

Repsol Campus

Pablo Diego Pastor
Irene Annoé

Construction III
Universidad Europea de Madrid



Campus Repsol

Proyect	Repsol Campus
Location	Méndez Álvaro, 44, 28045 Madrid
Students	Pablo Diego Pastor & Irene Annoè
Contents in this page	Basic information



LOCATION

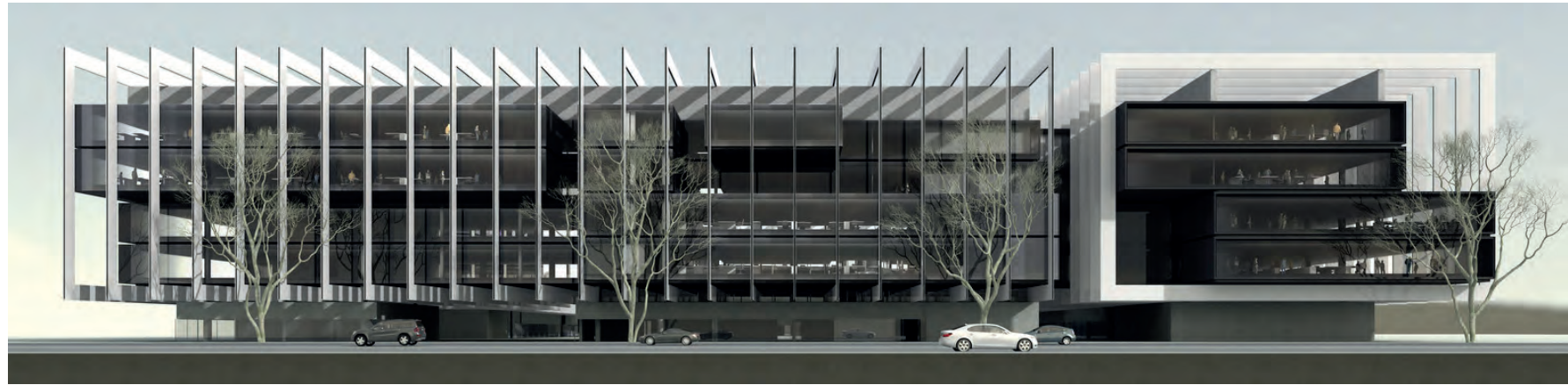
The The new Repsol YPF offices occupy the entire block of the area near the Méndez Álvaro interchange, an exceptional situa tion for a large corporate campus in Madrid. The Repsol Campus consists of four buildings surrounding a large garden, the complex is characterized as an intelligent building with large glass facades, which allows optimal use of natural light in all areas of the campus. The project was conceived with sustainability criteria, taking care of the use of recycled materials, use of alternative energy sources, as well as accessibility for people with limited capabilities.

STRUCTURE

Structurally, 105 large frames of steel, 50 tons and almost 24 meters high, surround the buildings and define its image. In this sense, first there was a preliminary analysis to determine the type of supports, so that the solution was chose the most effective from different points note: structural performance project, economy of materials and labor, ease of assembly and adapta-tion to different architectural approaches. Its archi-tecture is defined through a only type section,that will be the origine of structural design strategy, be formed by two unique and thick pillars,large beams supporting the deck.



MAIN CARATHERISTICS



Inspired by the atmosphere and collaborative team that reigns in the university campus, Rafael de la Hoz and his team have designed a complex where the horizontal lines win on the vertical ones: the building has in fact only 5 floors. De la Hoz has started from the concept of the central courtyard seen as the meeting point of social importan-ce. Offices and common areas are open, flexible and crossed by the light: the new headquarters of Repsol offers its 4,000 employees a comfortable working environment, where collaboration and exchange of ideas would be the main point Another important criterion was the "Design for All", which made buildings accessible to 100%, also inte-grating people with all types of disability in order to create equal chances for all.

SUSTAINABLE CAMPUS

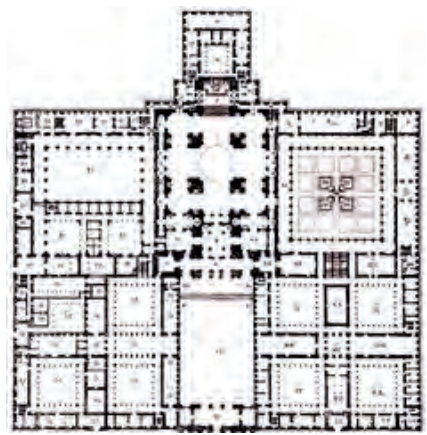


The Campus is designed to be sustainable, avoiding the emission of 22 tons of CO2 per year. 100% of the energy comes from renewable sour-ces, thanks to 1,700 square meters of photovoltaic panels. The parking spaces for electric bicycles and car stations for charging are available, rainwater is stored to be used to irrigate the 20,000 square meters of garden. The goal is to achieve LEED Gold certification, energy efficiency of the center will be evaluated in the coming months and years. It is a corporate campus, rather than stand, we want to integrate into the urban context. The area around Mendez Alvaro Street, formerly industrial area, is currently being restructured, where office buildings and residen-ces are under construction. Also, it was important not to turn the light on the context, which could be obtained with the limited height of the build-ing.

123 mq



The project assumes a total constructed area of 123,000 m², distributed equally on grade and in basements



The surface of the plot is equivalent to that of the Monastery of El Escorial



The extension of the garden is 1.5 times that of a soccer field

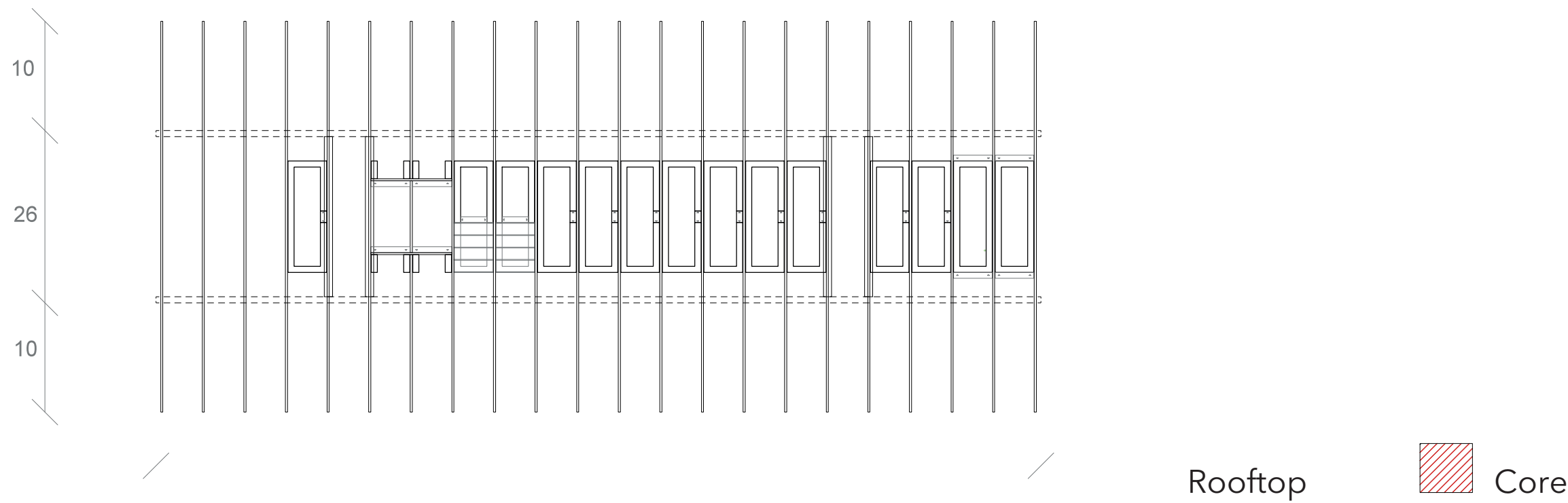
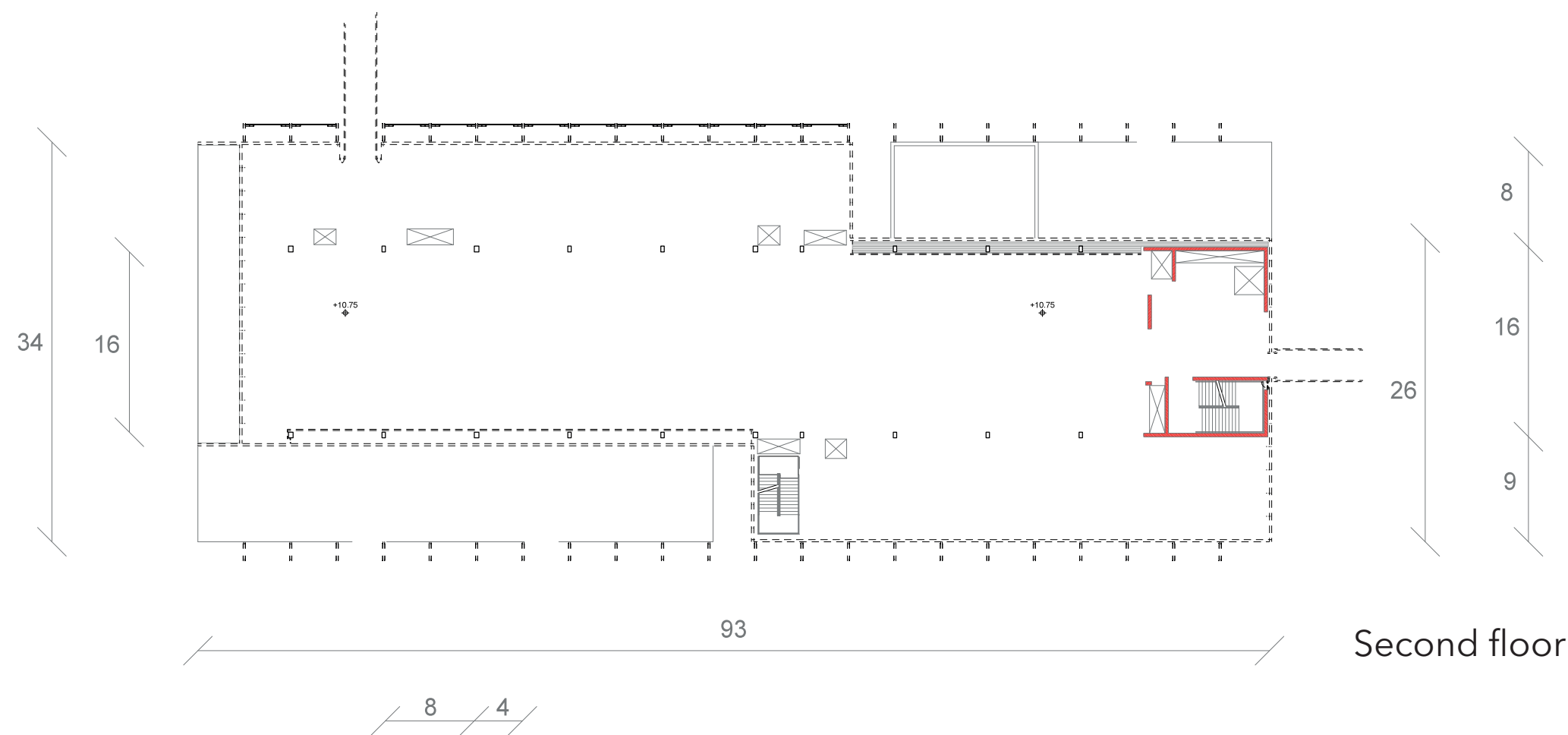
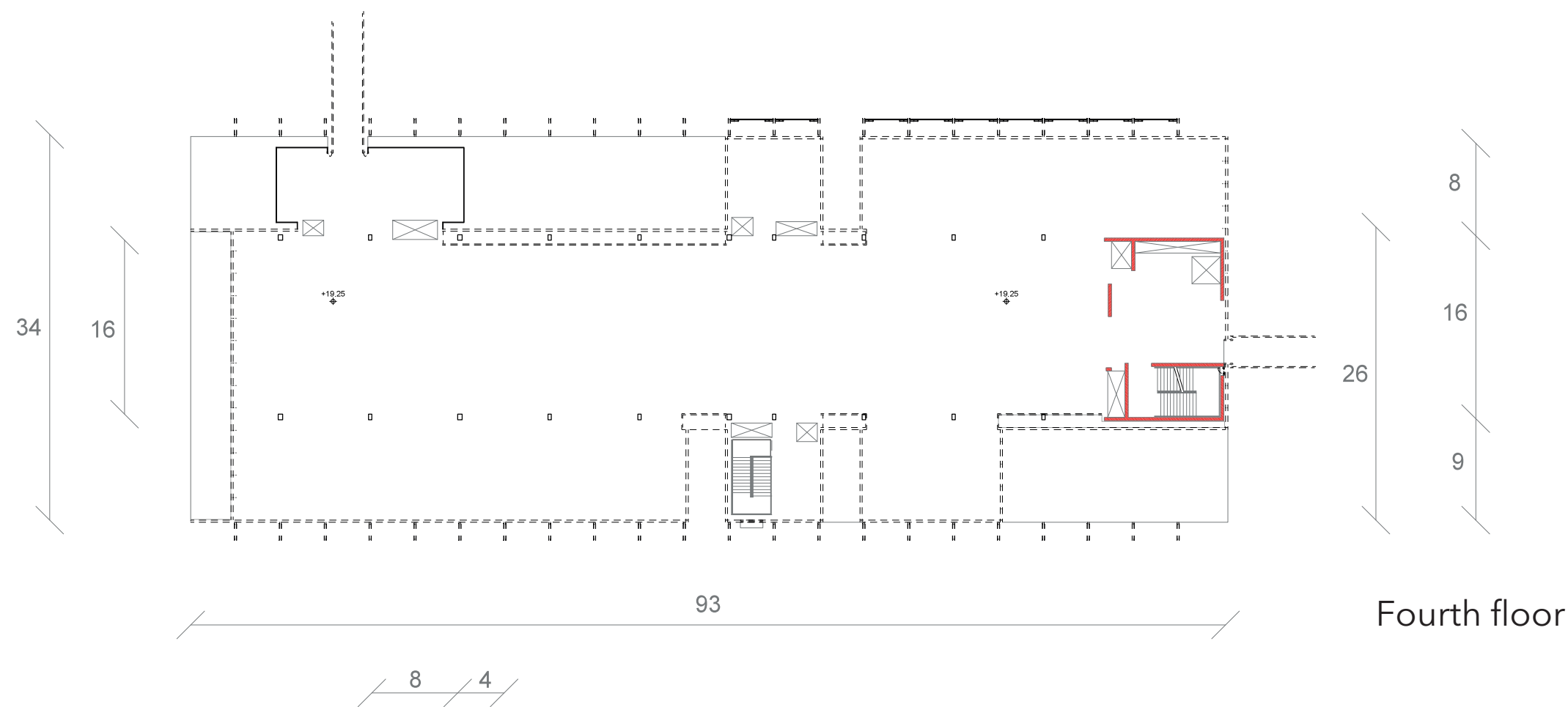
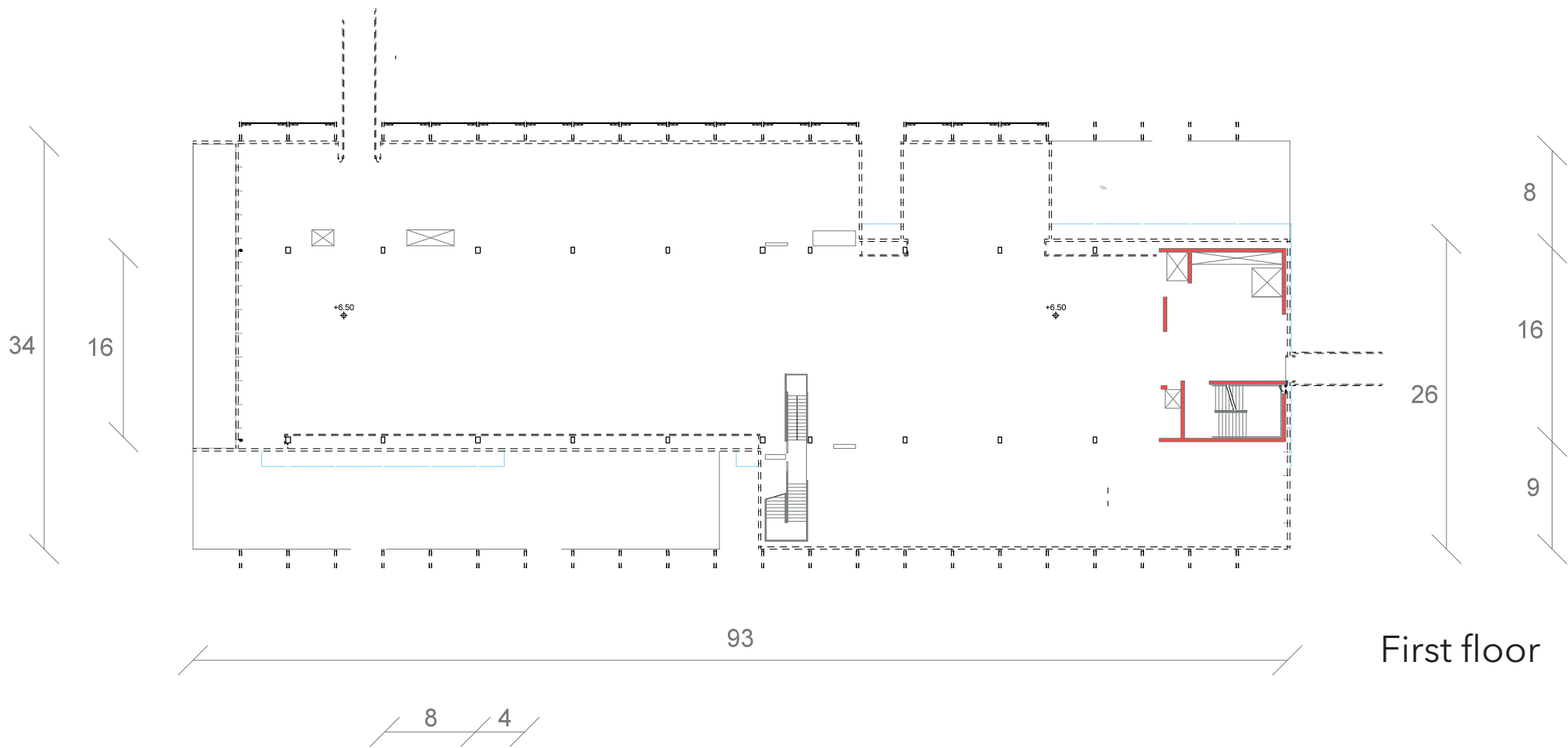
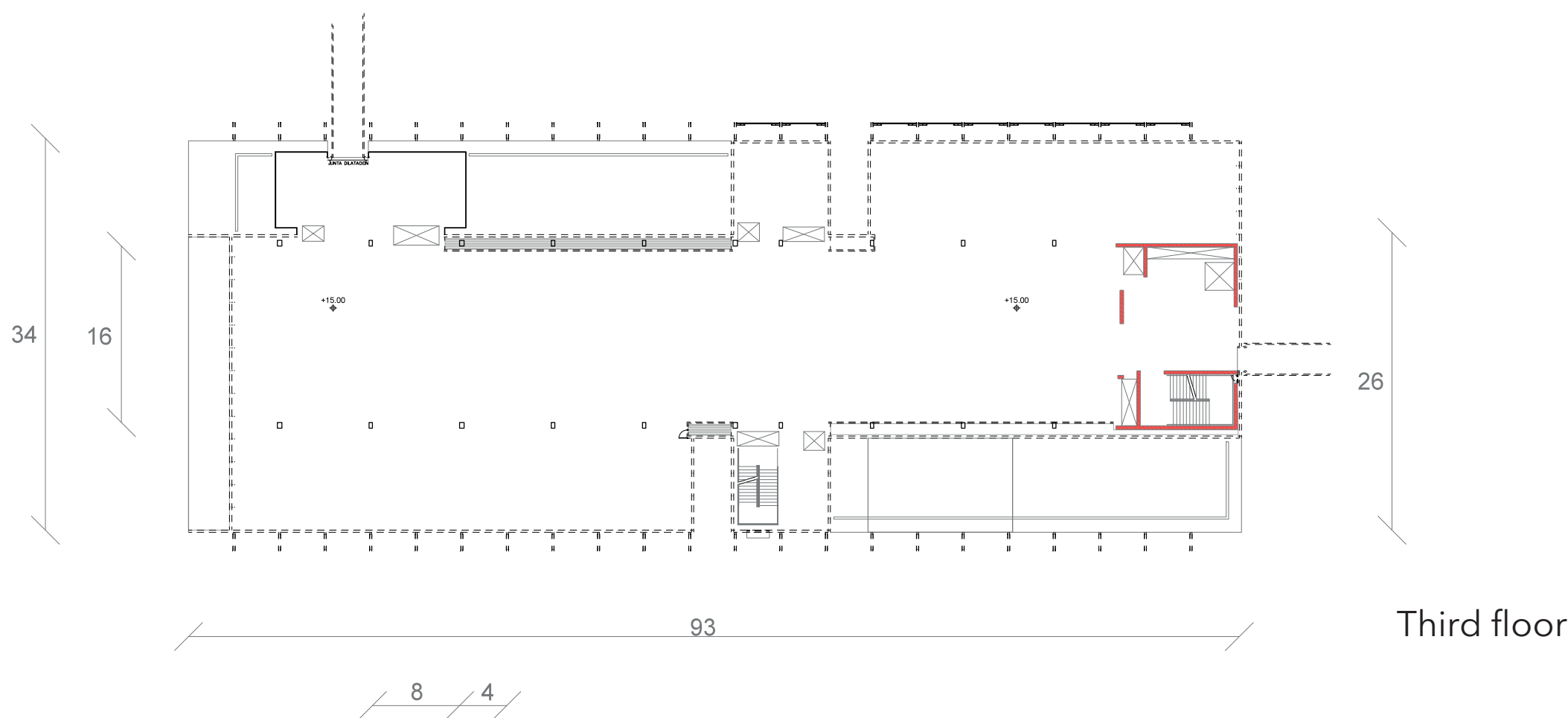
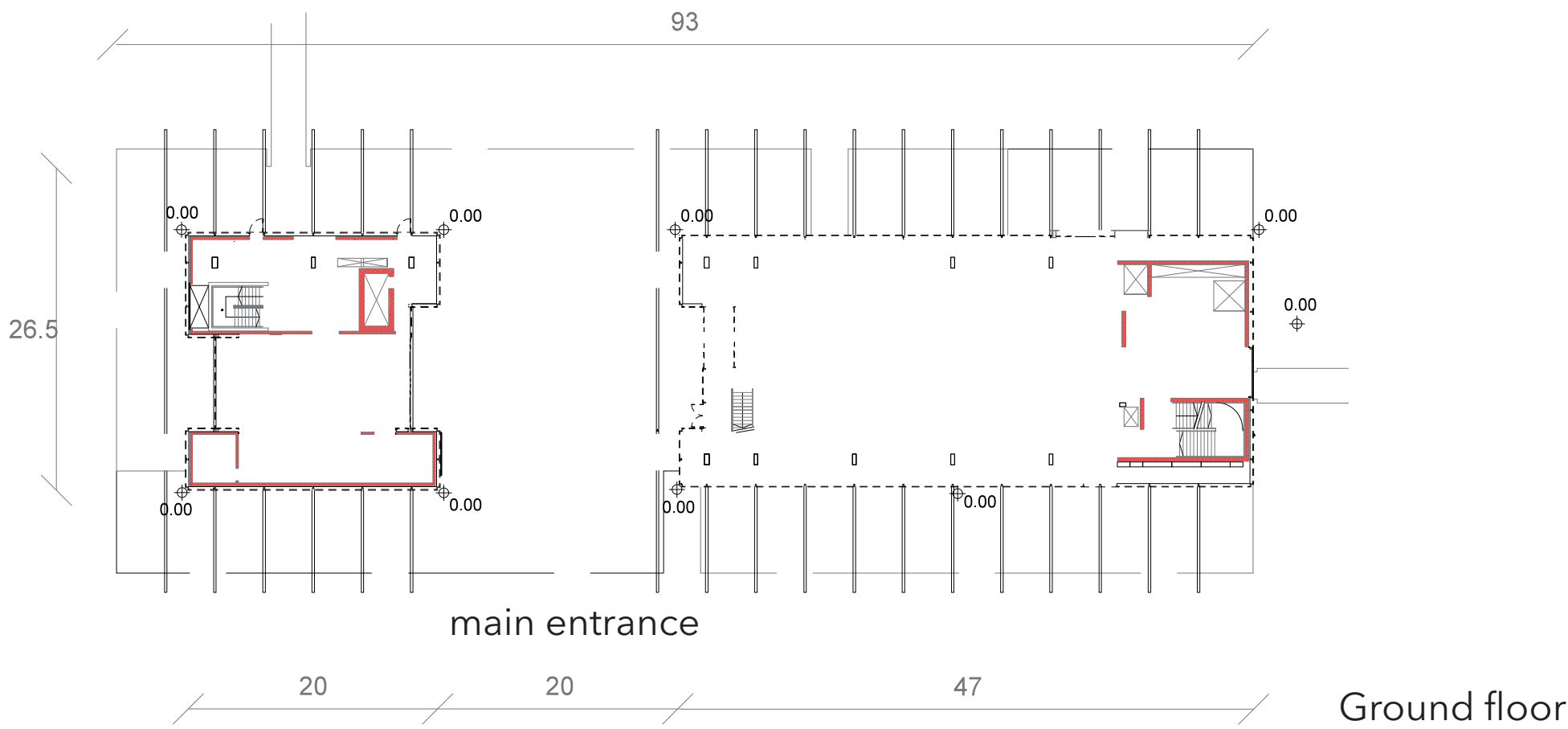
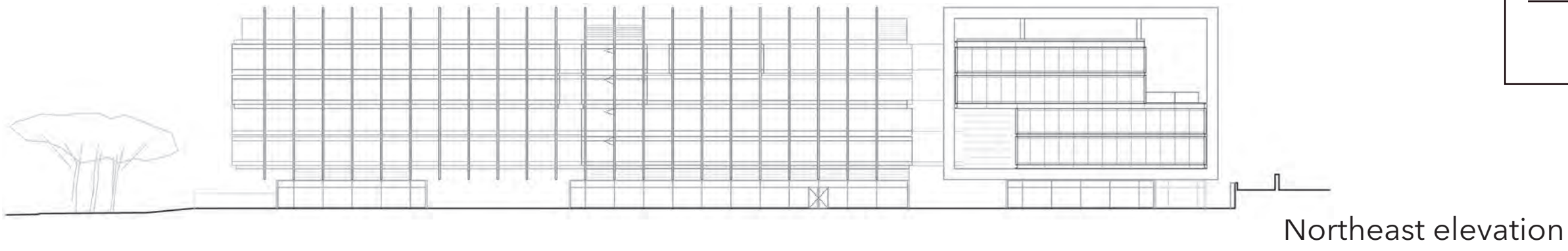
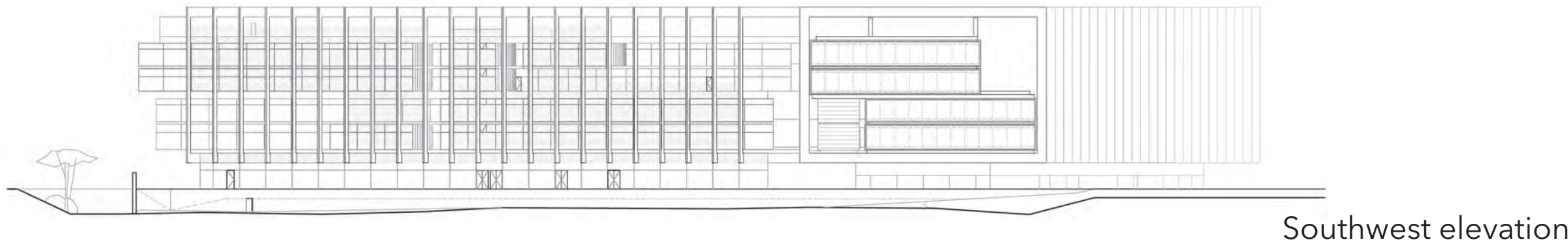


Structural steel is 1.5 times that used in the Eiffel Tower

Basical Architectonic documentation

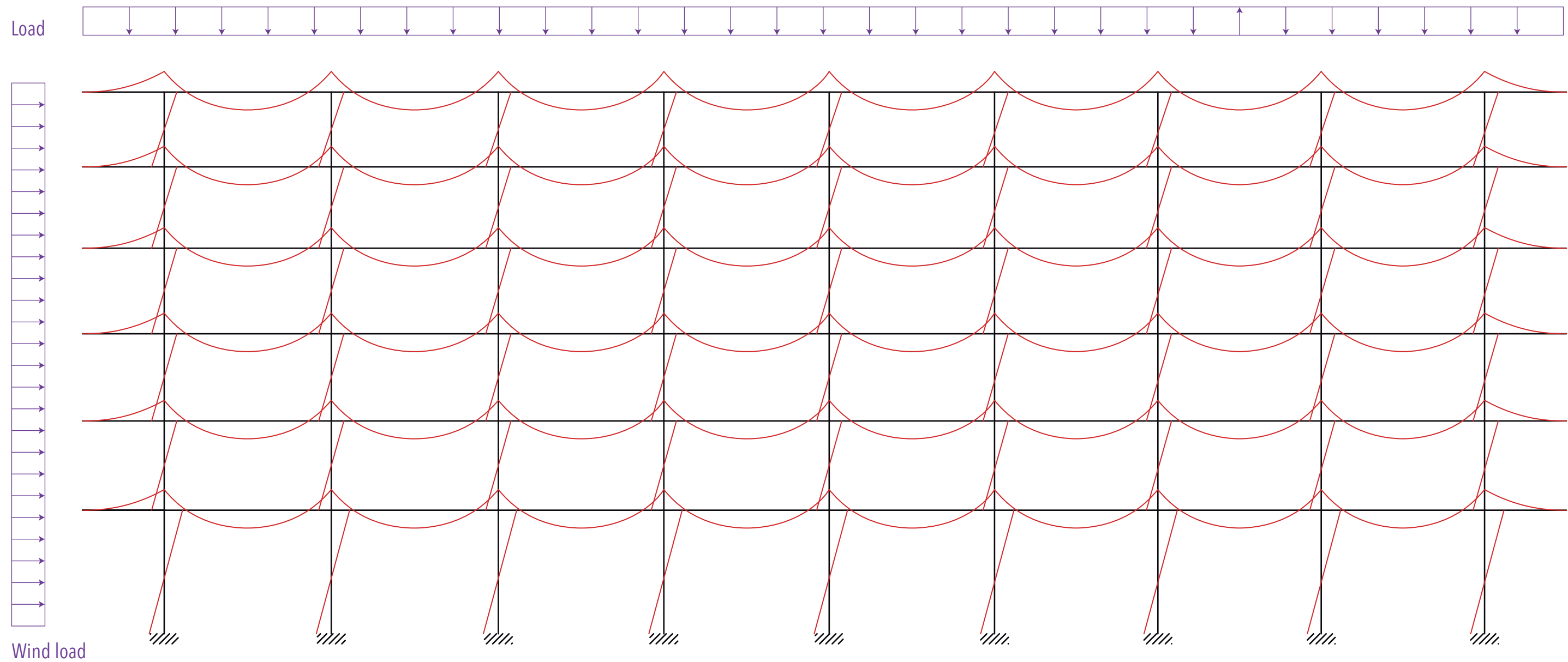
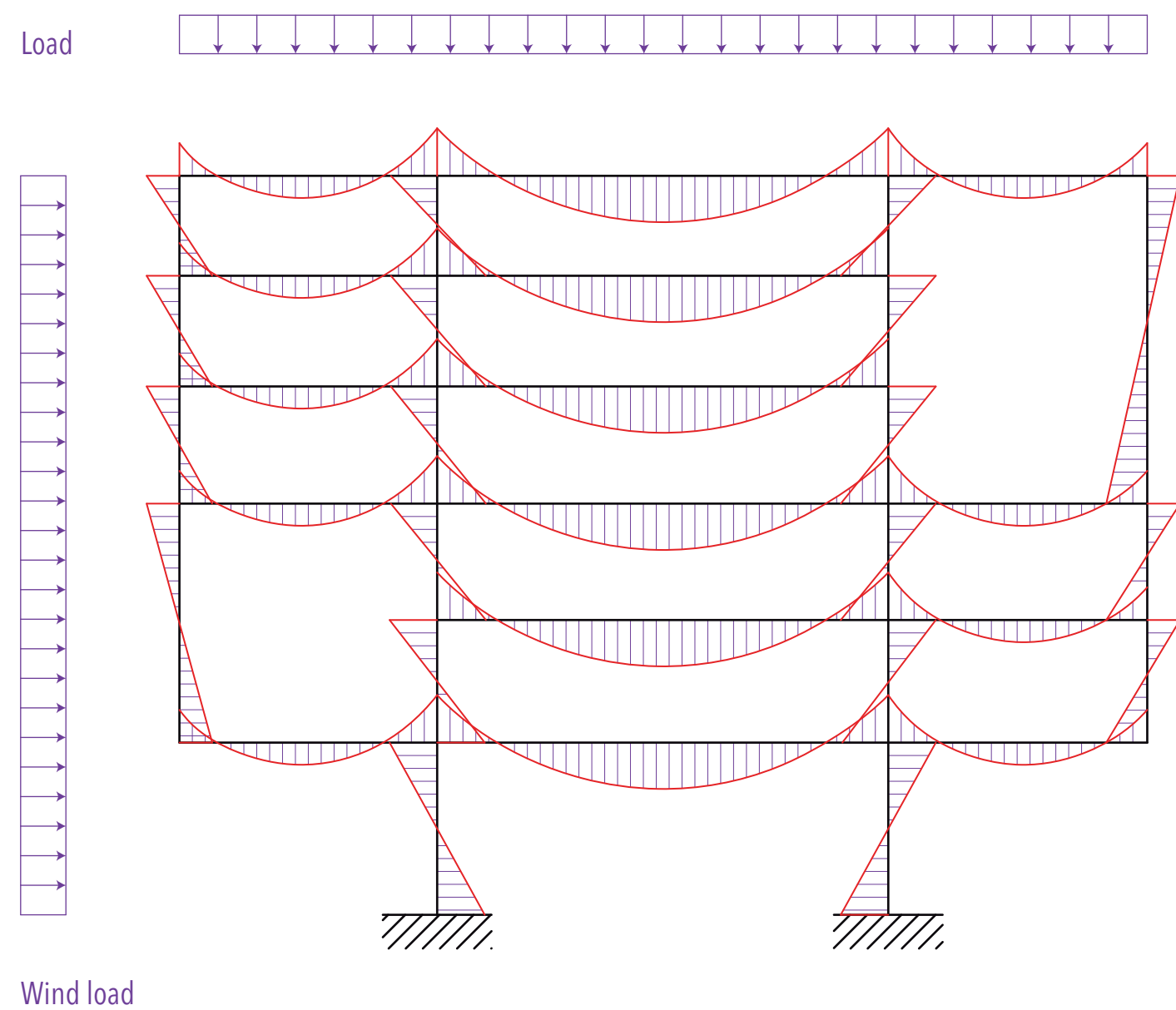
Plans 1/500

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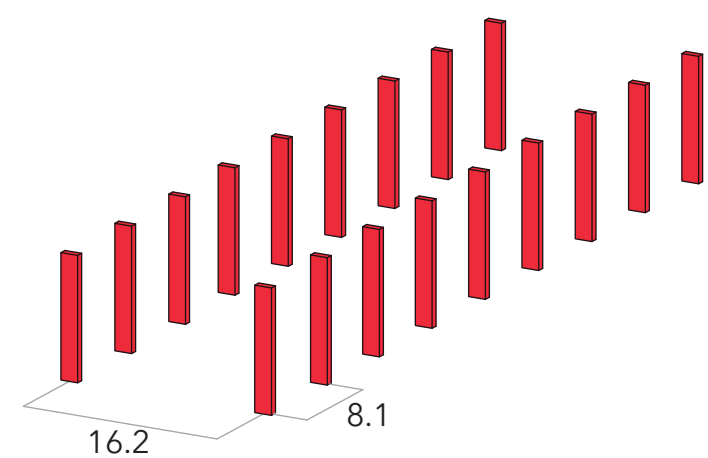
Structural analysis

Moment's diagram



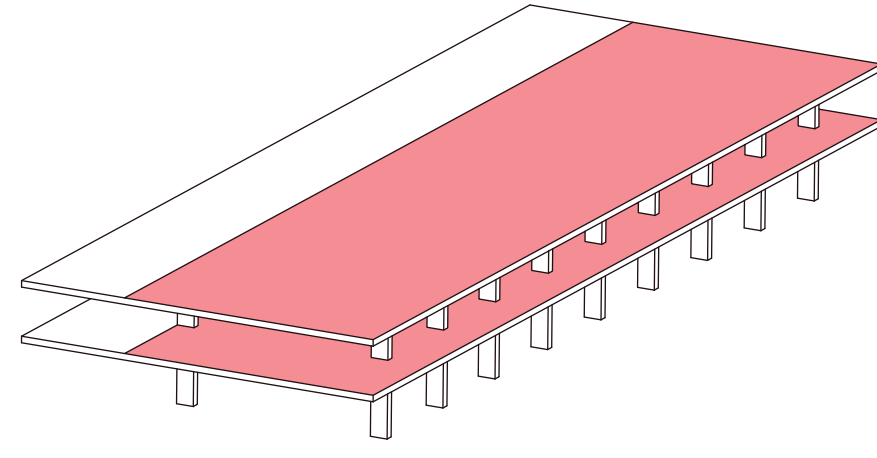
Structural schema

Steel pillars



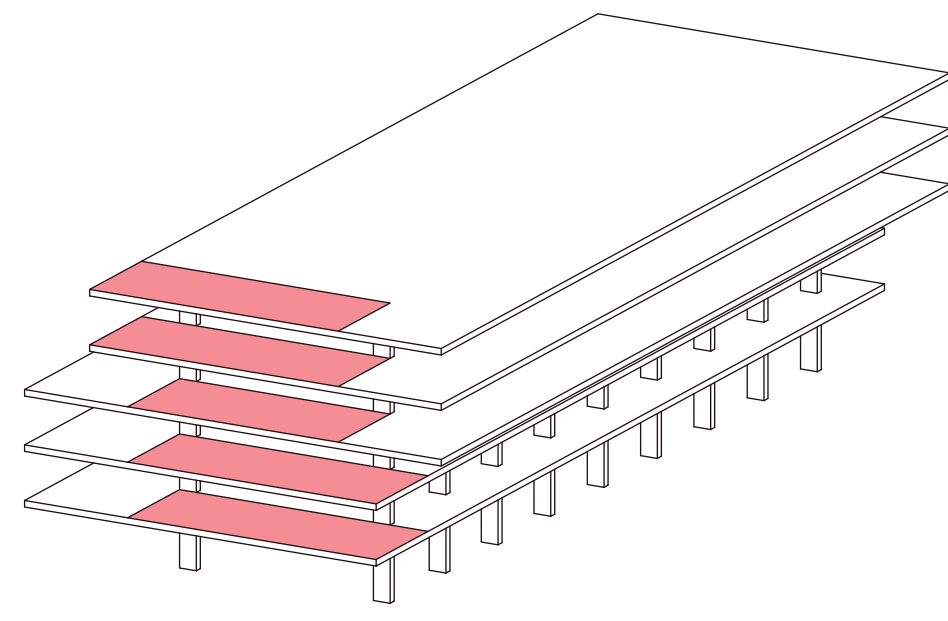
Steel pillars support the two large beams on the deck, which support the ribs. There are passive frames (ribs) every 10m, coincident with the pillars, and interspersed, other ribs hanging from the deck beams

Reinforced concrete slab



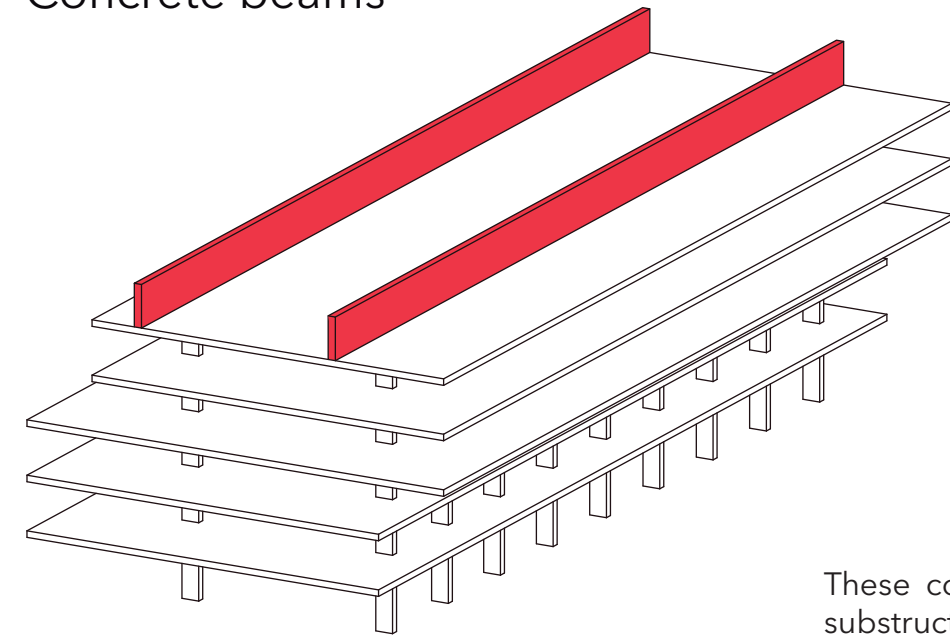
The slabs change according to the structure, the part indicated in salmon red is the reinforced concrete and the load of this slab is carried by the pillars

Hollow core precast slab



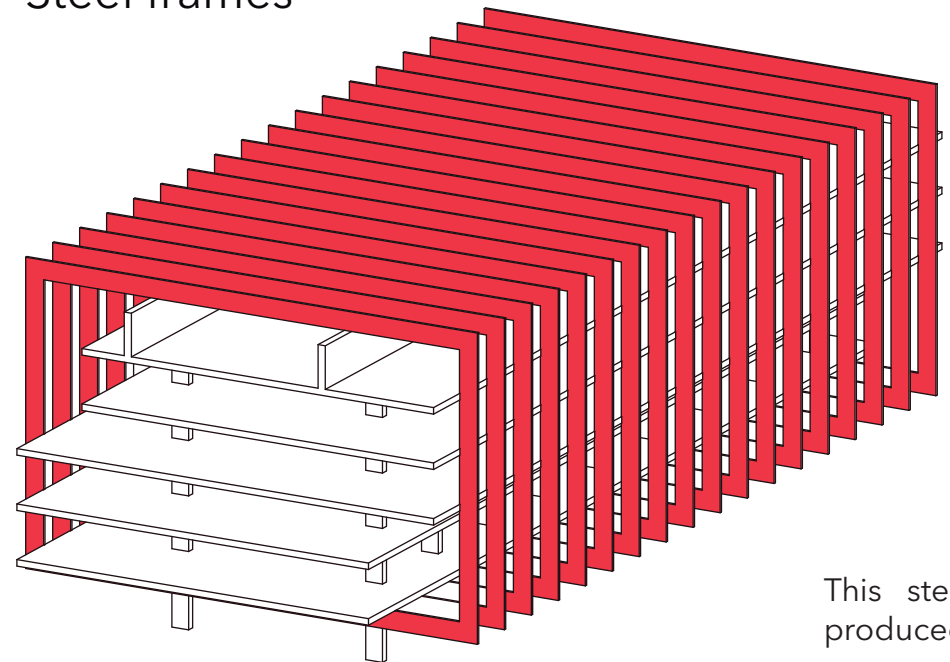
The hollow core precast slab are those used for the part that is cantilevered to reduce its weight, half of the load of this cantilever will be carried by the pillars

Concrete beams



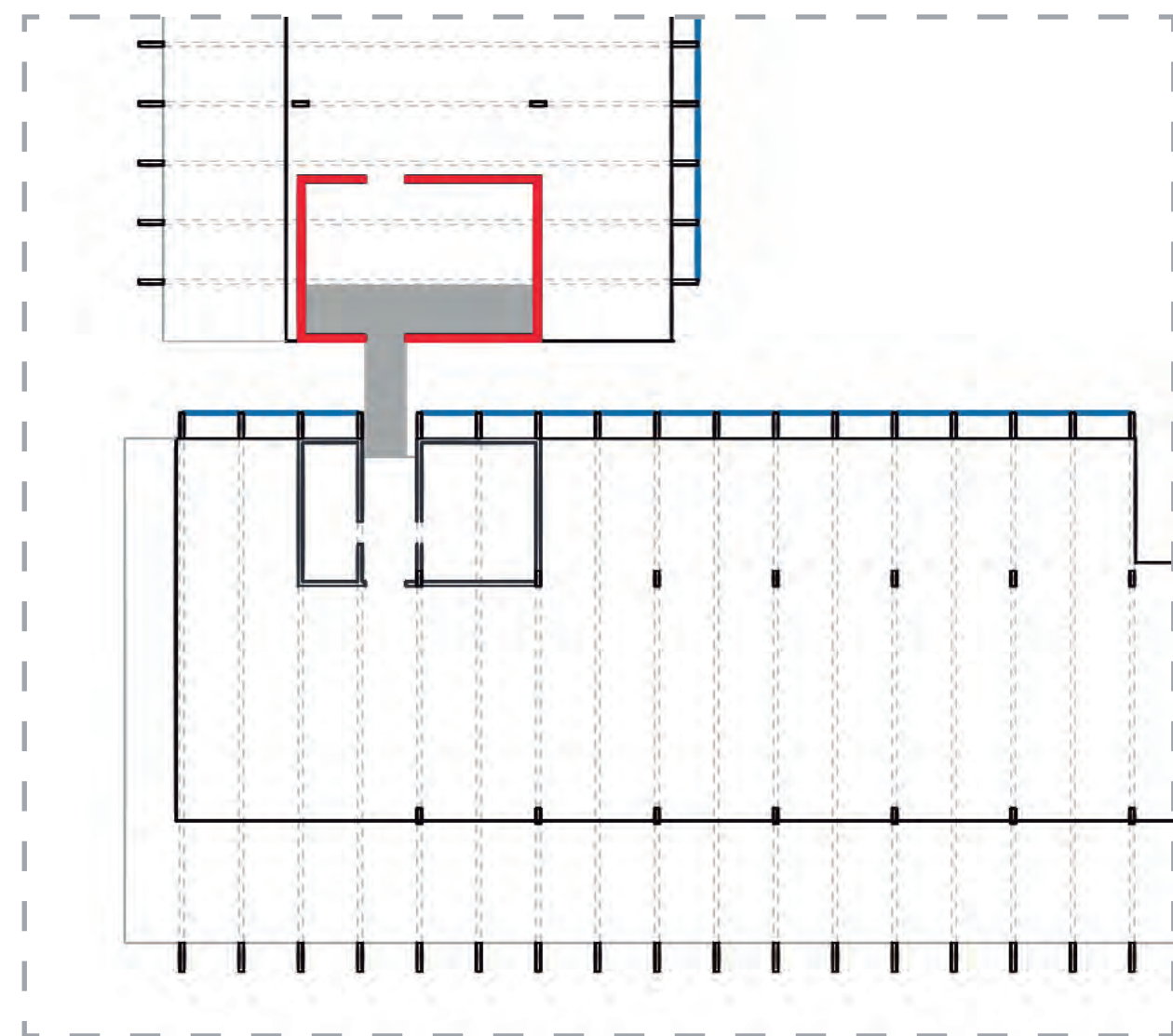
These concrete beams carry the weight of the outer substructure (ribs) and pass it to the pillars.

Steel frames

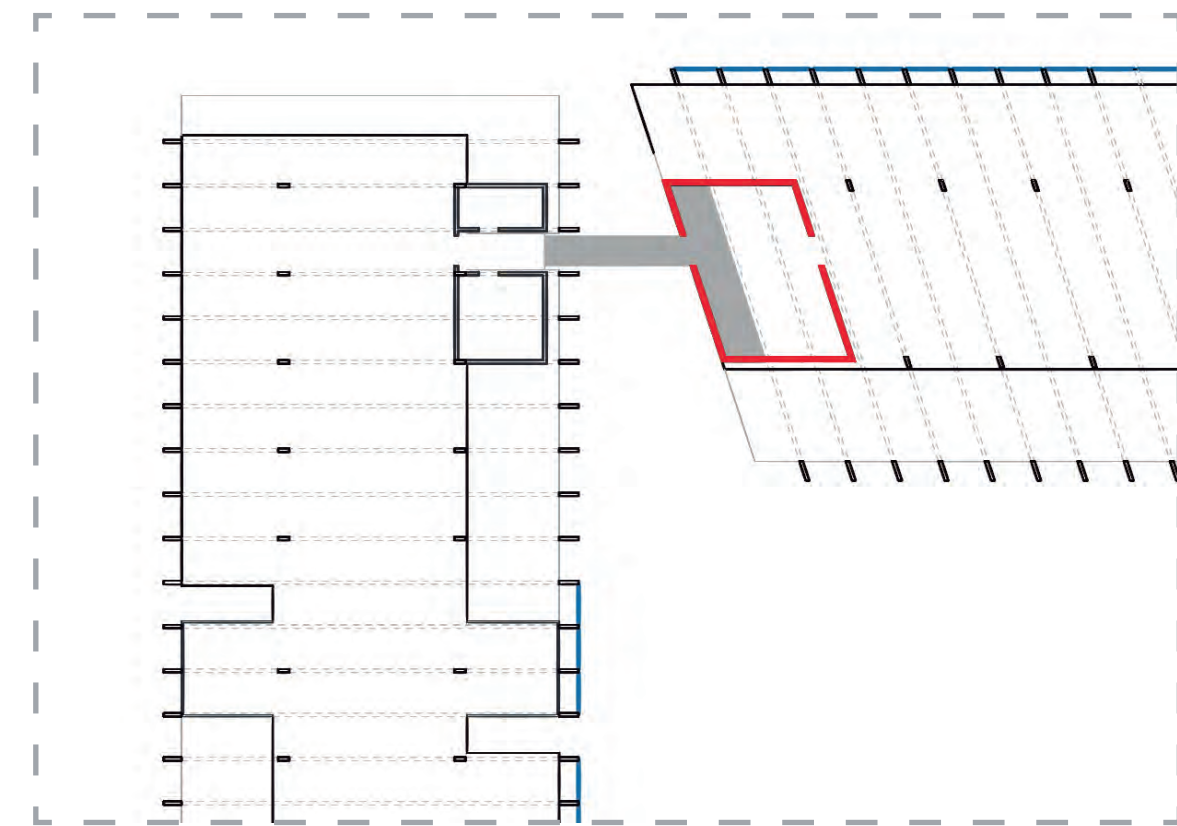
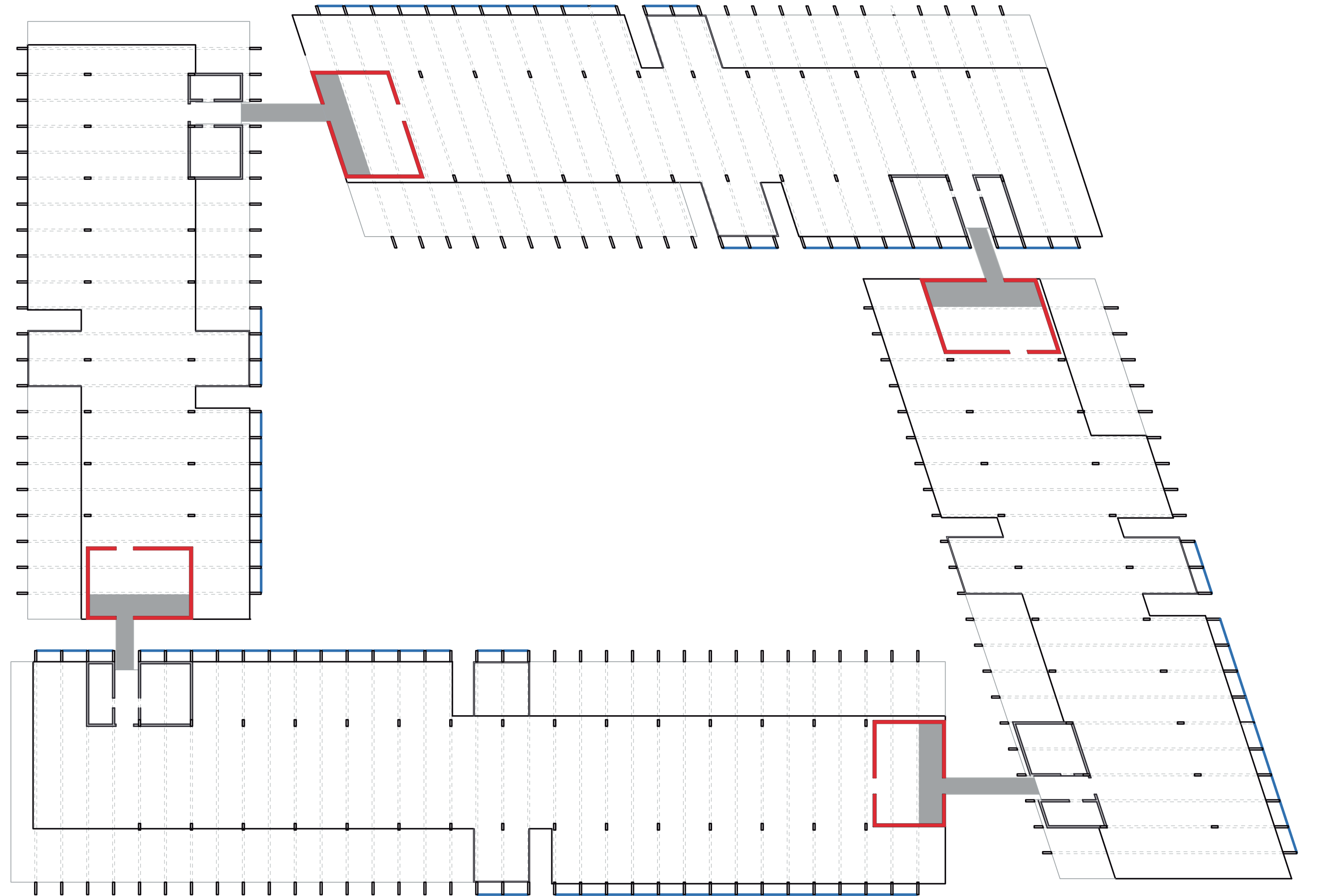


This steel substructure supports half of the load produced by hollow core precast slab.

The elements marked in red are concrete cores that work as horizontal bracing to resist the wind pushes



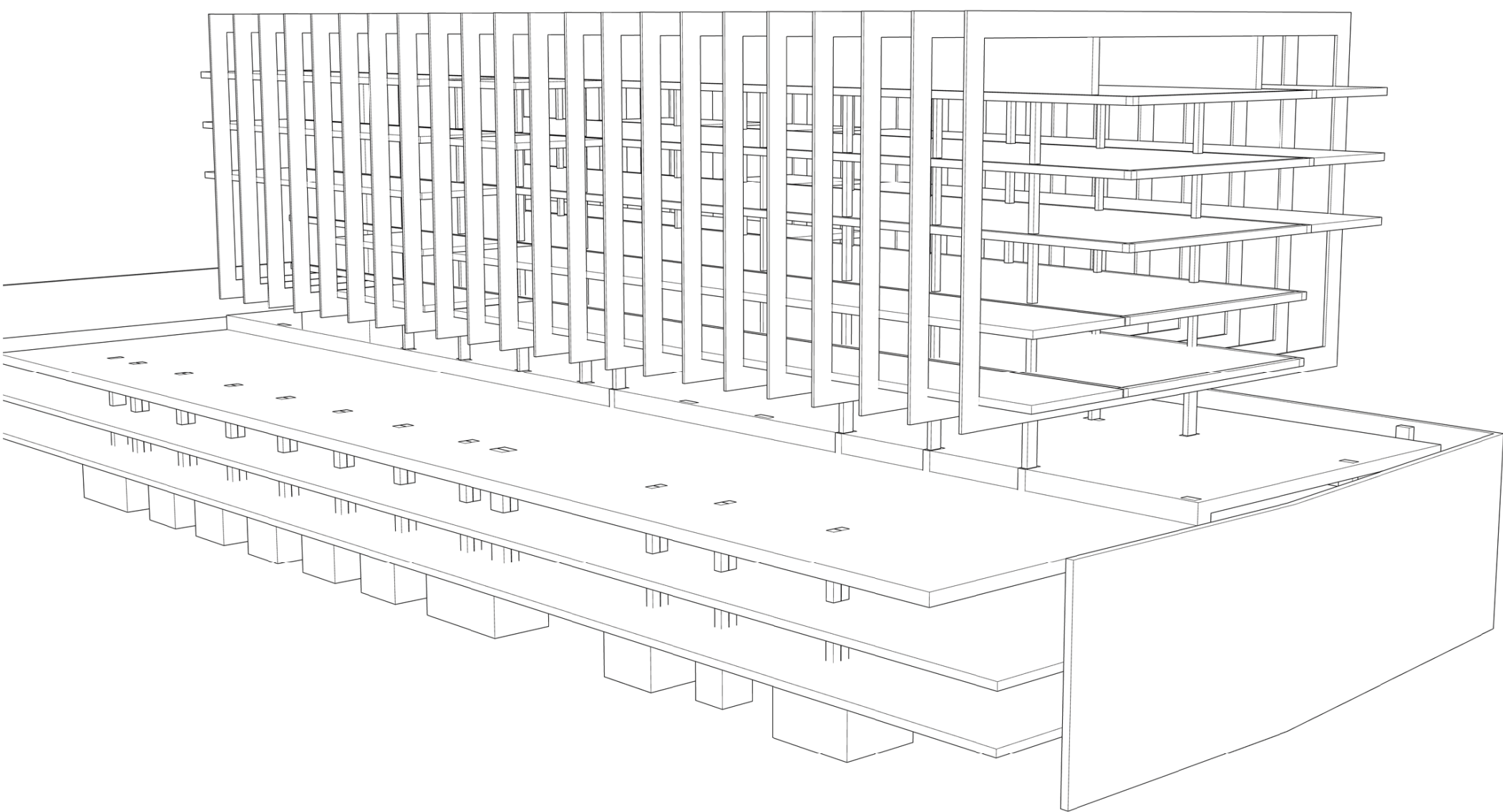
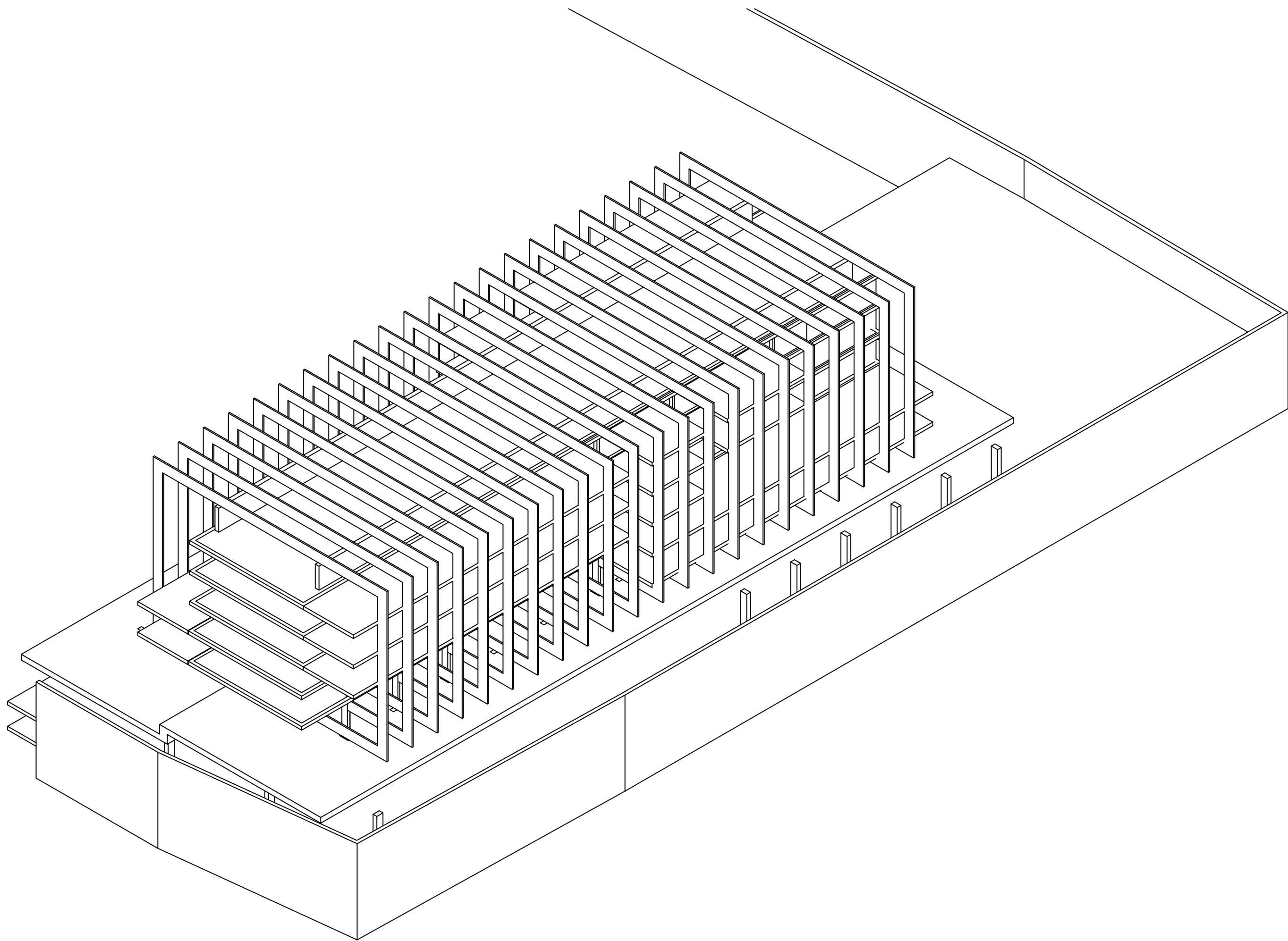
The elements gray are the walkways that anchored some buildings to others avoiding the overturning of any of the four pieces.



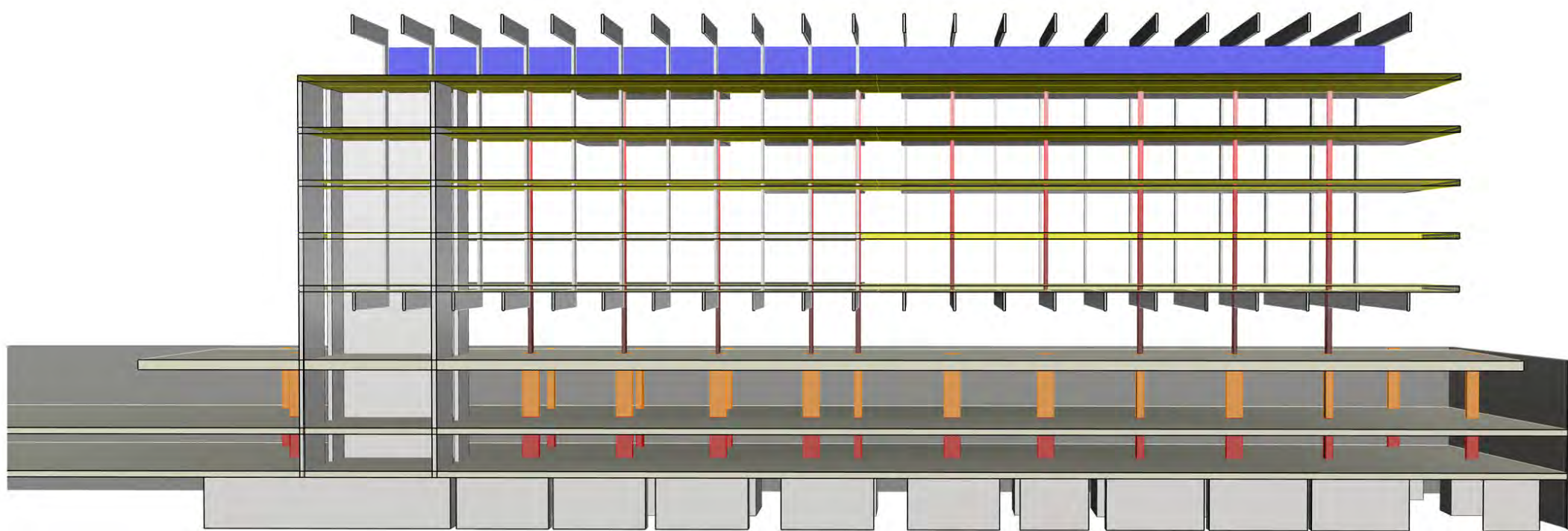
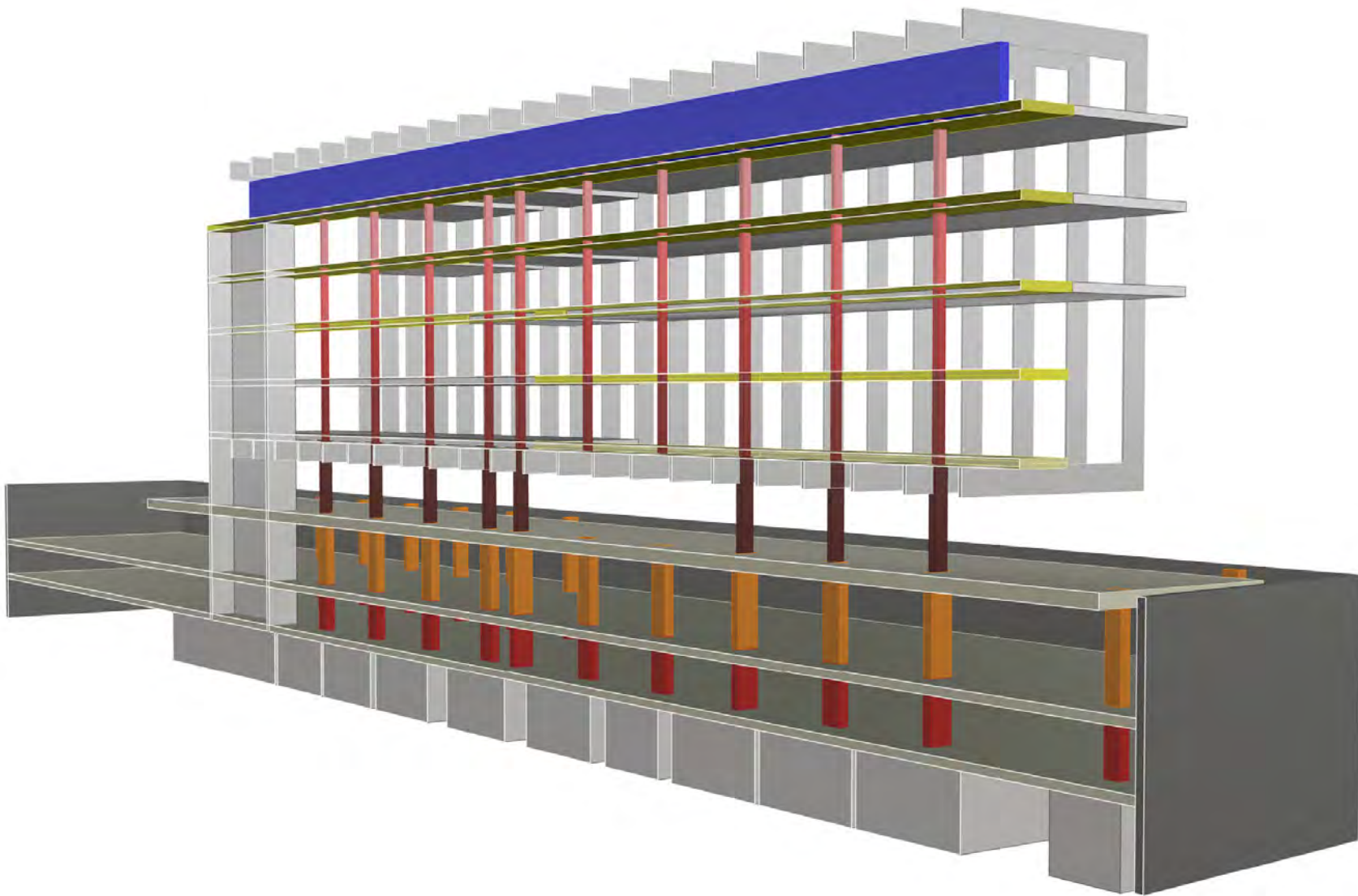
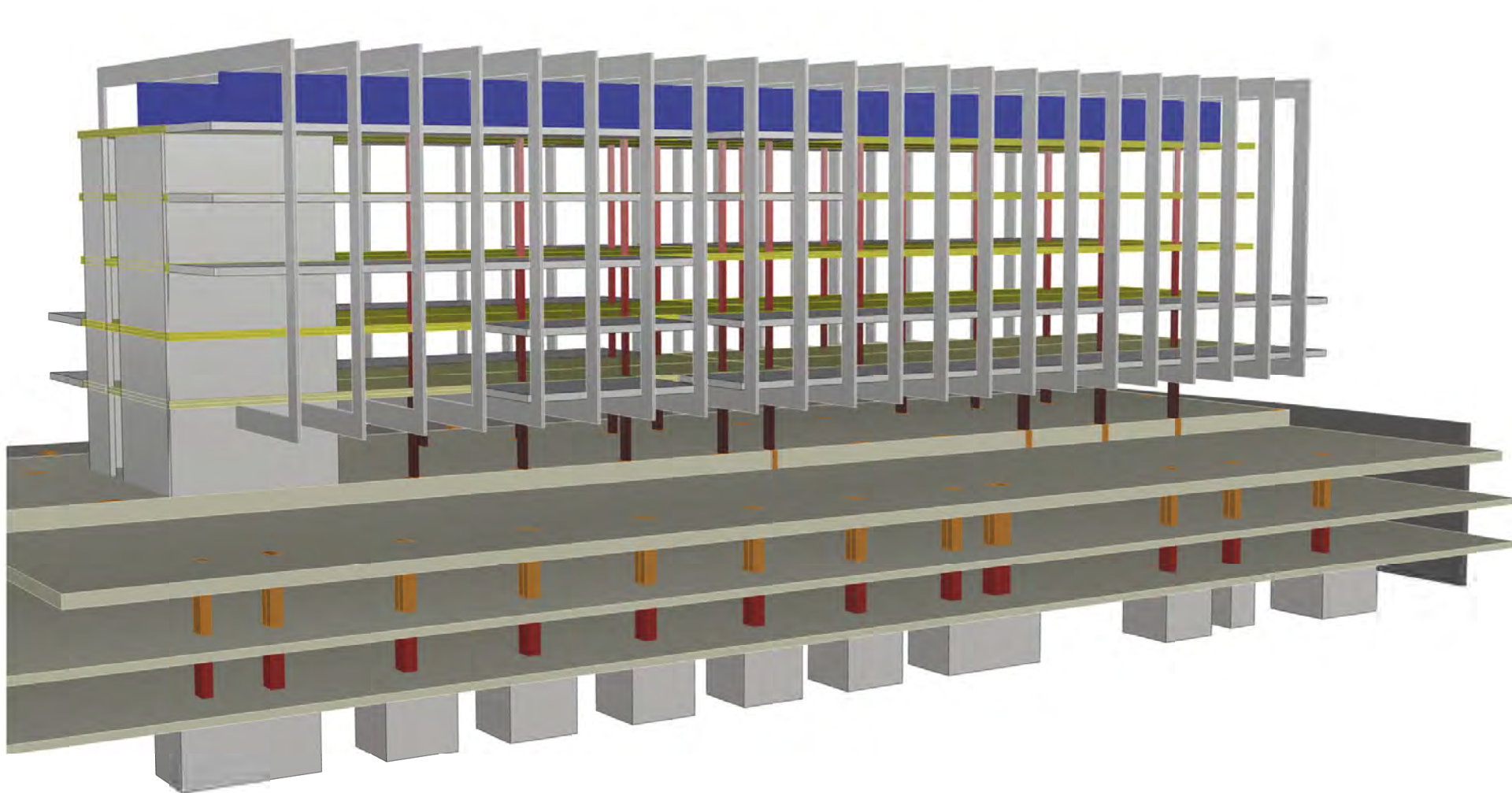
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Virtual model of the Repsol Campus

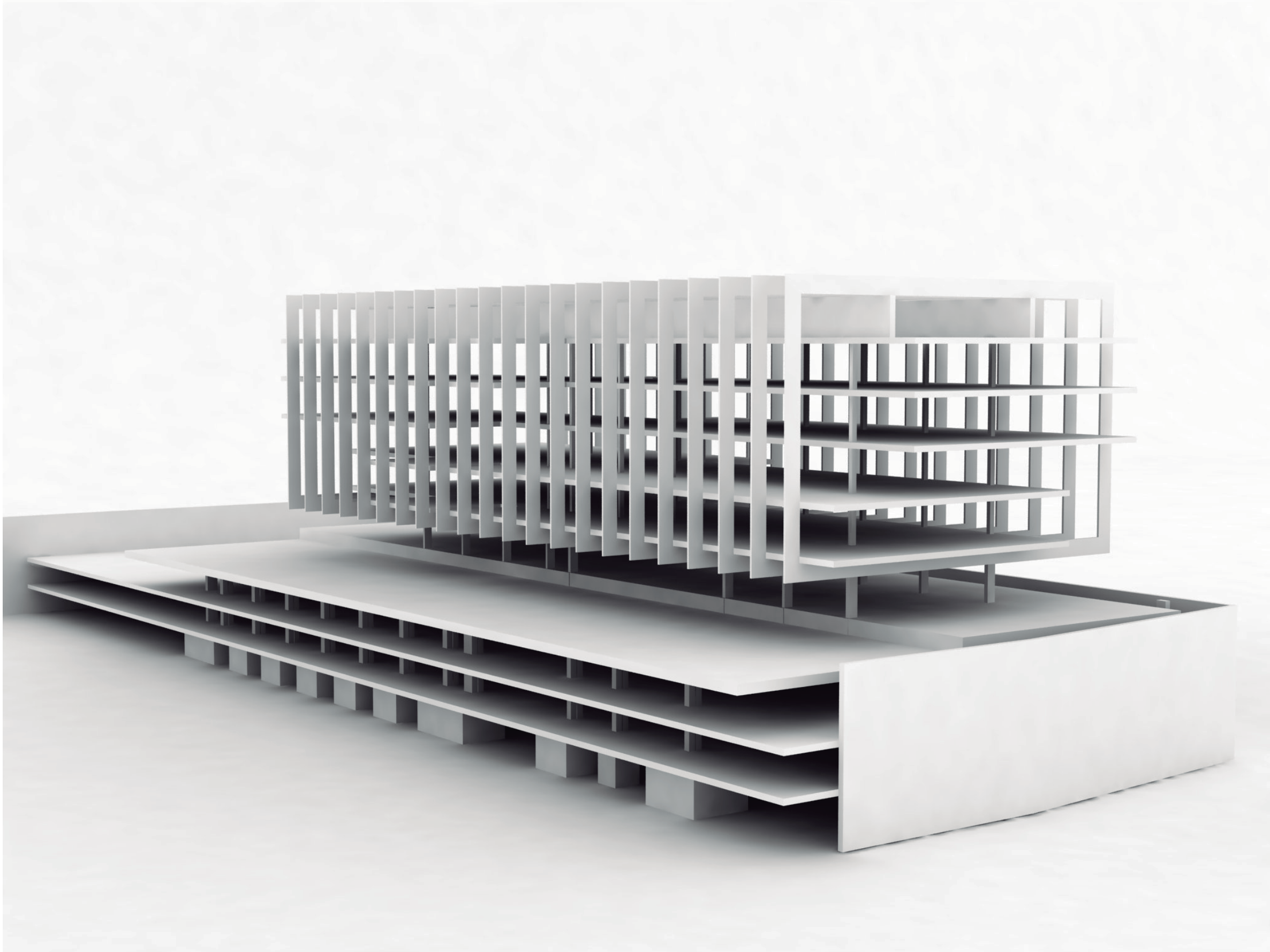
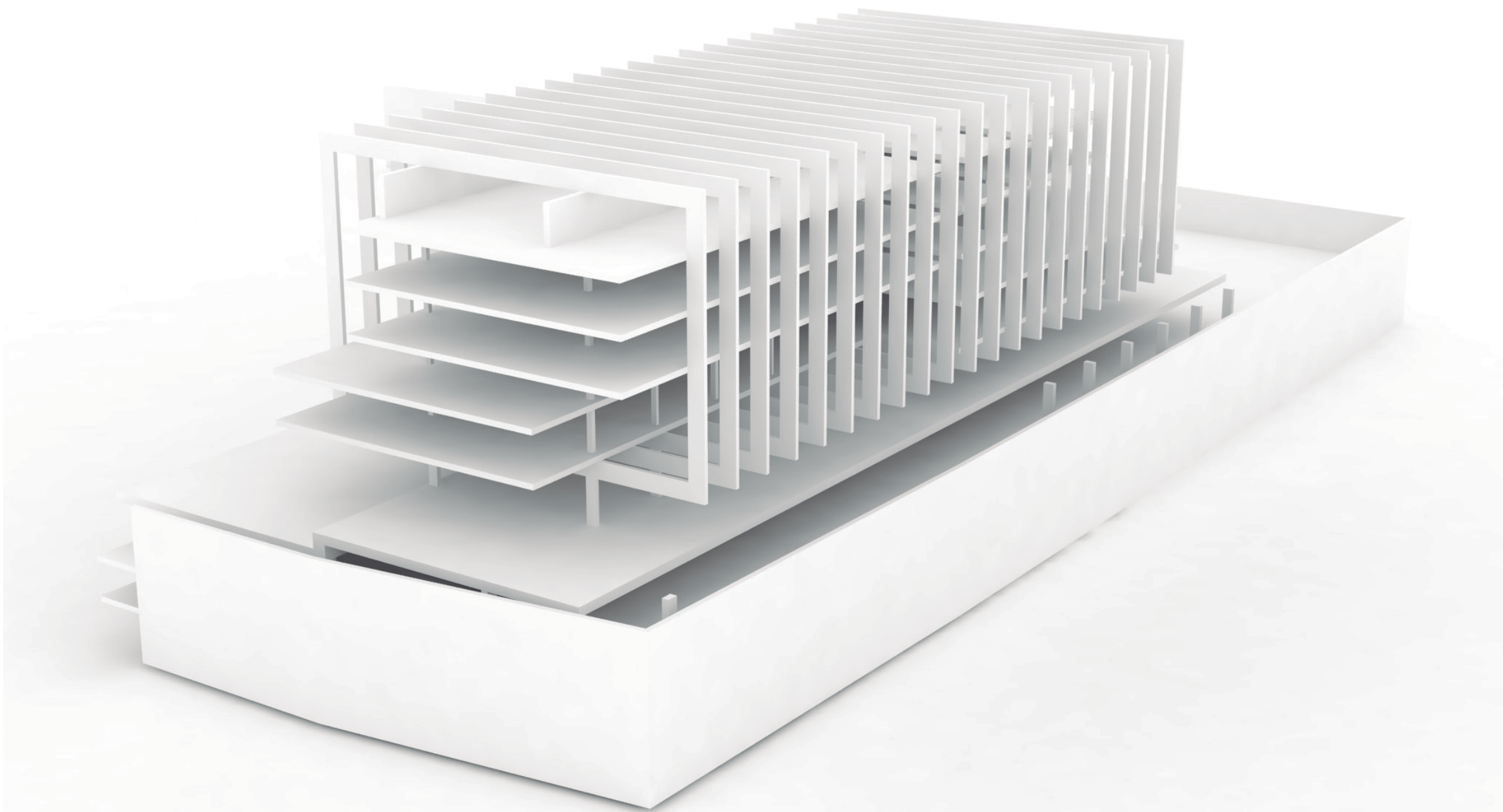
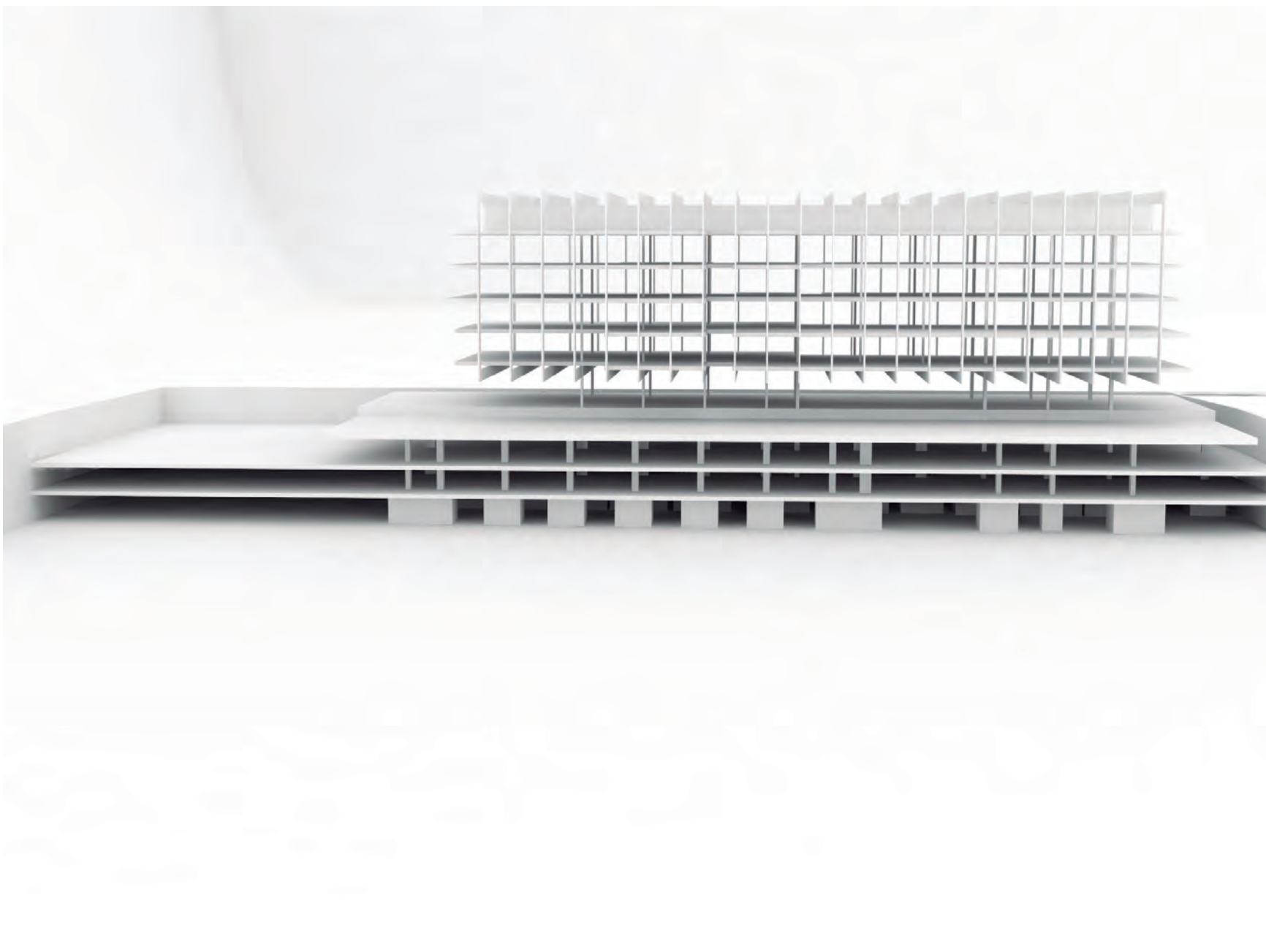
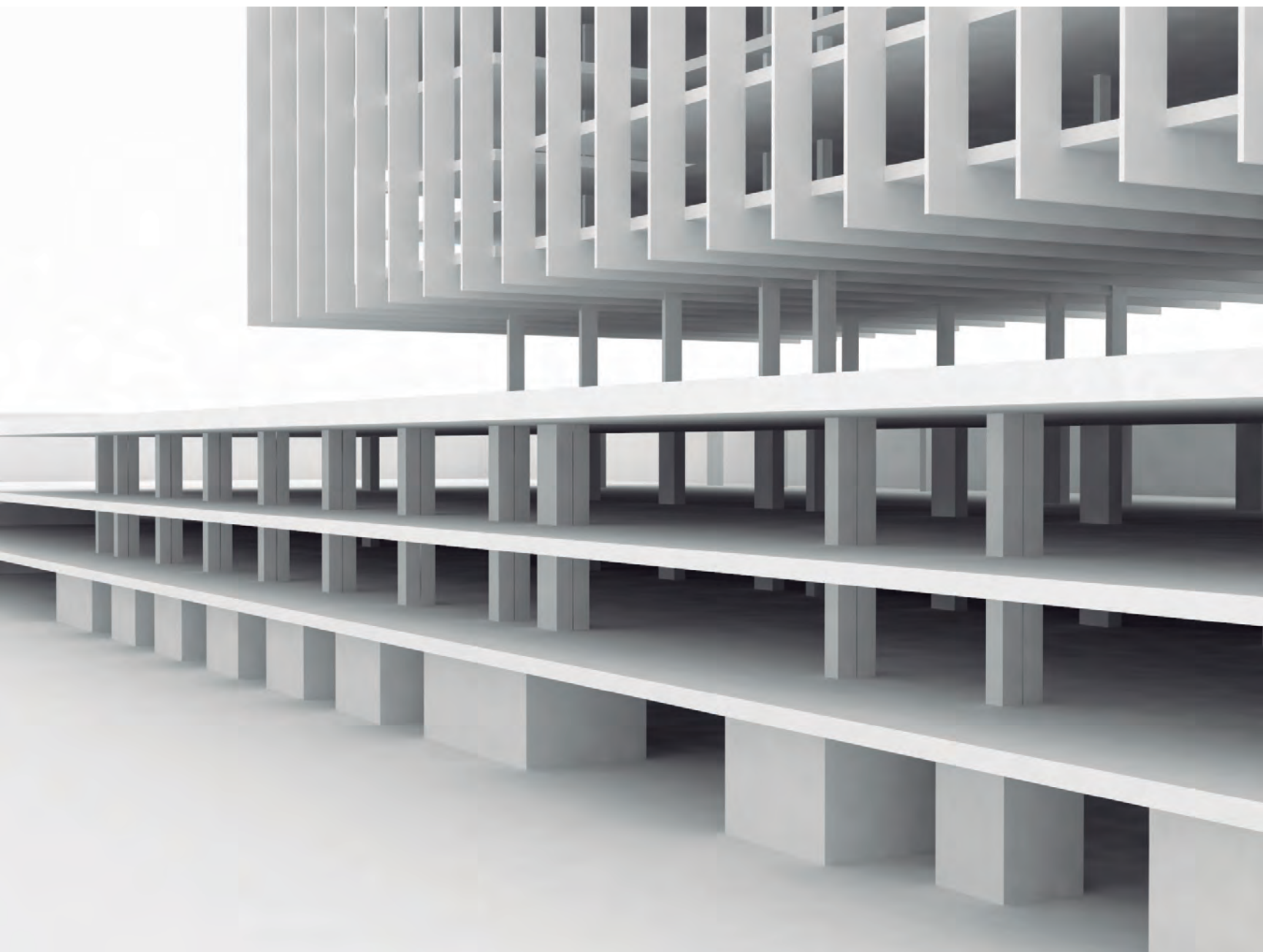
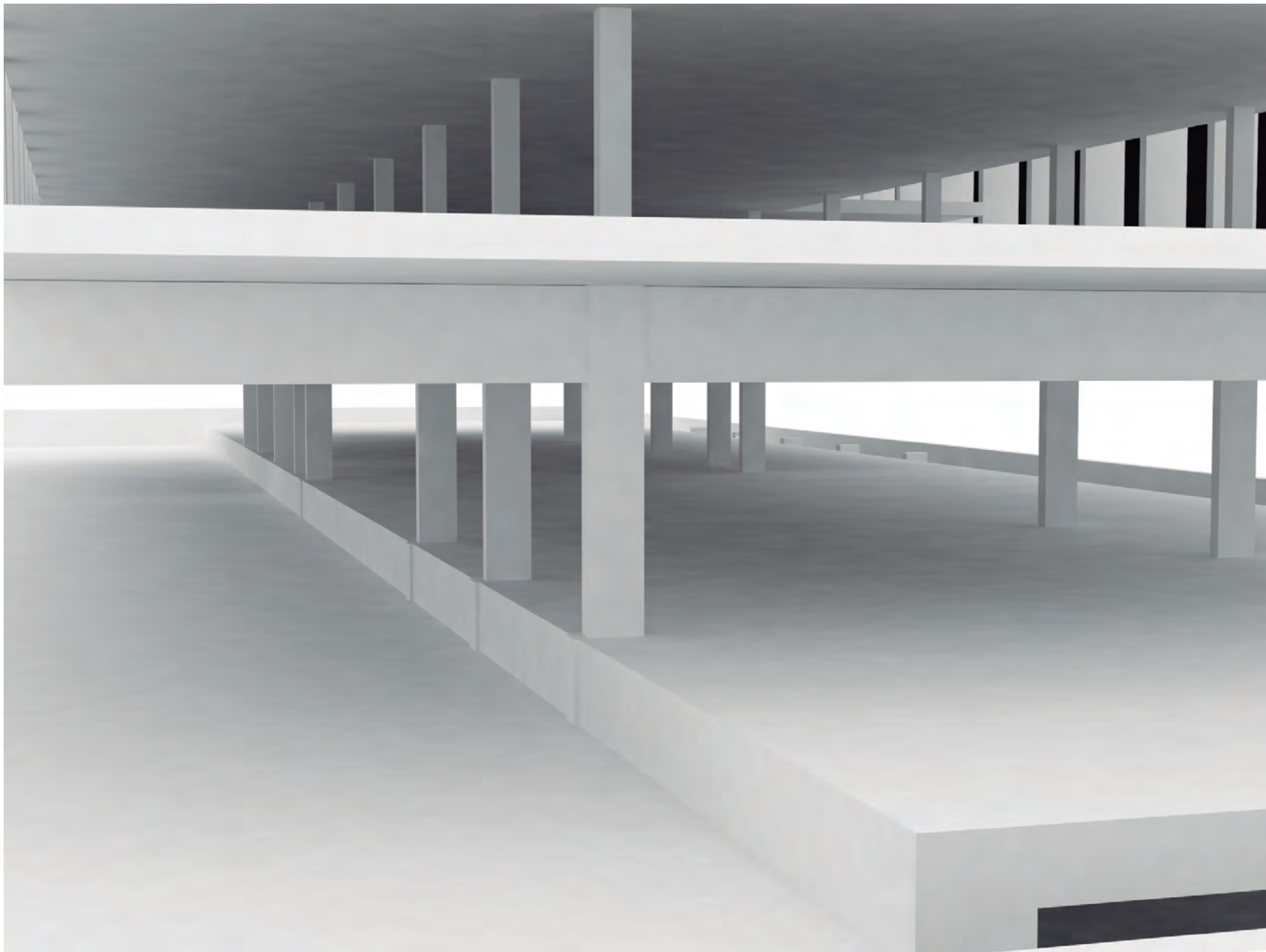
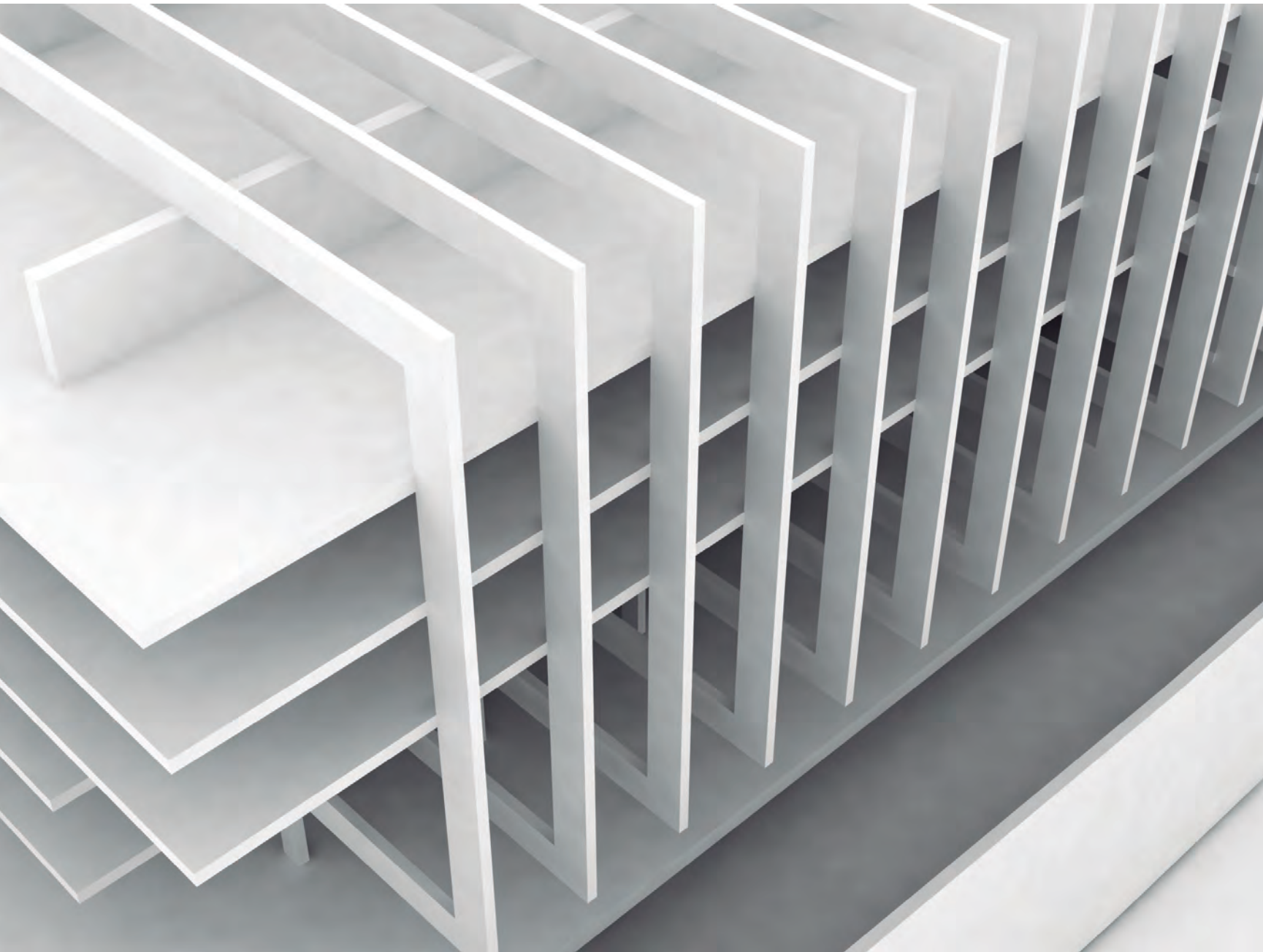
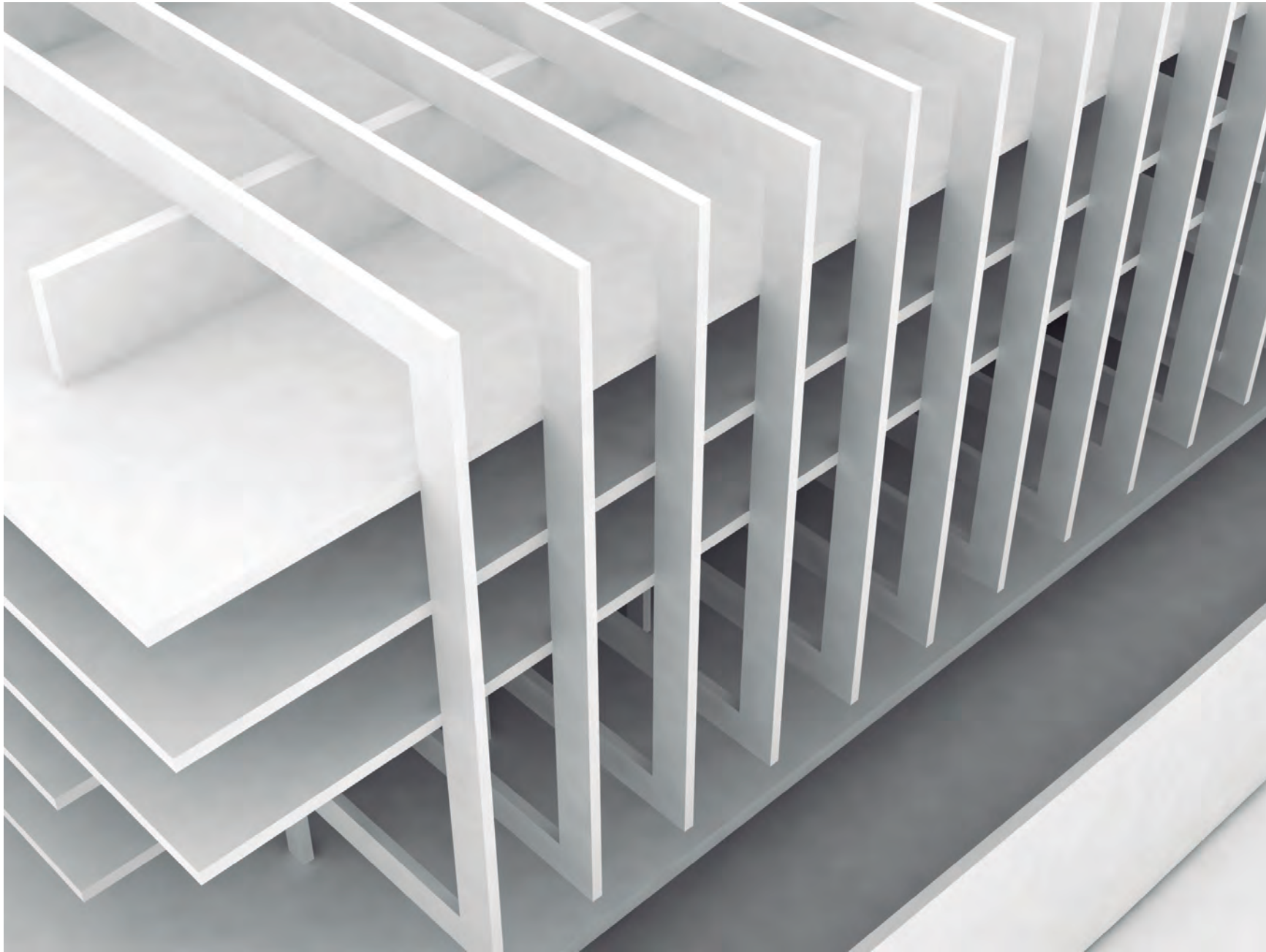
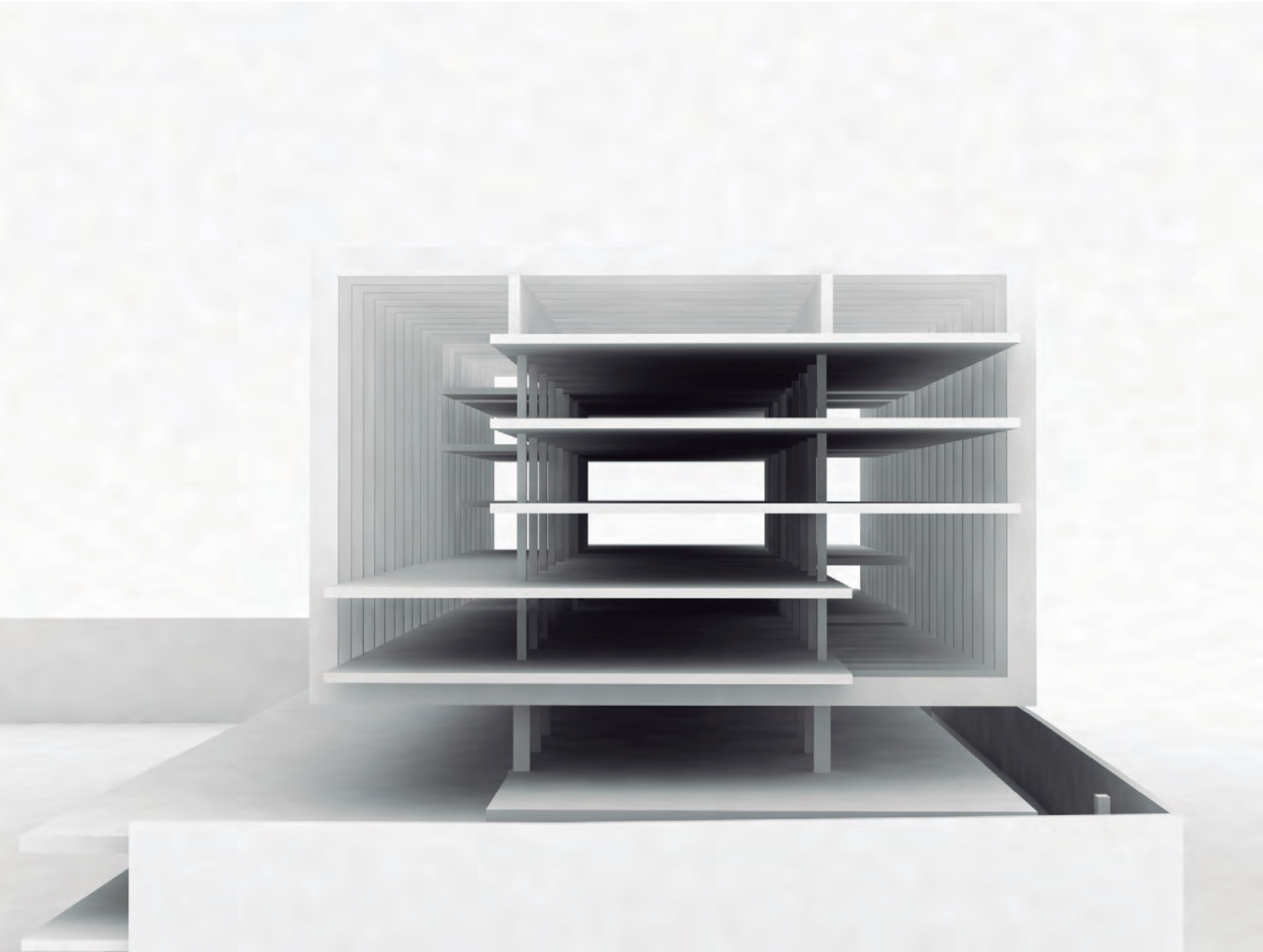
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Name	Color
Upper beams	
Concrete core	
Steel slabs	
<input checked="" type="checkbox"/> Concrete slabs (two way slab)	
Third floor slab	
Second floor slab	
Prking slab	
Fourth floor slab	
First floor slab	
Edge joist	
Ribs	
Retaining wall	
<input checked="" type="checkbox"/> Pilars	
Third floor pilars	
Second floor pilars	
Parking pilars -2	
Parking pilars -1	
Ground floor pilars	
Fourth floor pilars	
First floor pilars	
Footings	



Renders



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Construction model of the Repsol Campus



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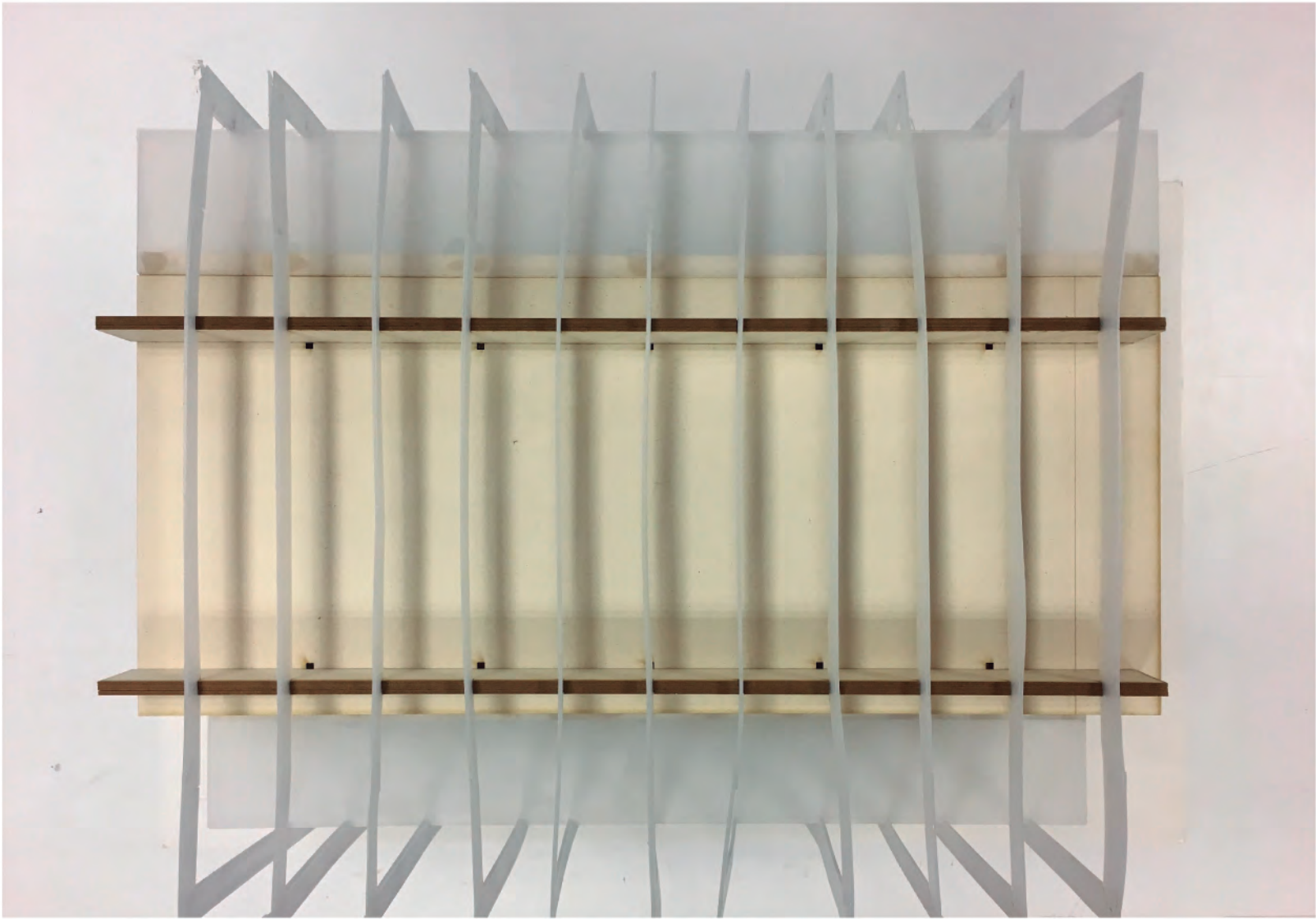
Model 1/100 Repsol Campus

- Concrete pillars: DM timber
- Concrete slab: Cardboard
- Steel slab: Polypropylene
- Concrete upper beams: Cardboard
- Steel ribs: Polypropylene

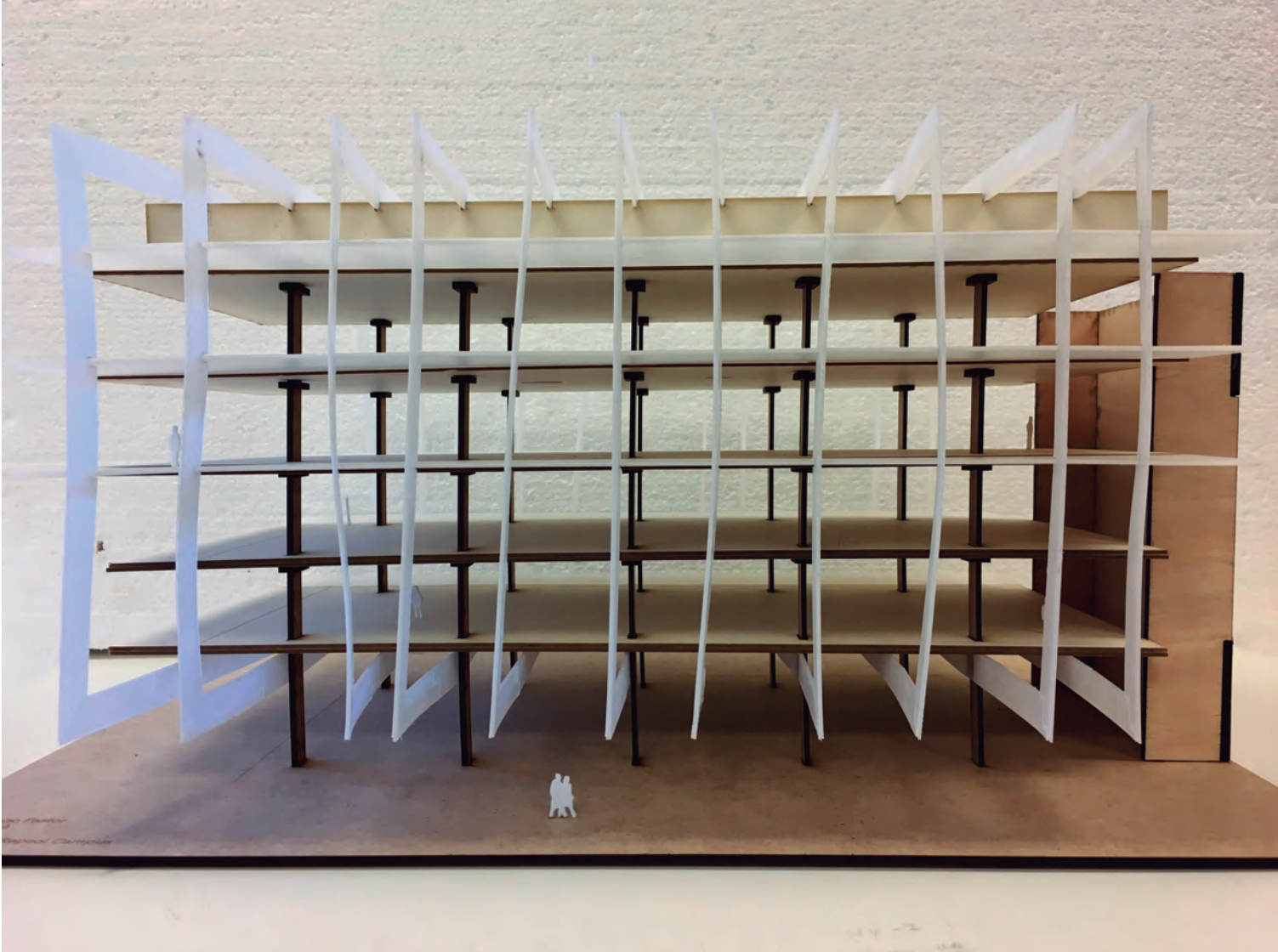
All the elements have the same thickness and proportion as the real building



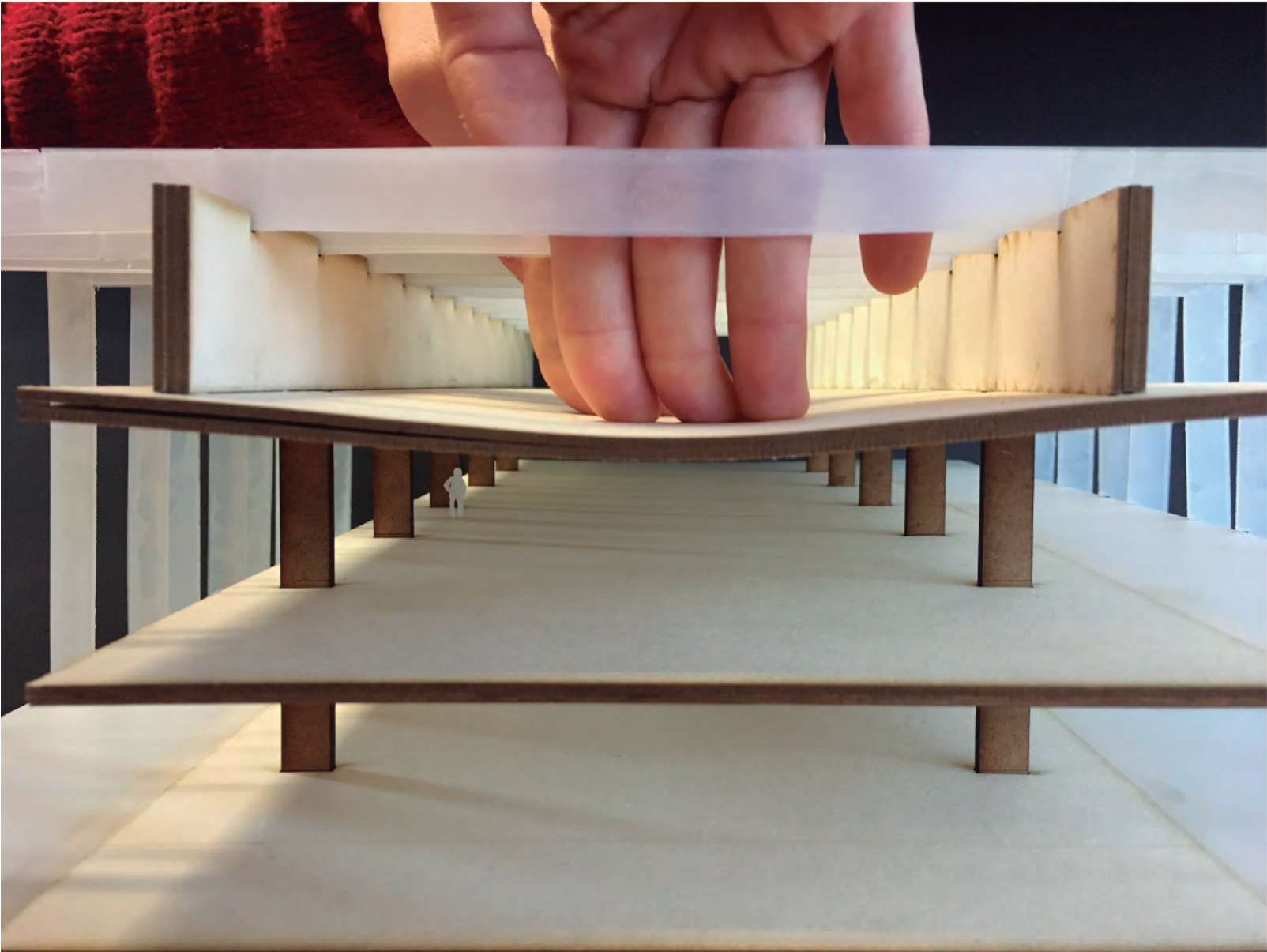
Due to the fact that in the model we were missing the concrete core, you can appreciate that the core is the one that works as a bracing for stability in that direction, while in the other direction the ribs work as a bracing.



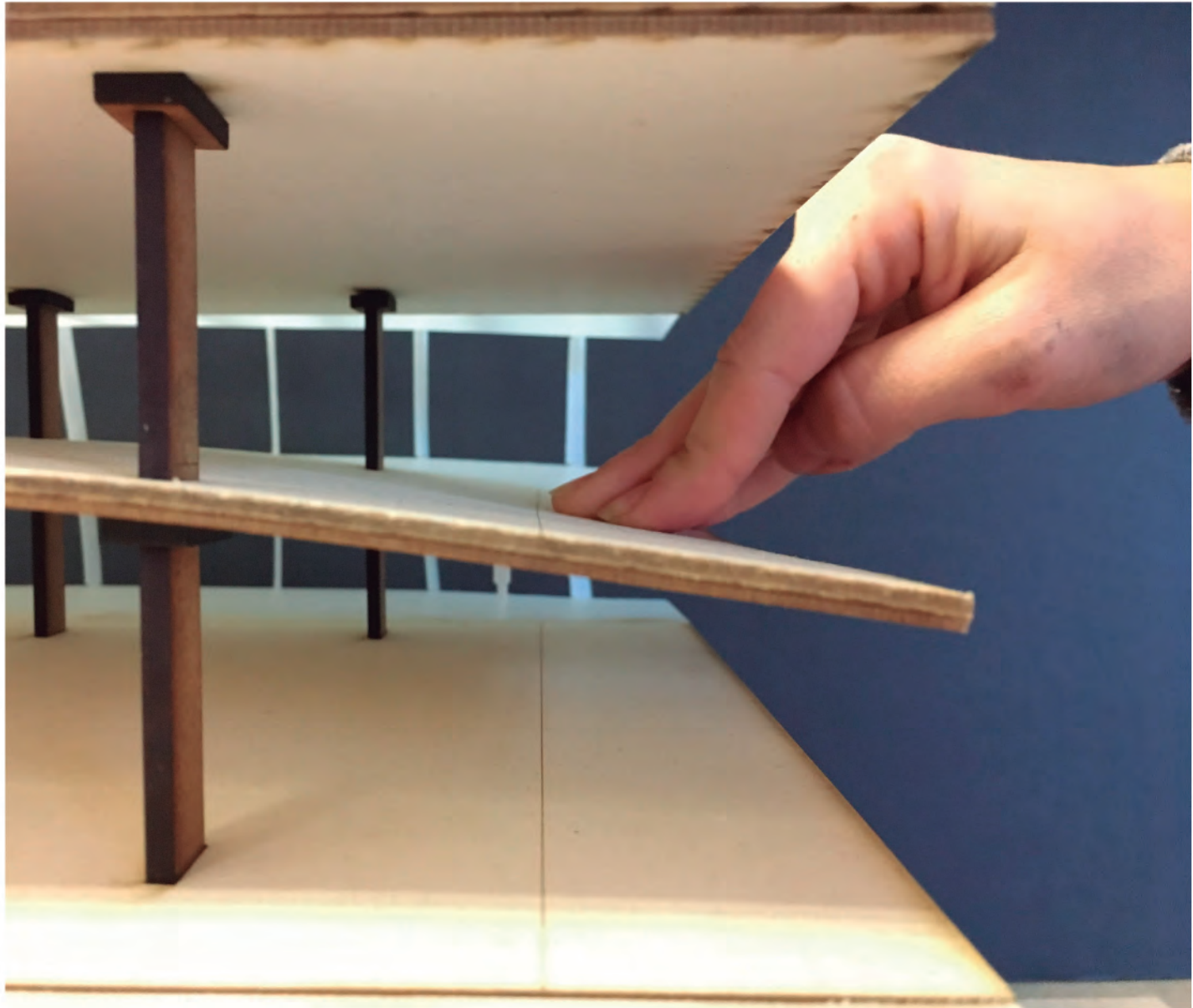
Top view



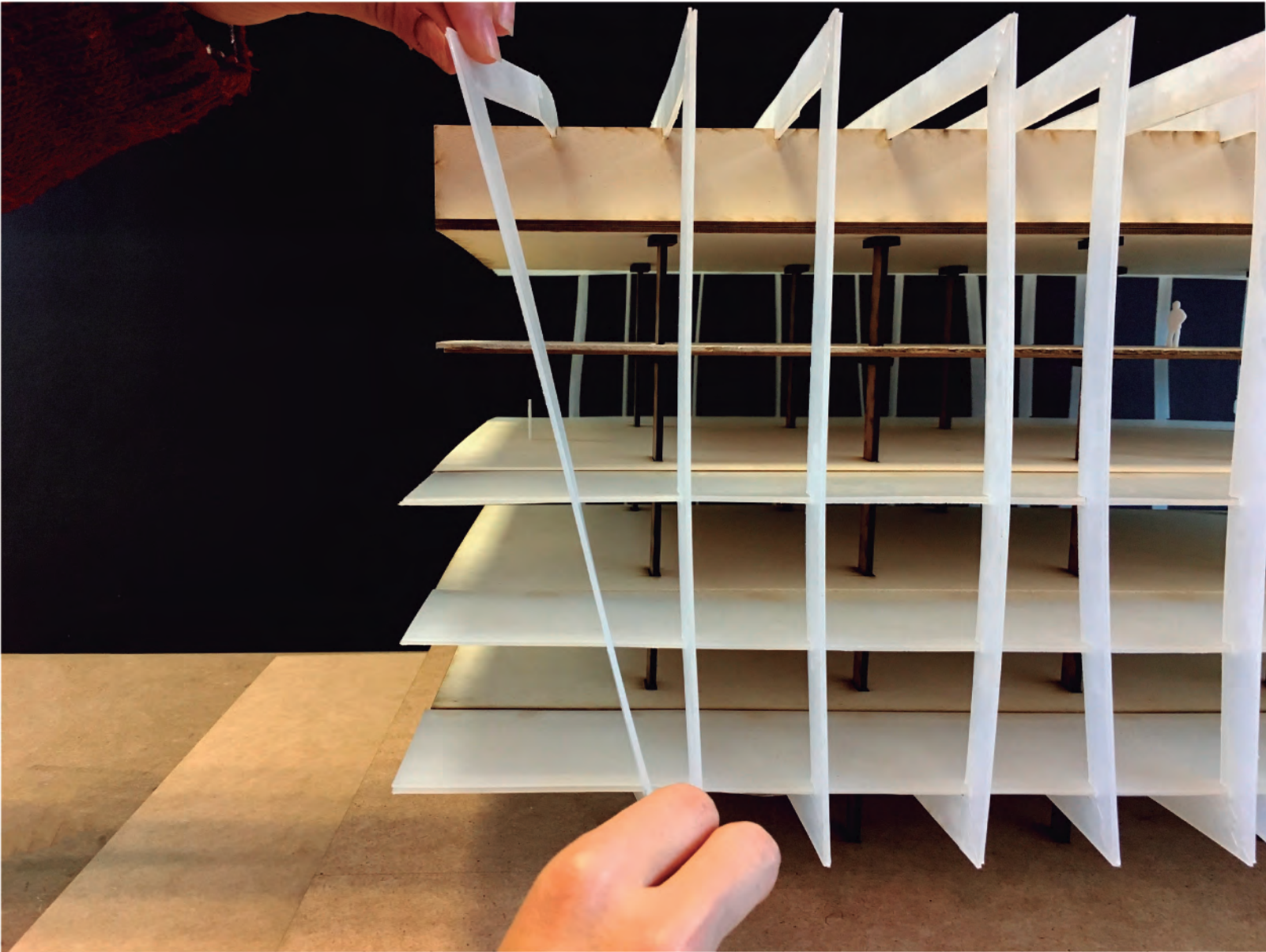
Front view with the concrete core, so it braces the building



Deformation of the slab

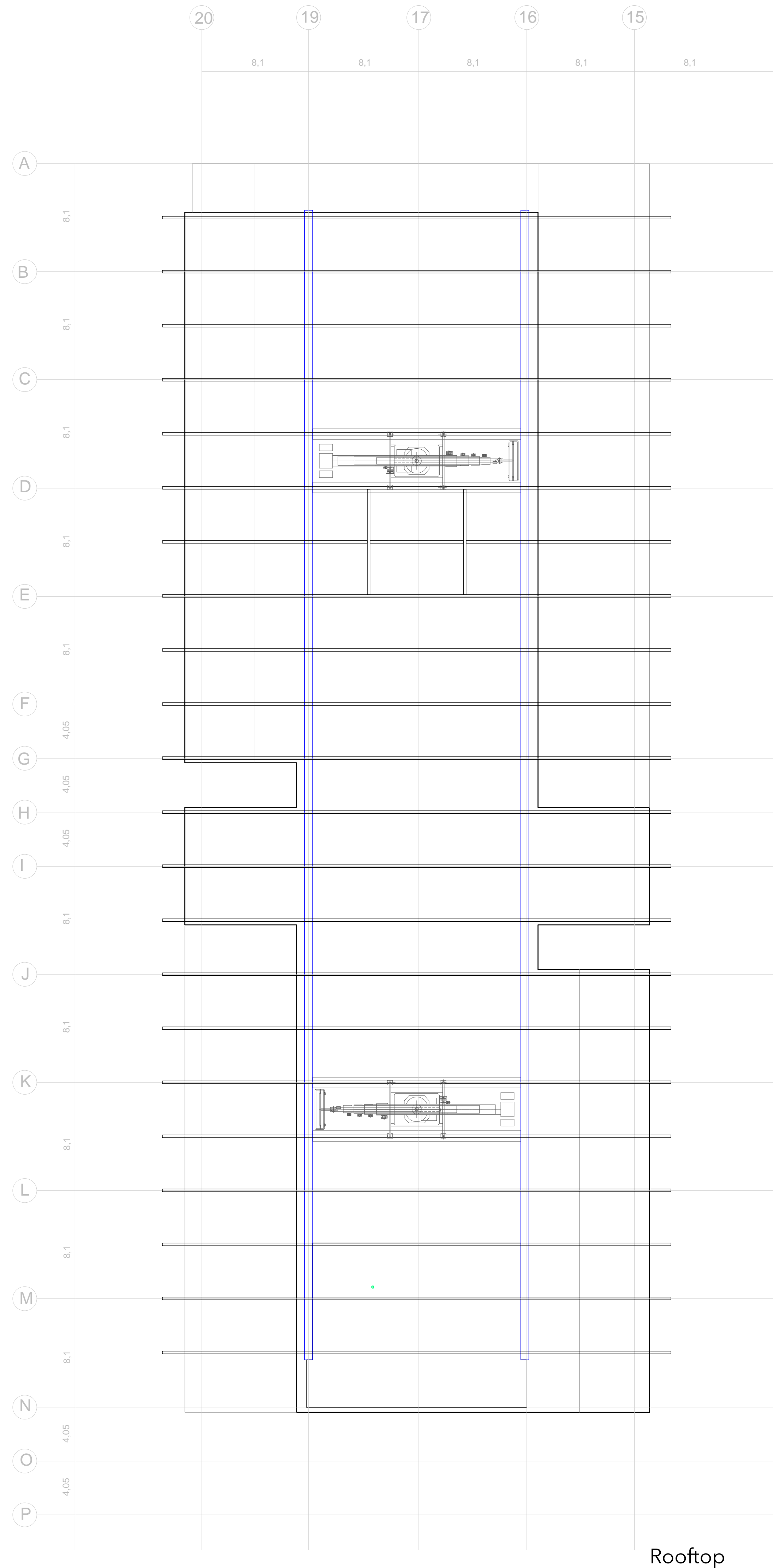
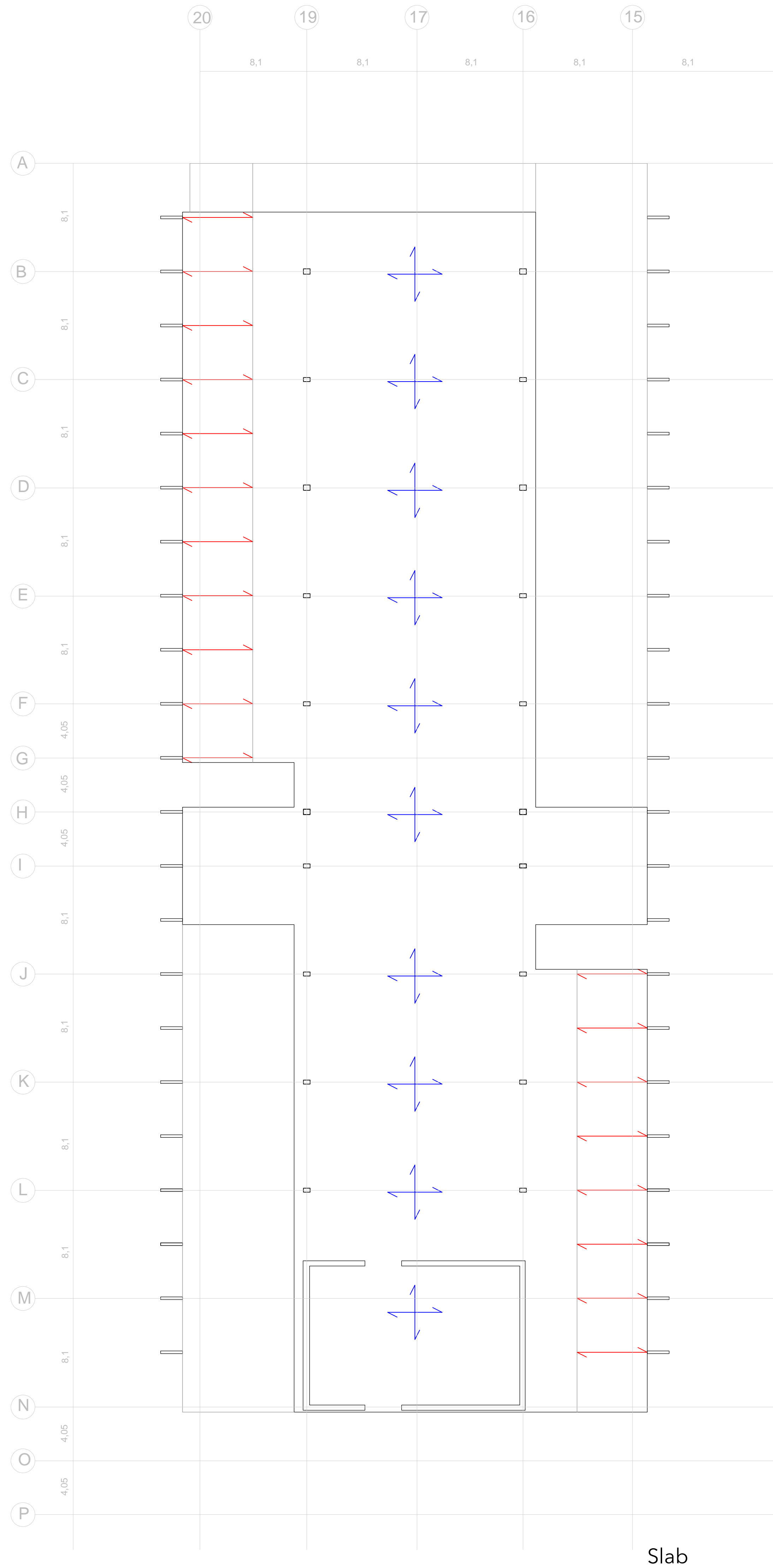
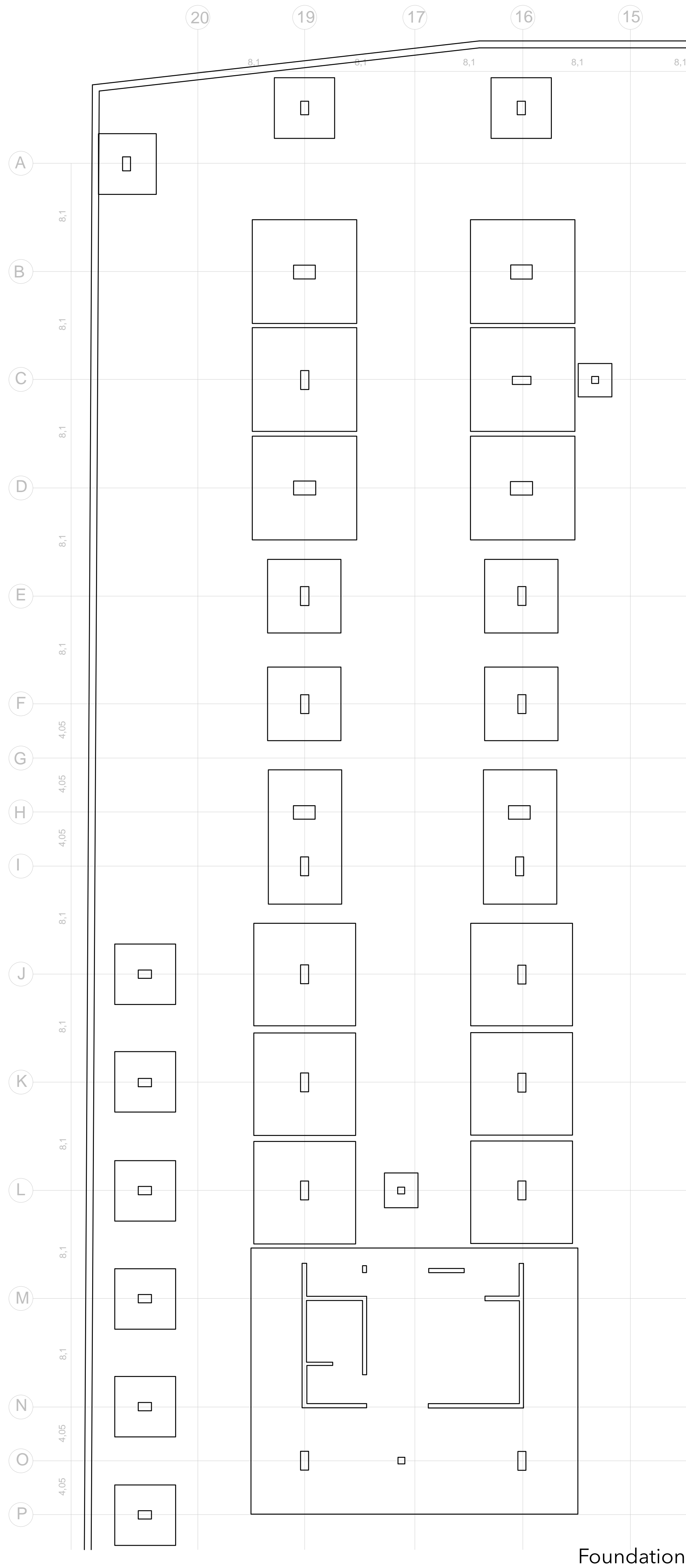


Deformation of the cantilever



Deformation of the steel ribs (they needed stiffeners)

Structural documentation

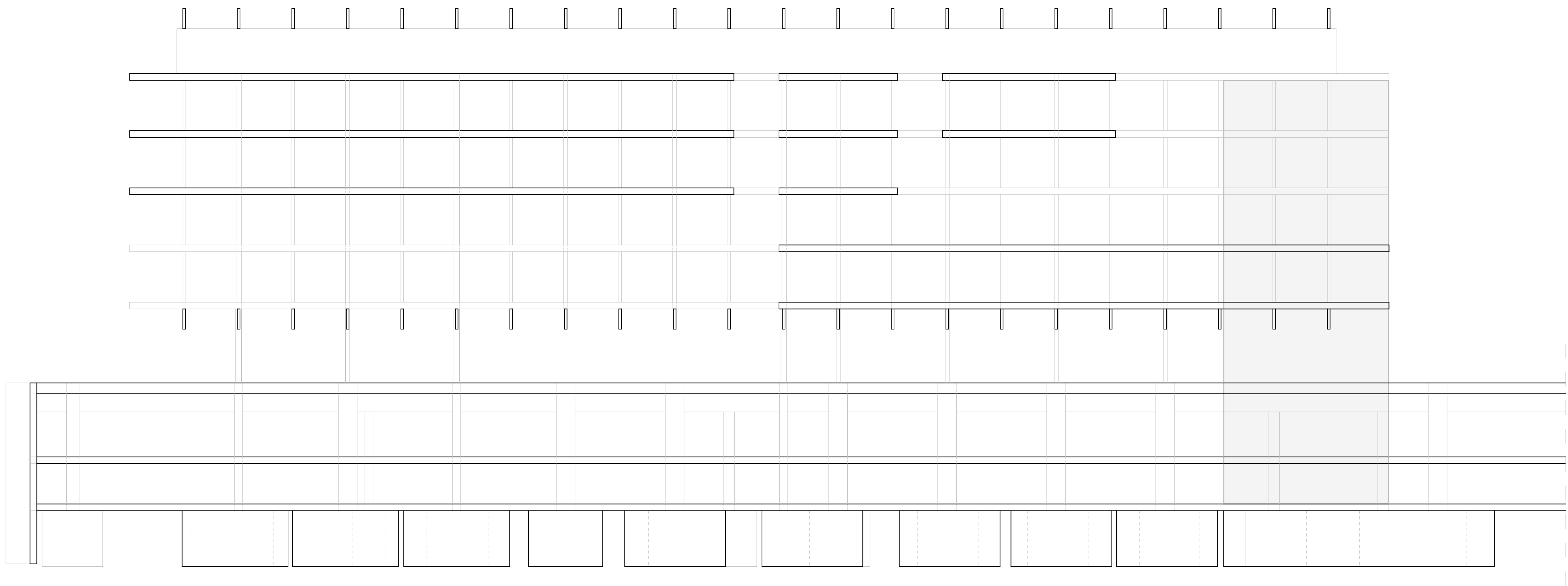


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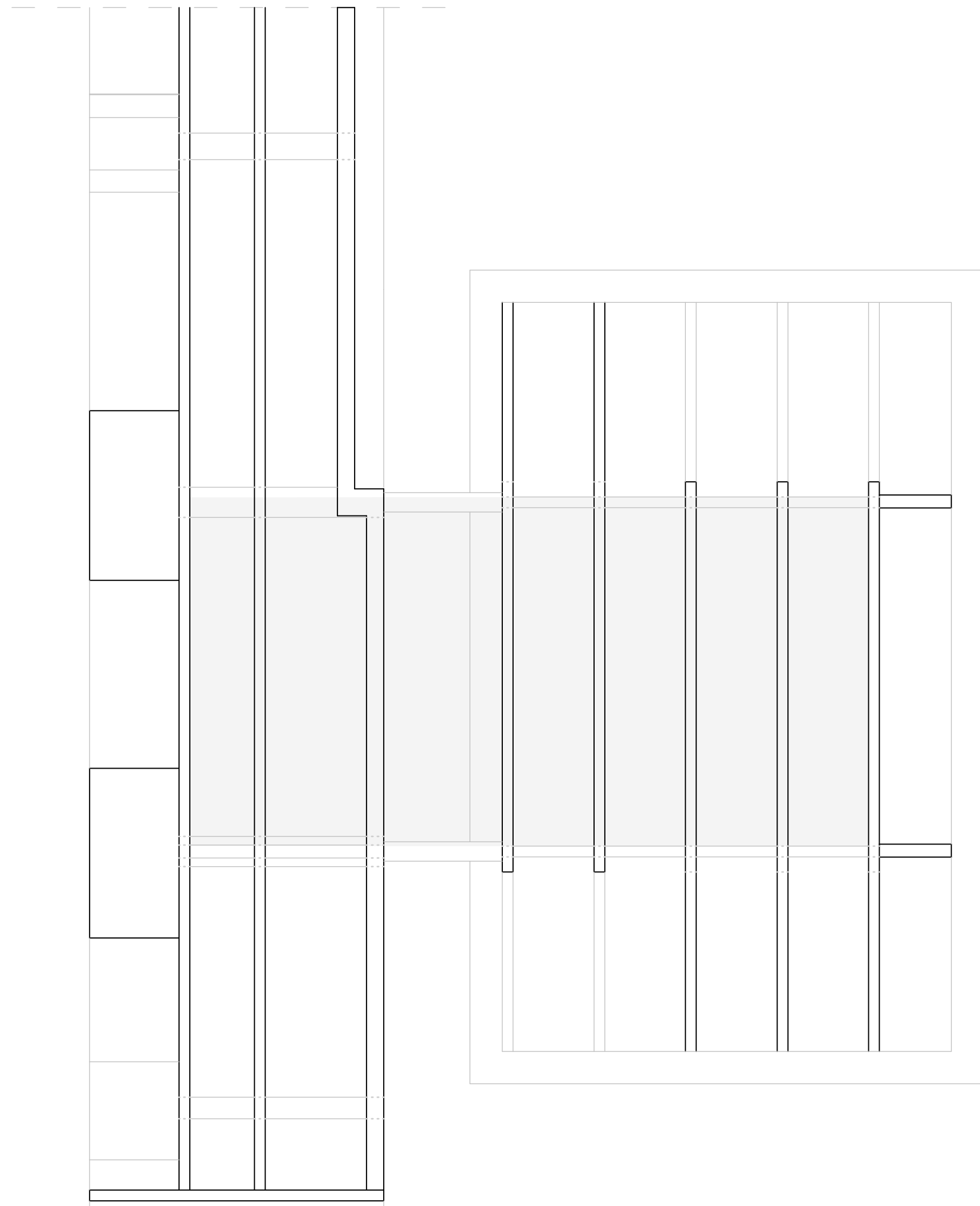
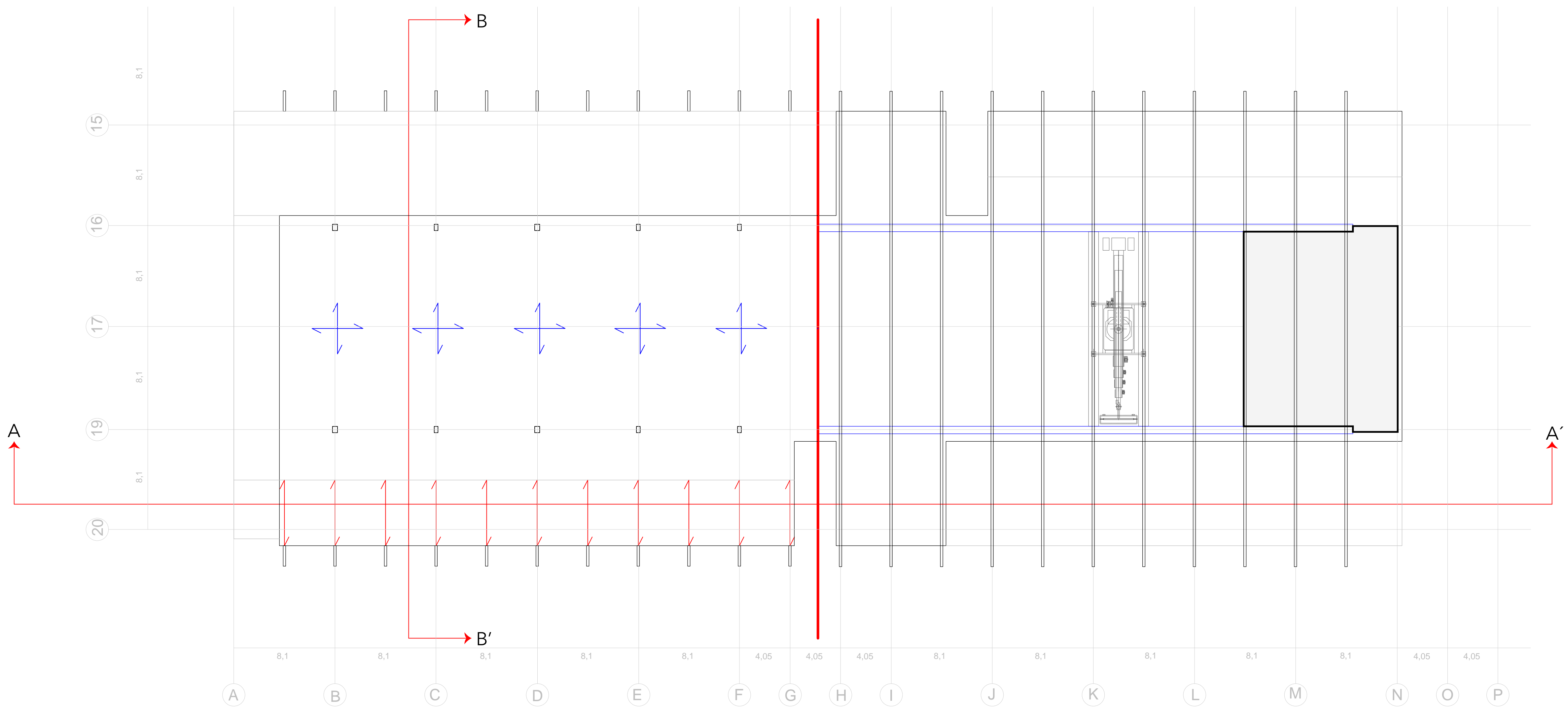


Structural documentation

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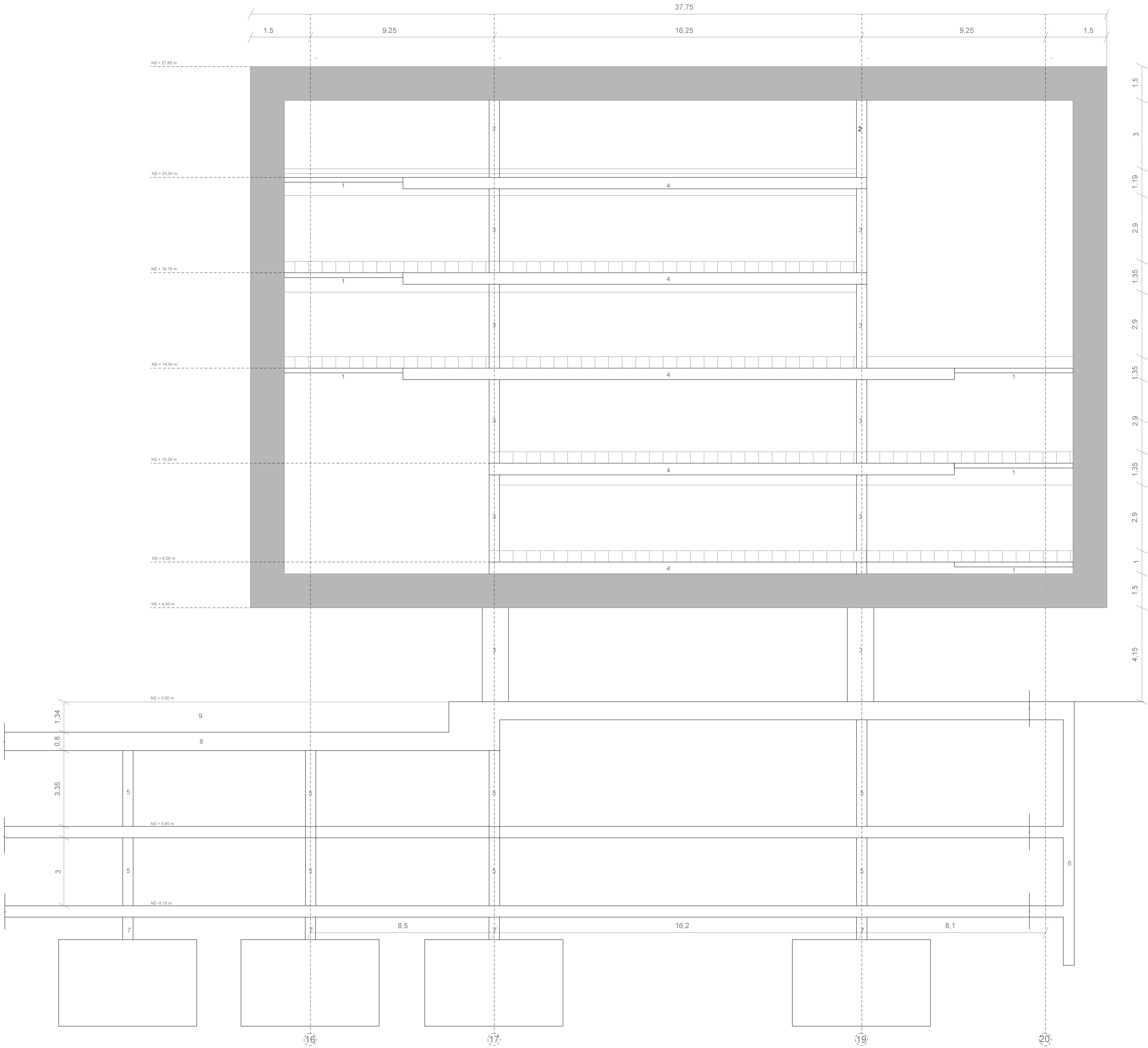
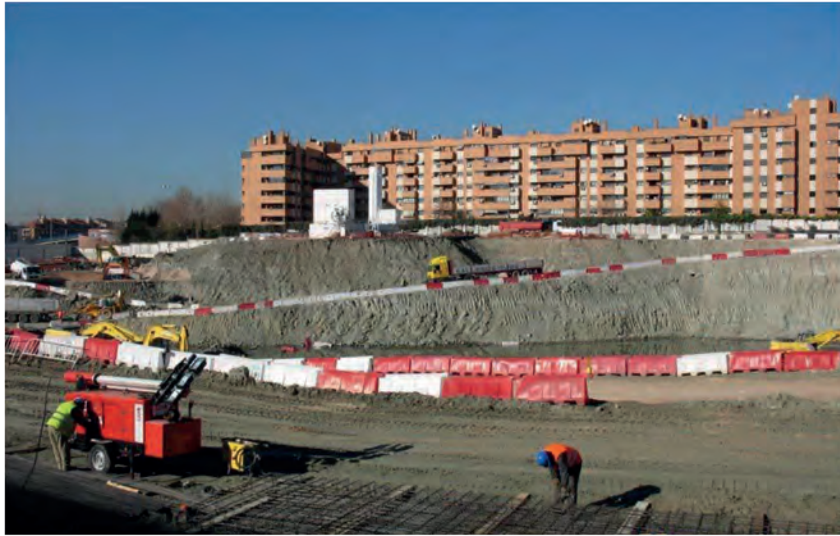
Section AA'



Section BB'

Section with the material

Building process pictures



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Contents in this page	Section with materials

KEY

1- STEAL SLABS

It is a steel structure with profiled laminates. It conforms with a HEB-260 every 4.05 meters. The perimetral part is a HEB-400 and the thickness of the slab of sheet is 14 cm.

2- UPPER BEAMS

Beams of white concrete (in the 5th ceilings and in the access the beams are of double mixed action)

3- STRUCTURE RIBS

The dimensions are 1500x200 mm. During construction it is necessary to put thermal insulation and heaters to pre- vent the deforming parts.

4- CONCRETE SLABS

Thickness of 0,5 m and 4,05 m of width. The concrete is HA-35

5- GARAGE PILLARS

Reinforced concrete pillars HA-50

6- RETAINING WALLS

A screen wall is used to contain the terrain. The concrete used is HA-50.

7- FOUNDATION

The foundation is individual footings every 8.1meters.

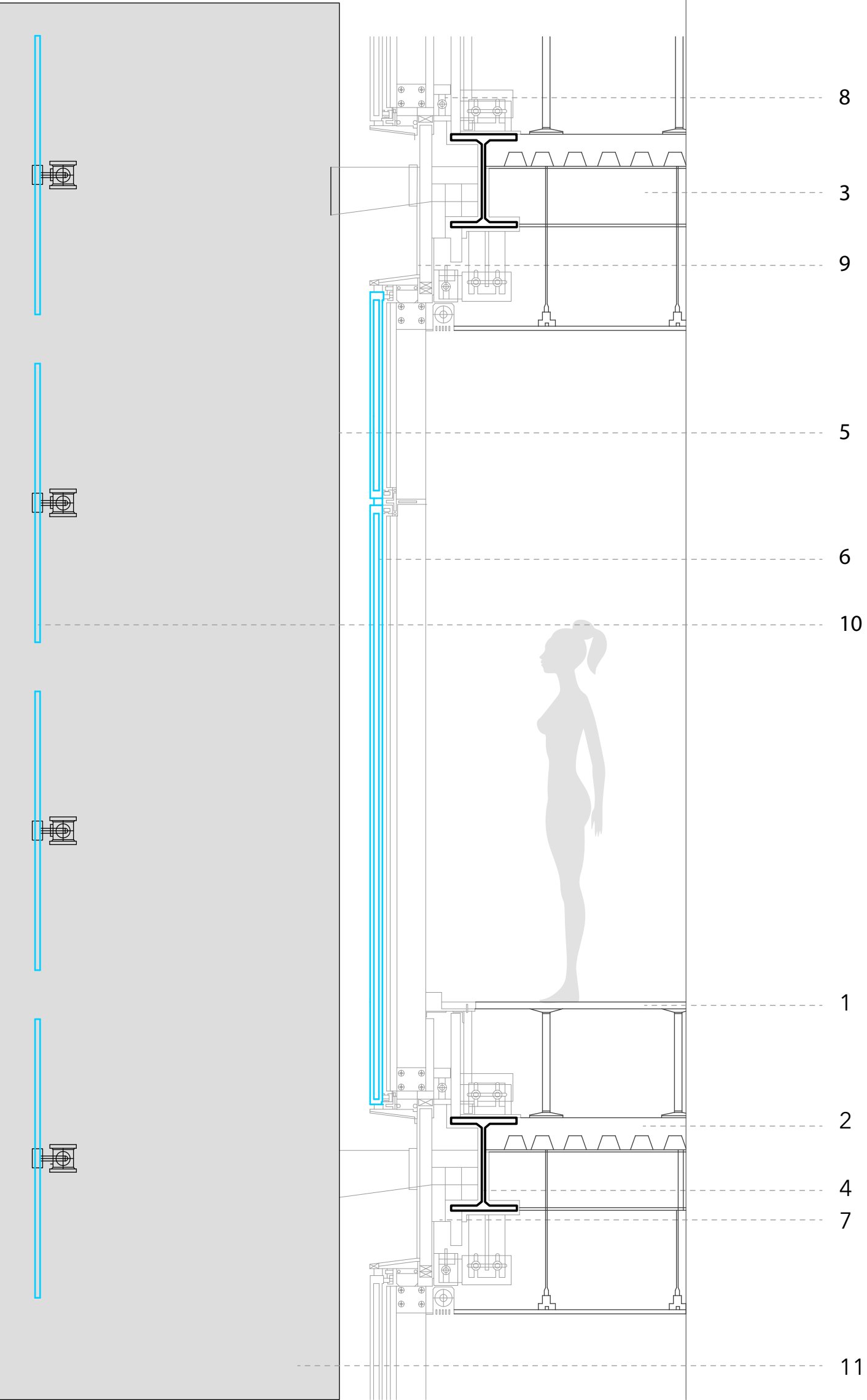
8- SPECIAL SLABS FOUNDATION FOR VEGETATION

It is a reinforced concrete slab HA-50 of post-tensioned beams, with a 0.8 meter edge to absorb the loads of the earth.

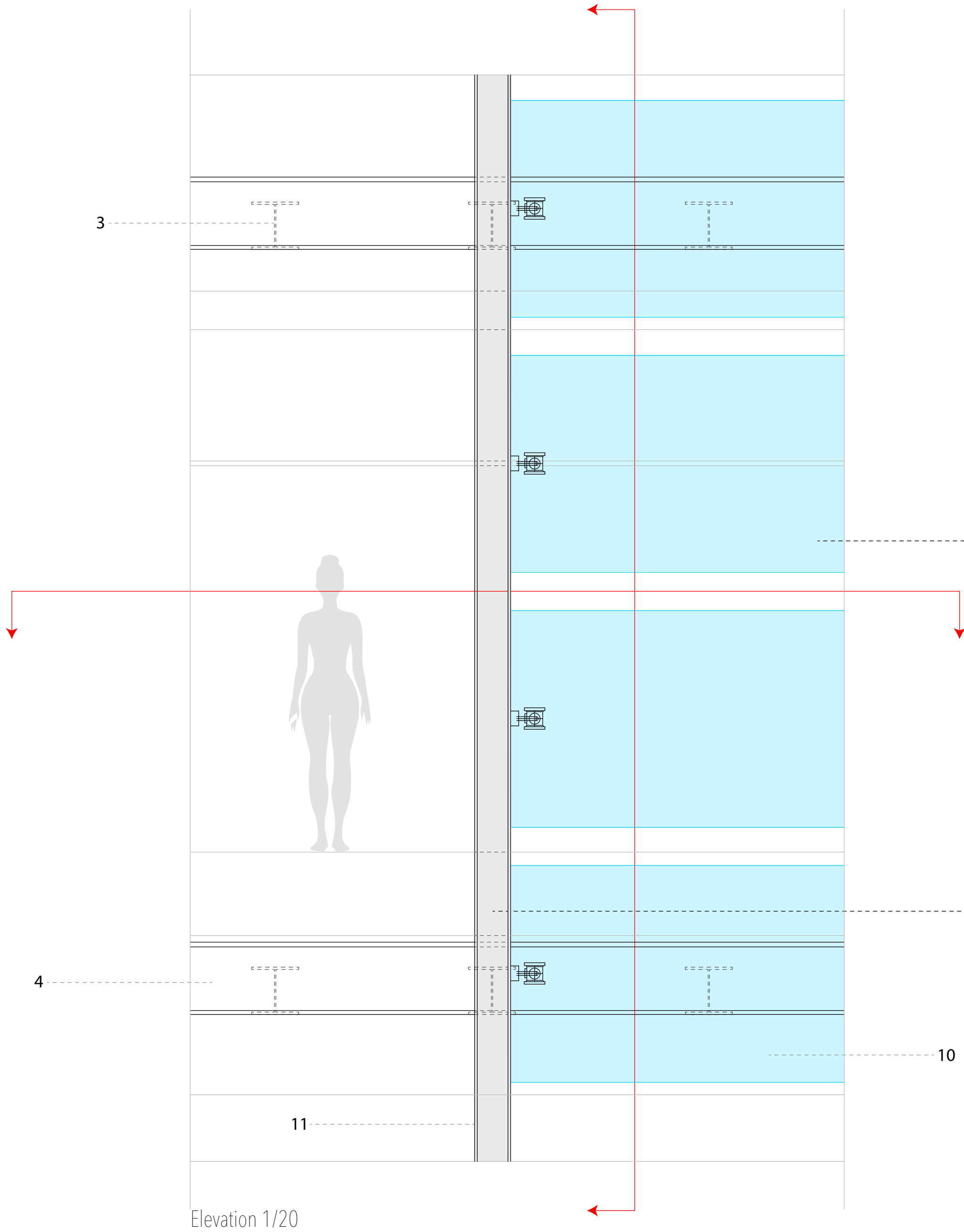
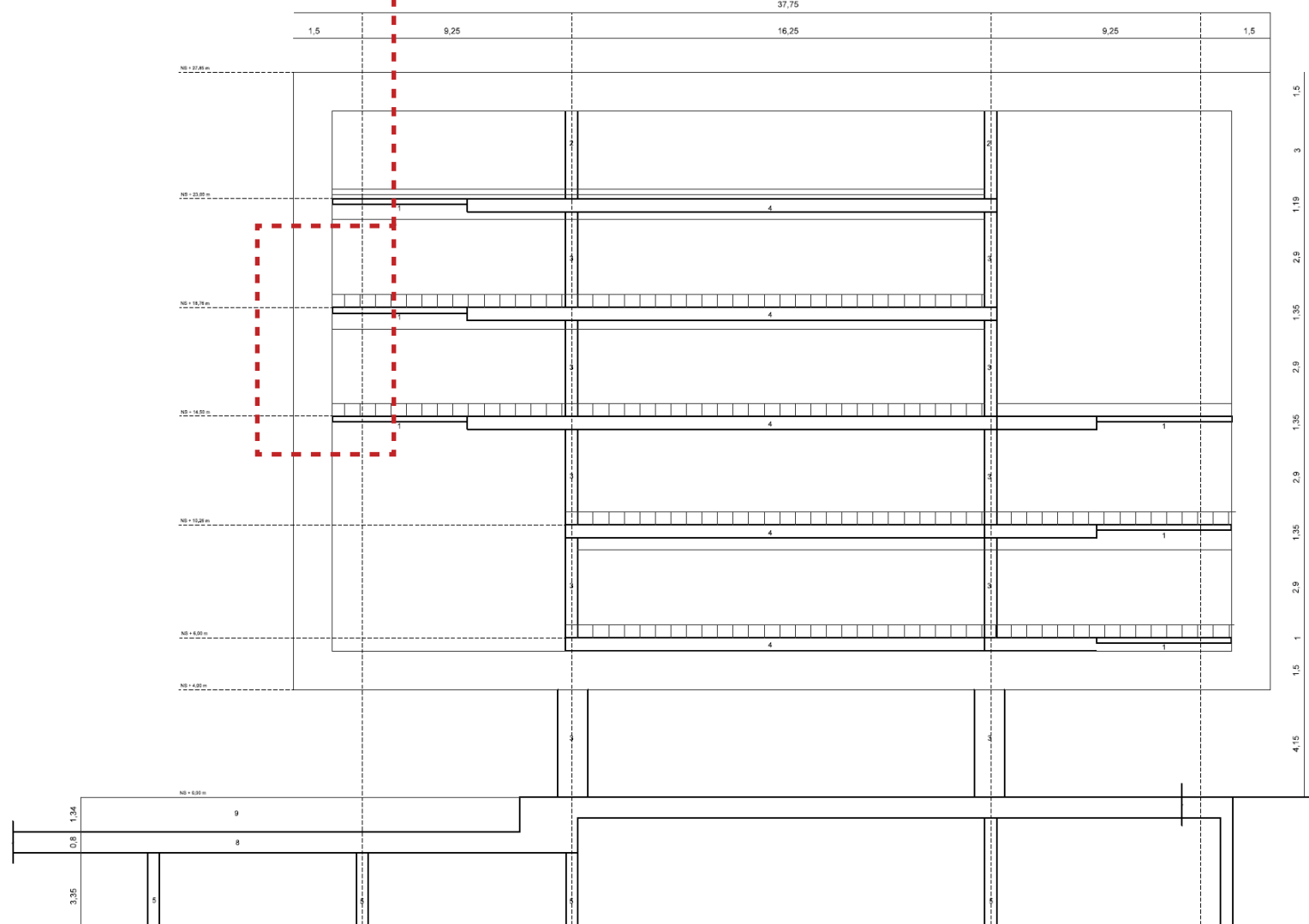
9- EARTH FOR THE GARDEN

It has1,30 m of land

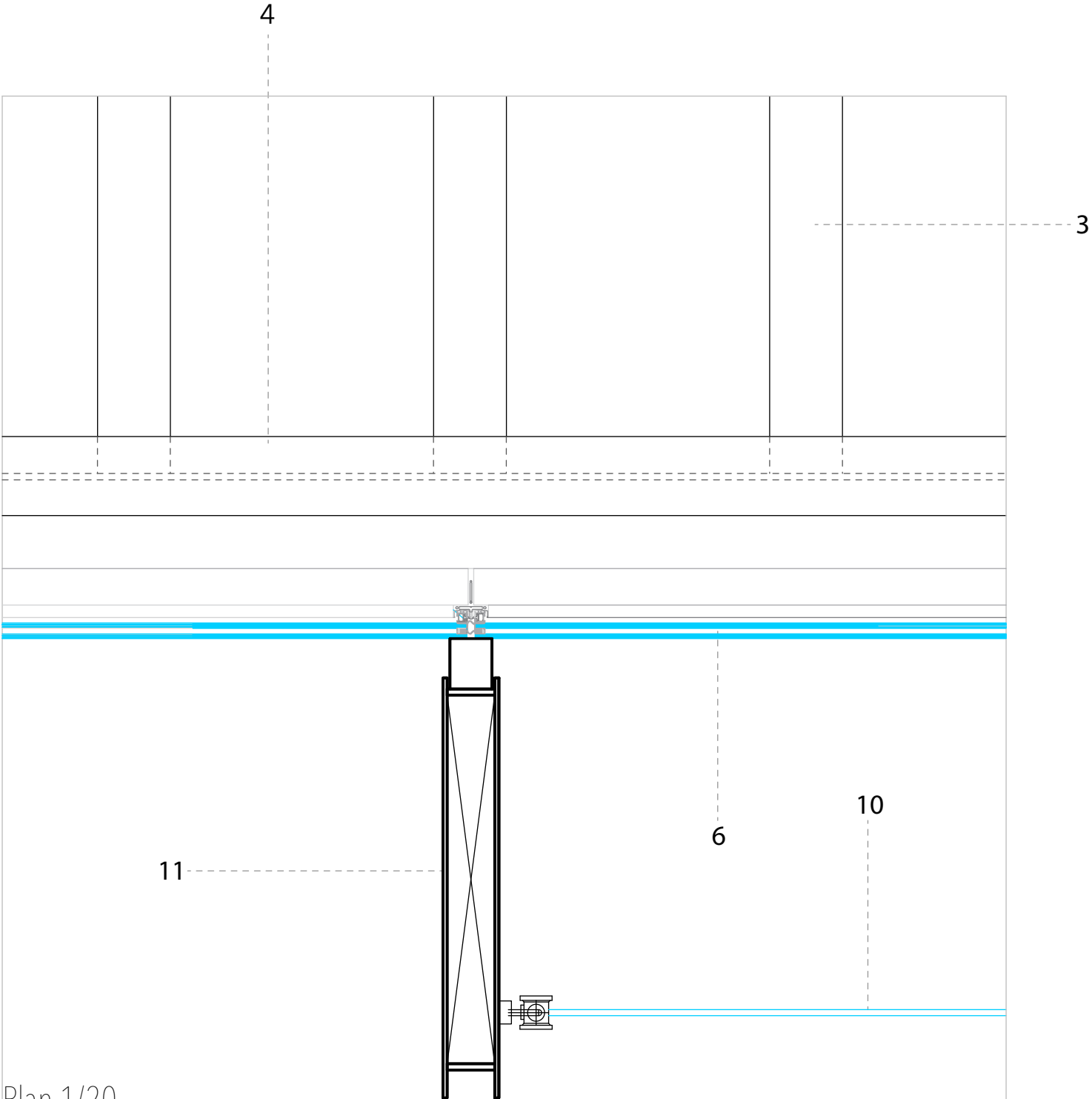
Envelope detail



Section 1/20

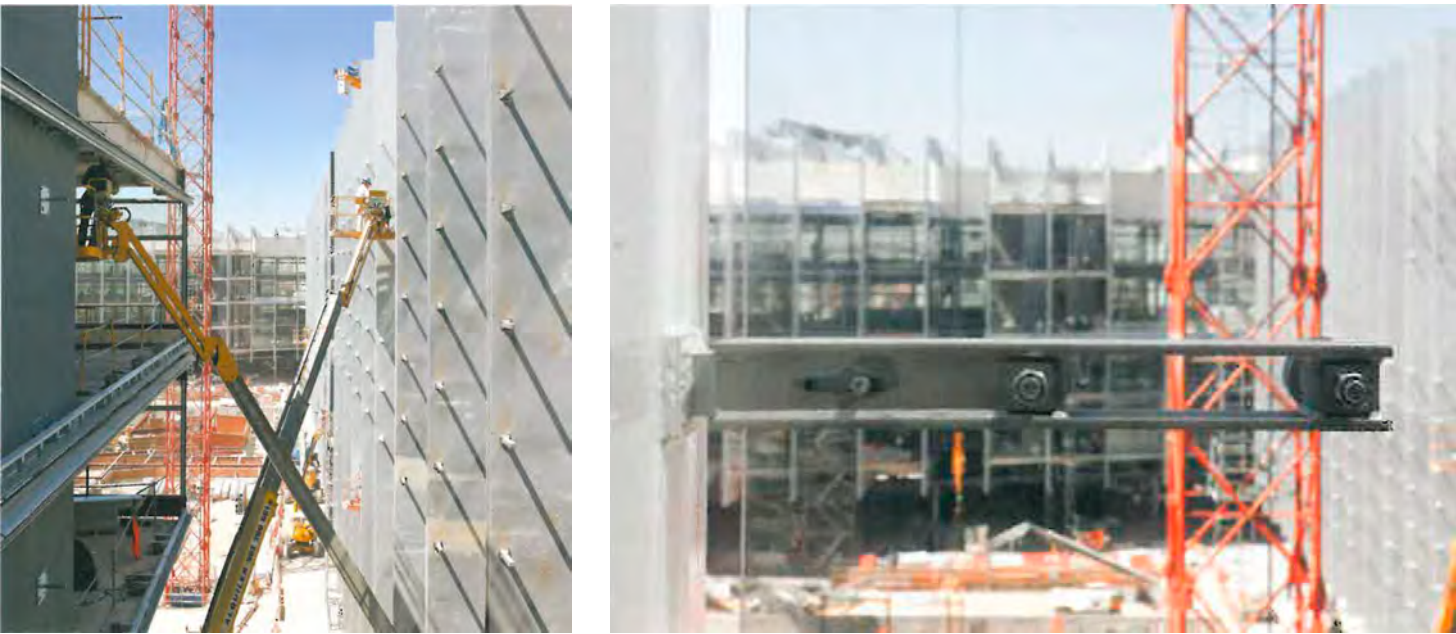


Elevation 1/20



Plan 1/20

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Contents in this page	Medium scale detail



A darker glass is superposed to the A-type facade in the sunnier orientations. The glass panels are attached to the ribs with a special piece allowing them to move sightly in a horizontal direction

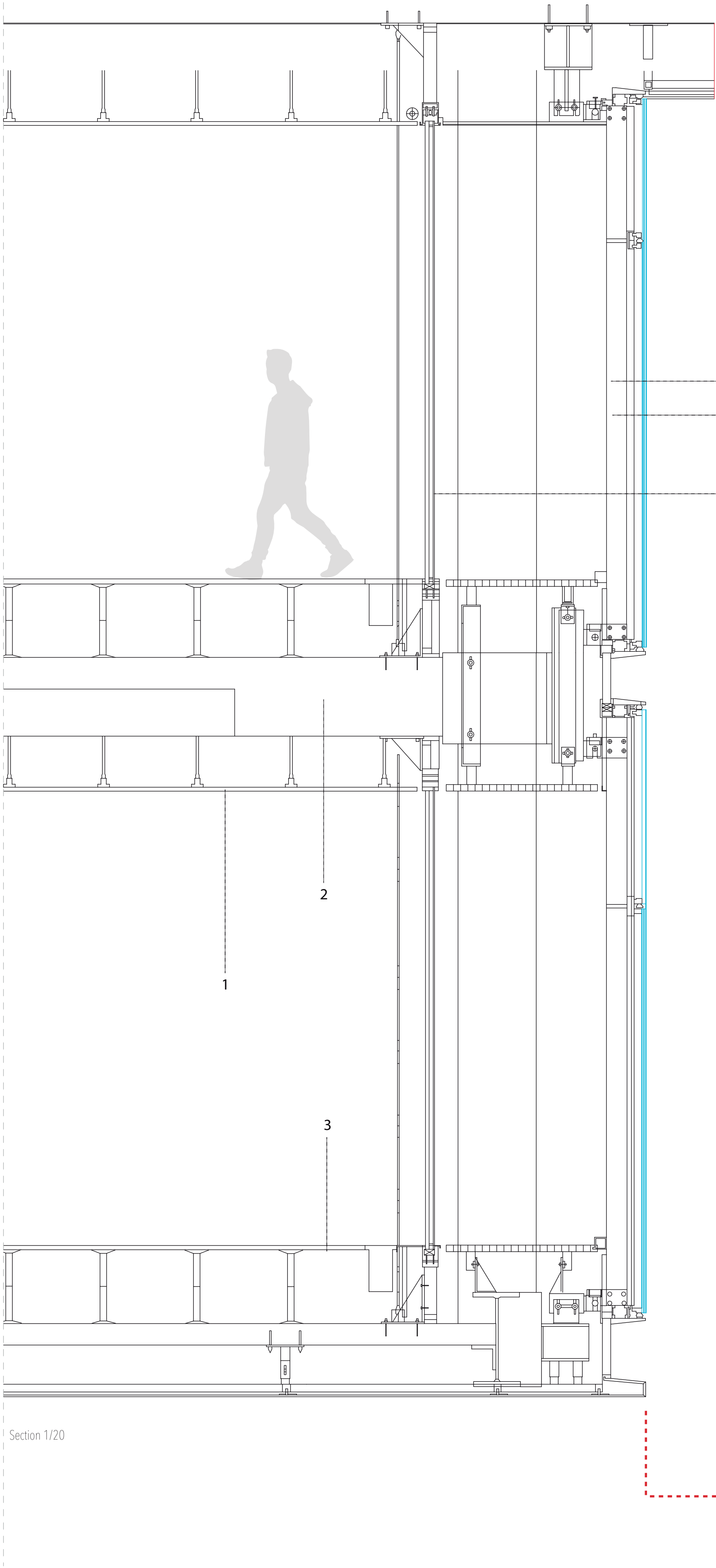


Every metallic rib is made up of ten pieces welded on site. Because of their size, there were problems during assembly process such as strong distortions, so stiffeners bars were finally added.

- KEY:
- 1-Technical floor
 - 2-Slab sheet
 - 3-Steel profile HEB-260
 - 4-Steel profile HEB_400
 - 5-Structural box
 - 6-Glass panels with structural silicone
 - 7-Infill of high intensity rock wool 70kg / mq
 - 8-Promatec LS 45mm Firewall
 - 9-Extruded aluminum profile, lacquer finish
 - 10-Lubbers
 - 11-Structural rib



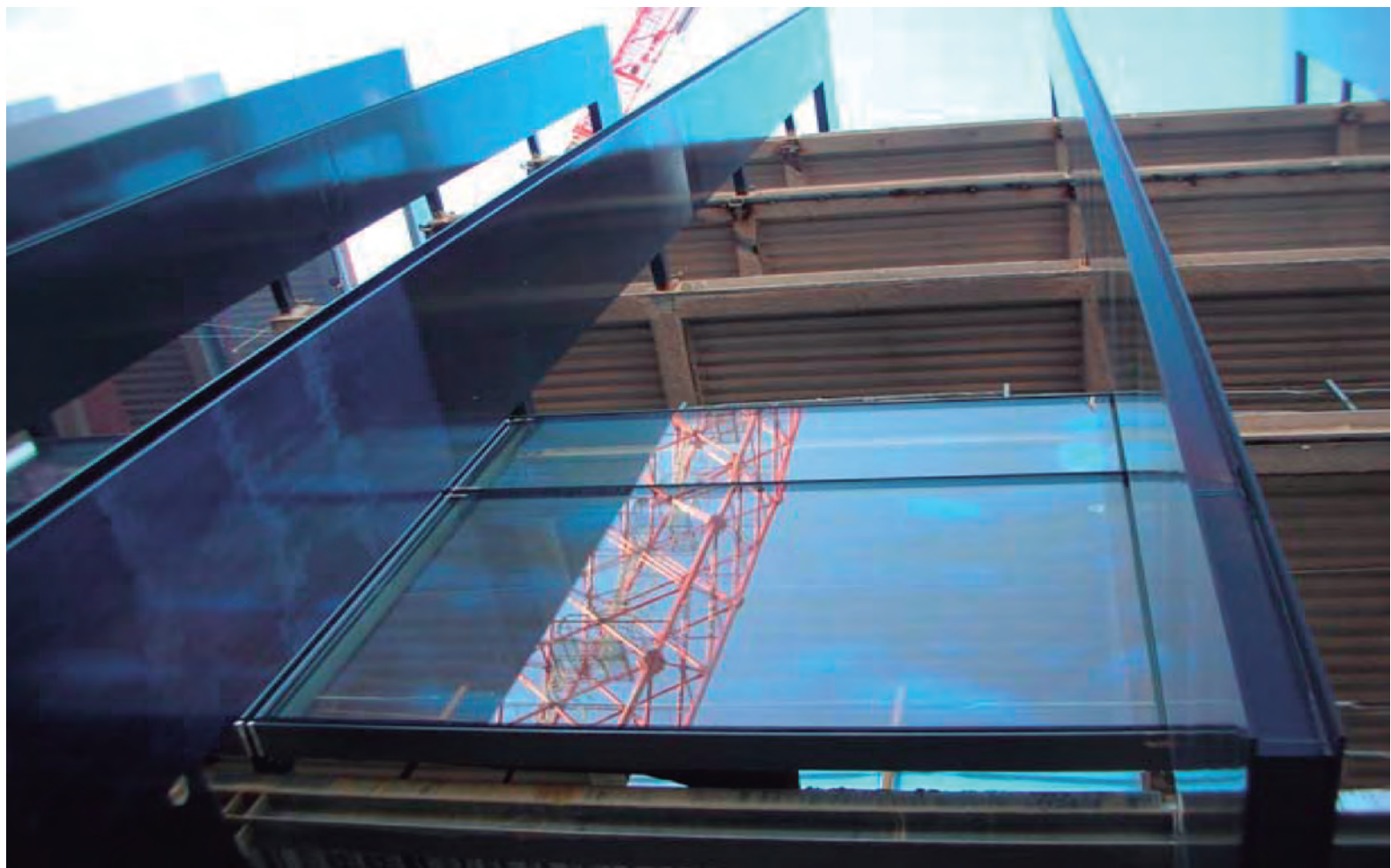
Envelope detail



- KEY:
- 1-Metallic 1350x450 mm suspended ceiling
 - 2-Post-tensioned slab according to structural planes
 - 3-Encapsulated technical floor of sheet with plenum
 - 4-Facade type A
 - 5-Facade type B
 - 6-Glass panels with structural silicone



Connection of the structural box with the rib



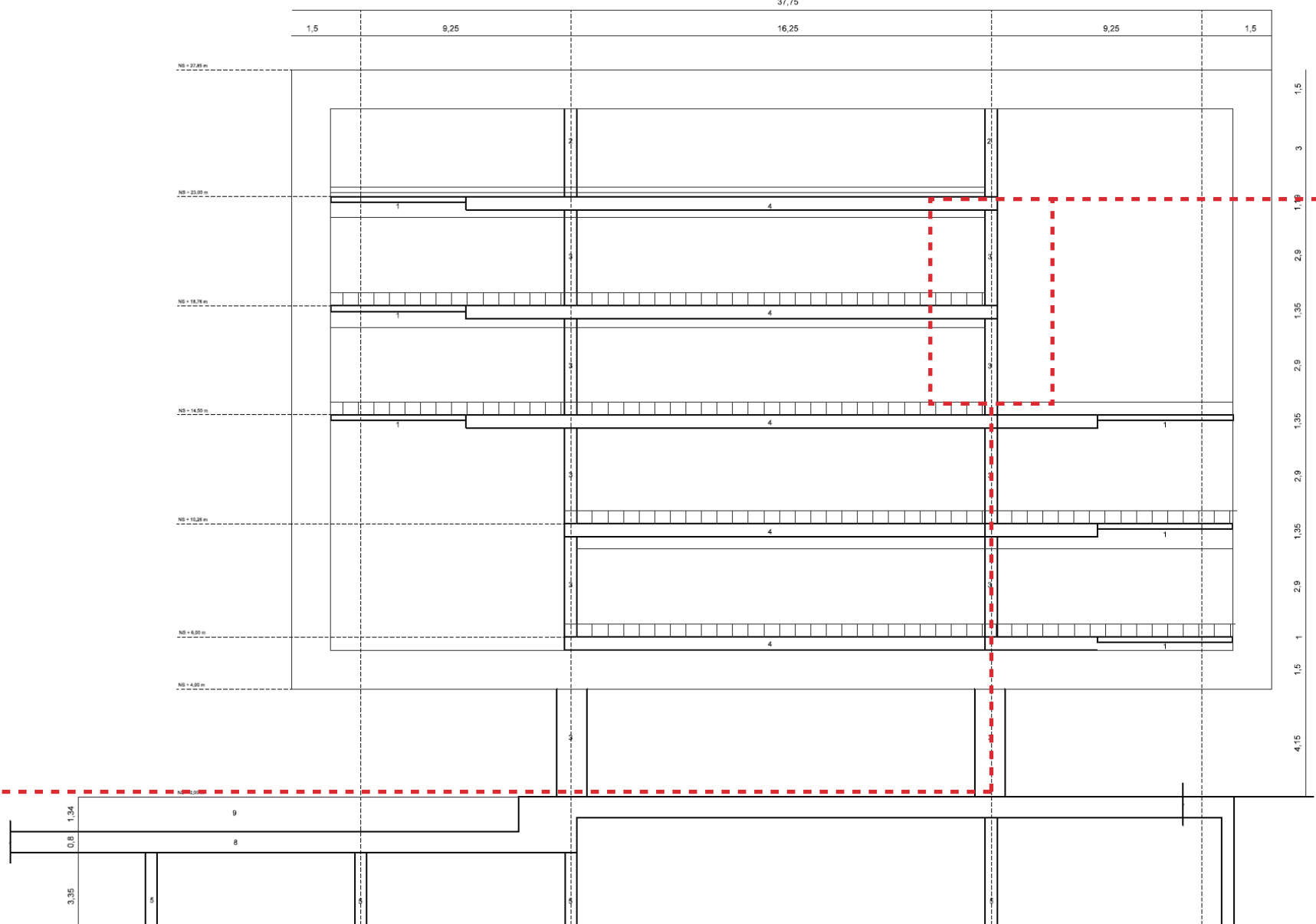
Double-joint beam (with connectors every 200mm)



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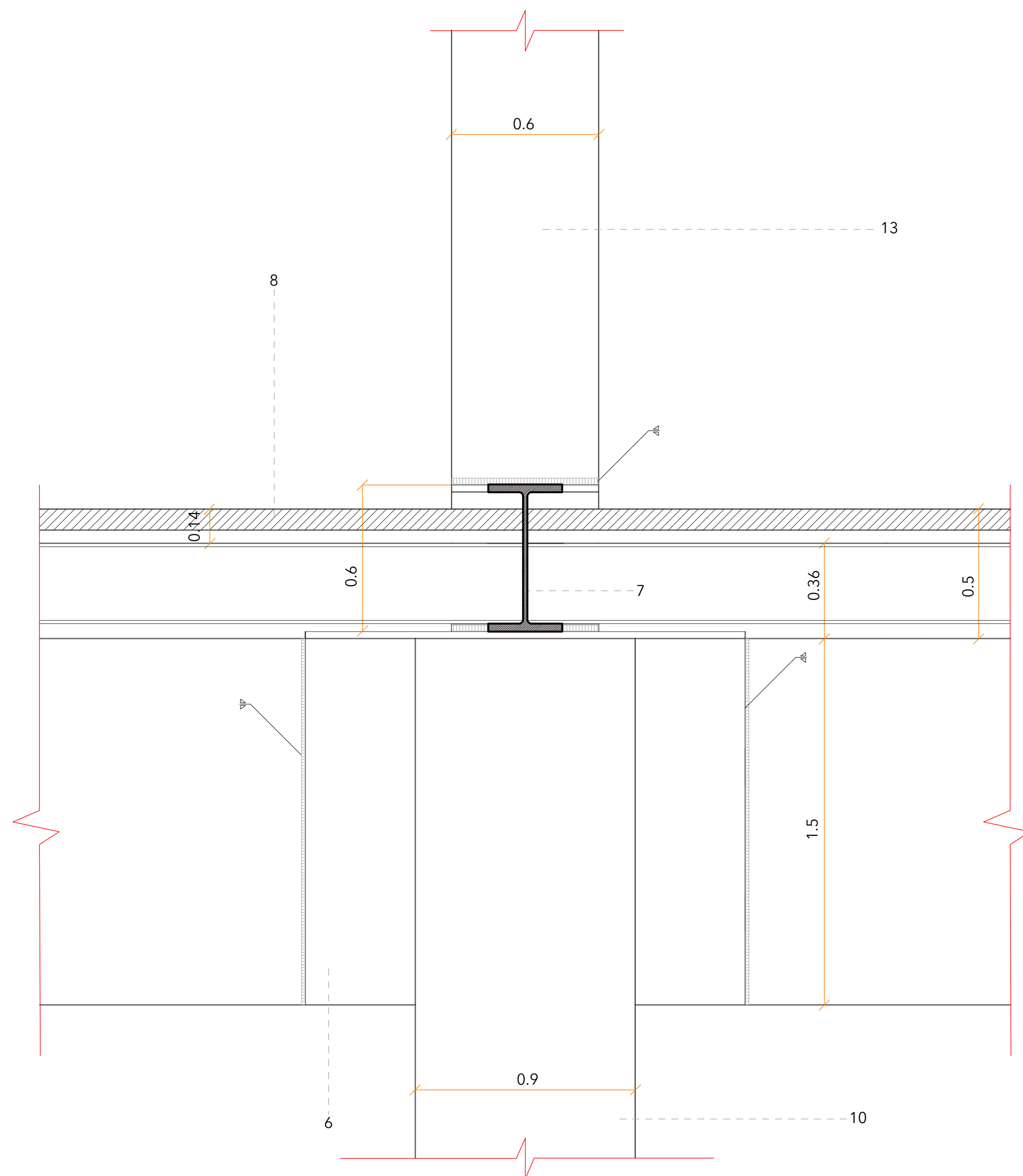
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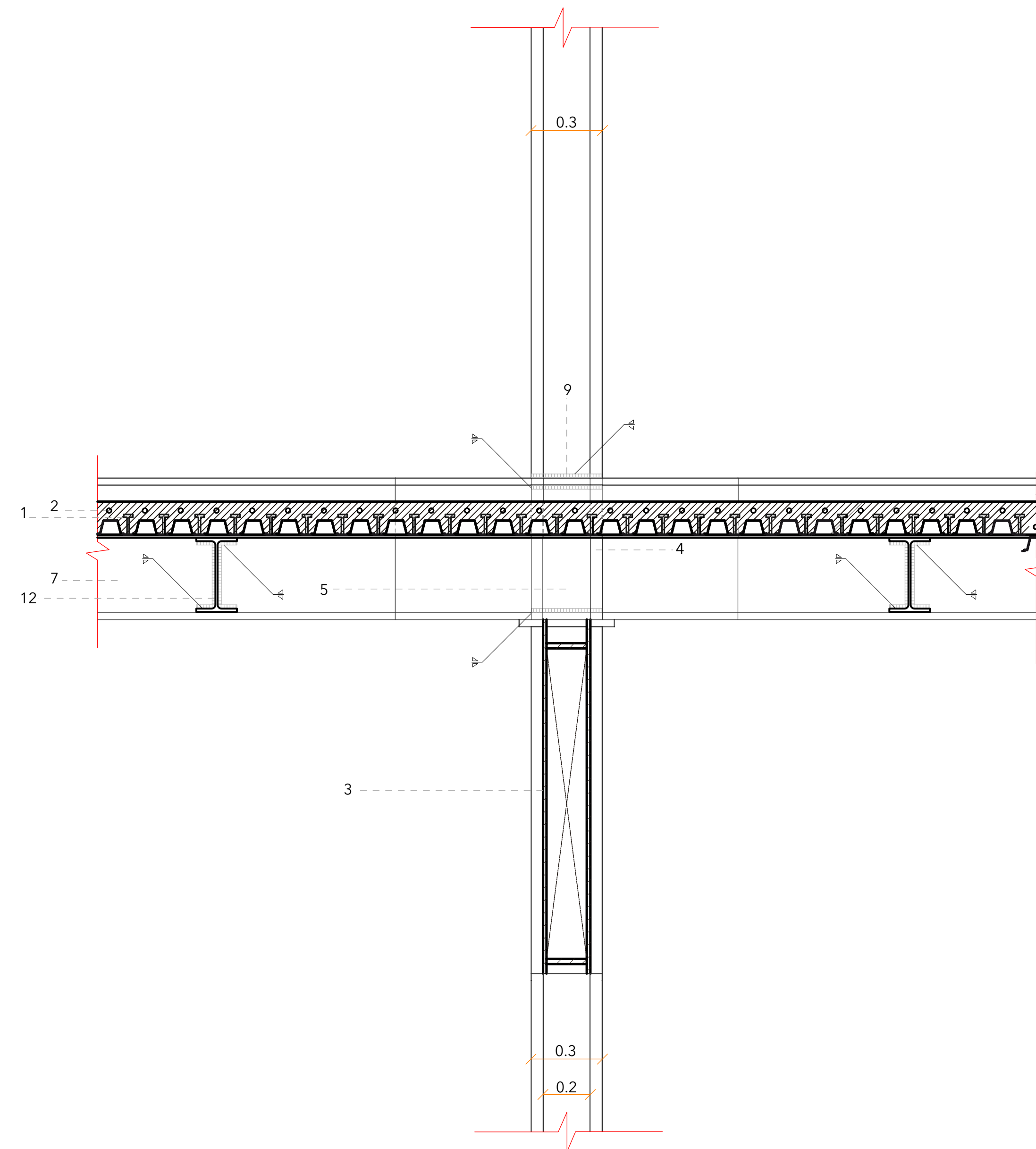
Connection of the post tensioned slab with the substructural frame

Structural detail steel

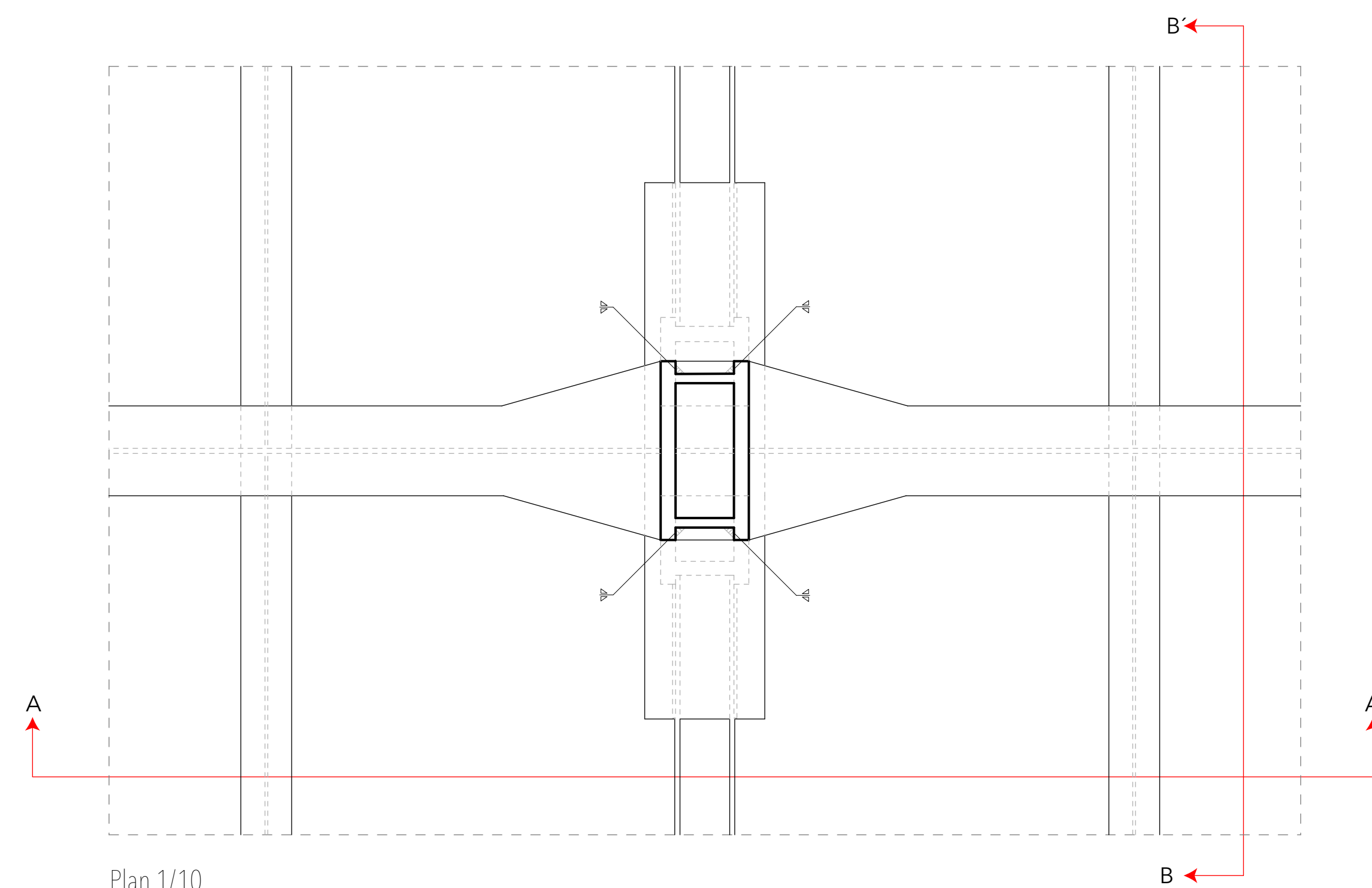
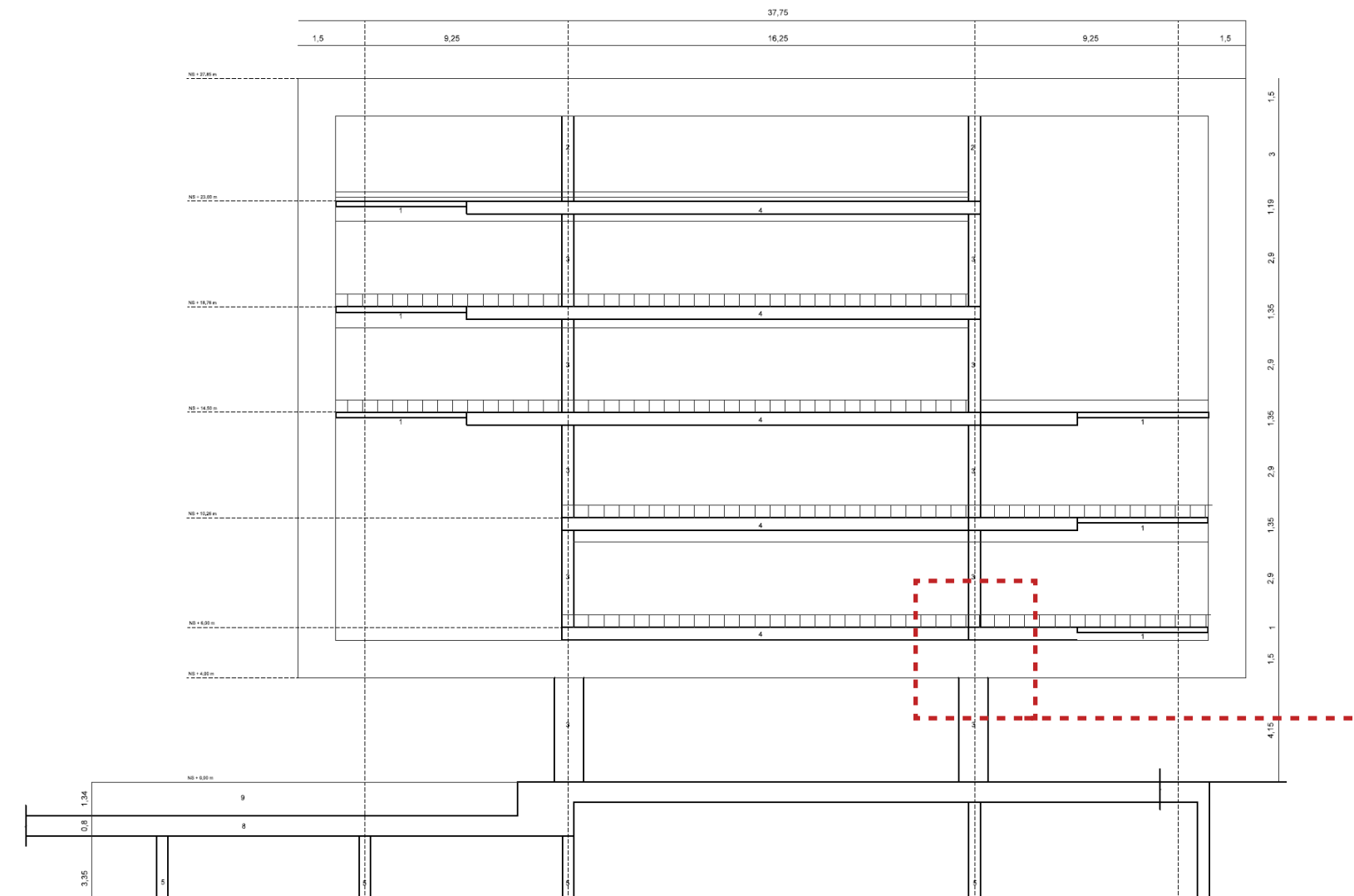
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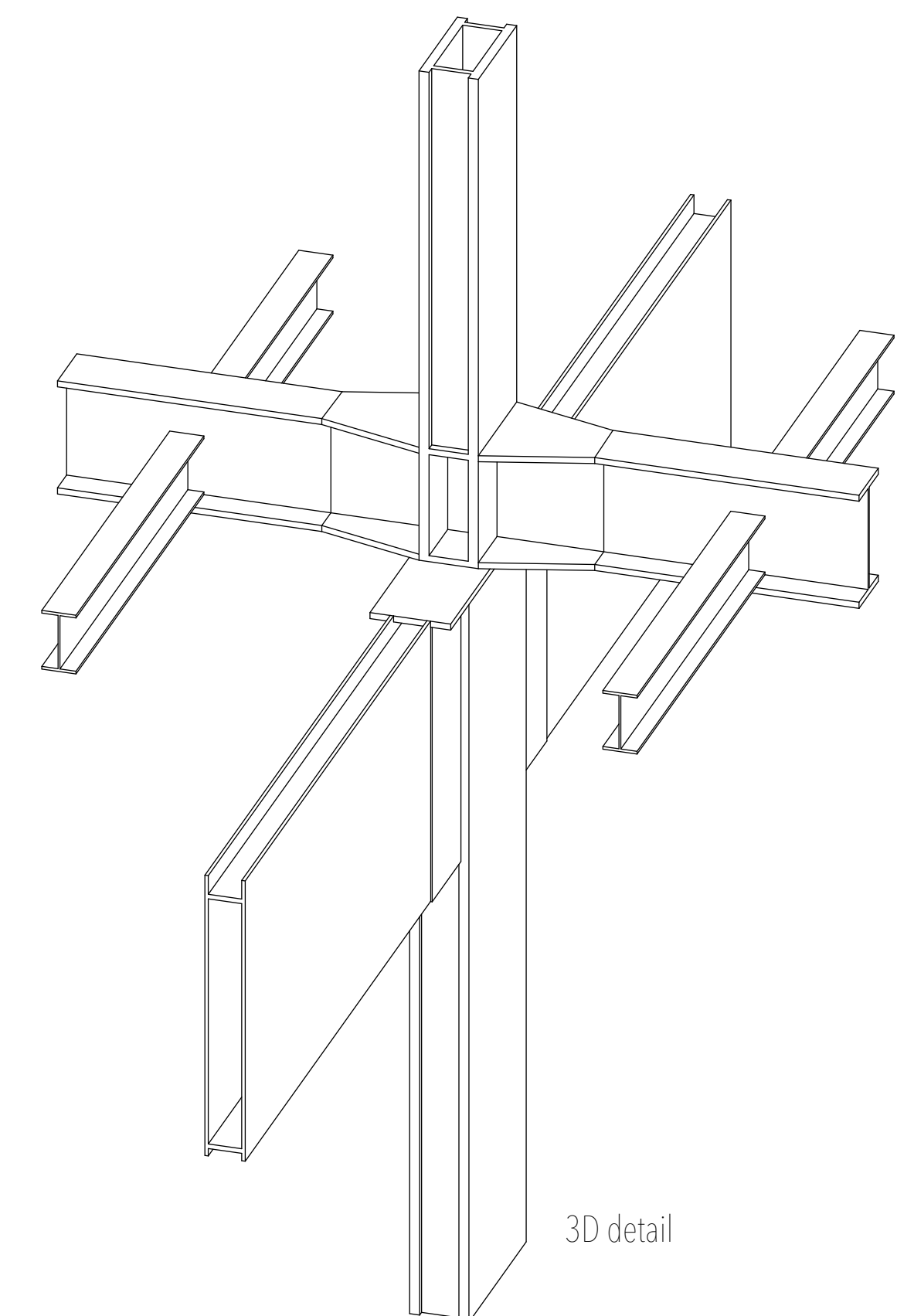
Transversal section BB' 1/10



Longitudinal section AA' 1/10



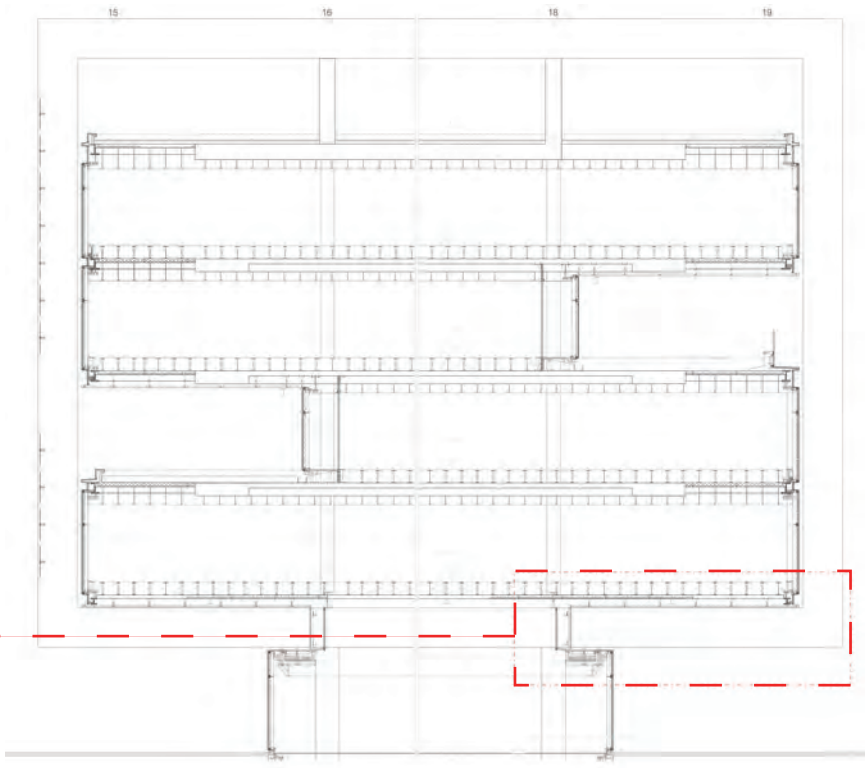
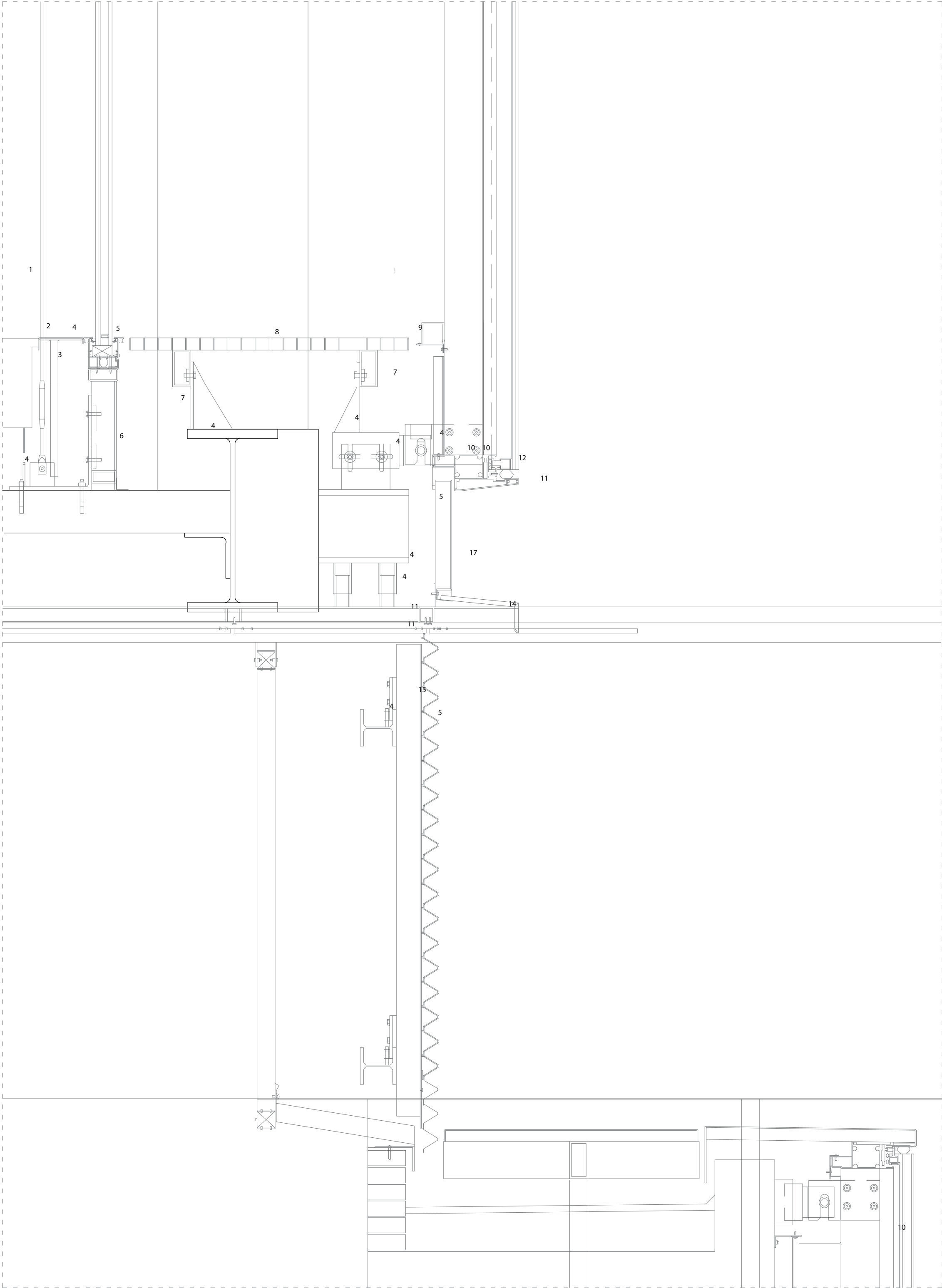
Plan 1/10



3D detail

- KEY:
- 1- Conectors
 - 2-Negative steel reinforcement
 - B500S
 - 3-Structural rib
 - 4-Stiffener
 - 5-Metalic piece
 - 6-Transition piece
 - 7-Steel beam IPE600
 - 8-Composite slab
 - 9-Welding
 - 10-Steel pilar 0.30x0.90m
 - 11-Steel pilar 0.60x0.30m

Detail scale 1:10



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KEY

- 1- Bar security type macalloy s460 stainless steel
- 2- Sheet of steel, thikness 3 mm
- 3- Galvanized steel auxiliary structure
- 4- Yellow or silver plate galvanized steel anchor
- 5- Extruded aluminum profile, colored lacquered finished with color ral 7011
- 6- Sendzimir galvanized sheet of steel, thikness 1mm
- 7- Dip galvanized steel pipes
- 8- Steel non-slip grille with galvanized finiture
- 9- Plates of 40x3mm and corrugated rods
- 10- Screw of Stainless steel allen m12
- 11- Ethylene propylene black profile
- 12- Norton joint 6.4 x 9 mm
- 13- Structural black silicone
- 14- Alucore panel, thickness 15 mm color finished SP07
- 15- Structure of aluminum tubes lacquered finished with color ral 7011
- 16- Black anodized aluminum profile
- 17- Extruded aluminum profile colored lacquer finished- 9006