples of aluminum in building envelops: Art Deco and early modern period

2. Aluminum in Contemporary Architecture

3. Aluminum experiments in architecture and realted fields

Each precedent studied will be recorded in an atlas, the reference tool of the studio. The uniform representation in terms of scale, graphic design and type of drawing allows a comparative study and a structuring of the content. Yet to support your individual analysis, drawings should also reflect the design principles you have identified.

CAPSULE 1 : atlas
étude de précédents des tours

extrait du plan de cours

La première approche de la typologie passe par l'étude critique de précédents depuis la première génération de tours à bureau des années 1900 aux constructions les plus récentes.

À l'aide de plan(s), coupe(s) et élévation(s), il est demandé d'analyser deux précédents de gratte-ciel pour comprendre les rapports structure/enveloppe, structure/planification, enveloppe/planification et l'impact sur l'image et la société (interne et externe) de chacun des précédents.

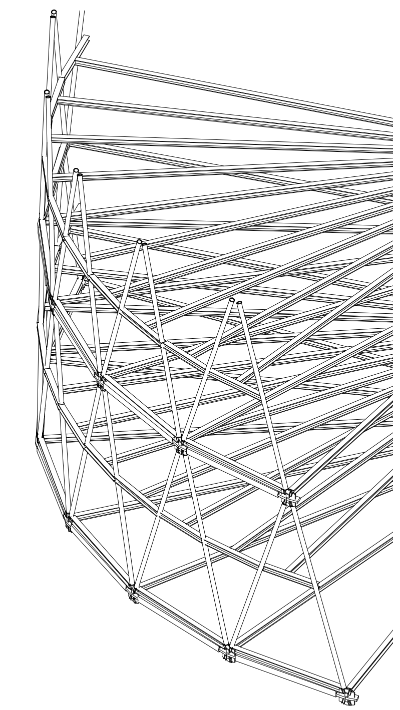
Chaque étude de cas sera orientée par les principes directeurs mis en place par les concepteurs originaux. Ainsi dans certains cas, l'analyse des détails d'enveloppe sera pertinente, dans d'autres la planification au sein de l'étage sera mise de l'avant alors que pour certains, les systèmes de ventilation mécanique et naturelle révèleront la qualité particulière de la tour. Ces spécificités vont découler de l'analyse critique des documents trouvés.

Une brève mise en contexte de l'étude est nécessaire pour comprendre les raisons et intentions derrière chaque décision et interpréter les mécanismes en place. La prise de connaissance de l'époque, de l'architecte, des ingénieurs et des utilisateurs offre des clés de lecture qui vous permettent de décrypter et interpréter les documents trouvés. Sans effectuer une analyse historique poussée, il est demandé de survoler l'Histoire derrière cette construction.

Table des matières

Atlas de Tours

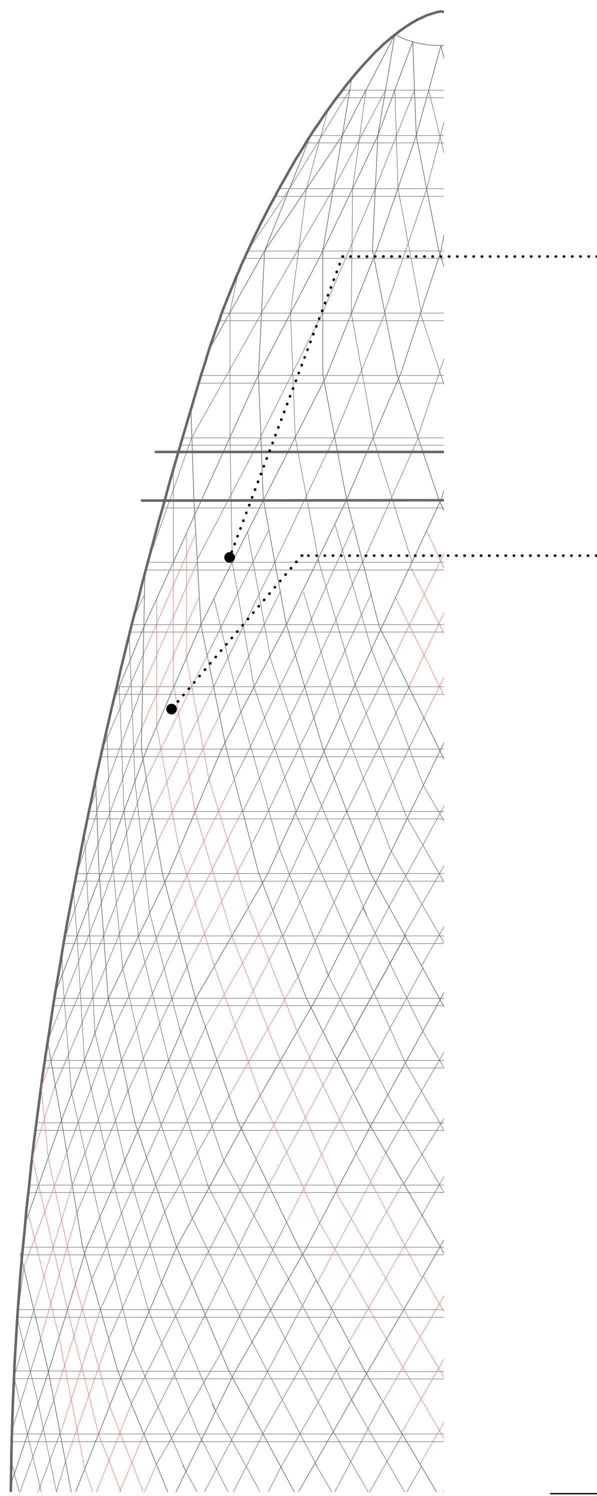
Atlas Aluminium



Architect I Architecte :	Foster + Partners
Engineer I Ingénieurs :	Arup
Location I Localisation :	London
Year of construction I Année de construction :	1997
Use I Usage :	Offices
Total area I Superficie totale :	64 469 m²
Height I Hauteur :	180 m
Number of floors I Nombre d'étage :	41
Floor plan area I Superficie d'un étage :	Min : 380 m² / Max : 2463 m²
Structure system I Système de structure :	Concealed diagrig
Structure materials I Matériaux de structure:	Steel
Envelope materials I Matériaux d'enveloppe:	Glass+Aluminum

The tower of 30 St Mary Axe, better known as The Gherkin, is a staple of not only London's skyline, but also of the city's most innovative and efficient buildings. Its designers brought advanced engineering to the use of a strong conceptual idea, combining both bioclimatic architecture and a new thinking for interior space design. The tower, standing at 180 meters, is the result of a research process that lasted over five years, to finally lead to Foster+Partners' project, that is actually much smaller than what was originally requested by the city's council. However, the Gherkin got unanimous approbation by both the professional critics and the citizens, who all appreciate its efficiency and style.

La tour qui se situe au 30 St Mary Axe est mieux connue sous le nom du Gherkin. Elle est l'emblème de l'architecture contemporaine de la ville, mais elle est aussi un bâtiment conçu pour être le plus ecoénergétique possible. La combinaison d'une ingénierie avancée et d'objectifs bioclimatiques a donné lieu à une forme inusitée et des espaces de travail réinventés. La recherche pour ce projet a duré plus de 5 ans, pour finalement s'arrêter à la tour de 180 mètres de Foster+Partners, significativement plus petit que la demande initiale. Le Gherkin fait cependant l'affaire de tout le monde, recevant l'approbation des critiques professionnelles ou non, qui célèbrent sont efficacité et son style.



Rails for the facade maintenance and glass cleaning system.

Rails du système d'entretien de la façade et du nettoyage des fenêtres.

Spiral curves illustrated in the facade by darker colored glass. They follow the floors' shape.

Courbes de la spirale représentée par un changement de la couleur du vitrage. Elles suivent la forme des dalles.

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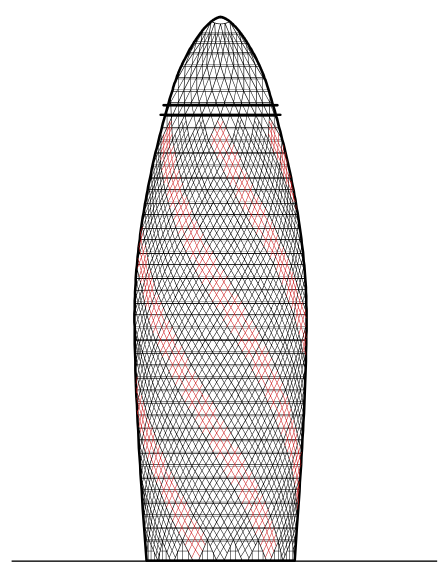

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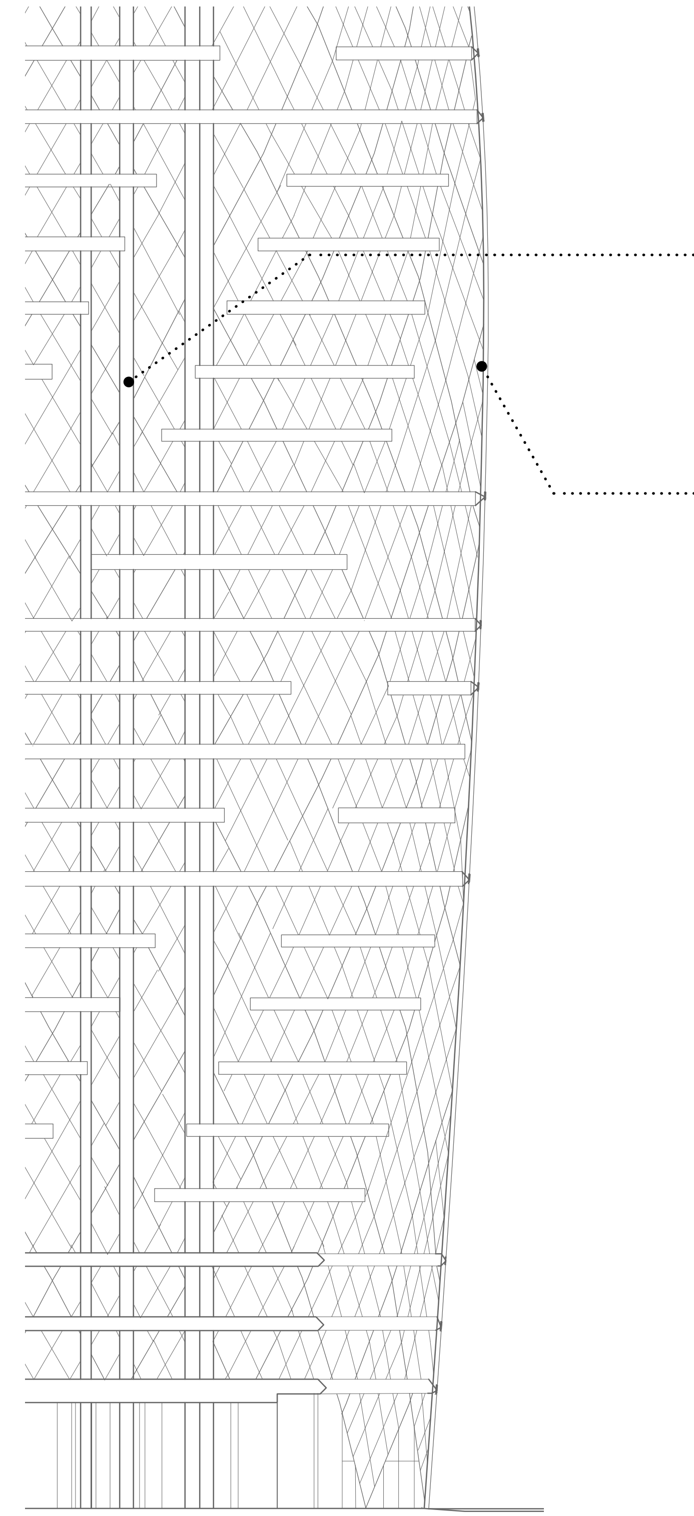

Steel core

Noyau de colonnes d'acier

Openings in the floors, key elements to the bioclimatic strategy as well as a conceptual approach for a dynamic office atmosphere.

Percements dans les dalles, éléments clés de la stratégie bioclimatique et ils ajoutent du dynamisme entre les niveaux.

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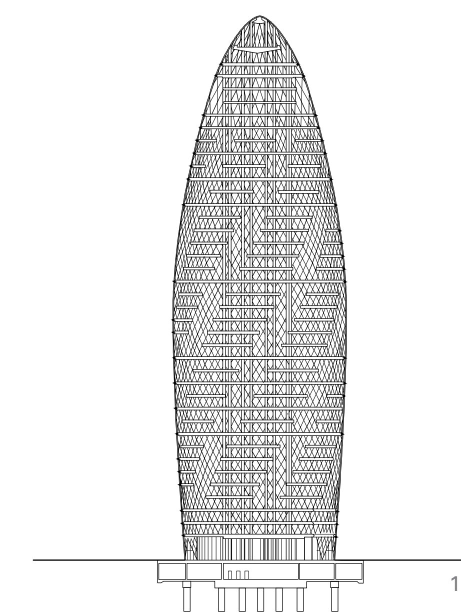

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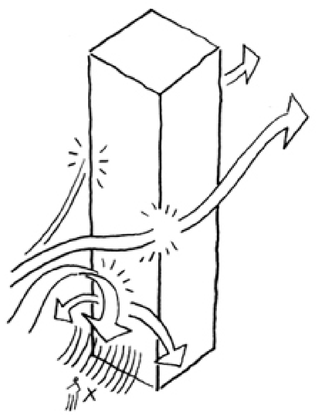
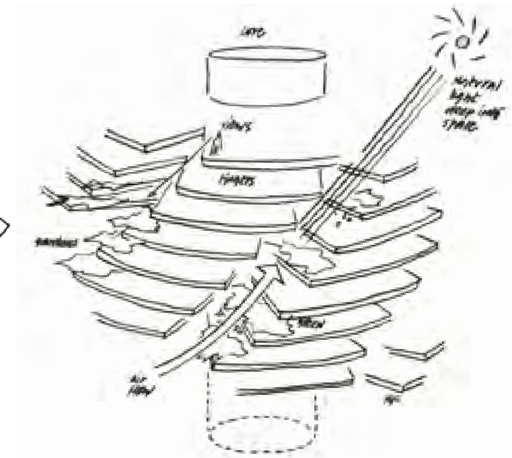
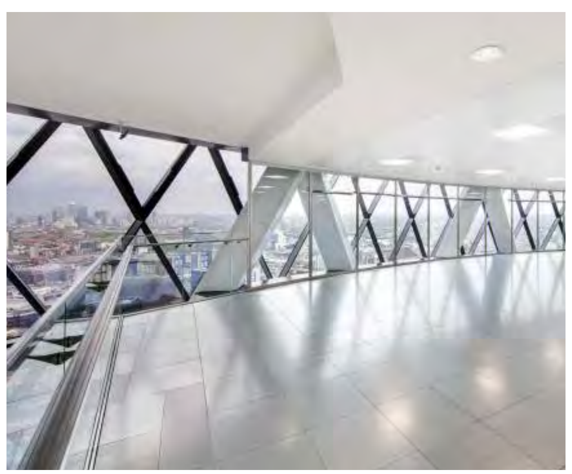
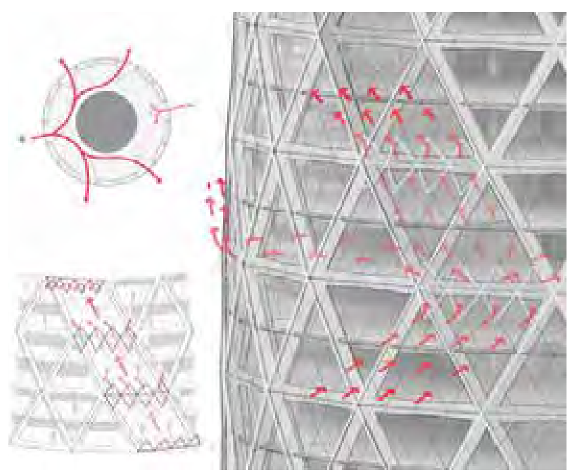






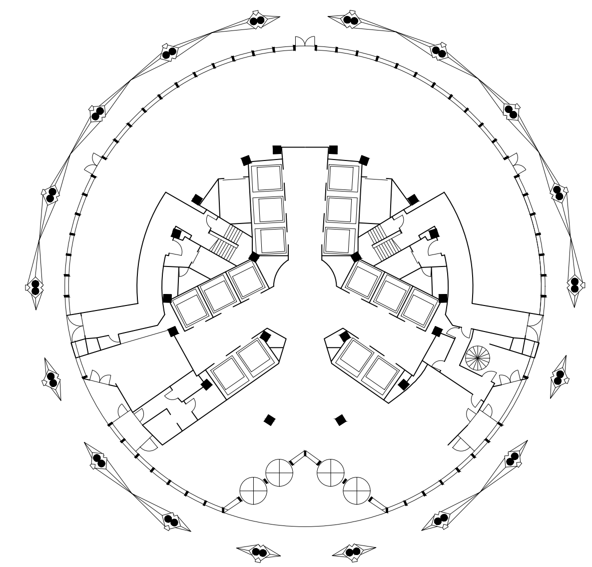
^ The Gherkin



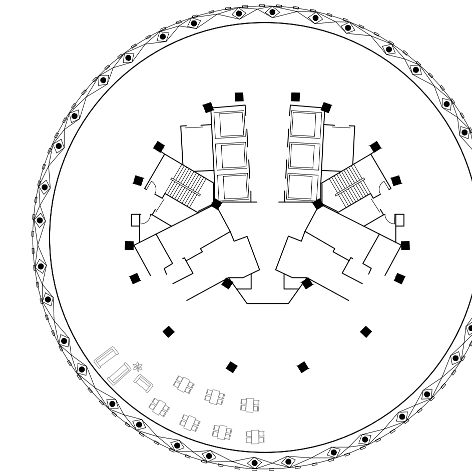
^ Archdaily

With the intention to elevate the standard in sustainable design for towers, the architects and engineers managed to reduce wind loads, and create a cooling system that draws air through panels in the facade. These innovations were made possible by the many parametric explorations that lead to the aerodynamic profile we know.

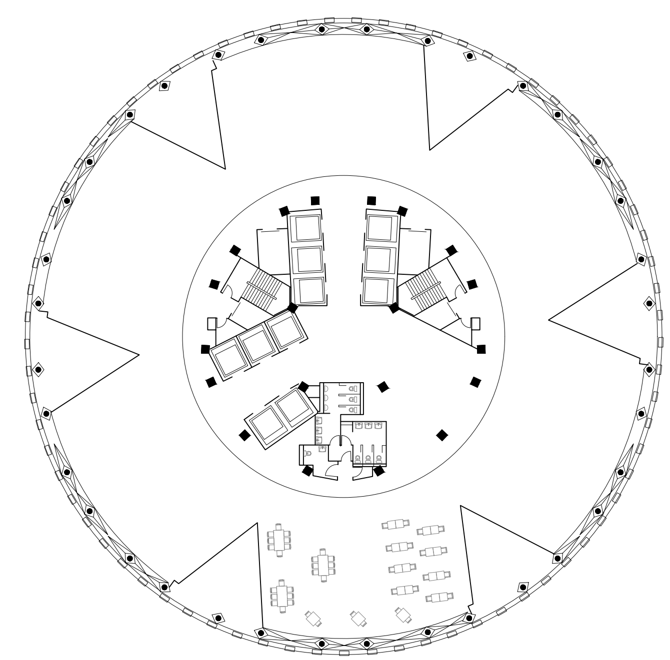
Les architectes et ingénieurs du projet avaient l'intention créer un nouveau standard pour la conception durable des tours. Pour rendre leur bâtiment plus efficace, ils ont réduit les charges de vent qui s'appliquent à l'enveloppe et inventé un système de refroidissement de l'air qui permet de faire pénétrer l'air frais à travers la façade. Pour réussir ce mandat, ils ont travaillé le concept environnemental et la modélisation paramétrique en tandem.



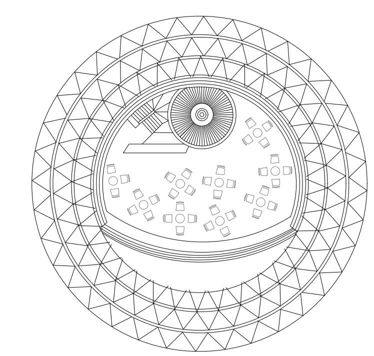
Ground floor



Level

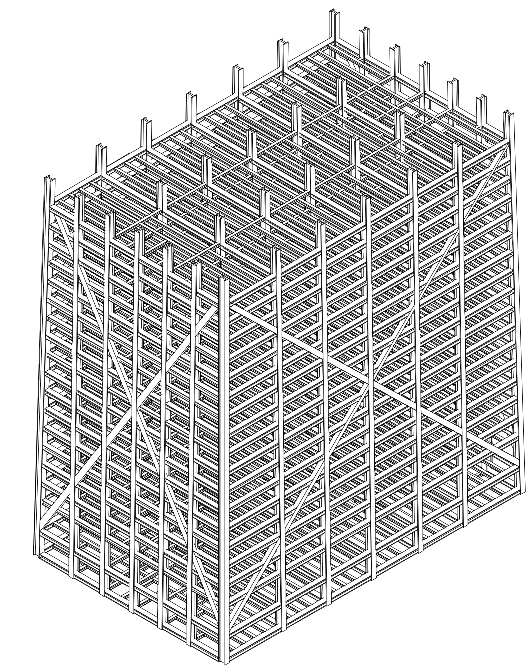


Level 21



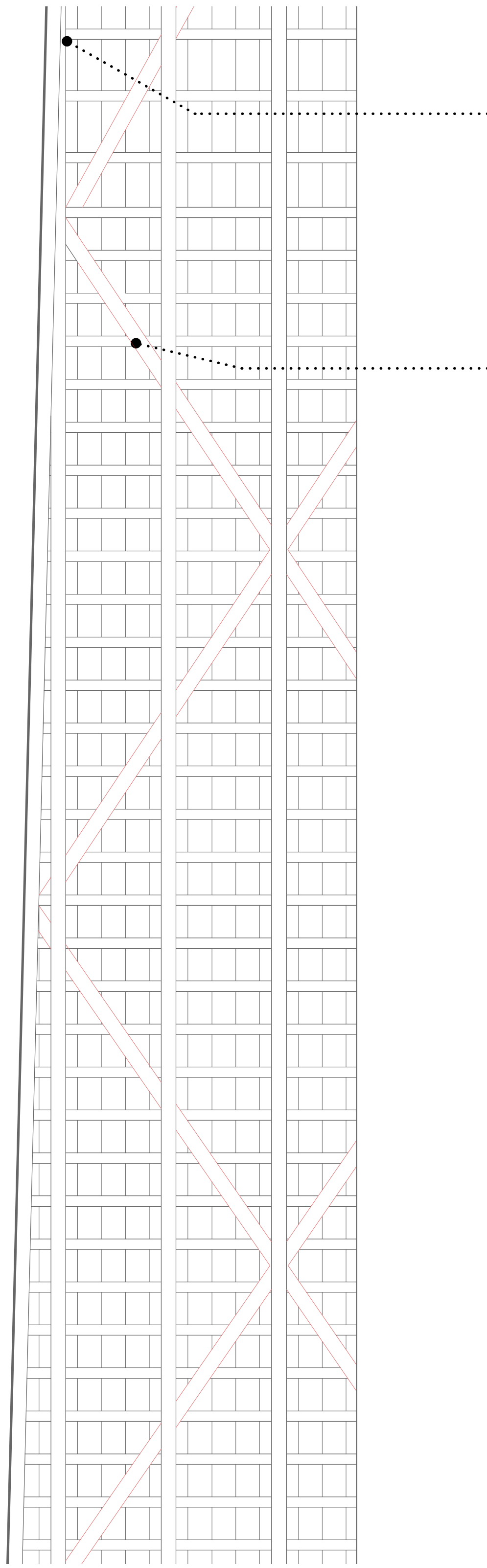
Level 40

Architect I Architecte :	SOM
Engineer I Ingénieurs :	Fazlur Khan
Location I Localisation :	Chicago
Year of construction I Année de construction :	1970
Use I Usage :	Offices, appartments, observatory
Total area I Superficie totale :	260 128 m²
Height I Hauteur :	344 m
Number of floors I Nombre d'étage :	100
Floor plan area I Superficie d'un étage :	Min : 1300 m² / Max : 3470 m²
Structure system I Système de structure :	Diagonalized core
Structure materials I Matériaux de structure:	Steel
Envelope materials I Matériaux d'enveloppe:	Glass+Aluminum



The John Hancock Center, today named after its address, 875 North Michigan Avenue, is the tallest tower of the city of Chicago. Its massive scale is a first in many ways, including the fact that it was the first ever multi-use tower, designed to host a shopping center, offices, apartments and an observatory and multiple restaurants at its top. The monumentality of this building is also visible in its massive bracing, which is located on the outside perimeter. Using a diagonalized core allowed the architects to include the many different uses since it completely liberates the floors from interior bracing, therefore each of them can be designed accordingly to the program.

Le John Hancock Center, rebaptisé aujourd'hui selon son adresse, est le plus haut bâtiment de la ville de Chicago. Son échelle massive est une nouveauté pour l'époque et se justifie parce que le bâtiment était aussi le premier à usage multiple à être porté à de telles proportions. On y retrouve des commerces, des bureaux, des appartements et un observatoire. La monumentalité de la tour se reflète dans son immense contreventement, visible de l'extérieur. L'usage d'une structure en tube renforcé a permis de transformer l'aménagement selon l'usage, puisque les planchers sont complètement libérés d'armature intérieure.



As the tower gets higher and narrower, the extra columns are absorbed in the peripheral structure.

Le périmètre de la tour diminue pendant que sa hauteur augmente, alors les colonnes en trop sont absorbées par la structure périphérique.

External bracing.

Contreventement extérieur.

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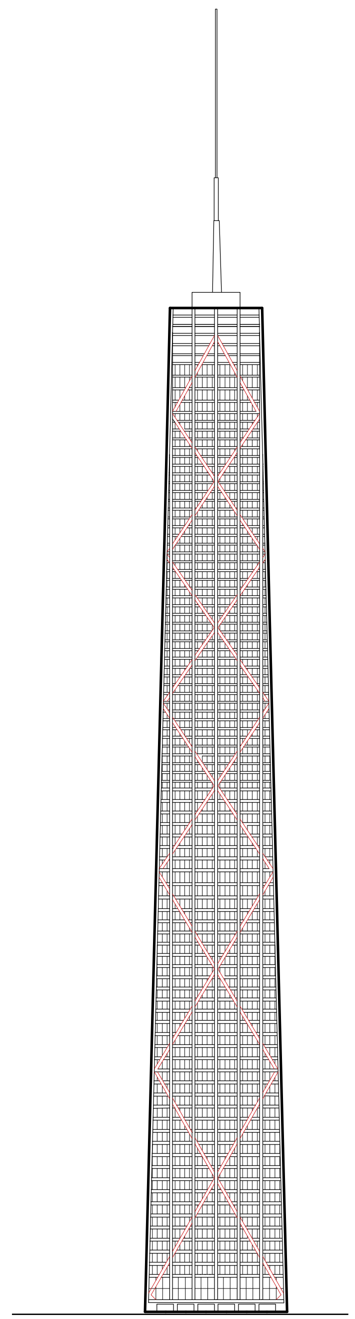

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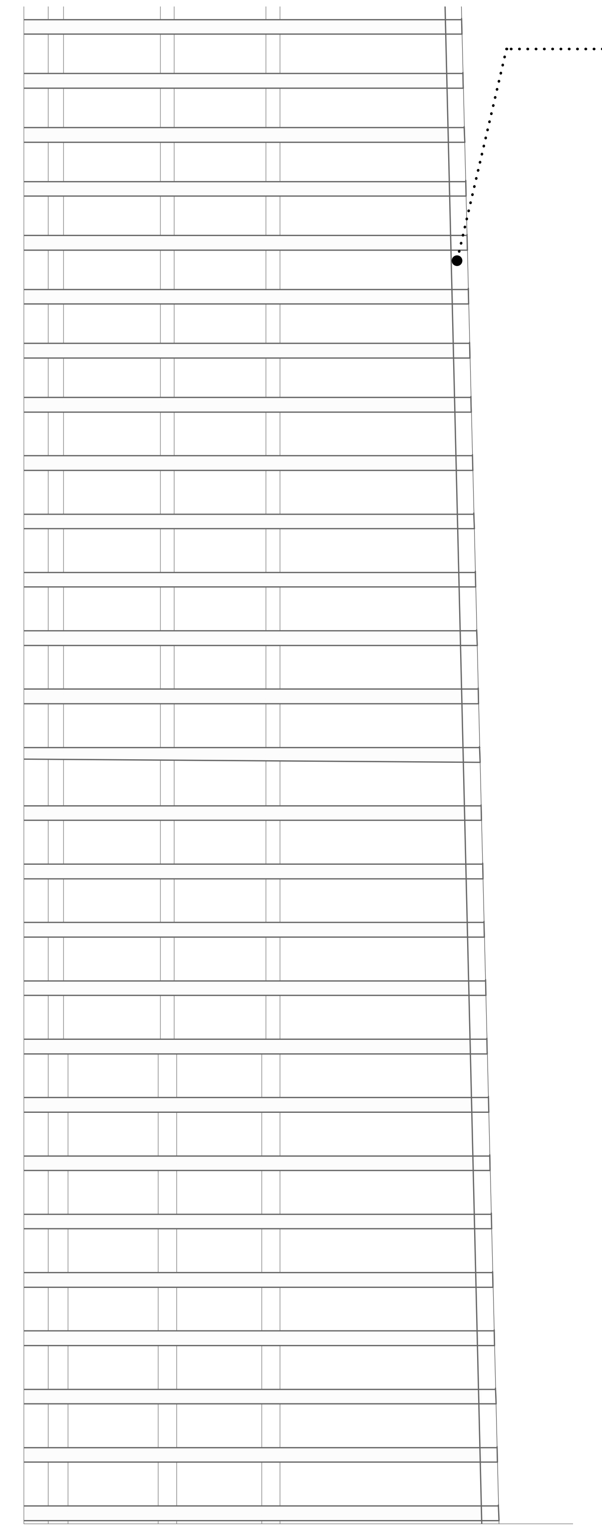

The tower's internal structure all connects to the exterior bracing, which acts as a braced tube.

La structure interne de la tour est reliée au contreventement extérieur, qui fait partie d'un système de tube renforcé.

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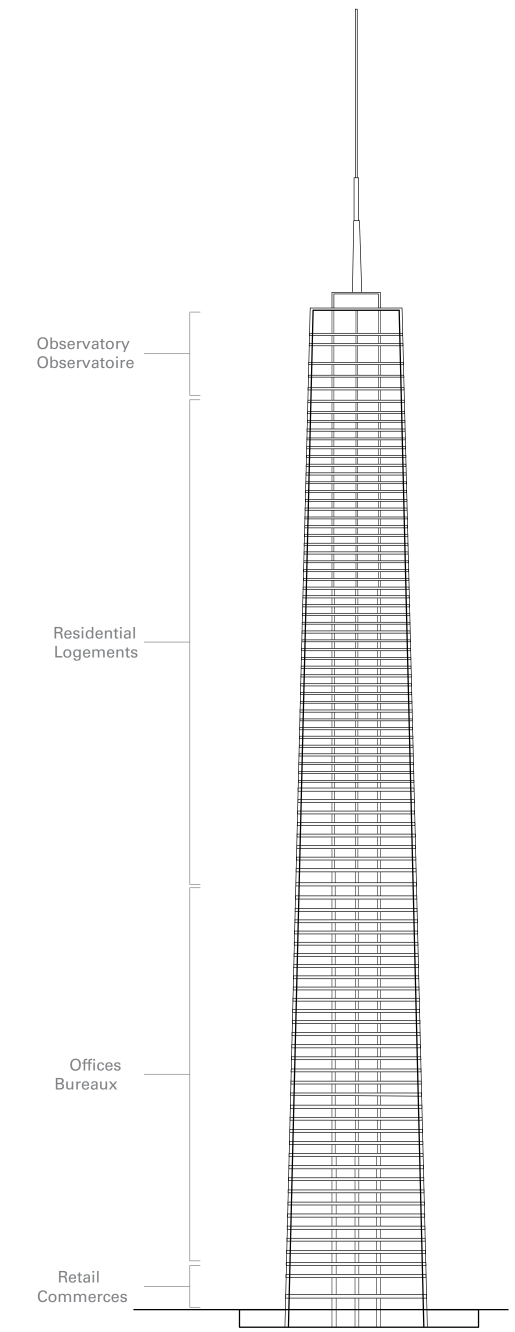

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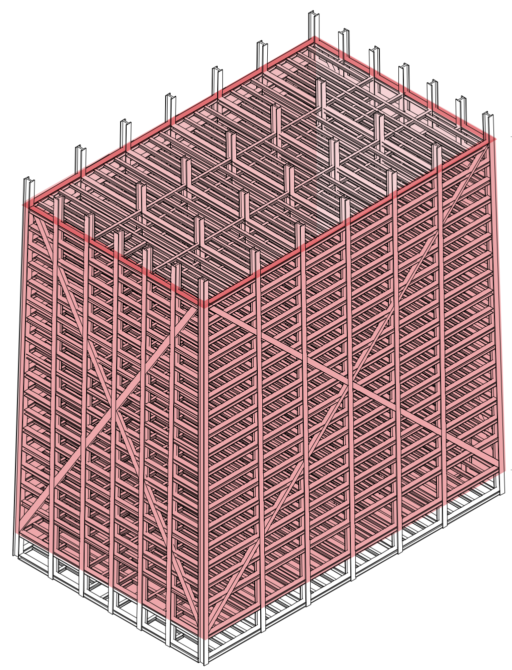
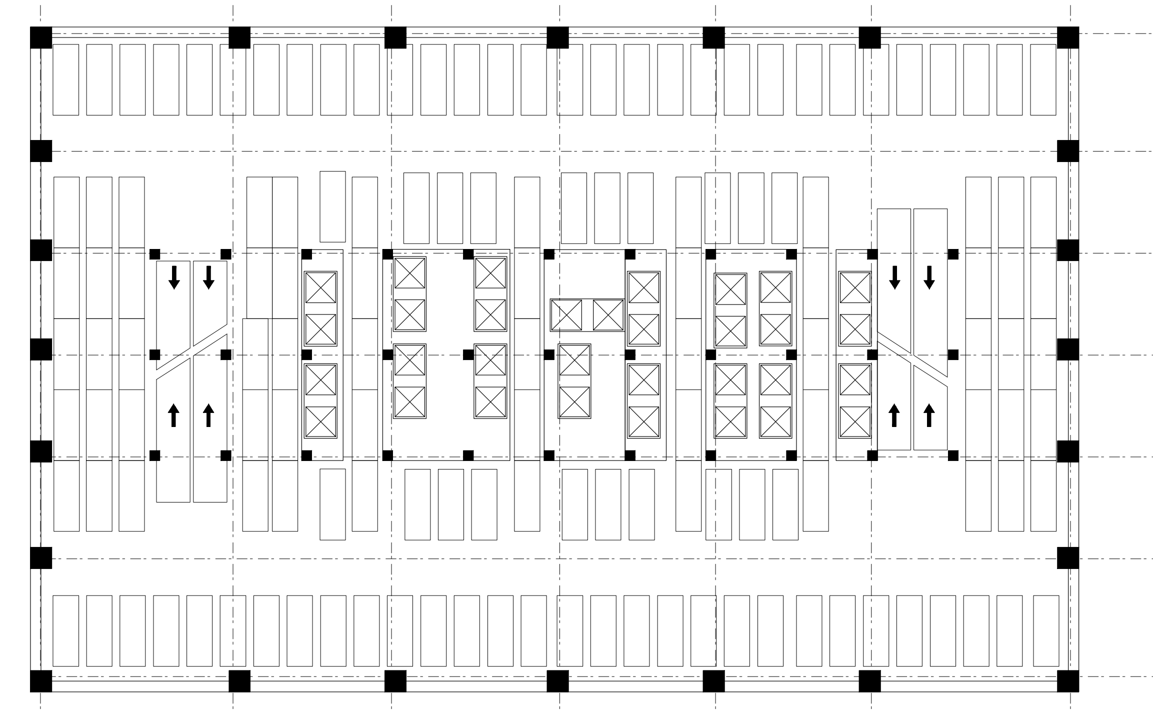
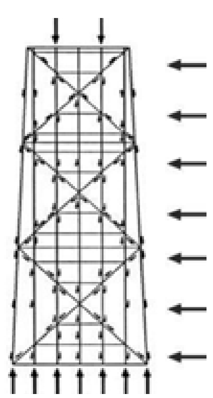
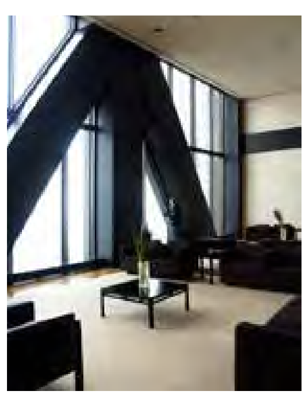


Ground floor | Rez-de-chaussée



Typical parking floor





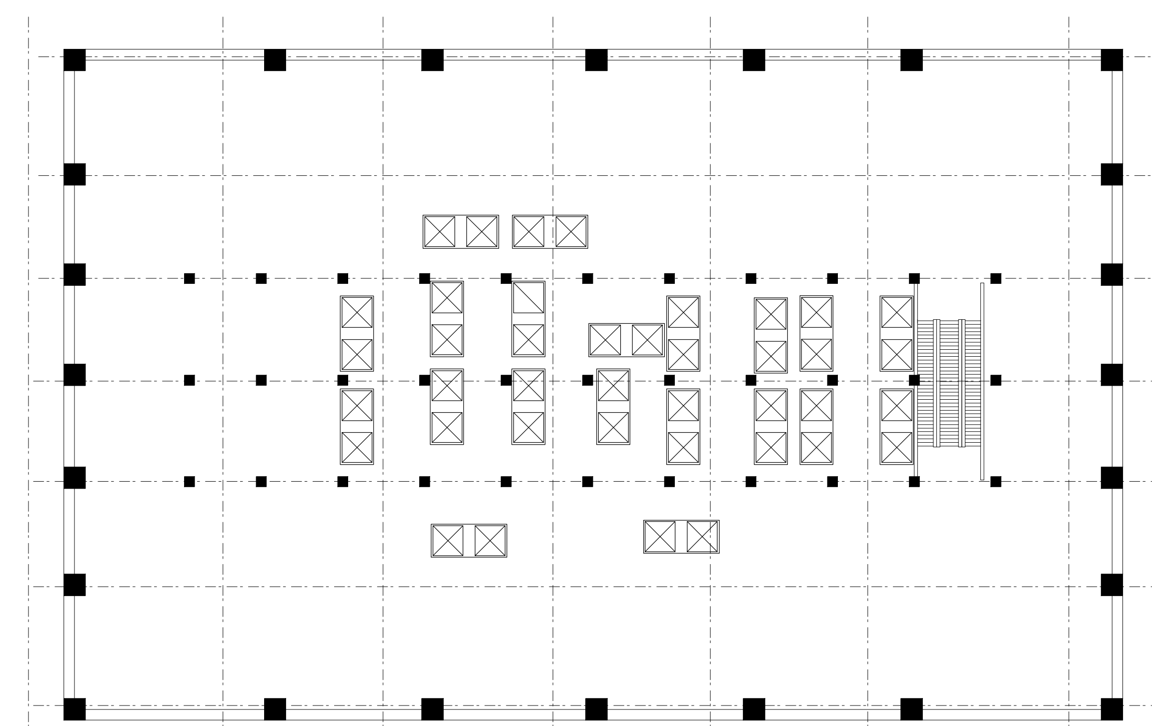
Reflections on the Hancock Concept. Hal IyengaAr.
CTBUH Journal Issue 1, 2000. P51

The structural design marked an evolution in the design of structural systems for skyscrapers.
The John Hancock Center was the first "trussed tube" structure utilizing exoskeletal members.

Dre Anne Nichols

La conception de structure de la tour a marqué un virage dans le design des gratte-ciels.
Le John Hancock Center est la première structure de tube renforcé utilisant un exosquelette.

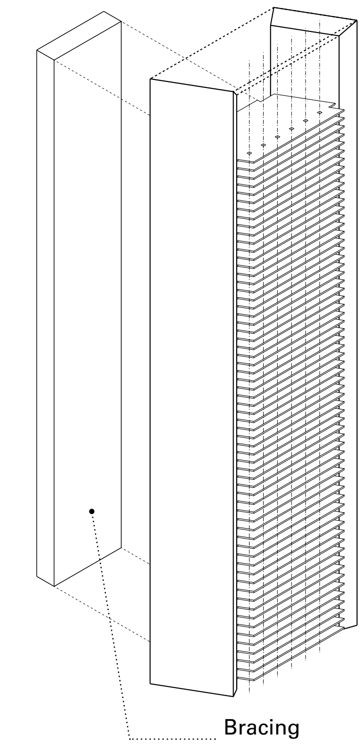
Dre Anne Nichols



Groundfloor

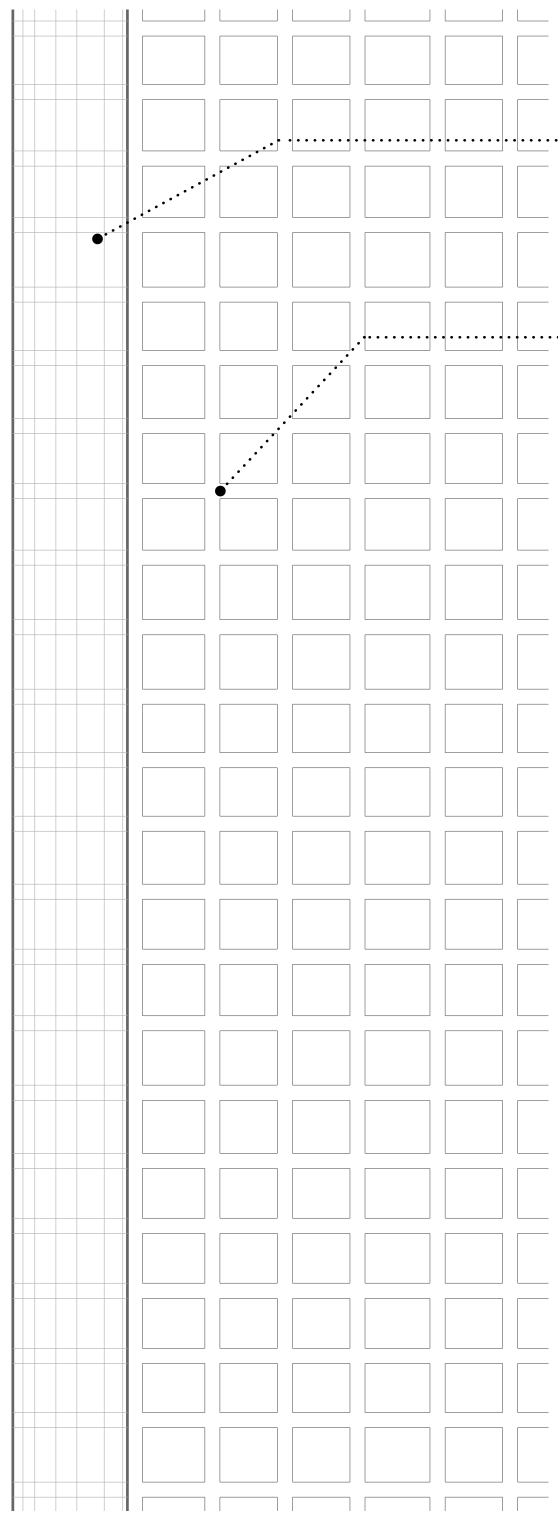
< ADNOC Tower, https://www.archdaily.com

Architect I Architecte :	HOK, inc.
Engineer I Ingénieurs :	CH2M HILL, BuroHappold, WSP, etc.
Location I Localisation :	Abu Dhabi, United Arab Emirates
Year of construction I Année de construction :	2015
Use I Usage :	Office
Total area I Superficie totale :	175 300 m²
Height I Hauteur :	342 m
Number of floors I Nombre d'étage :	74
Floor plan area I Superficie d'un étage :	2600 m²
Structure system I Système de structure :	Concrete arch and columns
Structure materials I Matériaux de structure :	Concrete
Envelope materials I Matériaux d'enveloppe:	Granite and glass



The ADNOC HQ tower is not aligned with the street. Its north-south orientation works with the sun's path, minimizes his footprint on the ground and leave some space for the gardens. The key element of the tower is the concrete arch around it. The two vertical elements work as gigantic columns that clears the center of the level plan. They contain the emergency staircases, the mechanical elements and the service elevators. Six columns and a concrete structure hold the building from the inside.

La tour ADNOC HQ n'est pas alignée avec la rue. Son orientation nord-sud répond à la course du soleil, minimise son empreinte au sol et laisse place aux aménagements paysagers. L'élément clé de la tour est l'arche de béton qui l'entoure. Les deux éléments verticaux ont la fonction d'immense colonnes qui libèrent le centre des étages de tout noyau. Ceux-ci contiennent les escaliers de secours, la mécanique, ainsi que des ascenseurs de service. Six colonnes et une structure de béton soutiennent également le bâtiment aux extrémités du plan.



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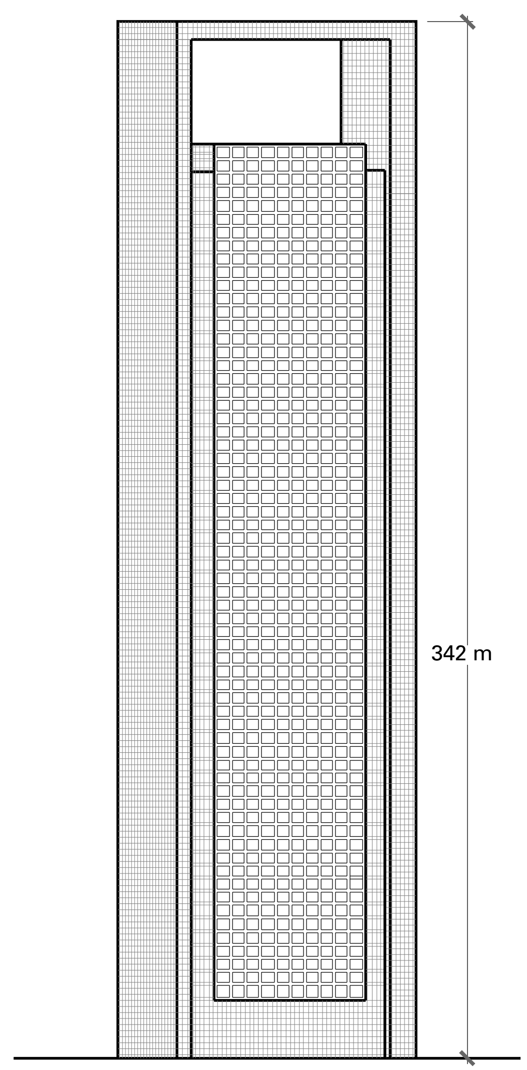

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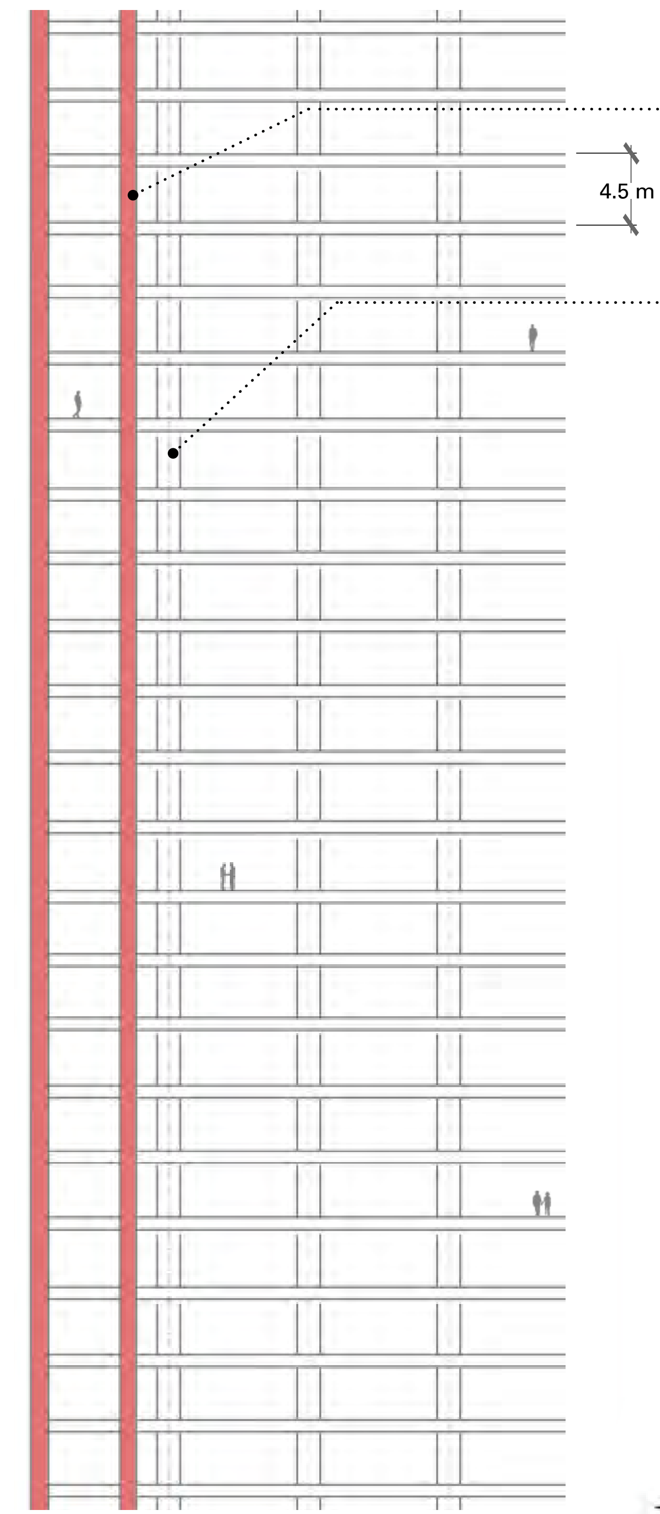

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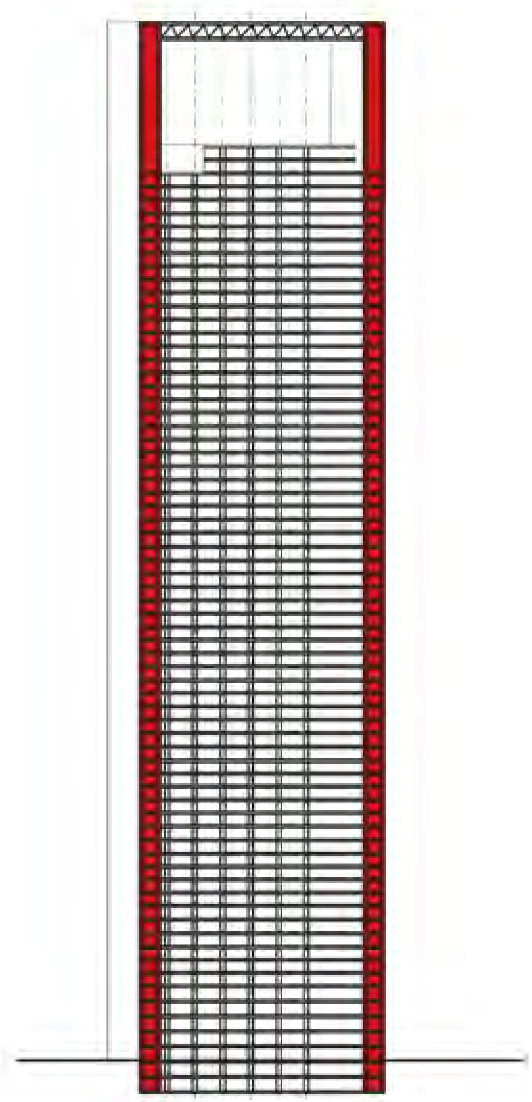

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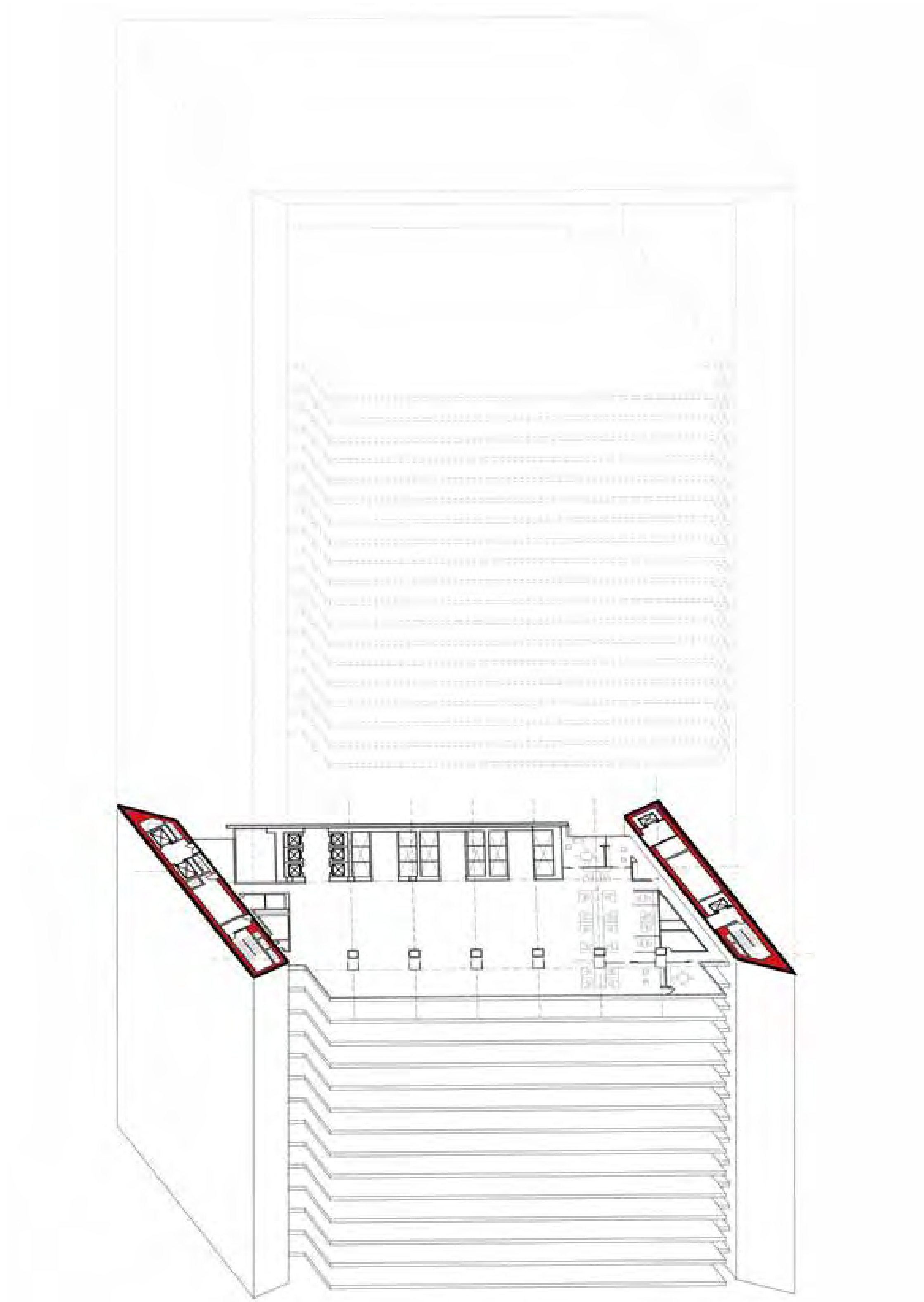
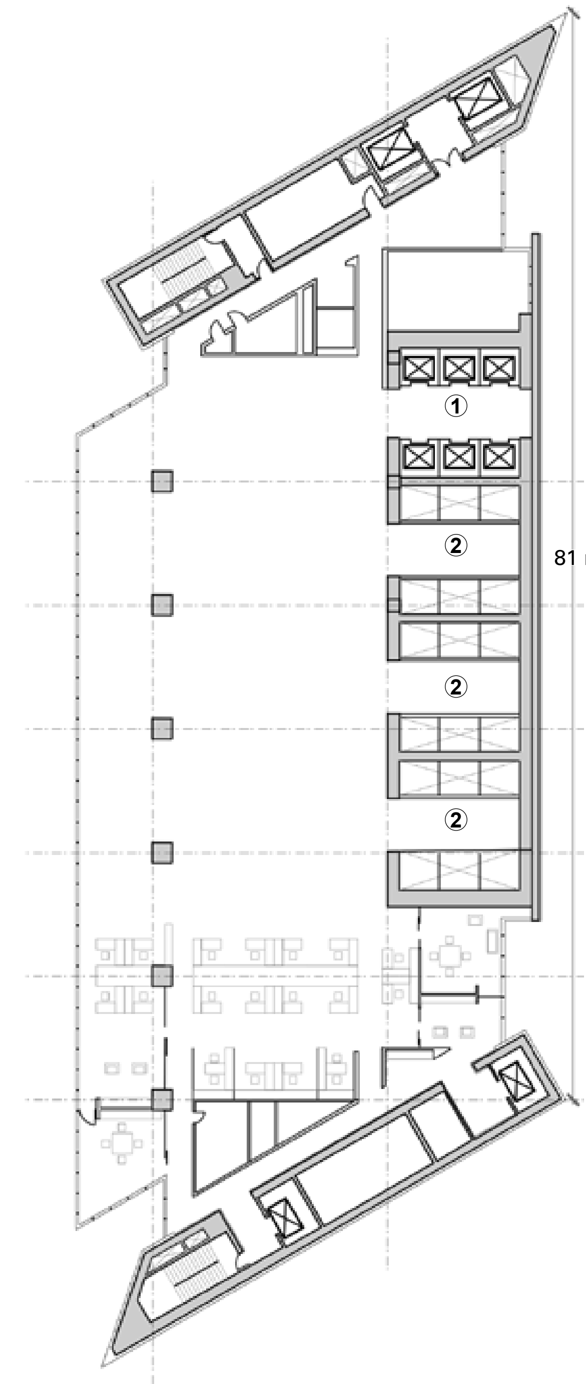
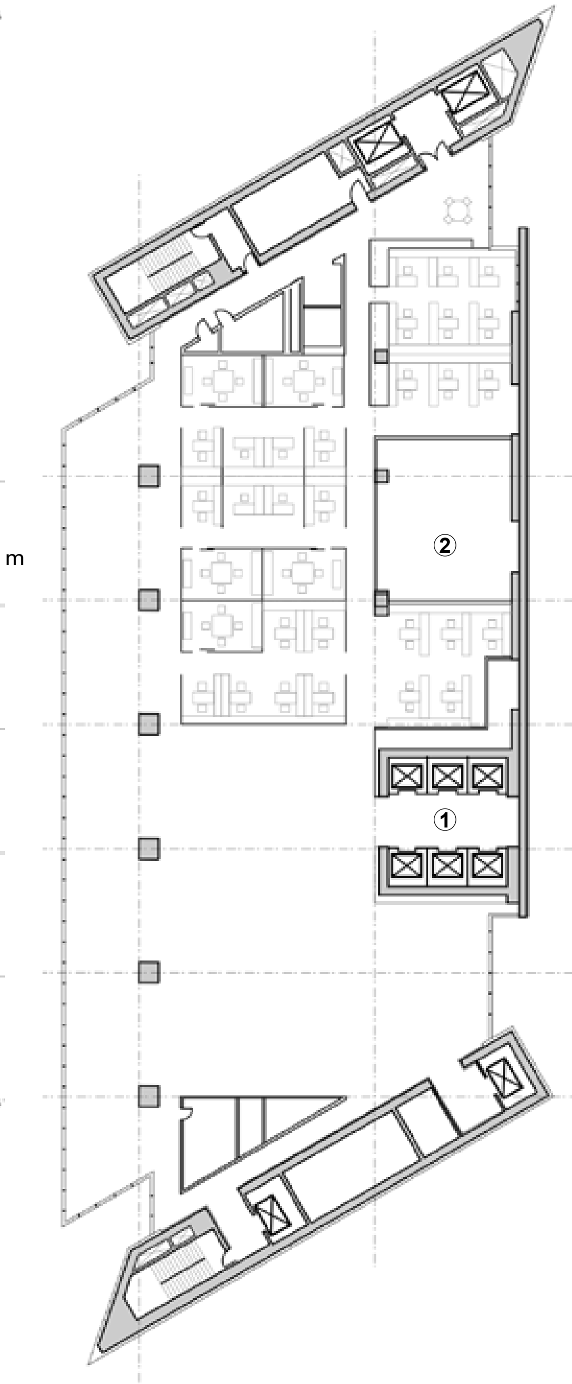


Section showing the importance of the arch and its composition

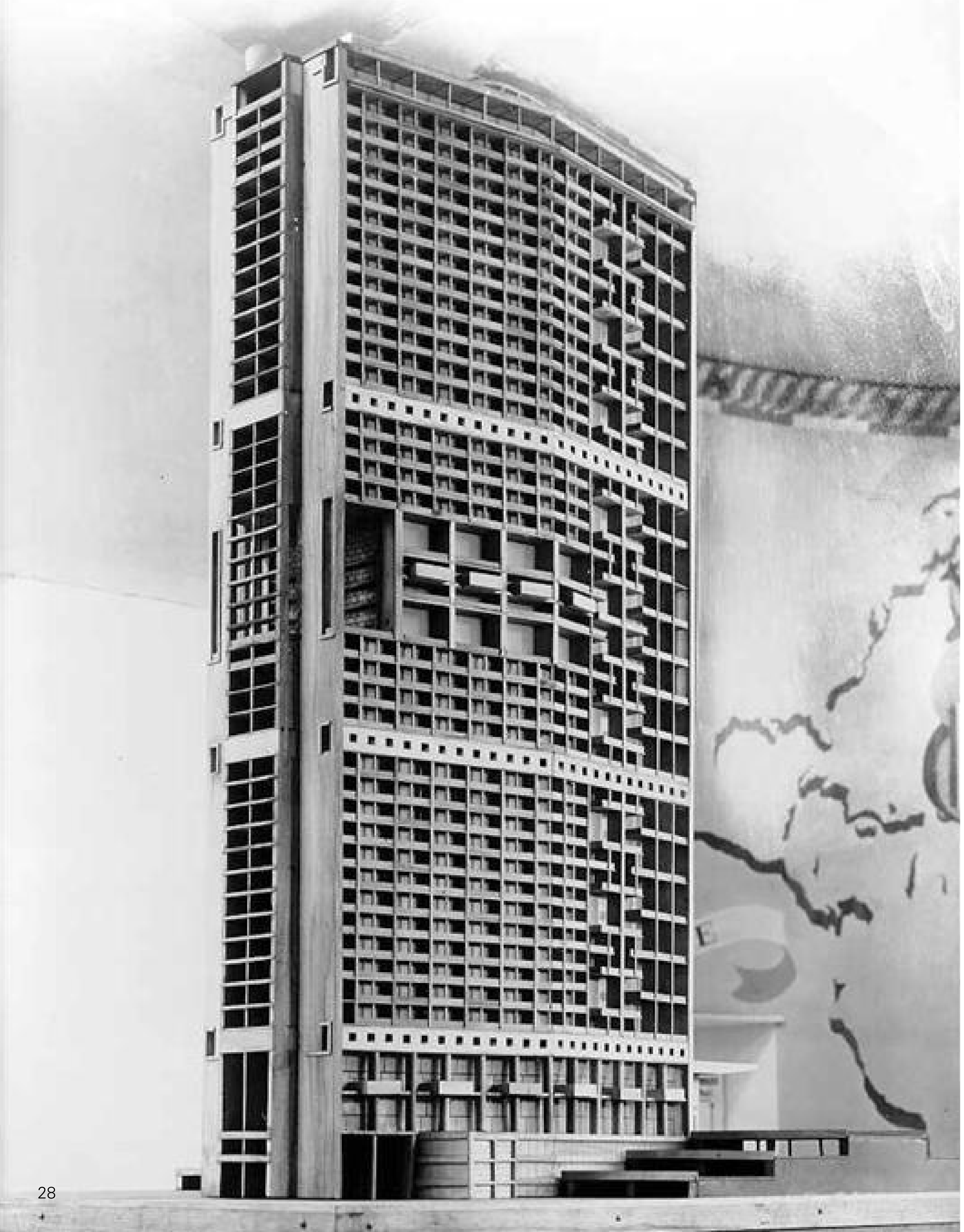
1- Elevators
Ascenseurs
2- Restrooms
Toilettes
Concrete structure
Structure de béton



Typical low-rise level floor plan

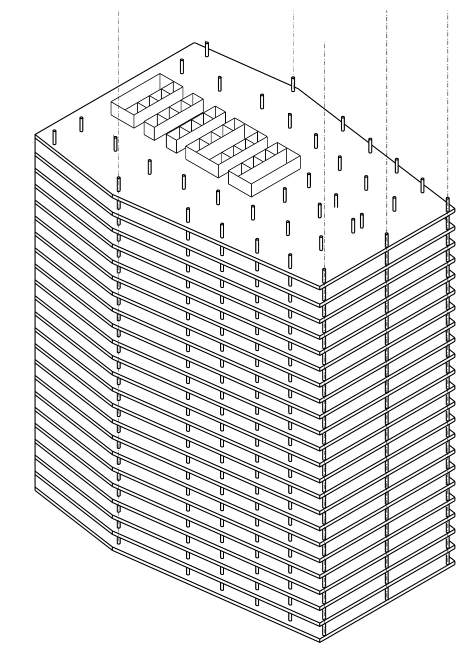


Typical high-rise level floor plan



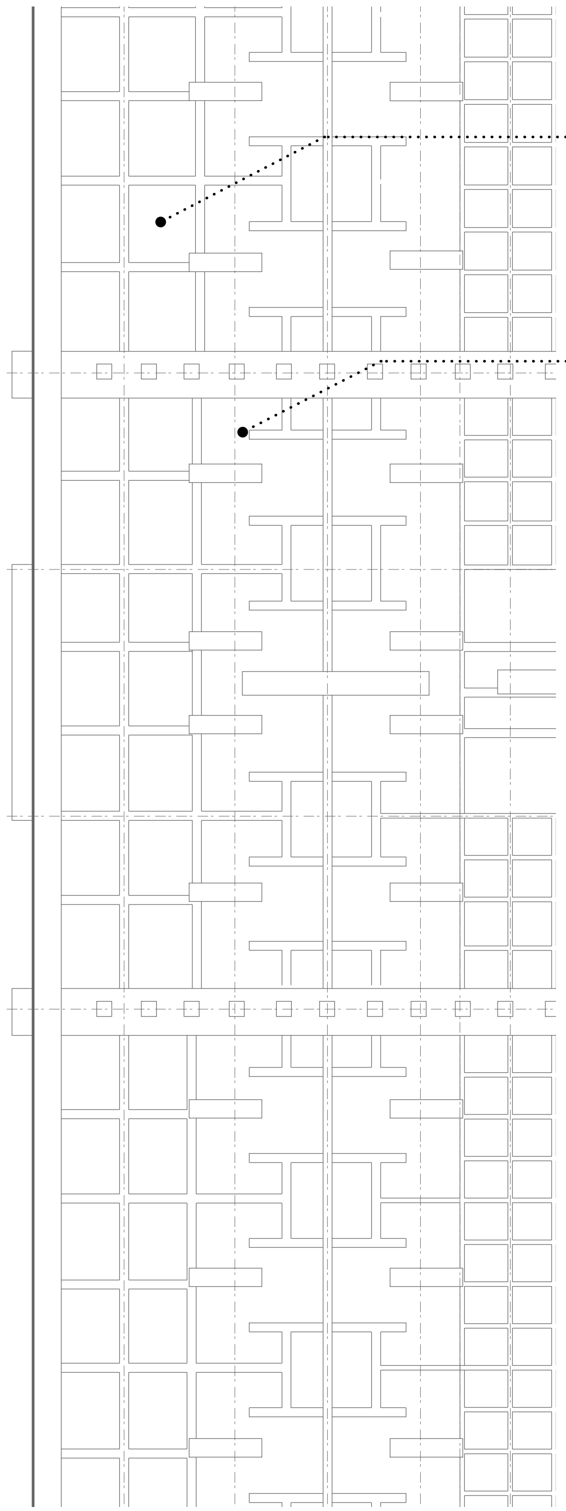
CAP DE LA MARINE // FORTIN FEDERIQUE

Architect I Architecte :	Le Corbusier
Engineer I Ingénieurs :	None
Location I Localisation :	Alger, Algeria
Year of construction I Année de construction :	1938 (not built)
Use I Usage :	Office
Total area I Superficie totale :	131 385 m²
Height I Hauteur :	172 m
Number of floors I Nombre d'étage :	53
Floor plan area I Superficie d'un étage :	2510 m²
Structure system I Système de structure :	Column/slab
Structure materials I Matériaux de structure :	Concrete
Envelope materials I Matériaux d'enveloppe:	Concrete



The project Cap de la Marine was developed by Le Corbusier in 1938. It acts as the culmination of the architect's experiments with commercial towers. In this building, Le Corbusier proposes a facade of brise-soleil that regulates the whole building. This element controls natural lighting, paces the facade, facilitates the visualization of the human scale, but also generates the structure and program of the building. The architect used the golden rules system to calculate the concrete pannel's patern. For the structure, the column/slab system was proposed.

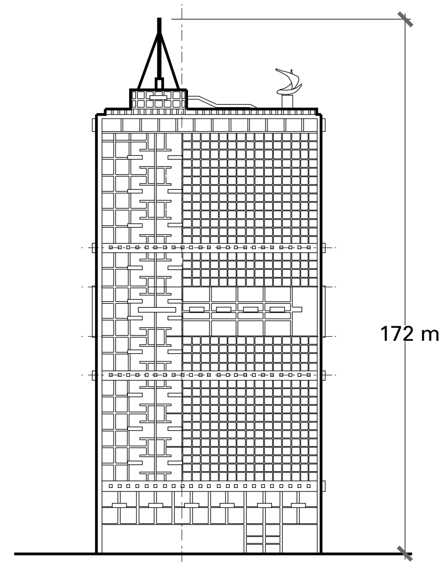
Le projet Cap de la Marine a été développé par Le Corbusier en 1938. Il s'inscrit comme l'apogée des expérimentations de tours commerciales de l'architecte. Dans cette tour, Le Corbusier propose une façade de brise-soleil qui régule tout le bâtiment. Cet élément contrôle la lumière naturelle, rythme la façade, facilite la visualisation de l'échelle humaine, mais génère également la structure et le programme du bâtiment. L'architecte a utilisé la règle d'or pour composer la façade et générer le rythme des panneaux de béton. Pour la structure, le système colonnes/dalles a été proposé.



Double height concrete pannels
Résille de béton double hauteur

Structural grid
Trame structurale

1:500



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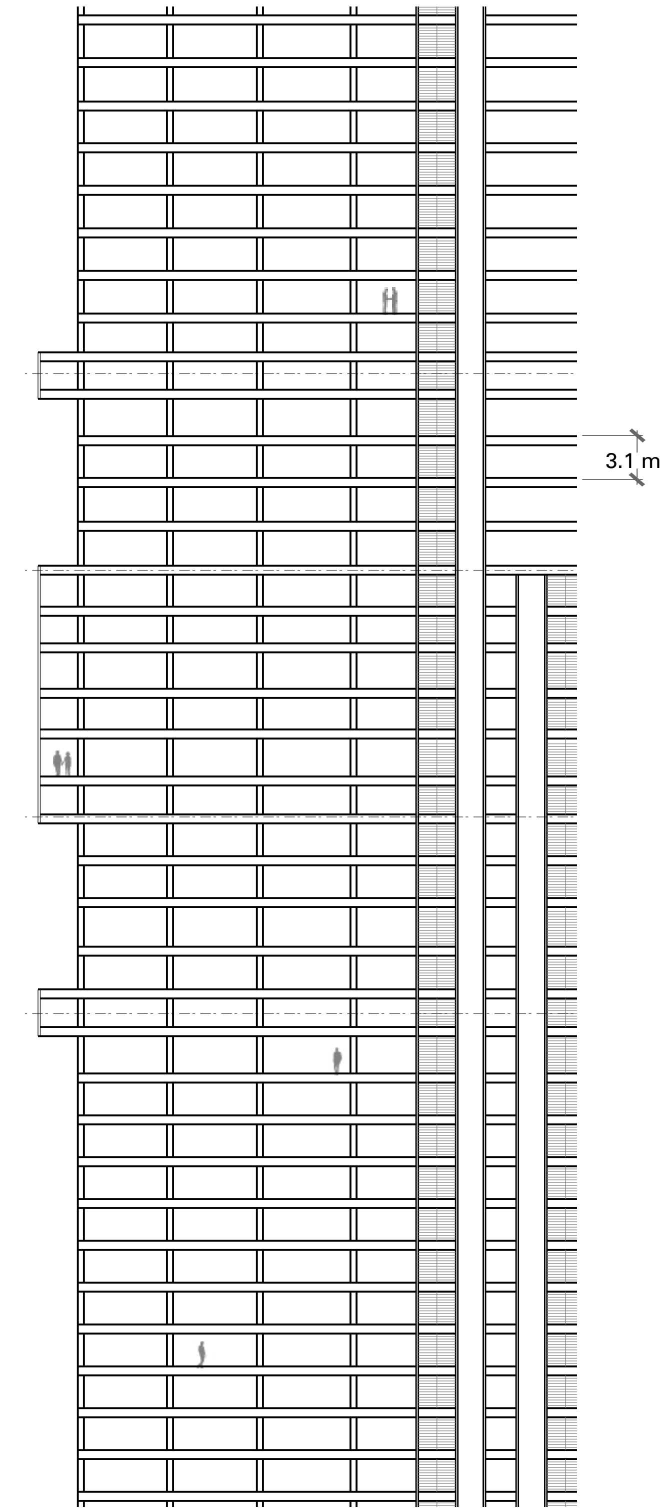
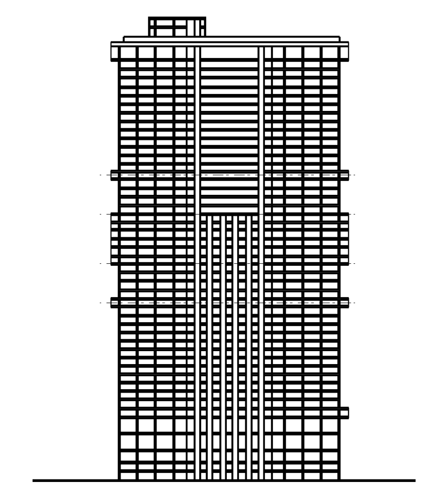


Floor-to-floor height
Hauteur dalle à dalle

1:500



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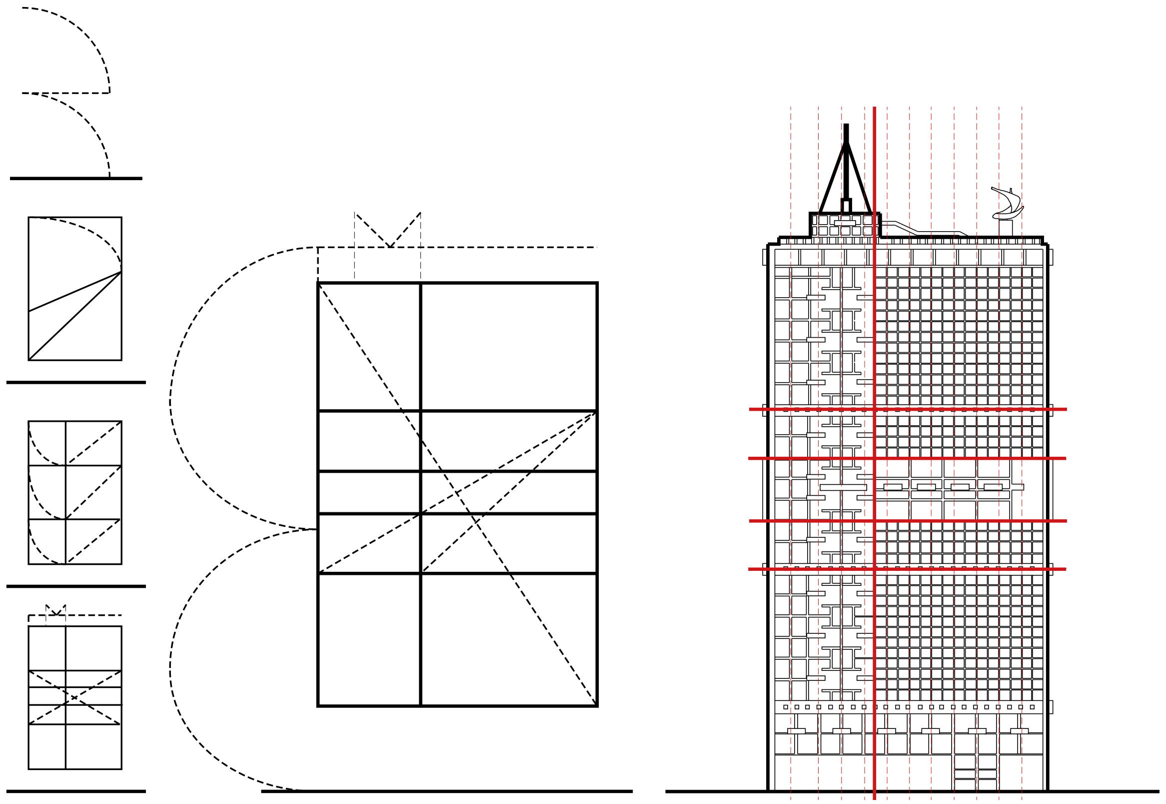
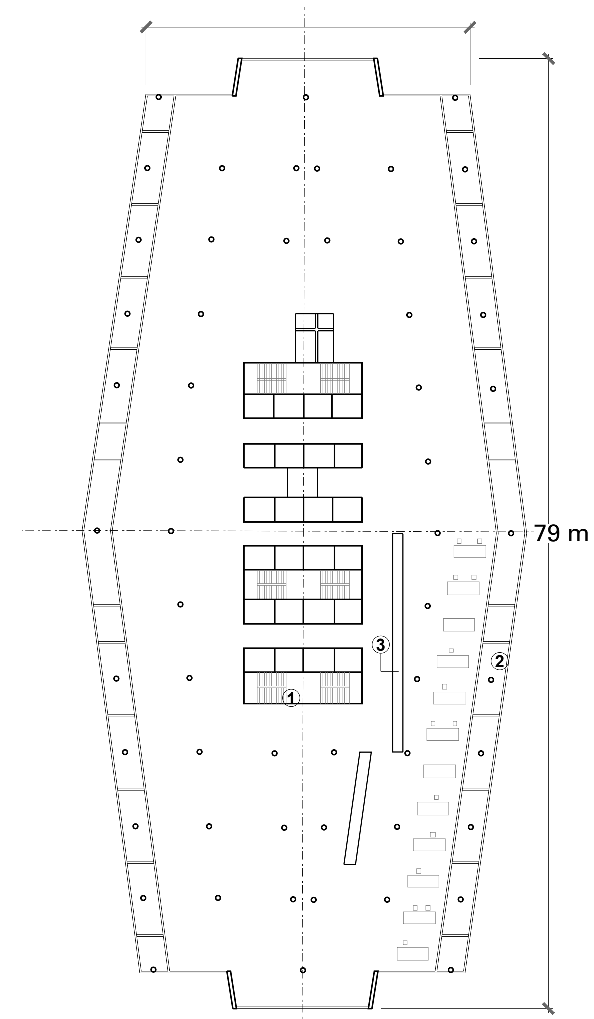
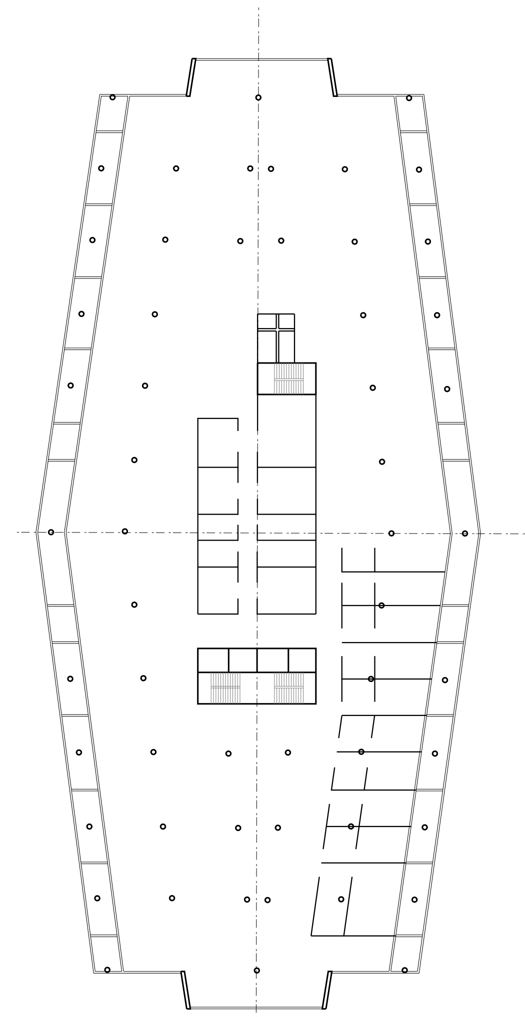


Elevation with regulating lines governing the facade, based on : ABALOS, I. and J. HERREROS. Tower and Office, p.28

Drawing showing loggia and interior space, ABALOS, I. and J. HERREROS. Tower and Office, p.188



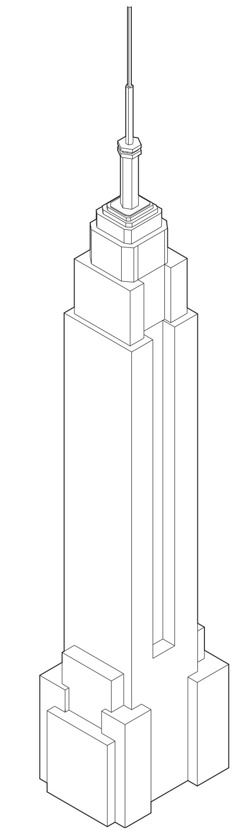
Typical low-rise level floor plan



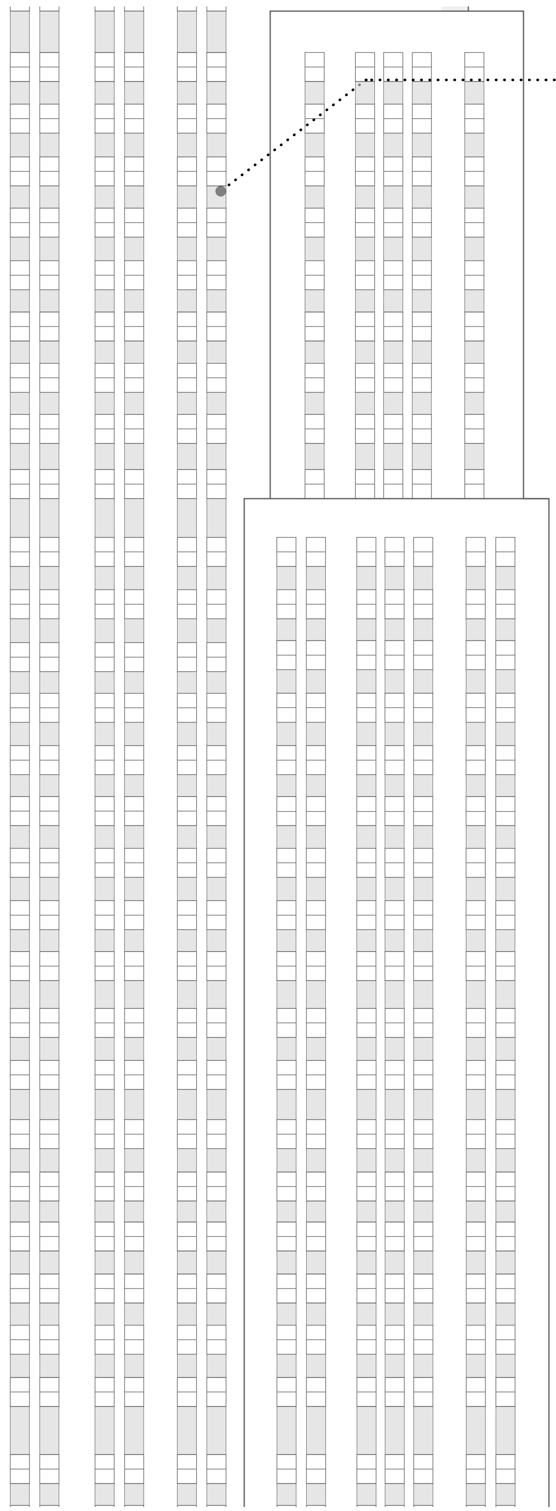
Typical high-rise level floor plan

1- Elevator
Ascenseur
2- Loggia
Loggia
3-Storage
Entreposage

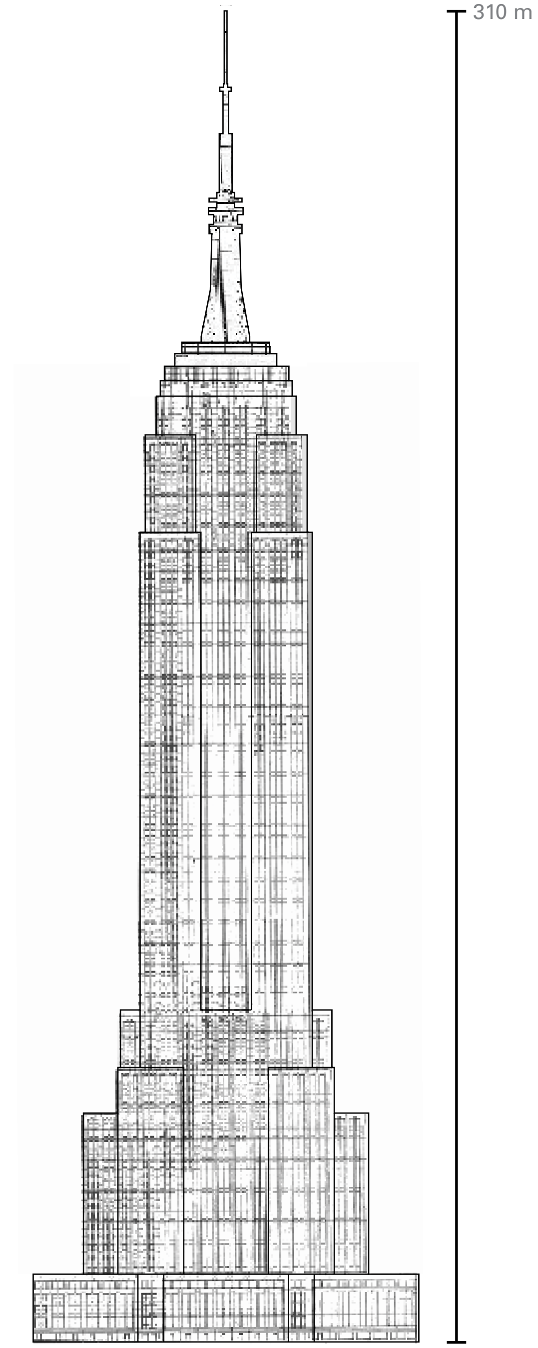
Architect I Architecte :	Shreve, Lamb & Harmon Homer G. Balcom
Engineer I Ingénieurs :	Manhanttan, New York
Location I Localisation :	
Year of construction I	1931
Année de construction :	Tour à bureau
Use I Usage :	
Total area I Superficie totale :	195 000 m²
Height I Hauteur :	381 m
Number of floors I Nombre d'étage :	86
Floor plan area I Superficie d'un étage :	83 725 m²
Structure system I Système de structure :	Cadre rigide avec murs de cisaillement
Structure materials I Matériaux de structure :	Acier
Envelope materials I Matériaux d'enveloppe:	Calcaire, aluminium, acier inoxydable, acier chrome-nickel



L'Empire State Building a été pendant plus de 40 ans le gratte-ciel le plus haut haut monde. Le système constructif et l'utilisation de matériaux simples et efficaces ont permis d'ériger cette tour en seulement 20 mois. Les lois de zonage, le principe de «economic height », les contrats de location du 1er mai ont façonné l'Empire State Building en forme de gâteau de mariage bien avant que des architectes soient impliqués. La collaboration étroite entre les différents experts a fait en sorte que des erreurs ou des problèmes ont évités et qu'il n'y ait pas eu de retard sur la chantier. Malgré le fait qu'elle a perdu son titre de la plus haute tour, elle demeure toujours la tour construite en si peu de temps.



Les fenêtres en bande verticale mettent de l'avant la hauteur du bâtiment tout en démontrant sa monumentalité.



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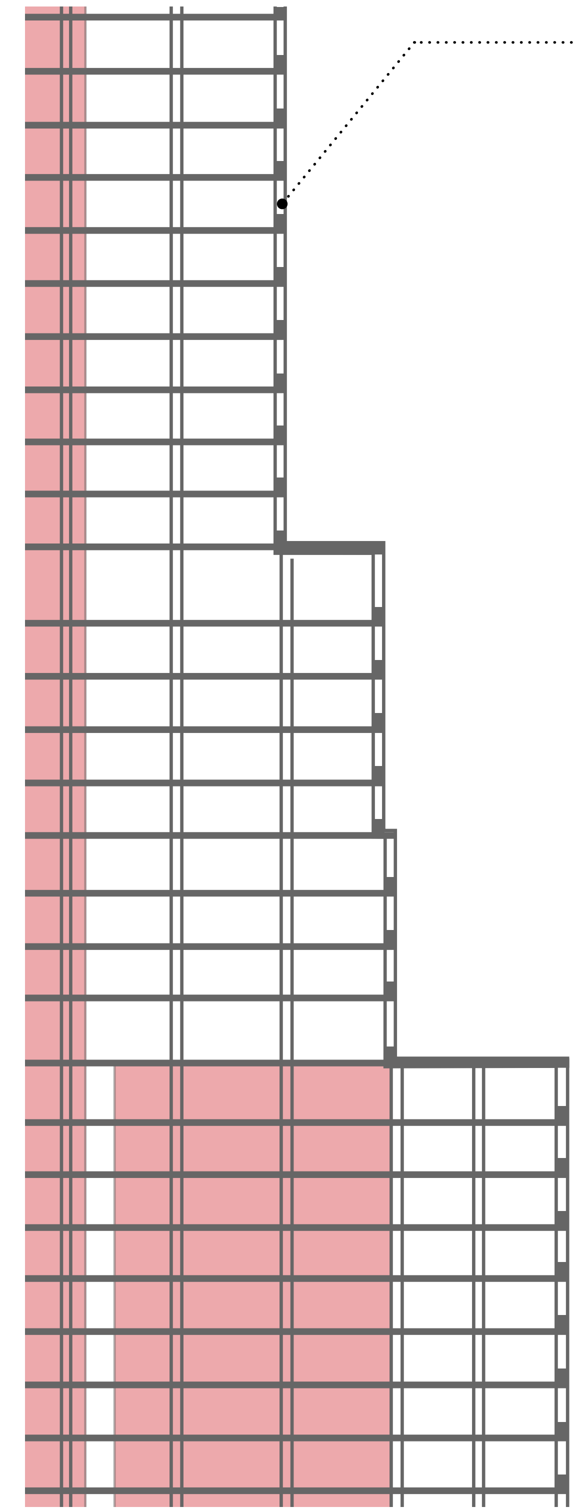
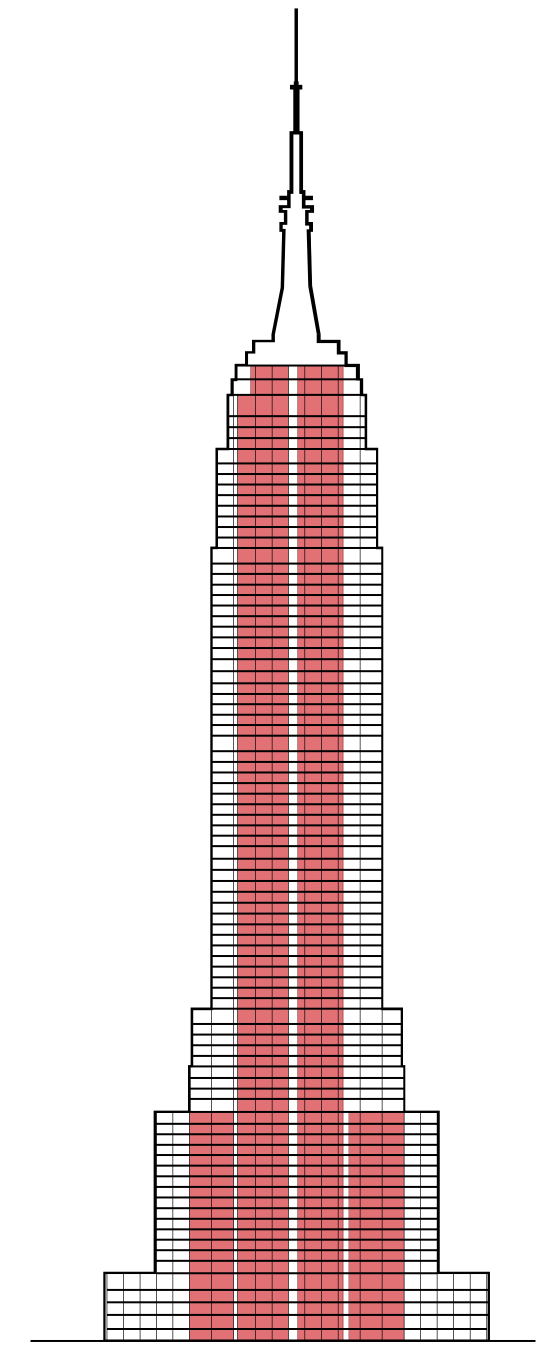


Les fenêtres sont à 600 mm du sol et montent jusqu'à la dalle de plafond.



1:500

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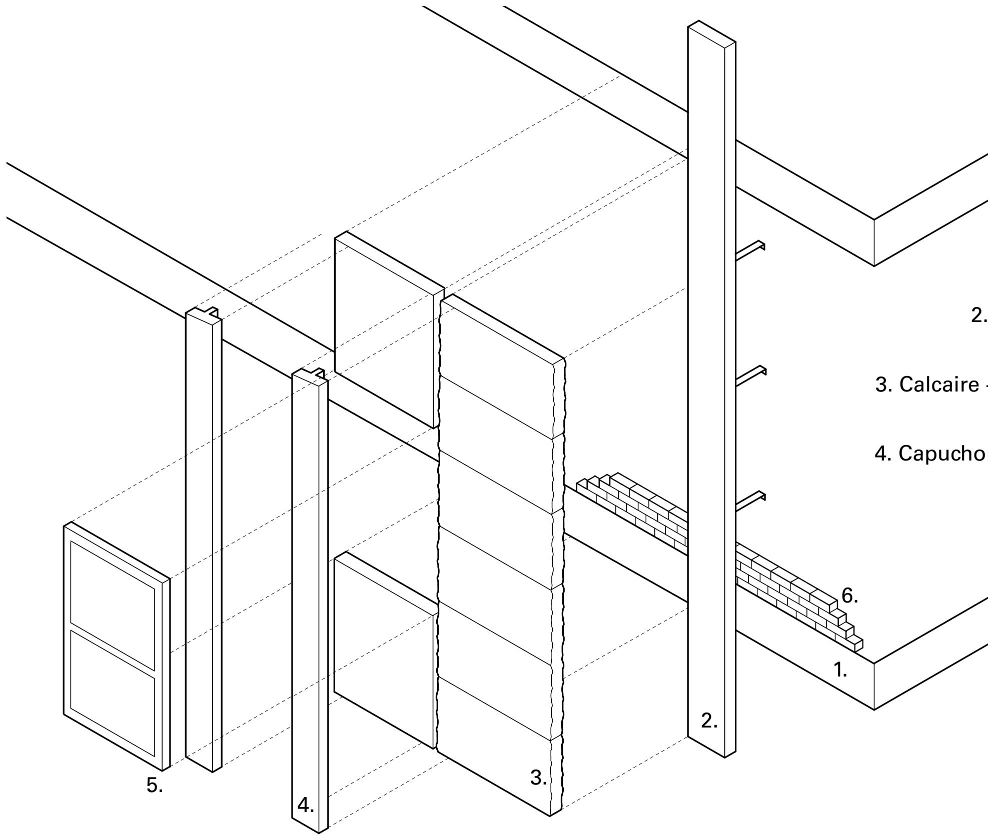
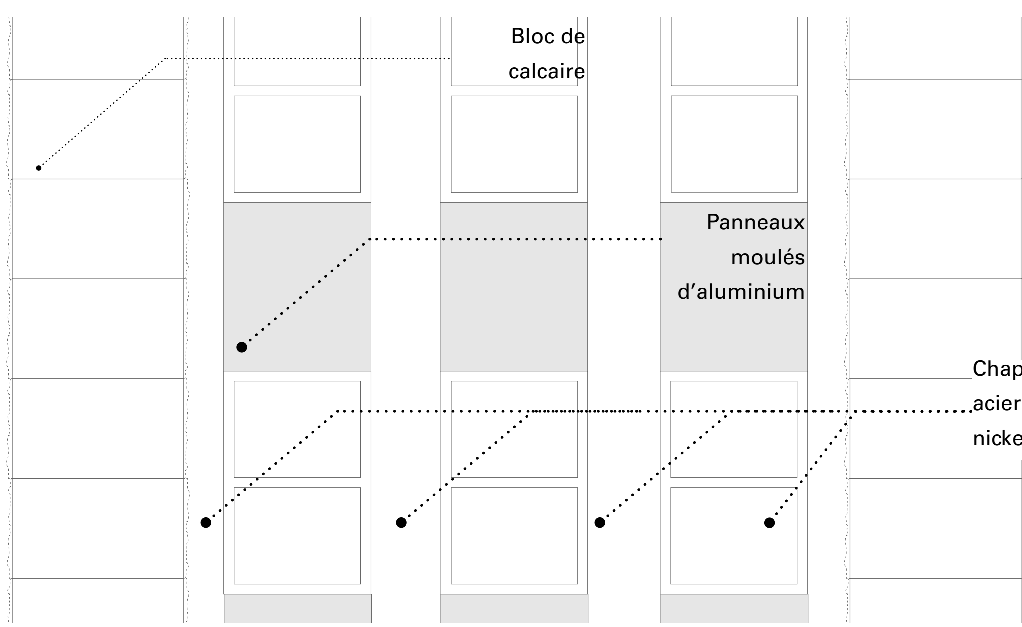
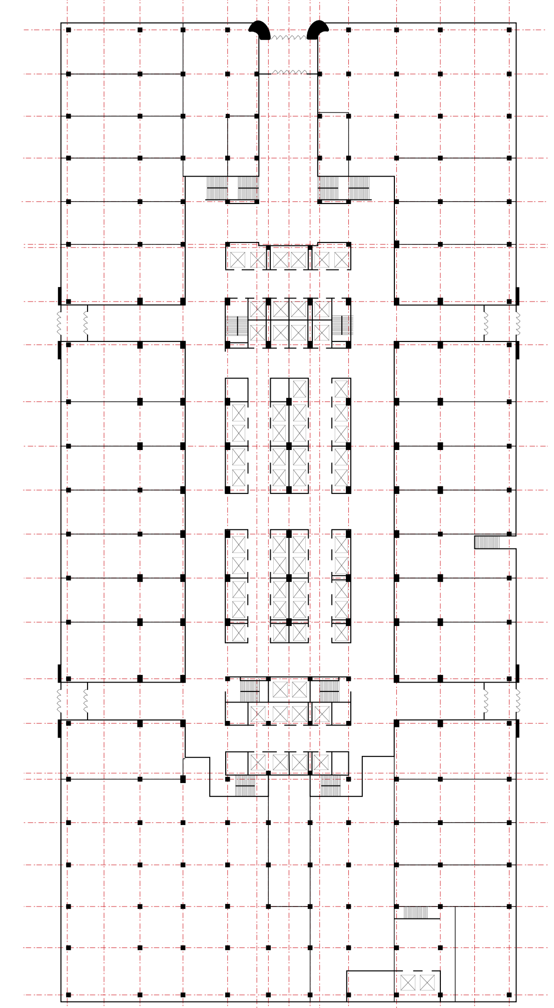
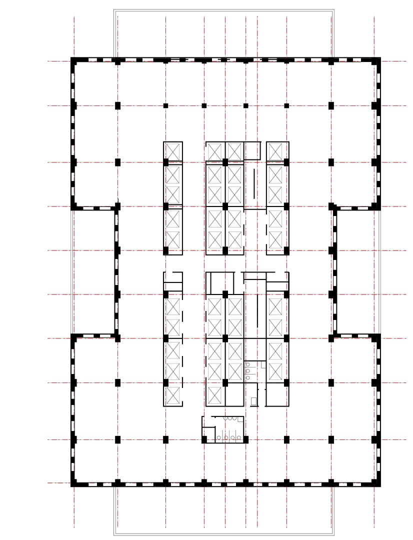


1. Dalle de béton
2. Meneau en acier inoxydable
3. Calcaire + panneau moulé d'aluminium
4. Capuchon d'acier chrome-nickel
5. Fenêtre
6. Mur de brique

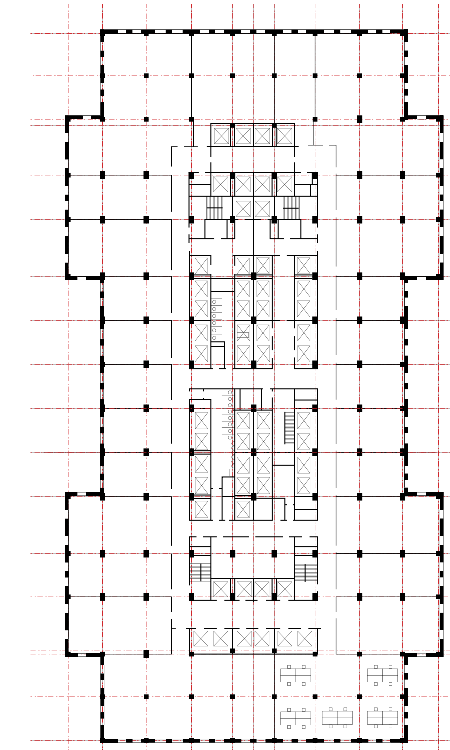




Rez-de-chaussée - 1:1000

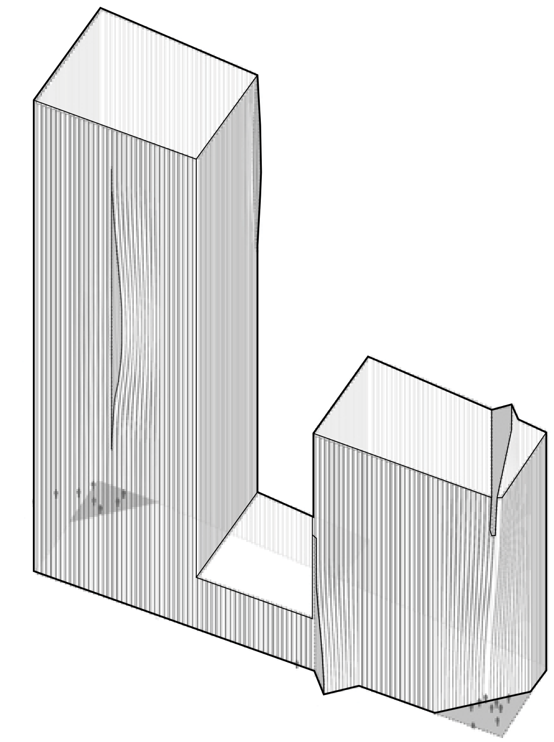


30e étage - 1:1000

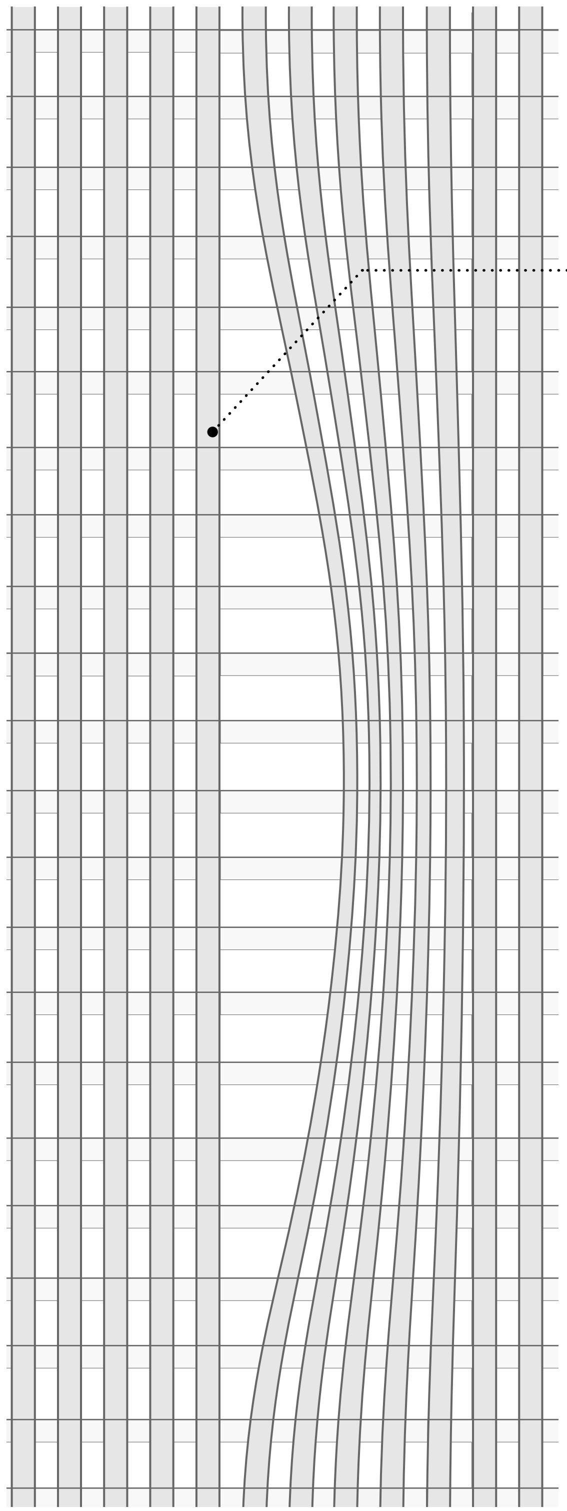


7e étage - 1:1000

Architect I Architecte :	BIG
Engineer I Ingénieurs :	Arup
Location I Localisation :	Shenzhen, Chine
Year of construction I Année de construction :	2018
Use I Usage :	Mix (bureaux et commerces)
Total area I Superficie totale :	92 000 m²
Height I Hauteur :	220, 120, 34 m
Number of floors I Nombre d'étage :	44
Floor plan area I Superficie d'un étage :	4200 m²
Structure system I Système de structure :	Cadre rigide avec murs de cisaillement
Structure materials I Matériaux de structure :	Béton
Envelope materials I Matériaux d'enveloppe:	Aluminium et verre



Le défi de BIG est de créer un gratte-ciel qui convient un climat tropical de cette régionde la Chine. La plupart des tours dans cette ville sont inadéquats et ne répondent à aucune question climatique. BIG décident donc de créer un enveloppe ondulante qui permet de d'avoir des sections transparentes et d'autres opaques. Les deux tours de bureau sont reliés par un petit volume ouvert sur quatre étages qui permet de concentrer l'entrée des gens tout en les dirigiant dans la bonne tour. BIG dit que le Shenzhen Energy Mansion est une mutation de la tour classique qui exploite les éléments externes : soleil, lumière de jour, l'humidité et le vent pour créer un confort maximal et un intérieur de qualité.



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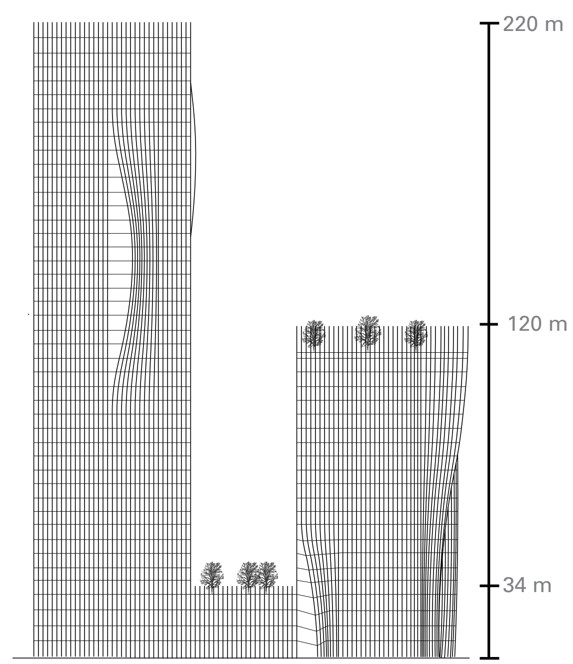
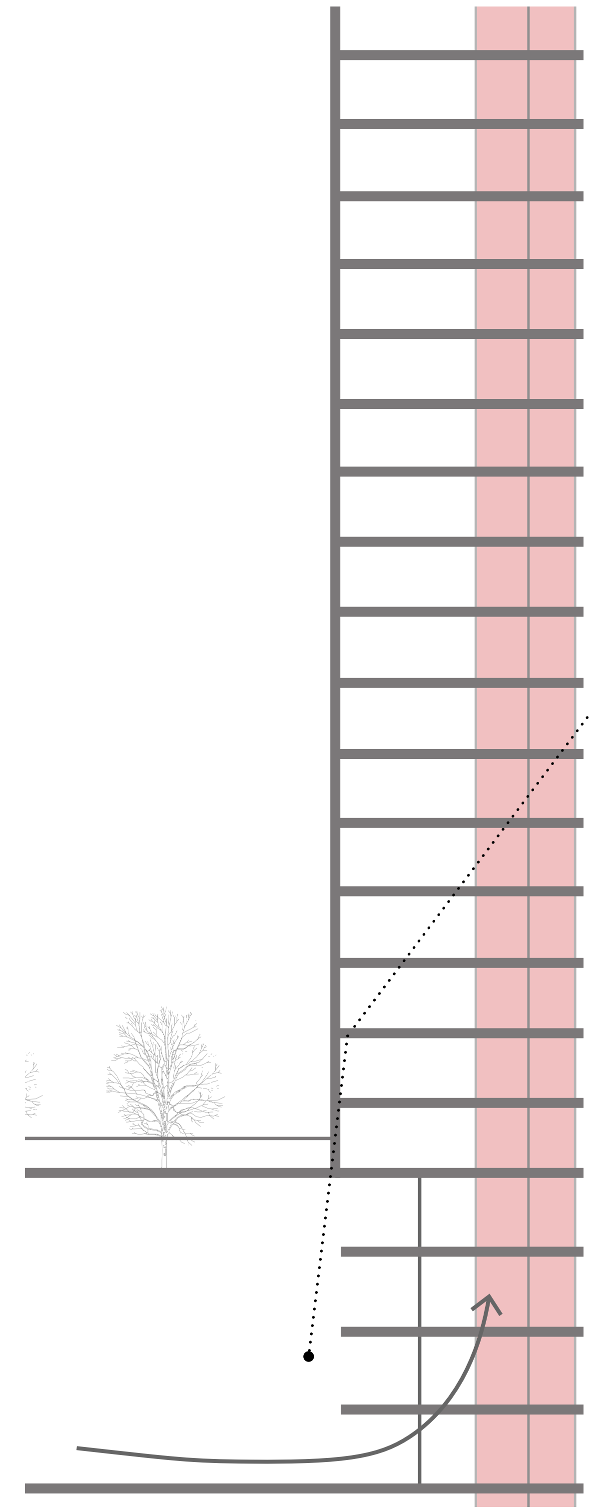


1:2500



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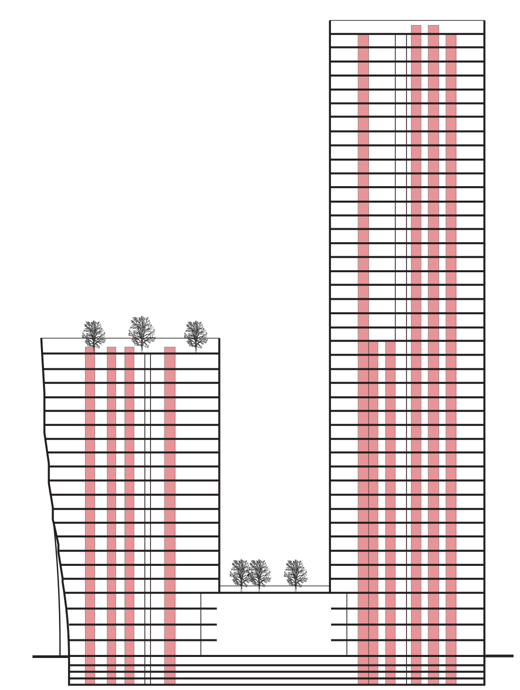

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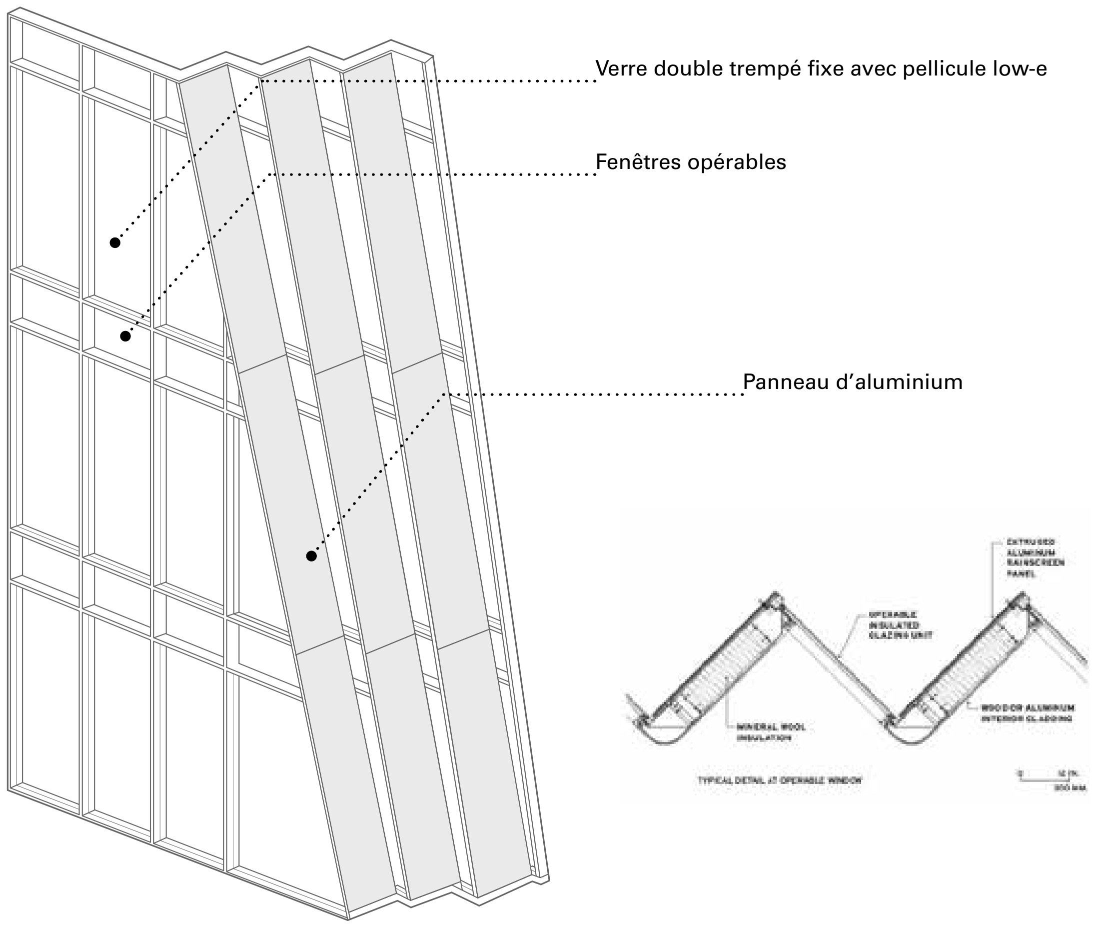
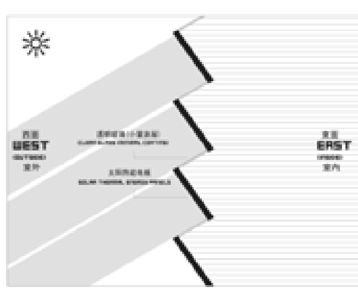
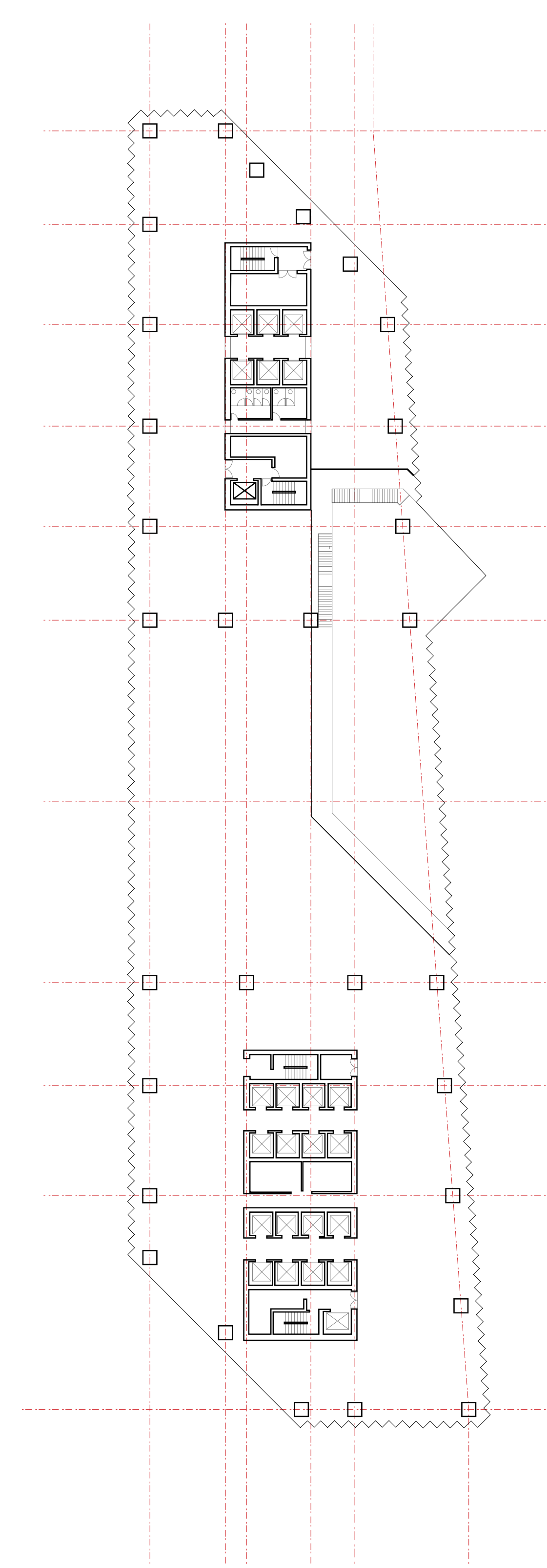


Le mur rideau en verre traditionnel qui ne répond pas aux conditions climatiques du site, car elle est faible en isolation et fait en sorte que les aires de travail sont surchauffés par la lumière directe du soleil. Il y a donc une consommation excessive d'air climatisée en plus d'un besoin d'enduit épais pour le verre qui laisse la vue paraître comme grise et terne.

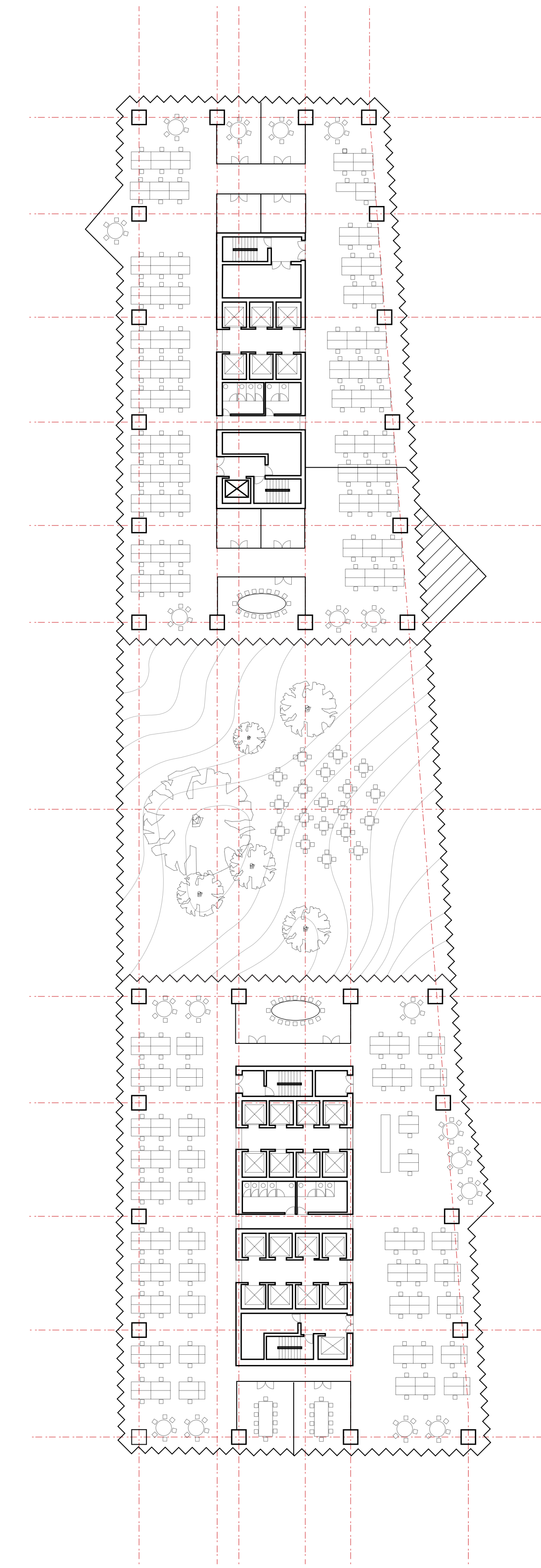


L'ondulation de 45 degrés de la facade permet un résultat organique entre ouvert et fermé. Les parties fermées sont bien isolées tout en bloquant les rayons solaires directs.

La partie transparente de la façade offre des vues à travers du verre transparent dans une direction. L'éclairage des espaces de travail est plutôt diffuse et ne crée pas d'éblouissement en raison de la réflexion de la lumière sur les panneaux d'aluminium.

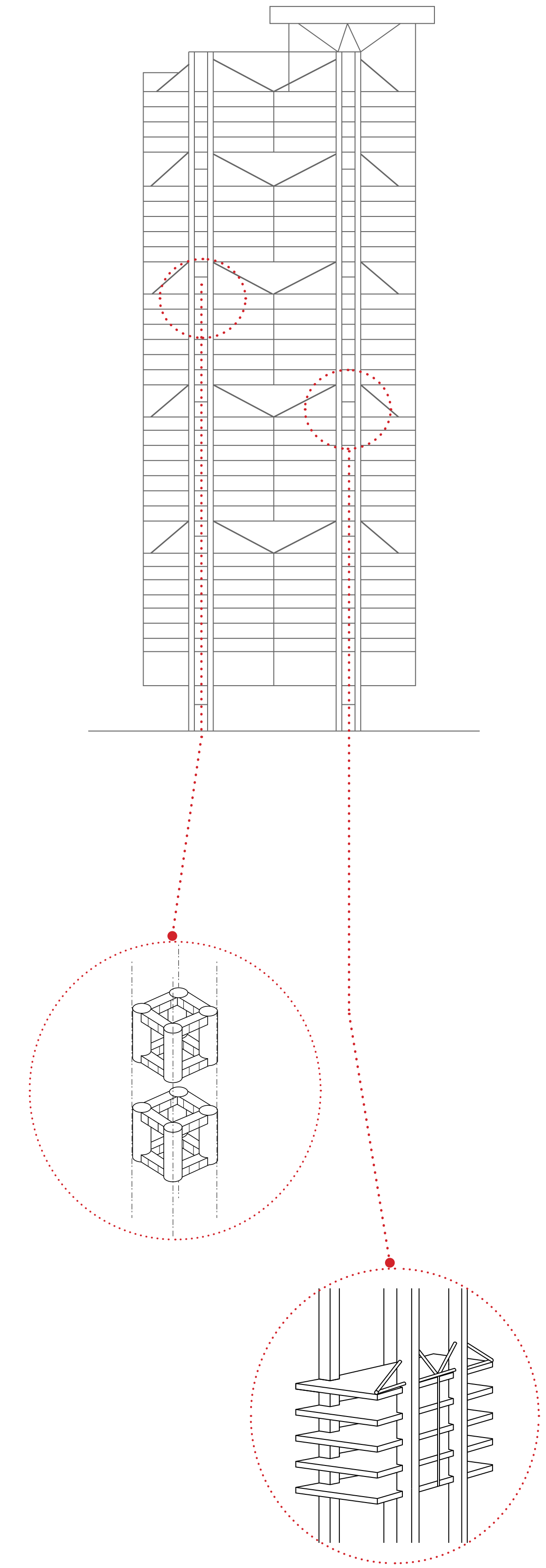


Rez-de-chaussée

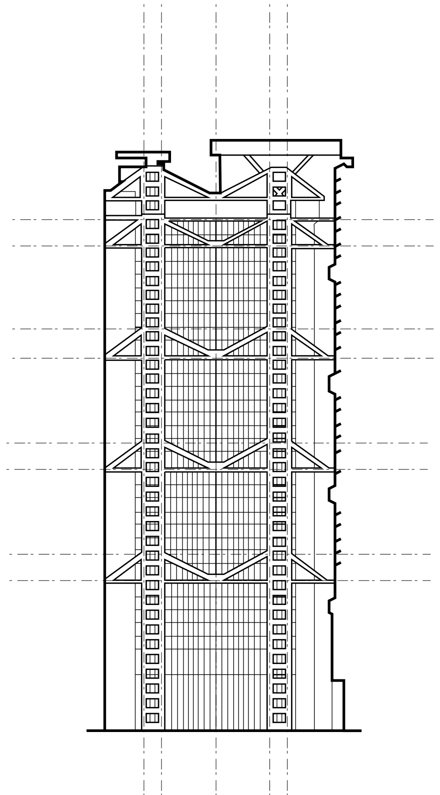


20e étage

Architect I Architecte :	Foster and Partners
Engineer I Ingénieurs :	Arup Associates
Location I Localisation :	Hong Kong, China
Year of construction I Année de construction :	1983-1986
Use I Usage :	Tour à bureaux
Total area I Superficie totale :	1 million de pieds carrés (93000 mètres carrés)
Height I Hauteur :	587 pieds (179 mètres)
Number of floors I Nombre d'étage :	47 (dont 4 sous le sol)
Floor plan area I Superficie d'un étage :	29 000 pieds carrés (2 700 mètres carrés)
Structure system I Système de structure :	Système de 8 mâts, chacun composé de 4 colonnes, et de treillis
Structure materials I Matériaux de structure :	Acier
Envelope materials I Matériaux d'enveloppe:	Aluminium, Acier & Verre



Le quartier général de la banque HSBC représente encore aujourd'hui l'une des infrastructures les plus technologiques au monde. En effet, sa structure caractérisée par 8 mâts, chacun composé de 4 colonnes, et de fermes triangulaires permet une suspension des planchers, libérant par le fait même le plan. La présence d'un atrium miroir de 10 étages est alors possible au centre de la construction, amenant ainsi une lumière naturelle dans l'ensemble du bâtiment. Les aires de service en périphérie permettent également une flexibilité au niveau du programme.



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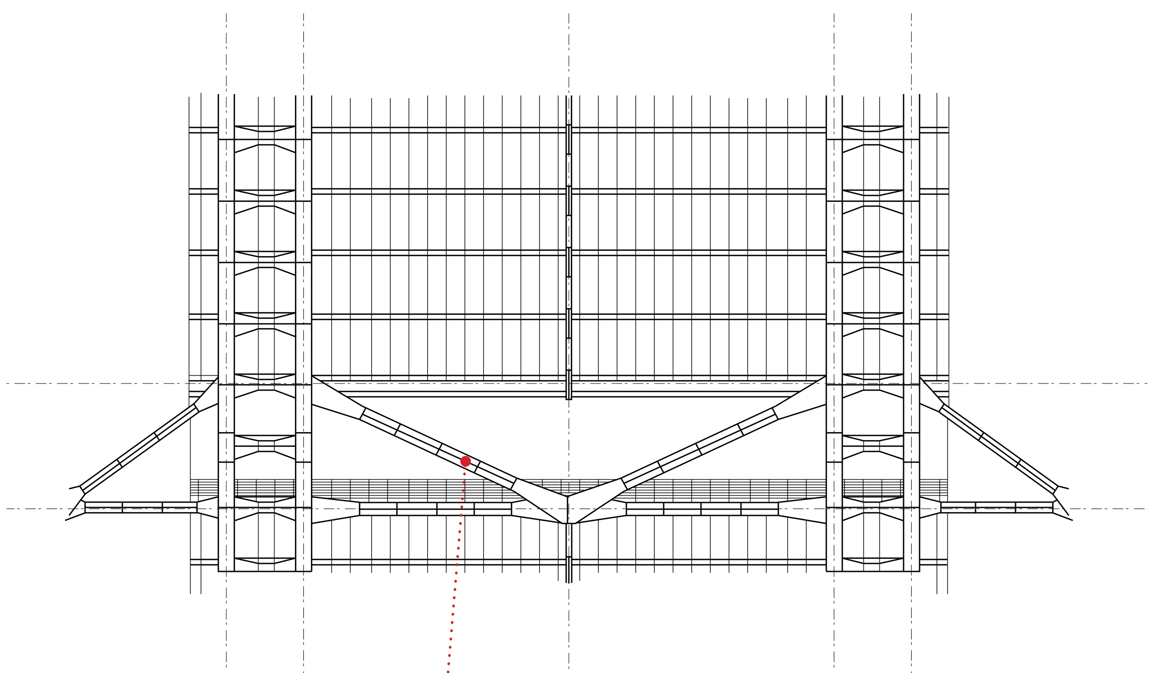
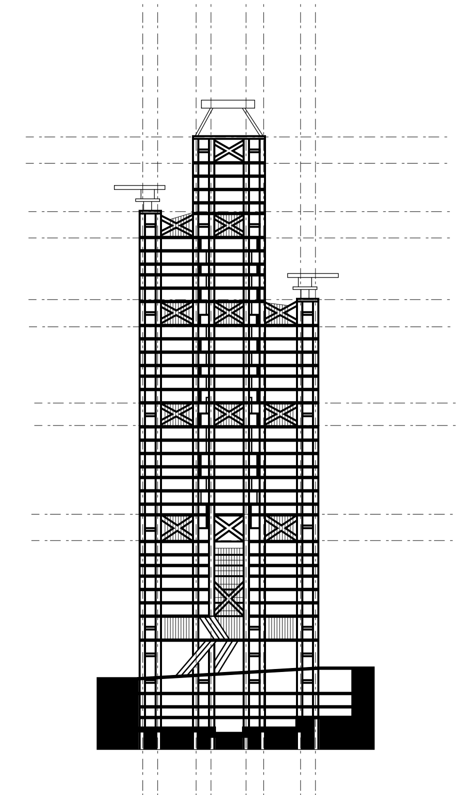


Les 5 segments inversés «VA», qui couvrent chacun deux niveaux de hauteur, représentent la caractéristique la plus évidente du bâtiment. Des loggias sont accesibles derrière l'exosquelette.

1:500



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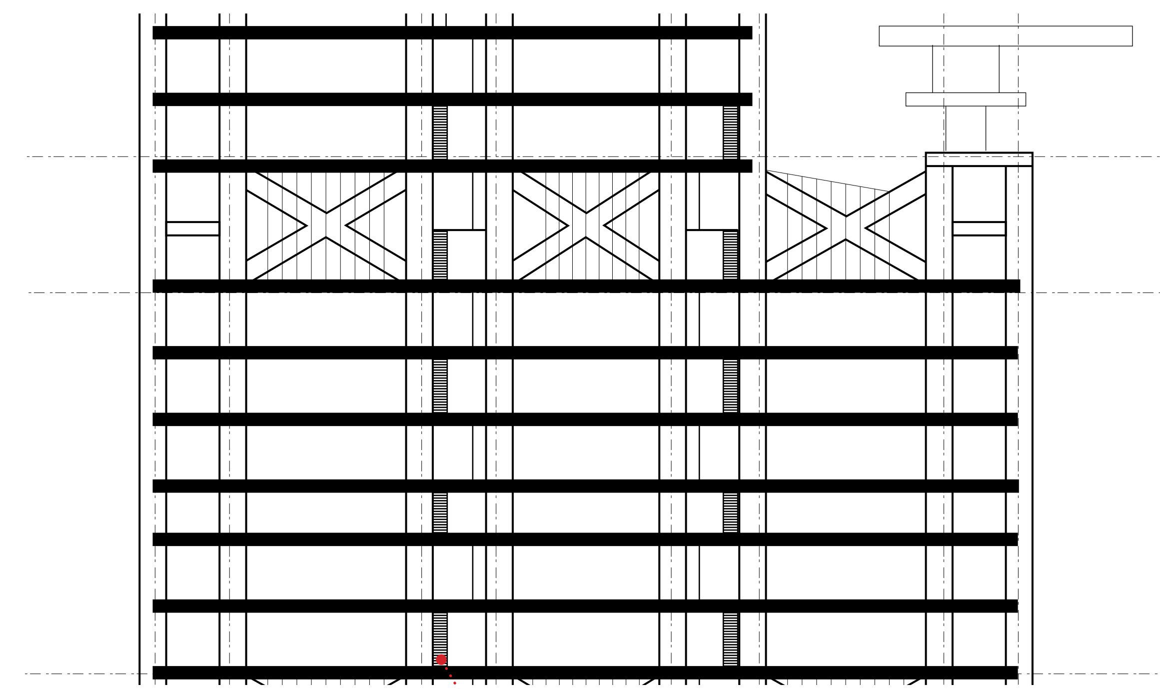
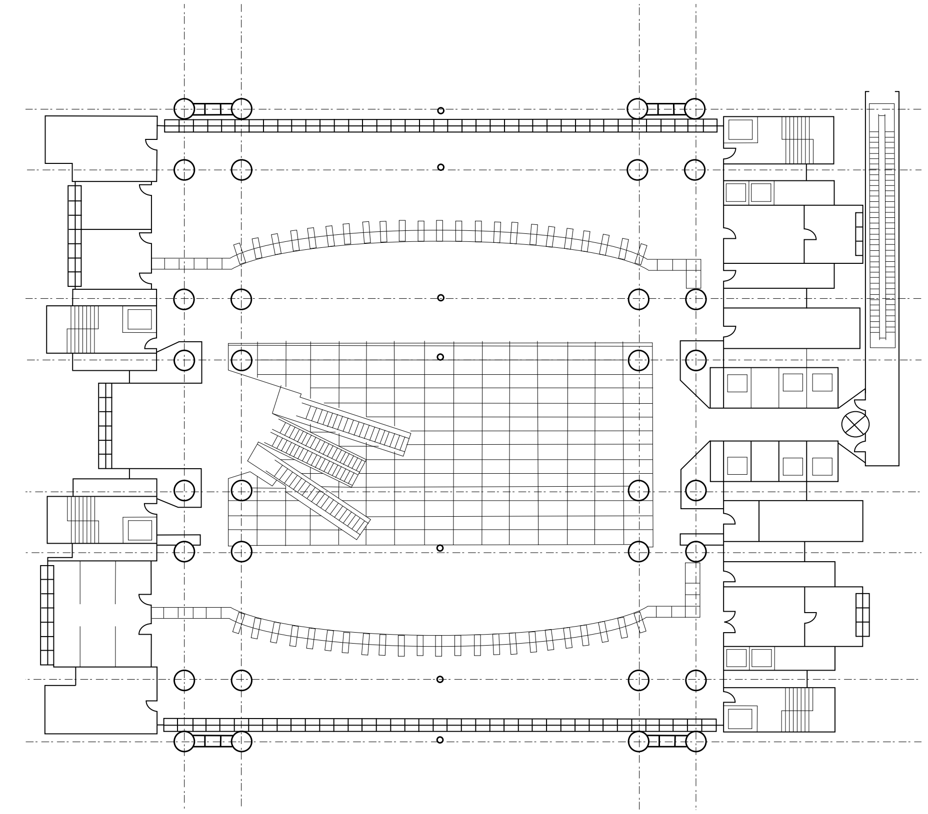


La circulation verticale est assurée par des escaliers roulants au centre du bâtiment. Les escaliers de service et les ascenseurs se trouvent plutôt en périphérie du plan.

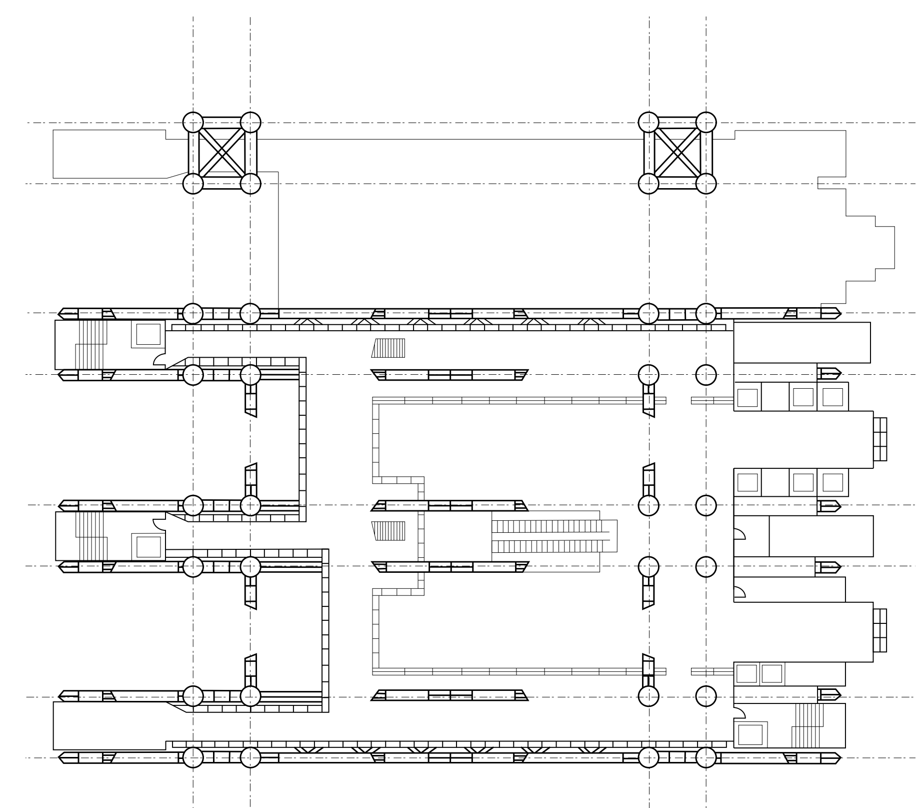
1:500

La structure du bâtiment est modulable et la majorité des pièces a été préfabriquée hors du chantier de sorte à favoriser une assemblage rapide et un démantèlement possible. La nécessité de construire simultanément vers le haut et vers le bas a menée à l'adoption d'un structure suspendue. Il est ainsi possible de percer les dalles de sol aux étages. Cette caractéristique a permis l'intégration d'un grand atrium de 10 étages au coeur du bâtiment.

L'infrastructure a été construite en fonction du feng shui. L'atrium invite en effet le vent et l'énergie positive à l'intérieur. Les escaliers roulants au bas du bâtiment sont placés de biais de sorte à empêcher les mauvais esprits de monter. Deux lions de bronze sont également installés à l'entrée pour symboliser la richesse et la prospérité. De plus, deux structures en forme de canon présentes sur le toit du bâtiment pointent en direction d'une banque rivale voisine pour protéger le lieu des mauvaises énergies de cette dernière.

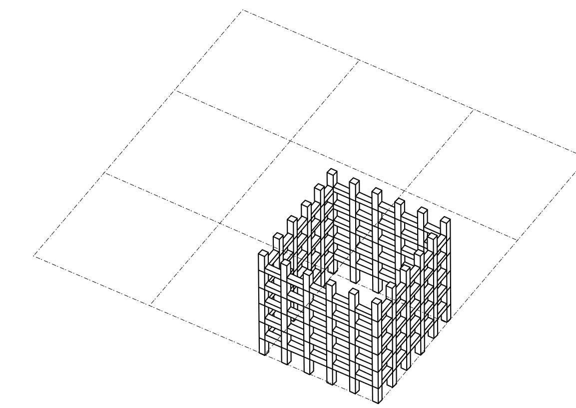


3e étage



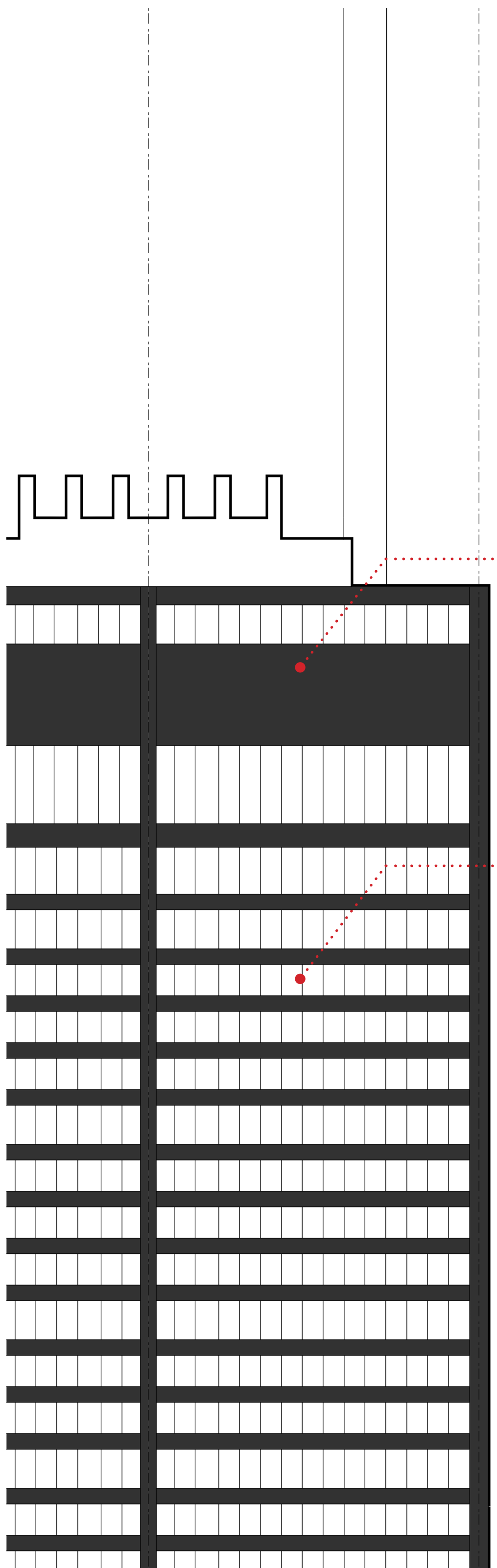
36e étage

Architect I Architecte :	Bruce Graham de Skidmore, Owings and Merrill (SOM)
Engineer I Ingénieurs :	Skidmore, Owings and Merrill (SOM)
Location I Localisation :	Chicago, États-Unis
Year of construction I Année de construction :	1970-1973
Use I Usage :	Use I Usage : Tour à bureaux (initialement pour Sears, Roebuck & Company)
Total area I Superficie totale :	4,5 millions de pieds carrés (418 000 mètres carrés)
Height I Hauteur :	1454 pieds (444 mètres)
Number of floors I Nombre d'étage :	110 étages
Floor plan area I Superficie d'un étage :	50 000 pieds carrés (4645 mètres carrés)
Structure system I Système de structure :	Système de poutres-colonnes en périphérie de 9 tubes dans une trame de 3 par 3
Structure materials I Matériaux de structure :	Acier & Béton
Envelope materials I Matériaux d'enveloppe:	Aluminium noir & verre teinté de bronze



L'ensemble du bâtiment a été pensé en fonction du principe « less is more ». Une structure en périphérie, et donc minimale au sein du projet, permet ainsi un plan libre et flexible. En effet, un système de poutres et de colonnes d'acier est présent aux abords de 9 tubes de hauteurs différentes positionnés dans une trame carrée de 3 par 3.

Le concept derrière les différentes hauteurs des tubes a été réfléchi de sorte à répondre à la force de la gravité et à la pression des vents, particulièrement présente en altitude. La stabilité de l'infrastructure dépend ainsi du principe que les tubes se supportent entre eux.



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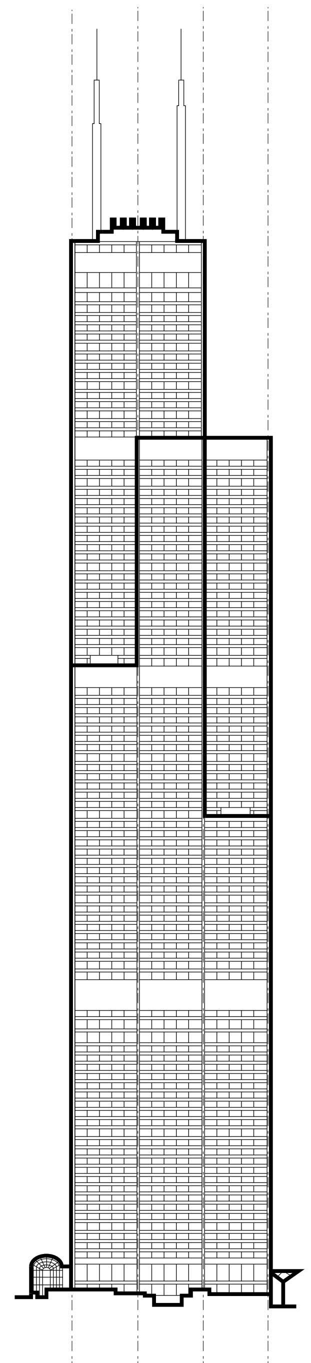

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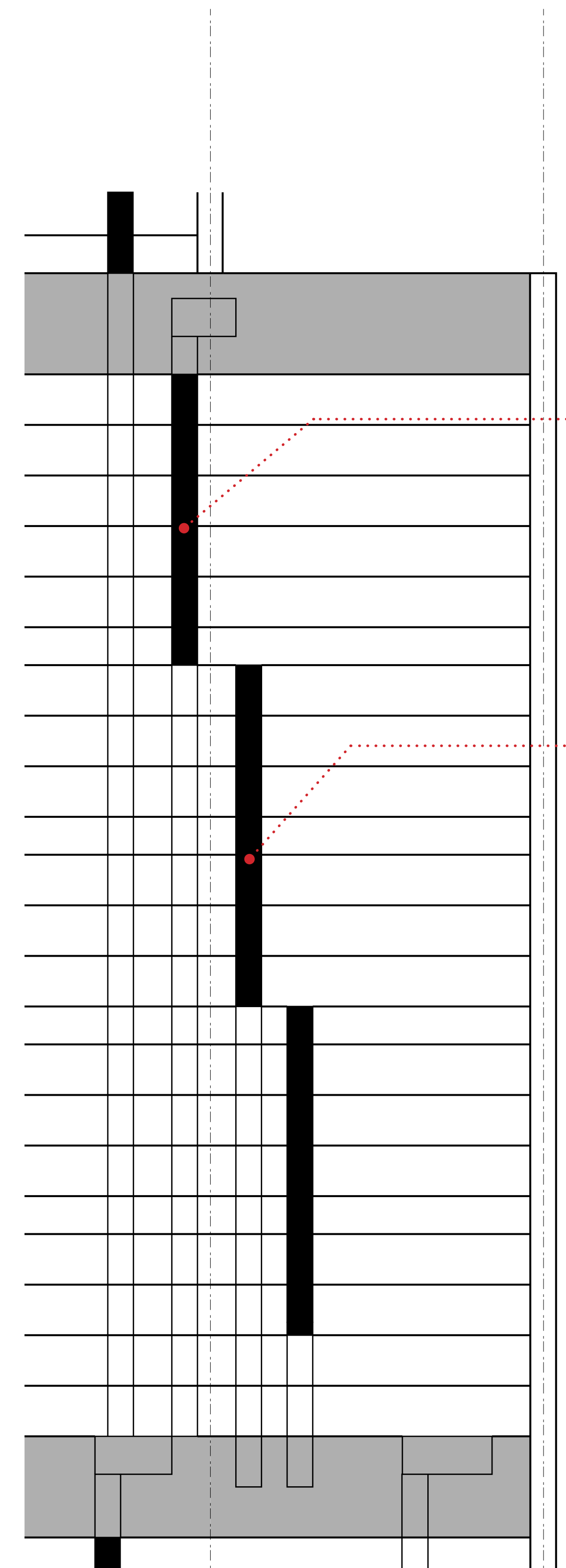

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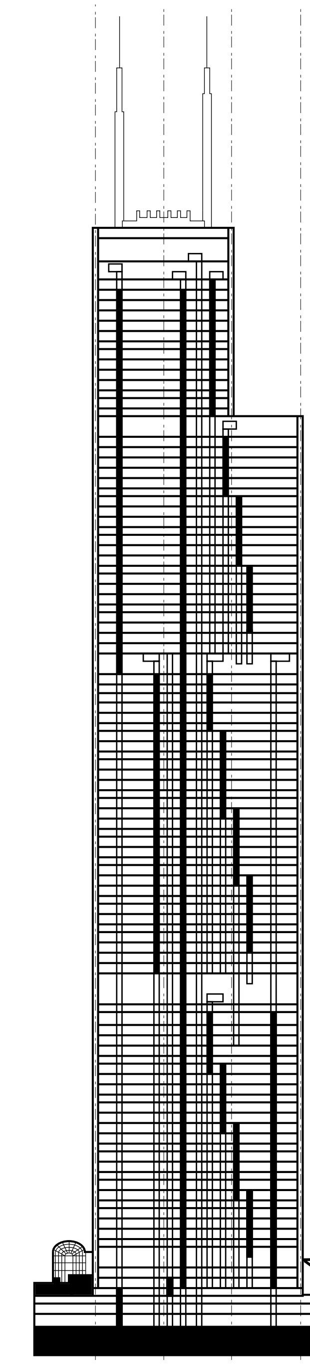

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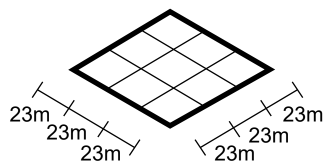
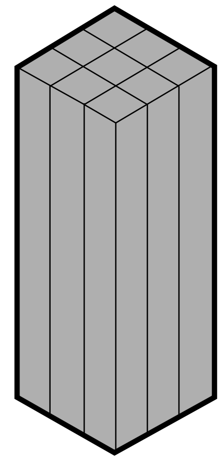


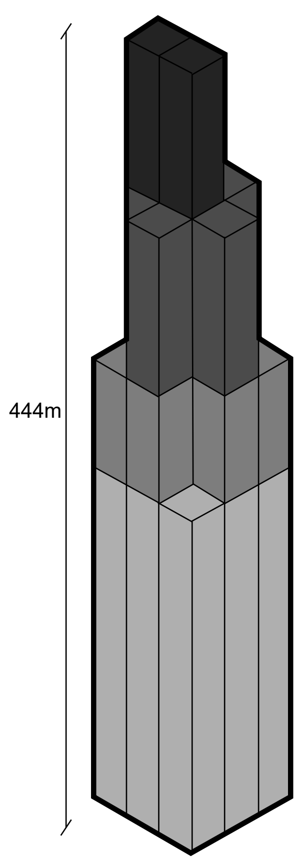


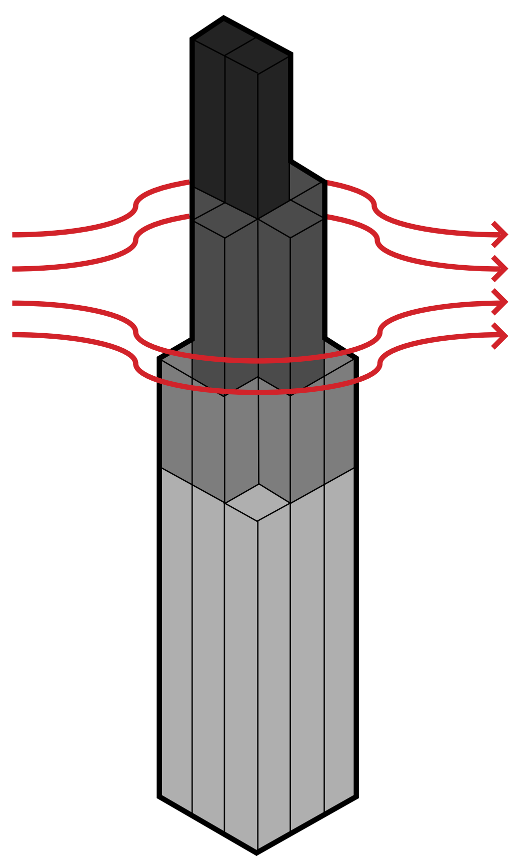
Trame de 9 carrés de 23 mètres de largeur assemblés sur un plan de 3 par 3.

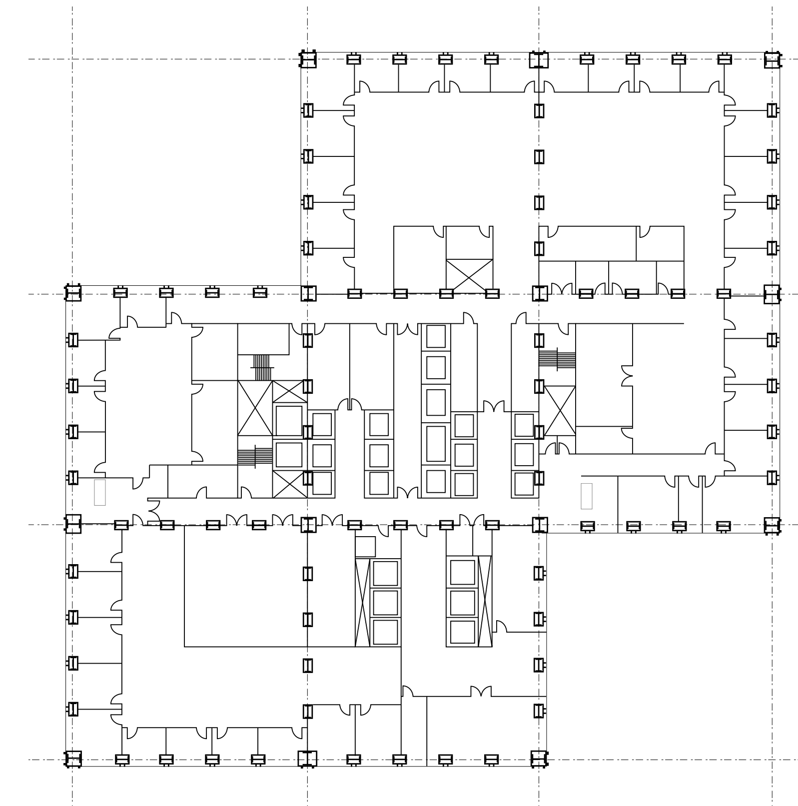
Élongation des tubes en différentes hauteurs. Les deux plus hauts tubes atteignent une hauteur de 444 mètres.

Formation d'un bloc solide à la base du bâtiment.

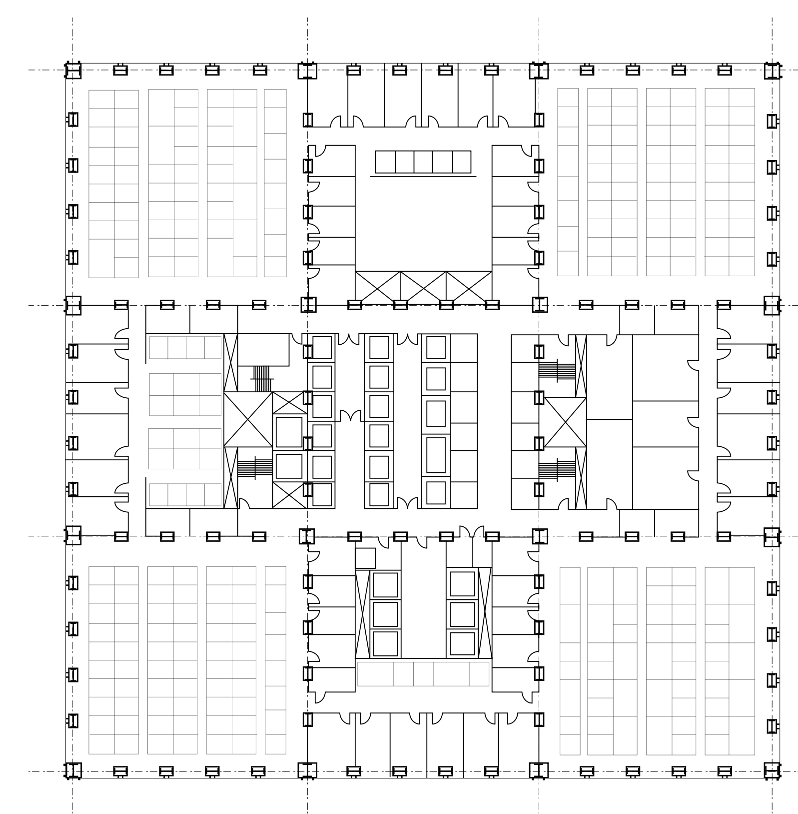
Le jeu de niveaux permet de briser la trajectoire des vents, permettant ainsi au bâtiment de résister à leur forte pression en altitude.







85e étage

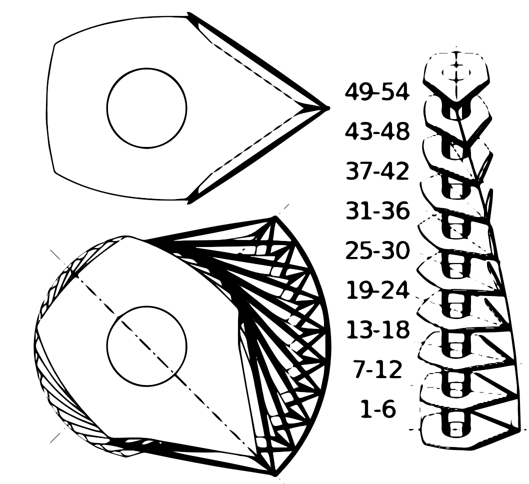


38e étage

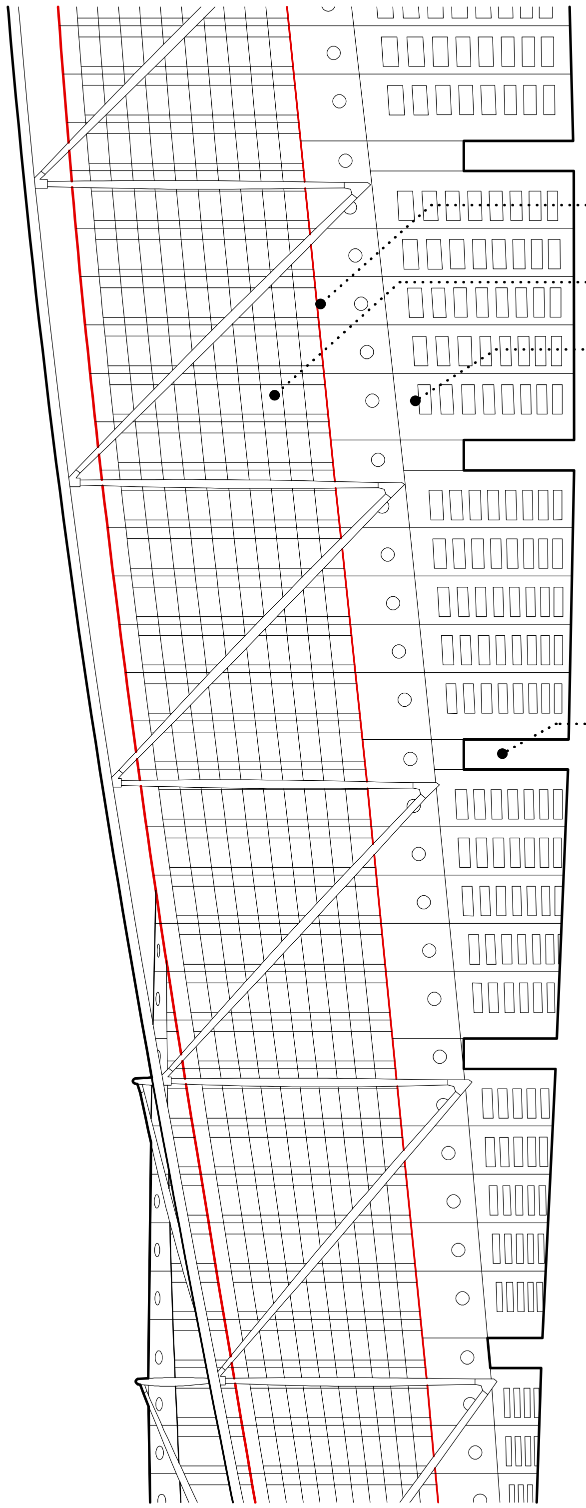
Architect I Architecte : Santiago Calatrava
Engineer I Ingénieurs : Santiago Calatrava
Location I Localisation : Suède
Year of construction I
Année de construction : 1999
Use I Usage : Mixte

Total area I Superficie totale : 27 000 m²
Height I Hauteur : 190 m
Number of floors I
Nombre d'étage : 54
Floor plan area I
Superficie d'un étage : 500 m²

Structure system I
Système de structure : Noyau
Structure materials I
Matériaux de structure : Béton armé
Envelope materials I
Matériaux d'enveloppe : Aluminium



Cette tour est considérée comme le premier gratte-ciel tournant au monde. Son concept repose sur l'idée d'un torse humain en rotation sur une fine tige : la colonne vertébrale qu'il est possible d'apercevoir à l'extérieur. La torsion complète des étages soit du dernier tourné de 90° par rapport au premier exprime une géométrie unique et innovante. Les étages libres de colonnes sont desservis par un noyau de diamètre intérieur fixe qui permet de regrouper à la fois la circulation verticale et la mécanique.



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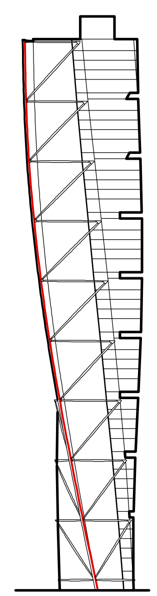

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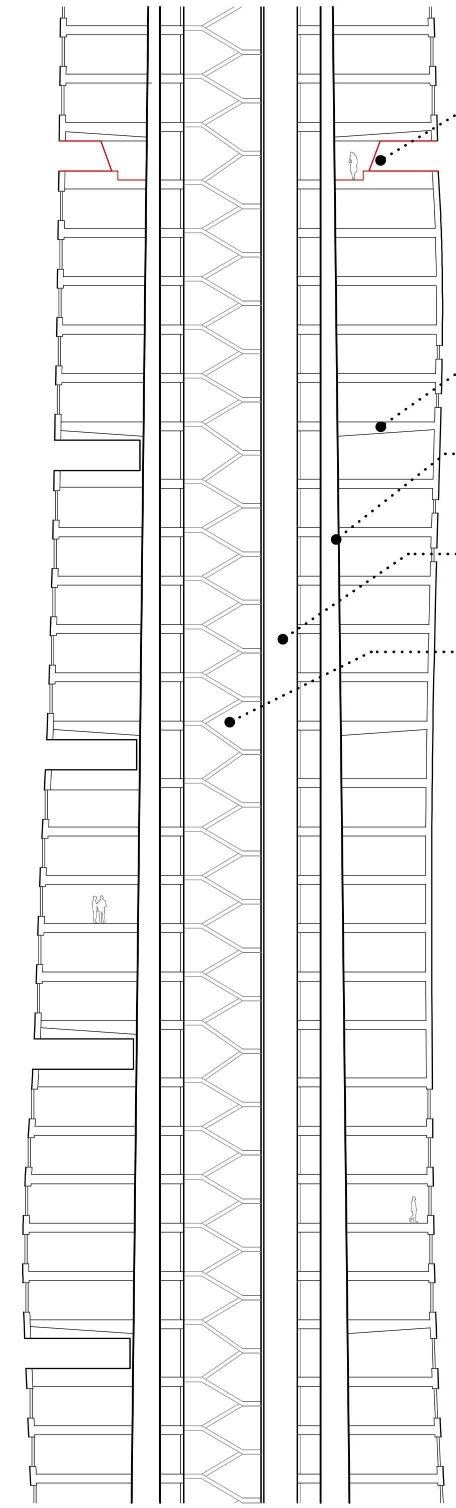

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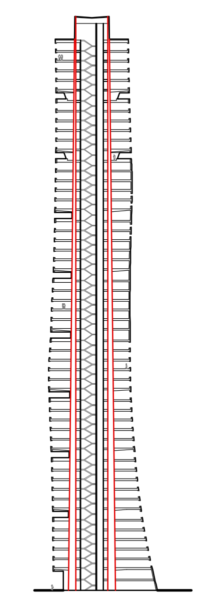

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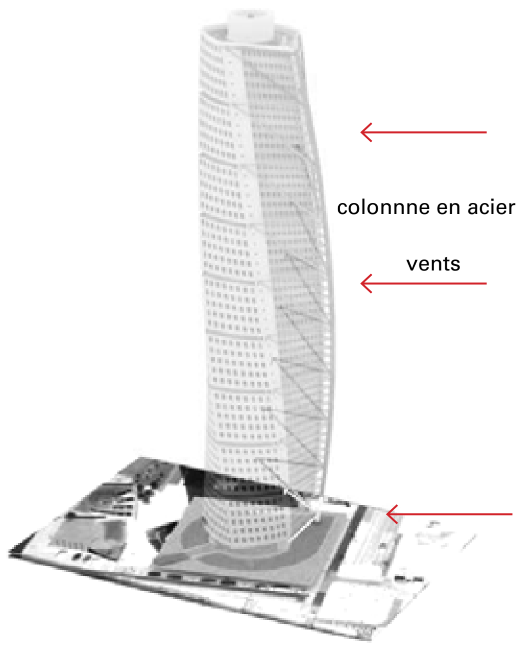
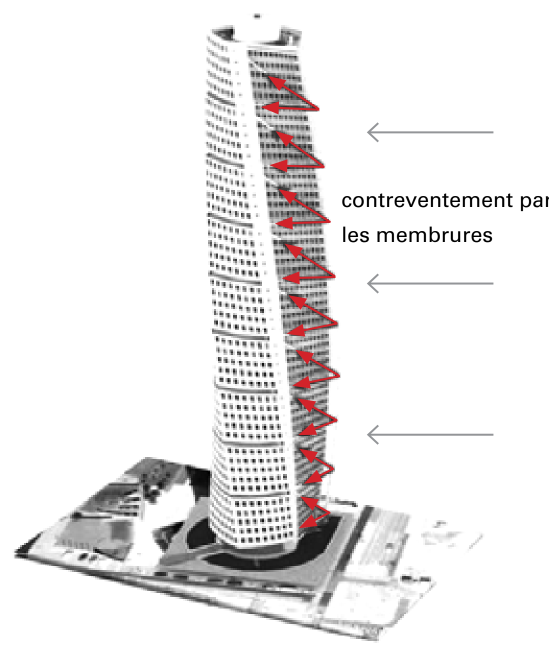
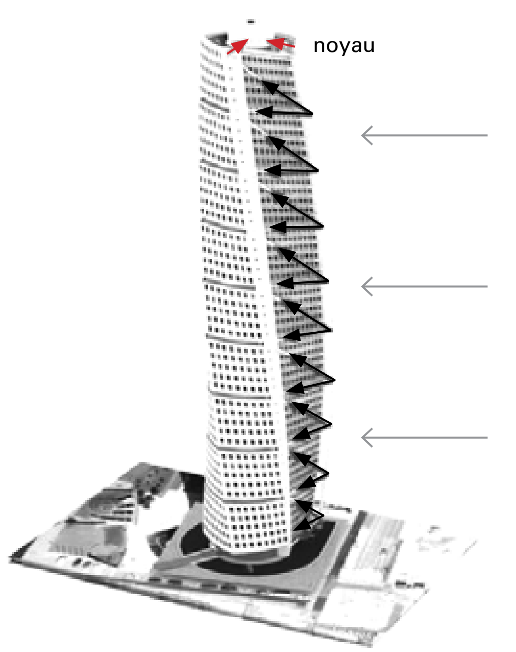
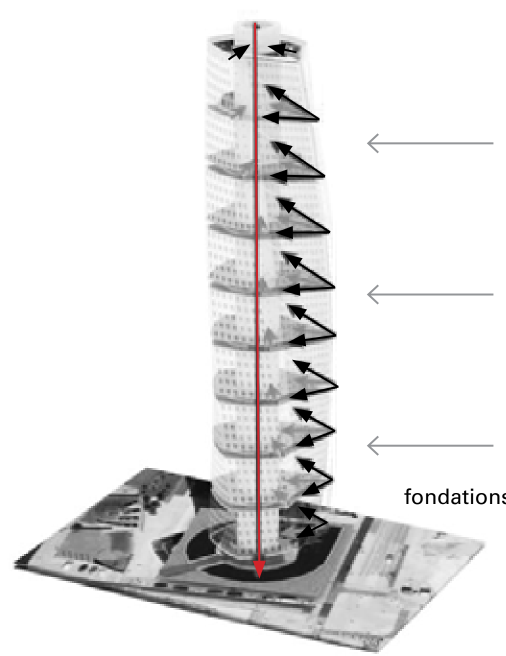
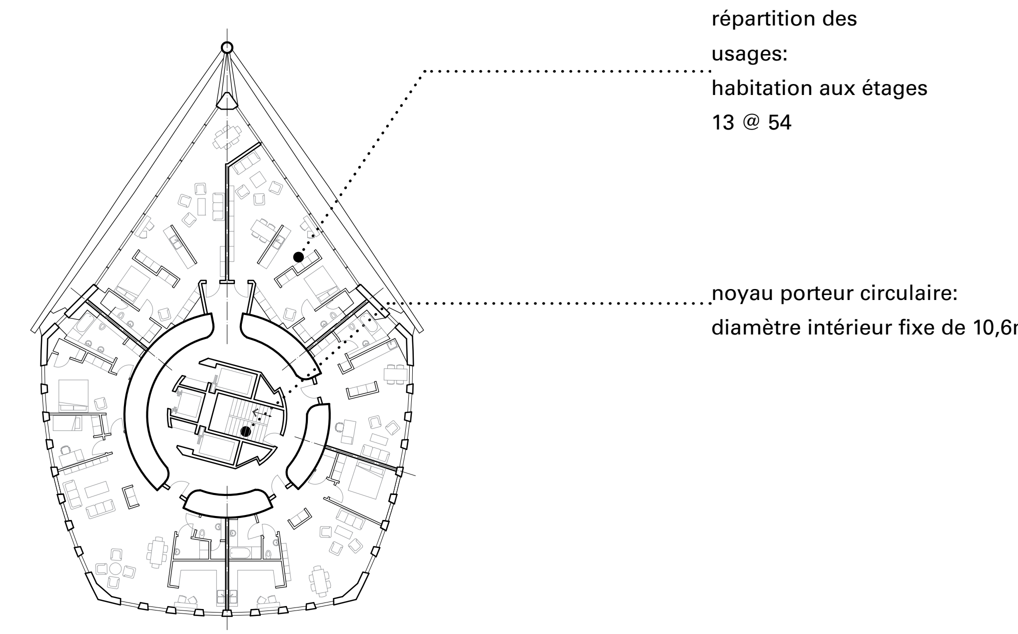


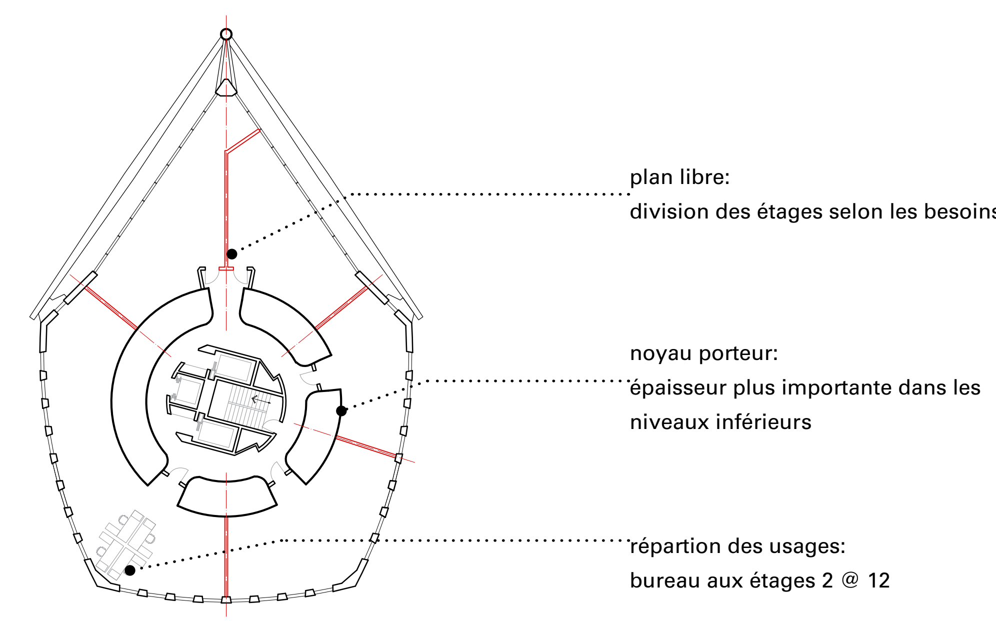








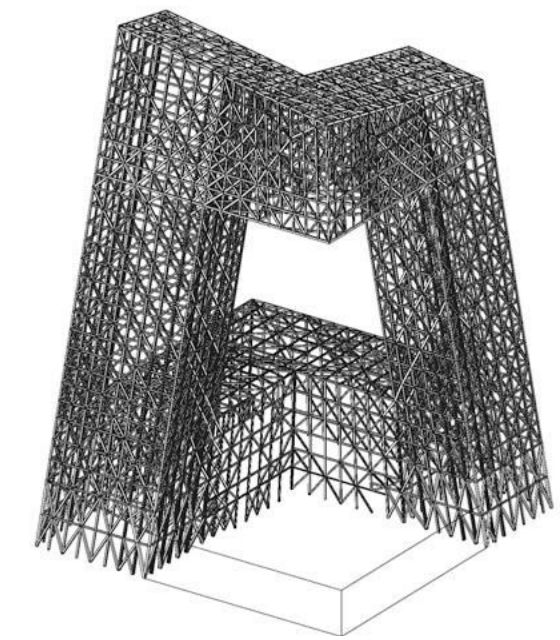
Apartment's Floor Number 25 - 1:500

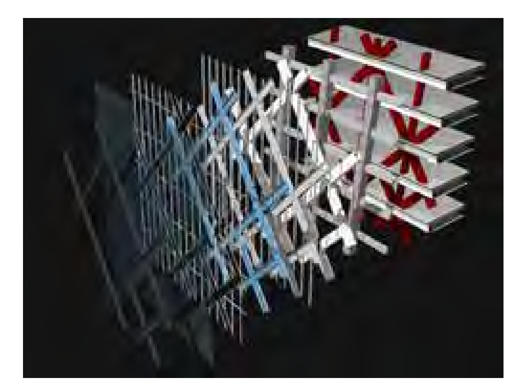


Office's Floor Number 2 - 1:500

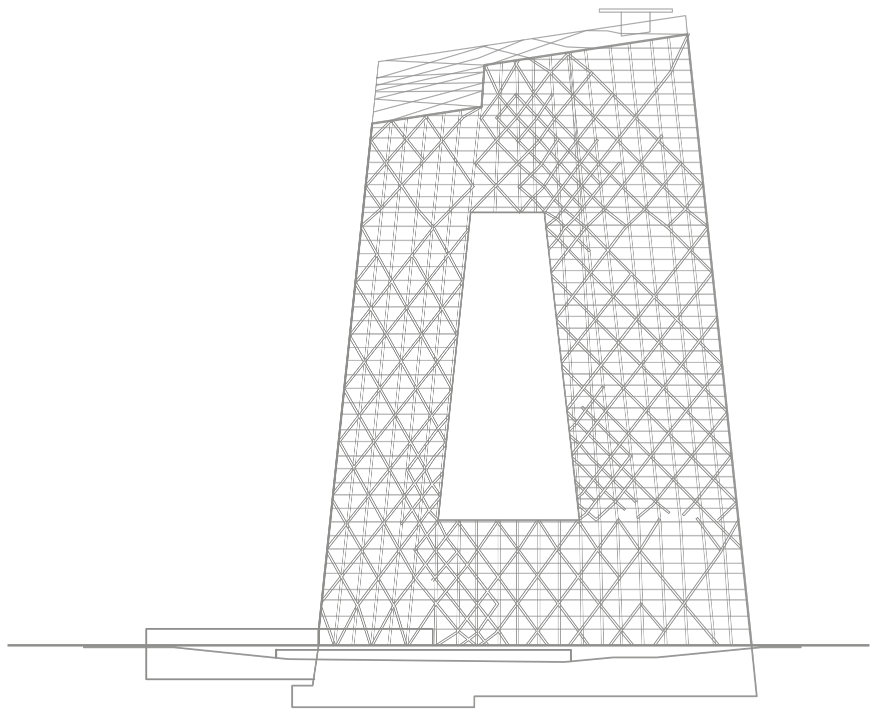
CCTV BUILDING // HAFFAF IKRAM

Architect I Architecte :	OMA
Engineer I Ingénieurs :	Ecadi, Arup
Location I Localisation :	Beijing, Chine
Year of construction I Année de construction :	2012
Use I Usage :	Tour pour chaîne télévisée
Total area I Superficie totale :	437 000 m^2
Height I Hauteur :	230 m
Number of floors I Nombre d'étage :	51
Floor plan area I Superficie d'un étage :	Varié
Structure system I Système de structure :	Diagrid/ Enveloppe structurale
Structure materials I Matériaux de structure :	Acier (enveloppe et dalles de plancher), béton armé (colonnes)
Envelope materials I Matériaux d'enveloppe:	Acier





Construit entre 2006 et 2012 à Beijing en Chine, le CCTV Building, un projet de OMA se veut telle une réinterprétation typologique du gratte-ciel. Il ne se distingue non plus par sa hauteur aux édifices à proximité, mais plutôt par sa forme singulière. LA forme en boucle du projet correspond parfaitement au programme de chaîne de télévision réunissant chaque étape de production télévisée. Il s'agit d'une proposition d'une nouvelle organisation intérieure du gratte-ciel et de la vie d'entreprise en général. La structure est par conséquent réinventée et une enveloppe structurale (diagrid) en est la principale composante. Cette dernière est adaptée à la différente distribution des charges au sein de l'édifice et aux risques de séismes. La façade est donc une expression directe de la structure. Ainsi, le gratte-ciel n'est plus simplement un symbole de verticalité, mais celui d'un objet tridimensionnel expressif adapté à son époque et sa fonction.



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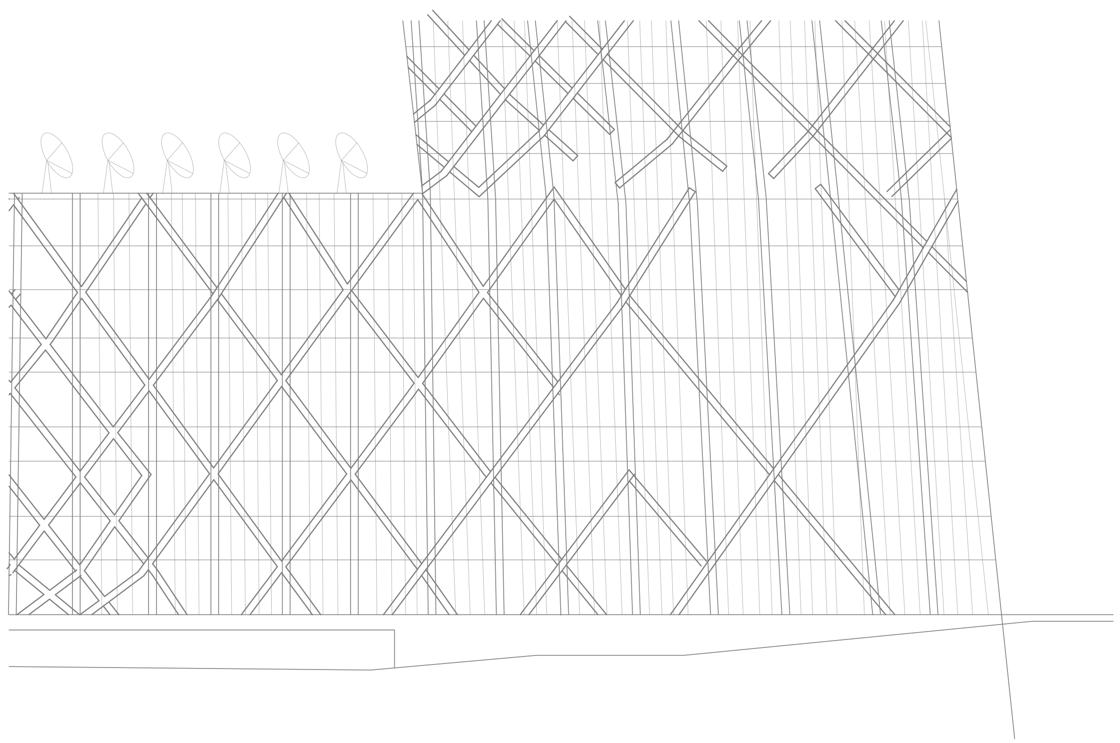
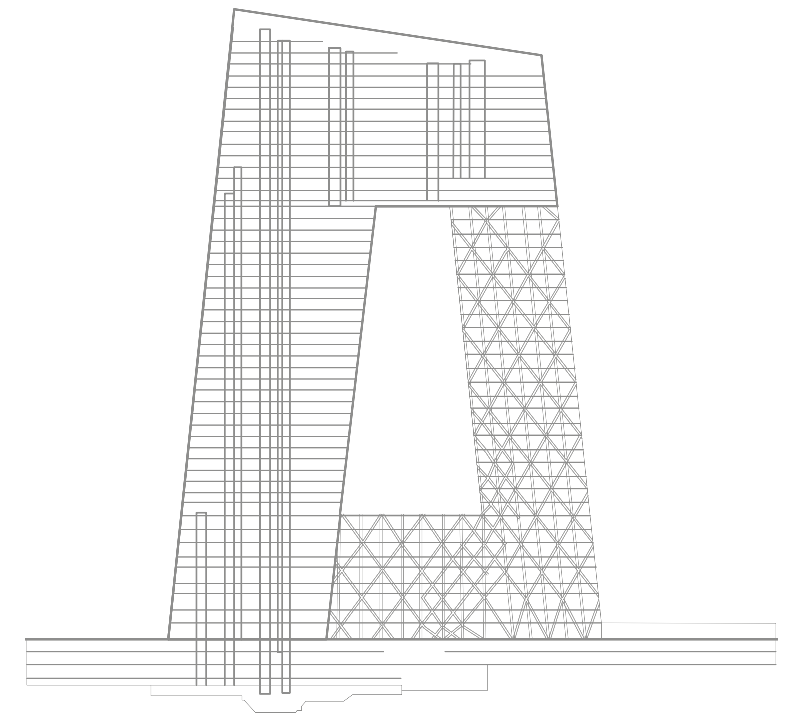
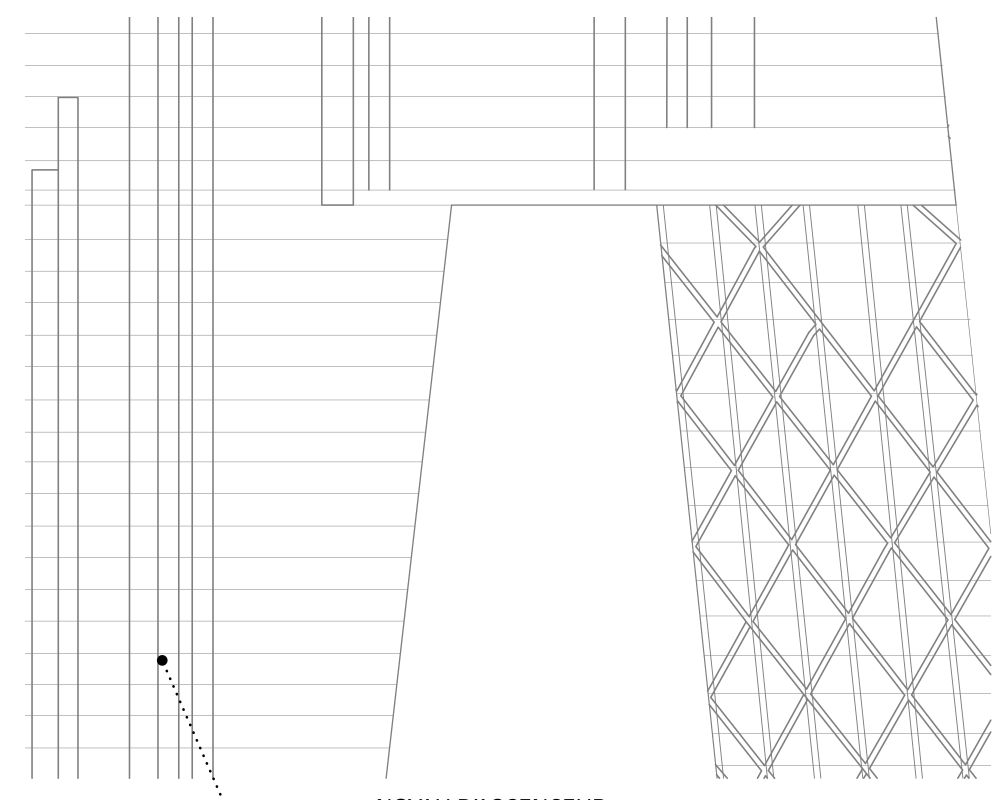


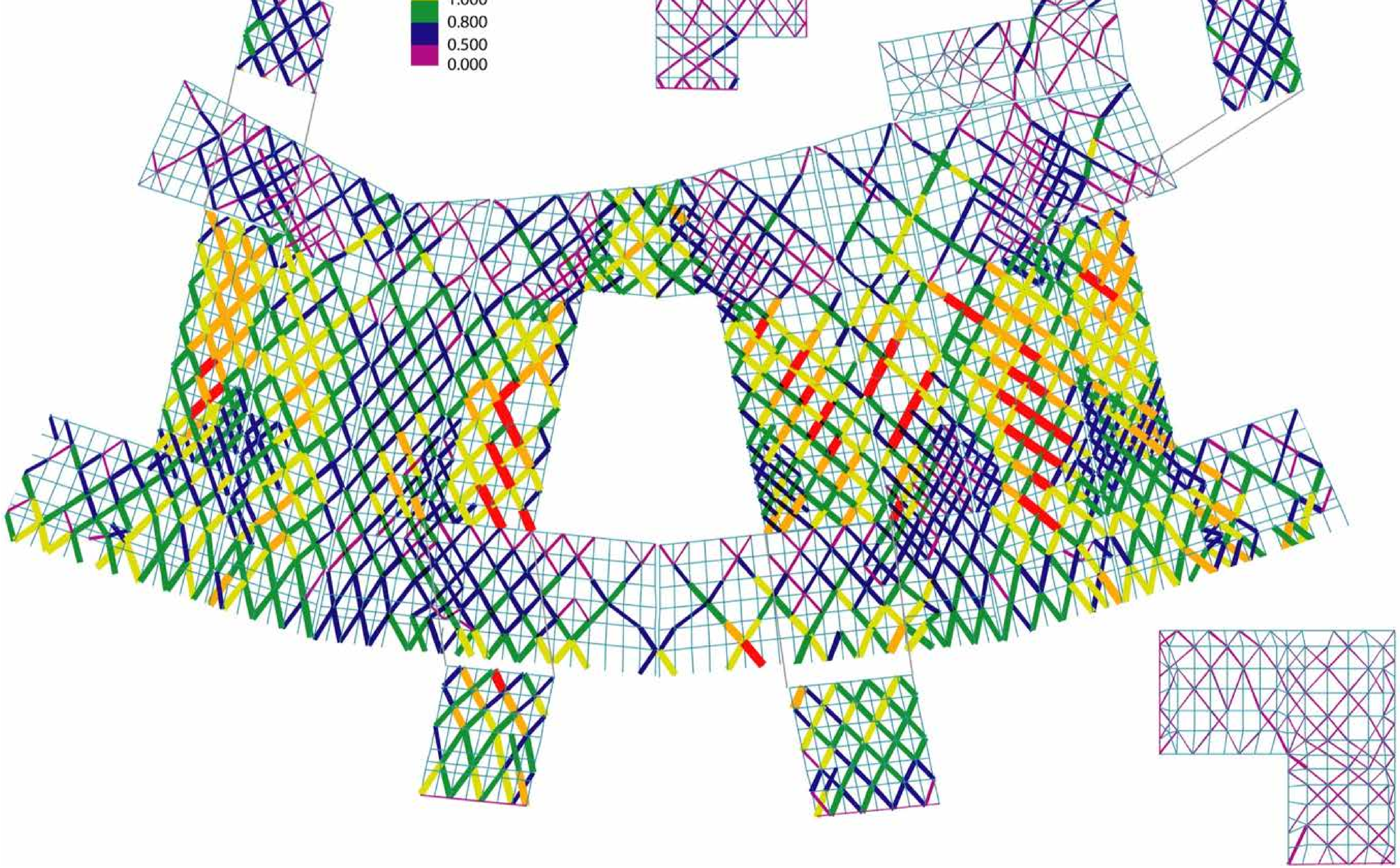
1:1000

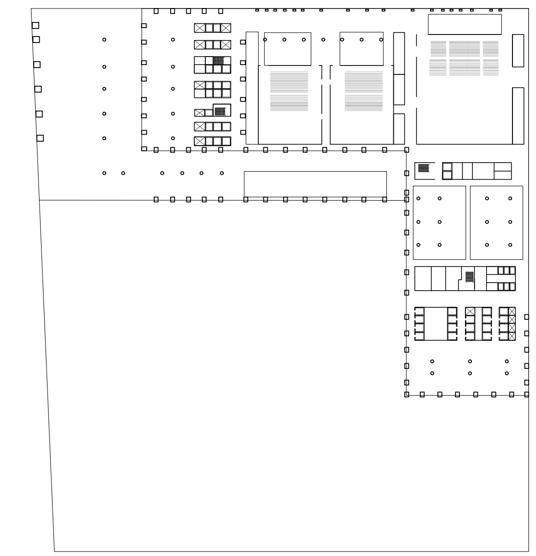


1:2500

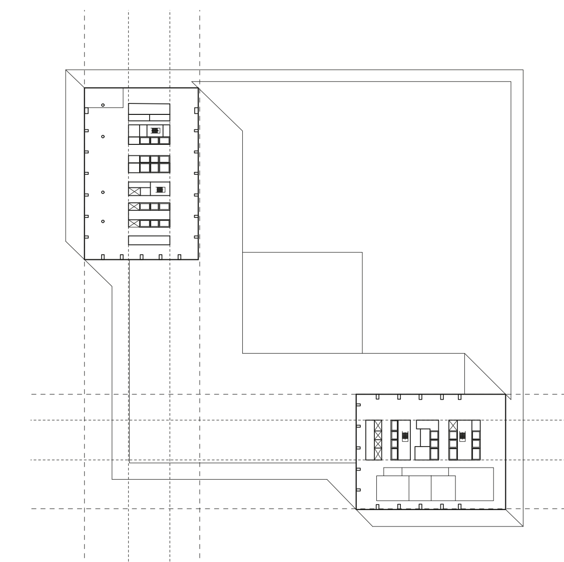


1:1000

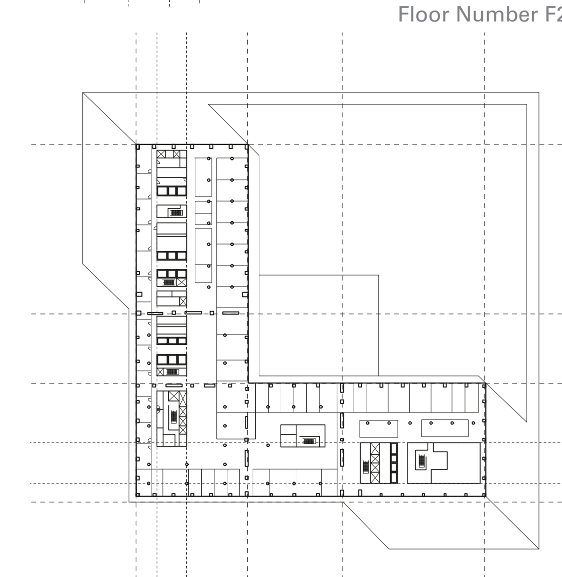




Floor Number F1



Floor Number F25

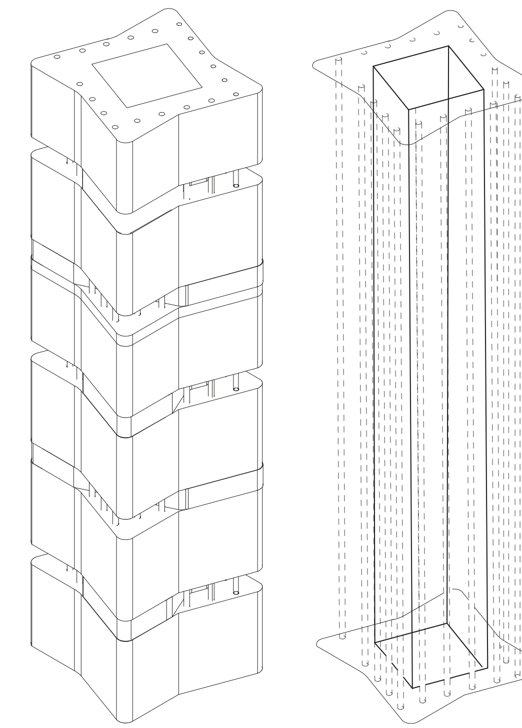


Floor Number F41

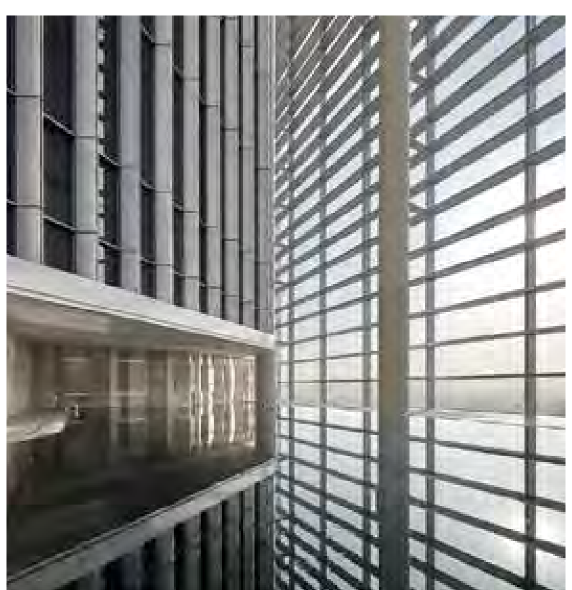
Architect I Architecte : Gmp architects
Engineer I Ingénieurs : Schlaich Bergermann partner
Location I Localisation : Zhengzhou, Chine
Year of construction I Année de construction : 2016
Use I Usage : Bureaux et résidentiel

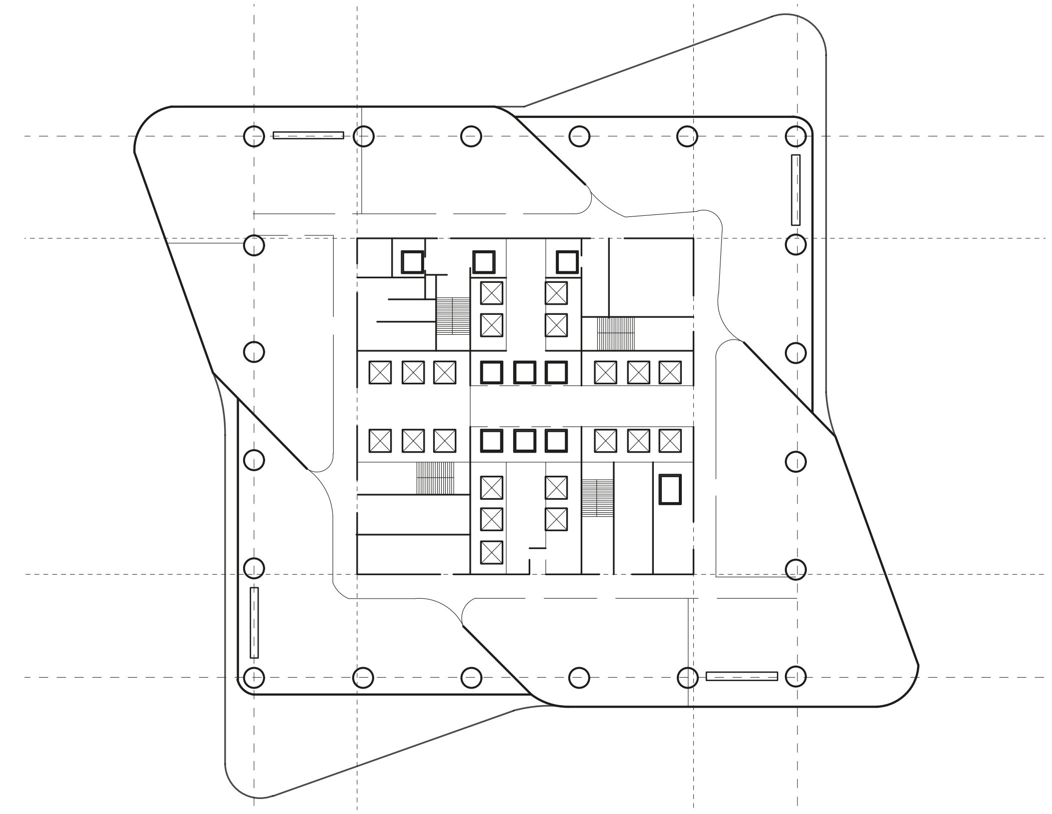
Total area I Superficie totale : 232 000 m²
Height I Hauteur : 284 m
Number of floors I Nombre d'étage : 63 étages
Floor plan area I Superficie d'un étage : 4000 m²

Structure system I Système de structure : Noyau cenrtal et colonne en périphérie (trame de 10.5m)
Structure materials I Matériaux de structure : béton
Envelope materials I Matériaux d'enveloppe:

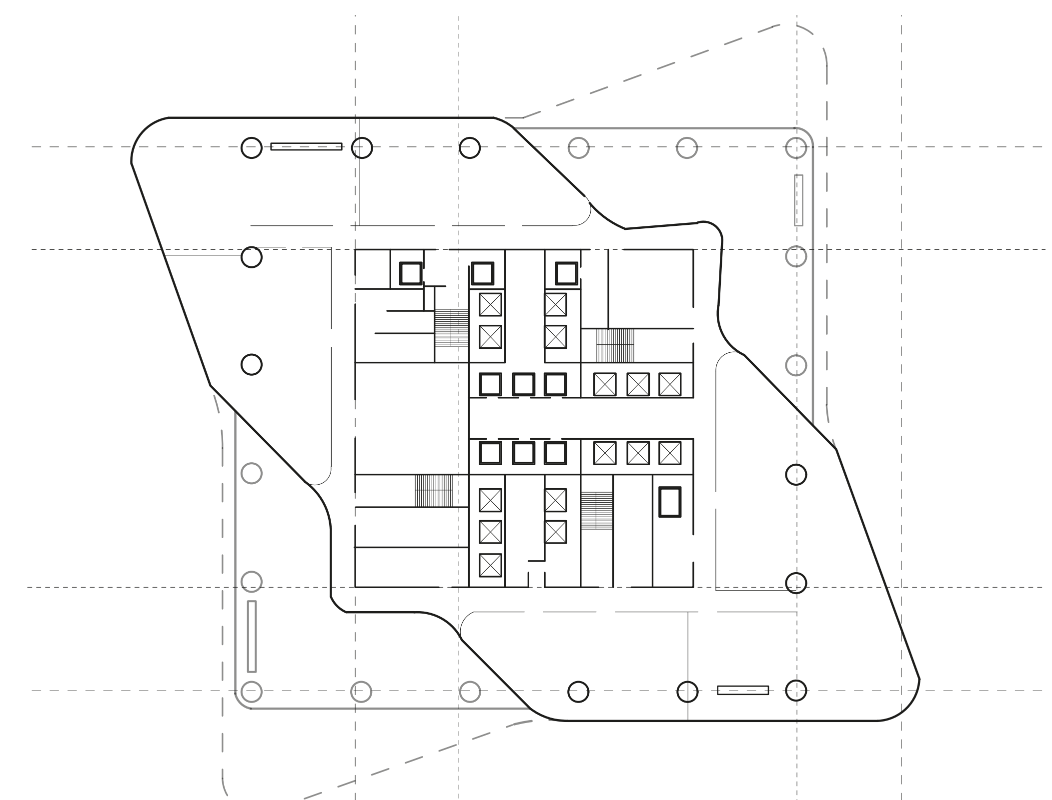


Ce projet se distingue à la fois pour son concept architectural et urbain. S'implantant dans une région prenant de l'ampleur démographiquement, à proximité d'un nouveau projet ferroviaire construit reliant l'Ouest de la ville à son centre, le projet des deux tours se veut telle la porte d'entrée de la ville. Une franche axialité est ainsi tracée entre ces deux tours symétriques se démarquant par leur verticalité dans une trame urbaine horizontale. Malgré les principes structuraux similaires, les deux tours ont un programme différent; une tour à bureau et une tour résidentielle.



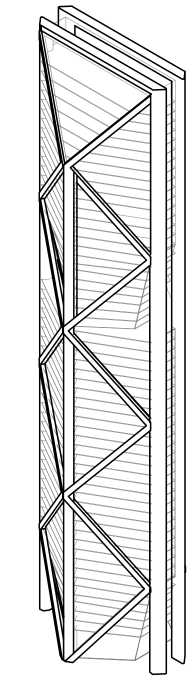


Floor Number F16



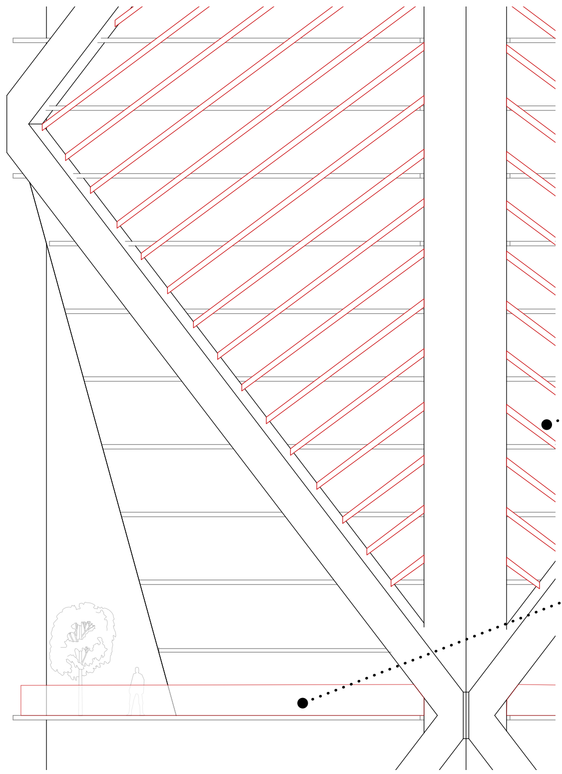
Floor Number F17

Architect I Architecte :	Foster + Partners
Engineer I Ingénieurs :	Daewoo E&C
Location I Localisation :	Juala Lumpur
Year of construction I Année de construction :	2015
Use I Usage :	Résidences et bureaux
Total area I Superficie totale :	9000m²
Height I Hauteur :	298m
Number of floors I Nombre d'étage :	64
Floor plan area I Superficie d'un étage :	±1750m²
Structure system I Système de structure :	Cadres triangulés extérieurs
Structure materials I Matériaux de structure :	Béton
Envelope materials I Matériaux d'enveloppe:	Verre et acier



Située tout près des deux tours Pétronas, la tour de Foster+Partners est une véritable figure de la conception intégrée. L'exosquelette composé de diagonales et de cadres triangulés assure la structure, l'enveloppe et l'ombrage du bâtiment et permet d'éliminer les colonnes au plan, offrant une flexibilité d'aménagement à chaque étage.

Sa forme de losange, façonnée par le contexte urbain, permet d'augmenter les espaces de vie et d'offrir des vues sur des monuments ciblés de la ville. Bien que les principales fonctions soient un hôtel et des bureaux, des espaces publics ont été aménagés au milieu de la tour de façon à ce que même les résidents de la ville puissent profiter des bienfaits de ce projet.



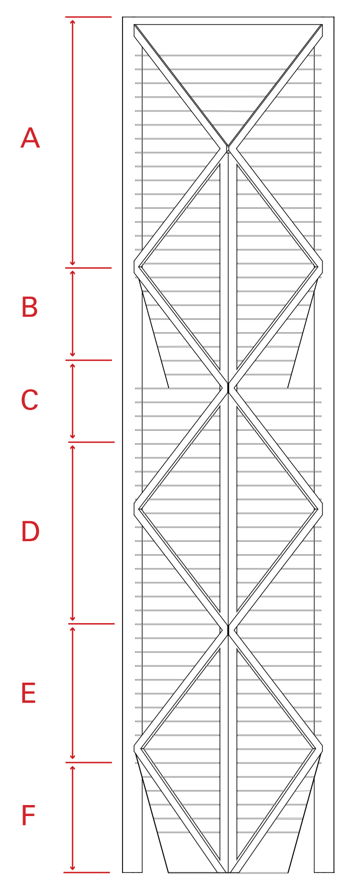
Brise-soleil
S'intégrant parfaitement avec le profil de la structure, le système d'ombrage protège l'intérieur contre les apports de chaleurs solaires.

Services publics
L'organisation de la tour permet au public de profiter de jardins à ciel ouvert et d'une vue imprenable sur la ville à plus de 40m de hauteur.

1:500

Programmation

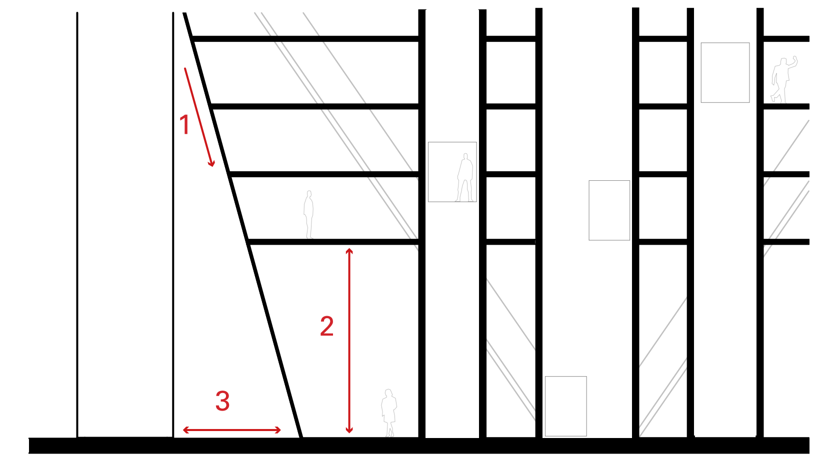
- A Appartements
- B Centre d'affaires, spa et services
- C Restaurant avec terrasse à ciel-ouvert
- D Bureaux
- E Bureaux
- F Food-court, gallerie d'art, magasins et services



1:2500

Base de la tour
La conception du rez-de-chaussée permet de prolonger l'espace public à l'intérieur de la tour et d'adoucir le passage vers un espace semi-privé.

1. Mur rideau en biais projette les passants vers l'intérieur
2. Atrium créé par la hauteur plancher-plafond de 14m
3. Retrait de la base par rapports aux limites du lots



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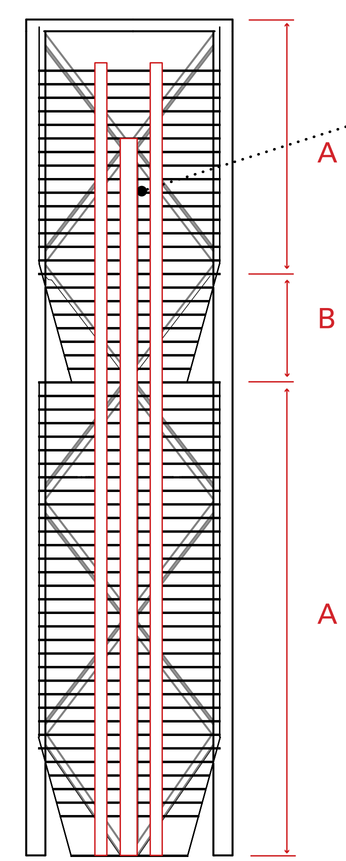
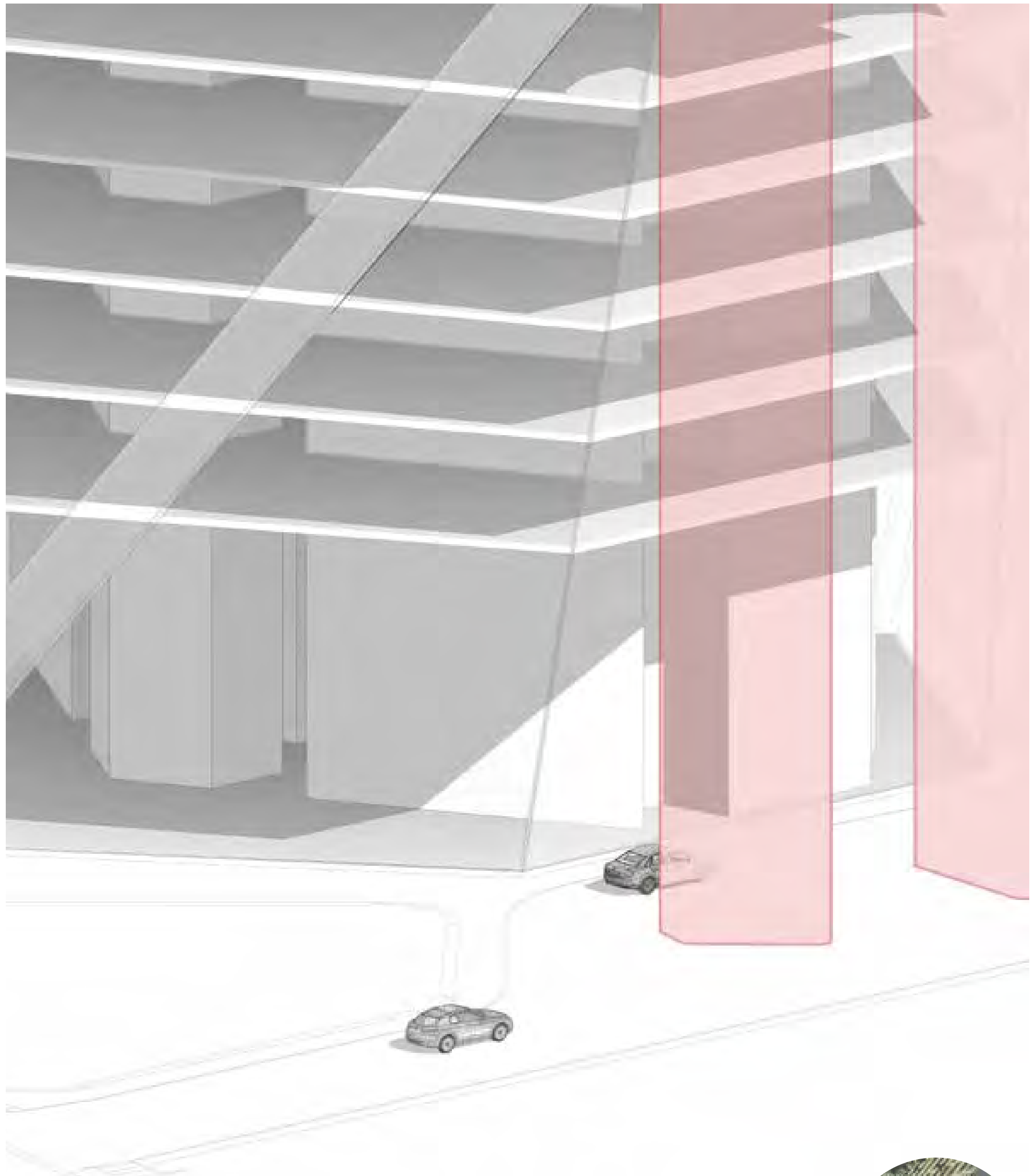


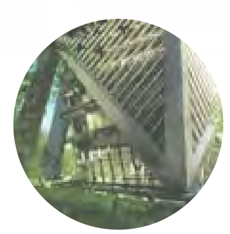
Noyau (asc + wc)
La géométrie de la tour et le positionnement du noyau de services offrent une flexibilité d'aménagement permettant d'acceuillir aisément les diverses fonctions.

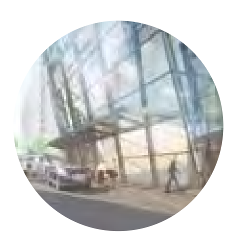
Structure
Changement de structure au niveau de la terrasse. Le poids des planchers est réparti sur des colonnes suspendues ancrées au 41ième étage.

- A Cadre triangulé
- B Colonnes suspendues

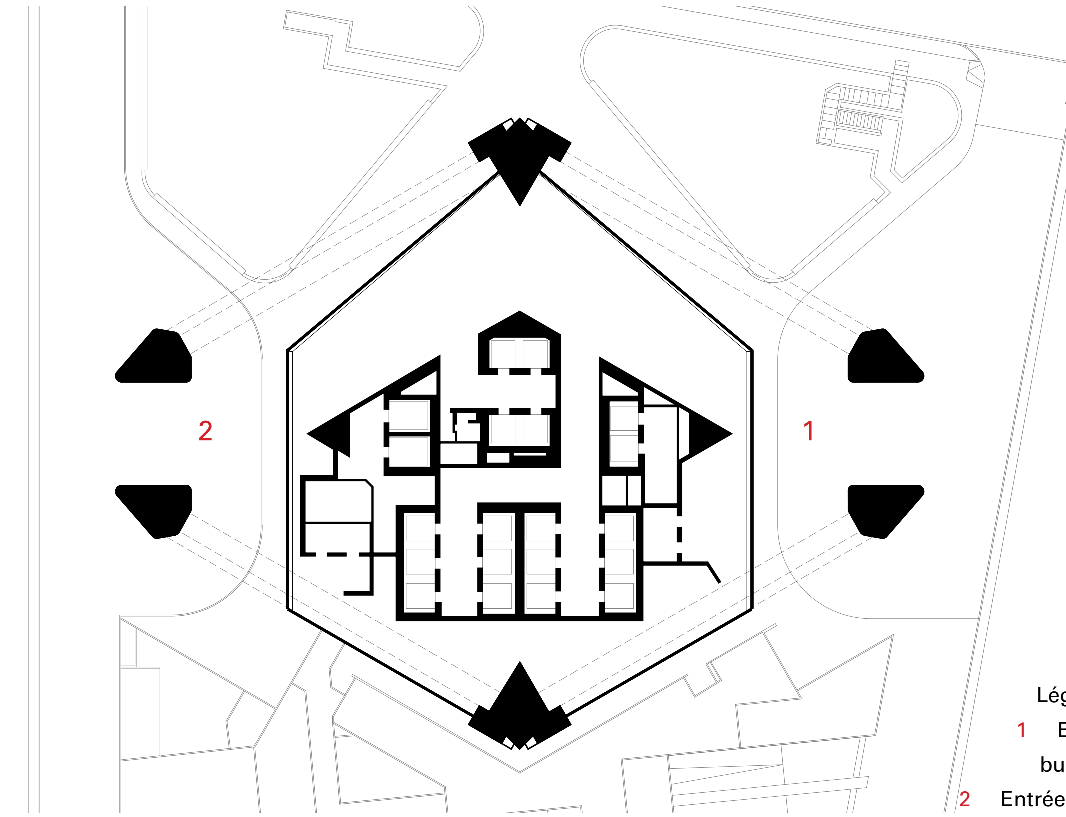
1:2500



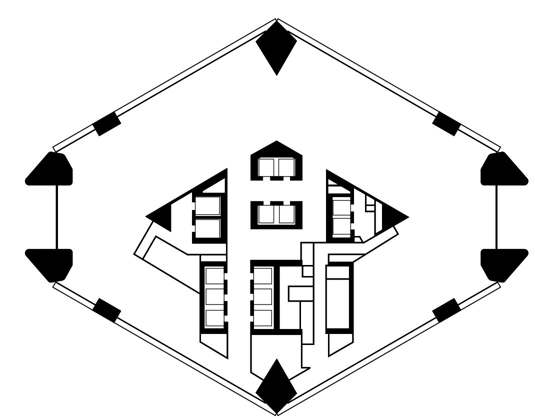




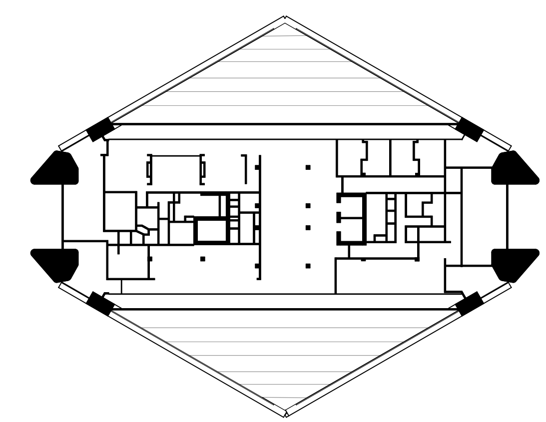
Conception intégrée | Marquise
La conception intégrée, maitrisée par Foster + Partners, offre des détails comme celui-ci où une marquise est créée par le jumelage de la structure et des gestes posés au rez-de-chaussée.



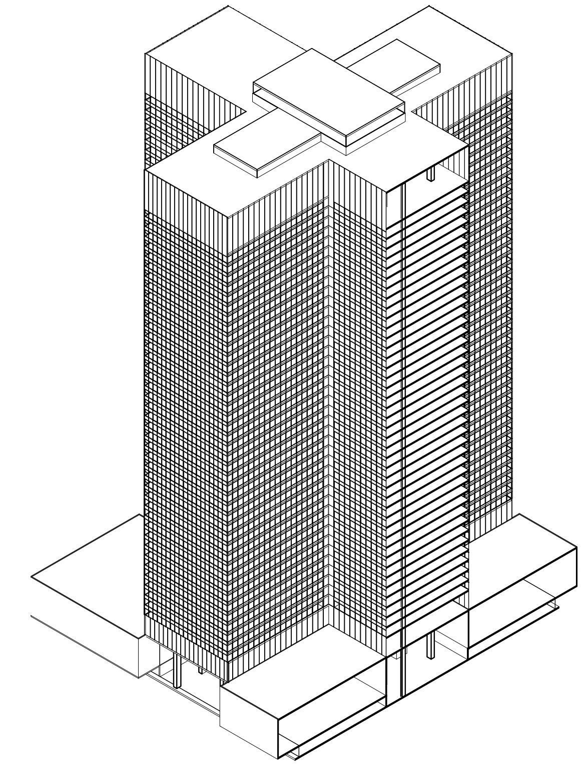
Rez-de-chaussée



Étage typique. - 1:500

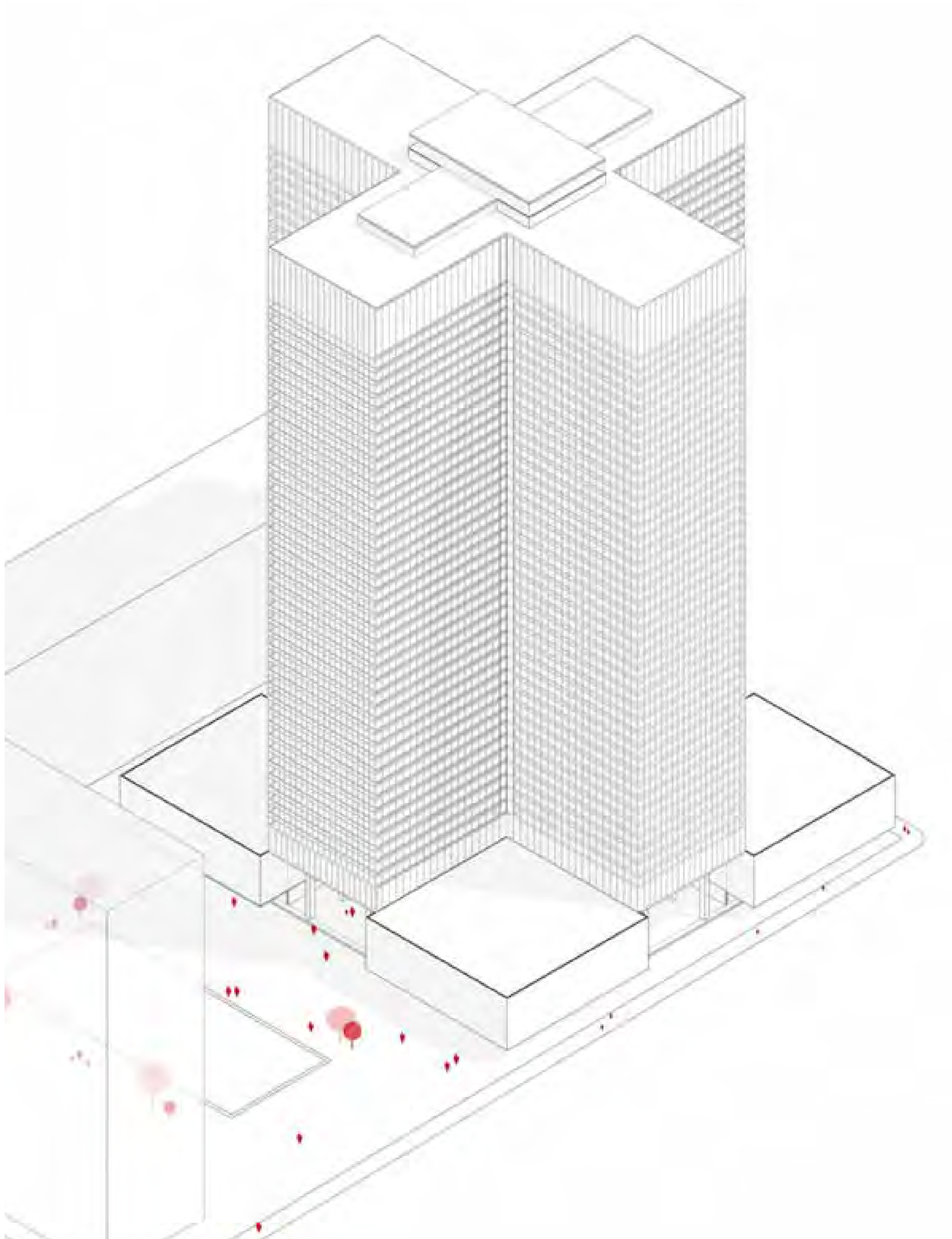


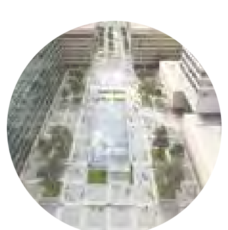
Étage terrasse - 1:500



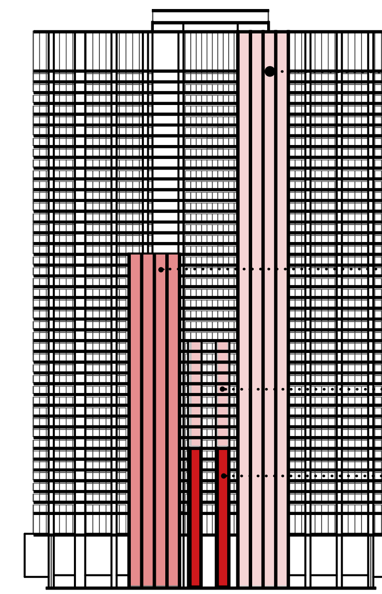
Architect I Architecte :	Henry N.Cobb et Ieoh Ming Pei
Engineer I Ingénieurs :	Severud Associates
Location I Localisation :	Montréal
Year of construction I Année de construction :	1958-1962
Use I Usage :	Bureaux et commerces
Total area I Superficie totale :	15000m²
Height I Hauteur :	188m
Number of floors I Nombre d'étage :	47
Floor plan area I Superficie d'un étage :	±3345m²
Structure system I Système de structure :	Poteaux dalles
Structure materials I Matériaux de structure :	Acier
Envelope materials I Matériaux d'enveloppe:	Verre et aluminium

Construite durant une époque charnière du développement des gratte-ciels, la tour de la Place Ville-Marie, reprenant la croix du Plan Voisin de Corbusier et le revêtement d'aluminium des tours d'appartements de Mies Van Der Rohe à Chicago, a fait preuve d'innovation sur plusieurs aspects : forme, structure et enveloppe de murs-rideaux. Ce bâtiment est donc extrêmement symbolique et identitaire pour la ville de Montréal. Un gyrophare installé sur le dernier étage, appartenant autrefois à la banque RBQ, nous le rappelle quotidiennement à plus de 58km.





Bâtiment identitaire de la ville
On retrouve à la base une véritable place publique devenue pôle majeur du centre-ville où occupants de la tour et gens du quartier peuvent se rassembler et retrouver divers services.



Bloc d'ascenseurs D
Étages 1 à 43

Bloc d'ascenseurs C
Étages 23 à 33

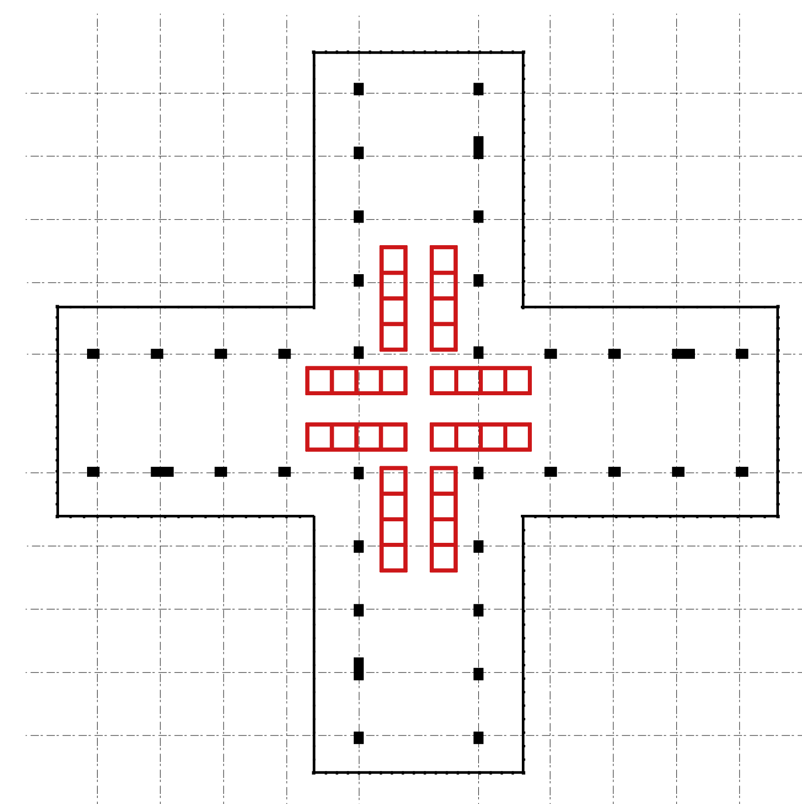
Bloc d'ascenseurs B
Étages 1 à 23

Bloc d'ascenseurs A
Étages 1 à 13

Enveloppe
Le développement de la structure et du porte-à-faux ont permis de réduire la conception des façades à un seul revêtement : le mur-rideau d'aluminium qui passe devant la dalle de béton. Système indicateur de modernité pour l'époque car ce fût l'une des première utilisation à Montréal reprise des É-U.

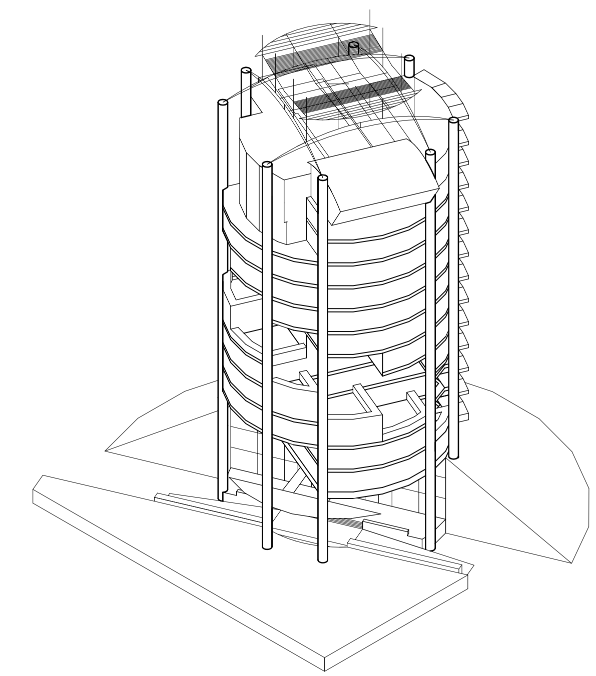
1:2500

Plans

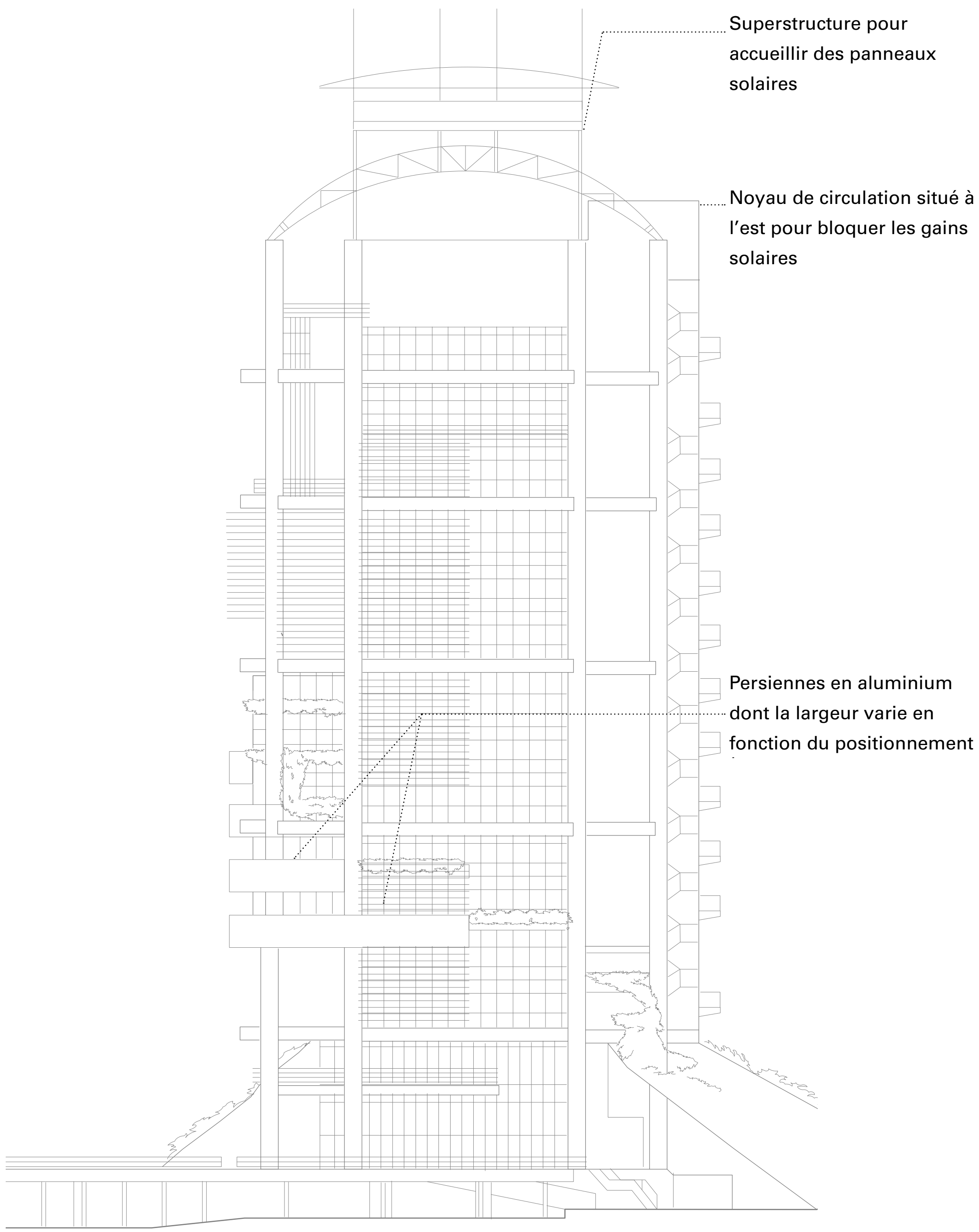


Blocs d'ascenseurs A, B, C et D

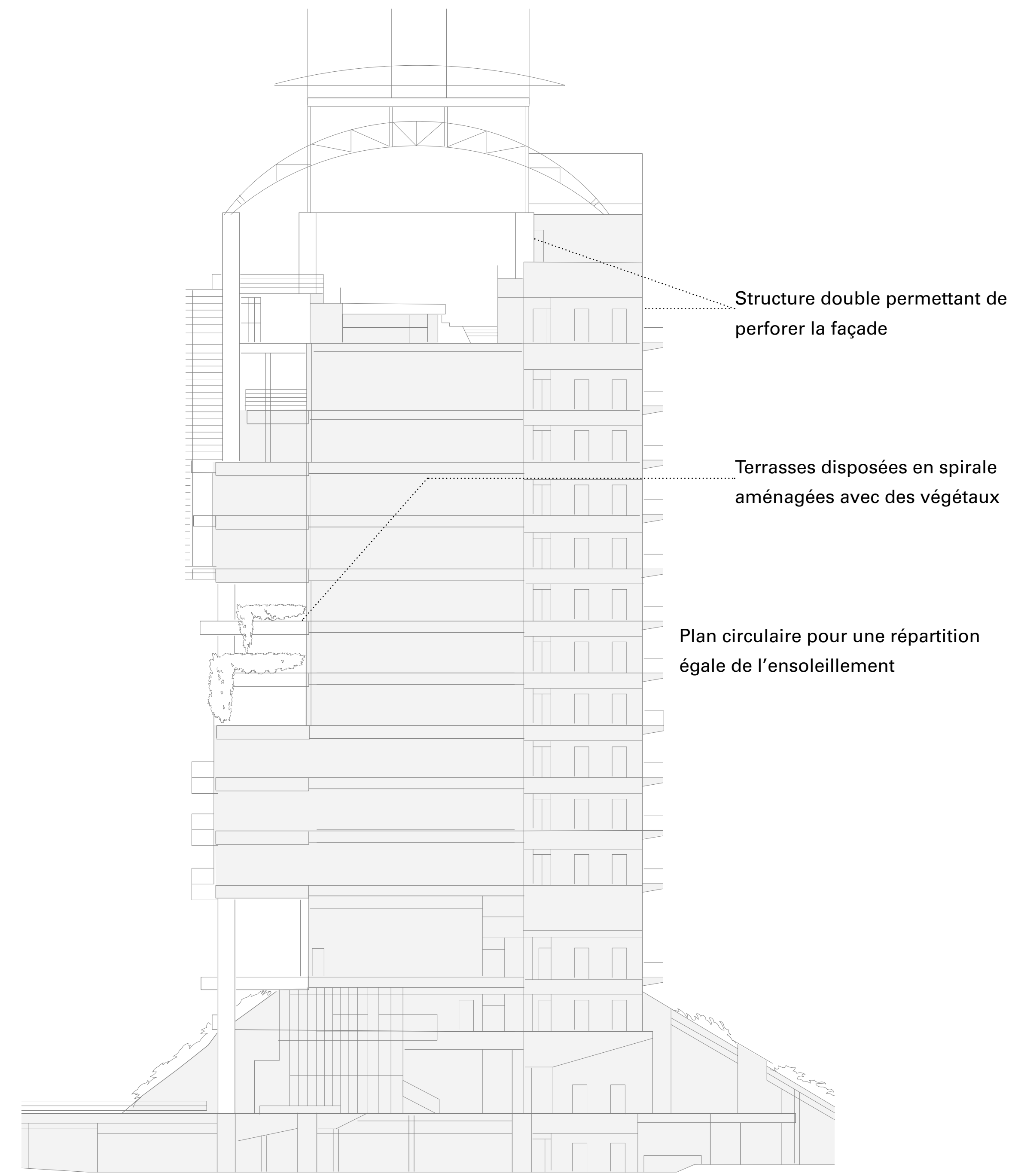
Architect I Architecte :	Hamzah & Ywang
Engineer I Ingénieurs :	Reka Perinding
Location I Localisation :	Subang Java, Malaisie
Year of construction I Année de construction :	1989-1992
Use I Usage :	Siège social (bureaux)
Total area I Superficie totale :	12 356m^2
Height I Hauteur :	63m
Number of floors I Nombre d'étage :	15
Floor plan area I Superficie d'un étage :	
Structure system I Système de structure :	Double; à noyau excentrique et exosquelette
Structure materials I Matériaux de structure :	Acier et béton armé
Envelope materials I Matériaux d'enveloppe:	Verre et panneaux d'aluminium



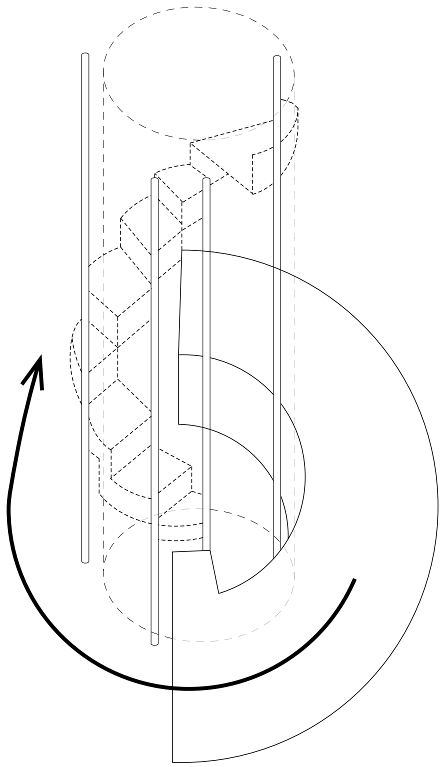
La tour Menara Mesiniaga est un modèle précurseur de bâtiment faisant la transition physique de principes écologiques dans une architecture de grande hauteur. La construction et l'utilisation ont été conçus afin de réduire au maximum la quantité d'énergie utilisée, notamment à l'aide de dispositifs bioclimatiques passifs. L'orientation et l'implantation, la trajectoire du soleil, la récurrence des pluies et des vents, la température chaude et humide ont ainsi été étudiés afin d'améliorer les performances de la tour, tout en assurant le confort de ses utilisateurs et la relation au paysage.


Superstructure pour accueillir des panneaux solaires
Noyau de circulation situé à l'est pour bloquer les gains solaires
Persiennes en aluminium dont la largeur varie en fonction du positionnement

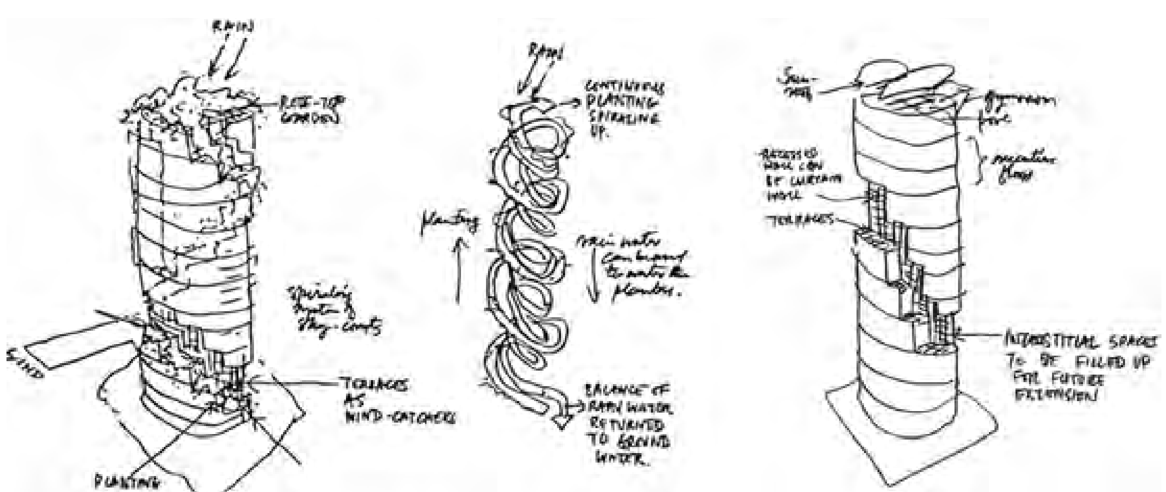
1:500


Structure double permettant de perforer la façade
Terrasses disposées en spirale aménagées avec des végétaux
Plan circulaire pour une répartition égale de l'ensoleillement

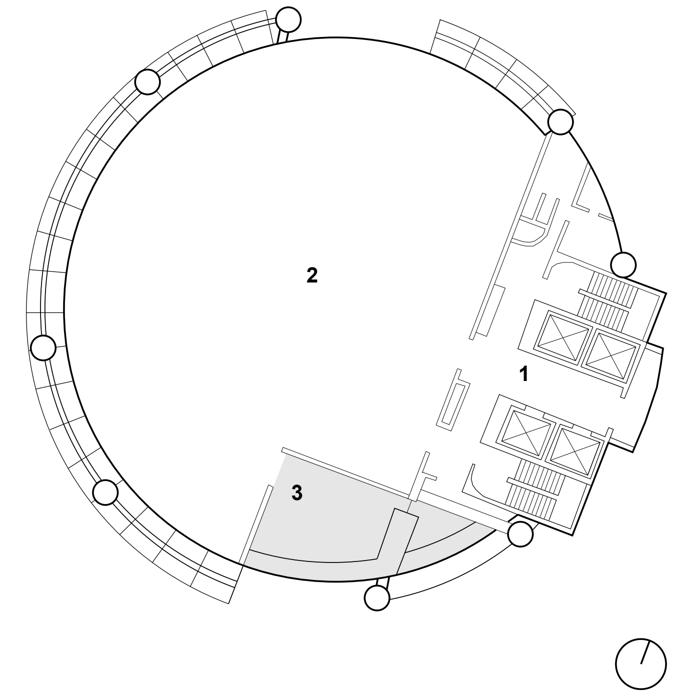
1:500



Distribution des terrasses

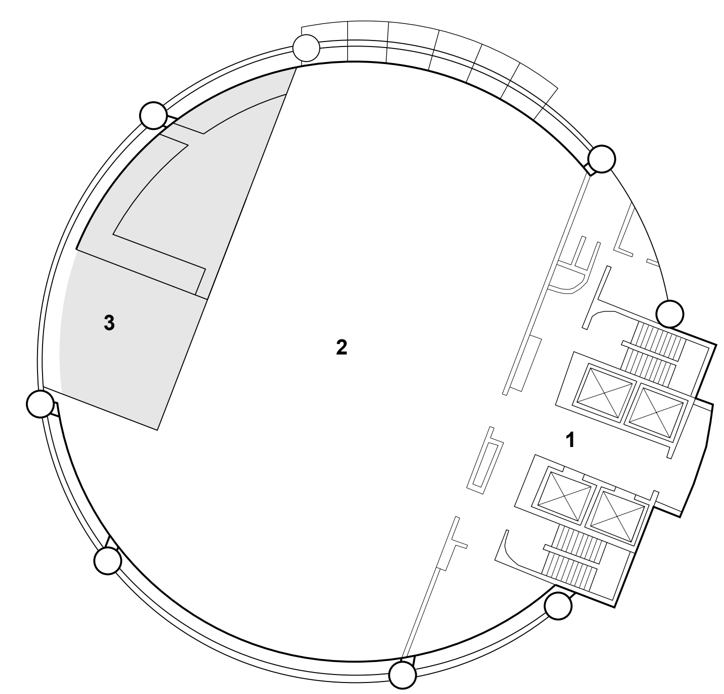


Schémas de Ken Yeang



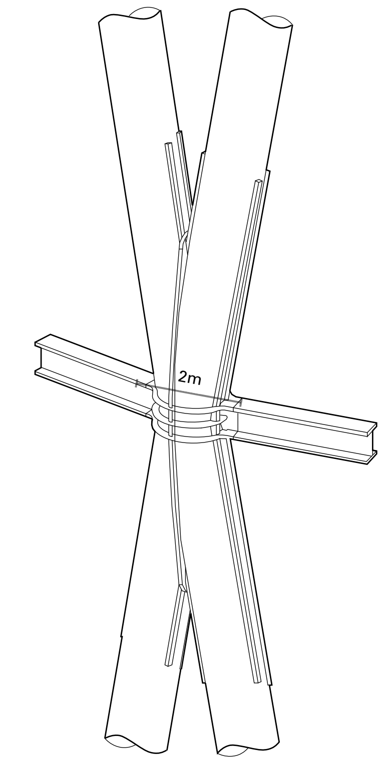
2e étage - 1:500

1- Noyau de circulation et services
2- Espaces de bureaux
3- Terrasse



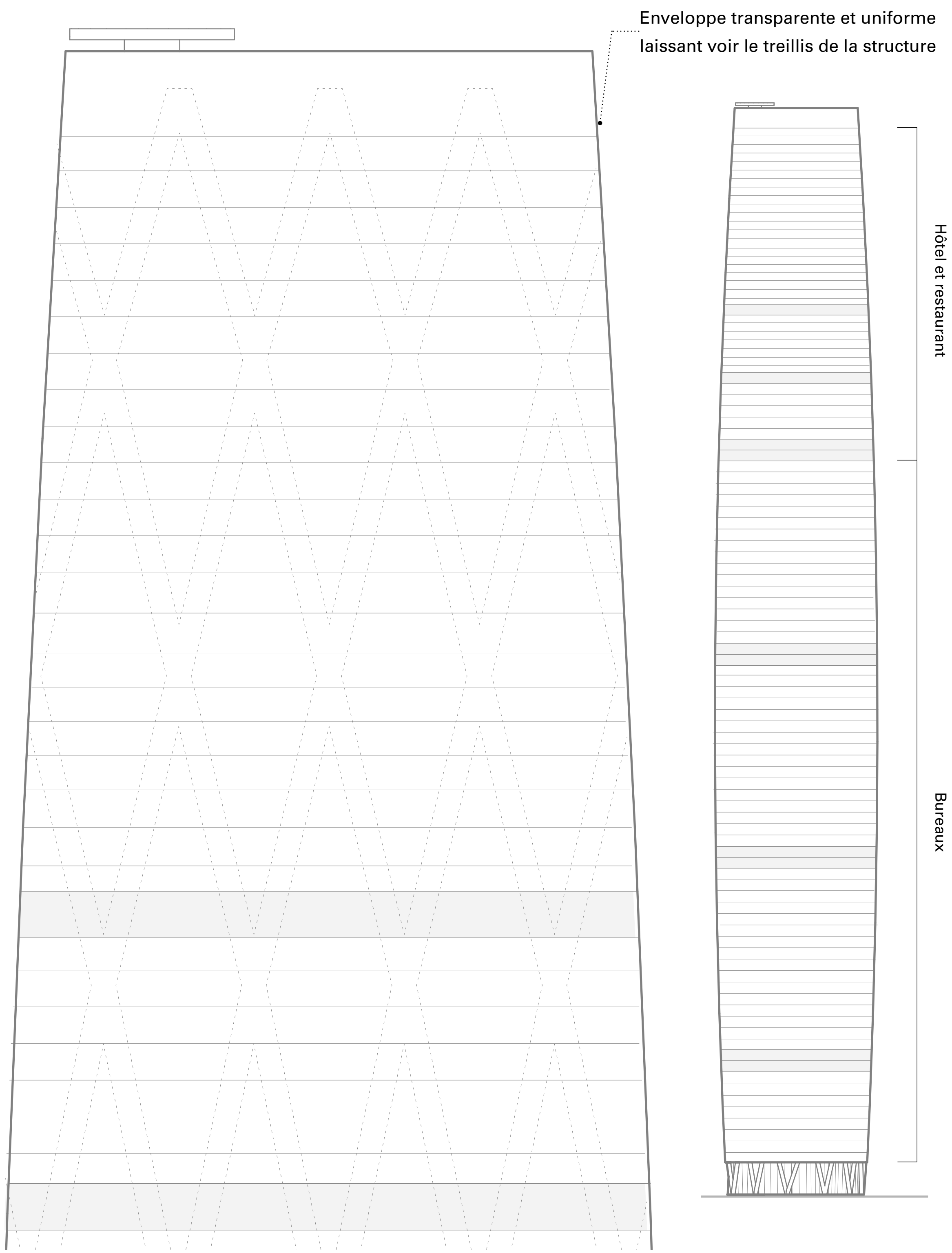
7e étage - 1:500

Architect I Architecte :	Wilkinson Eyre Architects
Engineer I Ingénieurs :	Arup
Location I Localisation :	Guanghzou, Chine
Year of construction I Année de construction :	2005-2010
Use I Usage :	Bureaux et hôtel de luxe
Total area I Superficie totale :	247 000m²
Height I Hauteur :	440m
Number of floors I Nombre d'étage :	103
Floor plan area I Superficie d'un étage :	
Structure system I Système de structure :	Double; à noyau central et exosquelette
Structure materials I Matériaux de structure :	Acier et béton armé
Envelope materials I Matériaux d'enveloppe:	Verre doublé



Le Centre Financier International de Guangzhou constitue un point de liaison dans le nouveau développement de la ville, entre le secteur commercial au nord et la Pearl River au sud. Il combine une programmatique variée ; des bureaux et un hôtel de luxe se trouvent aux étages et un complexe combinant des magasins de luxe, un centre de conférence et des appartements au rez-de-chaussée, tous reliés aux transports en communs par des souterrains. Son plan triangulaire répond à la densité du site ainsi qu'à la dominance des vents et sa structure à une programmatique scinte en deux.

Elevation I Élévation



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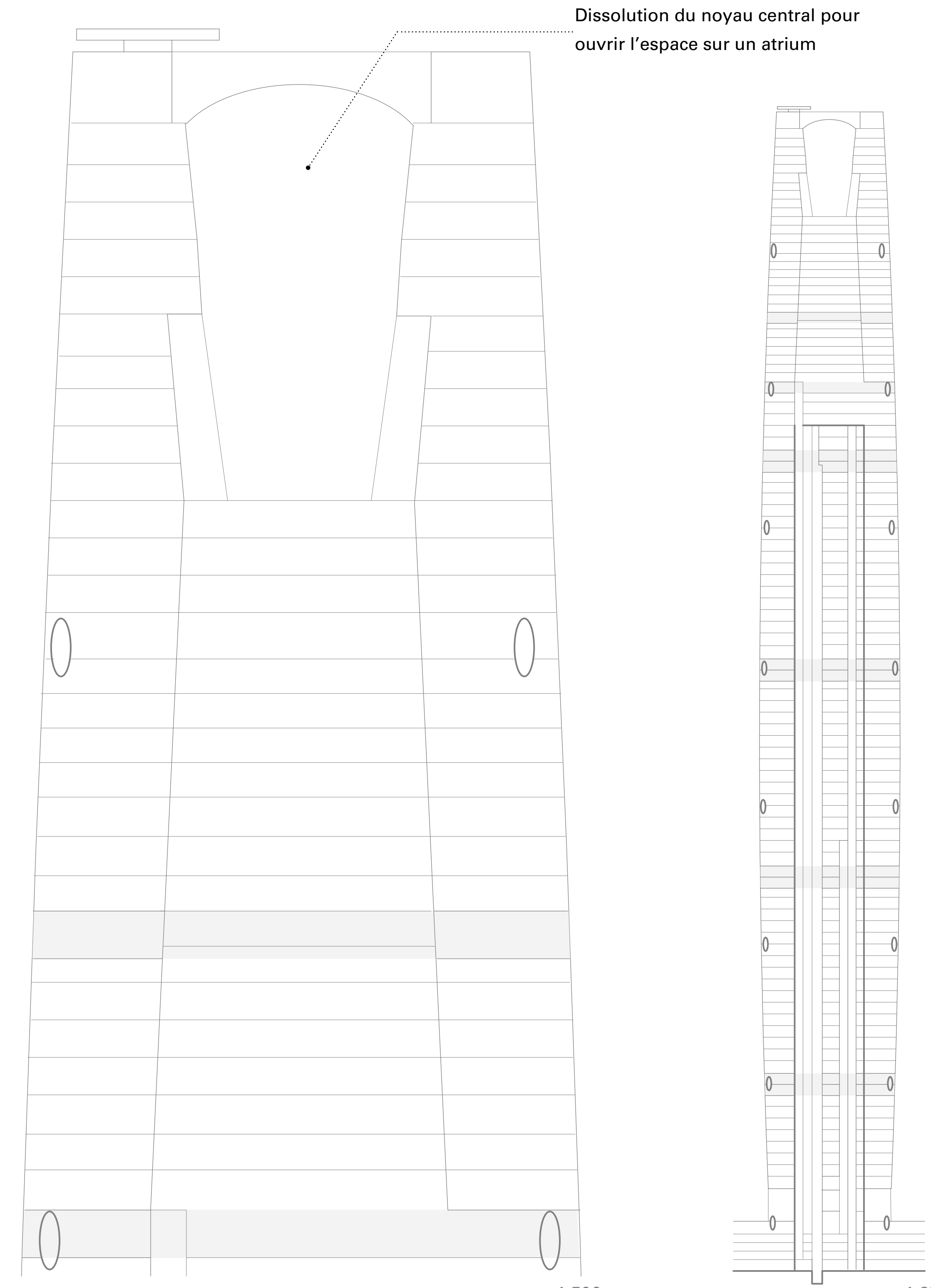
Section I Coupe



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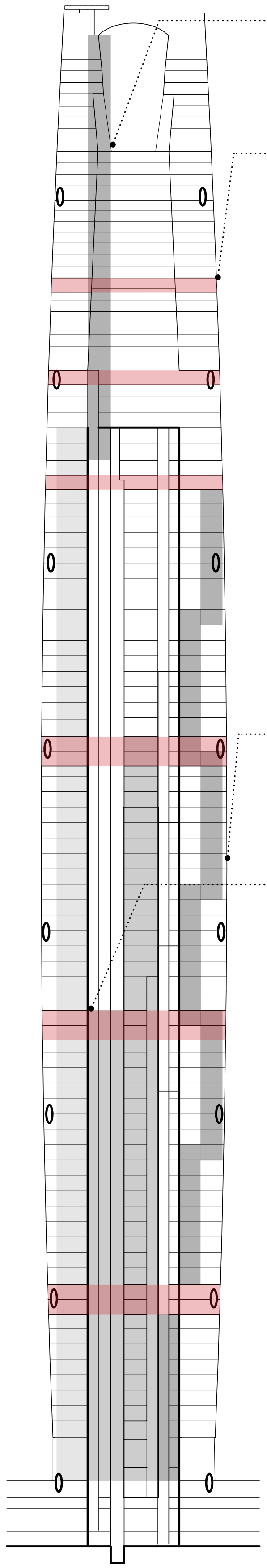
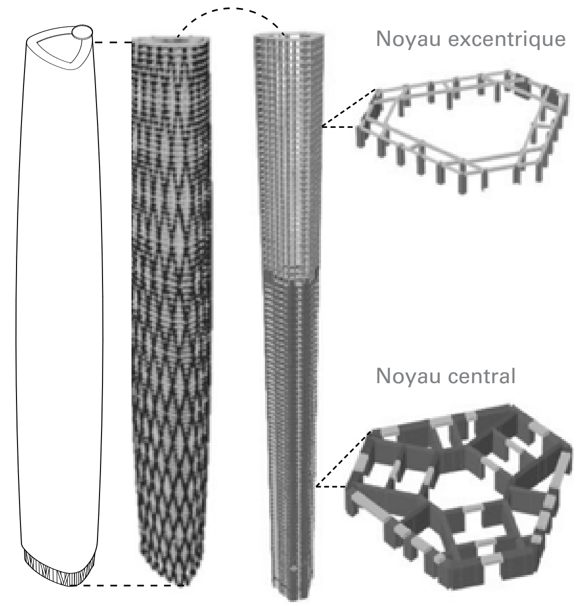
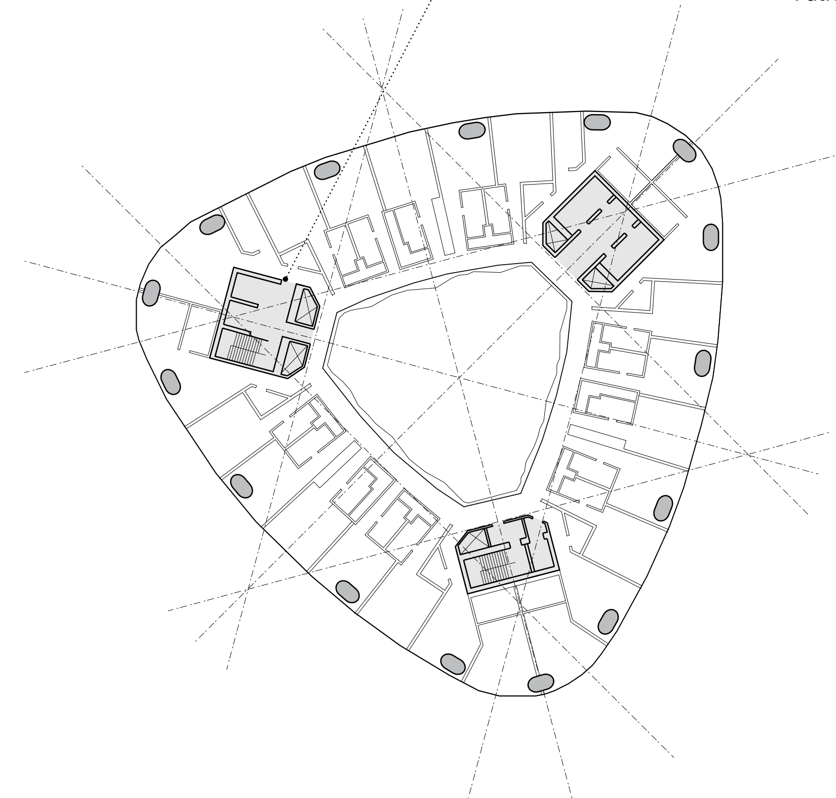


Système de circulation verticale



Système structural double

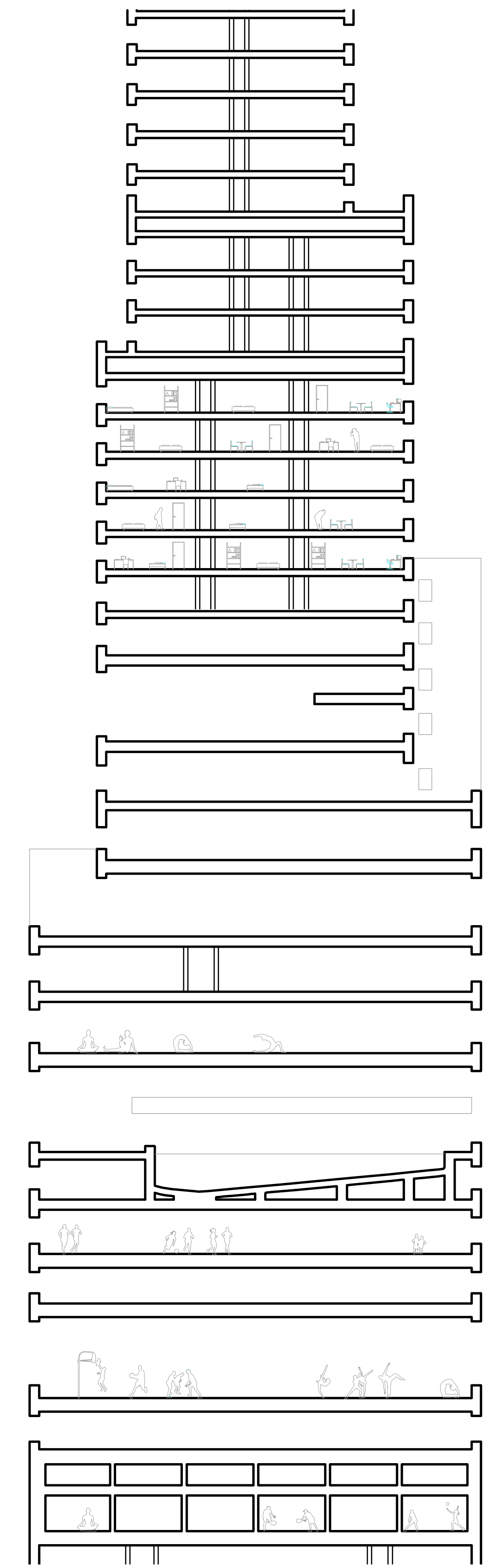
Étage de bureaux type



Étage d'hôtel type

Architect I Architecte :	Starrett & van Vleck
Engineer I Ingénieurs :	Moinian Group
Location I Localisation :	New-York
Year of construction I Année de construction :	1928
Use I Usage :	
Total area I Superficie totale :	180000m²
Height I Hauteur :	158m
Number of floors I Nombre d'étage :	39
Floor plan area I Superficie d'un étage :	3500m²
Structure system I Système de structure :	Maçonnerie
Structure materials I Matériaux de structure :	Béton
Envelope materials I Matériaux d'enveloppe:	Brique

Le dowtown atheltic club est une tour qui accueuille un club de sport. Le terrain étant étroit, la tour a été pensée pour accueillir une fonction du club de sport à chaque étage et des chambres d'hôtel en partie haute. Le club étant proche du World Trade Center, depuis les attaques de ce dernier, le club a fermé et la tour ne compte aujourd'hui que des résidences. D'un point de vu extérieur la tour ne dévoile rien de son organisation interne mais apparaît au contraire plutôt comme un amas de petites tours individuelles.

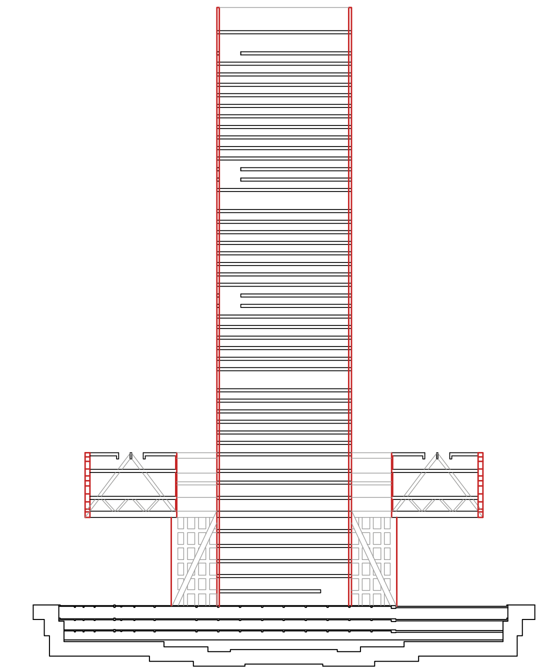


Section I Coupe 1:500

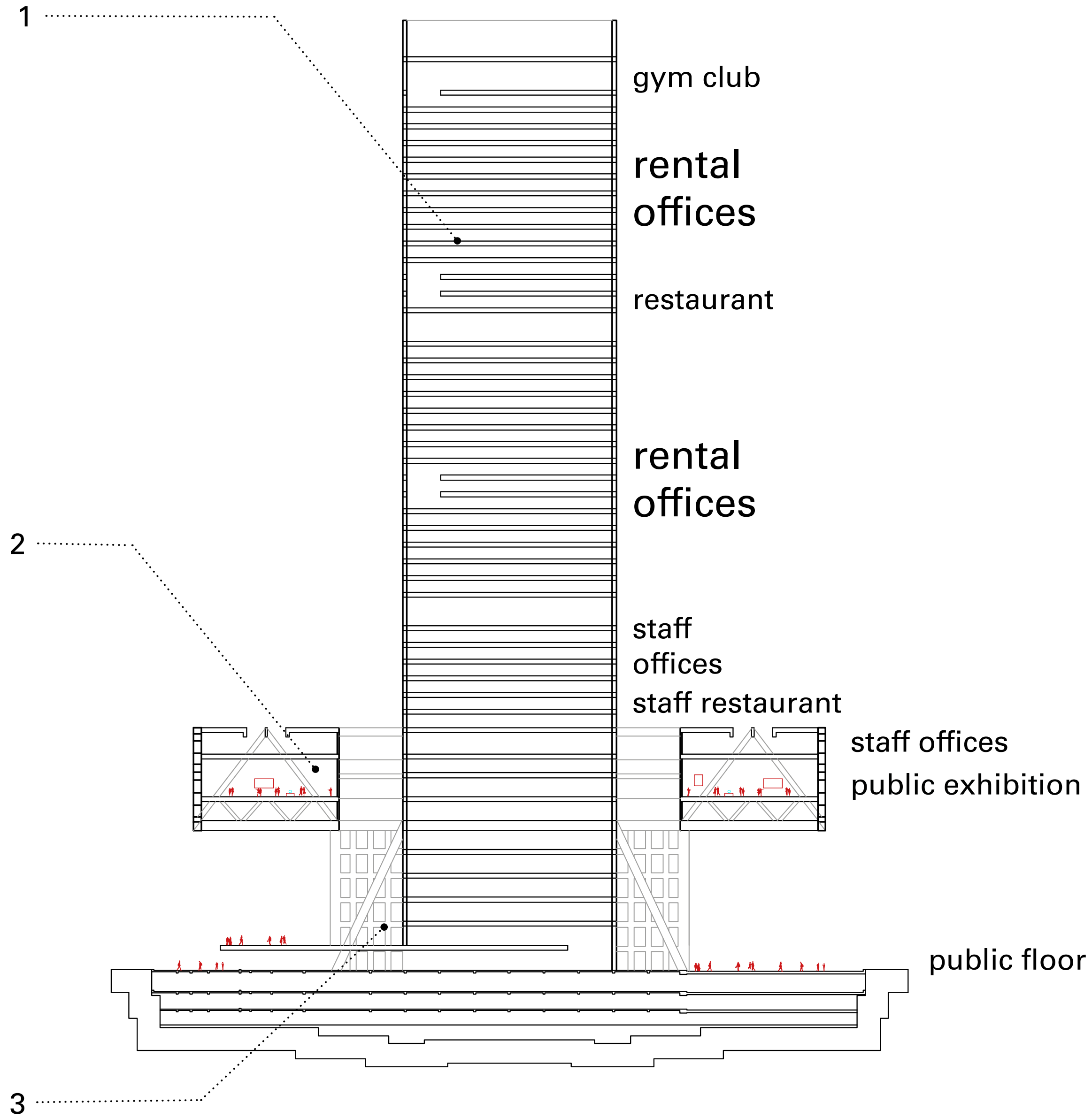
Architect I Architecte : OMA
Engineer I Ingénieurs : ARUP
Location I Localisation : Schenzhen, China
Year of construction I
Année de construction : 2006
Use I Usage :

Total area I Superficie
totale : 265 000m²
Height I Hauteur : 245 mètres
Number of floors I
Nombre d'étage : 45
Floor plan area I
Superficie d'un étage : 2500m² à 15000m²

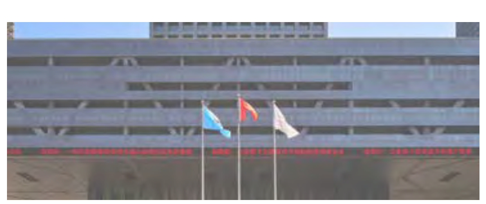
Structure system I
Système de structure : Exosquelette et noyau central
Structure materials I
Matériaux de structure : Acier
Envelope materials I
Matériaux d'enveloppe: Acier



Le concept d'OMA est assez simple puisqu'il consiste en une tour accueuillant une bourse dont la base aurait été soulevée par "l'euphorie spéculative". La tour se compose de 3 parties aux enveloppes différentes. Ces changements d'ambiance et de programme se font au travers de la structure. C'est à dire qu'elle permet de générer des enveloppes plus ou moins transparentes ou plus ou moins fermées afin d'accueillir des fonctions différentes comme des bureaux, des cantines ou encore des espaces d'expositions ouverts au public.




1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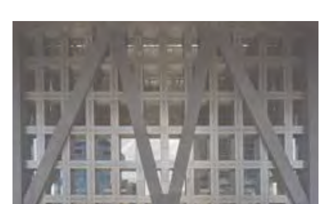
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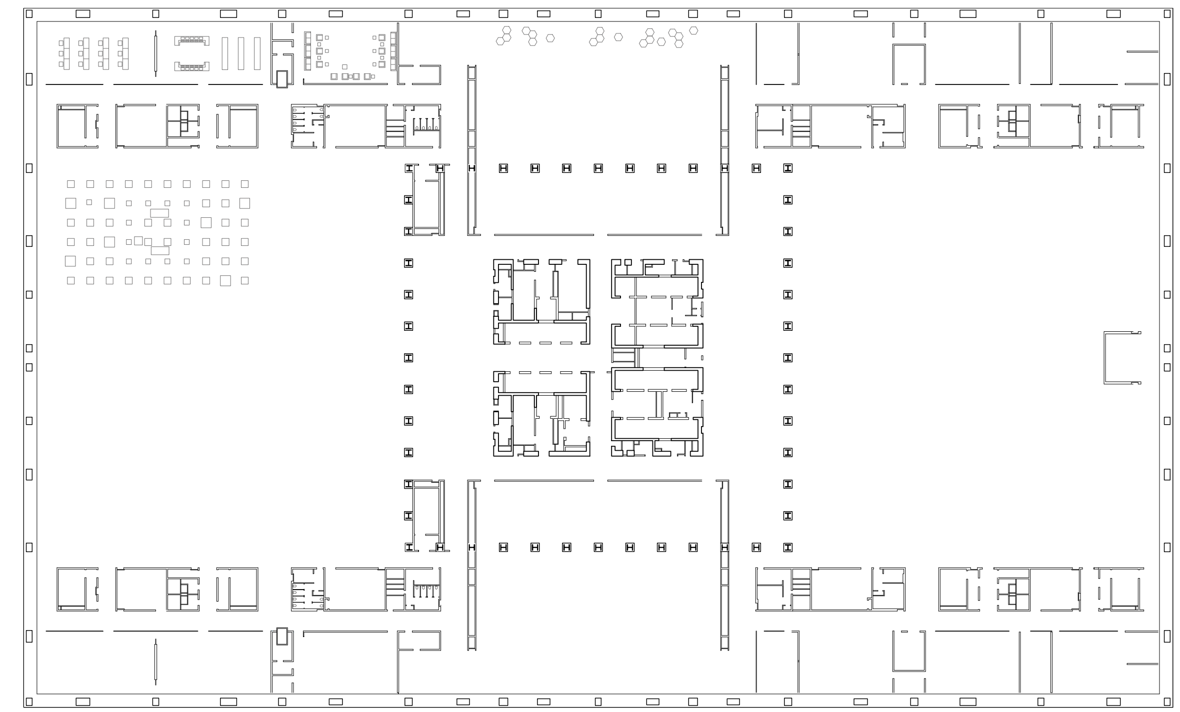
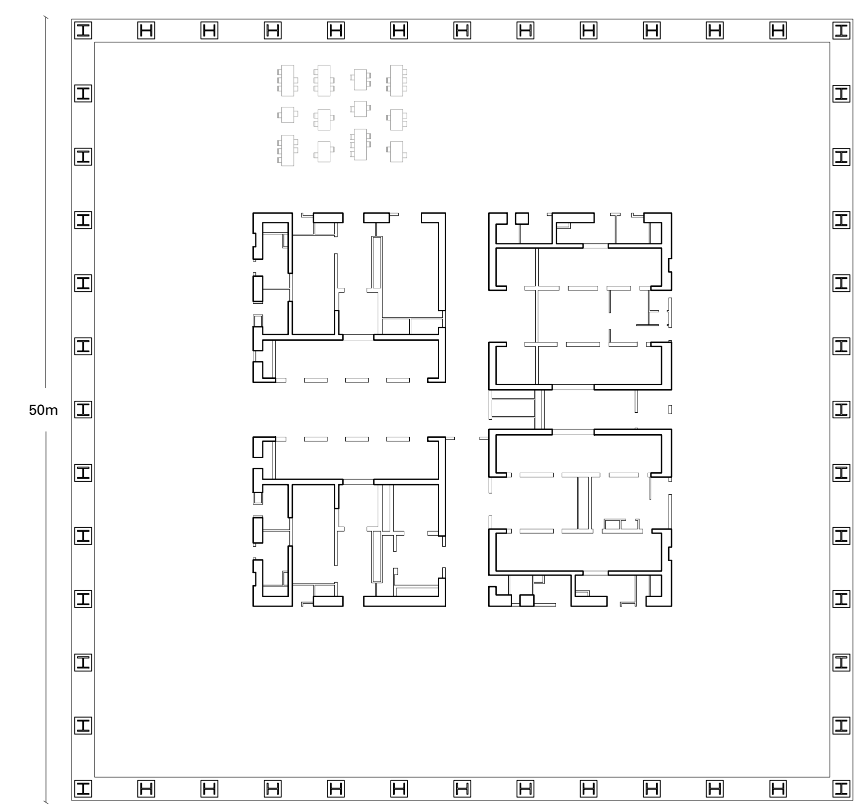
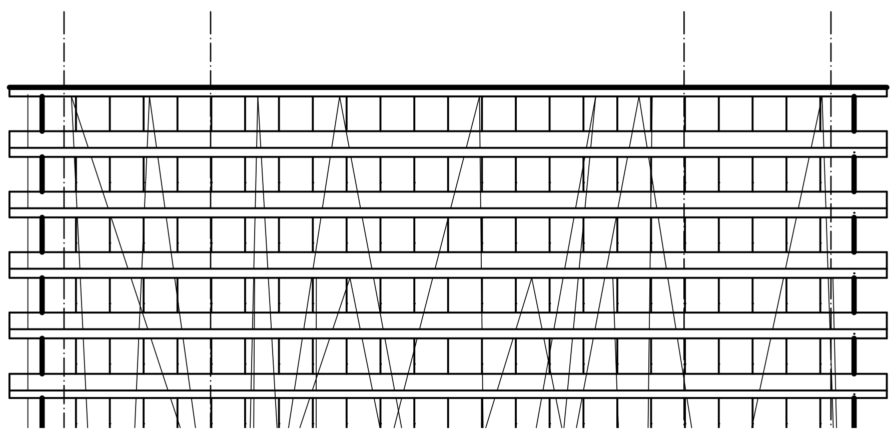

Floor Number 8



Floor Number 15

Architect I Architecte :	Chrisian Kerez
Engineer I Ingénieurs :	idk
Location I Localisation :	ZhengZhou buisness district,
Year of construction I	China
Année de construction :	
Use I Usage :	Office space
Total area I Superficie totale :	69 600m2
Height I Hauteur :	120m
Number of floors I Nombre d'étage :	30
Floor plan area I Superficie d'un étage :	2 320m2
Structure system I Système de structure :	Poutres et poteaux jumellé a dalles structurales
Structure materials I Matériaux de structure :	Coslab + steel structure
Envelope materials I Matériaux d'enveloppe:	Glass

The CBD Bank tower is a innovated building by his uncommun structure. The base point of the design and the strucutre starts by the desire of creating a fully transparent building with a lot of changing atmosphere. " Stability becomes litteraly an experience in every single space of the building."-Christian Kerez- In that sense the architect was trying to create a opposition in between his concept and the general way to design a tower. In other words a classic tower design will have at his center a mecanic core but with the structure they design it is now possible to have a totaly open space without any walls or divisons.



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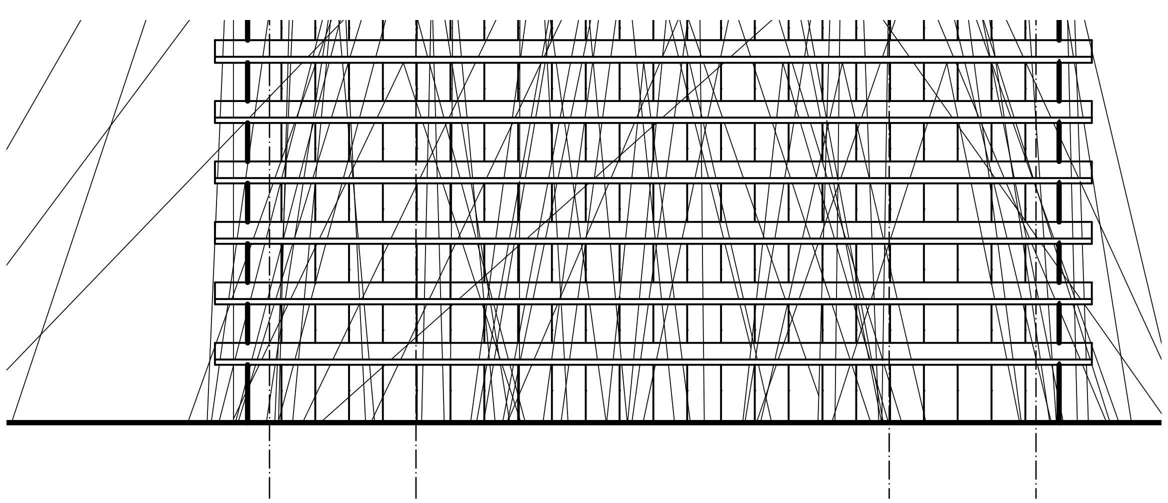

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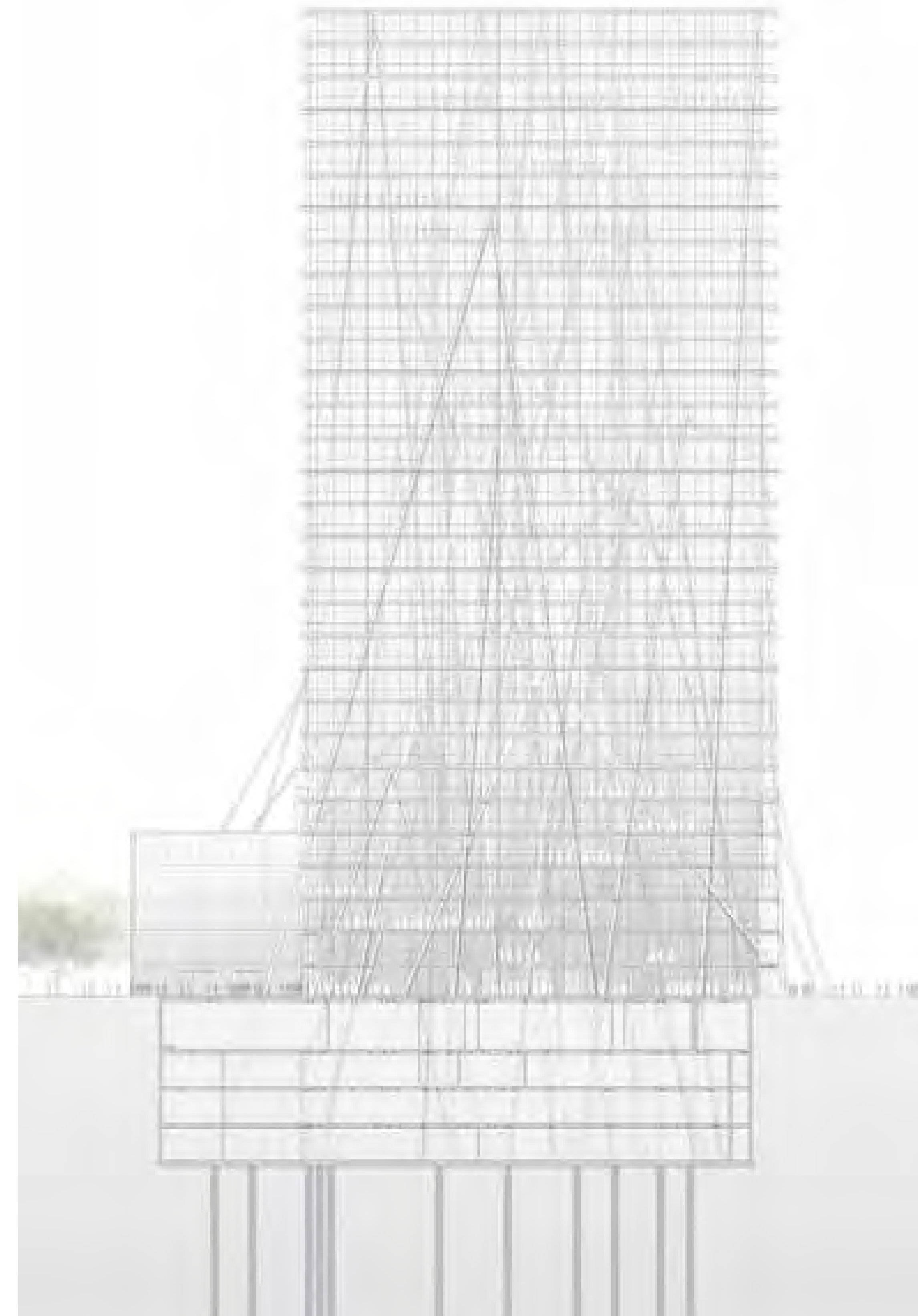
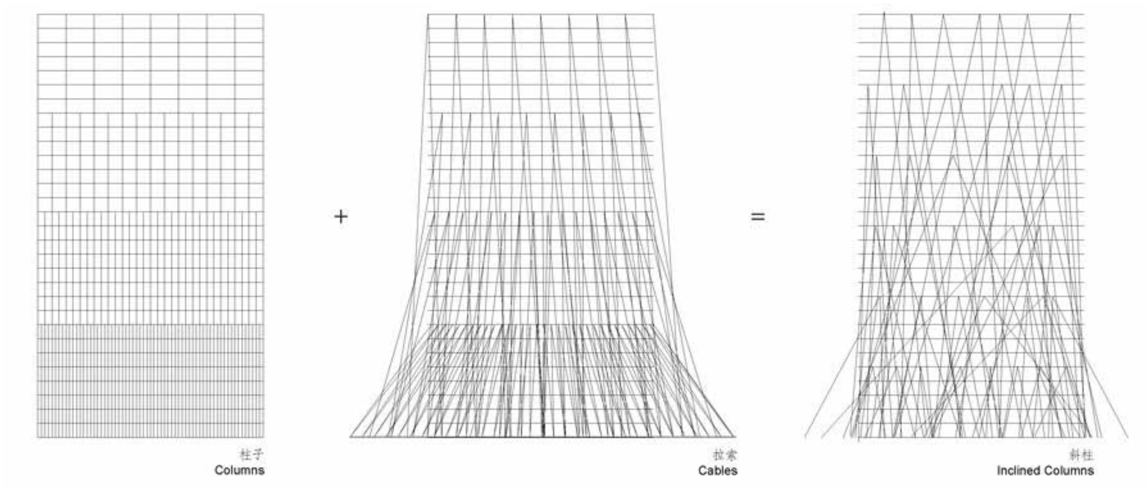
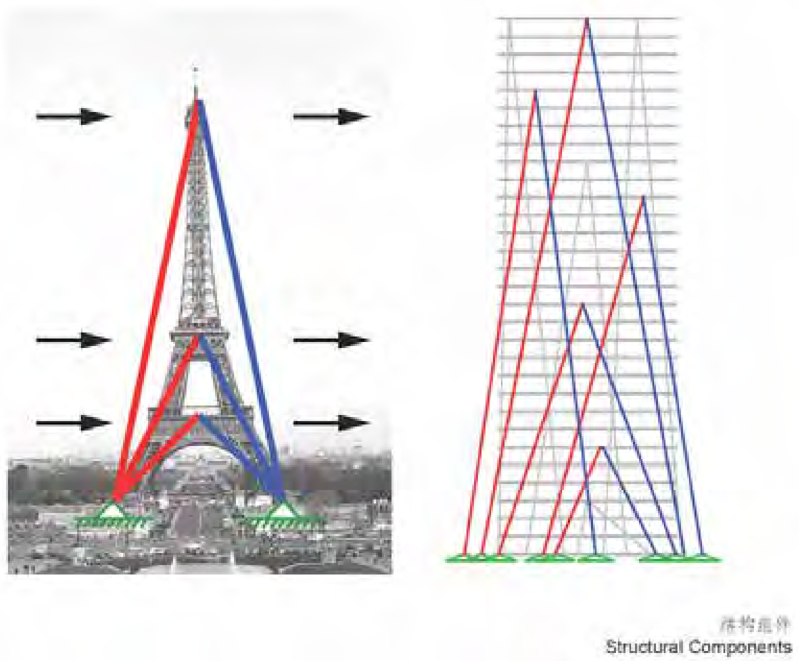
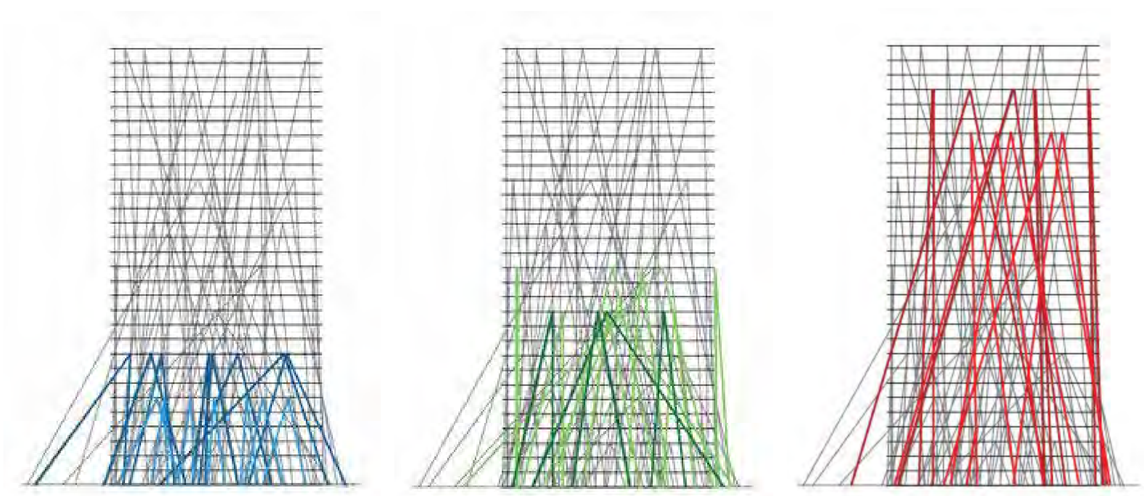
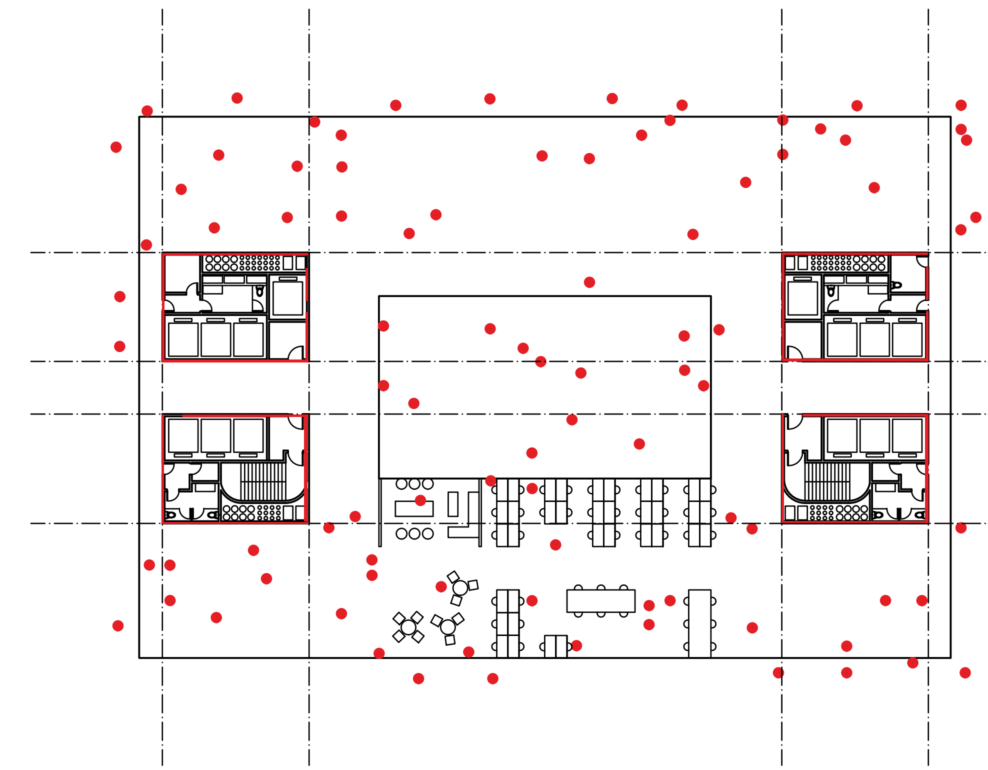


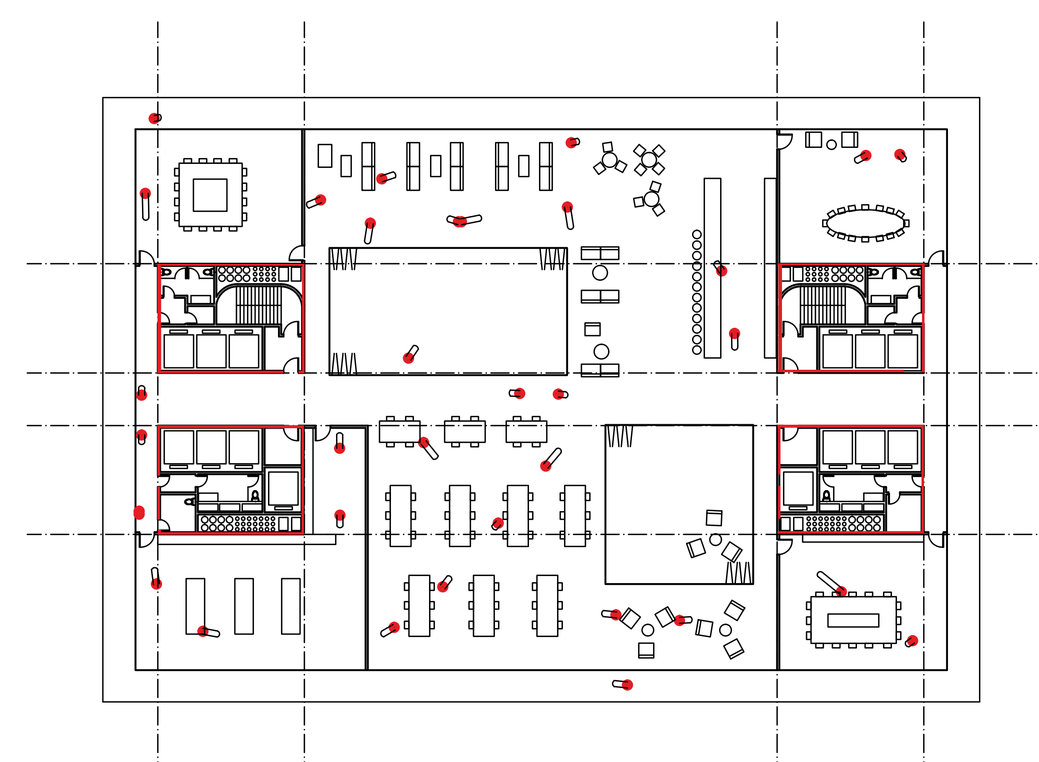




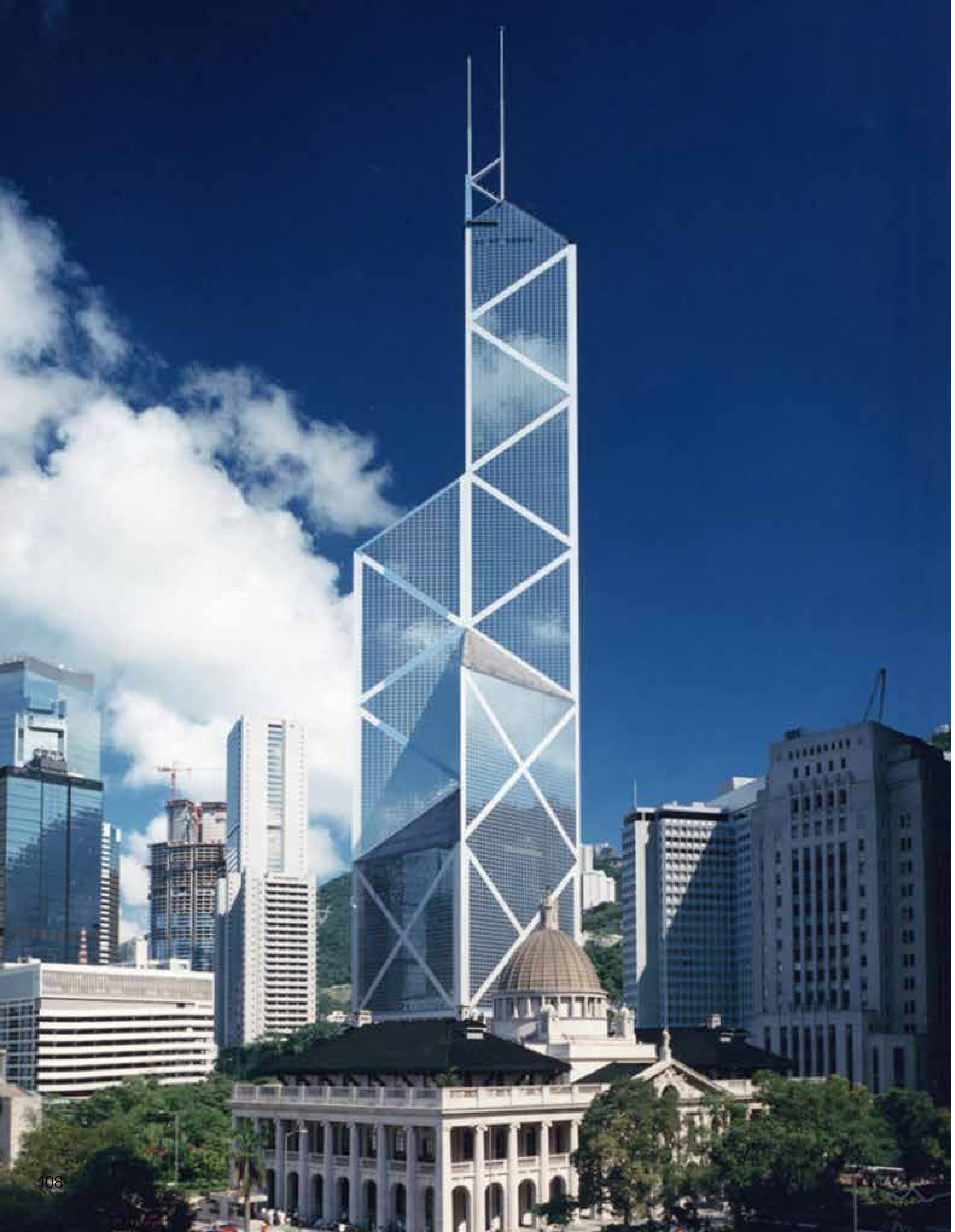




Floor Number 2



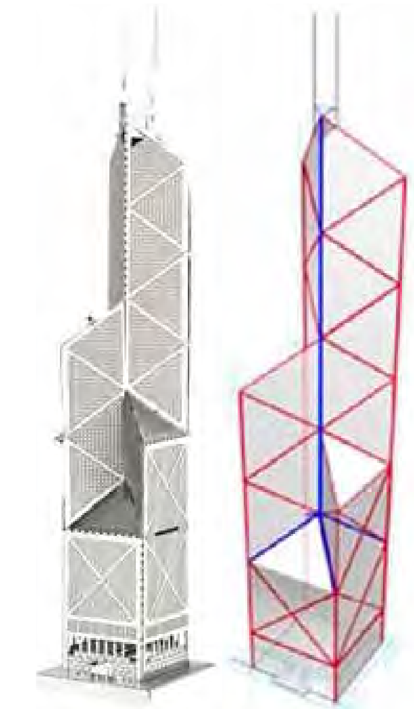
Floor Number 26



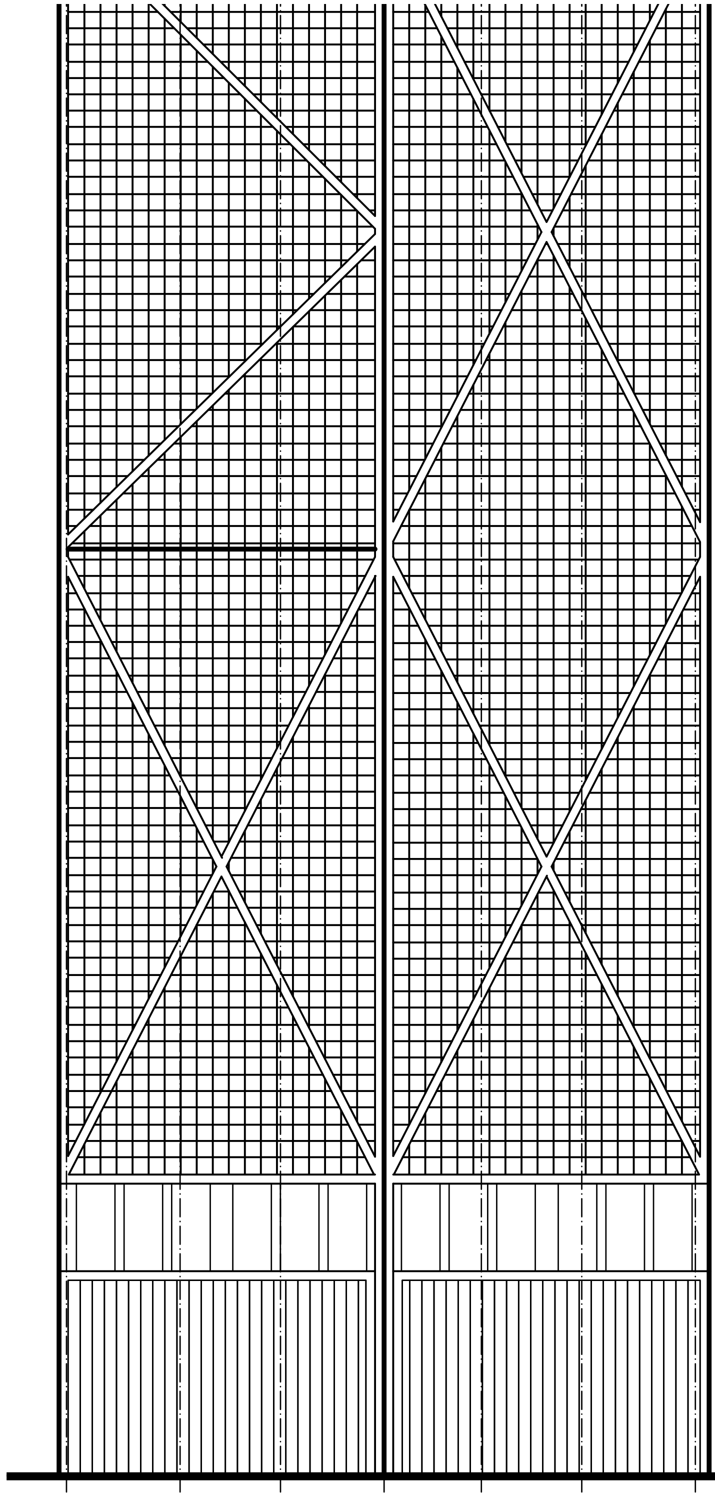
Architect I Architecte : IM PEI
Engineer I Ingénieurs : Leslie E. Robertson Associates
Location I Localisation : Hong Kong, China
Year of construction I
Année de construction : 1985-1990
Use I Usage : Office space

Total area I Superficie
totale : 135 000m2
Height I Hauteur : 367,4m / 1205ft
Number of floors I
Nombre d'étage : 72
Floor plan area I
Superficie d'un étage : 1875m2

Structure system I
Système de structure : Poteaux poutres
Structure materials I
Matériaux de structure : Concrete + steel for floors strucutre
Envelope materials I
Matériaux d'enveloppe: Glass+concrete



The design of the Bank of China Tower starts with the traditional bamboo, wich in the chinese culture is a symbol for hope, revitalization, force and vitality. The form of the tower represent the growth pattern of the bamboo plant. The form is a result of basic geometric exercices. The base of the tower is a cube that after 24 florrs gets divide in 4 equal triangles.These triangles are extruded in different high to create the variation of the form.



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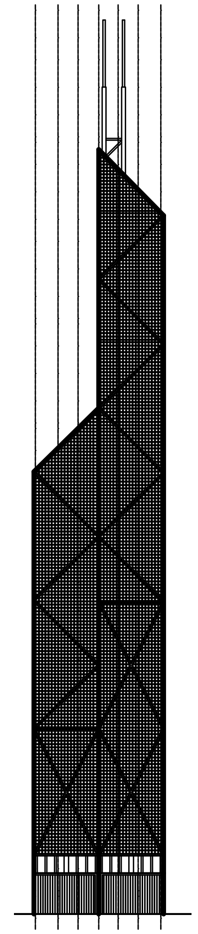

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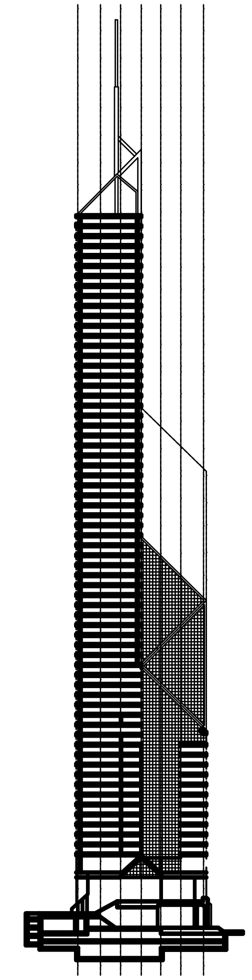

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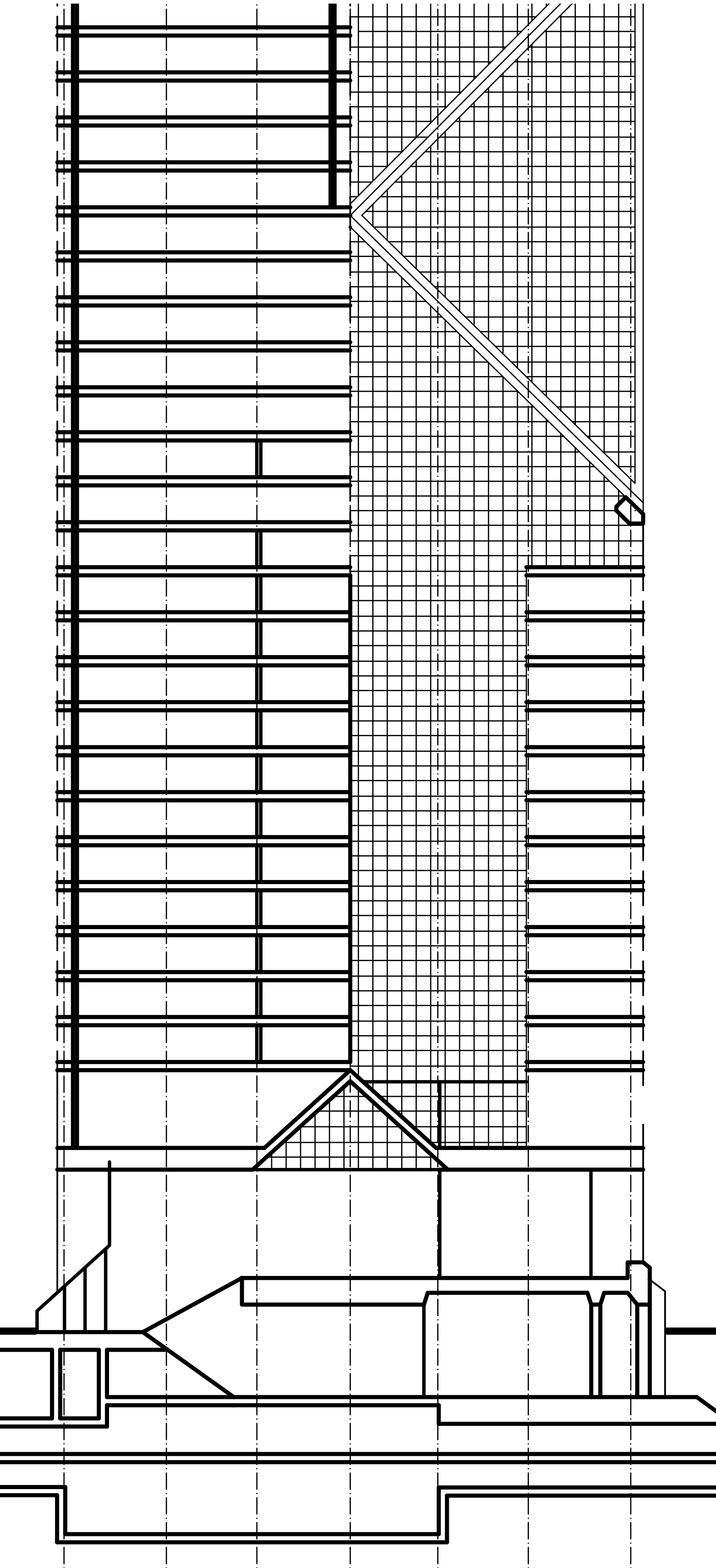

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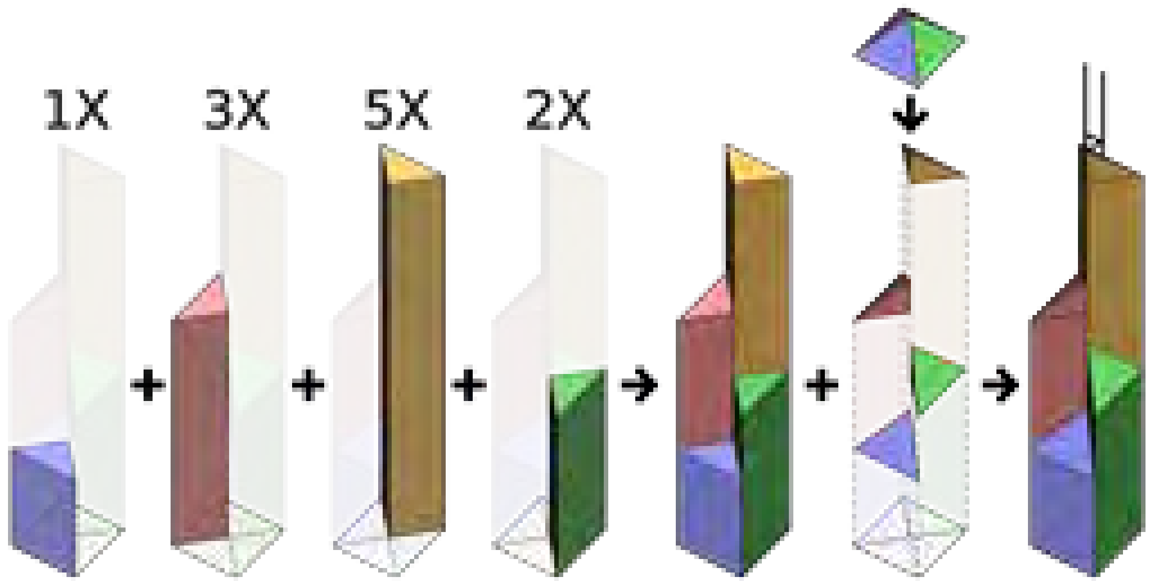
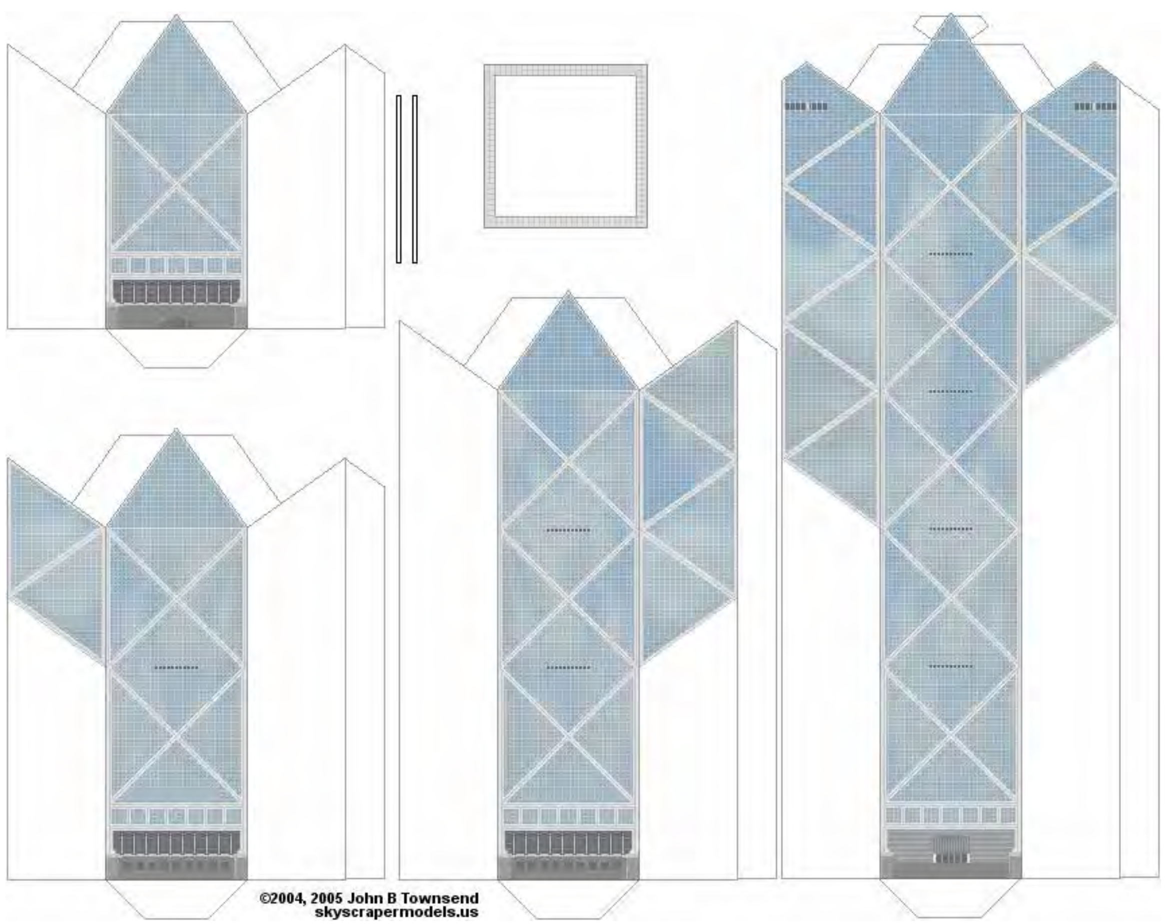
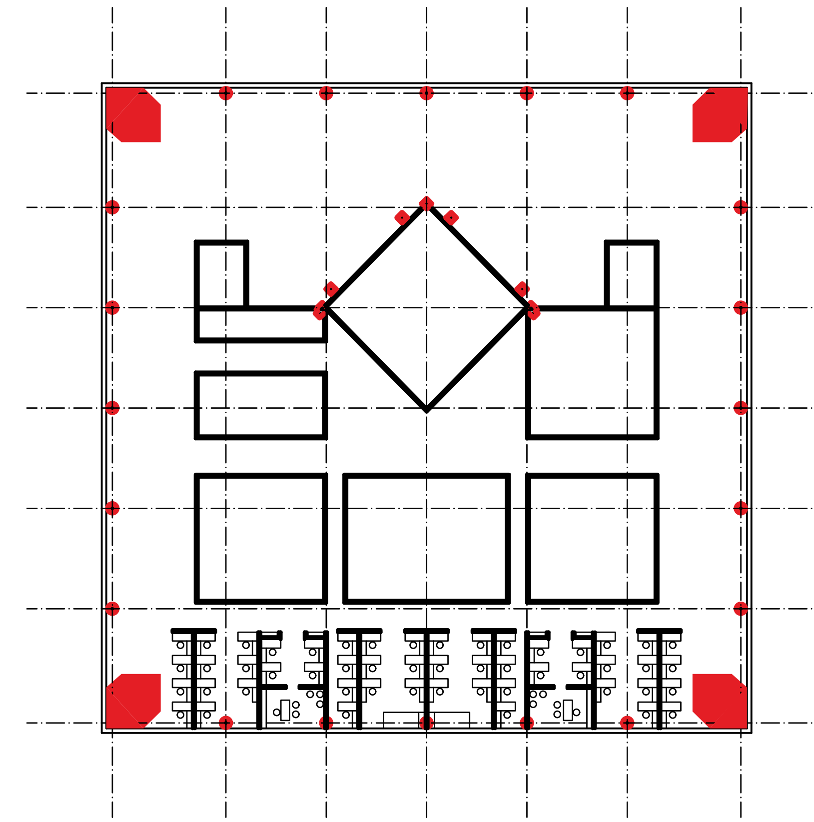
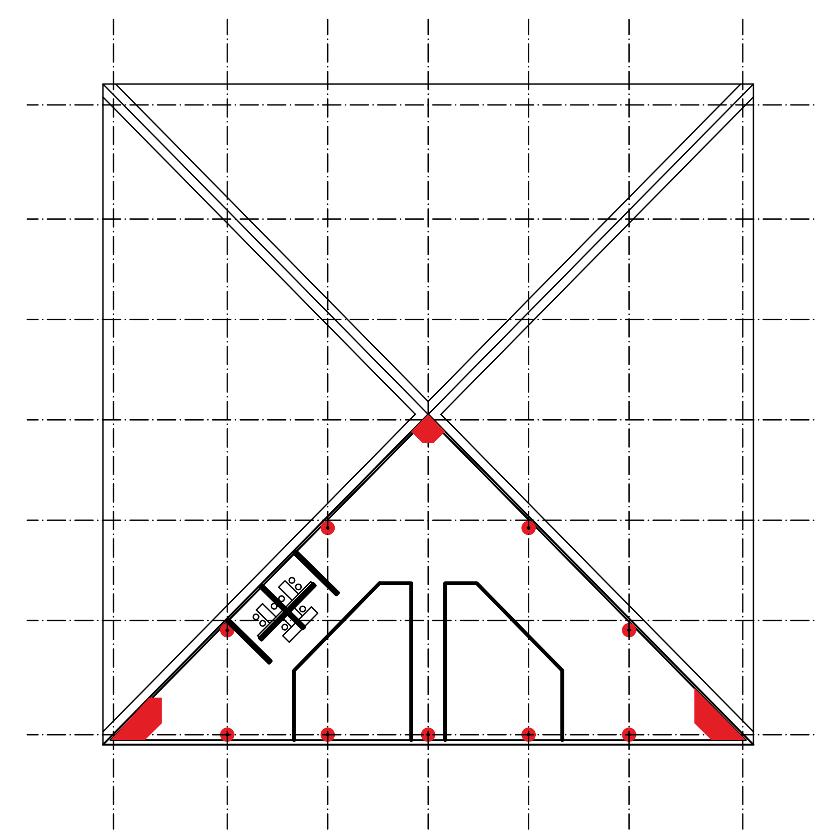






Floor Number 2

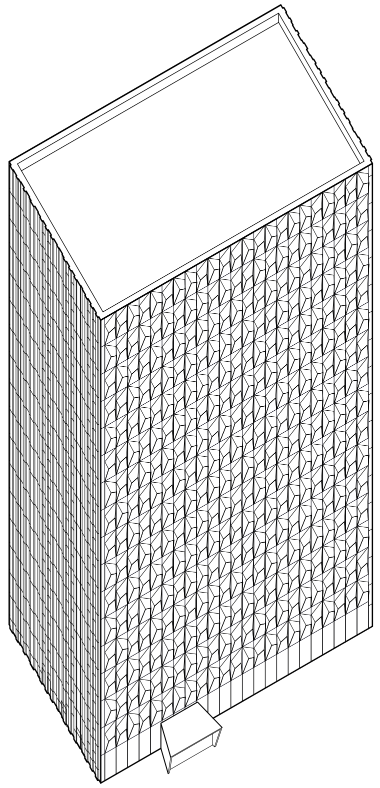


Floor Number 70

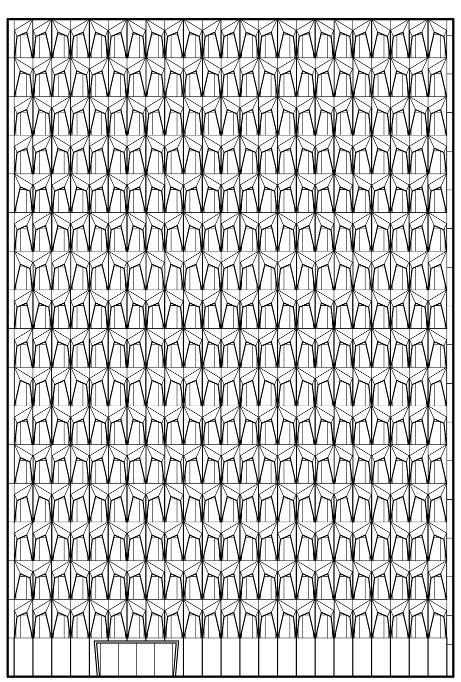
Atlas Aluminium

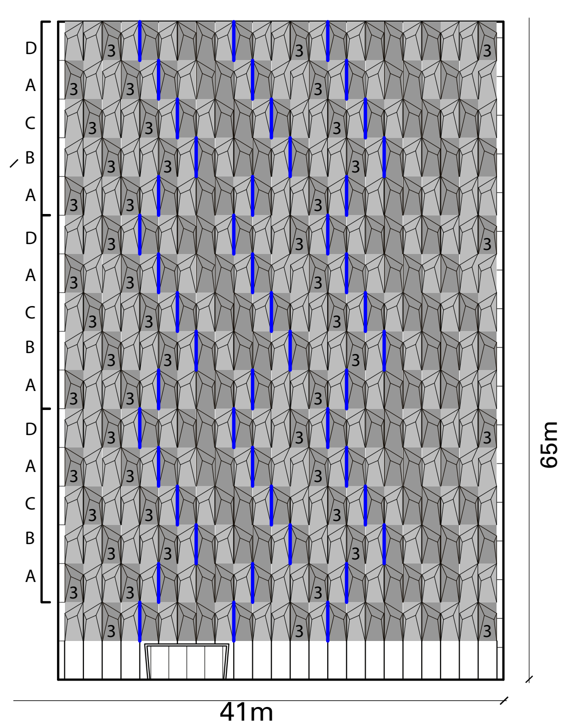
Architect I Architecte :	Staab Architects
Engineer I Ingénieurs :	IBC Ingenieurbau-Consult GmbH
Location I Localisation :	Darmstadt, Germany
Year of construction I Année de construction :	2009-2011
Use I Usage :	Educational
Total area I Superficie totale :	16,080sqm
Height I Hauteur :	65m
Number of floors I Nombre d'étage :	16
Floor plan area I Superficie d'un étage :	1,005sqm
Structure system I Système de structure :	Post and Beam
Structure materials I Matériaux de structure :	Reinforced Concrete
Envelope materials I Matériaux d'enveloppe:	Aluminum

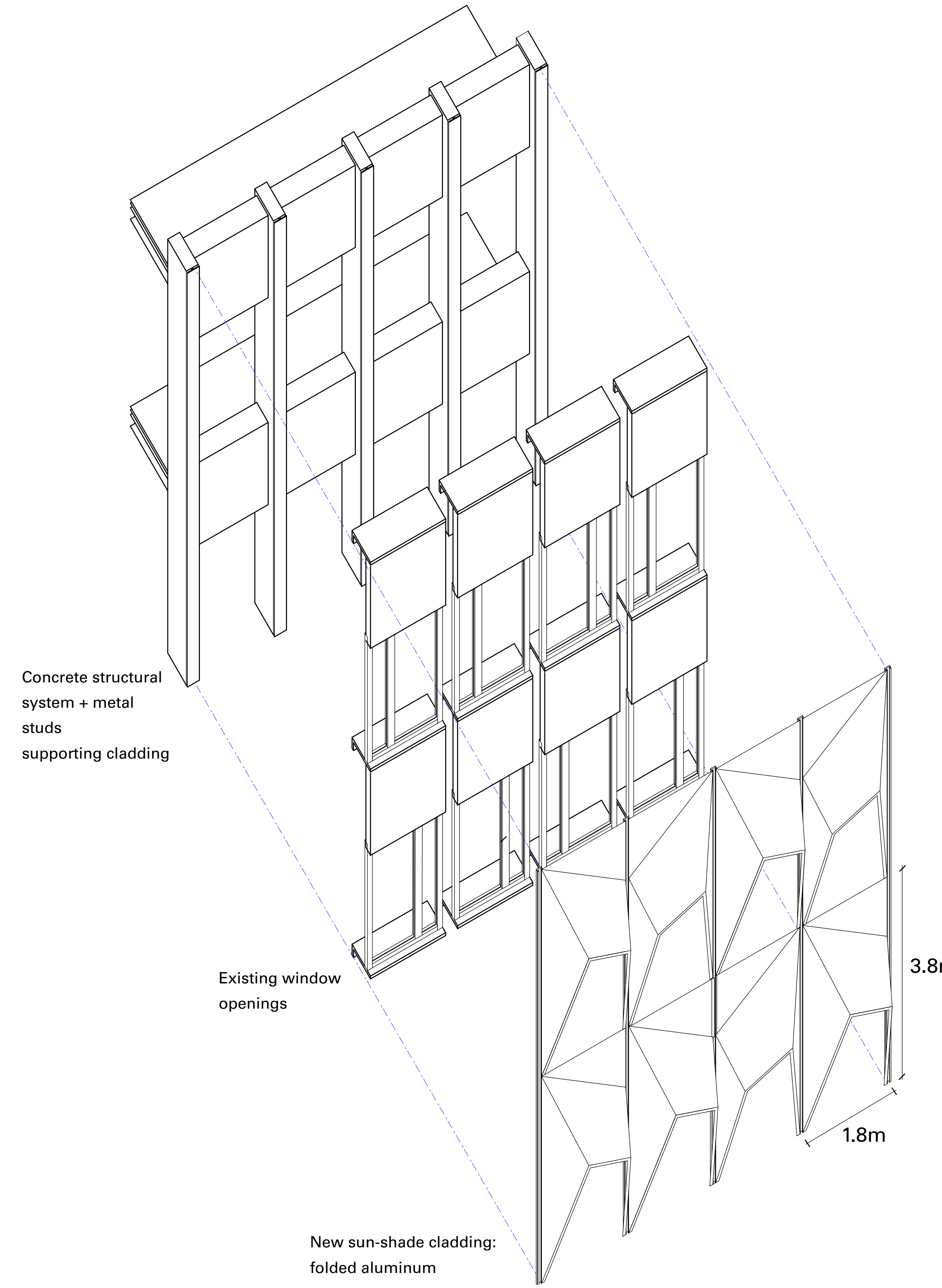
In an effort to reinforce the iconic status as the sole highrise in the area, and to draw attention to the campus for which the building is a part of, building C10 (originally built in the 1960's) was given a complete makeover. The renovation stripped the building of its concrete shell, cleared it of hazardous materials, and gave it a new façade that resonated with the buildings identity as a home for the university's applied sciences department. Each of the buildings facades was conceived differently, in dialog with the direction and surrounding context for which it corresponded. The city-facing north side was given an elegant glass façade, and the east and west sides both display a vertical relief of lightweight metal. The south face, which is the most notable of the four, features a patterned array of three-dimensional folding aluminum origami modules. Functionally speaking, these fixed, low-maintenance, geometric entities provide shade, and aesthetically speaking they mark the buildings main entrance and create an intriguing physical appearance.The use of aluminum the material to achieve this desired look is not surprising, as it is easier to work with, less wasteful, and cheaper to transport, making not only the finished building, but also the construction process more efficient. This means that choosing modern aluminum alloys results in lower greenhouse gas emissions, less energy and water use, and less waste that ends up in a landfill.



Elevation | Élévation







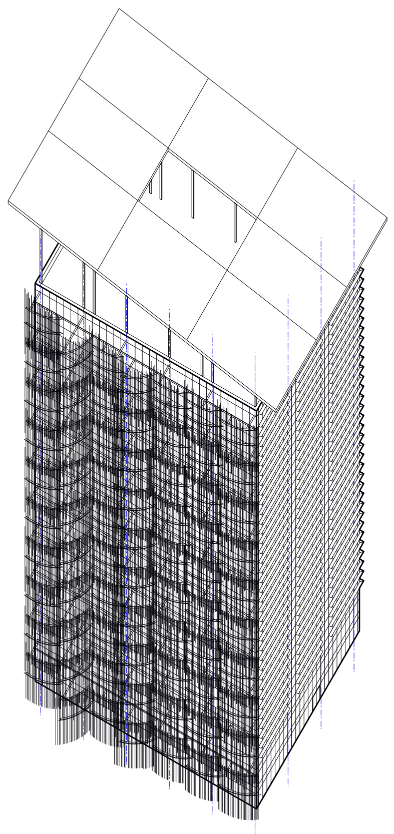
Architect I Architecte :	Cutler Anderson Architects, SERA Architects
Engineer I Ingénieurs :	KPFF Consulting Engineers
Location I Localisation :	Portland, USA
Year of construction I Année de construction :	2010-2013
Use I Usage :	Office
Total area I Superficie totale :	48,600sqm
Height I Hauteur :	
Number of floors I Nombre d'étage :	18
Floor plan area I Superficie d'un étage :	2,700sqm
Structure system I Système de structure :	Post and Beam
Structure materials I Matériaux de structure :	Steel
Envelope materials I Matériaux d'enveloppe:	Aluminum

"We wanted to make this a building that any kid visiting Portland on a field trip would immediately recognize as environmentally sensitive."
Jim Riley

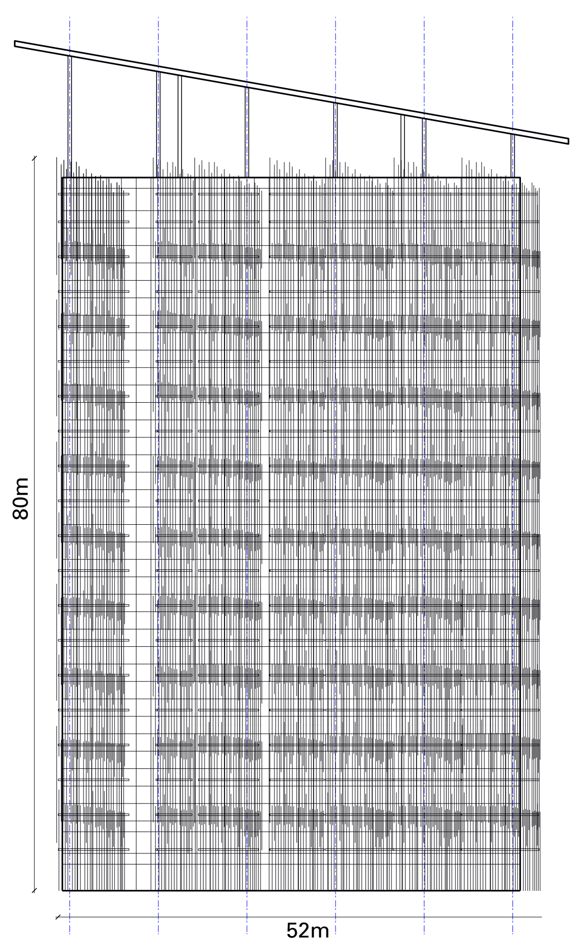
The building we see standing today is not a new architectural entity, but rather an addition to the 40-year old, energy consumptive, original concrete box built in 1974. The architectural concept intended for the building to become visually compelling while advocating leading-edge sustainability. The new, retrofitted building performs 60% more efficiently than its predecessor. Among the eye-catching upgrades, which include mounted solar panels and a rainwater harvesting system, the most notable are the vertical fins wrapping the West façade of the building. These animated, rhythmic series of aluminum extrusions successfully control daylight penetration into the space and minimize solar gain.

To stand in striking contrast with the old, heavy and dull original concrete building, the glass and aluminum make the building appear light and lucid. The sharp linear vertical strands give a look that is clean, defined, and systematic. Unlike the old static appearance given to the building due to the concrete exterior, the new aluminum skin series have a more tectonic and machine-like appearance; as though the building could pick up off the floor, transform, and move.
The use of aluminum in green buildings is almost a must, given the materials unique, highly recyclable capacity. Recycled aluminum retains a 100% of the materials original characteristic, but takes 90% less energy to produce than mined aluminum ore.

EGWW Federal Building
Axonometric I Axonométrie



Elevation I Elevation



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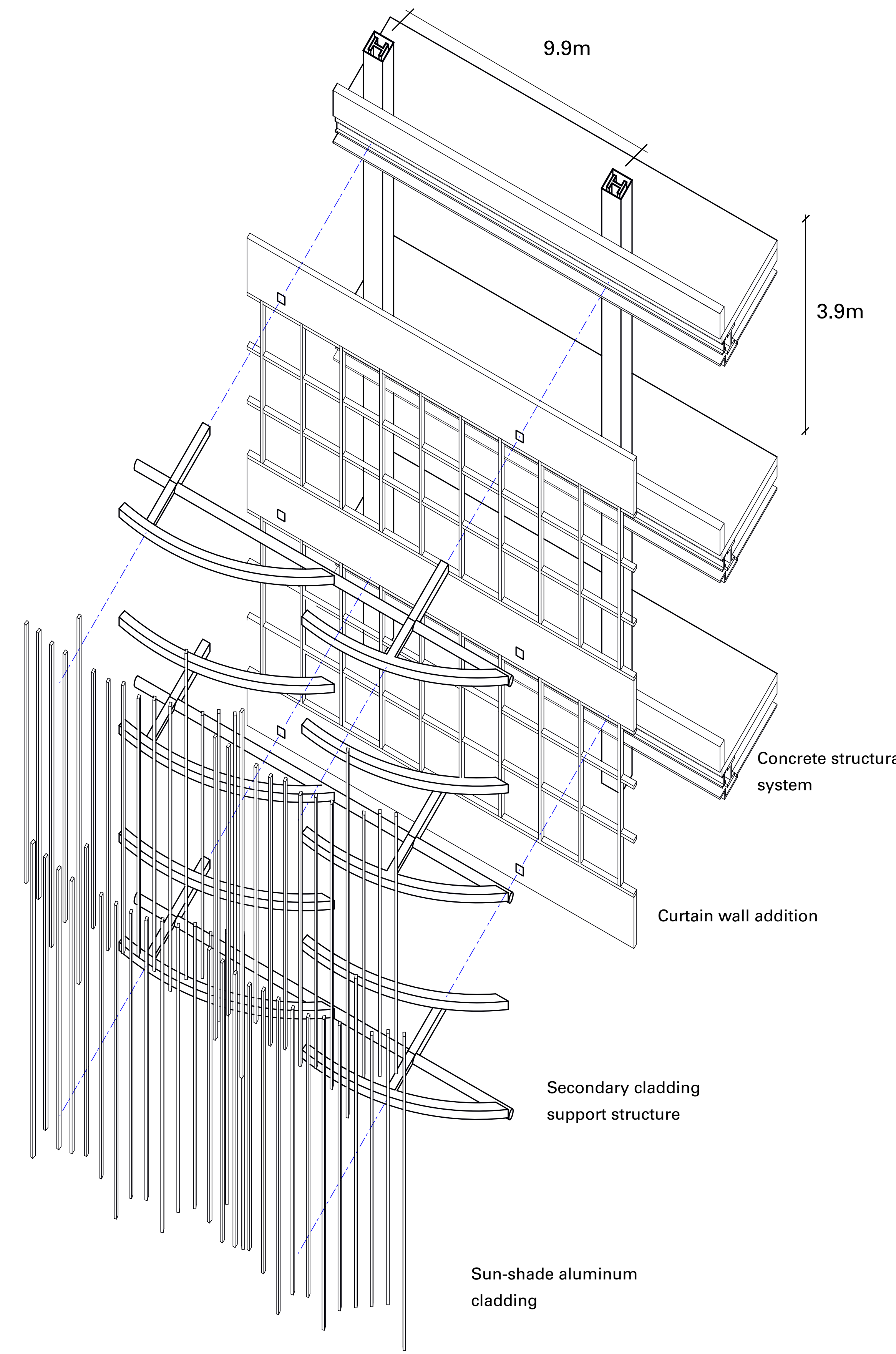
EGWW Federal Building
Detail I Détail d'assemblage

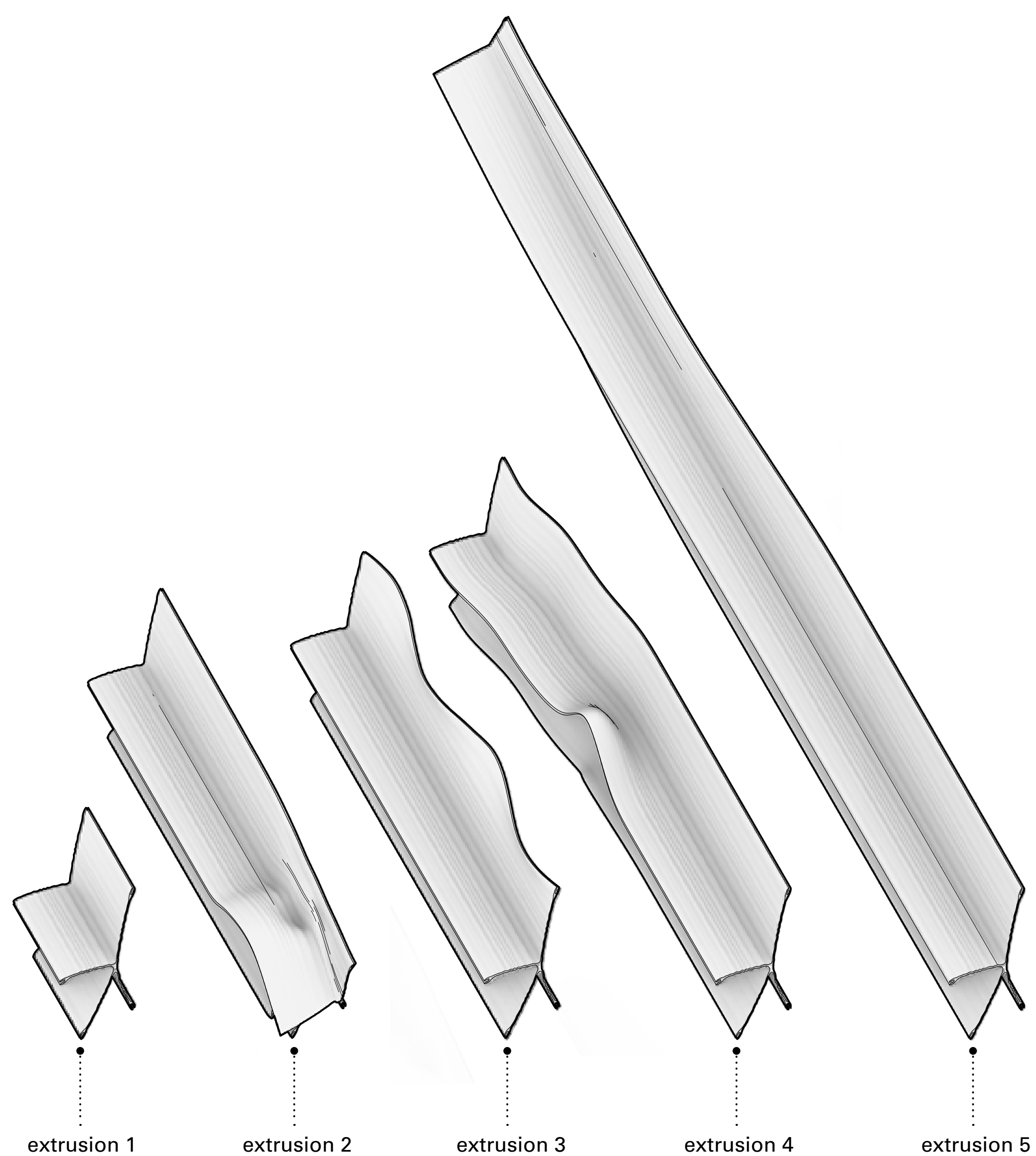


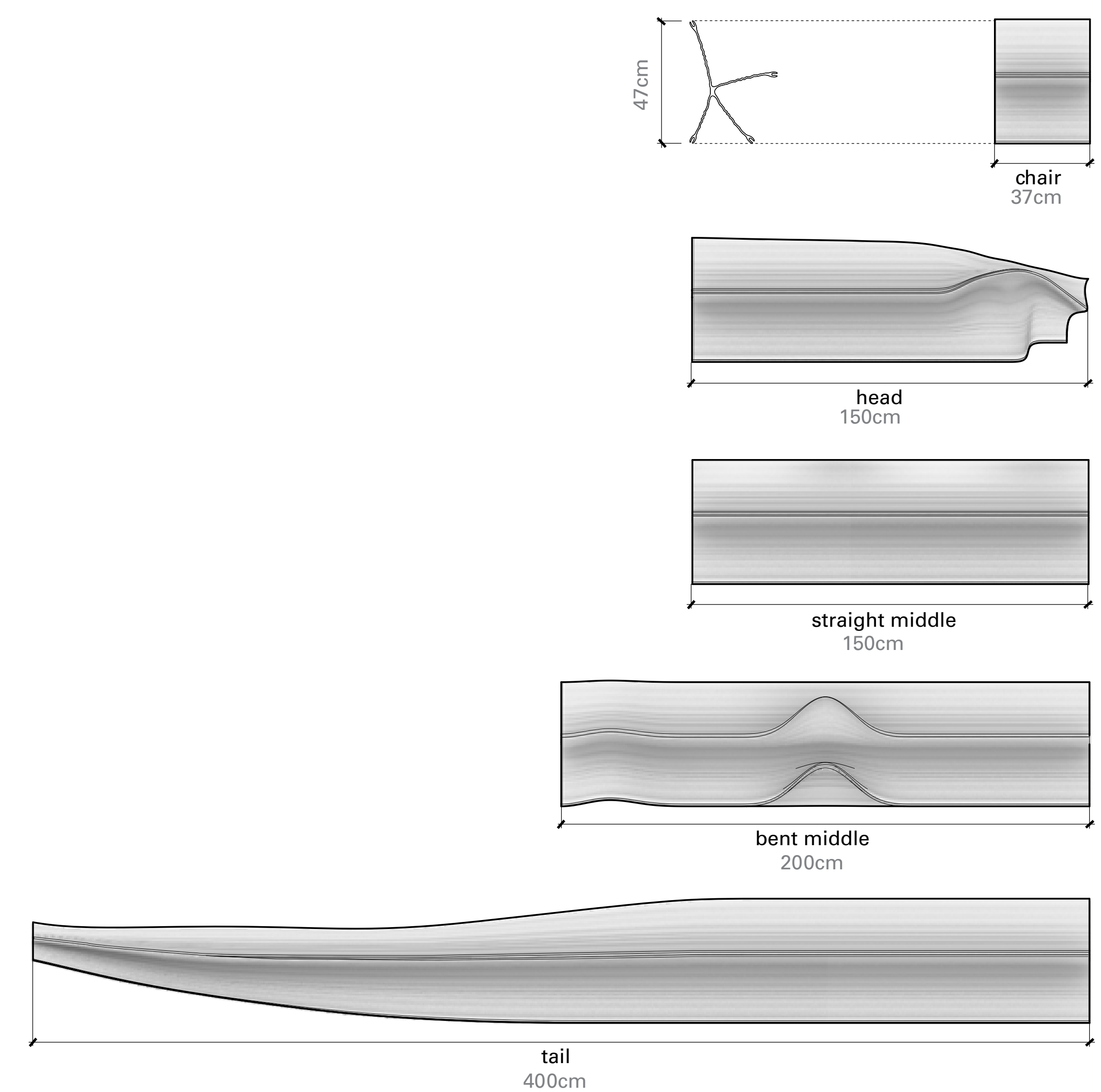
Architect I Architecte :	Thomas Alexander Heatherwick
Year of construction I Année de construction :	2006
Use I Usage :	Furniture
Height I Hauteur :	0.47 m
materials I Matériaux:	Aluminium

"Can you squeeze a chair out of a machine, the way you squeeze toothpaste out of a tube?"
Thomas Alexander Heatherwick

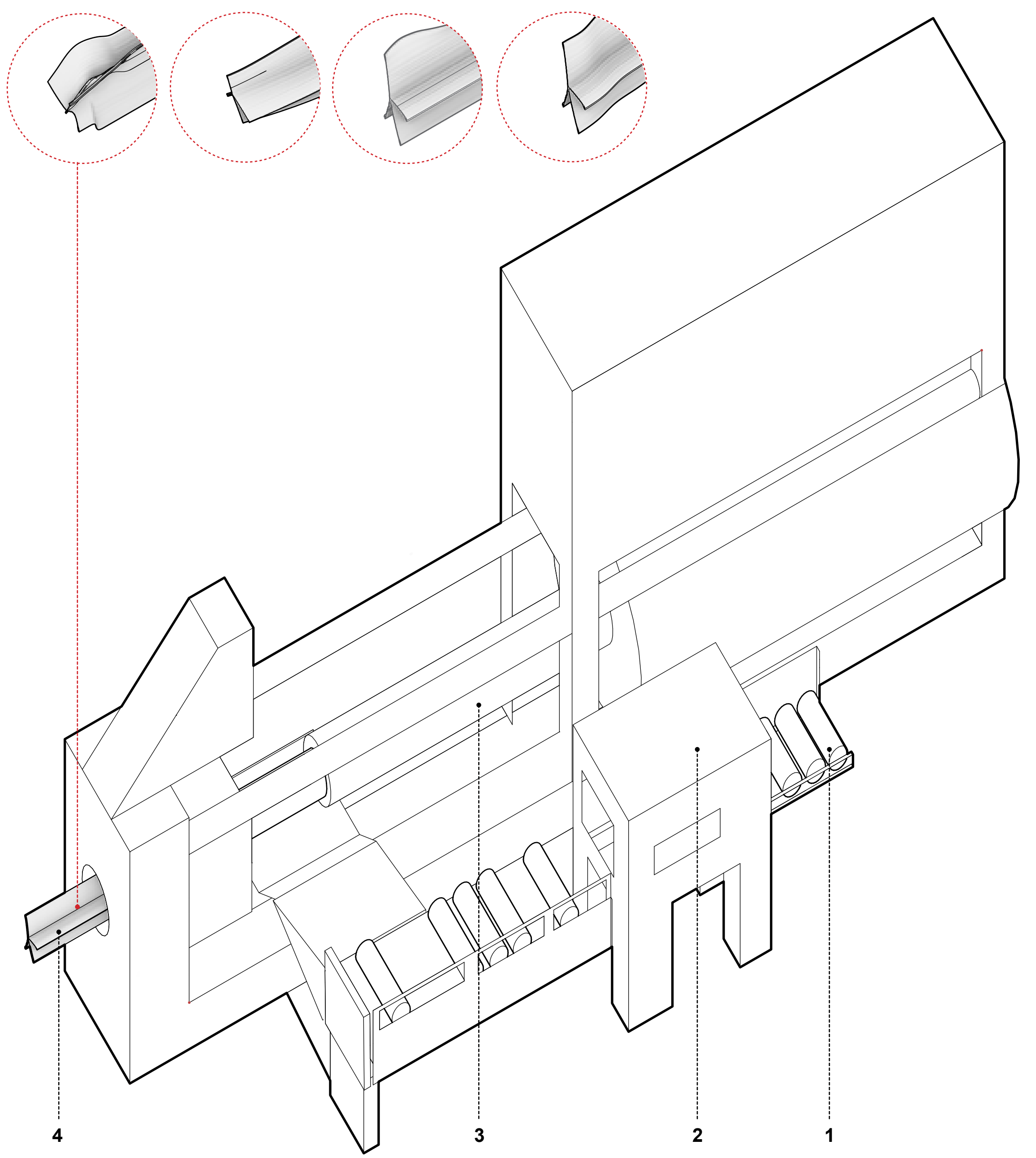
When Thomas Heatherwick was a student at Manchester Polytechnic, he was fabricating a pavilion having extruded aluminium for double-glazed window frame systems. In order to manufacture the aluminium components, he visited the British Alcan aluminium factory in Banbury, and had a chance to learn an industrial process, known as extrusion. To create extruded aluminium, a cylindrical metal billet gets heat and pushed through a shaped hole in a steel plate called a die. He found an interesting fact while the industrial process being finished. The outcomes are unavoidable imperfect and mutated. The imperfect parts were cut off and melted down to reuse. However, the failed part was perfect to him.

This process led him to bring an idea for many linear kilometers of seating at new airports and stations. He thought the seating could be a single component such as squeezing it once. However, he could not find any technologically advanced machine to realize his concept at the time. While he looked for the aluminium factory, he tested the form with birch plywood. After 16 years, a factory manufacturing aerospace component in Asia had big enough scale to capable of the largest extrusion. Through several experiments, He came out with a series of pieces in which a straight, clean, extruded length is contrasted with its raw, contorted end.


extrusion 1
extrusion 2
extrusion 3
extrusion 4
extrusion 5

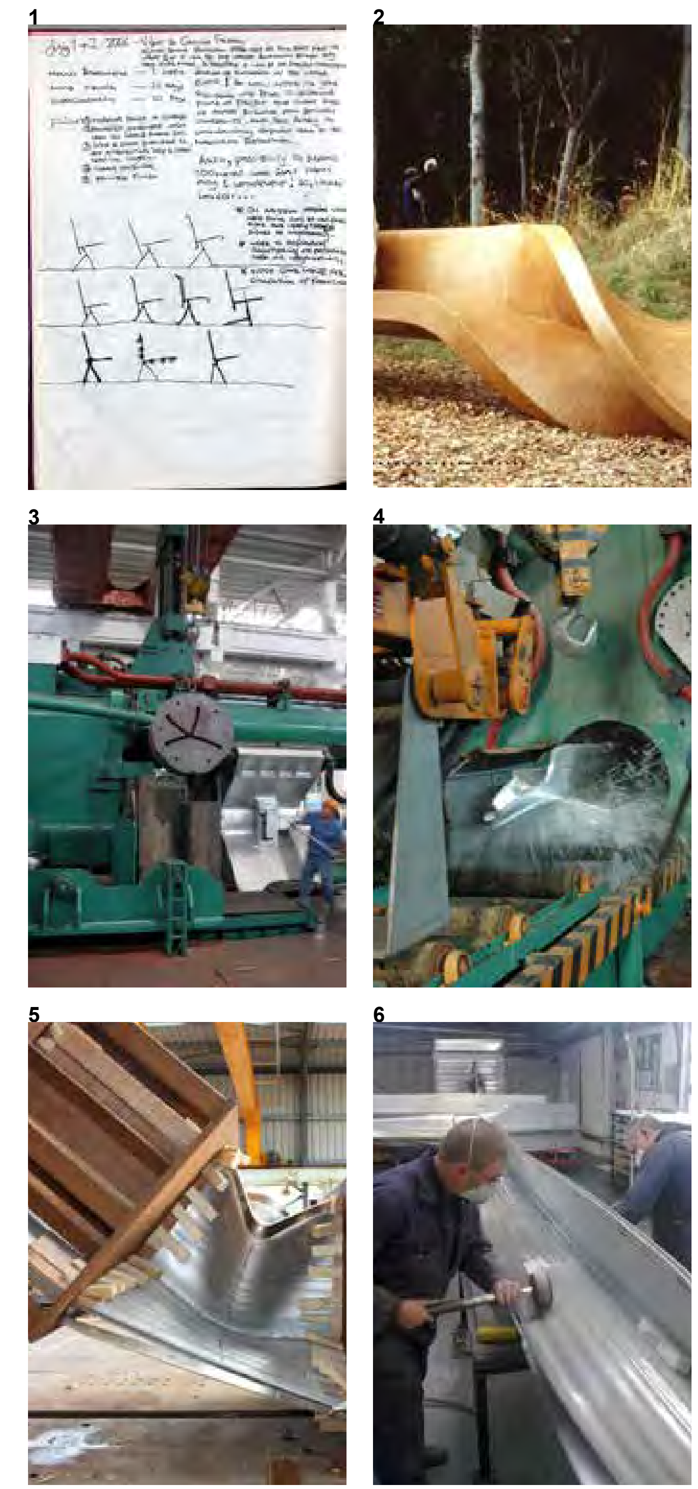

47cm
chair
37cm
head
150cm
straight middle
150cm
bent middle
200cm
tail
400cm

1:25

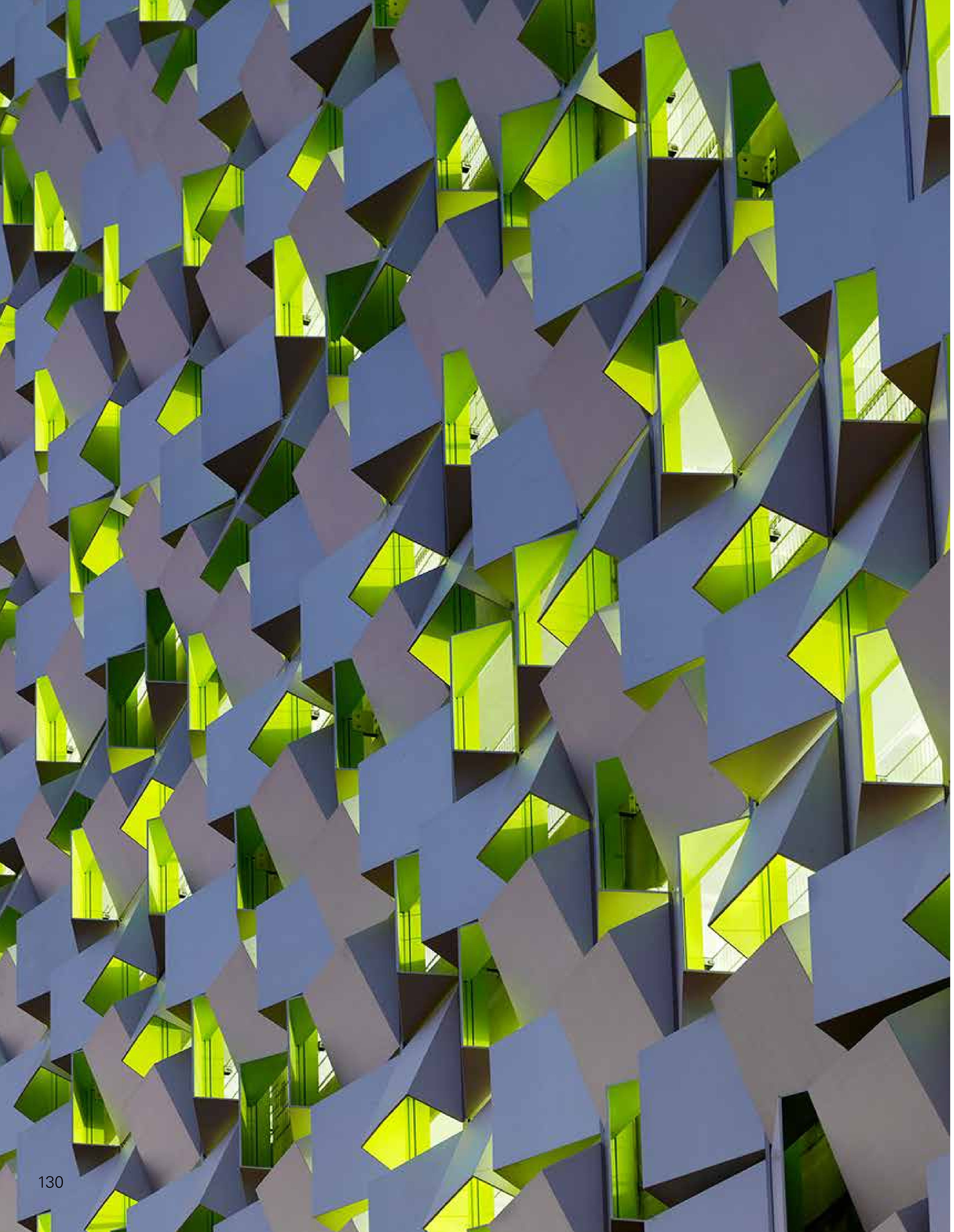


1- aluminium billet
2- preheating of billets
3- extrusion press
4- aluminium extrusion

1:50



1- sketch ideas
2- tesing form and shape with birch plywood
3- a die of cross sectional desired
4- extrusion aluminium
5- force to bend for making shape
6- 300 hours polishing



SHIEFFIELD CITY CENTER CARPARK // BAIK STEPHEN

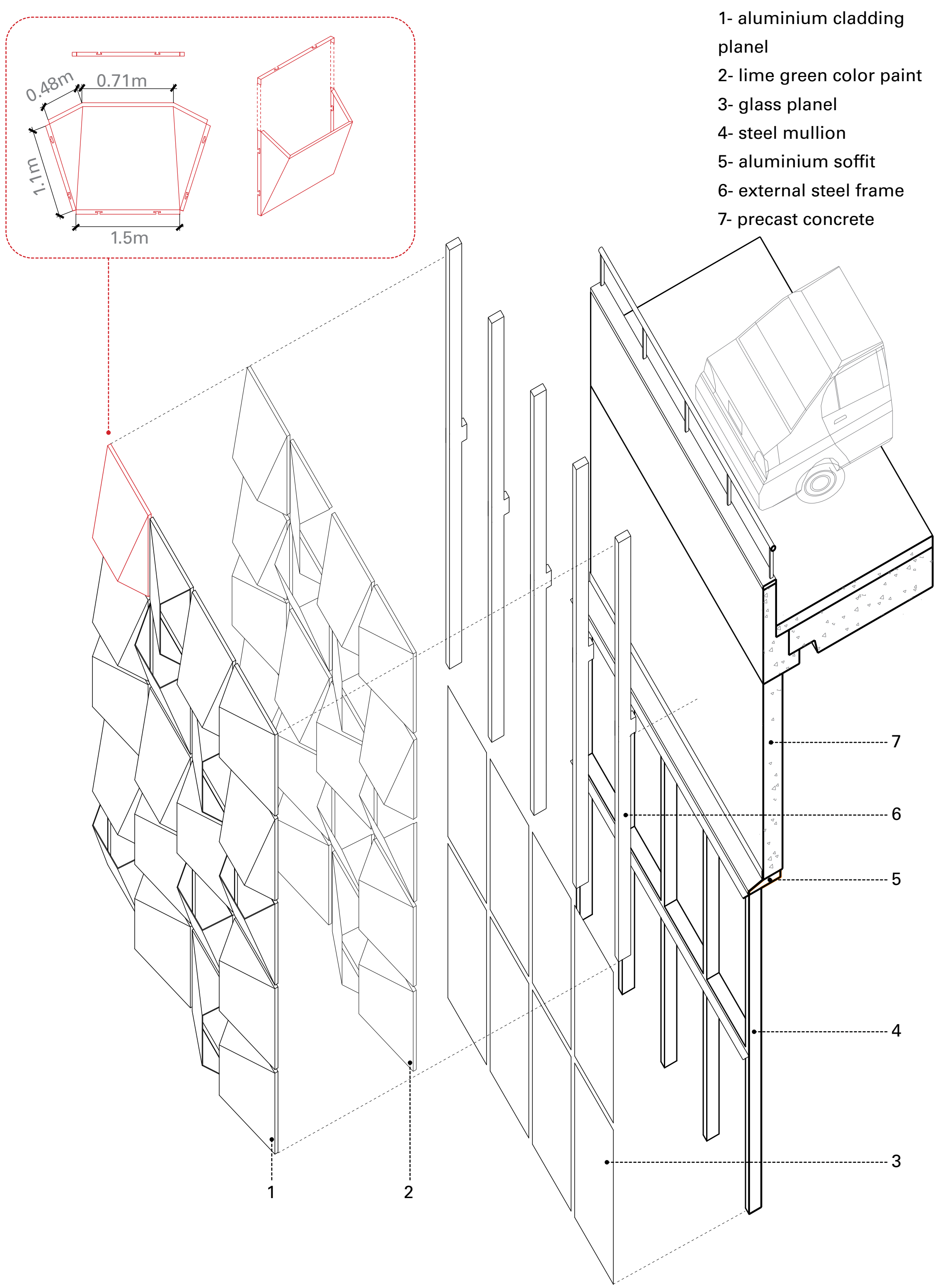
Architect I Architecte :	Allies and Morrison
Engineer I Ingénieurs :	Capita Symonds Structures
Location I Localisation :	Charles Street, Sheffield, UK
Year of construction I Année de construction :	2008
Use I Usage :	Public Car Parking
Total area I Superficie totale :	18,700 m²
Height I Hauteur :	44 m
Number of floors I Nombre d'étage :	11 storeys
Floor plan area I Superficie d'un étage :	1700 m²
Structure system I Système de structure :	Precast Concrete columns, walls, and floors.
Structure materials I Matériaux de structure :	Precast Concrete
Envelope materials I Matériaux d'enveloppe:	Aluminium

"This building speaks of algorithms underpinning the appearance of individuality in a society of mass production. Will it become a cult arhitecral classic? "

Christopher Croazzo Hill

The Sheffield city center car park offers public car parking space to people in Sheffield city centre. A spiral ramp leads vehicles to the first-floor level, after which straight ramps continue. the real interesting about the building is the external envelop. With an uncompromising homogeneous surface, It wraps around the building such as demure woman wearing a glitzy, metallic cocktail dress.

The structure systems are precast concrete columns, walls and floors. The external cladding is arranged randomly by generating a computer algorithm. Each panel is rotated in four different orientations. The arrangement makes the building stands out architecturally. The homogeneous surface is consisted of natural anodized aluminium panels, painted lime green color on the inside. Each panel is produced from a single sheet of folded aluminium with an angle on two sides cut based on 1.2m grid. External frame system attachedto the floor, holds the 3,692 cladding panels Not only the shape helps for natural ventilation, but also protects the building fomr the most raining.



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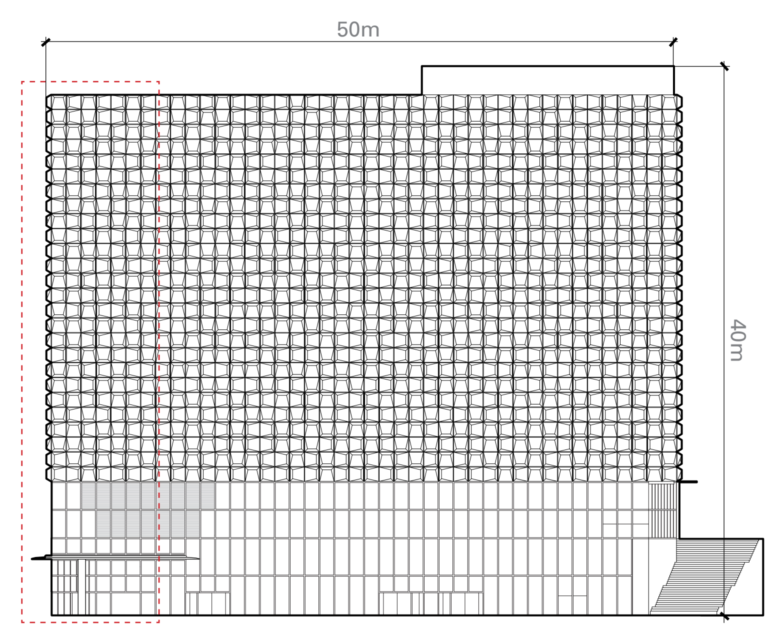

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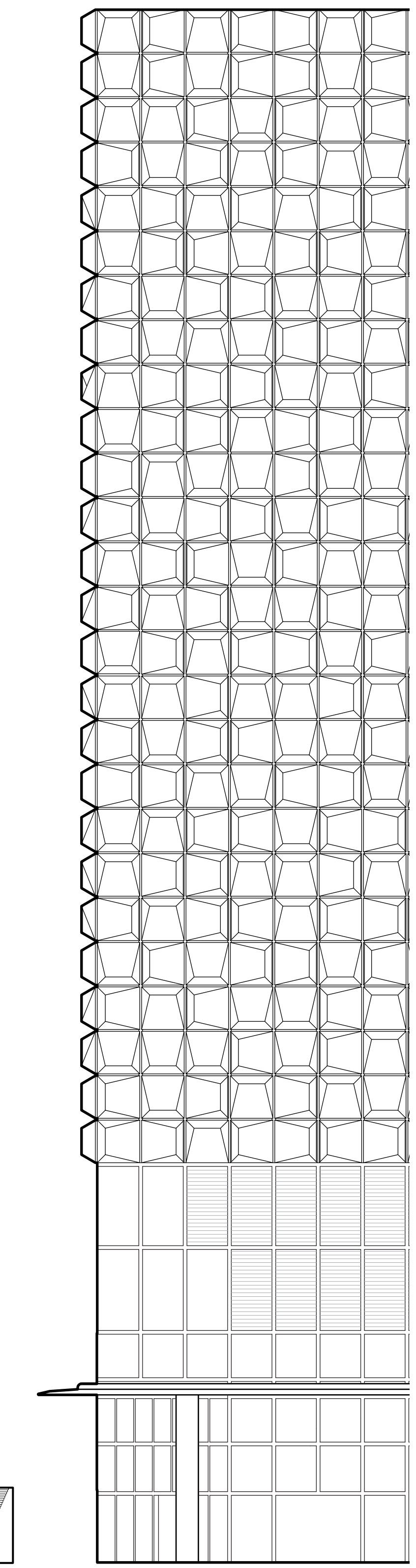


1:200

Architect I Architecte : Harisson and Abramovitch

Engineer I Ingénieurs : Harisson and Abramovitch

Location I Localisation : Pittsburgh, Pennsylvania
Year of construction I
Année de construction : 1951-1953
Use I Usage :

Total area I Superficie totale : 24,832.5 m²
Height I Hauteur : 125m
Number of floors I Nombre d'étage : 30
Floor plan area I Superficie d'un étage : 827.75 m² (extension)

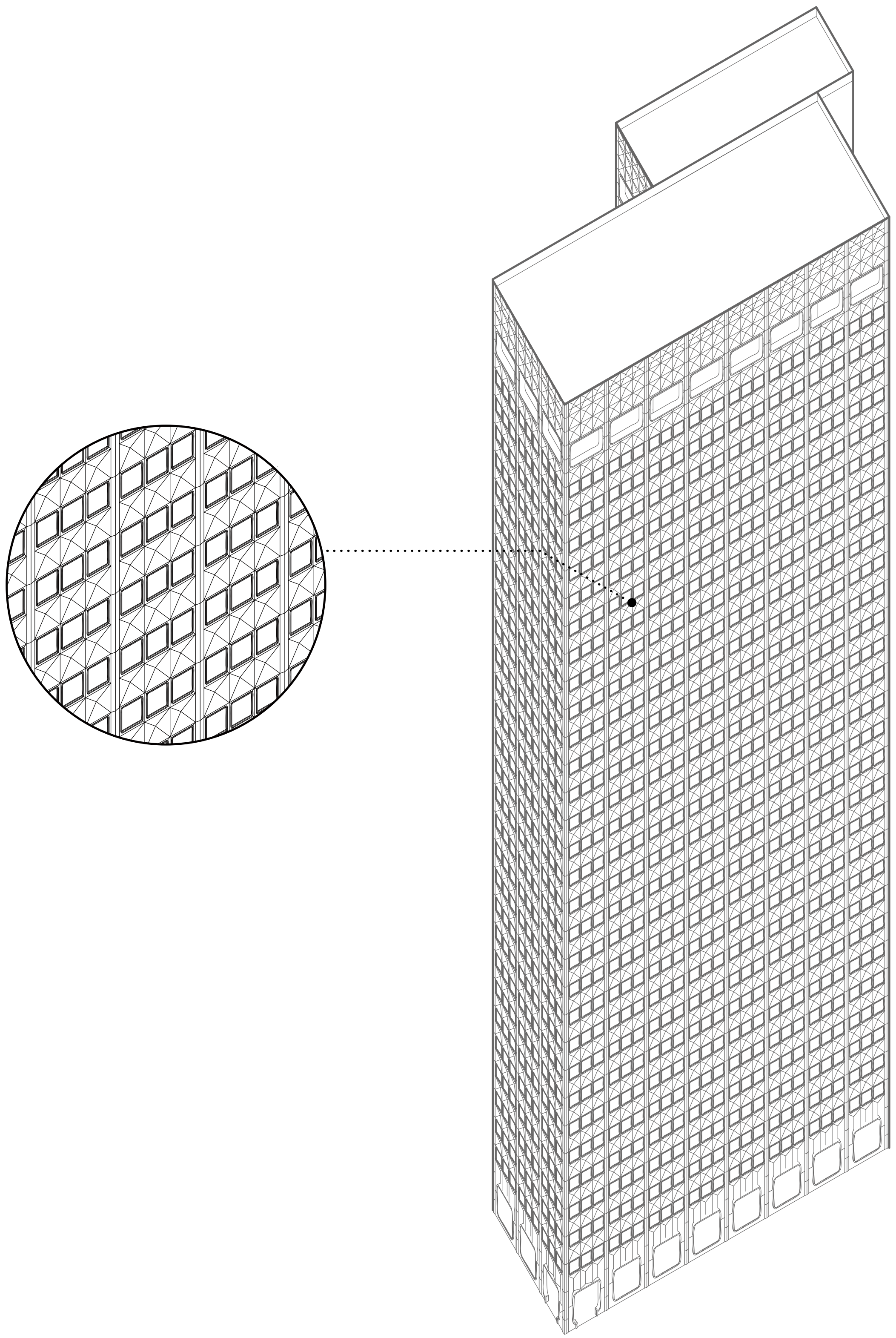
Structure system I Système de structure : Beam-Column Structure
Structure materials I Matériaux de structure : Steel
Envelope materials I Matériaux d'enveloppe: Stamped aluminum panels

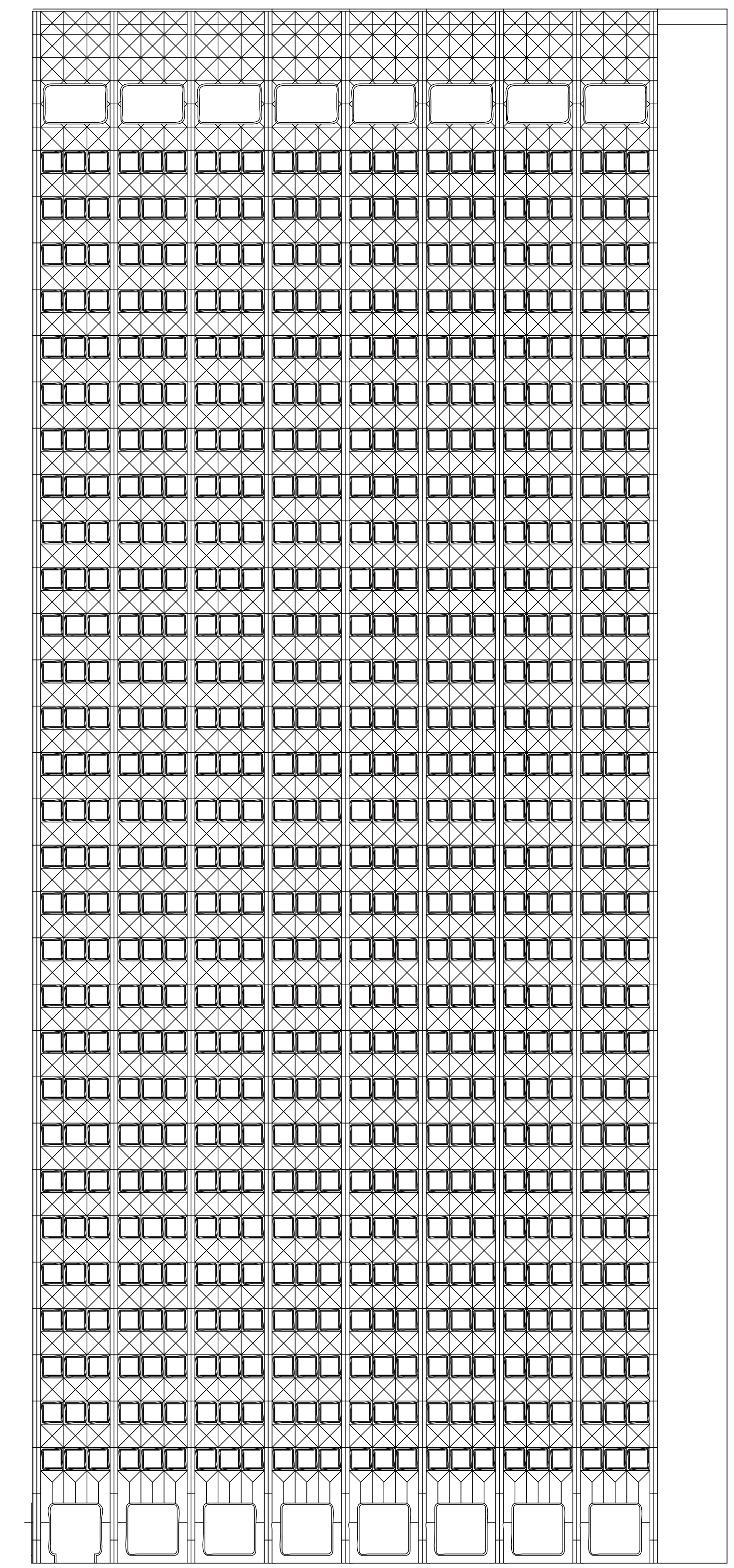
"America's first aluminum skyscraper, the 410-foot, 30-story Alcoa building in downtown Pittsburgh, is also said to be te lightest building of its size in the world."

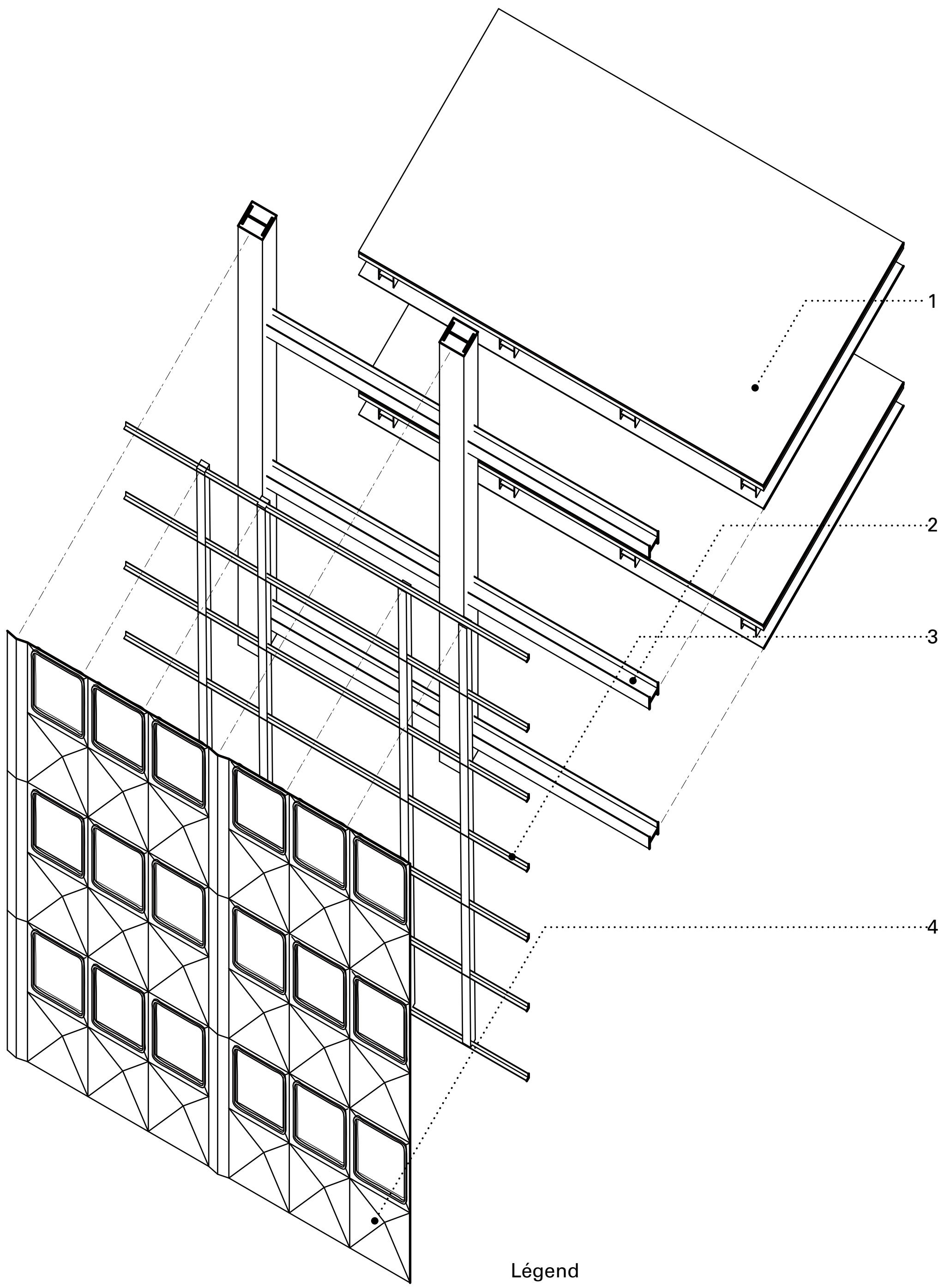
The Alcoa Building is a 410-foot-tall (120 m) skyscraper in Downtown Pittsburgh, Pennsylvania. It was completed in 1953 and has 30 floors. It is the 15th tallest building in the city and is adjacent to Mellon Square. A unique radiant heating and cooling system is contained in the ceiling: since there are no pipes, radiators, or air conditioning units along the exterior walls, an additional 15,000 square feet (1,400 m2) of rentable space was gained. Also, the windows rotate 360 degrees so they can be washed from the inside.

Originally the headquarters for the Aluminum Company of America (ALCOA), the unique aluminum walls of the building are 1/8 inch thick, which gives the building a very light weight and economical design. It was the first skyscraper with an all-aluminum facade. Upon ALCOA's 2001 relocation to a new headquarters building on Pittsburgh's North Shore near PNC Park, the old ALCOA building became a home to government entities, regional nonprofits and small start-up companies including the RIDC.

On July 14, 2015, PMC Property Group closed on a $40 million loan to redevelop what they continue to call the Alcoa Building, including building 241 class-A multi-family units, 133,000 square feet of office space, and 6,200 square feet of retail including restaurants. The apartments began renting in March 2016.







Légend

1- concrete on metal deck floor
2- steel beam and columns
3- aluminum lath and metal reinforcing bars
4- stamped aluminum panels

1:150

Perforated aluminum panels in the ceilings, topped by a glass-fiber blanket, deaden sound and mask grids of aluminum pipes which heat and cool the offices. Lights are hooked to aluminum conduits. Circulated air travels through aluminum ducts.

A skinlike outer wall is made up of stamped aluminum panels only 1/8 inch thick, giving the building a lightweight and economical design. . After metal holding clips were bolted to the horizontal beams the one-story-high panels were easily hoisted and bolted into place by a small crew working inside the building. The inner wall consists of four separate layers of perlite concrete sprayed from a pneumatic nozzle onto slotted aluminum lath and metal reinforcing bars. Such methods resulted in a strong, modern, low-cost structure.

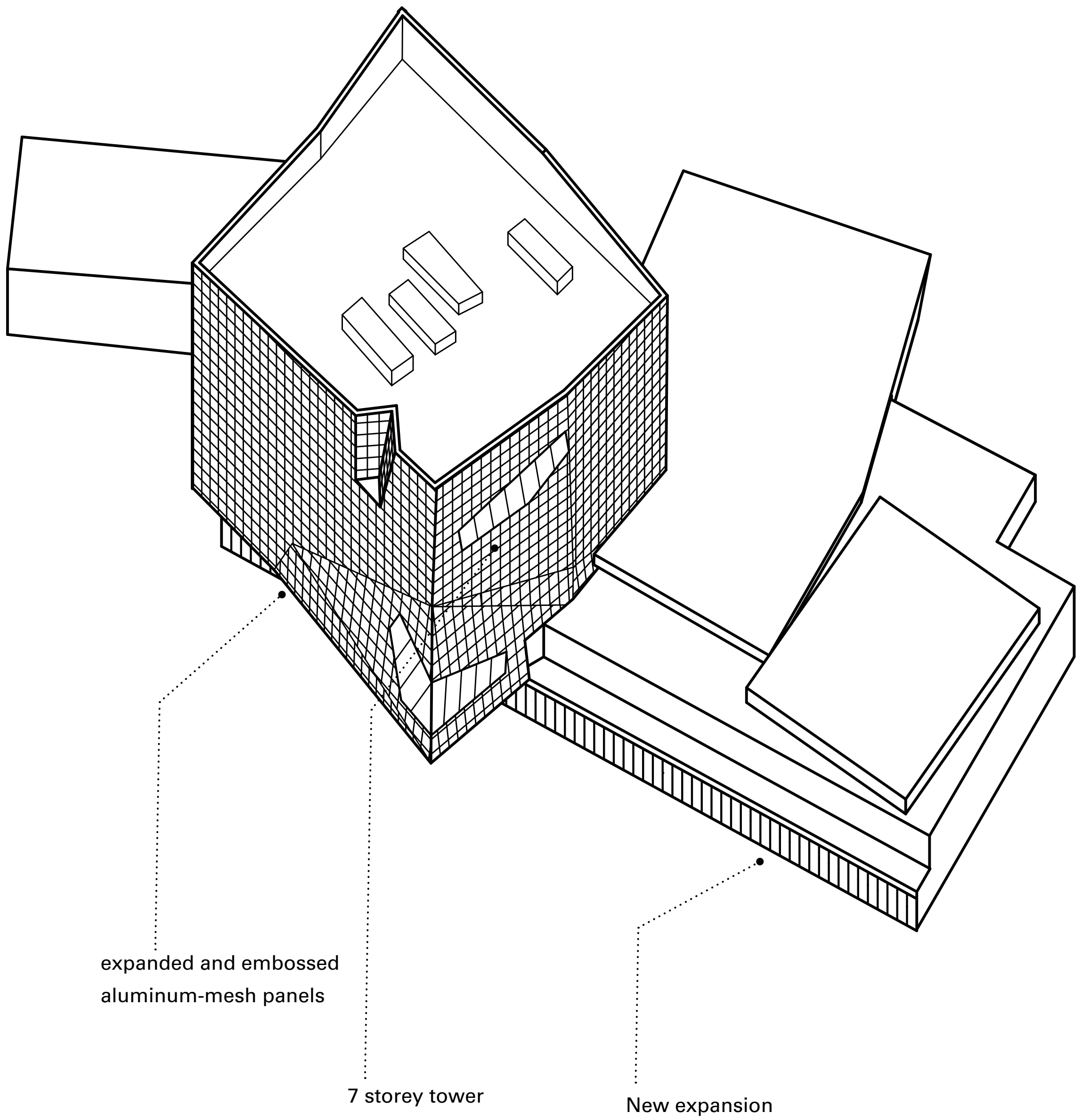
The windows, sashes and frames, heating and ventilating ducts, water piping and wiring system were all made of aluminum.

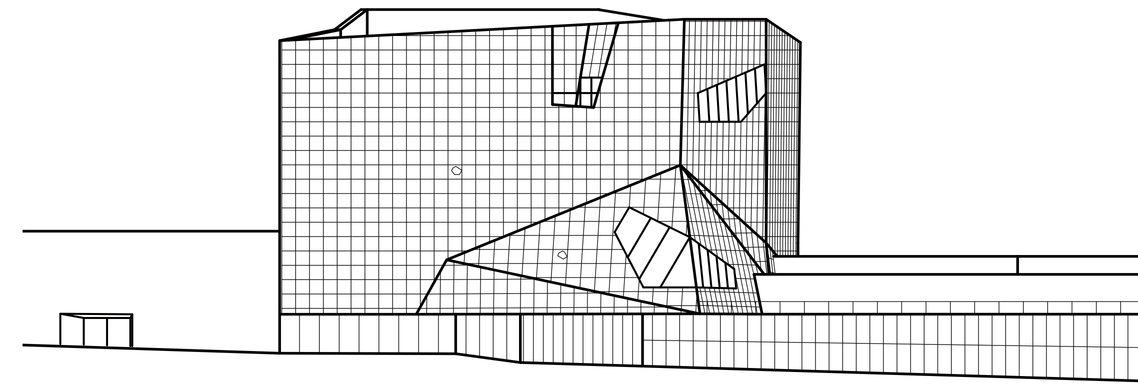
Another innovation in skyscraper construction was the aluminum windows, which rotate 360 degrees so they can be washed from the inside. The glimmering Alcoa Building was another magnificent addition to the newly-emerging skyline, and another historic achievement for the City of Pittsburgh.

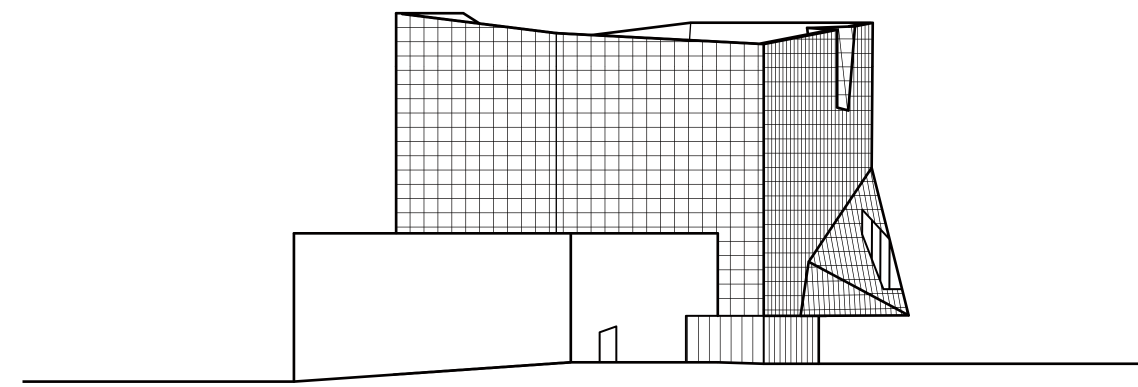
Architect I Architecte :	Herzog and De Meuro
Engineer I Ingénieurs :	Hammel, Green and Abrahamson
Location I Localisation :	Minneapolis, Minnesota, USA
Year of construction I Année de construction :	2005
Use I Usage :	
Total area I Superficie totale :	40,000m²
Height I Hauteur :	18.288m
Number of floors I Nombre d'étage :	5
Floor plan area I Superficie d'un étage :	10,200m² (extension)
Structure system I Système de structure :	Steel Structure
Structure materials I Matériaux de structure :	Steel
Envelope materials I Matériaux d'enveloppe:	Custom-stamped expanded aluminum panels

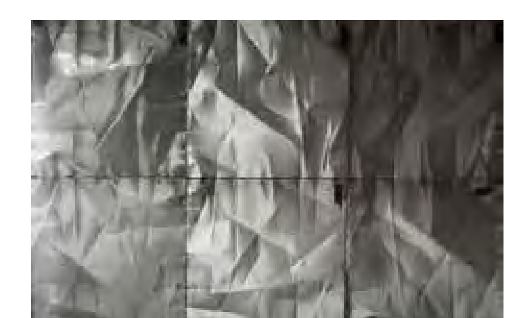
"I think being an architect and doing different things is like the muscles in your body, you have to train the different muscles – the small ones and the big ones – so that you remain flexible and active."
Jacques Herzog

The tower is essential not only as an urban landmark; it also expresses the increased importance of the performing arts in the WAC program. Inside the tower there will be a theater encased in a balcony-like, three story zone for the audience, somewhat like a down-sized version of the Scala in Milan or the open air Vlobe theater of Shakespeare's day. The architecture fosters an intensification of the various activities with a view to the targeted urbanism of the new WAC. We wanted to generate a similar intensification and blend of urban energies on the street level. Here, in contrast to the solid brick of the existing building, the walls are completely glazed, which will allow direct eye contact between the busy throughfare of Hennepin Avenue, the new interior of the WAC, and the new enlarged Sculpture Garden. This glazed street level running parallel to the slightly angled street will function like a 'Town Square' open to everyone as a meeting point, a place to exchange information and news or to have a cup of coffee. The design is a highly accelerated Semperian evolution from literal to metaphorical fabric on a steel frame. After investigating various types of metal, a literally translucent fabric exterior was proposed. A mock-up demonstrated that it acted as a giant light to attract insects and the design was changed to perforated metal panels, stamped with a repetitive pattern. The architects argue that it resembles crumpled paper.


expanded and embossed
aluminum-mesh panels
7 storey tower
New expansion







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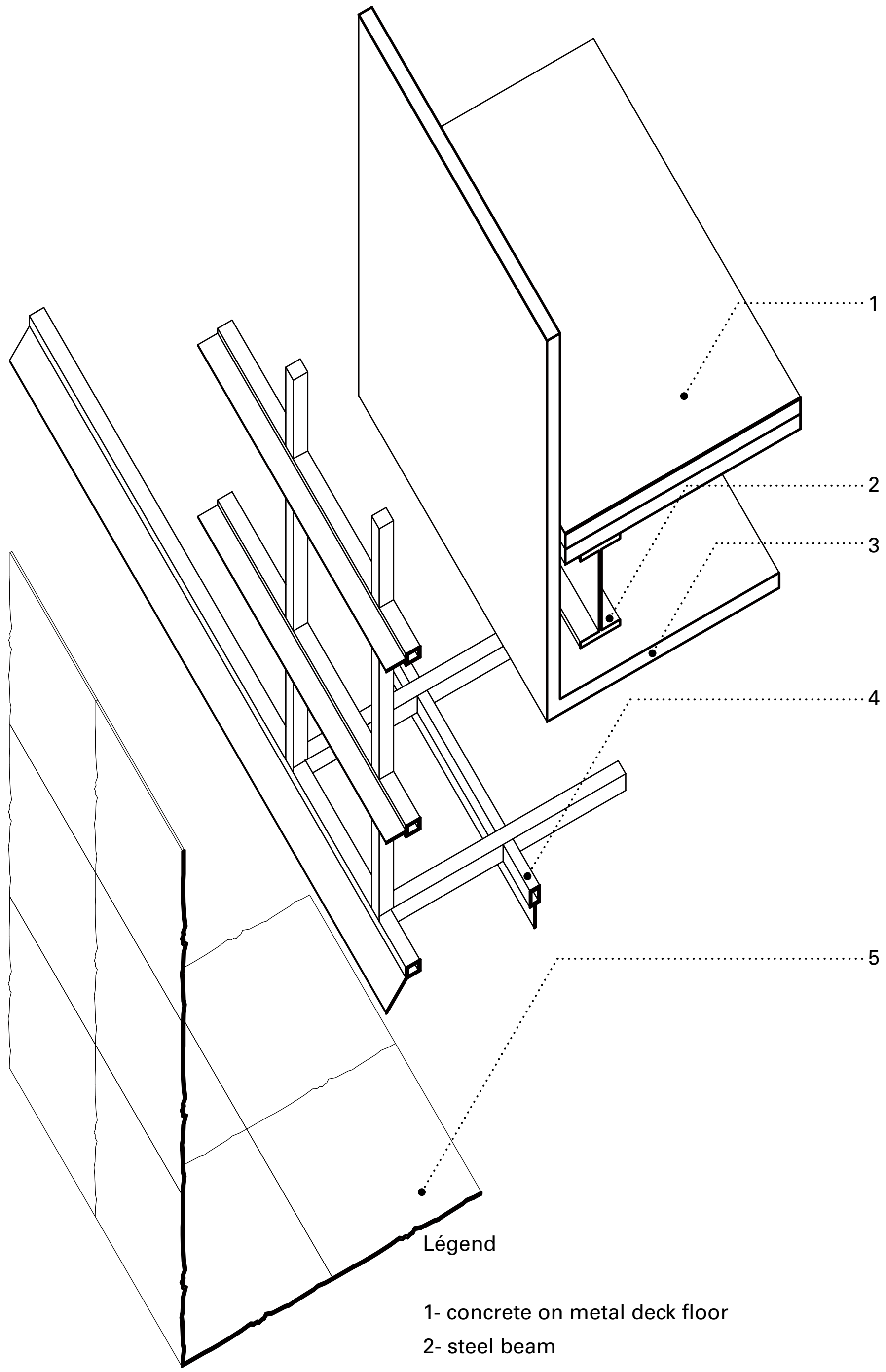


Légend

1- concrete on metal deck floor
2- steel beam
3- insulated metal panel on secondary steel frame This forms the environmental boundary of the wall
4- aluminum tube framing to support mesh\
5- expanded metal mesh panels at wall & soffit

1:50

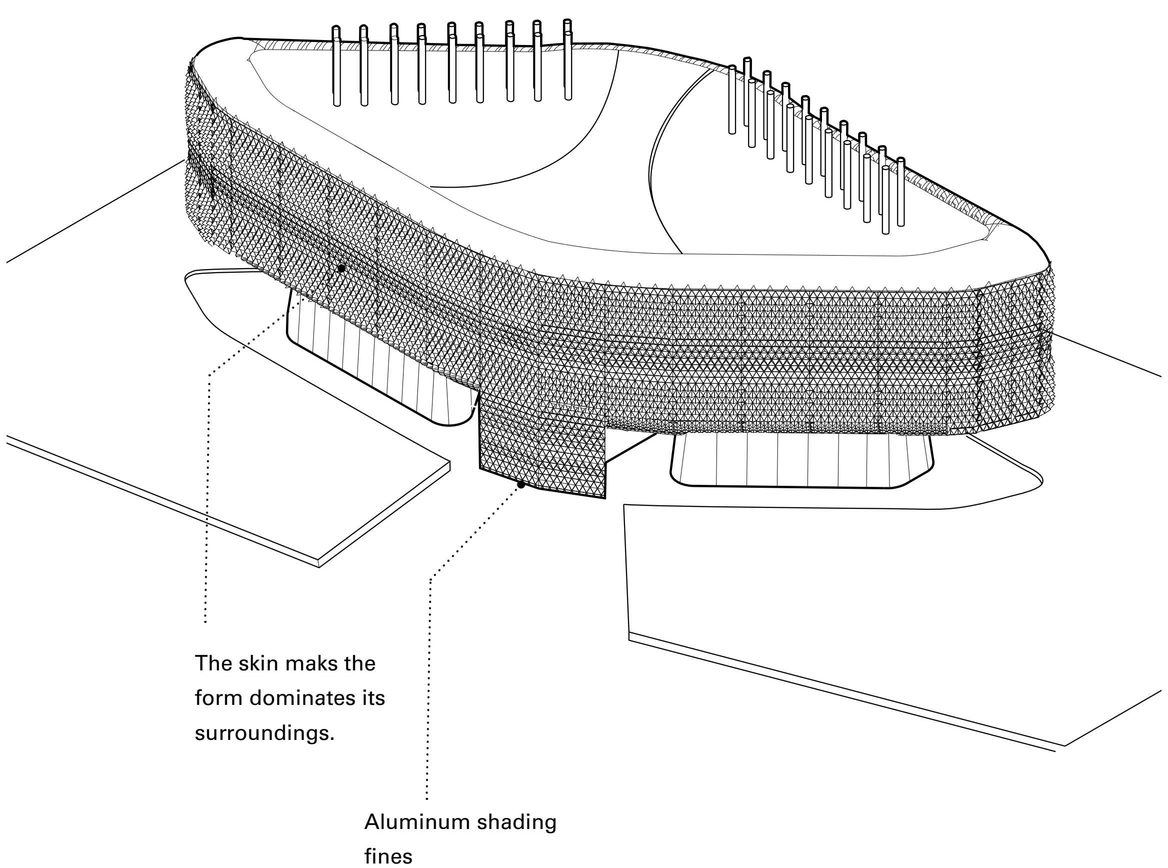
EXPANDED AND EMBOSSED ALUMINUM-MESH PANELS FORM THE CUBE'S EXTERIOR

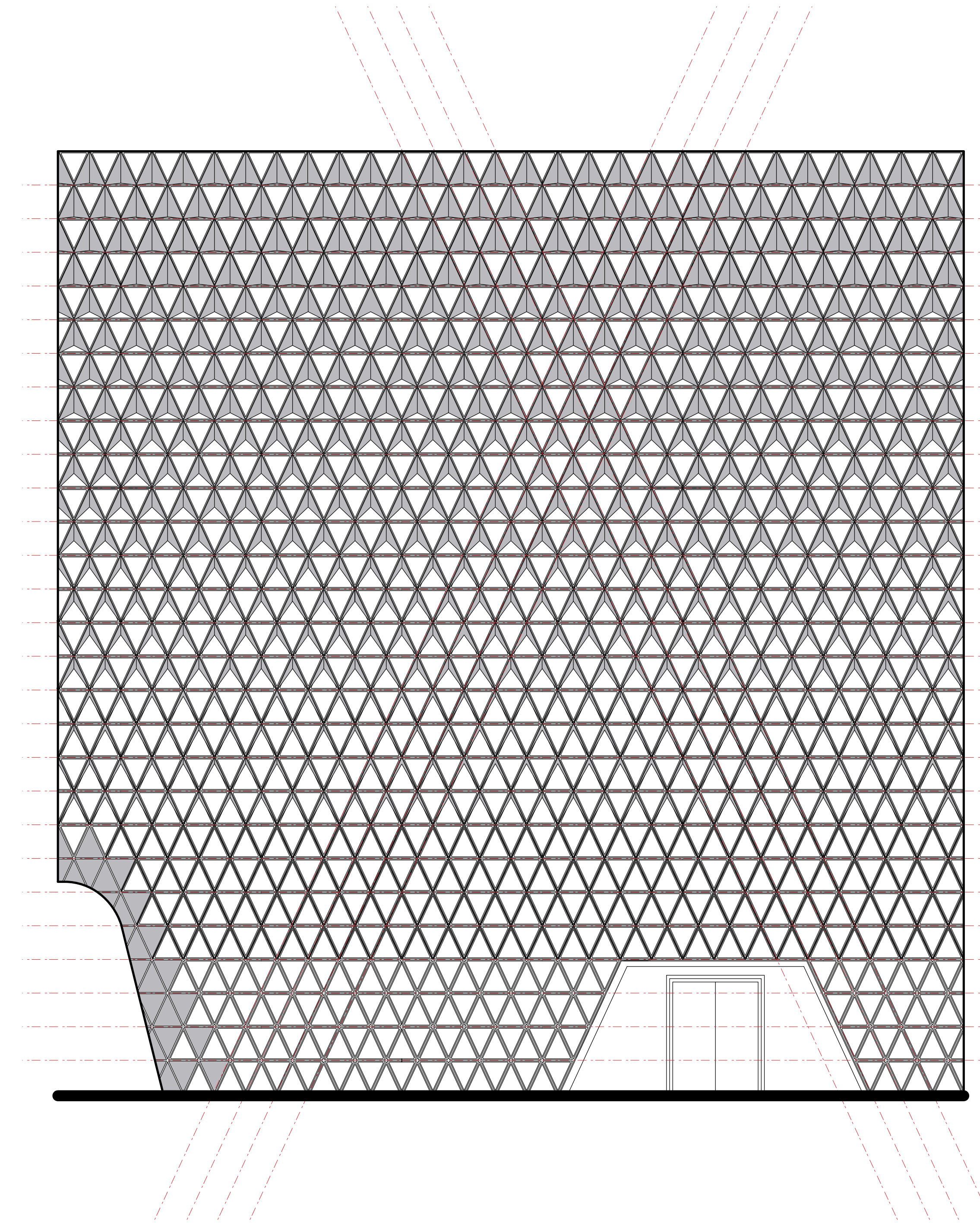
The cladding system as realized consists of expanded aluminum panels that are stamped to give a crumpled effect. Technically, this was achieved by rotating and stamping the material four times. mock-up shows that thinner mesh panels expose too much of the gridwork beneath. A pillowlike panel with sides was chosen to provide increased opacity and depth. The panels are actually 1.14m square boxes that are 15cm deep. Though all panels are identical, they are turned in different directions to give more variety to the facade, and the combination of finish (brite dip clear anodized) and the apparently non-repetitive texture makes the facades shimmer. A randomizing software was used to determine the overall pattern. The panels, or boxes, are attached to a frame of aluminum tubes (generally 5 by 10 cm) that is in turn attached to an interior layer of insulated aluminum weatherproof panels. The crumpled, aluminum finish panels are also used for the exterior soffit and the interior ceiling of the entry space. Using the panels for the horizontal finish reinforces the impression of a unified mass. There are approximately 3,000 panels that were manufactured locally by M.G.McGrath who later also manufactured the expanded metal facade panels for SANAA's New Museum of Contemporary Art in New York. For Herzog & de Meuron, adopting local methods of production and available construction technologies is a way of responding to each place where they realize a project.

SOUTH AUSTRALIAN HEALTH AND MEDICAL RESEARCH INSTITUTE // MEGAHED HALED

Architect I Architecte :	Woods Bagot
Engineer I Ingénieurs :	Aurecon and Norman Disney & Young (NDY)
Location I Localisation :	Adelaide, South Australia
Year of construction I Année de construction :	2010-2013
Use I Usage :	Medical Research Institution
Total area I Superficie totale :	25,000 square meter
Height I Hauteur :	40 meter
Number of floors I Nombre d'étage :	10 floors
Floor plan area I Superficie d'un étage :	3,800 square meter
Structure system I Système de structure :	Trusses
Structure materials I Matériaux de structure :	Steel and Concrete
Envelope materials I Matériaux d'enveloppe:	Steel, Glass and Aluminum

The unique triangulated diagrid facade was inspired by the skin of a pine cone and how it responds to its environment. Woods Bagot designed the building skin with the intention of creating a unified sculptural form that, visually, dominates its surroundings and reflect the importance of the building function. In addition, the unity of the façade reflects the interconnectivity of the interior. The architect placed two big atriums on the east and west side of the interior, connect all the floors virtually, to allow the glass façade to flood the interior spaces with natural light. Also, he was able to control the heat and glare of the sun by covering the glass façade with 8 different categories of aluminum fins, vary in angle, that allows different degrees of shading to the interior. The glass façade was developed as a free standing and self-supporting steel structure that does not connect to the floor slabs which allowed a free flexible interior. The aluminum material of the shading fins played an important role in reducing the overall load of the skin which led to developing a very narrow steel structure. In developing the grid of the façade, the architect considered the human scale. Each triangle measure 2 meters in height and 2 meters in width. The floor hight was also considered in the design. The triangles were combined off-site to form a bigger unit that matches the floor height.


The skin maks the
form dominates its
surroundings.
Aluminum shading
fines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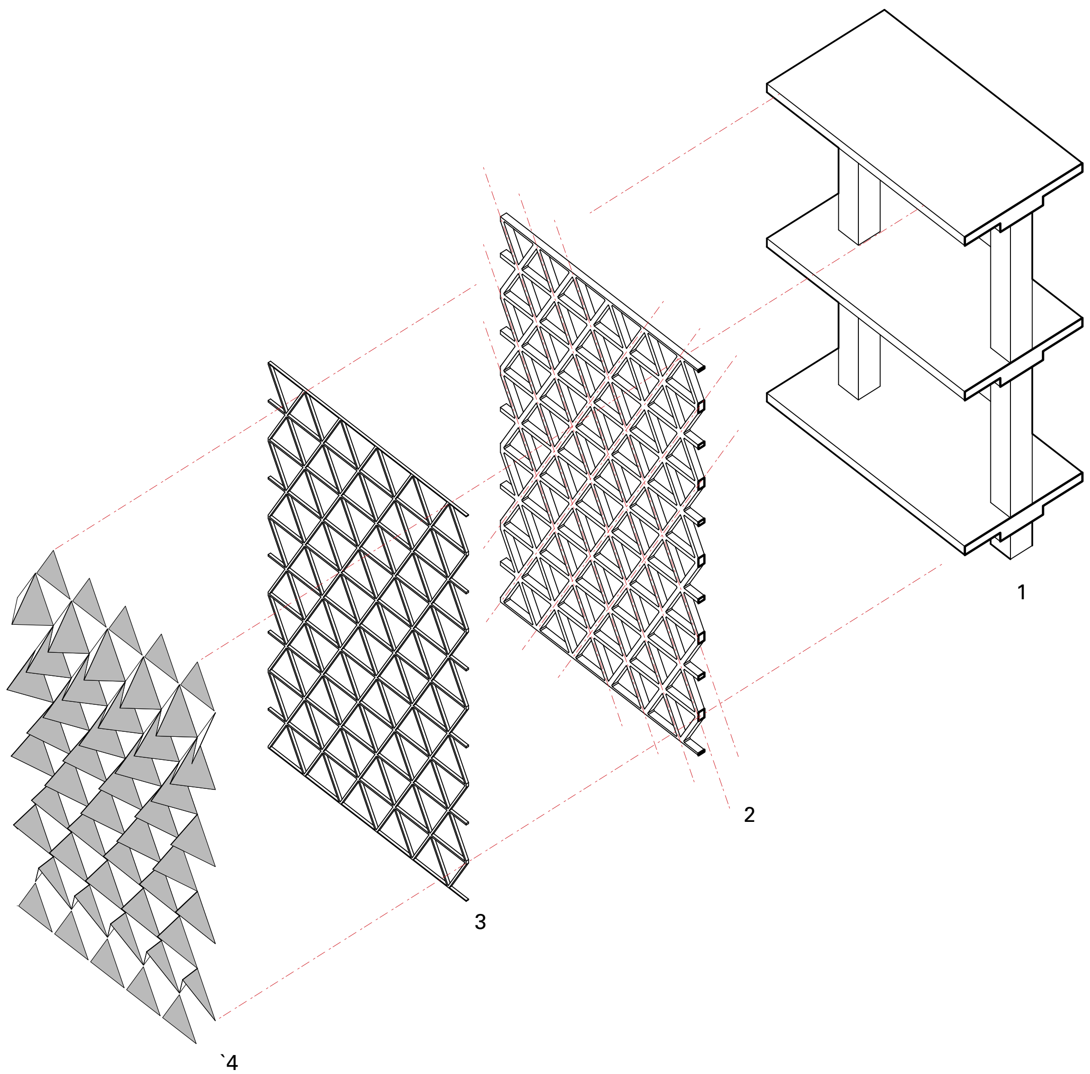
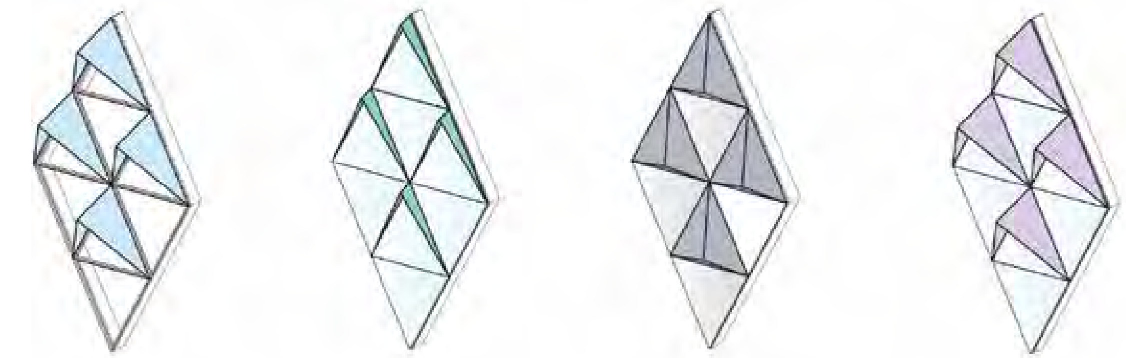


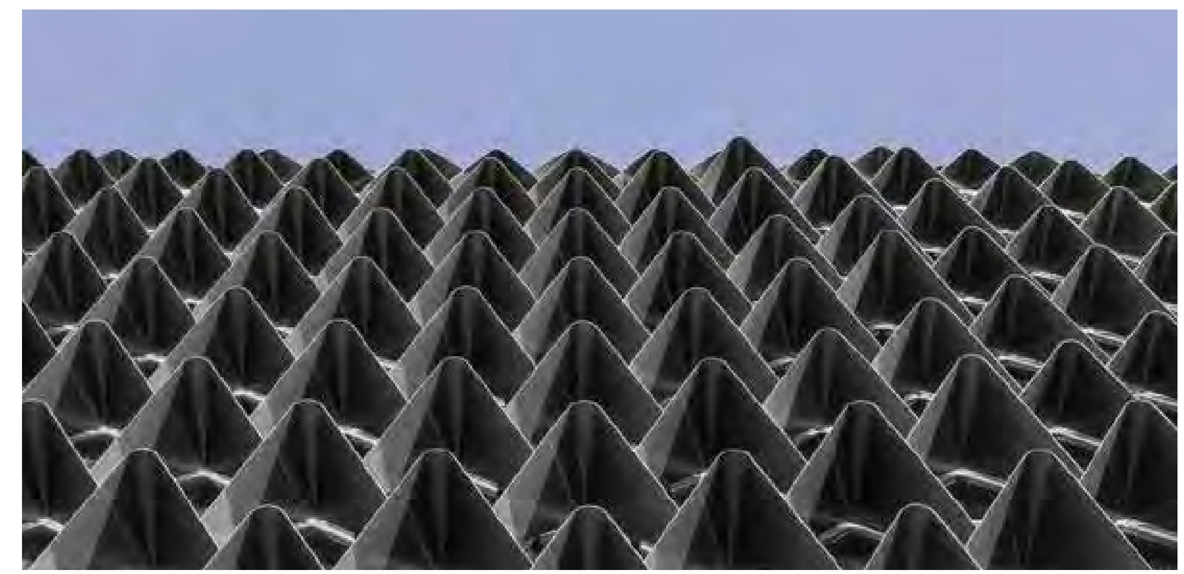
Légend

1- Concrete Structure
2- Self-supporting Steel Structure
3- Glass diagrid
4- Aluminum Shading Louver

1:50



Shade with no glass | Shallow shade with glass | Closed shade with metal panels | Shade with glass



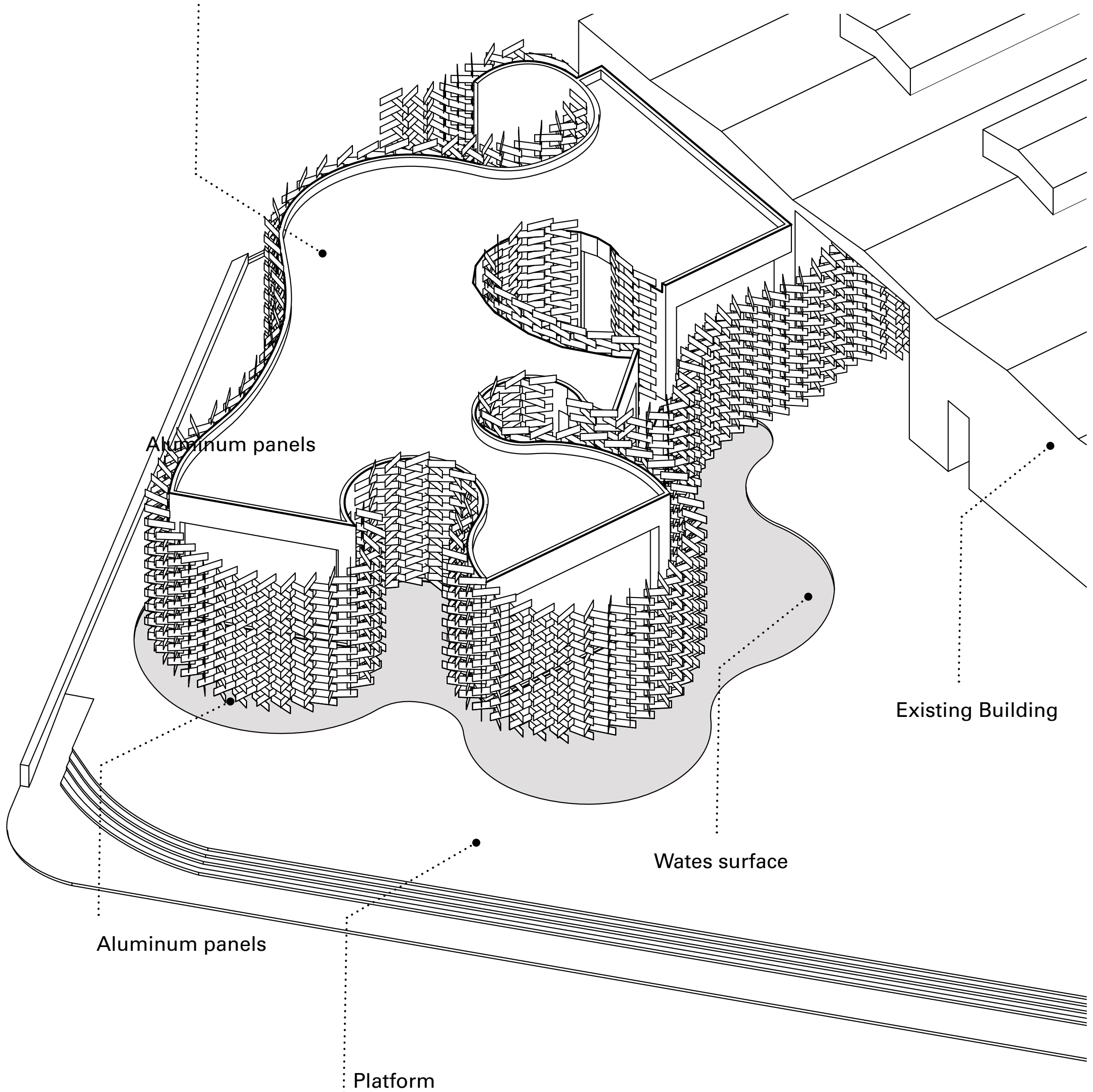
The façade consists of very narrow steel structure, 15 cm deep, that runs from the ground all the way the upper top of the building. The structure was mainly building to carry the triangular pieces and the aluminum fins. The glass and shading fins were prefabricated off-site on transferred to the site for faster assembly. Multiple software were used to manipulate the geometry of the skin and come with different variations. The intensive environmental analysis was applied to these forms, allowing it to achieve its best solar orientation. As a result, the system of shading fines was developed. For example, the bigger shading fines were placed on the upper part of the facade to prevent the vertical hot sun during the day while the lower part of the building is fully transparent to allow visual connection with the surrounding. Also, there are fewer shading fines on the north façade in comparison with the south façade because it doesn't get a direct sun during the day. This system allowed the building to reduce the consumed cooling energy. In addition, the shading fines were placed in an alternation pattern to create a balance between the open and closed and maintain continues transparency throughout the façade.

Architect I Architecte :	Kengo Kuma and Associates
Engineer I Ingénieurs :	
Location I Localisation :	Wuxi, China
Year of construction I Année de construction :	2014
Use I Usage :	Art Gallery
Total area I Superficie totale :	10,000 Square Meter
Height I Hauteur :	7 meters
Number of floors I Nombre d'étage :	2 floors
Floor plan area I Superficie d'un étage :	5,000 square meter
Structure system I Système de structure :	Beam and column system
Structure materials I Matériaux de structure :	Concrete
Envelope materials I Matériaux d'enveloppe:	Glass and aluminum

The architect Kengo Kuma has converted a former cotton mill into an arts and shopping complex. the original red brick building, which dates back to the 1960s, has been completely renovated, while a sculptural addition lends the venue a new sense of identity. in designing the extension, the architects referenced the shape of a local stone that remains significant in Taihu culture.

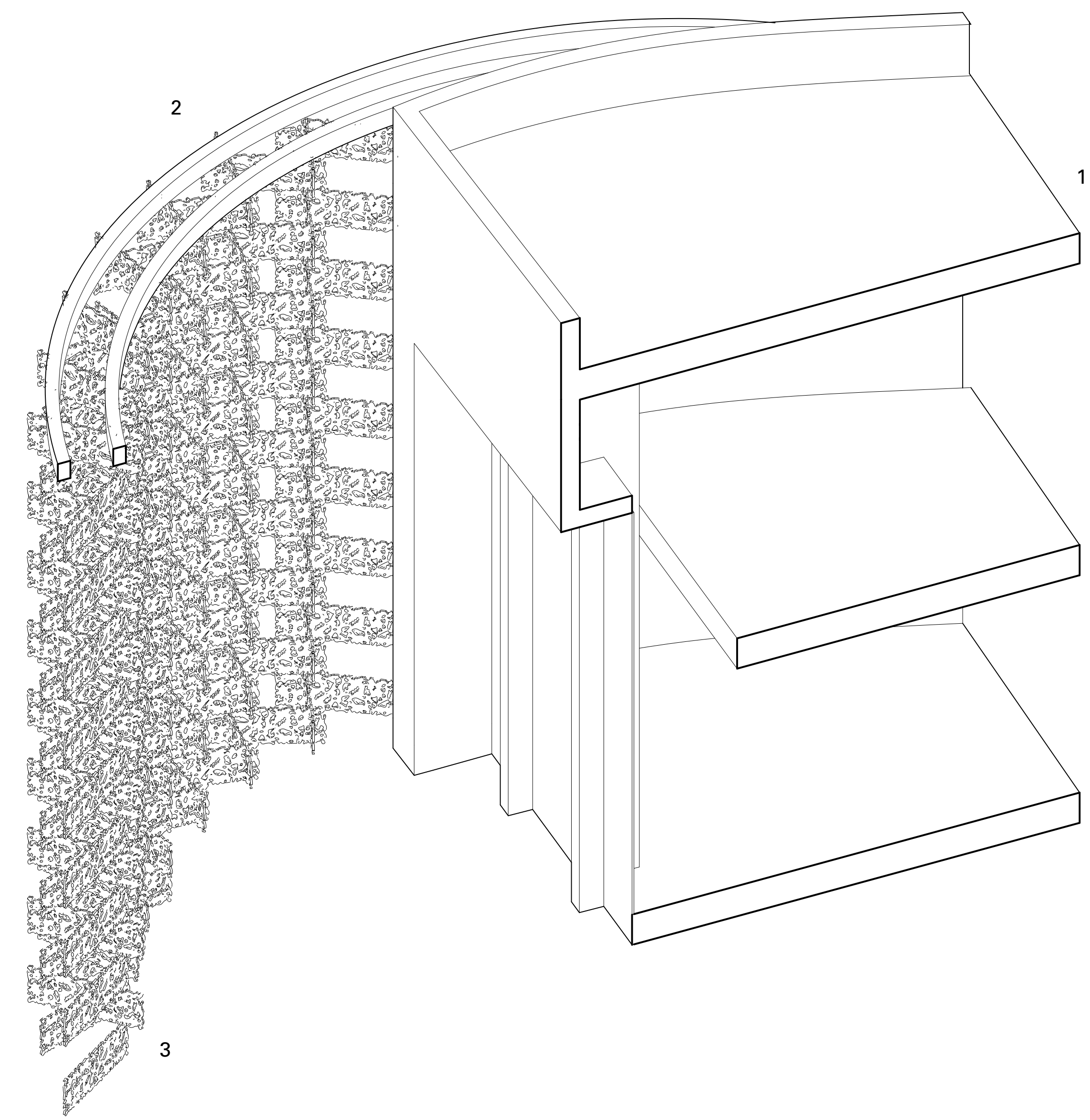
A shallow pool of water surrounds the gallery, delineating a threshold and providing a connection with the natural environment. the structure itself comprises a number of aluminum cast panels that allow sunlight to gently filter inside the glazed exhibition space. the extension forms an amoeba-shaped footprint, joined to the brickwork of the former mill. the renovated building provides further gallery space, alongside a range of retail outlets and offices.

The new development occupying more than 10,000 square meters. It serves as a connection between the site's industrial past, and its cultural future.



Légend

1- Concrete Structure
2- Steel rails to support hanging steel cables
3- Aluminum panels



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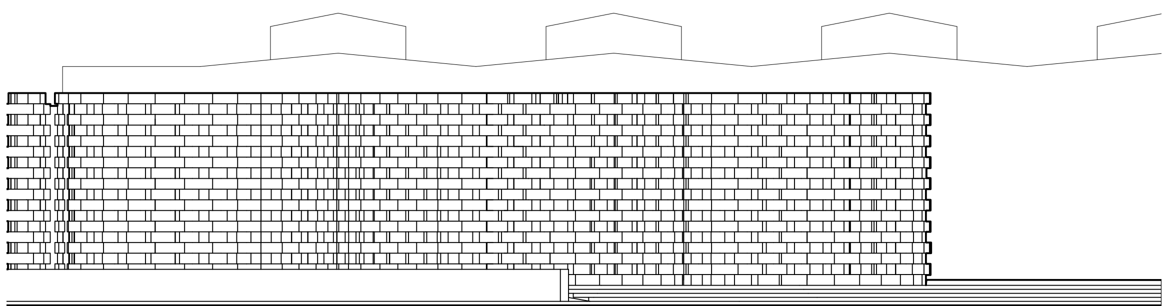

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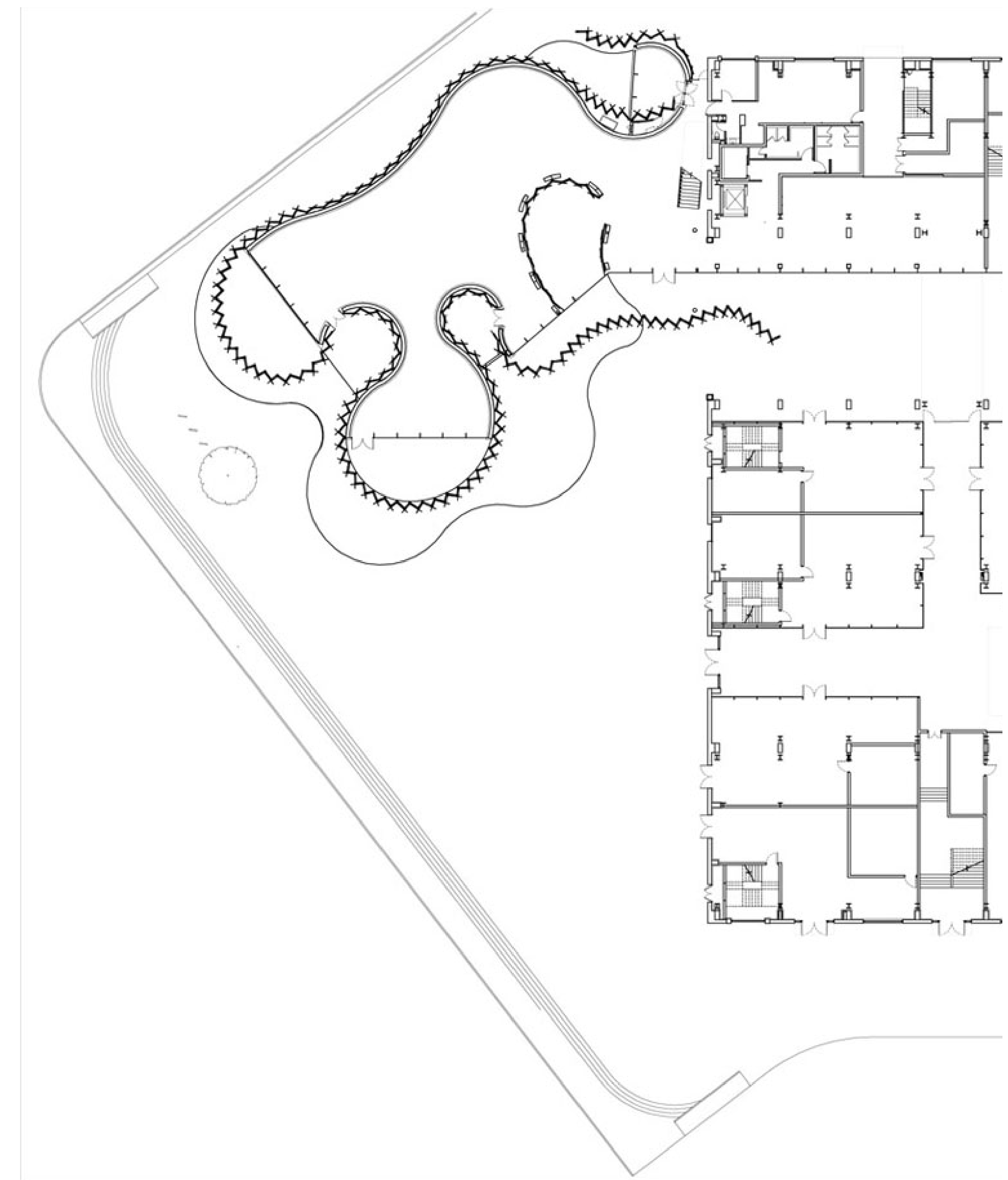


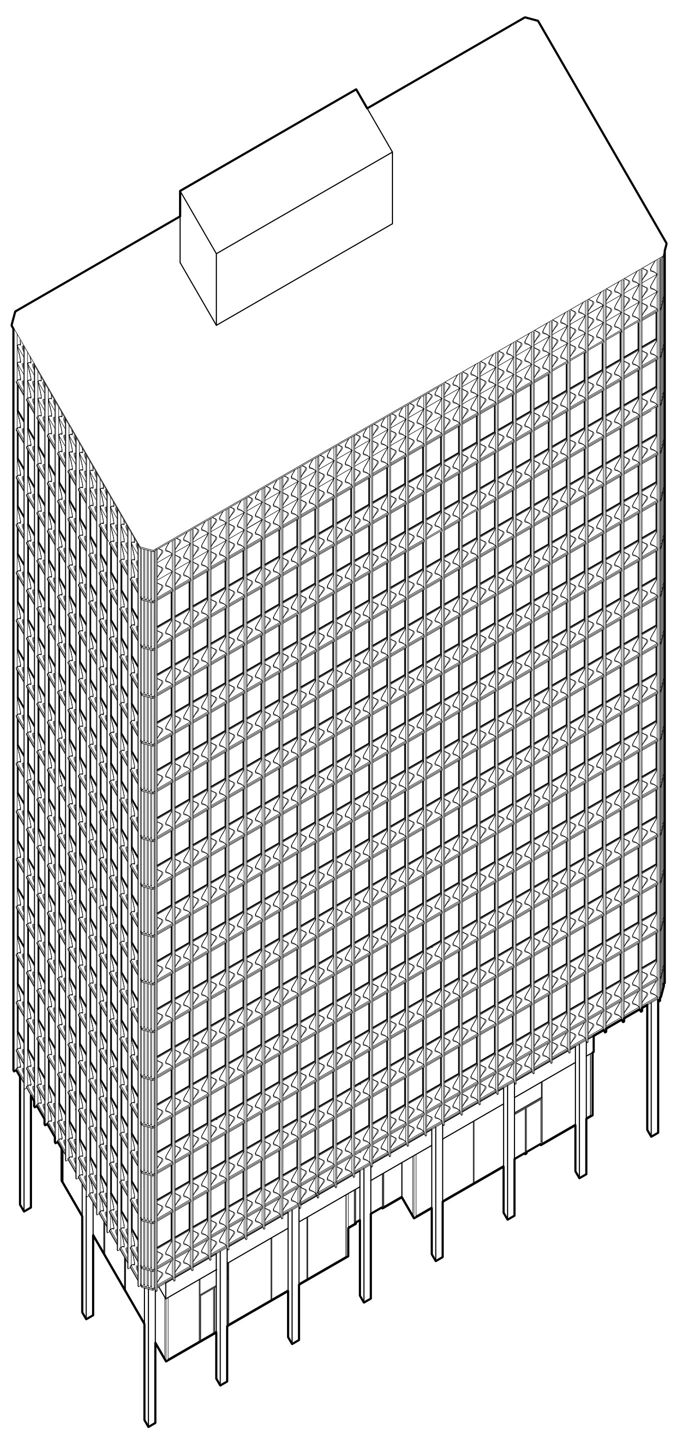
METALKA OFFICEBUILDING // BAJAMAN ABUBAKER

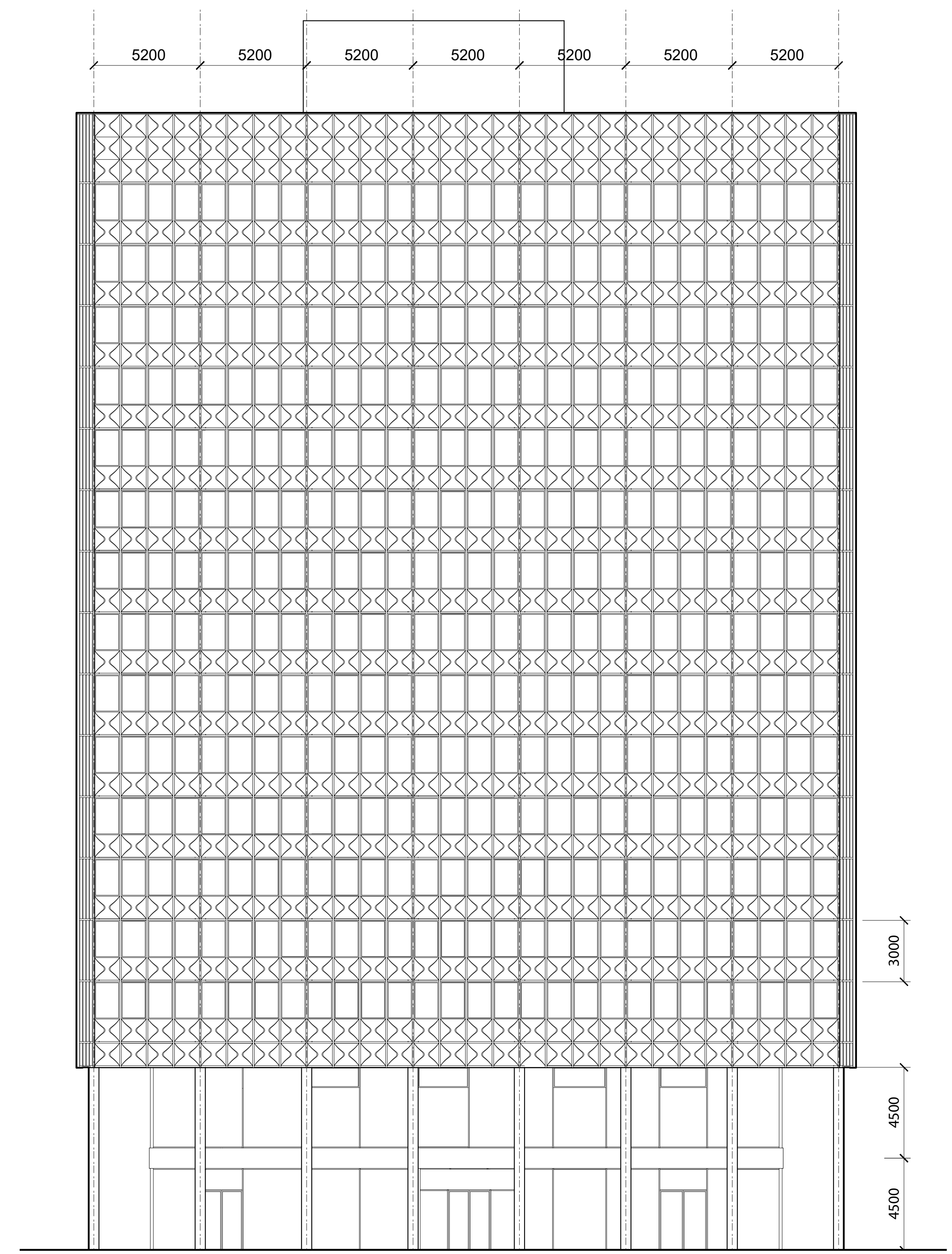
Architect I Architecte :	Edo Mihevc, Branko Kraševac
Engineer I Ingénieurs :	Impol
Location I Localisation :	Ljubljana
Year of construction I Année de construction :	1963
Use I Usage :	Office
Total area I Superficie totale :	~10,000m^2
Height I Hauteur :	60m
Number of floors I Nombre d'étage :	15
Floor plan area I Superficie d'un étage :	
Structure system I Système de structure :	Concrete Frame
Structure materials I Matériaux de structure :	Concrete
Envelope materials I Matériaux d'enveloppe:	Pressed Aluminium SheetExtruded AluminiumGlass curtain wall Stone Cladding

The Metalka building in Ljubljana was the first high-rise building in the city. The tower was designed by Edo Mihevc and the facade was designed and developed by Branko Kraševac. The 15 storey office tower was designed for Metalka, an import/export firm dealing with metal products, including aluminium sheets, castings and extrusions. Boeing being one of the firm's customers, the architects wanted to introduce innovation into the design of the facade.

The Metalka tower design was inspired by the Seagram building in New York by Mies van der Rohe when the 'International style' of architecture was quite prominent and represented development, modernity and material innovation.

The Metalka tower uses the same urban principles as the Seagram as it is setback from the street and fronted by a public square. Besides this, similar to the Seagram Building, it also has a structural system comprising of a steel frame that is encased in concrete for fireproofing. From this system, a light-prefabricated aluminium facade is hung. At the time, the technology used for the fabrication of the facade was a symbol of technological progress of the metal manufacturer and proved that Slovenian architecture was on par with European development.

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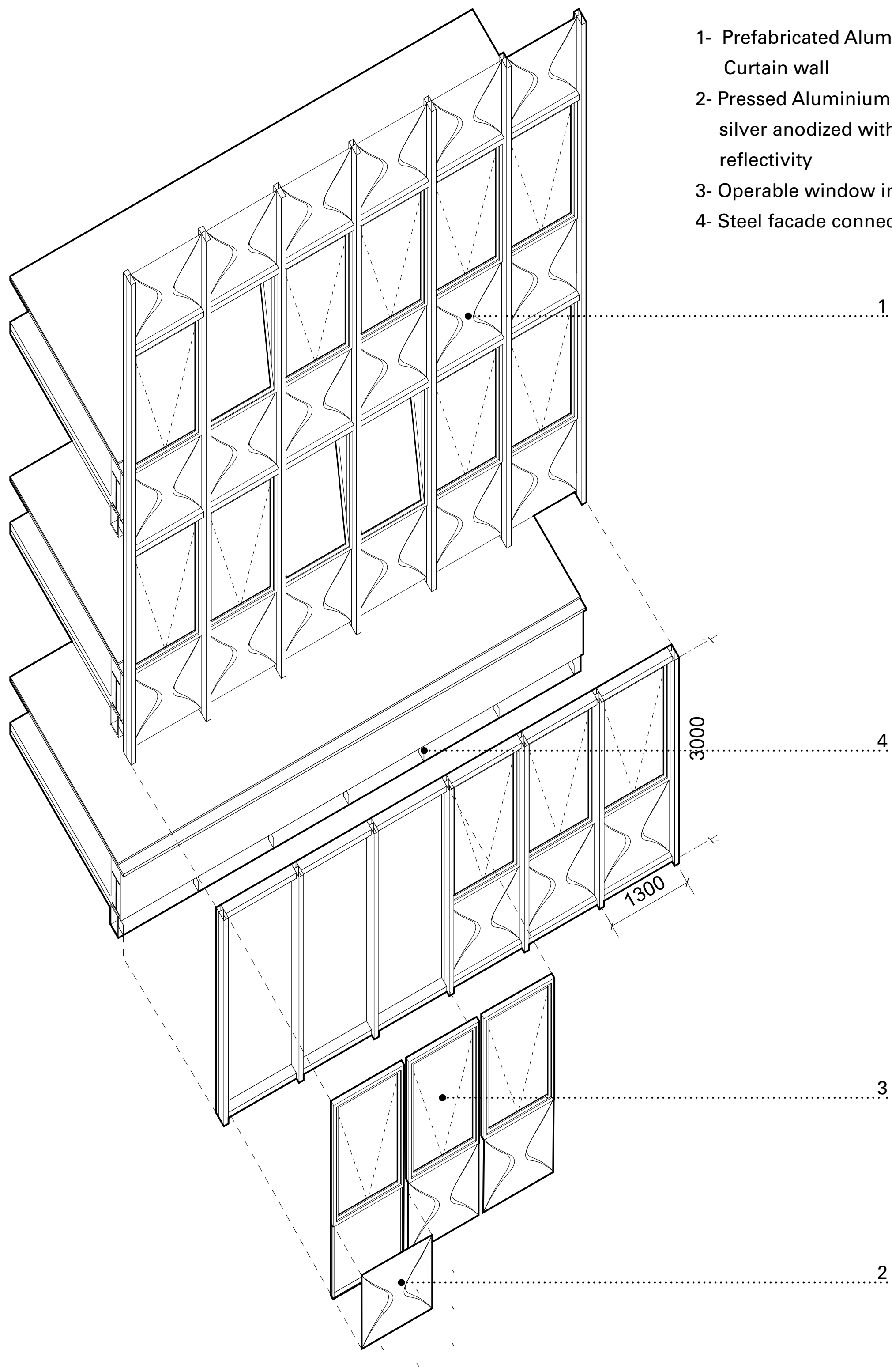


1- Prefabricated Aluminium Curtain wall
2- Pressed Aluminium sheet- silver anodized with golden reflectivity
3- Operable window insert
4- Steel facade connections

1:100

The unique characteristic of the Metalka tower is the light prefabricated aluminum cladding that is used to encase the building. This facade system is quite similar to the Alcoa building designed by Harrison and Abramovitz in Pittsburgh in 1953, which was dubbed by *Popular Mechanics* as 'the world's first aluminium skyscraper'. Aluminium was a material of choice because of its light weight and strength.

The custom shaped pressed aluminium sheets were designed to provide rigidity while also rendering a beautiful aesthetic to the facade. They are silver anodized with a little golden reflectivity.

The components of the facade consist of aluminium curtain walling within which a unitized system consisting of an operable window along with a bent aluminium panel are then inserted. The entire facade is then hung off of the flanged fittings that connect back onto the concrete encased steel beams.

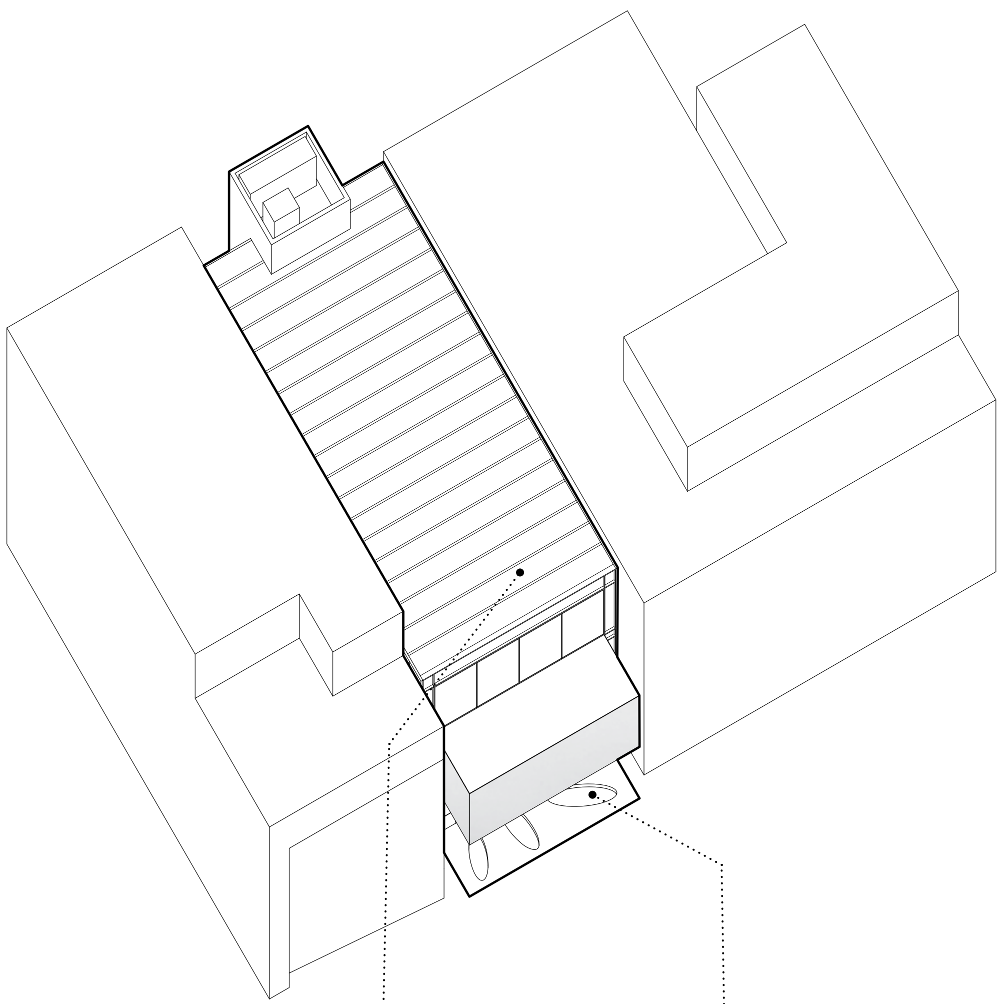
Pressed aluminium panels are produced in a factory by means of a hydraulic press with the negative mold of the shape. The large pressure of the press deforms the panel to the shape required and in the process also adds some structural rigidity to the panel.

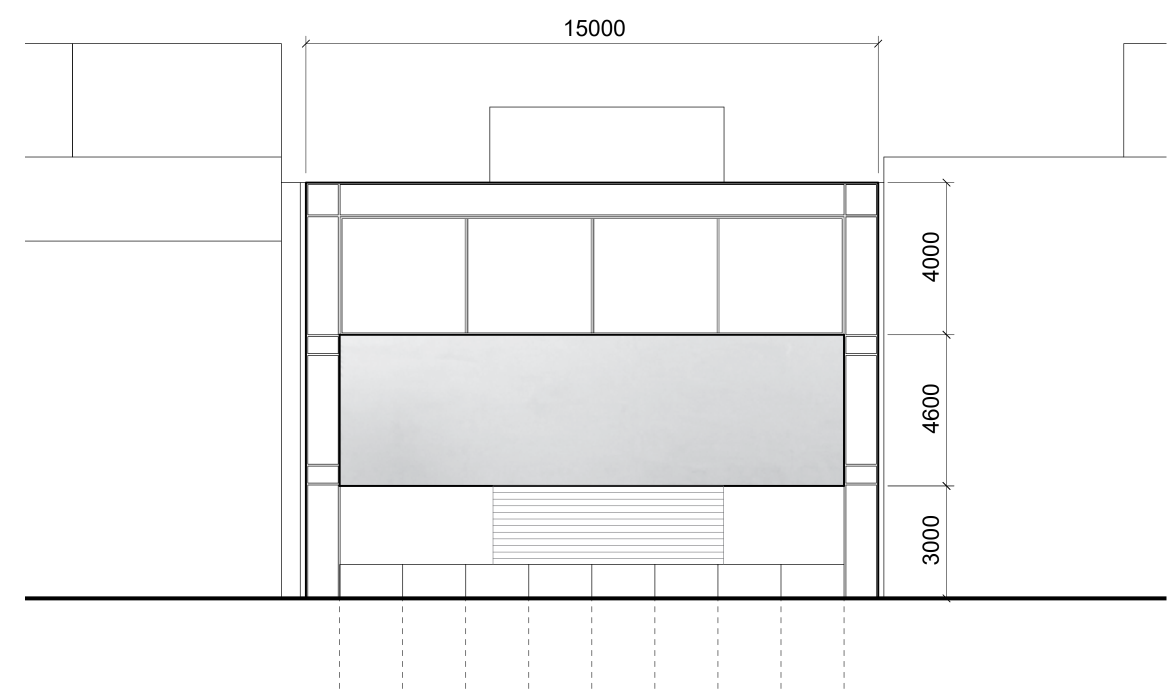
Architect I Architecte :	Office of Metropolitan Architecture
Engineer I Ingénieurs :	Ove Arup & Partners USA
Location I Localisation :	Beverly Hills
Year of construction I Année de construction :	2004
Use I Usage :	Retail
Total area I Superficie totale :	1900m²
Height I Hauteur :	11m
Number of floors I Nombre d'étage :	3
Floor plan area I Superficie d'un étage :	
Structure system I Système de structure :	Steel
Structure materials I Matériaux de structure :	Steel
Envelope materials I Matériaux d'enveloppe:	1" Aluminum PlateGlass window wall Steel W-Beams

"We decided not to experiment with materials but to develop materials. So you will see a material that is neither substance nor nothingness: foam. Then there is an interesting statistic: above the void is the largest single plate of architectural aluminium ever made."
Rem Koolhaas

The design of the Prada store aims to question the basic idea of a traditional store and how this idea can then be pushed further which is why OMA was the architect of choice fot the location in LA.

The architectural concept of the store is based on stripping all branding and identity from the facade so the store functions rather as an extension of the public space. This is done through the large single uninterrupted piece of aluminium for the second floor facade designed without articulation, visible joints or connections. This minimalist nature allows the store to stand out on a strip overtaken by flashy branding and allows the public space to invade the store. Besides this, the traditional storefront displays are replaced with just an open floor connecting inside to outside where climatic separation is achieved through an environmentally responsive air-curtain system. The lower floor is sealed at night by an aluminium panel that rises from the ground. Koolhaas also rethought displays for the store by embedding them into the ground visible through structural skylights in the ground.





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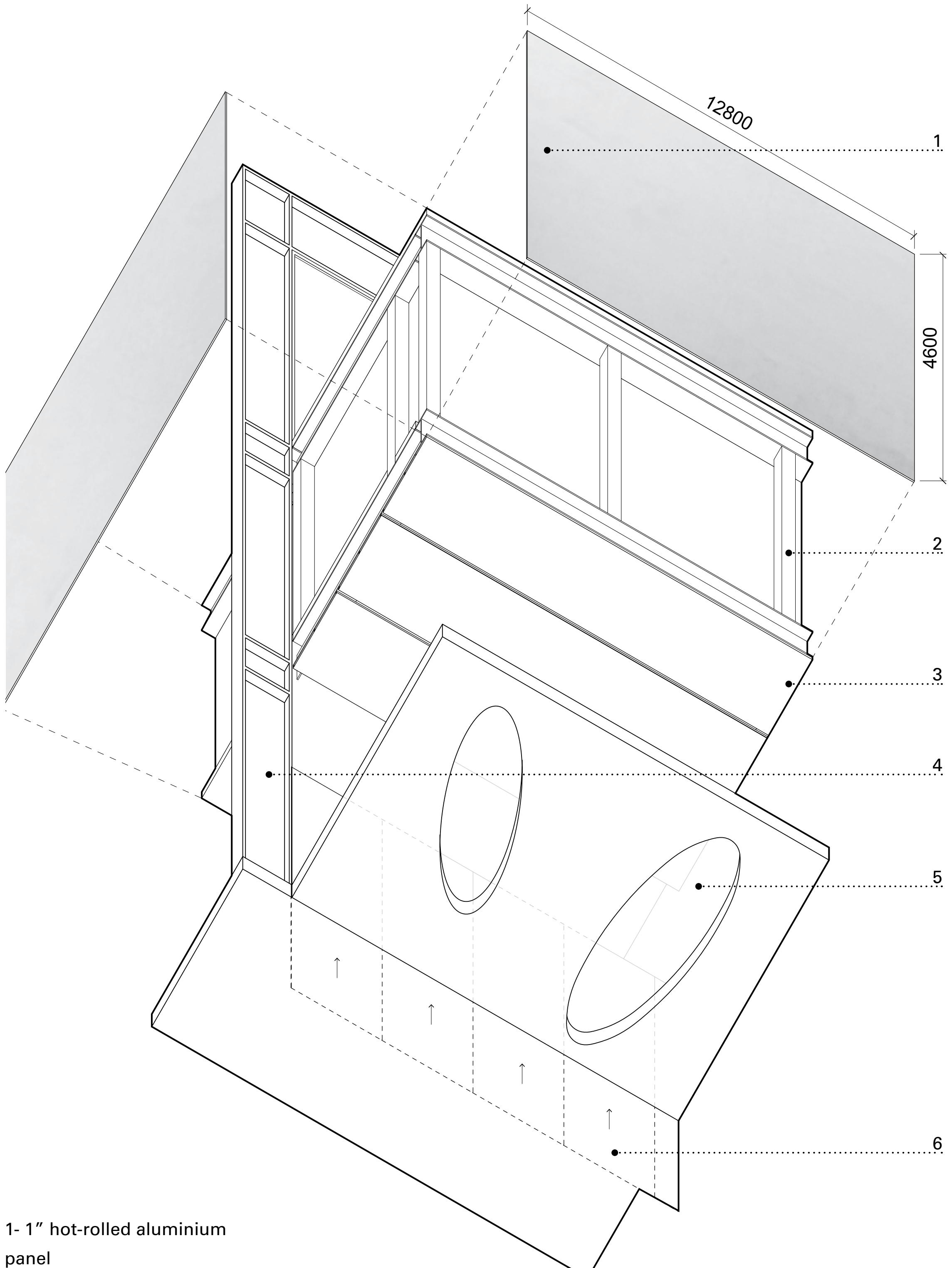


1- 1″ hot-rolled aluminium panel
2- Steel beams and columns
3- Aluminium soffit panel
4- Exposed steel structure
5- Structural glass skylights
6- 12m wide retractractable aluminium door
1:100

The large budget for the store design allowed OMA to experiment with material innovation and design and this is evident in the large 5000 ft² skylight that runs the entire length and width of the floor, the custom-designed 3-dimensional sponge wall that surrounds the main selling area and the monolithic 4.6 x 12.8m of aluminium panels encasing the second floor of the store.

The structural system of the store is a traditional steel frame that supports the various structural elements like the floor and the roof. Besides this, the large and heavy aluminium panels are also fastened onto the facade with steel substructure.

Of the new materials and technology used for the store, the most significant is the hot-rolled aluminium panel, which is the largest single plate of aluminium ever made. It is an inch thick, and the tolerance of 1/8″ over the entire plate was so large the entire thing had to be rolled thicker and then machined down. The technology and equipment required for the machining was so extensive it had to carried out at Boeing International in St. Louis, MO. The technological innovation is also seen in the large aluminium retractable door that rises from the ground.

The project is a great example of innovative design, material research and coordination with custom fabricators.

Architect I Architecte :	Herzog & De Meuron
Engineer I Ingénieurs :	Metallurgist : Dick Polich, Polich Tallix Foundry
Location I Localisation :	NY, USA
Year of construction I Année de construction :	2006-2007
Use I Usage :	Residential
Total area I Superficie totale :	7,731 sqm
Height I Hauteur :	~40 m
Number of floors I Nombre d'étage :	11
Floor plan area I Superficie d'un étage :	702 sqm
Structure system I Système de structure :	Reinforced Concrete
Structure materials I Matériaux de structure :	Concrete, Steel
Envelope materials I Matériaux d'enveloppe:	Cast Iron, Cast Aluminum, Stainless Steel

"For nearly eight centuries, Spain set all Europe a shining example of a civilized and enlightened state. Her fertile provinces rendered doubly prolific, by the industrious engineering skill of the conquerors bore fruit a hundredfold, cities innumerable sprang up in the rich valleys in the Guadalquivir and the Guadiana whose names, and names only commemorate the vanished glories of their past"
Stanley Lane-Poole

40 Bond St is Herzog and De Meuron's first residential building in United States. It is a luxury residence located in the NoHo District of Manhattan. The building has been completed in 2007. Since then, it has become a recognizable architectural icon in New York City.
"*The building has influenced the current generation of architectural developments, influencing the design of luxury residences across the city.*" *azahner.com*
One of the most distinctive features of the building is a sculptural fence made of cast aluminum. The fence has been subject to many discussions and is widely advertised to have been inspired from New York's 1970's graffiti art. However, there seems to be that the patterns might have been derived from a completely different context

In 2003, Herzog De Meuron entered a competition to design the *Ciudad del Flamenco*
Jerez de la Frontera, in Spain. It was a a complex for the study, performance, and documentation of Flamenco misic.

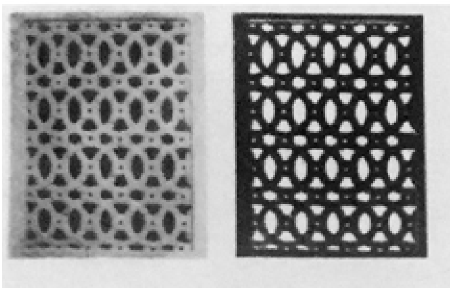
“Their design was born from an ably executed play of material subtractions, true to such an extent that the most effective way of describing it is to start at the void at its centre: a spacious courtyard in the best Mediterranean tradition, serene, shaded, restful with an orange grove, fountains and pools. Concealed beneath the courtyard, deep in the ground, lies another void hiding the auditoriums, teaching rooms, and practice halls”. *damusweb.it*

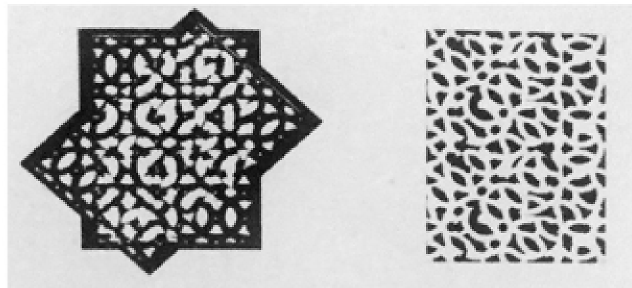
“Flamenco music was born, and still lives, among the scenic green hills of Andalusia in southern Spain” and is heavily rooted in the Spanish tradition. However, searching for the obscure origins of flamenco, “ *reveals Arabic influence, touching everything from the style of performance to the very rhythms and scales of the songs themselves.” “And what they have produced as a result is a fusion of Spanish and Arab traditions that is both interesting and*
Inspirational.” Greg Noakes

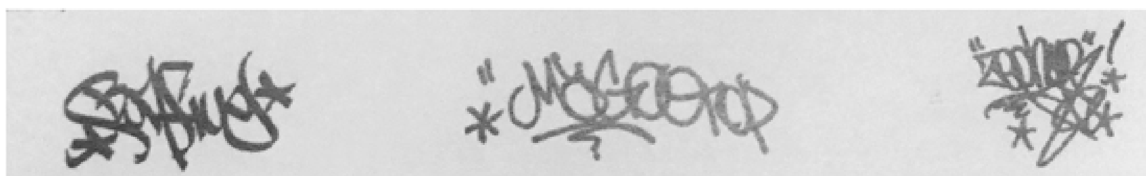
It is no wonder why Herzog and De Meuron - being masters at exploring the context - turned their eyes towards Arabic heritage when compiling the narrative for *Ciudad del Flamenco.*

“The surfaces of the Ciudad del Flamenco consist of poured, perforated and artificially processed concrete; they follow the lines, shapes and patterns of Gypsy tradition and Arabic ornamentation. Both traditions are extremely contemporary; to be more precise, they are centuries-old and ceaselessly new source of inspiration for contemporary art and daily culture. We encounter them in punk and rock music, in tattoos, in symbols and emblems, in patterns and in many other places. This kind of ornamentation informs the concrete at the Ciudad del Flamenco.” Herzog & De Meuron

The works of Herzog and De Meuron are results of “dialogue and inspiration” as they put it. It seems that their investigation into deep roots of the Flamenco music has led them to fabricate a fusion of ancient cultures out of the context. The *Ciudad del Flamenco* is a perfect example of their approach on re-defining contemporary readings from the context.







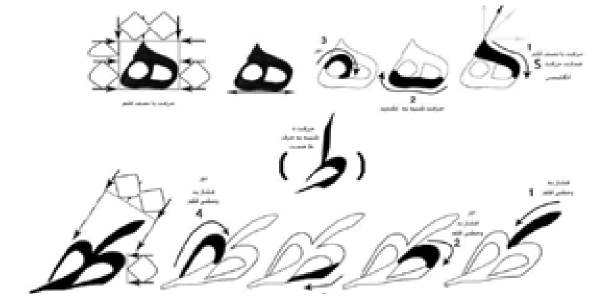
It is no wonder why Herzog and De Meuron - being masters at exploring the context - turned their eyes towards Arabic heritage when compiling the narrative for *Ciudad del Flamenco.*

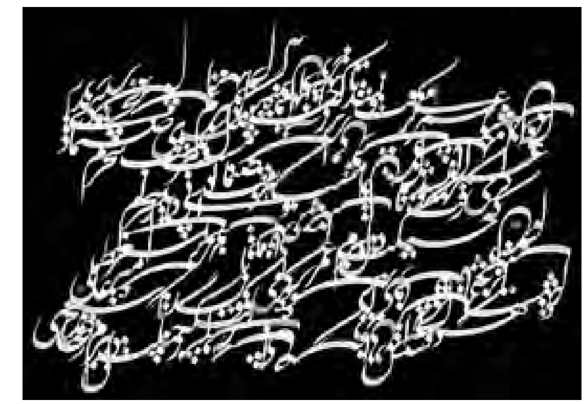
The architects' process of pattern finding has started with experimenting with traditional patterns found in traditional latticed window frames. The pattern then is simplified after super imposing and duplicating the primary patterns on top on each other.

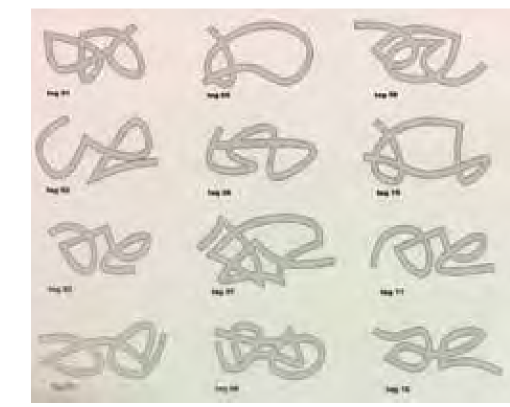
The other method is of more interest to us here since it seems that it is the main derive behind their also later works, 40 Bond St. They have experimented with different traditional calligraphy styles found in Arabic tradition. The calligraphy art is a huge part of the cultural tradition in both Arabic and non-Arabic civilizations of the Middle East region. In this tradition, sentences of phrases are often complied in a geometrical shape with intricate and heavy detail lines. Herzog and De Meuron have extracted abstract readings from some of these examples to produce two dimensional patterns which are later translated into perforated patterns on the building envelop.

Here's how the architects themsleves explained the sculptural fence;
"The gate is a collage of graffiti tags, which were translated into the third dimension with the help of computer technology. The thickness of the strokes is defined according to material thickness requirements of the casting process."
Herzog & De Meuron

It is unclear why the arcitects keep emphasizing that the patterns are derived from new york's 1970's graffiti art.
Yet, nvestigation into their ealier works shows a rich reseach into the caligraphy art of middleeastern cultures and their influence in the Spa in's Islamic heritage.







Polich Tallix Fine Art Foundry

Dick Polich started his first foundry in late 1960's. He has worked with some of the most significant artists of late 20th and early 21th century such as Jeff Koon's gleaming stainless stell Rabit (1986) and Louise Bourgeois's spider Manan.

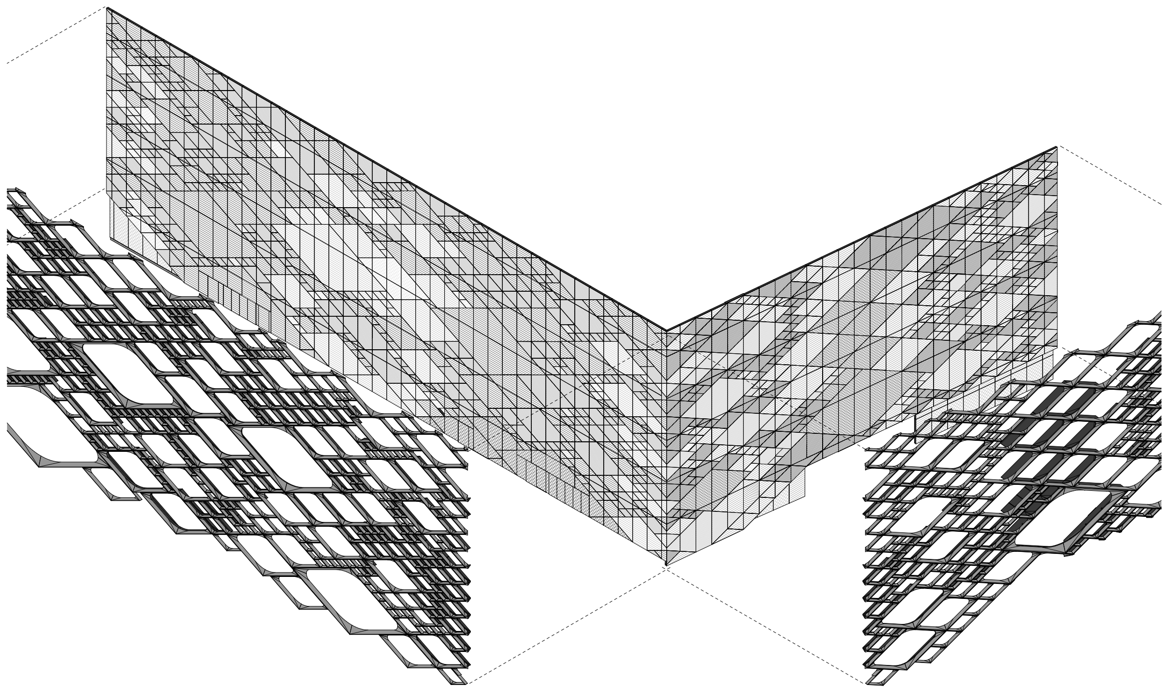
In 2007 Polich Tallix created the custom fence for Herzog and de Meuron's 40 Bond Street Complex. The wavy metal forms started as digital patterns that were machined in Styrofoam then cast in aluminum. The process is similar to the one in industrial metallurgy. But Polich Tallix uses their own process to make the unique patterns found in their work.

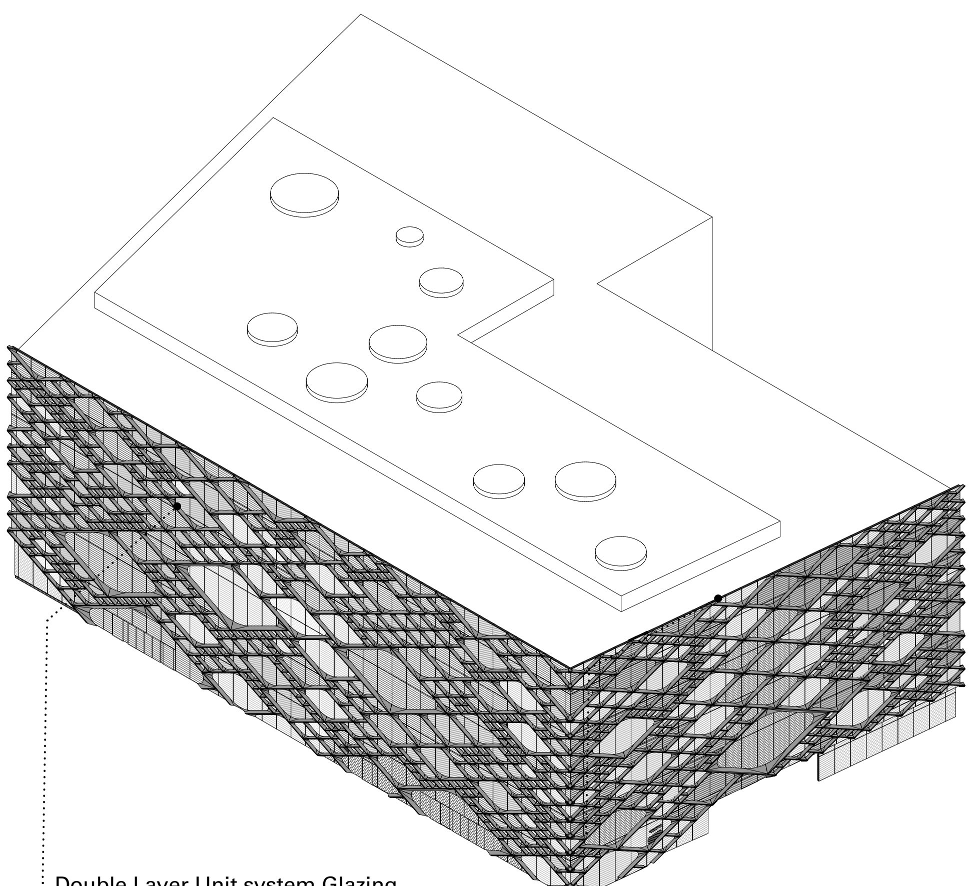
Architect I Architecte :	Twelve Architects
Engineer I Ingénieurs :	ARUP, SPIRAL
Location I Localisation :	Sheffield, UK
Year of construction I Année de construction :	2015
Use I Usage :	Institutional
Total area I Superficie totale :	19,500 sqm
Height I Hauteur :	12,850 mm
Number of floors I Nombre d'étage :	6
Floor plan area I Superficie d'un étage :	1,400 sqm
Structure system I Système de structure :	Reinforced Concrete
Structure materials I Matériaux de structure :	Concrete, Steel
Envelope materials I Matériaux d'enveloppe:	Steel, Aluminum

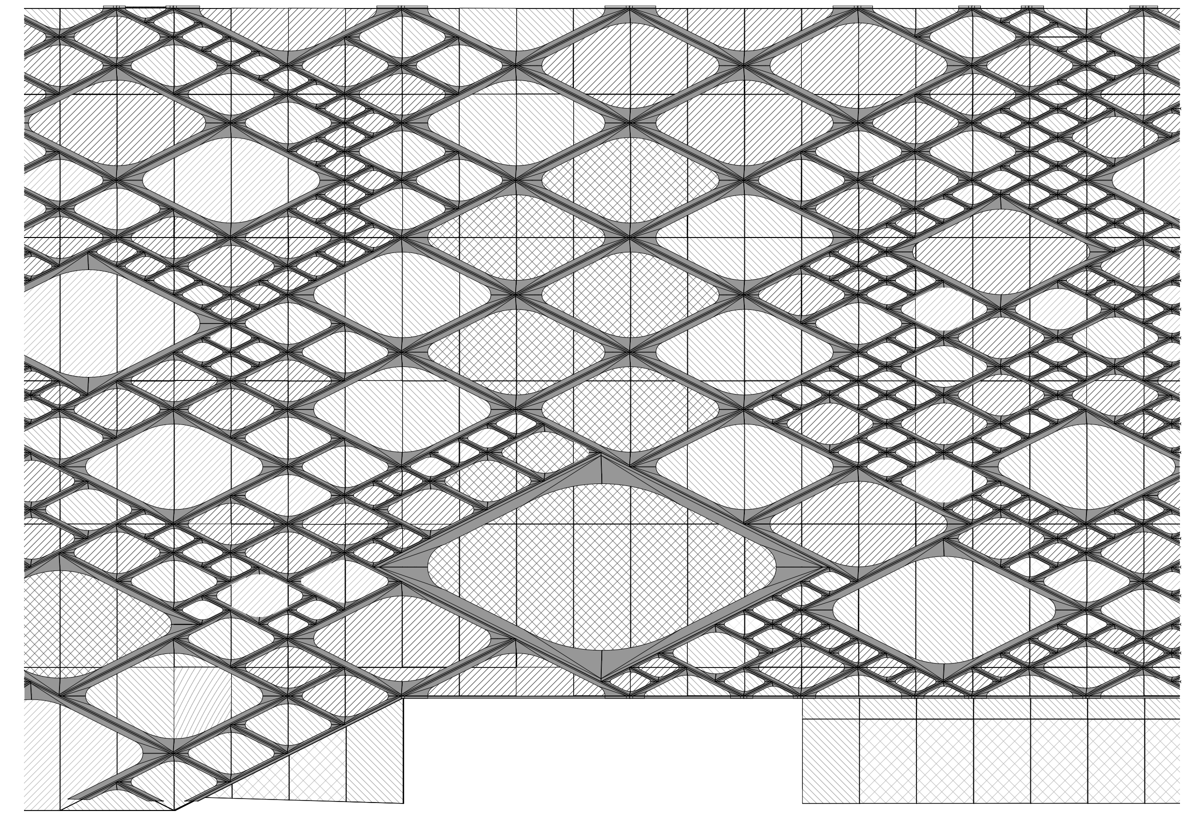
"Mention the Gothic, and many readers will probably picture gloomy castles and an assortment of sinister Victoriana. However, the truth is that the Gothic genre has continued to flourish and evolve since the days of Bram Stoker, producing some of its most interesting and accomplished examples in the 20th century - in literature, film and beyond. "
Albert Frey

The new Faculty of Engineering building at The University of Sheffield is an statement from the University to demonstrate it's ambitious future plans. "It is housing specialist engineering laboratories, lecture theaters, large scale flexible teaching spaces, workshops, a learning resource center and integrated formal and informal study environments for up to 5,000 students." *Arup*

The Diamond - apparently named after its unique facade - is designed by Twelve Architects and engineered by Arup. The facade is said to be "drawing inspiration from the detail of the surrounding buildings". *Arup* However, the building is unmistakably modern reading from the neo-Gothic style. The ribbed elements of the facade heavily resemble those of a Gothic cathedral. Coupled with the building's explicit structural expression, the narrative behind the architect's design becomes more clear:
To resemble the Gothic heritage of England's most prestigious educational institutions, Oxford and Cambridge







Material Concept
Innovation
Technology

The detailed design as been carried out with a Czech firm called Spiral. A series of shots from the timpelapse shows the façade developing in layers.

The facade's innermost layer is top hung in rectangular panels where hey meet floor plates. But the structure is more complex in the large atrium. There are additional diagonal steel bracing when there is a double height or triple hight glazing. The panels are glazed, and the diagonal grids are clipped onto these panels both internally and externally. One of the most difficult challenges in this project had been to optimally accommodate expansion with the rectilinear panels and diagonal pieces expanding in different directions, as the maximum sizes that aluminum can be dipped to be anodized is limited by industrial procedures.

The building allows students to see for themselves how it consumes energy. Using workstations within the building or tablets, they can access data from sensors linked to a building management system. The system also enables the university to improve the building's operational efficiency in the longer term. This will help the university achieve its challenging target of reducing its absolute carbon emissions by 43% by 2020, relative to 2005, while accommodating rapid growth in student numbers. *Arup*

Architect I Architecte : Jean Prouvé

Engineer I Ingénieurs : Henri Hugonnet Armand Coppienne
Location I Localisation : Paris
Year of construction I Année de construction : 1954
Use I Usage : Temporary Exhibition

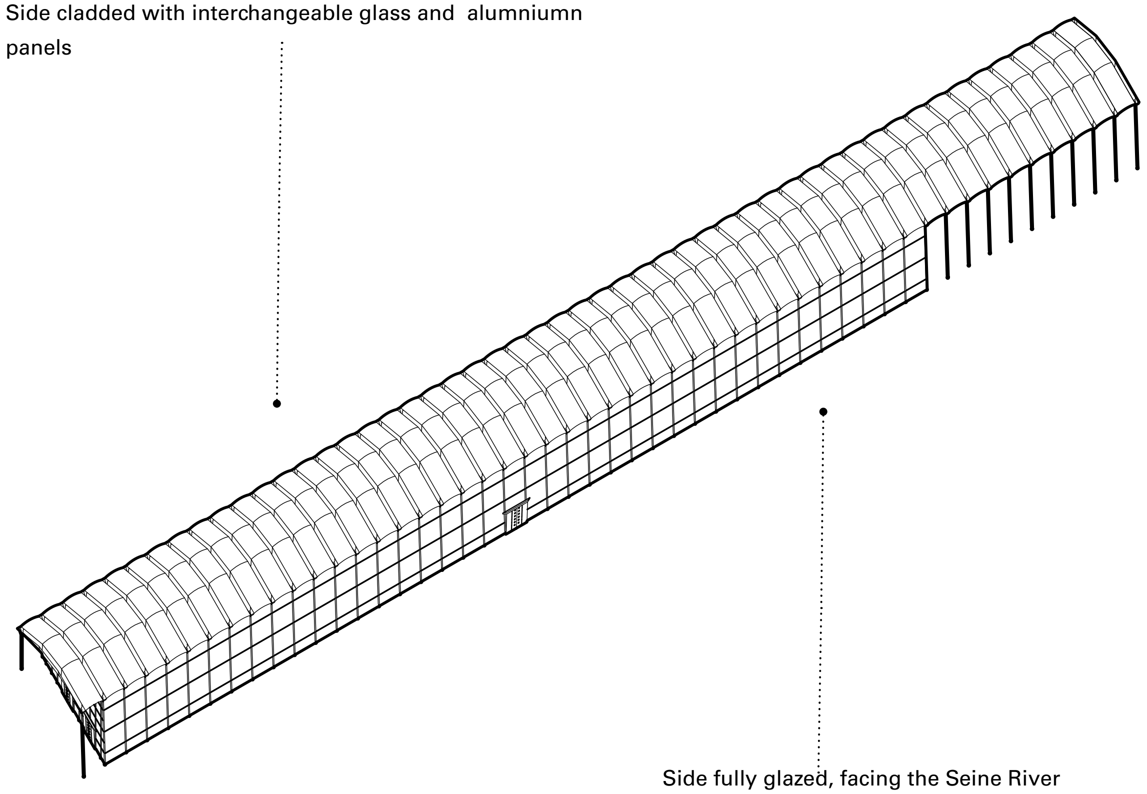
Total area I Superficie totale : 2250m²
Height I Hauteur : 8m
Number of floors I Nombre d'étage : 1
Floor plan area I Superficie d'un étage : 2250m²

Structure system I Système de structure : Aluminum Framework
Structure materials I Matériaux de structure : Aluminum
Envelope materials I Matériaux d'enveloppe: Aluminum Cladding

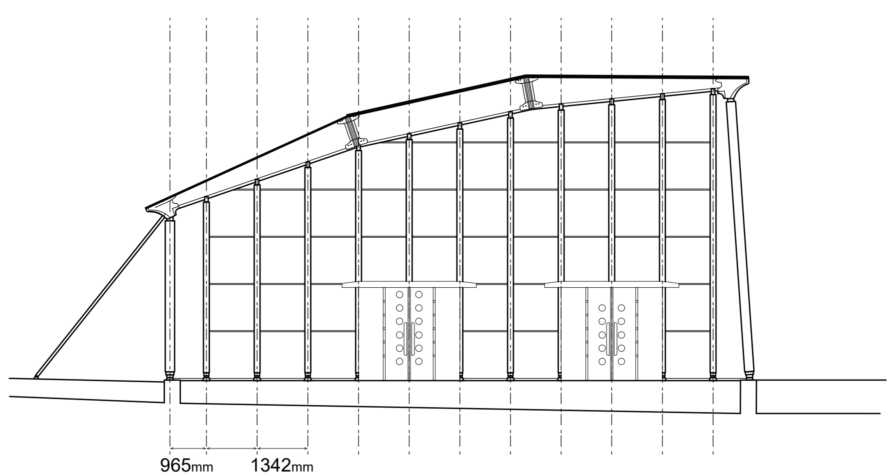
"He combines the soul of an engineer with that of an architect."
Le Corbusier

The Aluminum centenary pavilion, constructed in 1954, is designed as a temporary exhibition building by Jean Prouvé. Sited along the Seine River in France, the exhibition was to celebrate the centenary of the earliest chemical process for industrial aluminum production. Therefore, aluminum was chosen to be the main construction material to demonstrate the current technology of aluminum and its application in construction, focusing on the simple manufacture and easy assembly properties. Jean Prouvé designed the pavilion as an elongated form with the elevation facing the Seine river fully glazed. All the components in the building were structural and were exposed, each performed several functions. For example, the shell shed roof also acted as a gutter; the columns were also the mullions for curtain wall. This fully integrated system minimized the number of elements and avoided many interface problem, reduced material usage and simplified assembly operations.
The focused technology include use and shaping of sheets, drawn sections and various joint components and are all visible on the envelope. The U-shaped trusses on the roof were shaped by press folding and joined by cast shells. Space between the trusses were covered by aluminum sheets. The columns were drawn, hear-hardened sections made of ASG alloy and welded together. The total weight of the building was 60 tonnes and it took 21 days for assembly.

Axonometric | Axonométrie



Elevation | Elevation



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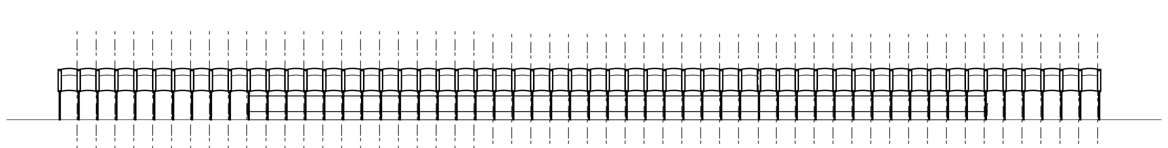
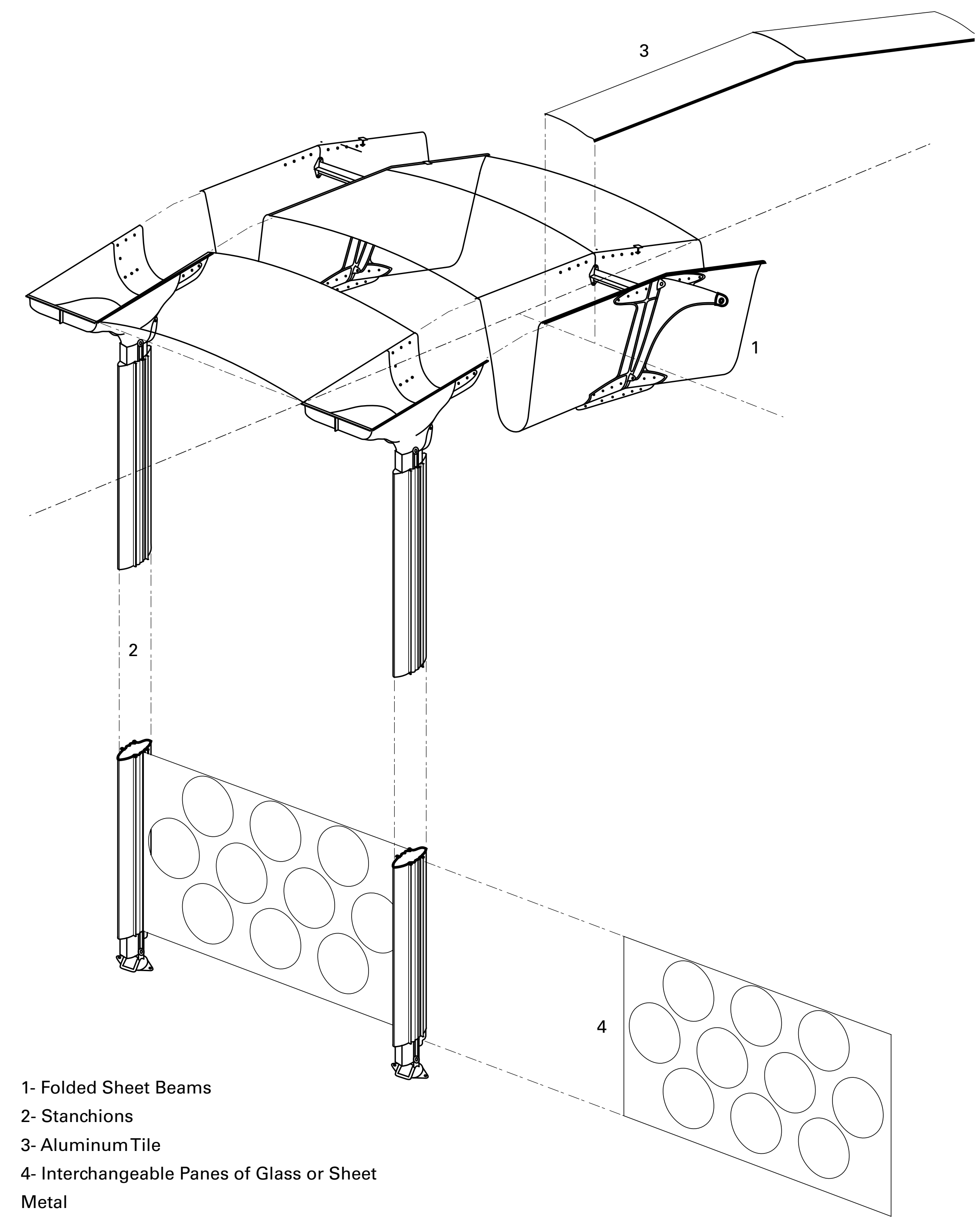


1:1200

Detail | Détail d’assemblage



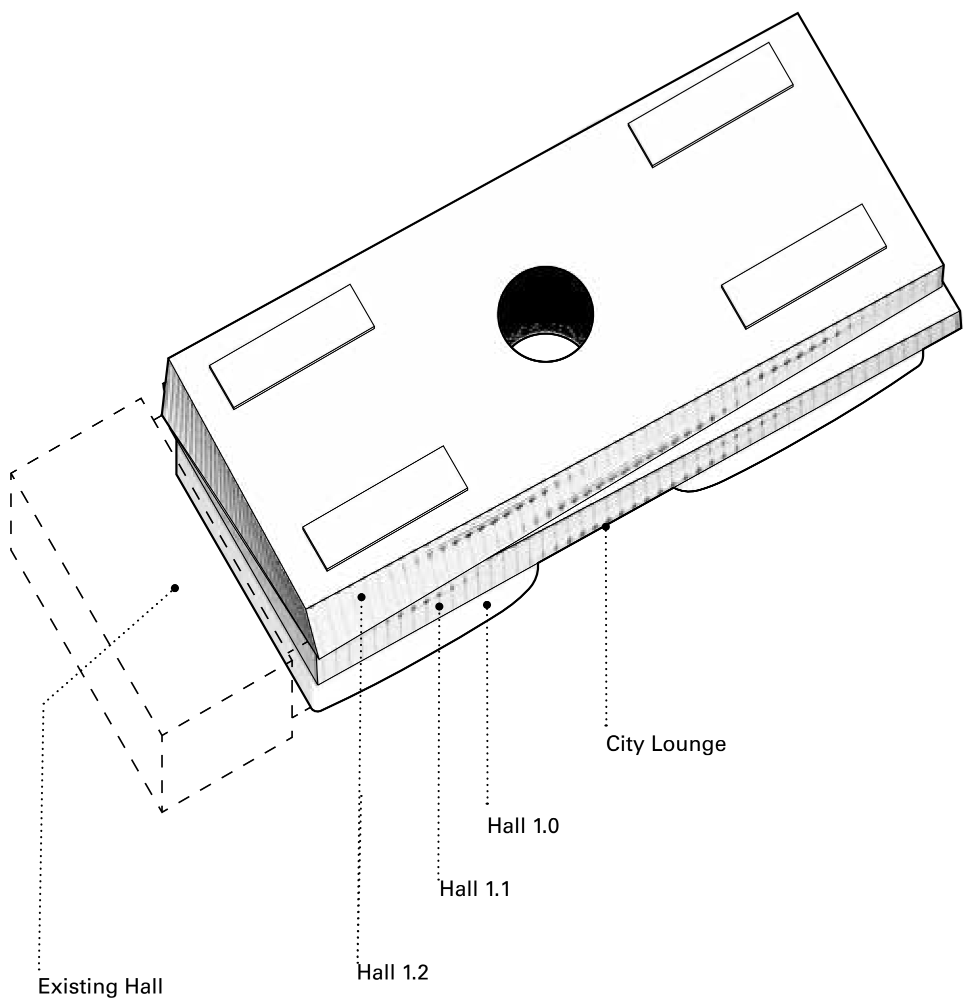
1- Folded Sheet Beams
2- Stanchions
3- Aluminum Tile
4- Interchangeable Panes of Glass or Sheet Metal

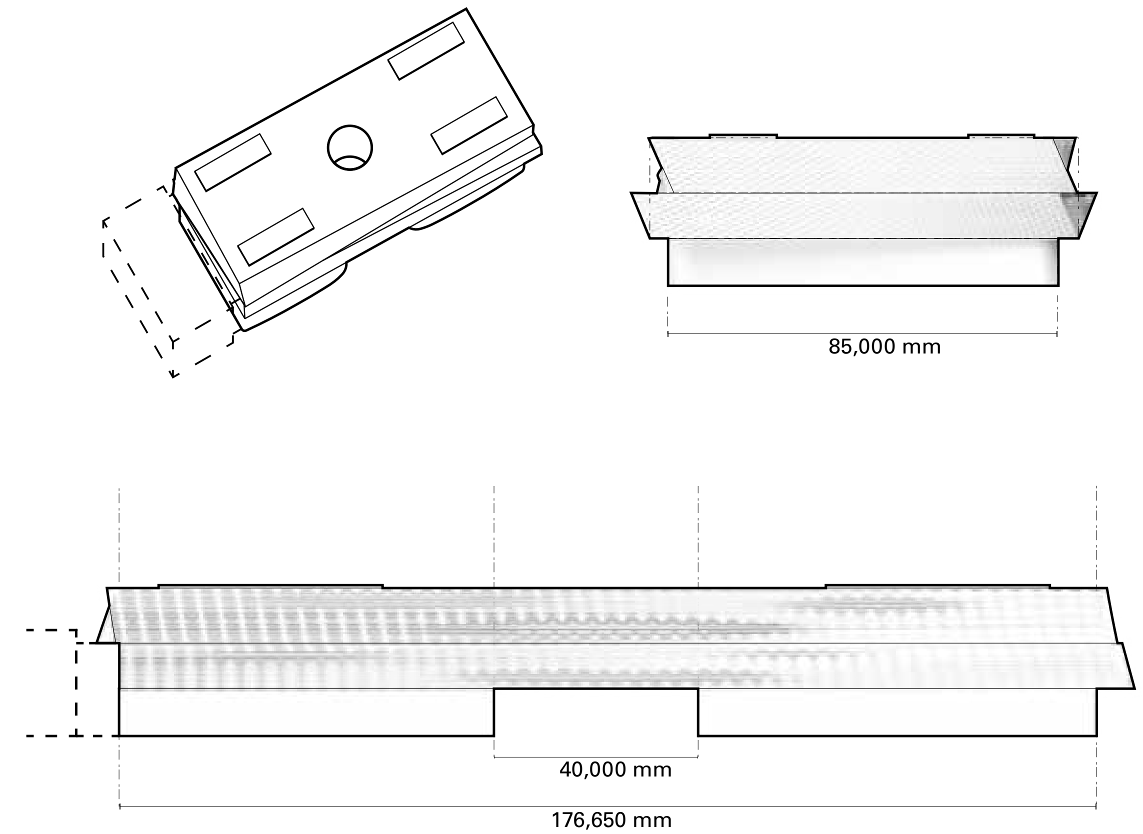
1:50

Architect I Architecte :	Herzog & de Meuron
Engineer I Ingénieurs :	Ribi+Blum AG Ingenieure und Planer
Location I Localisation :	Basel, Switzerland
Year of construction I Année de construction :	2010-2013
Use I Usage :	Exhibition Hall
Total area I Superficie totale :	83297 m²
Height I Hauteur :	32 m
Number of floors I Nombre d'étage :	3
Floor plan area I Superficie d'un étage :	9328 m²
Structure system I Système de structure :	Steel Frame and Precasted Concrete Beams
Structure materials I Matériaux de structure :	Steel and Concrete
Envelope materials I Matériaux d'enveloppe:	Aluminum and Glass

"They refine the traditions of moderism to elemental simplicity, while transforming materials and surfaces through the exploration of new treatments and techniques. "
Ada Louise Huxtable

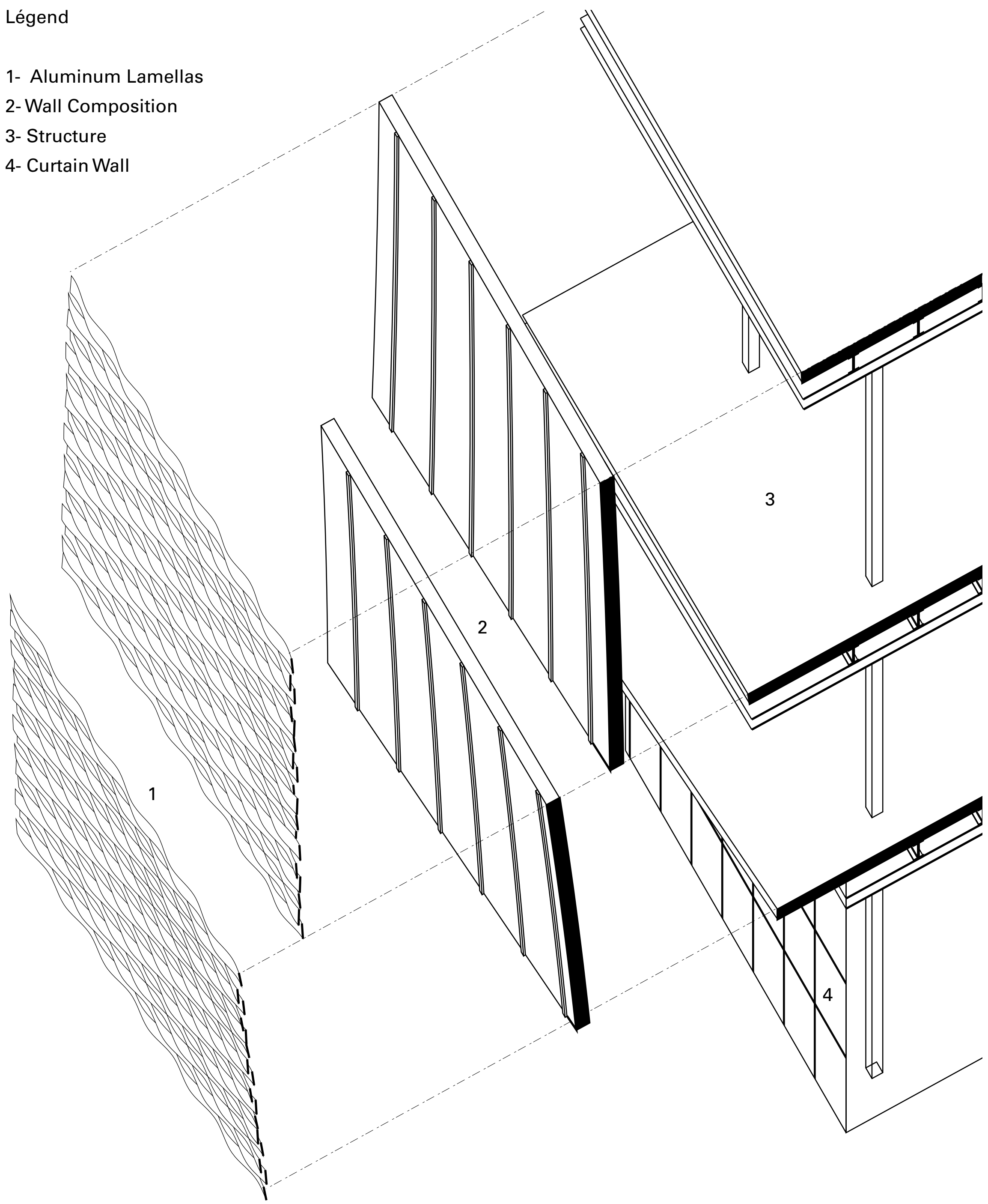
Messe Basel New Hall is one of the projects under the city's entrepreneurial strategy and is an important urban planning move for the development of the surrounding neighbourhood.
The design aims to create substantial exhibition spaces and to connect to the wider public landscape of the city.
Large volumes, uninterrupted floor areas and rectangular layouts are the practical usage demands to maximize the interior flexibility, hence the three 10-meter-high stacked boxes are designed. An east-west oriented thoroughfare accompanied with outdoor exhibition space cut the ground floor box into two separate volumes and links the Exhibition Square on the east with the residential area on the west. Named "the City Lounge", it is expected to enliven the street culture and become the focal point of public life and is illuminated by a big circular opening through the two upper boxes. To avoid the monotony of uniform facade lines, the two upper volumes are offset from each other, each projecting over the street in varying degrees, and allowing them to respond to different urban conditions. From each point of view the New Hall offers a different perception every time.


City Lounge
Hall 1.0
Hall 1.1
Hall 1.2
Existing Hall


85,000 mm
40,000 mm
176,650 mm

Légend

1- Aluminum Lamellas
2- Wall Composition
3- Structure
4- Curtain Wall



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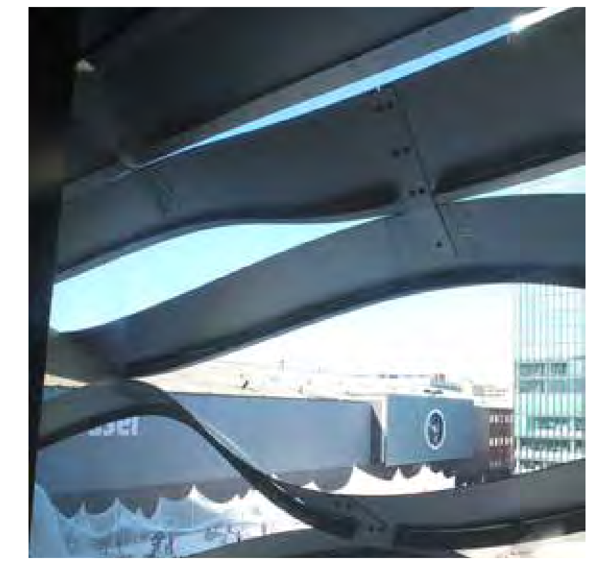
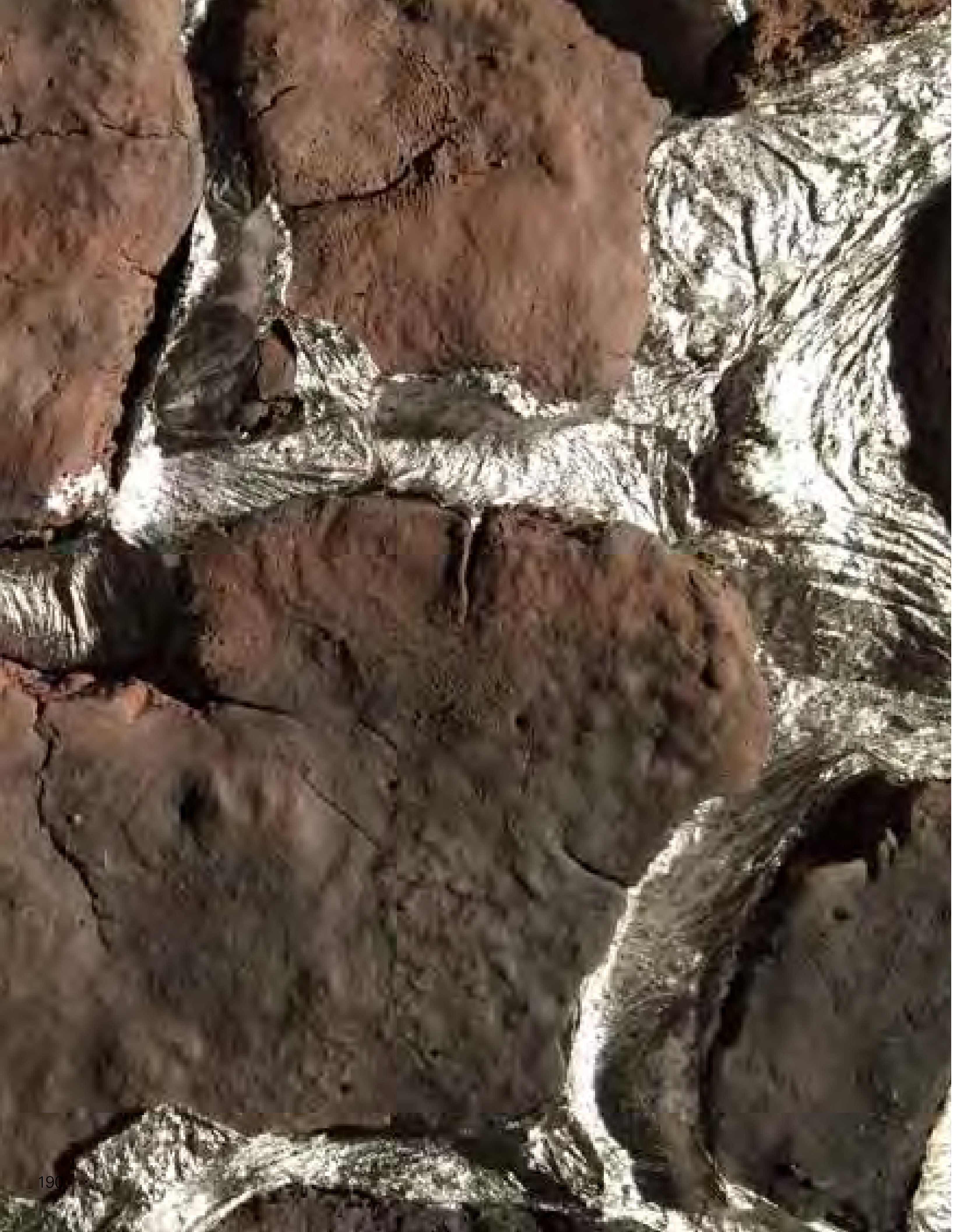


The glass facades on the street level create the spatial transparency necessary to achieve the openness envisioned for the exhibition hall complex and the enlivening of public urban life. The top two volumes are cladded with intricate woven aluminum design made of aluminum lamellas to modulate and reduce the scale of the large exhibition volumes to its surroundings, regulate natural light penetration and frame specific views from individual spaces towards the public life of the city.

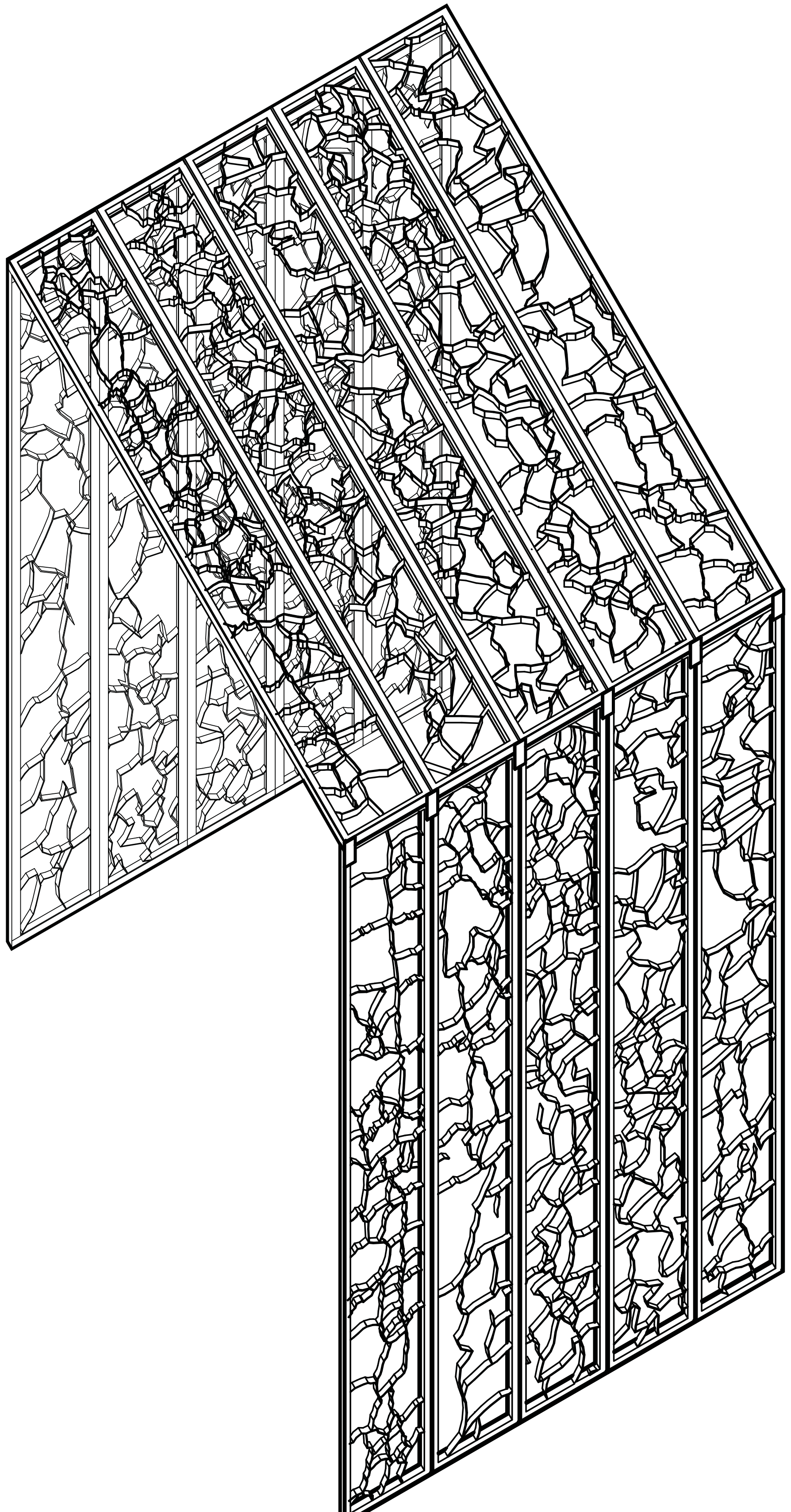
The aluminum lamellas are shaped to form gill-like openings. Though there are 15,000 individual rigid panels, the cladding reads as a single flexible element, a textile stretched taut over corners and slumping into gentle folds on the long elevations. The ribbonlike lamellas were cut and bent according to a parametric script that translated two-dimensional elevation designs into a three-dimensional model replete with all fabrication information, allowing fast revisions during design development.

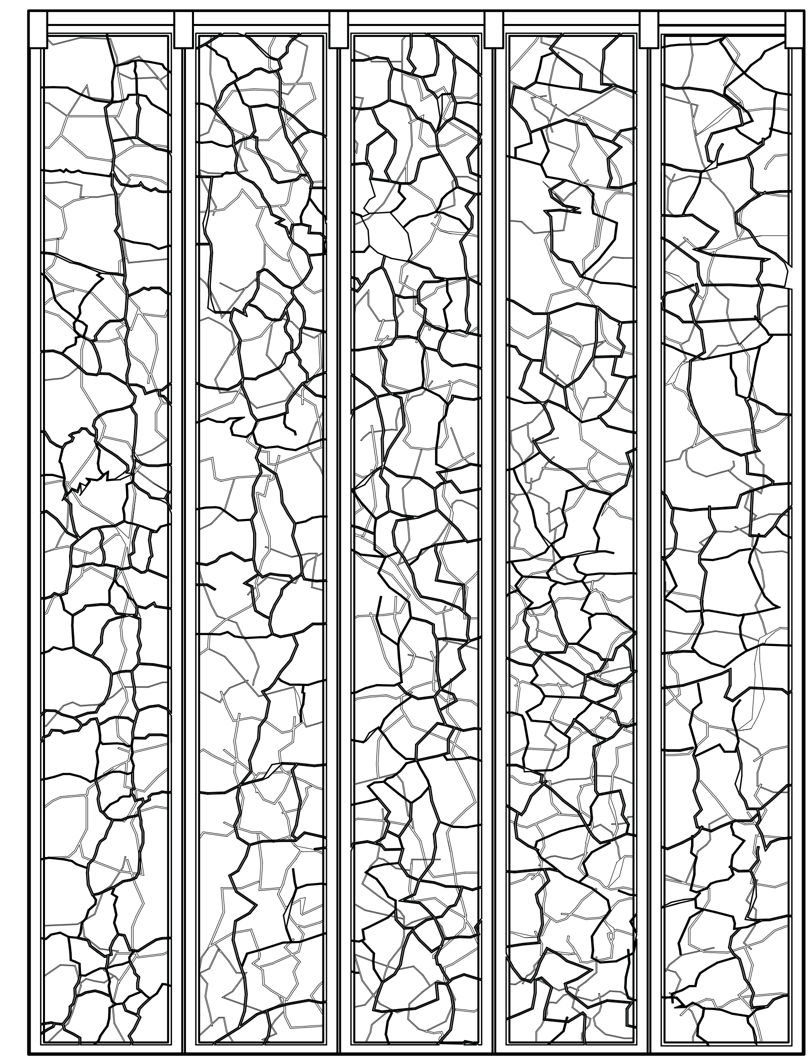


Architect I Architecte :	Team Aesop
Engineer I Ingénieurs :	Schlaich Bergermann Partner
Location I Localisation :	New York, New York, U.S.A
Year of construction I Année de construction :	2017
Use I Usage :	Pavilion
Total area I Superficie totale :	9 sqm
Height I Hauteur :	3 m
Number of floors I Nombre d'étage :	1
Floor plan area I Superficie d'un étage :	
Structure system I Système de structure :	Frame
Structure materials I Matériaux de structure :	Steel
Envelope materials I Matériaux d'enveloppe:	Cast Aluminum

Cast & Place was the winning entry by Team Aesop for the 2017 City of Dreams competition in New York city. The wining proposal was based off the theme of reusing materials to propose an alternative for future methods of design in New York city. Team Aesop's winning design was based around the process of melting down used aluminum cans and food containers that were cast into panels of cracked mud. Once the panels were formed they would be attached together to create a small pavilion on Governors Island. When the pavilion closed the panels would be deconstructed and converted into benches for future use, reinforcing the idea of reuse of materials in the city.

The process of creating the panels started with mud being placed into large reclaimed wood frames. The filled frames were then dried in the sun over the course of ten days to form large cracks similar to the surface of the desert floor. The cracked mud is then transferred into steel molds, so the forms can be secured with sheetrock and cement. Once the steel mold is prepared the molten aluminum can be cast into the cracks, creating the panels for the pavilion. Unlike the proposed design the team was unable to use recycled aluminium products because it produced an alloy that was unpredictable and inconsistent. For increased stability the pavilion's panels were created with melted aluminium ingots that were then secured together with a steel frame. The final element of the pavilion's design was the embedding of mud filled frames beside the structure, so cracks could form over time as the pavilion is used.





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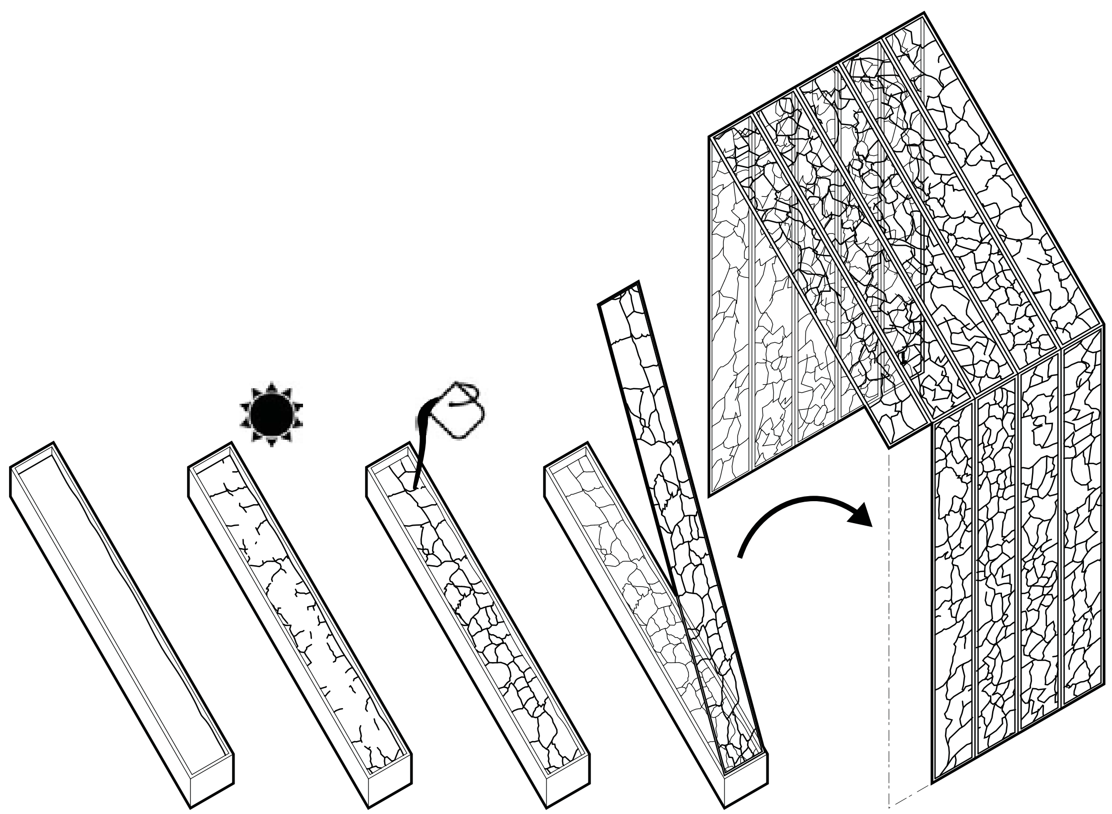
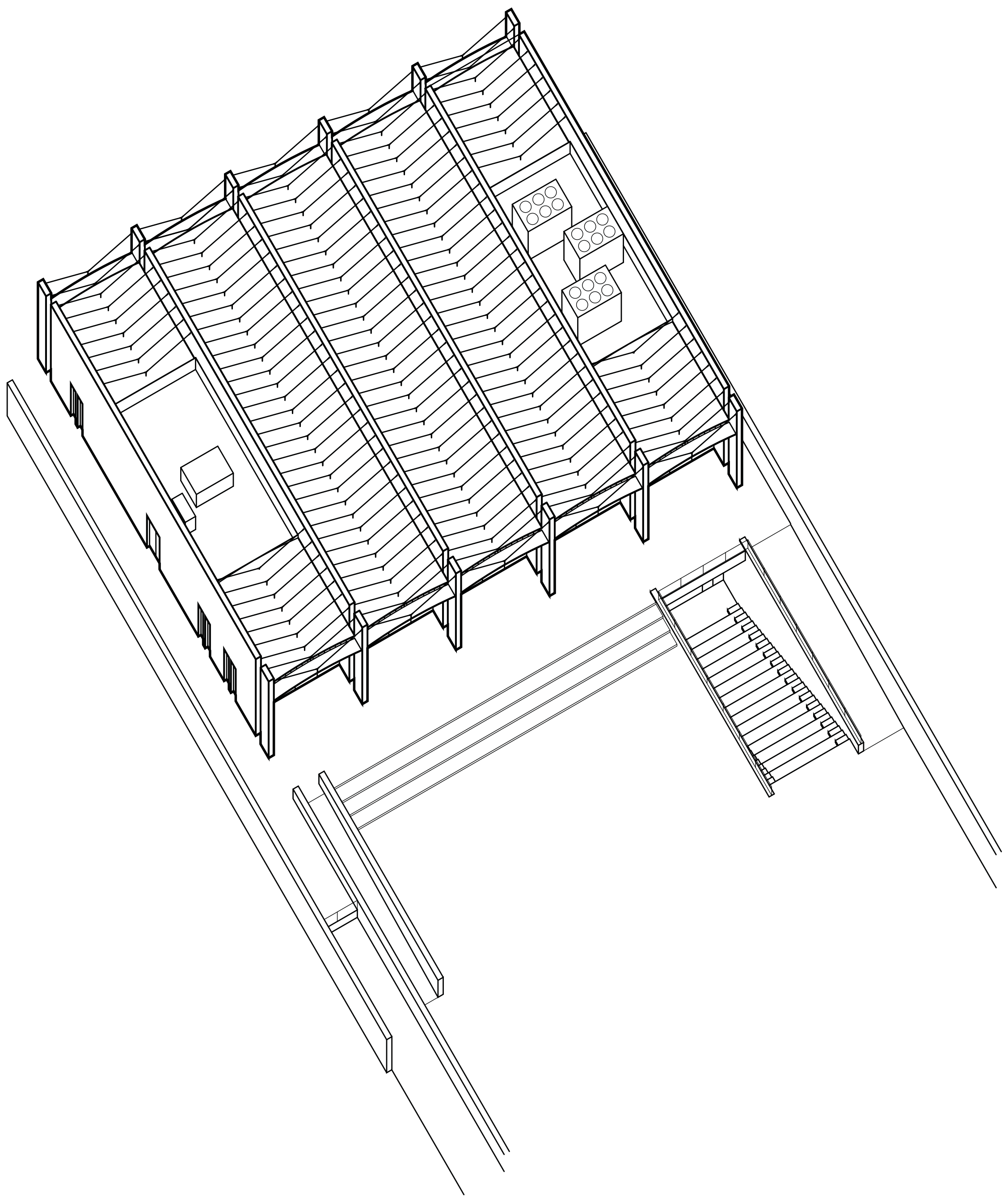


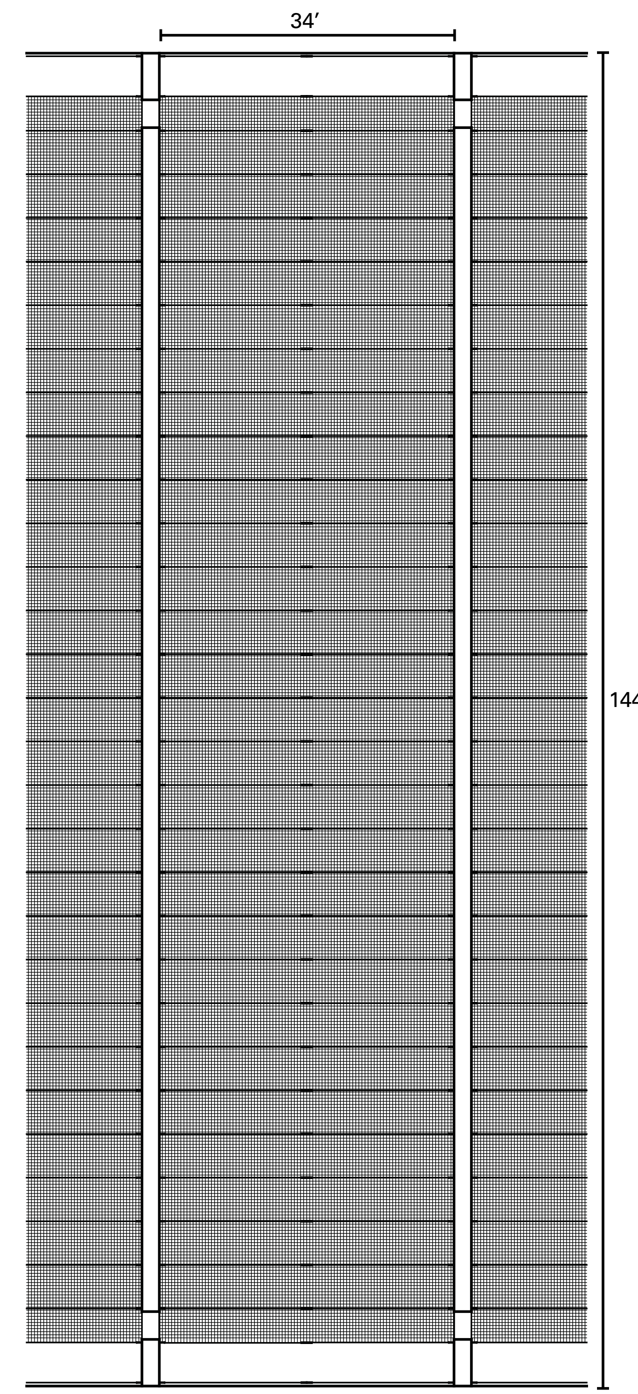
1- Frames filled with mud
2- Mud dried to crack
3- Cracks filled with molten aluminum
4- Hardened aluminum extracted and attached to steel frames

Architect I Architecte :	Renzo Piano
Engineer I Ingénieurs :	Ove Arup & Partners
Location I Localisation :	Dallas,Texas, U.S.A
Year of construction I Année de construction :	1993-2003
Use I Usage :	Museum
Total area I Superficie totale :	5,100 sqm
Height I Hauteur :	11 m
Number of floors I Nombre d'étage :	2
Floor plan area I Superficie d'un étage :	2,300 sqm
Structure system I Système de structure :	Tensile
Structure materials I Matériaux de structure :	Steel
Envelope materials I Matériaux d'enveloppe:	Cast aluminum, glass and travertine

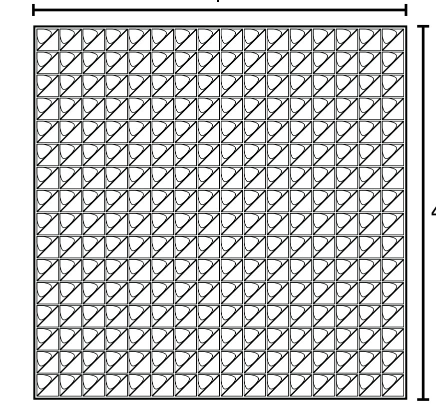
The Nasher Sculpture Center is located in Dallas,Texas and holds the private collection of Raymond Nasher, a prominent real-estate developer. The museum was designed around the concept of transparency and openness which is created by the large glazed front and rear facades and the glass roof above the gallery spaces. The large glazed openings create a visual connection between the street and the treed sculpture garden at the rear of the building, permitting views to the collection of over 300 artifacts. The fully glazed ceiling creates a rich naturally lit gallery space which contrasted older museums such as the Kimbell Museum by Luis Kahn which are viewed as being heavy solid masses.
The idea of lightness was also reinforced in the project with the thickness of the roof assembly. To make the roof feel light and airy, a very thin section was created using an array of tensile supports that are anchored to a steel structure hidden inside the travertine walls. The tensile structure is located on the exterior of the building reducing the assembly's thickness, creating a minuscule roof plane on the building's elevation.

Aluminum shading elements were placed on the exterior of the roof's glazing to ensure the artifacts were not damaged by the harsh sun and to reduce solar heat gains. The shading device is created by cast aluminum shells that have openings which are oriented due North, permitting only indirect lighting for the majority of the day.



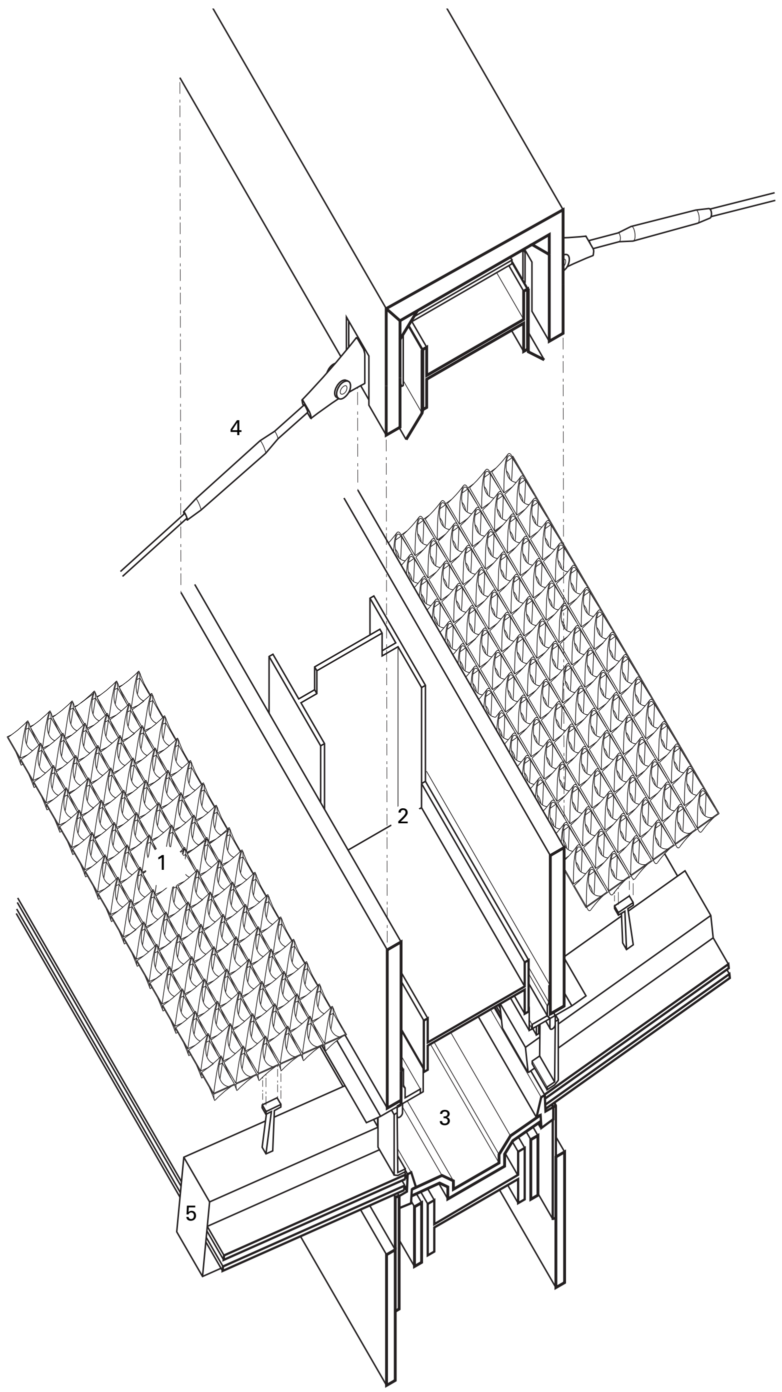


Partial Roof Plan



Cast Aluminum Shade Panel

1:250 | 1:25

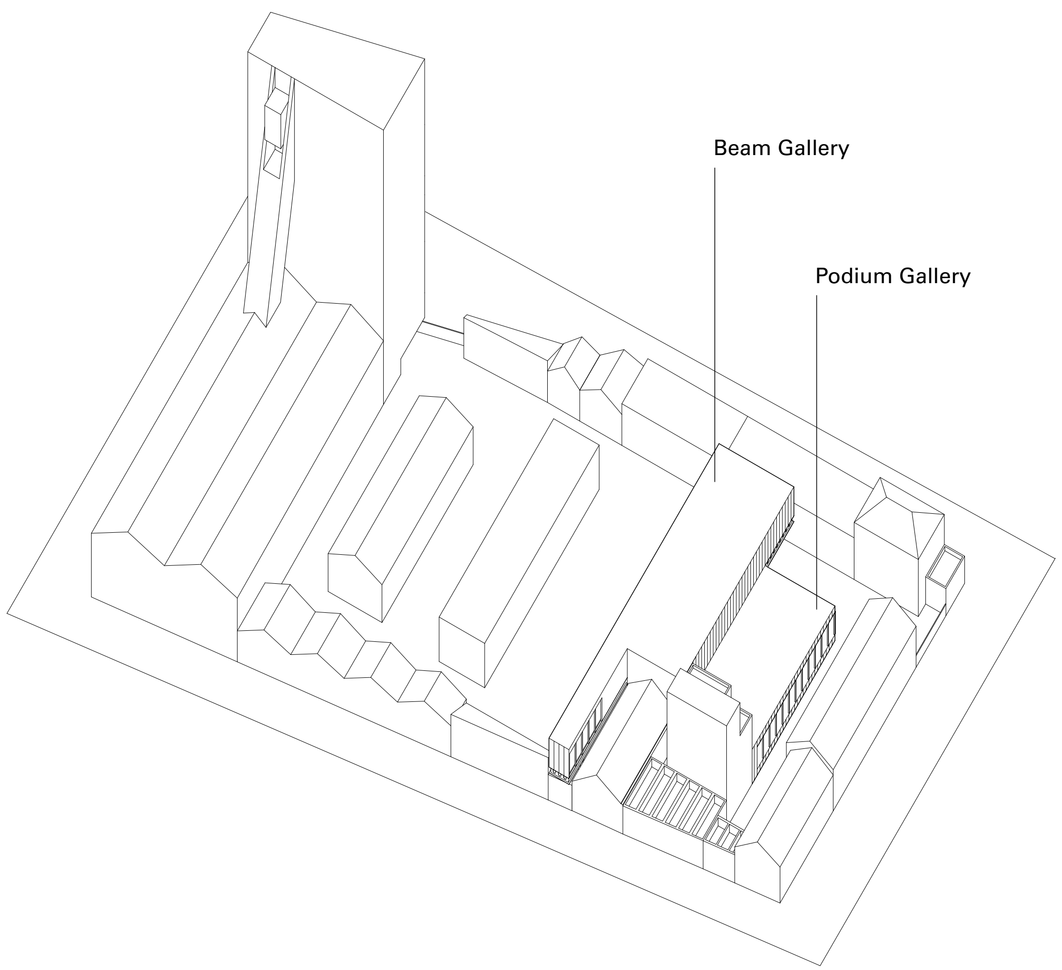


1- Cast Aluminum Shade
2- Steel Structure
3- Gutter
4-Tensile Cable
5- Double Glazing

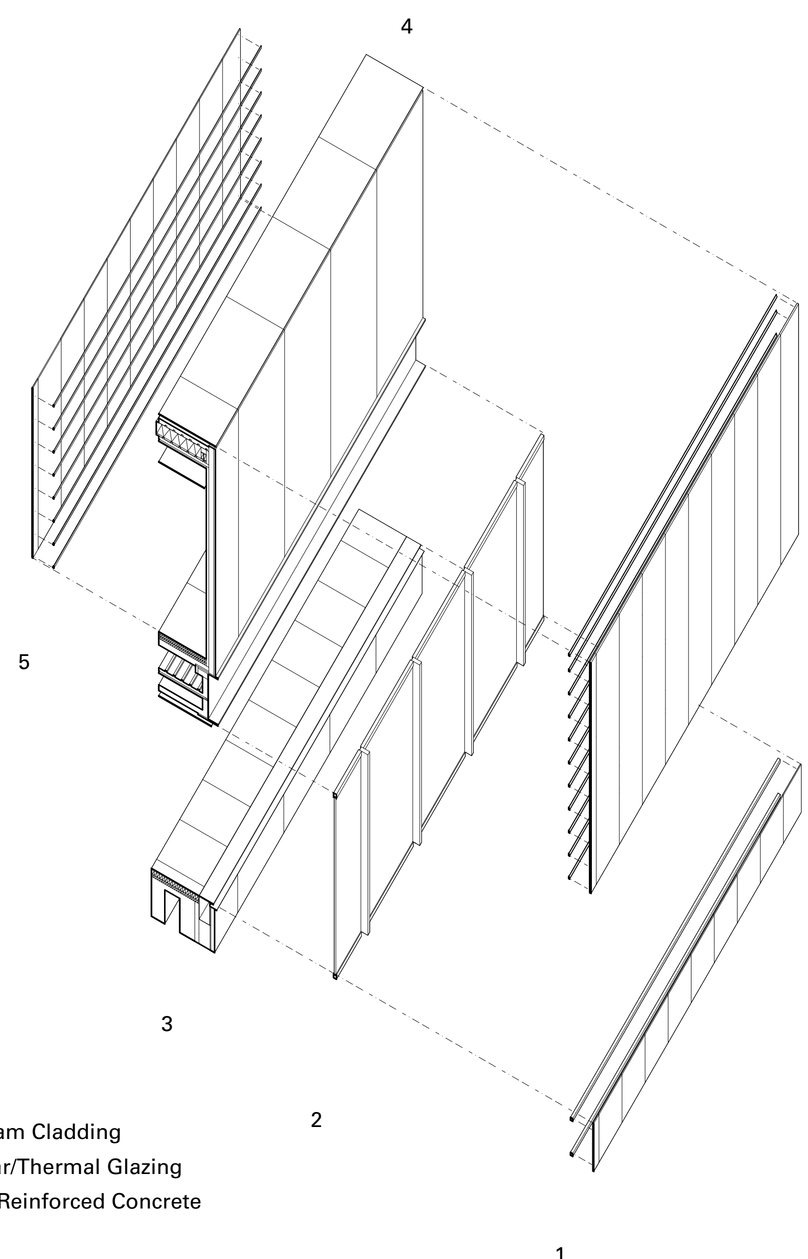
The shading device is created by cast aluminium shells with a baked on pvf2 coating measuring three inches in size. The shell's shape is derived through the combination of a square base and a sinusoidal curve. Engineers used computer software to modify the sinusoidal curve by removing only the segments that were not hit by direct sunlight, thus reducing the amount of light that enters into the museum. The shell is arrayed in four-foot square sheets to decrease the amount of fabrication and instillation needed. The panels are mirrored along their horizontal axis and rotated 180^{o} to create each module of the shading system. The shade itself is elevated above the glazing on clips to allow for air circulation below the aluminium to help cool the panels, reducing the heat transfer to the mullion system below. In total the roof has over half a million shells weighing approximately forty grams each.

Architect I Architecte :	OMA
Engineer I Ingénieurs :	Favero & Milan
Location I Localisation :	Milan, Italy
Year of construction I Année de construction :	2009–2018
Use I Usage :	Museum / Gallery
Total area I Superficie totale :	28 340 m²
Height I Hauteur :	4 m
Number of floors I Nombre d'étage :	2
Floor plan area I Superficie d'un étage :	1417 m²
Structure system I Système de structure :	Steel frame and reinforced concrete with hollow supports
Structure materials I Matériaux de structure :	Steel / concrete
Envelope materials I Matériaux d'enveloppe:	Aluminum foam

The Fondazione Prada's 19,000m² campus combines the restoration of 7 existing buildings along with the design of 3 new structures: the podium gallery, a multi-media cinema/auditorium, and a tower for the foundations larger collection and events. The combination of twentieth-century style industrial buildings next to newly erected exhibition spaces creates an exciting assemblage of spaces.
Following OMA's use of PVC foil and plastic foams in Prada's temporary pavilions in Korea, OMA developed a new cladding material for use in the design of the Ideal Museum in the new complex. The Ideal Museum, also known as the podium and beam galleries, was designed as a new exhibition space to house the Foundations rotating exhibits.
The buildings figure consists of two main volumes including a fully glazed level sitting on the ground and a fully clad volume resting on top. The structure consists of reinforced concrete and hollow steel supports with columns inset from the buildings edges to free the envelope from bearing loads.
The newly engineered cladding for the building's exterior and interior spaces consist of stabilized aluminum foam. The panels used are 1 to 1 ¾ inches thick with three different sizes of open cells. The material is employed extensively in the building, used as floor finishes, wall and ceiling panels, exterior cladding, and as a roofing material.

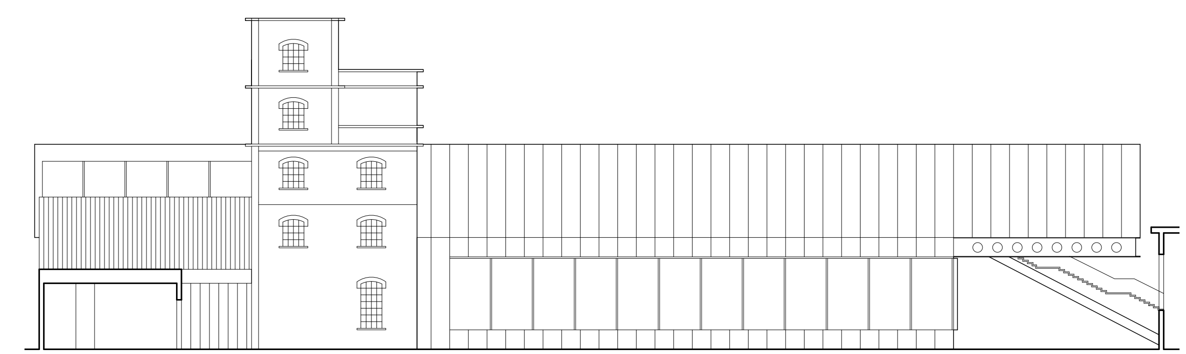


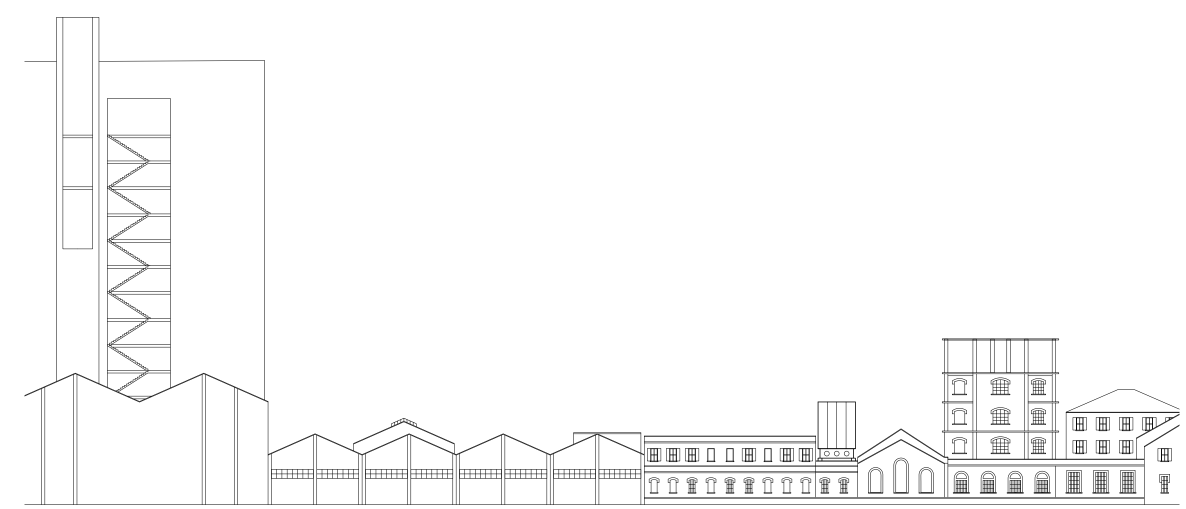
1:200 / 1:1000



Legend

1- Aluminum Foam Cladding
2- Anodized Solar/Thermal Glazing
3- Steel Frame / Reinforced Concrete Structure
4- Aluminum Foam Panel Siding
5- Aluminum Foam Roof Panels
1:200





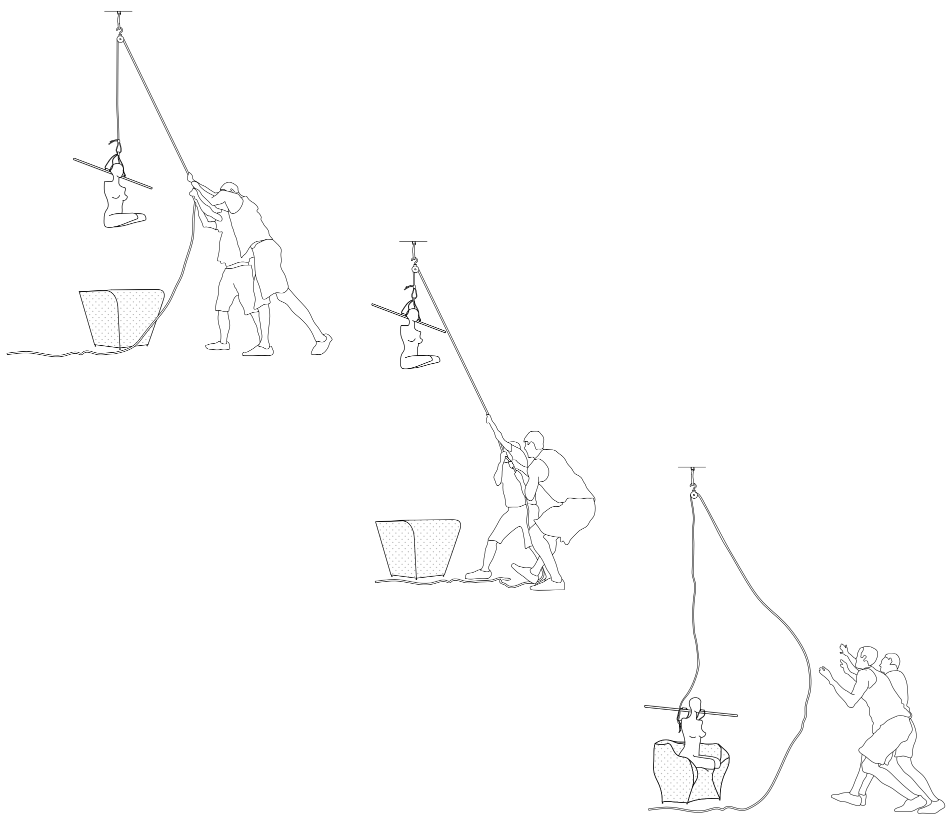
The cellular cast aluminum foam panels are made from injecting gas into molten aluminum. The gas contains ceramic particles that stabilize the bubbles during the cooling/hardening processes after which the liquid is solidified to a solid foam. Panels can be formed into sheets or cast into three dimensional forms.They are 100% recyclable, acoustically absorbent, non-combustible, corrosion resistant, lightweight, and wind load resistant up to 356km/hr.

Although patents for aluminum foams date back as far as the 1940s, their application during this time is largely unknown. Since the 1980s engineers have revisited the use of foamed aluminum in military and automotive applications taking advantage of their lightweight and impact-absorbent properties.

Architect I Architecte :	FREE FALLING CHAIR
Engineer I Ingénieurs :	
Location I Localisation :	Architect : Tarazi Design Studio
Year of construction I	Engineer : –
Année de construction :	Location : Tel Aviv, Israel
Use I Usage :	Year of construction : 2011
	Use : Furnishing
Total area I Superficie	
totale :	Total area : –
Height I Hauteur :	Height : .066m
Number of floors I	Number of floors : –
Nombre d'étage :	Floor area : –
Floor plan area I	
Superficie d'un étage :	
	Structural system : –
Structure system I	Structural materials :
Système de structure :	Perforated Aluminum
Structure materials I	Envelope materials: –
Matériaux de structure :	
Envelope materials I	
Matériaux d'enveloppe:	

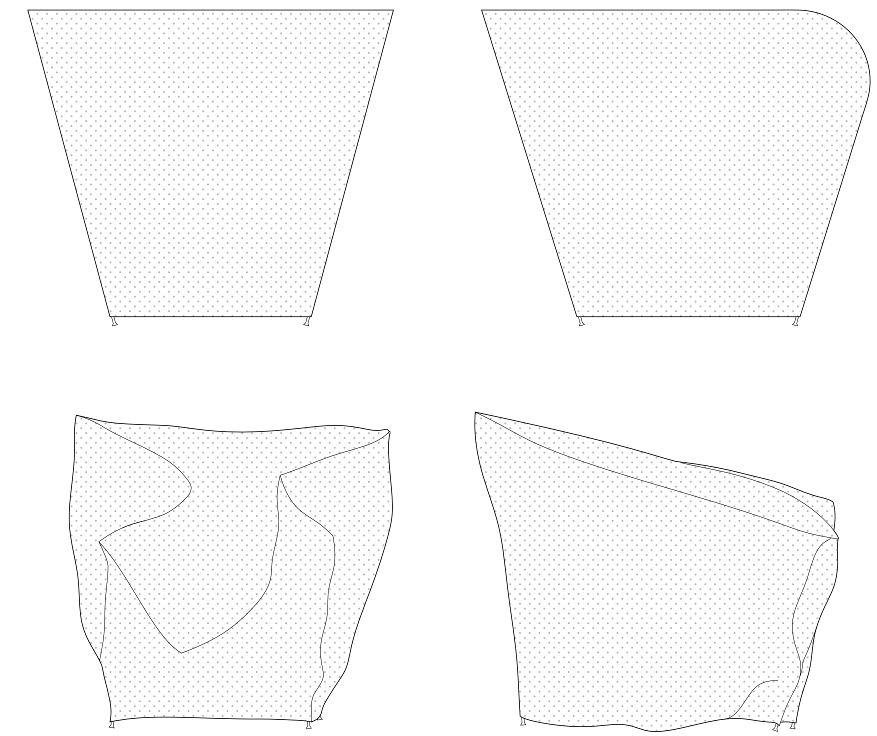
"the human is tool to create the chair [...] sooner or later the moral and ethical contradictions of the human [condition] will break into a big fall.. "
Ezri Tarazi

Historically speaking, chairs and other furnishings are designed and physically fabricated through the use of tools and other industrial processes. The free-falling chair designed by Ezri Tarazi challenges this model by creating a chair that is formed by the physical impression of the human figure.
The fabrication process begins with single perforated metal sheet that is folded into a trapezoidal volume and welded at the seams. A mannequin, in place of a proper human, is filled with 100kg of concrete and raised 5m above the ground. The entire apparatus is hoisted by two men using a rope and a pulley and is abruptly dropped so that the mannequin's fall is broken by the chair. The impression of the collision leaves an imprint of the plastic figure creating the appearance of a typical chair.
The metal itself is .3mm thick and can support the weight of typical chair.
The entire process was carried out only three times, with subsequent versions being powdercoated in white and red.



Manufacturing

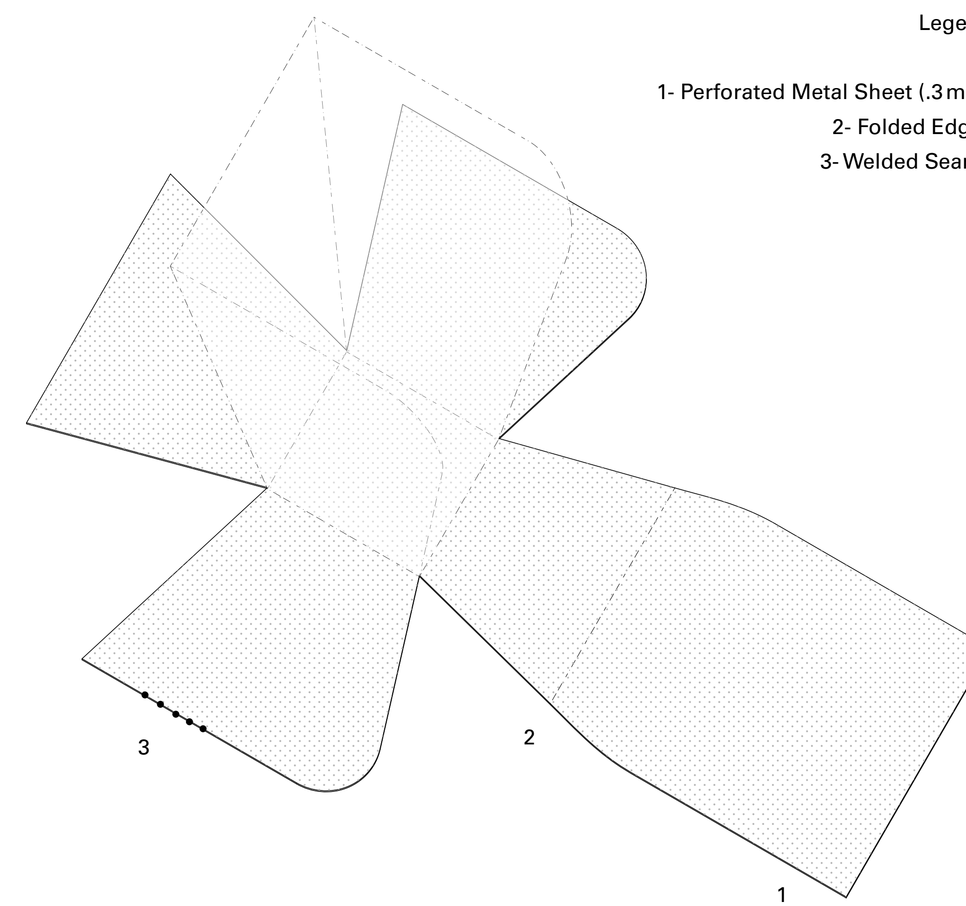
The mannequin was dropped three times before it cracked and broke, thereby limiting the manufacture to three chairs in total.



1:200 Front & Side Before | Front & Side After

Legend

1- Perforated Metal Sheet (.3mm)
2- Folded Edges
3- Welded Seams



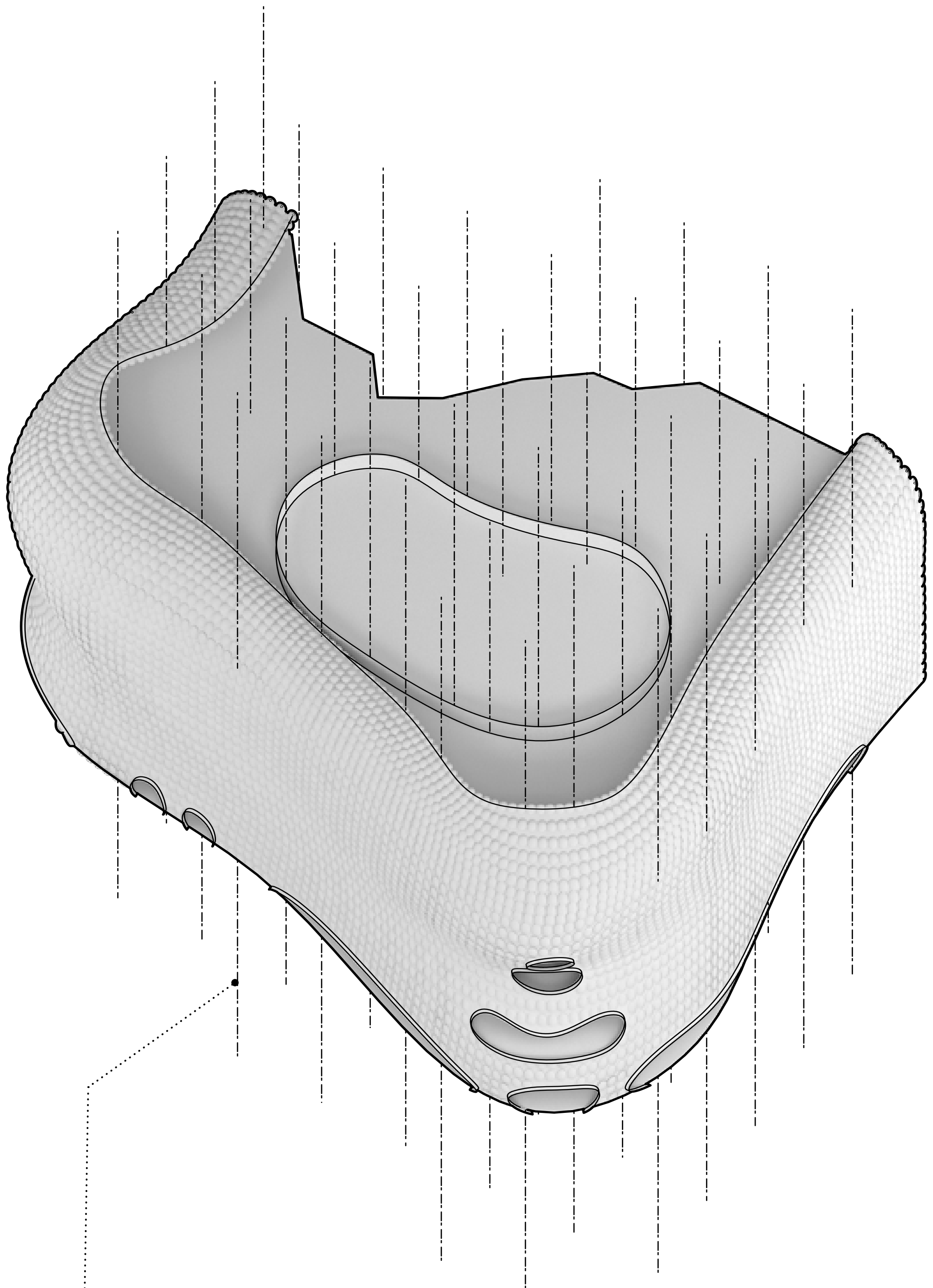
1:50
Detail | Détail d'assemblage

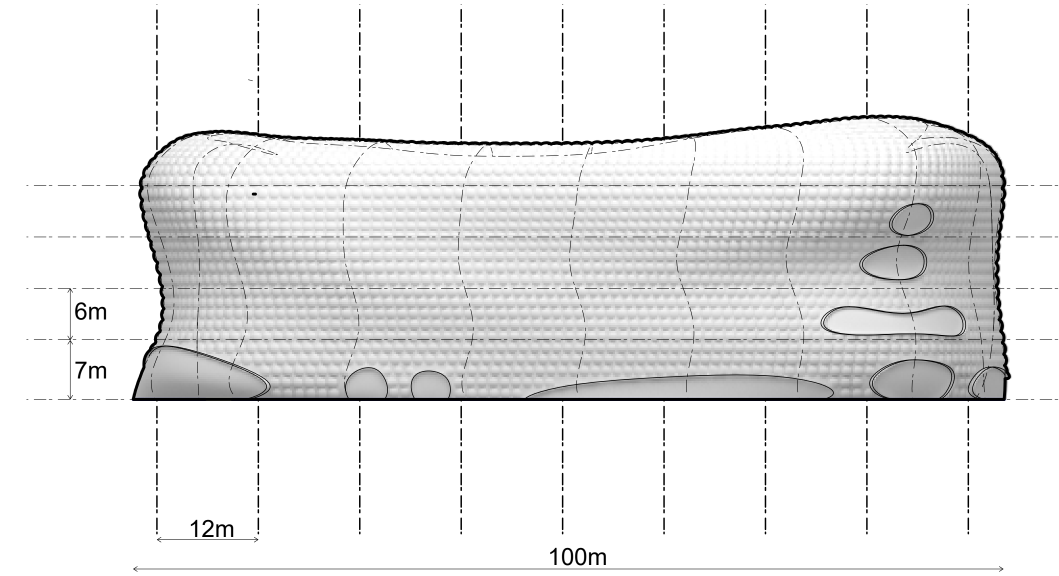
Architect I Architecte :	Future Systems
Engineer I Ingénieurs :	ARUP
Location I Localisation :	Birmingham, England
Year of construction I Année de construction :	2003
Use I Usage :	Retail
Total area I Superficie totale :	89,184m²
Height I Hauteur :	31m
Number of floors I Nombre d'étage :	6
Floor plan area I Superficie d'un étage :	14,864m²
Structure system I Système de structure :	12x12m Steel Frame work
Structure materials I Matériaux de structure :	Steel
Envelope materials I Matériaux d'enveloppe:	Sprayed Concrete with Anodised Aluminum Discs Cladding

The building is a romantic metaphor machine, stimulating its creators and critics to call it a dress, a diamante bustier, a boulder, a sea monster, an alien, a cloud, even an insect's eye" Metropolis 125

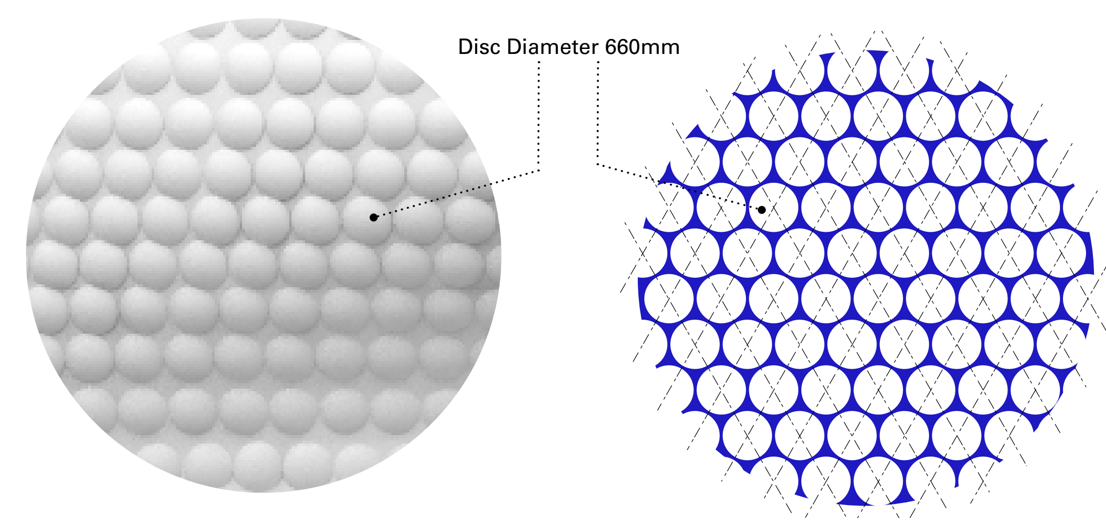
The incentive of Selfridges Birmingham building is to explore new possibilities of retail architecture and to create exciting state-of-art retail space. Future System envisioned the design as a building form that fit its diverse context while meet Selfridges's pursuit of curvature.

Integrating high architectural inspiration, complicated brief, and demanding budget, the project was set to be an engineering and design challenge. Due to its organic form, many designs such as structure, facades etc had to be reconsidered. One of the major solutions to achieve balance between building engineering and architecture design was to construct internal steel grid which was constituted by strategically placed columns that have minimum impact to architectural integrity. Selfridges's strict requirement of not incurring high construction cost on curved geometry of the facade of the building was another issue. Sprayed concrete was proposed as the ideal solution because of its characteristics of formability and cost-effective. By relying on the expanded metal mesh as a permanent framework, sprayed concrete can be shaped according to demanded geometry and sprayed to certain but appropriate thickness in order to hold its own form and resist wind loads without the need for support sub-framing. The final design is comparable, on cost terms, with the more traditional metal and glass façades of the adjacent buildings.

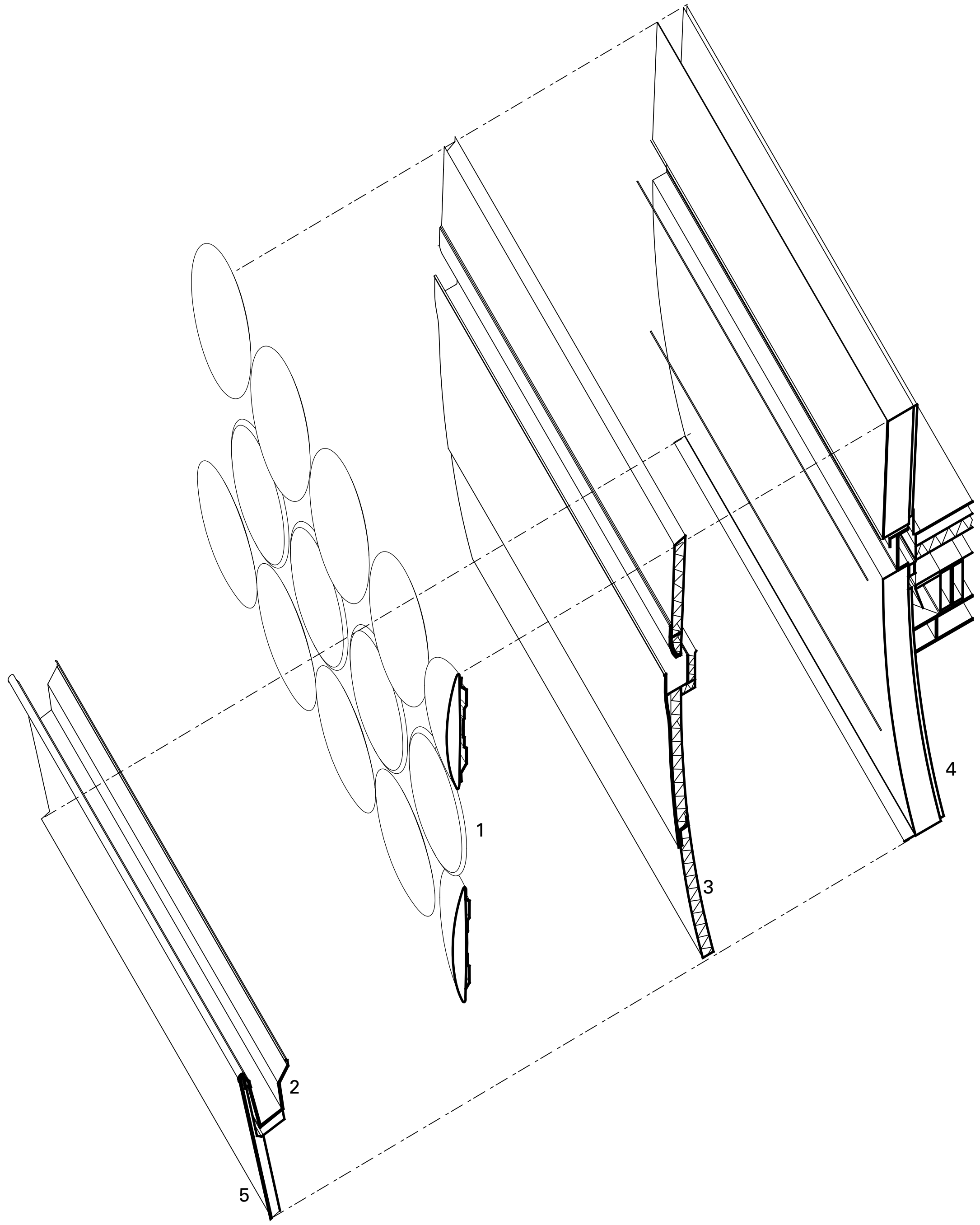




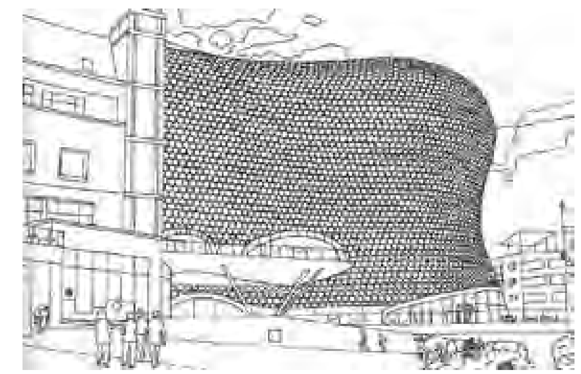
Elevation 1:200

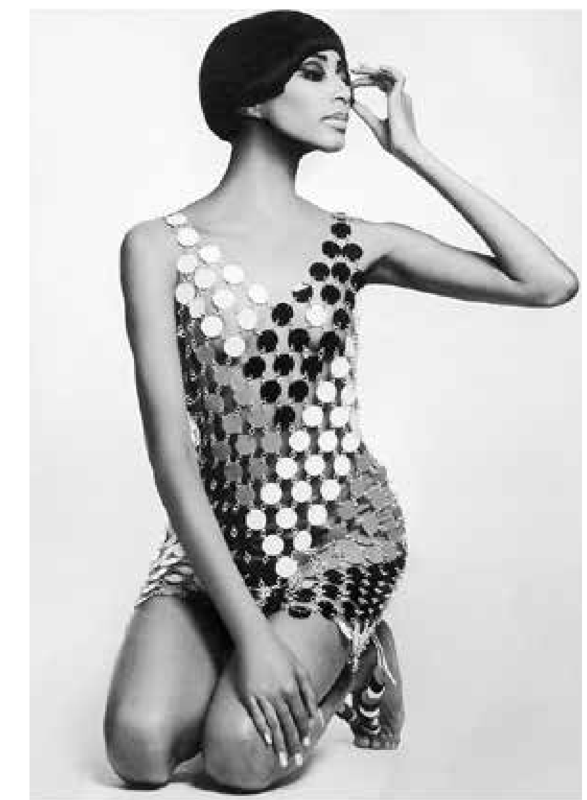


Pattern Detail 1:200



1- 660 mm dia. aluminum disc polished anodised
2- aluminum gutter
3- 75mm insulating mat
4- 175mm sprayed concrete with 30mm plaster
5- polished stainless-steel panel





The striking facade, which is decorated by 15,000 spun anodized aluminum discs, was inspired by the famous 1960s chainmail Paco Rabanne dress, and its organic form intends to express the silhouette of a woman. Some regards this quirky style of architecture as blobtecture, a colloquial term to describe buildings with organic form or curved and rounded shapes. The discs are set against the background of Yves Klein Blue of which the hue was created by French artist Yves Klein in 1962.

Designer I Designer : Charlie Davidson

Location I Localisation : Milan
Year of construction I
Année de construction : 2007-2008
Use I Usage : Furniture

Structure system I
Système de structure : Chair frame
Structure materials I
Matériaux de structure : Medium-density fibreboard
Envelope materials I
Matériaux d'enveloppe: BlackWrap

Charlie Davidson, the designer of The Crunk Chair and The Black Light, has long term experience in film and television industry as an art director and prop builder in 90's, which made him intend to stay late to dismantle and remove the set from the studio. One thing he noticed while lying on the floor was all the discarded black painted aluminum foil used by lighting technicians. The aluminum foil was mouldable enough to hold different shapes which he thought as the perfect material to create a piece of furniture.

Before he created The Crunk Chair, the sculptural creation of The Black Light made by completely matt black aluminum foil was also inspired by the same concept and observation of the material character. In 2008, Charlie Davidson crafted two Crunk Chairs for Milan Furniture Fair. A piece of 6m square black aluminum foil sheet was placed over a common chair frame made of MDF, then the aluminum foil sheet was moulded along the frame to create the shape. Minor adjustment of the form depended on sitting on the surface. Finally, the chair was turned upside down, and filled the void between the chair and aluminum foil with expanding polyurethane foam.

The Crunk Chair
Process I Processus

BlackWrap, which is made from aluminum foil, is a recyclable material. Researches illustrates the possibilities of anodizing or painting aluminum foil.The approaches has been proved that would be very costly and not as durable as would be required.

There are processes for coating aluminum foil with colour to be used in cooking. The coatings are durable, can endure high temperature, and are safe to use. However, GAM's intention was to find black coating process that could create matte black hue, instead of shiny. Collaborating with aluminum manufactures, GAM invented BlackWrap in 1983 that was the first and original black foil for motion picture, television and theatrical use.

There are cheaper ways for coating aluminum foil, however they are usually not durable as the BlackWrap technique. It has been tested under 1000 °F before the paint starts to turn brown.

Blackwrap does not flake. Similar products made with cheaper process cannot withstand under the same temperature, and are not able to remain matte black compared to BlackWrap. Flake-off Black coatings can be disastrous in film shoots and very annoying due to the shine.

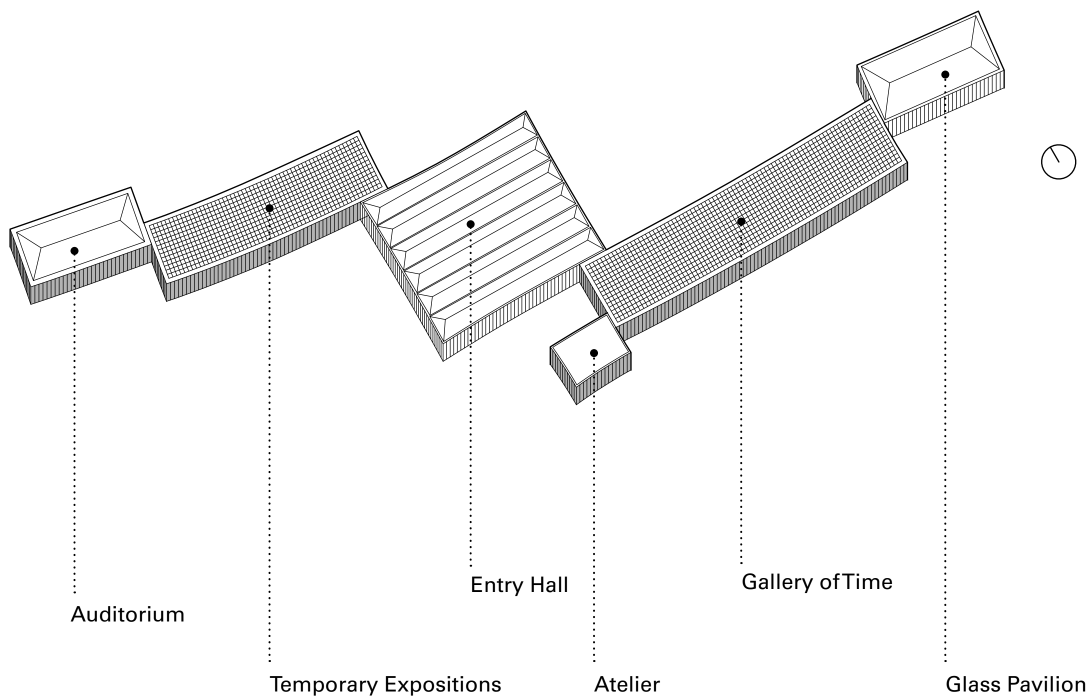
Architect I Architecte :	SANAA, Imrey + Culbert
Landscape:	Mosbach Paysagistes
Engineer I Ingénieurs :	Betom Ingénierie (structure); Arup (ligh) Bollinger + Grohmann (facade)
Location I Localisation :	Lens, France
Year of construction I Année de construction :	2012
Use I Usage :	Museum / Gallery
Total area I Superficie totale :	11,950 m^2
Height I Hauteur :	7m
Number of floors I Nombre d'étage :	1 (+ basement)
Floor plan area I Superficie d'un étage :	25,411 m^2
Structure system I Système de structure :	Cast-in-place walls; Steel roof structure
Structure materials I Matériaux de structure :	Concrete, Steel
Envelope materials I Matériaux d'enveloppe:	Double-glazed curtain walls; Insulated concrete walls w/ Wnodized aluminum cladding; Insulated and glazed steel roof

"This area has a special kind of light ... the light is colder ... The reflections of the exhibits as well as of the visitors on the aluminum walls lead to a special relationship between observer and object. "
Kazuyo Sejima

The Louvre-Lens is an annex of the Louvre Paris initiated by the French government as part of a project aiming to decentralize institutions of art and culture - almost all of which are in Paris. Lens was chosen as the recipient city in 2002 and soon thereafter an architectural competition for the project was won by a team lead by SANAA and Imrey Culbert.

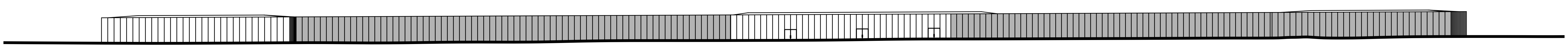
The massing of the building is in keeping with the surrounding site; the building softly meanders over the land, rising and falling with the subtle changes in elevation. One enters the building at its center, recalling the organizational scheme of the Louvre Paris where two primary galleries flank the entrance hall. The simplicity of the scheme (both in terms of form and organization) complement the highly evocative reflective aluminum panels used for the majority of the facade. These panels, like the form of the building, reflect the landscape and light of the place: the core concept behind this work.

Axonometric | Axonométrie

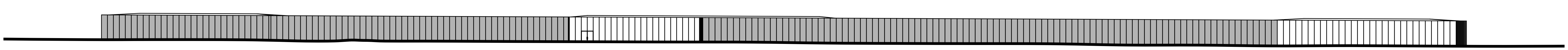


Louvre-Lens

Interior / Exterior



North



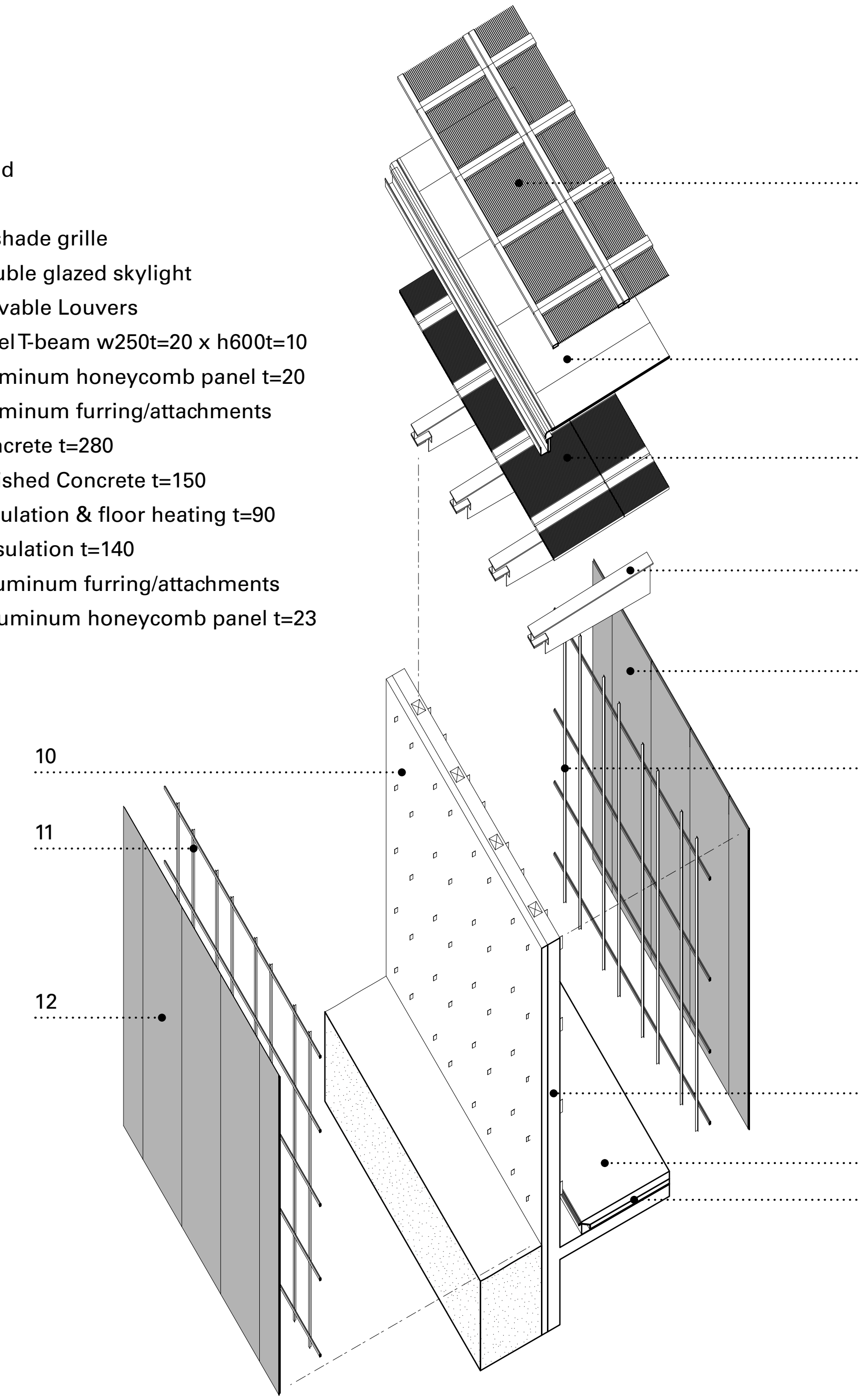
South

Elevation | Elevation

MATERIAL: The cladding of the Louvre-Lens embodies the overall concept that the building reflect and mimic the site on which it sits. Constructionally, The panels are relatively conventional: an aluminum honeycomb core faced on the inside and out with 1 and 2mm thick aluminum sheets, respectively. The innovation in this case, has occurred in the anodization and polishing of the panels which has been carefully crafted to "offer a blurred and unfocused reflection of the contours of the surroundings."
The interior spaces are also clad with anodized aluminum panels to give the gallery spaces the same ephemeral quality as the exterior, though these panels are thinner as a result of the reduced environmental stress.

Légend

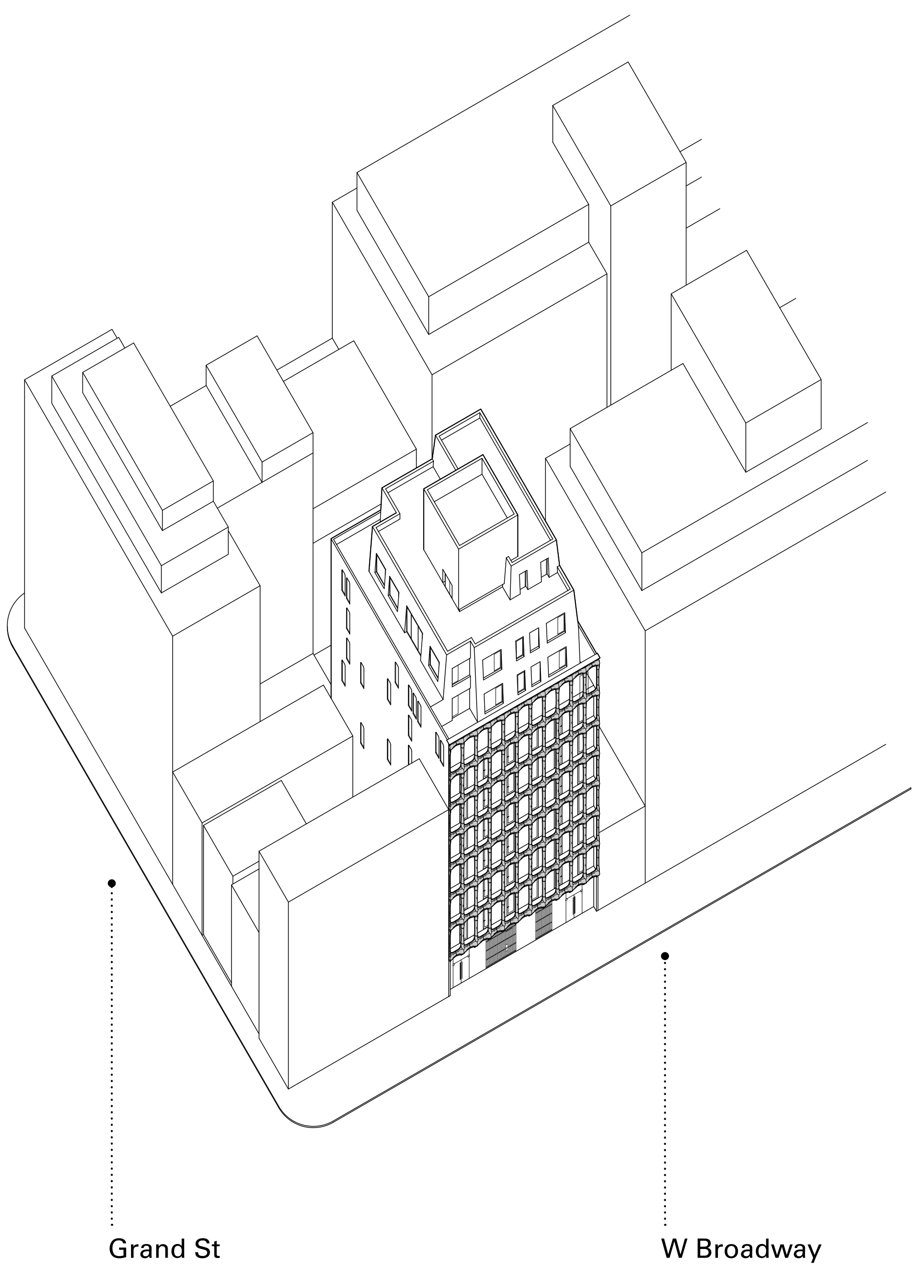
1- Sushade grille
2- Double glazed skylight
3- Movable Louvers
4- Steel T-beam w250t=20 x h600t=10
5- Aluminum honeycomb panel t=20
6- Aluminum furring/attachments
7- Concrete t=280
8- Polished Concrete t=150
9 - Insulation & floor heating t=90
10- Insulation t=140
11- Aluminum furring/attachments
12- Aluminum honeycomb panel t=23

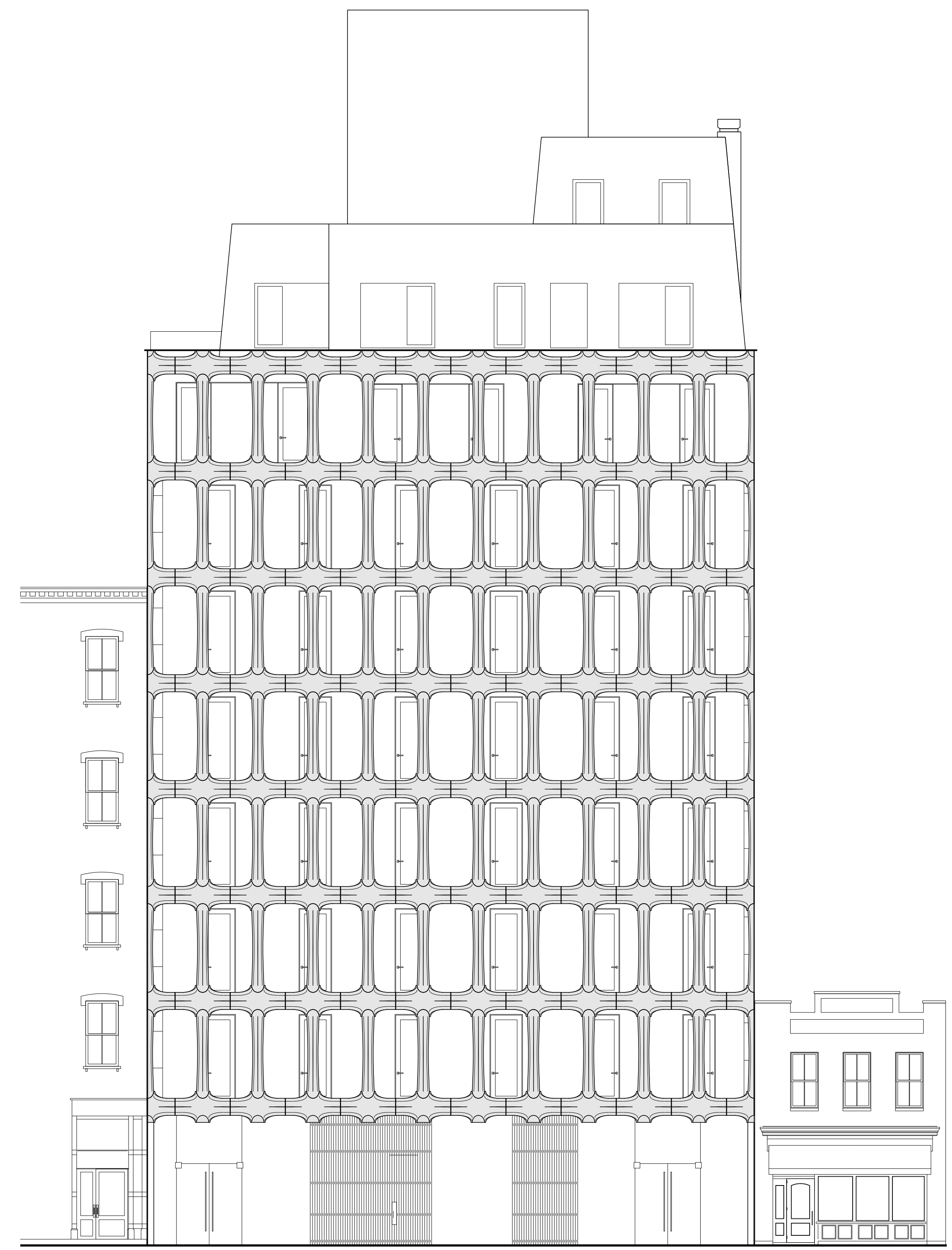


1:150

Architect I Architecte :	DDG
Landscape:	DDG
Engineer I Ingénieurs :	Severud Associates
Location I Localisation :	New York
Year of construction I Année de construction :	2016
Use I Usage :	Condominiums + Retail
Total area I Superficie totale :	1,040 m^2
Height I Hauteur :	40.2m
Number of floors I Nombre d'étage :	0 (+ basement)
Floor plan area I Superficie d'un étage :	5,755 m^2
Structure system I Système de structure :	Cast-in-place walls; Steel roof structure
Structure materials I Matériaux de structure :	Concrete, Steel
Envelope materials I Matériaux d'enveloppe:	Double-glazed curtain walls; Insulated concrete walls.

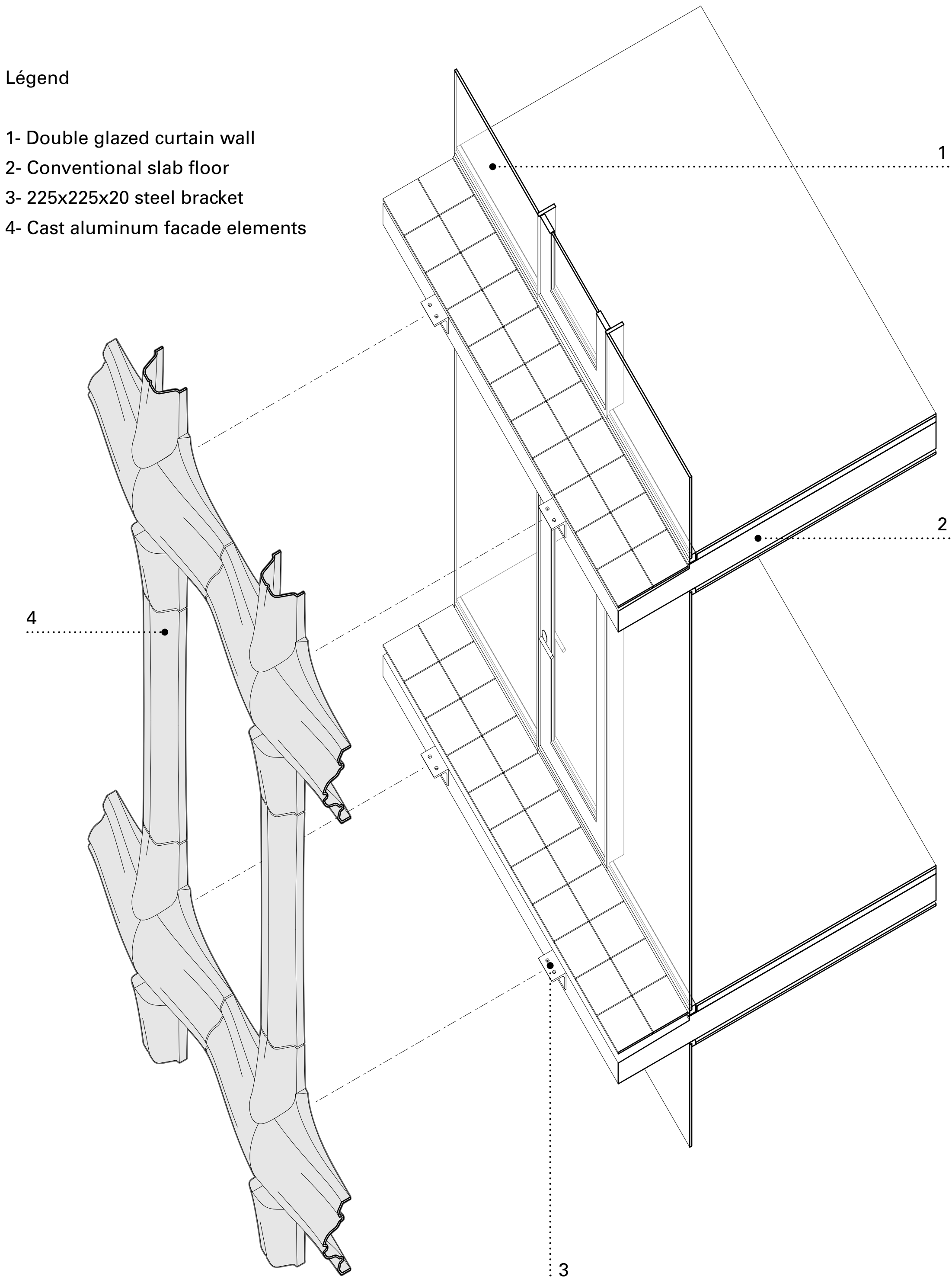
Situated in the historic SoHo neigbourhood of Manhattan, the design of Xoco 325 playfully incorporates decorative themes and motifs of the surrounding 19th century cast-iron loft buildings. Unabashedly a 'façade' project, the design team has sought to design a public face that directly references the decorative traditions and proportions of Soho's historic loft buildings as opposed to the adjacent rectilinear modernist projects built in the latter half of the 20th century. To this end, the façade is built from an organic, sinewy frame that floats free from the glass envelope and hovers one storey off the street. The elements recall not only the neoclassical motifs of the neighbouring buildings, but also the work of Victor Horta and Hector Guimard. The resulting cast forms, while skeletal in appearance, are cast from aluminum and, unlike their iron counterparts, are not structural members. Instead, the cast elements incorporate mounting plates which bear on steel shelf angles on the edge of the floor slabs.


Grand St
W Broadway


1:200

Légend

1- Double glazed curtain wall
2- Conventional slab floor
3- 225x225x20 steel bracket
4- Cast aluminum facade elements



1:50


1

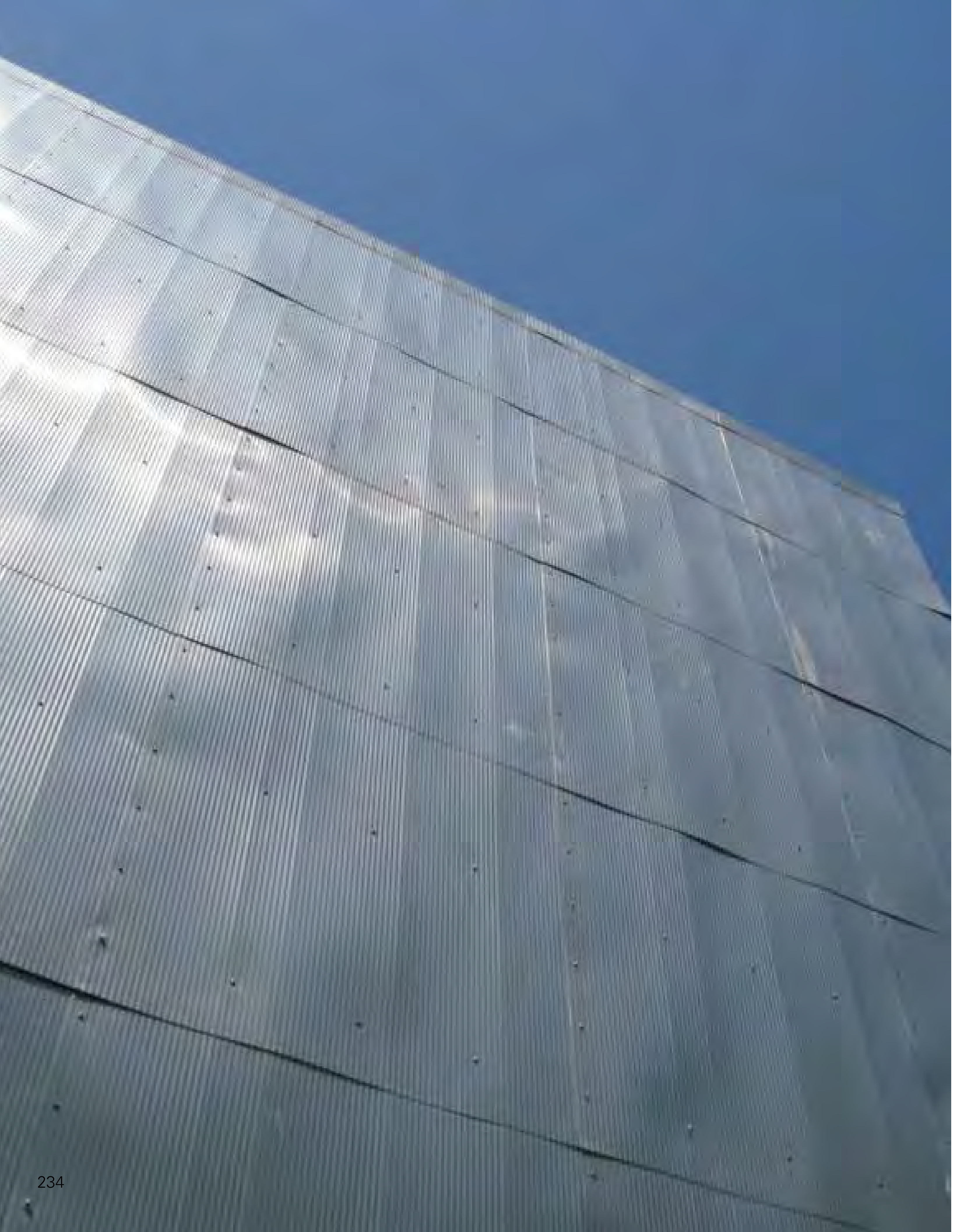

2


3


4

The façade elements on Xoco 325 are rare both in terms of the material used and the chosen production method. While architectural foundries were commonplace in the era of cast iron, they have become almost non-existent since the adoption of concrete and steel in 20th century architecture. The design team, then, turned to a producer of fine art and sculpture, Walla Walla Foundry, to fabricate the elements. The foundry worked with the design team to fabricate the elements in 4 steps:

1. The two unique elements were CNC milled from high density polyurethane.
2. These 'positives' were then covered in burlap to add texture to the finished surfaces.
3. A ceramic negative was cast over the positive.
4. The final aluminum element is cast from the ceramic negative.

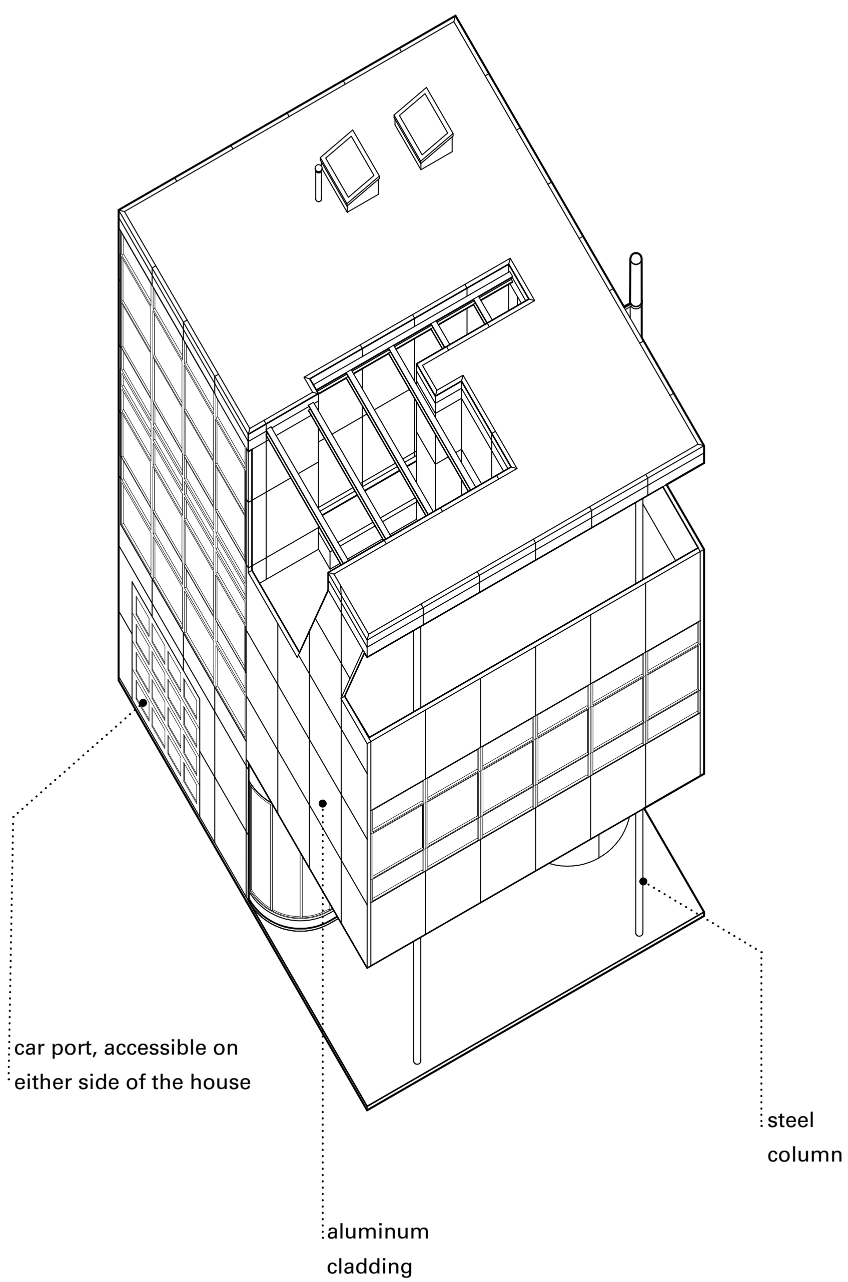


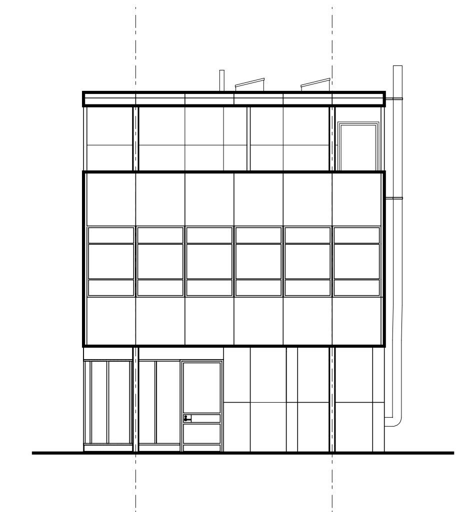
Architect I Architecte :	ALBERT FREY, A. LAWRENCE KOCHER
Engineer I Ingénieurs :	
Location I Localisation :	NEWYORK CITY, NY
Year of construction I Année de construction :	931
Use I Usage :	HOUSE/EXHIBITION
Total area I Superficie totale :	102 sqm (1,100 sf)
Height I Hauteur :	8.3m (27'3")
Number of floors I Nombre d'étage :	3
Floor plan area I Superficie d'un étage :	54 sqm (586 sf)
Structure system I Système de structure :	STEEL FRAME
Structure materials I Matériaux de structure :	TEEL
Envelope materials I Matériaux d'enveloppe:	ALUMINUM, WOOD, GLASS

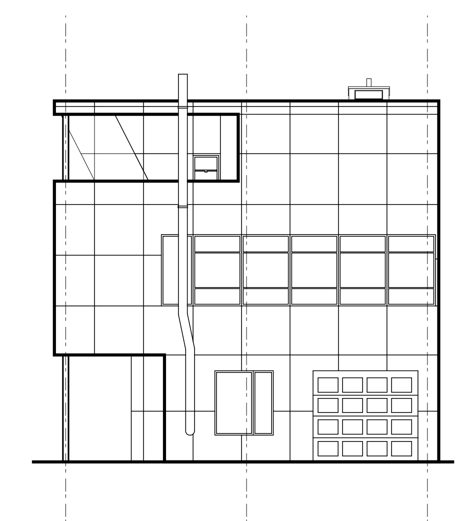
"I thought my job was to make aesthetically attractive technology for the public to accept. I always thought that the structure was the main thing. "
Albert Frey

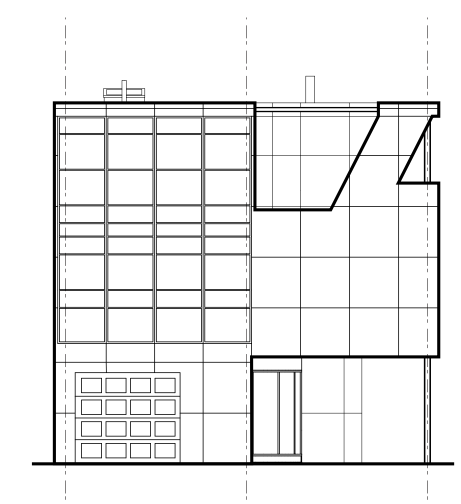
The first house in the United States to be built entirely of steel and aluminum, the Aluminaire House was an exploration of prefabricated modular design. A. Lawrence Kocher was commissioned for the project by Allied Arts and the Architectural League, for an exhibition of building products in 1930. Kocher then brought on Albert Frey, who had worked under Le Corbusier and was a proponent of the International Style.

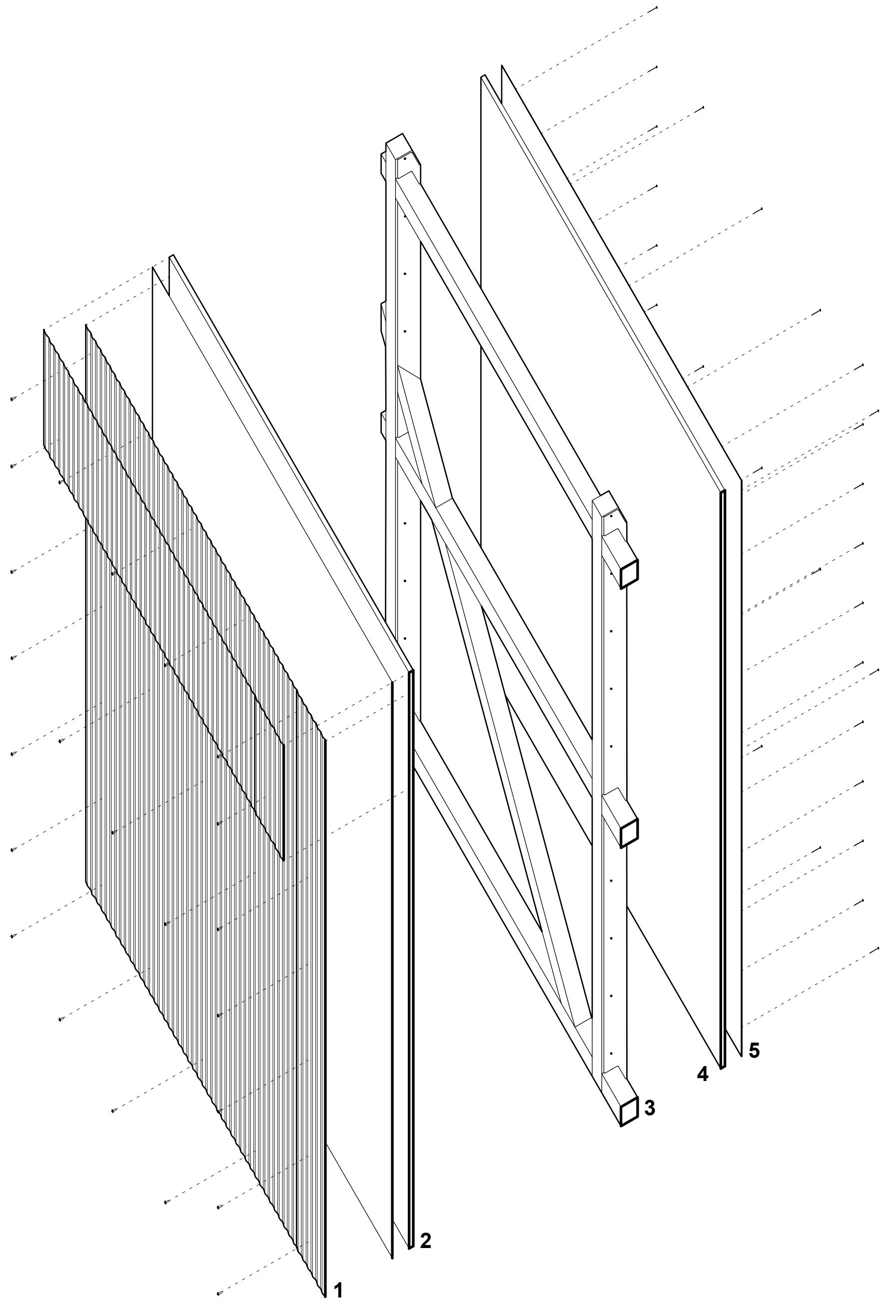
The Aluminaire House was a prototype, intended to demonstrate a low-cost housing alternative, using materials that were not even on the market yet. The main construction materials — steel, aluminum and glass — were all donated by various manufacturers, including the Aluminum Company of America (ALCOA). Frey had chosen aluminum because of its popularity in other forms of design at the time, its color, malleability and alleged economy. The entire building was constructed in 10 days, inside the Grand Central Palace in New York. At the end of the exhibition, Wallace K. Harrison bought the house for personal use for $1,000. The disassembly only took 6 hours. It is currently anticipated to be reconstructed for the third time in Palm Strings, where Frey at practiced and lived.


car port, accessible on
either side of the house
aluminum
cladding
steel
column





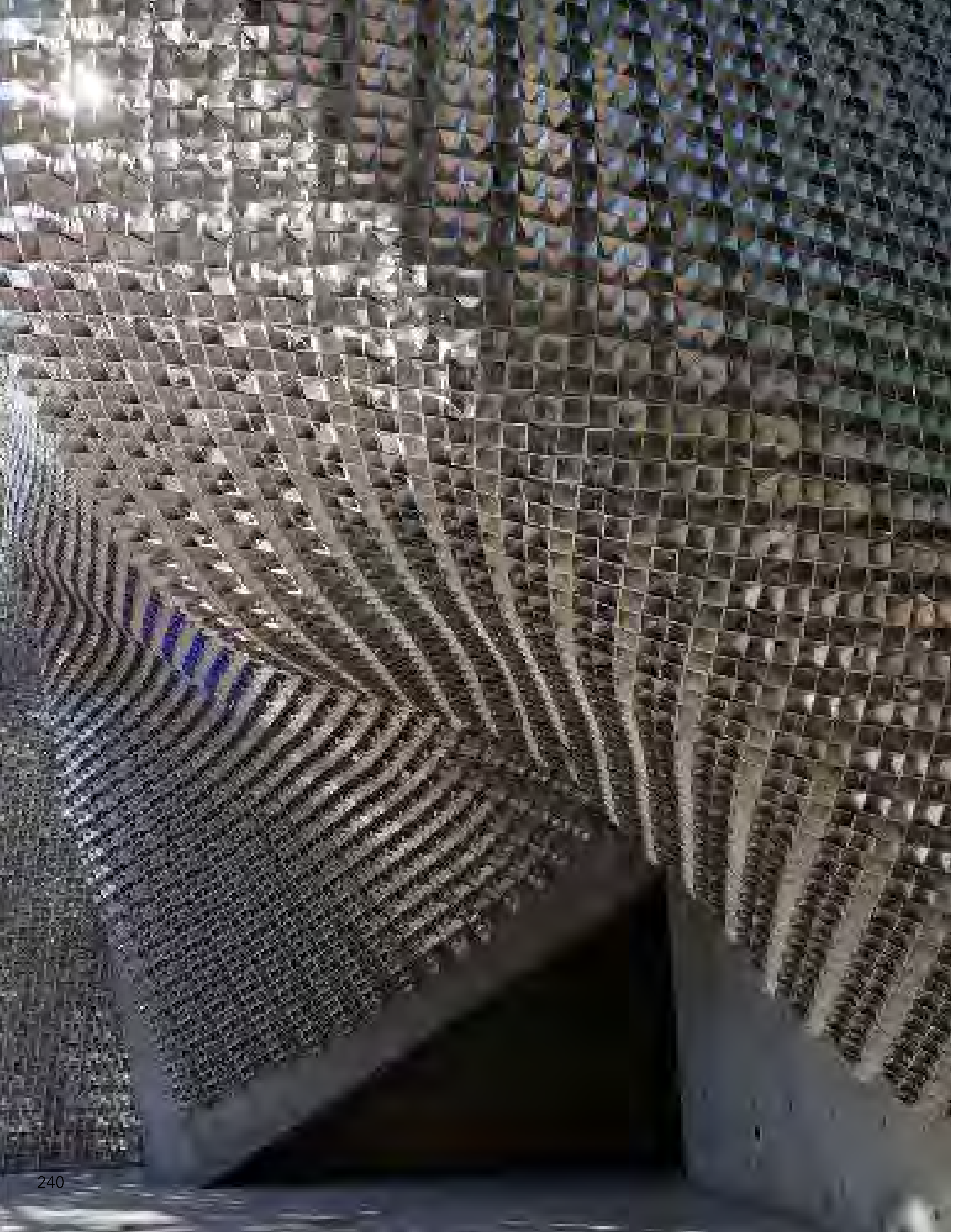




1- CORRUGATED ALUMINUM
2- INSULATION BOARD
3- WOOD FRAME
4- INSULATION BOARD
5- FABRIKOID

1:20

The Aluminaire House has been constructed, deconstructed, and added onto for the entirity of its lifetime, since the early 1930s. The first house to be designed in the United States in the Corbusian style, it stands on only 6 steel columns, 5" in diametre, and is a combination of expansive glass and aluminum cladding. The corrugated aluminum used for the façade was less than a millimetre thick (1/32") and ribbed for stiffness, but the material still warped and buckled. Each sheet was 48" x 58" originally but overlapped only to show a 44" x 48" panel. The cladding is secured to the non-loading bearing wood frame behind with aluminum screws. The assembly, which was made up only of wood framing and 1" in insulation board was said to have a higher insulation value than a 13" thick masonry wall.



OMS STAGE // ZITELLA BRIANA-NICOLE

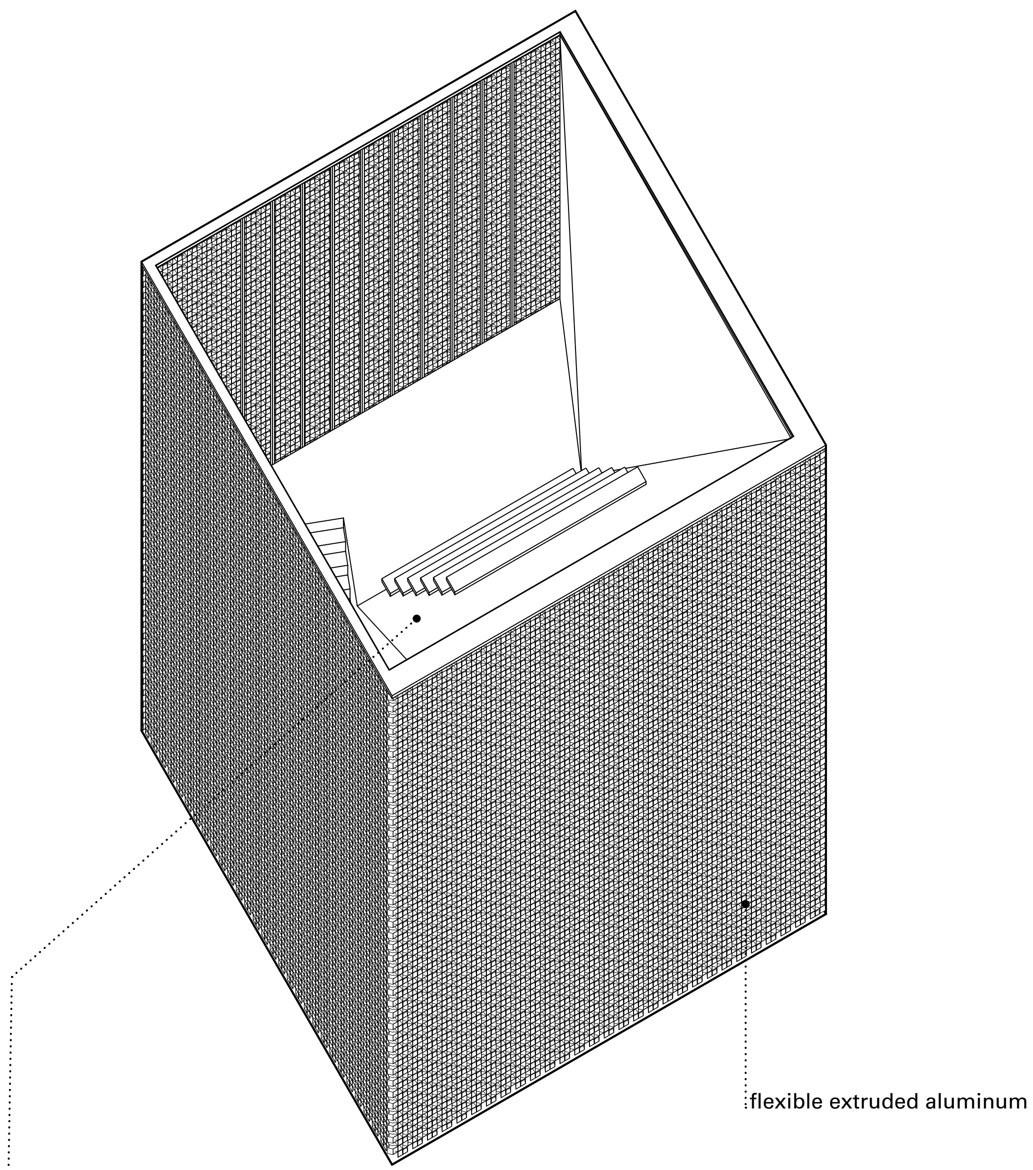
Architect I Architecte :	Architect : 5468796 ARCHITECTURE
Engineer I Ingénieurs :	MELVIN KLEINSASSER
Location I Localisation :	WINNIPEG, MB
Year of construction I Année de construction :	2010
Use I Usage :	OPEN-AIR VENUE
Total area I Superficie totale :	73 sqm (784 sf)
Height I Hauteur :	8.5m (28”)
Number of floors I Nombre d’étage :	2
Floor plan area I Superficie d’un étage :	65 sqm (708 sqf)
Structure system I Système de structure :	REINFORCED CONCRETE WITH TENSION CABLES
Structure materials I Matériaux de structure :	CONCRETE, STEEL, AIRCRAFT CABLE
Envelope materials I Matériaux d’enveloppe:	ALUMINUM, CONCRETE

“How can we [create an energy] with music, sound, and light from within so that it becomes a player in the city?”
Sasa Radulovic, 5468796

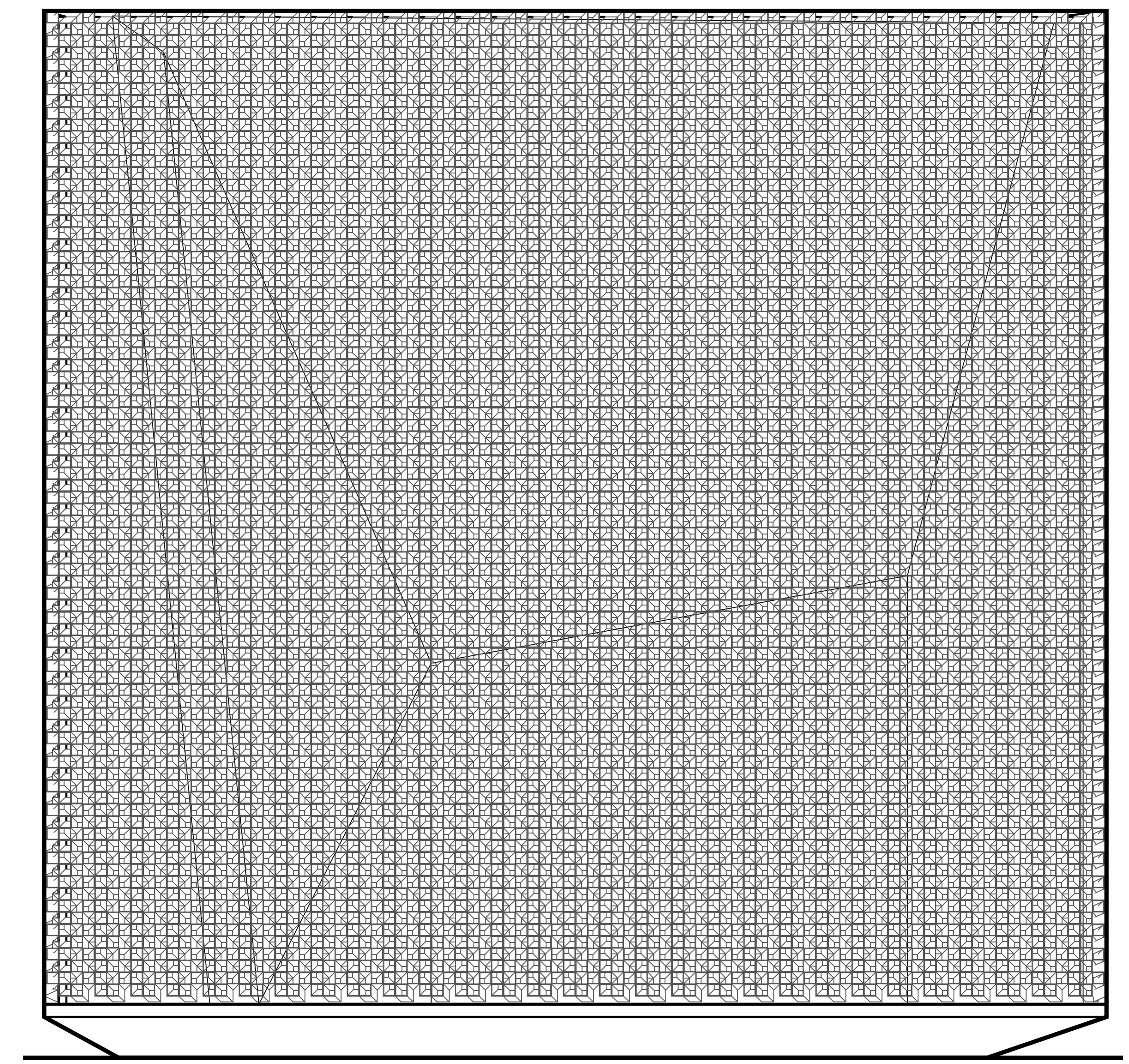
The Old Market Square Stage began as an invited competition and was awarded to local architecture practice 5468796. The challenge was to design a flexible outdoor performance space that could be used during the summer, but also during the winter — the longer off season. What resulted was a cube enclosed in a shell made of multi-faceted extruded aluminum modules. The screen acts like a flexible fabric, that can be lifted and peeled back to reveal a performance stage when needed. When the venue is closed, it looks like a shining beacon in the park. The design was influenced by medieval chainmail armor, which was light and flexible but also strong and protective. The aluminum curtain acts in the same way.
5468796 made several prototypes to develop a module that allowed projection to be captured on the exterior of the cube. The pieces resemble a diamond in shape, with a hollow centre, that allowed for light to refract from the interior to the exterior, and vice versa. The façade is composed of 20,000 identical pieces, but they appear varied because they are mirrored and flipped in an array.

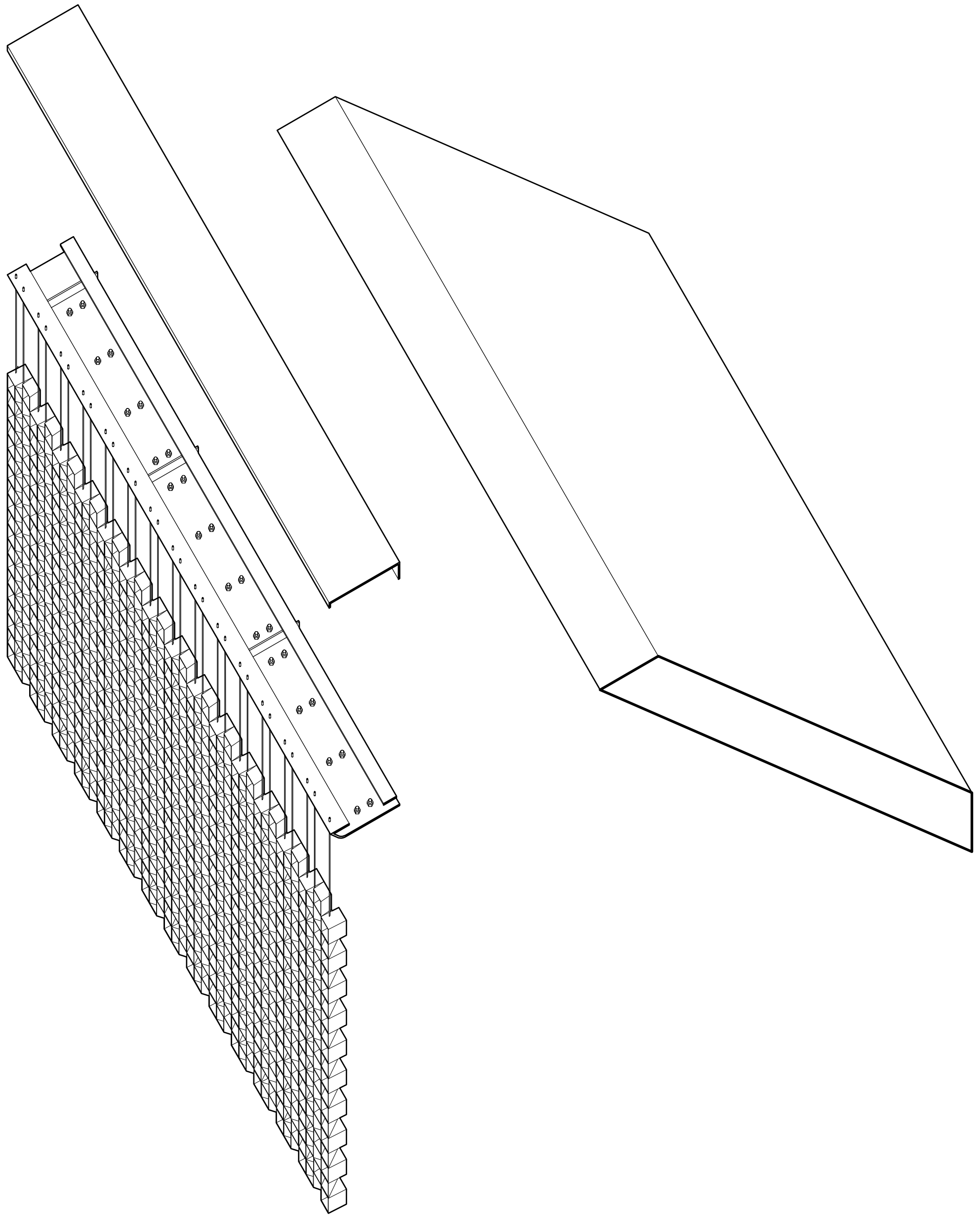
The OMS Stage is used as a performance venue, yoga studio, wedding venue, exhibition hall, as a beacon, and many more throughout the year.

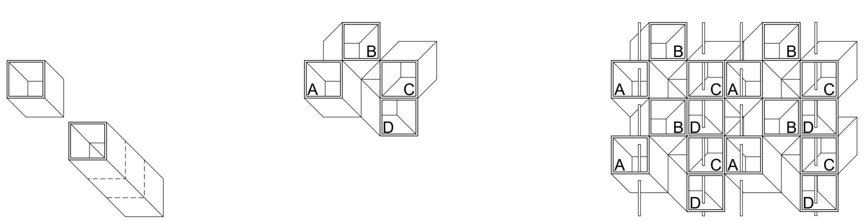
Axonometric I Axonométrie



Elevation I Elevation







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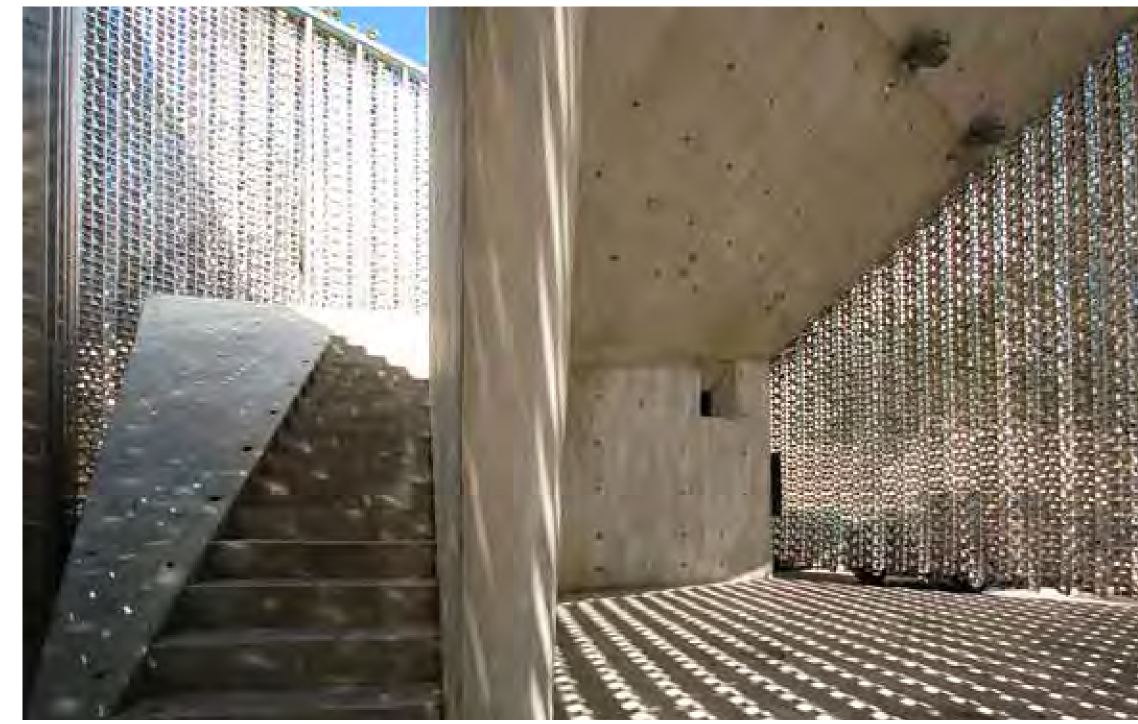

The OMS Stage is a project entirely devoted to the exploration and manipulation of one material — aluminum. Prior to the final design iteration, 5468796 worked for months with metalworkers from a local Hutterite colony. The result, 20,000 identical pieces of extruded aluminum that alternate in vertical rows to form a complex screen. They are tied together through aircraft cables and every third piece is riveted together. This allows the membrane to be both rigid and flexible, when needed. The riveting was done on site during construction.