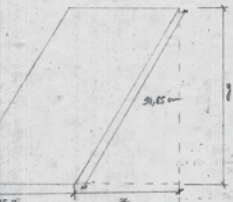


DOCTA MANUS DRAWING STRUCTURES

*la coupe 17 est particulièrement intéressante
C'est un effet de qui se base sur la solution
une transition des effets des parts à faire.*

18,59 m ou 24,85 m à 1:20

cote à l'échelle 1:20:



$$\cos 60 = \frac{x}{24,85}$$

$$\Rightarrow x = 24,85 \cos 60 = 12,425$$

$$\Rightarrow \text{il faut } \frac{1}{2} \cdot 25,7 = 12,85 = 25,7 \text{ m}$$

⇒ deux feuilles

$$24,85 \sin 60 = 21,15 \text{ m}$$

ajouter elevation de 20

$$1,75 + (21,15) = 22,9$$

à 1:20

⇒ deux feuilles

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Drawing constitutes a very powerful and critical tool of conceptual design. Drawing constructs thought, it acts as a communication interface between the work and the mind and between different disciplines; it is the most powerful language of communication in the working together between architects and engineers.

The UE Docta Manus — Drawing Structures will introduce the basic drawing techniques (sketch, plan, section, elevation, axonometry, perspective). Based on these techniques, we will further investigate analytical drawing methods capable of exploring structural concepts and their architectural solutions.

Through hand drawing we will analyse selected projects that embody an exemplary interplay of architecture and engineering, as e.g. the work of Mies van der Rohe, Jean Prouvé, Pier Luigi Nervi, Eduardo Torroja, Robert Maillart, Christian Menn or Eugène Freyssinet. Our main focus lies on the load bearing structure and its tectonic and spatial articulation as common intersection between architecture and engineering. Through analysis, students will enter into dialogue with construction in a direct way. They will get a sense for the adequacy of tools and refinements of solutions. We will investigate proportion, material innovation and tectonic articulation in relation to the structural idea and become aware of the importance of detail. Analysis will take apart and make transparent the parameters and dependencies of the design process and will open the work into a condition of possibility.

We will draw by hand, as this is the most direct and immediate way of

becoming aware of technique in relation to intention (it forces to take decisions). Drawing by hand is a cognitive process where the dynamic relation between doing and thinking is essential. That is why 'the more you draw, the more you see' and vice versa. The construction of points and lines on a sheet of paper will sensitize students to the notions of scale, size, proportion, transparency and composition. The learning hand will build up tacit knowledge.

The construction of points and lines on a sheet of paper sensitizes students to the notions of scale, size, proportion, transparency and composition; it makes them aware of the importance of detail as a key moment of construction, as a mediator relating a structure to the perceiving subject.

This fourth publication shows a selection of 27 working drawings from an atelier of 38 students in civil engineering and architecture that took place during the autumn semester 2023 at EPFL. Each student analyzed one out of seven selected projects exploring adequate scales, drawing types and techniques to understand the project's structure and construction principles. The drawings thus include dimensioning and fabrication notes up to catalogue of elements, mounting principles and sequence. The careful construction of layers of information by hand builds up into tactile working drawings that embody the spatial and tectonic ideas as well as the construction process of a structure. These 'meta-drawings' allow the observing eye to survey from one detail to another in a synchronous manner while integrating all information into the mental construction.

The space of a drawing can expand by allowing the lines to stretch and breathe. It is the foundation of constructing knowledge that can be transformed and evolve over time.

The instrument used for tracing is a fix pencil. Depending on the pressure exerted by the hand on the surface of the paper, different types of leads are tested (4H, 2H, F). An attempt is made to discover the thickness of each line. It is recommended to constantly sharpen the lead, in order to draw by cutting. The pencil acts like a knife. Lines act like cuts.

It is necessary to understand the value of each line that crosses the paper. Each stroke changes over time. It is recommended to rotate the pencil while drawing a line stroke to naturally sharpen the lead tip. The line may be more or less intense. Each personality produces a unique line. We do not want a space within the line. One feels the level of precision needed to construct the geometry and tries to adjust the thickness of the line. The material line only makes sense if it reveals a thought. You cannot draw without thinking. Lines without thought are absent. At the same time, one must stop thinking.

The paper serves as a training ground, a battleground. Delimit the territory in order to generate intensity. It organizes the space of the paper and ensures that all future fragments relate within this territory. The empty space that remains is important.

Everything is built simultaneously, not started, and finished, but everything is open. Only with lines do we perform the following actions: draw, sharpen,

adjust, erase. And our mind selects, compares, surprises.

One feels the ability to make the absent appear. The paper as physical territory, as a place of construction. It is built, not represented; we need to feel in each stroke the concentration and effort of a thought. The drawing tells us how we have to place the pencil on the paper. Everything drawn on the paper is measured. The line in its construction helps to focus, to forget one's body. We enter the drawing and are transported to another world.

Drawing allows us to generate a surface that transforms continuously, fragile and ambiguous, with its own laws. Lines, annotations, measurements accumulate, thus revealing unsuspected, dense, tense spaces. We don't erase, we accumulate; we show everything. One learns the necessity of precision for accumulating, for measuring, for observing. It is not about defining the edges, nor filling them; rather, lines intertwine, materials interweave. The edges are not present. At that moment, one can be both inside and outside simultaneously.

The sheet transforms and reveals its third dimension in a slow, almost invisible process. It takes time to draw with precision, to layer, to iterate. Our body and mind adapt to the temporality of the line. Each line is drawn by connecting two points. Each point is constructed by the intersection of two lines. Each line is unique, with a tension different from the others. All lines are equally important on the paper. The friction between the lines is felt.

A fragile balance is established between each line, between each idea, between each movement. The lines are alive.

The finer and less forcefully supported construction lines on the paper must be constant, always the same.

These lines establish a spider web, a network that helps tie the rest of the lines, which construct the geometry and constantly reveal the extent of the territory. If they are too fine, they can be confirmed, retraced. Projection lines must be more intense but without making the rest of the drawing disappear, without erasing the other lines.

The drawing reveals its own transparency, its depth. At some point, we begin not to see the lines; we begin to feel the captured space. This only arises with discipline and patience. Fragments gradually appear, with a certain precision and in motion. Without codes, without shadows, without makeup, just lines. The drawing in its pure state. Everything is possible. The drawing continually opens up.

The intention is not to build a neutral drawing. We seek a space with gaps and fissures where the necessary doubts can exist. Personal/emotional spaces where one can have a certain level of privacy can be acquired. Where the conscious and unconscious dialogue. We are inside the drawing, we draw ourselves. As if the lines weave the drawing and the one who does it with it.

The drawing constantly reveals itself as a fragile present that can be modified. Matter and double thicknesses also appear. The different scales of the fragments are fixed. We can experience,

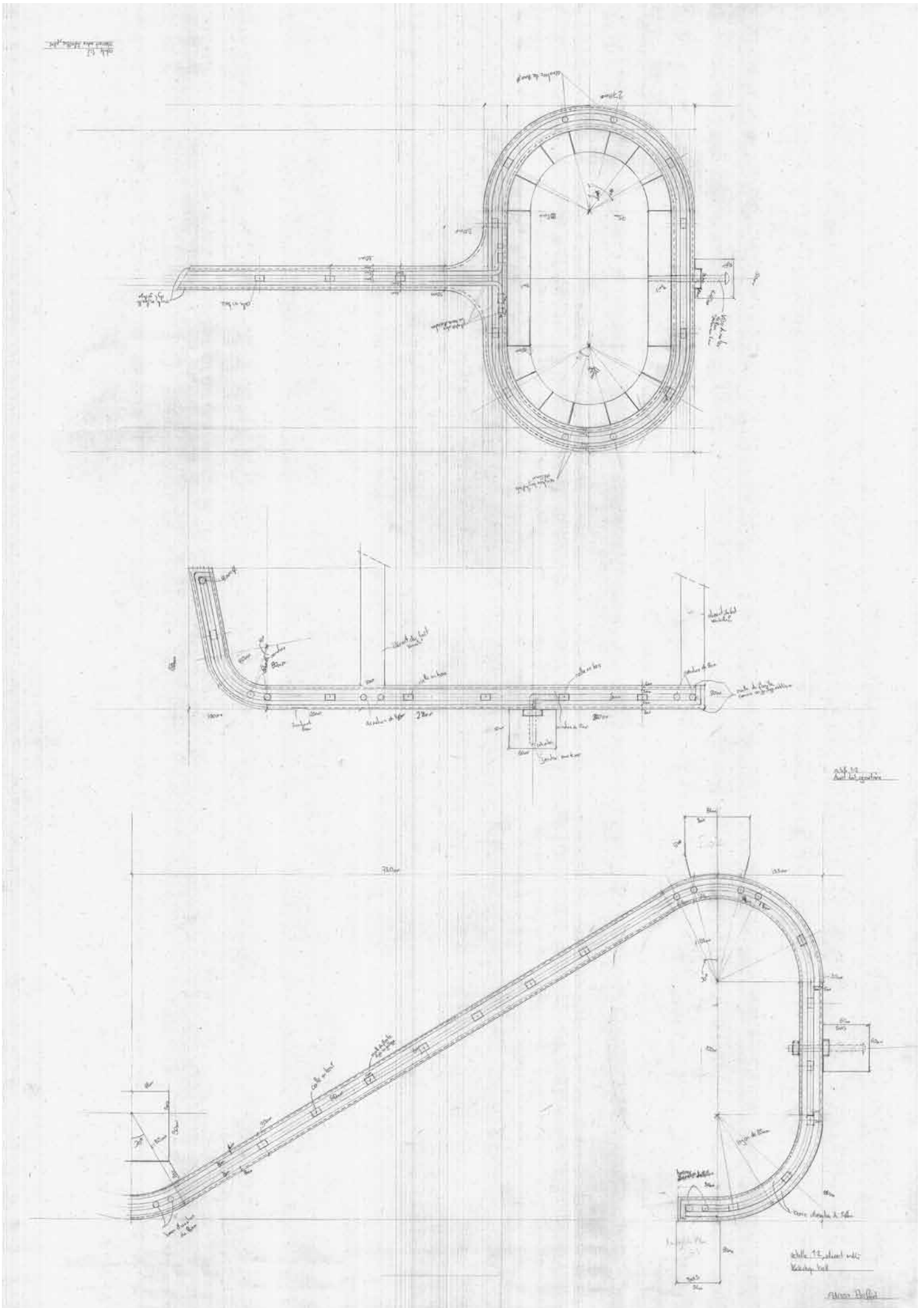
touch, smell, listen to them. We can look at them from afar, with squinted eyes, but they also need to function very closely.

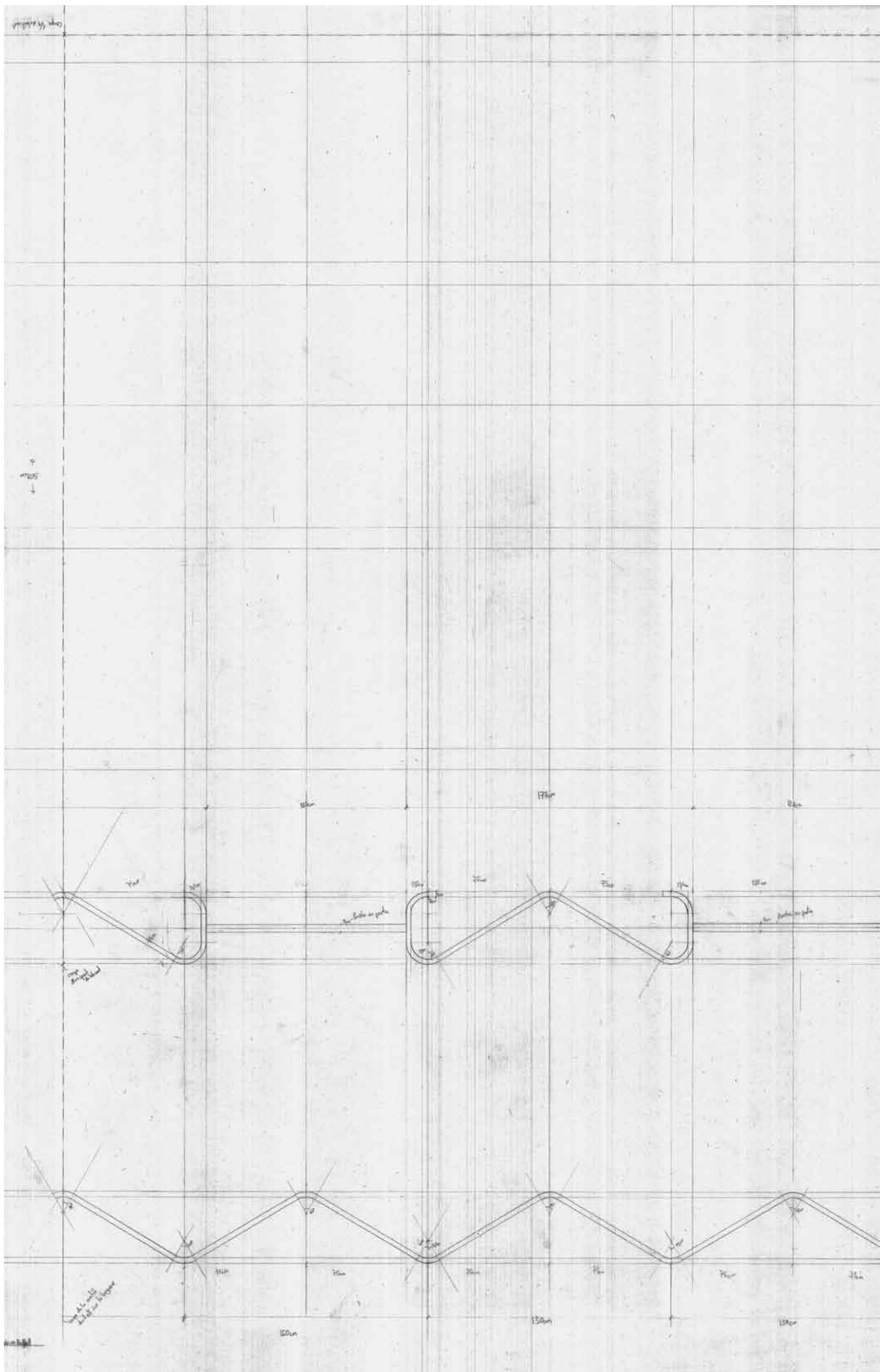
Lines are marks, like memories that remain, even if erased. These lines record a constant architectural through successive layers/strata of research.

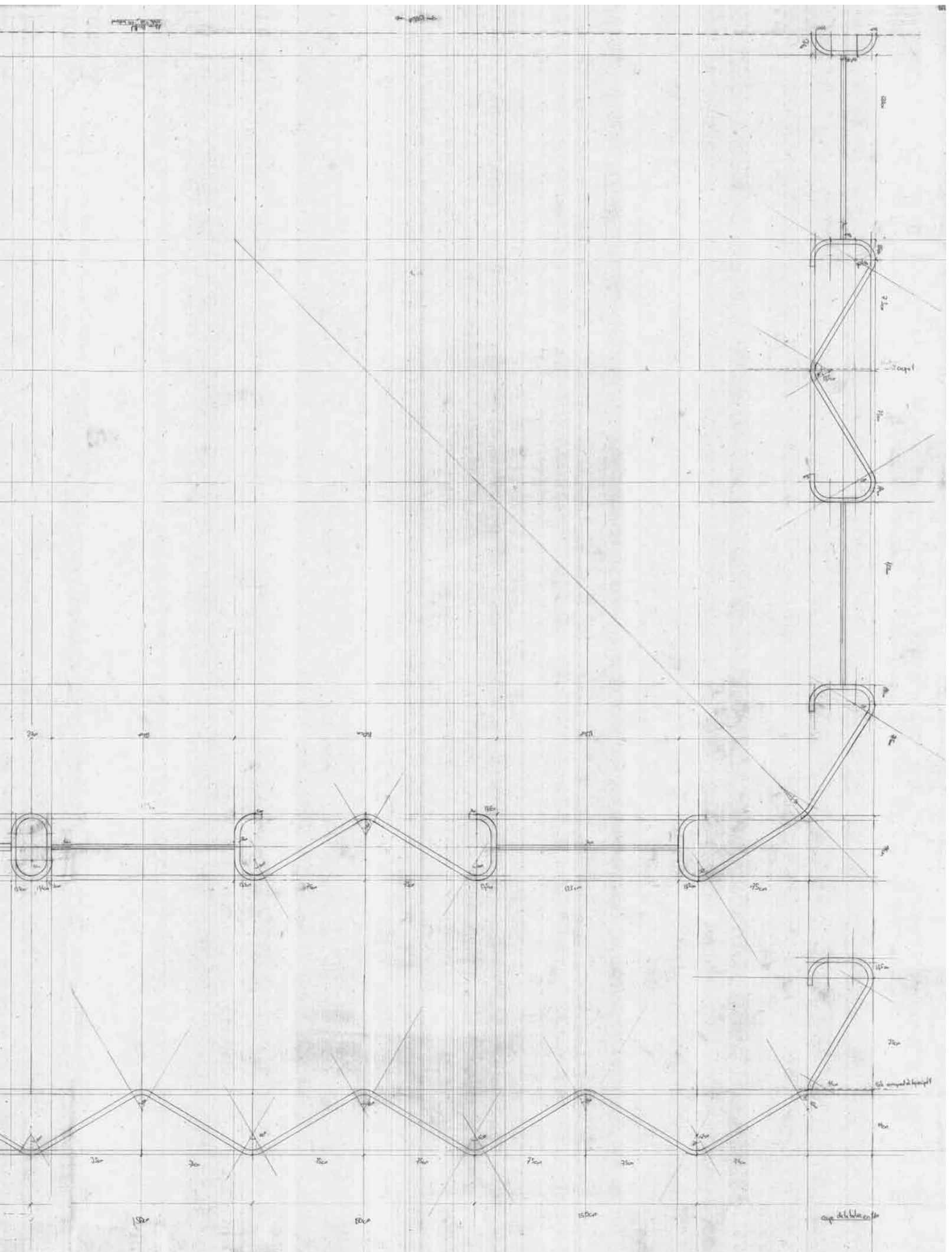
These lines can be heard, touched, smelled. They are fragile, imperfect, changing, like us. They are a mirror. They connect us to the earth, to our origin, to our childhood. Our subconscious is always in them. These lines are hands and body because they are ourselves.

Recently, we have other lines that are drawn on screens. Perfect, shiny, clear, homogeneous, fast. They leave traces but can disappear without a trace. They show us everything. They are fast, agile, and productive. They can be copied and reproduced at great speed. They are made effortlessly, almost without attention. Homogeneous, descriptive, synthetic, flat. It is difficult to create depth. They do not accompany abstraction. They do not breathe. They are an image. They are flat. They don't seem to be like ours.

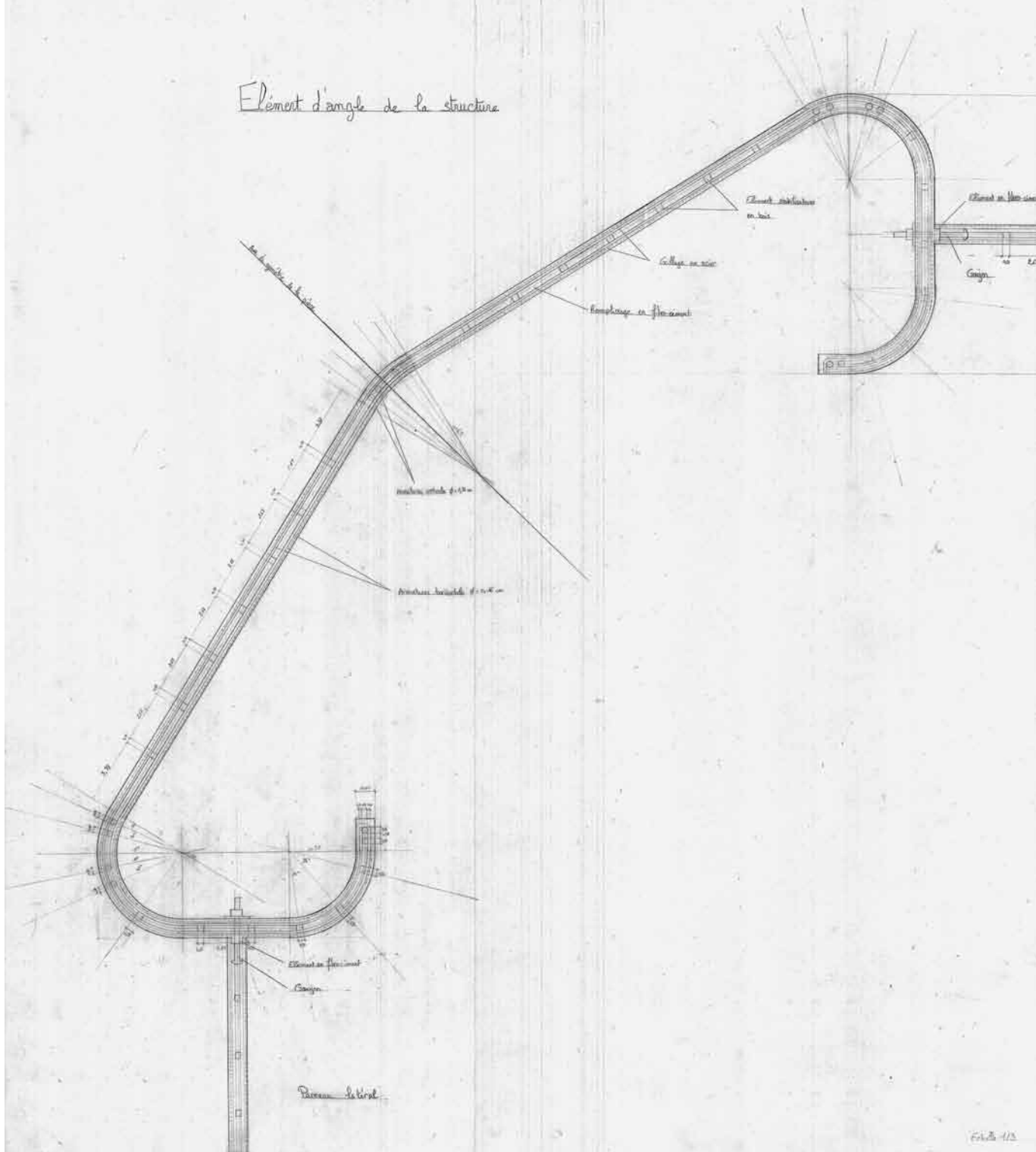
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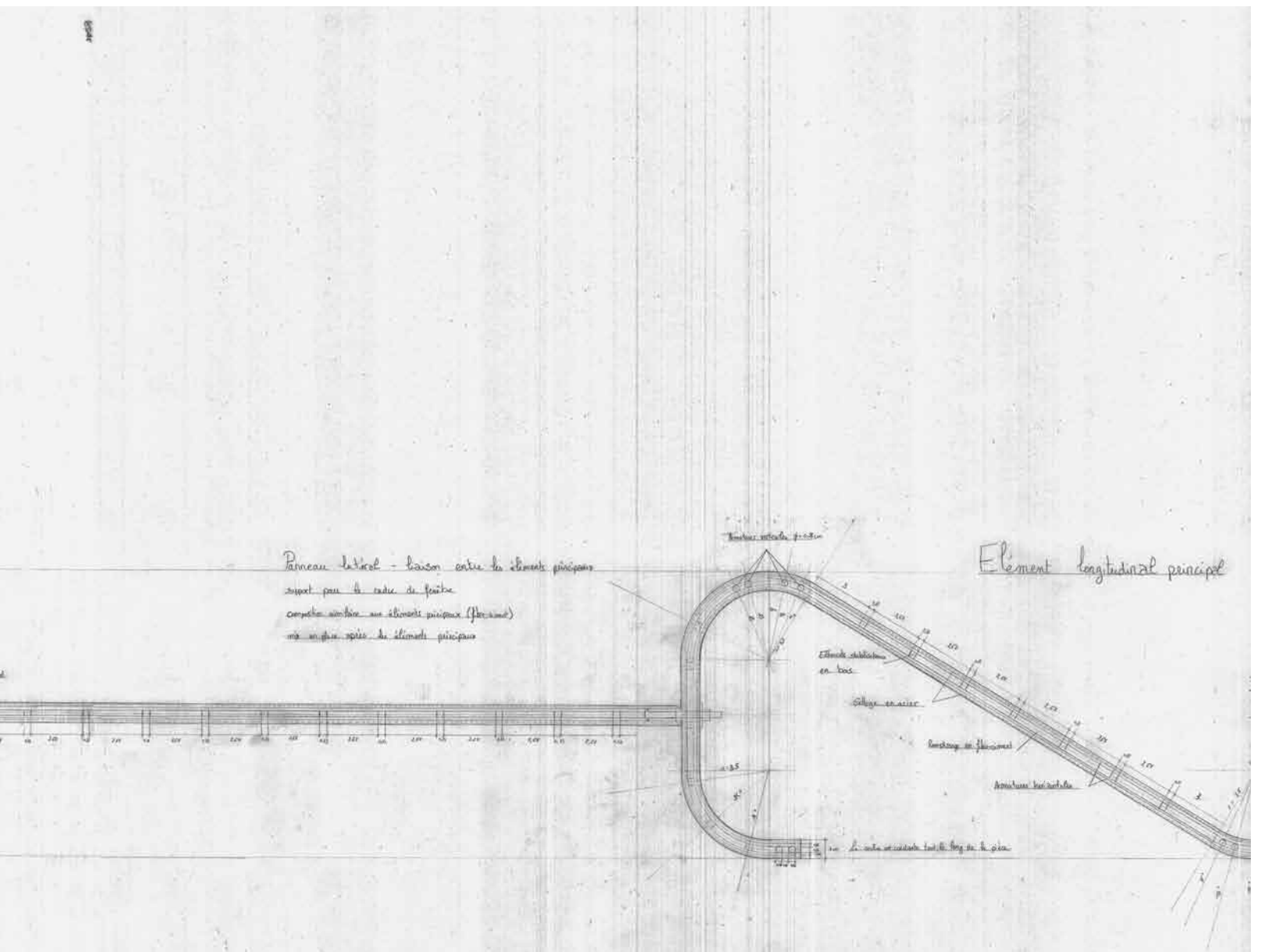




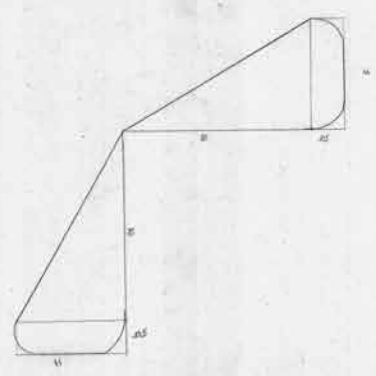
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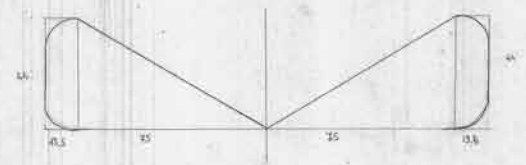
Projet de la Ville

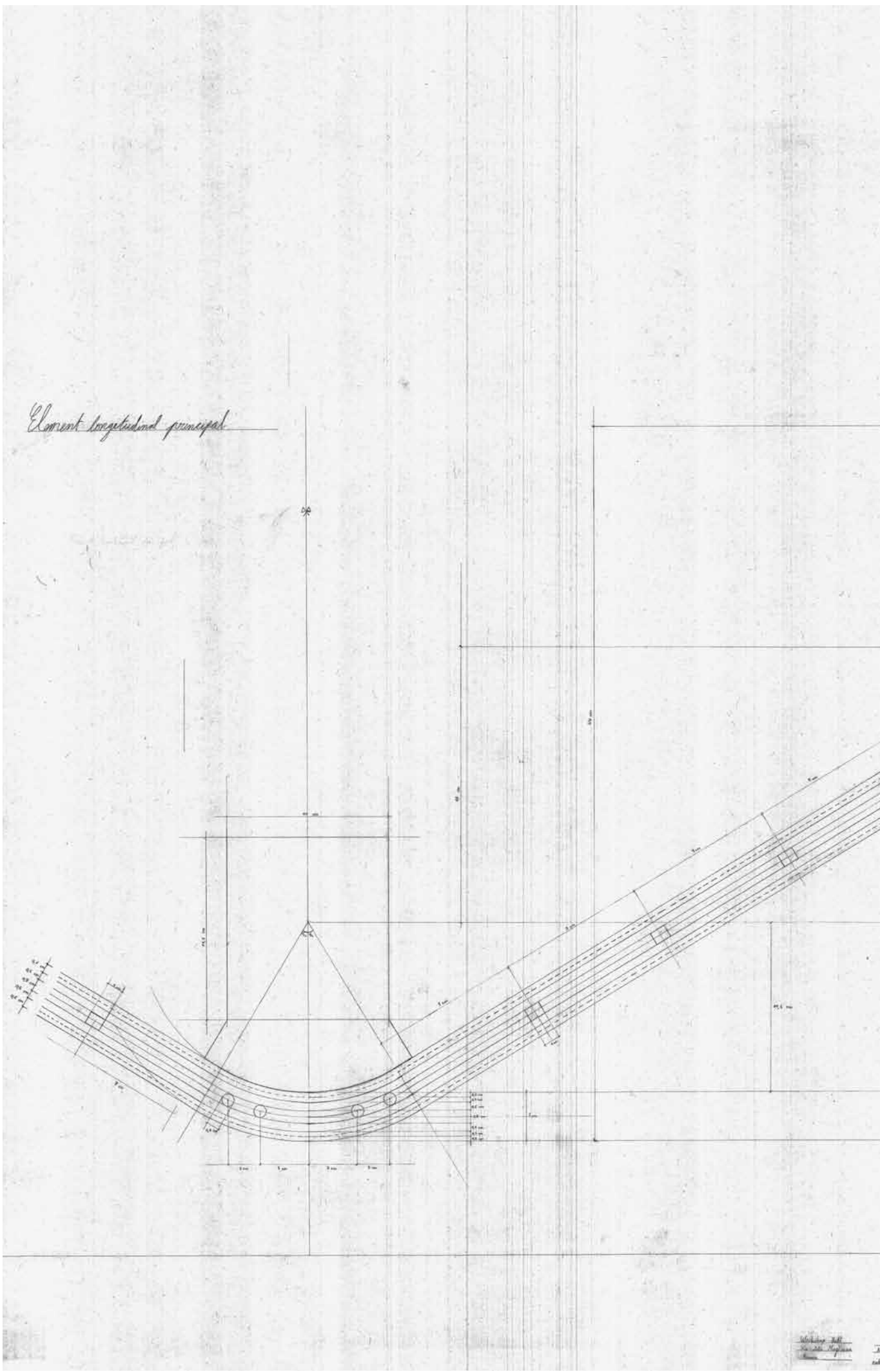


Schema de la piece representee à l'echelle 1/10
Dimensions en mm

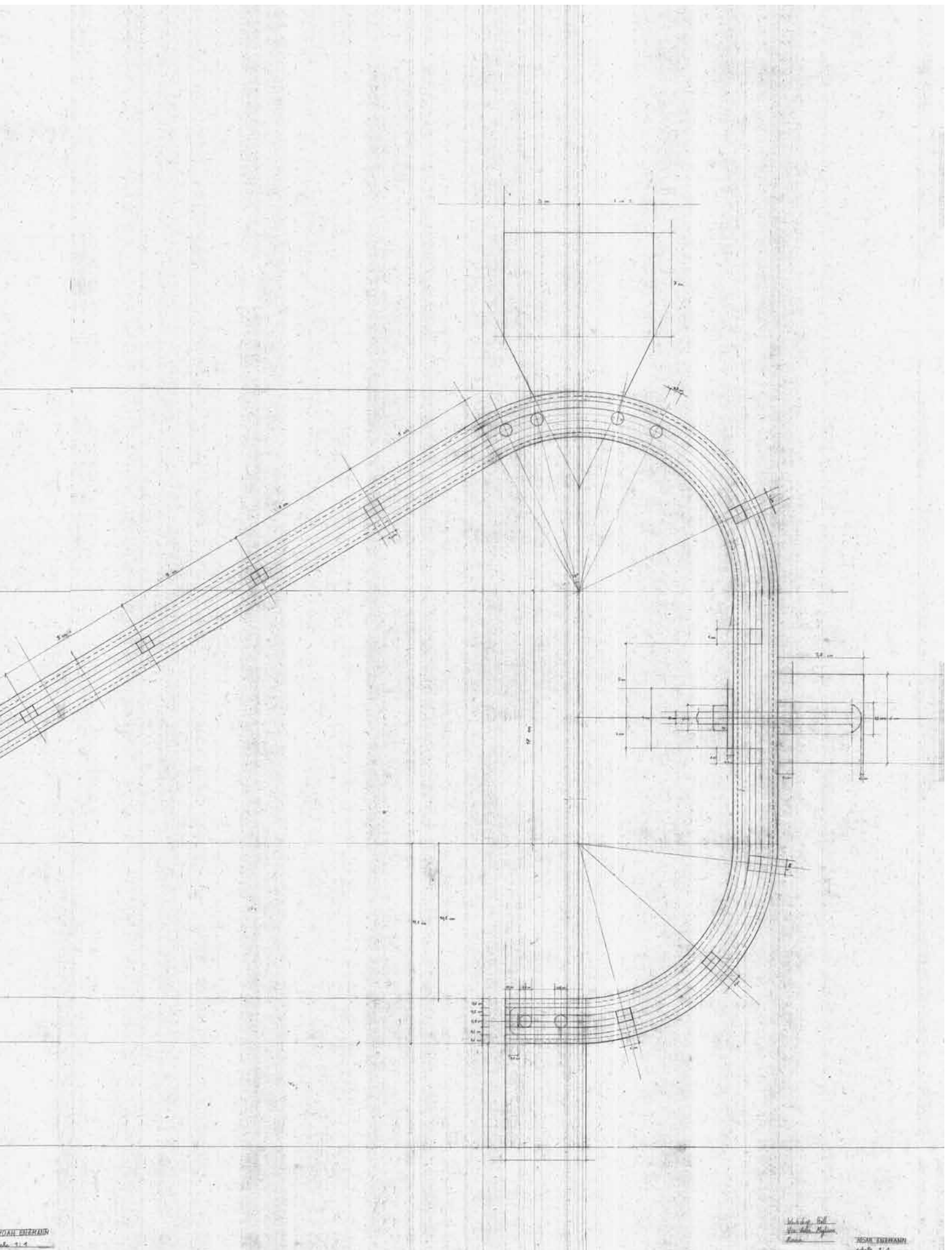


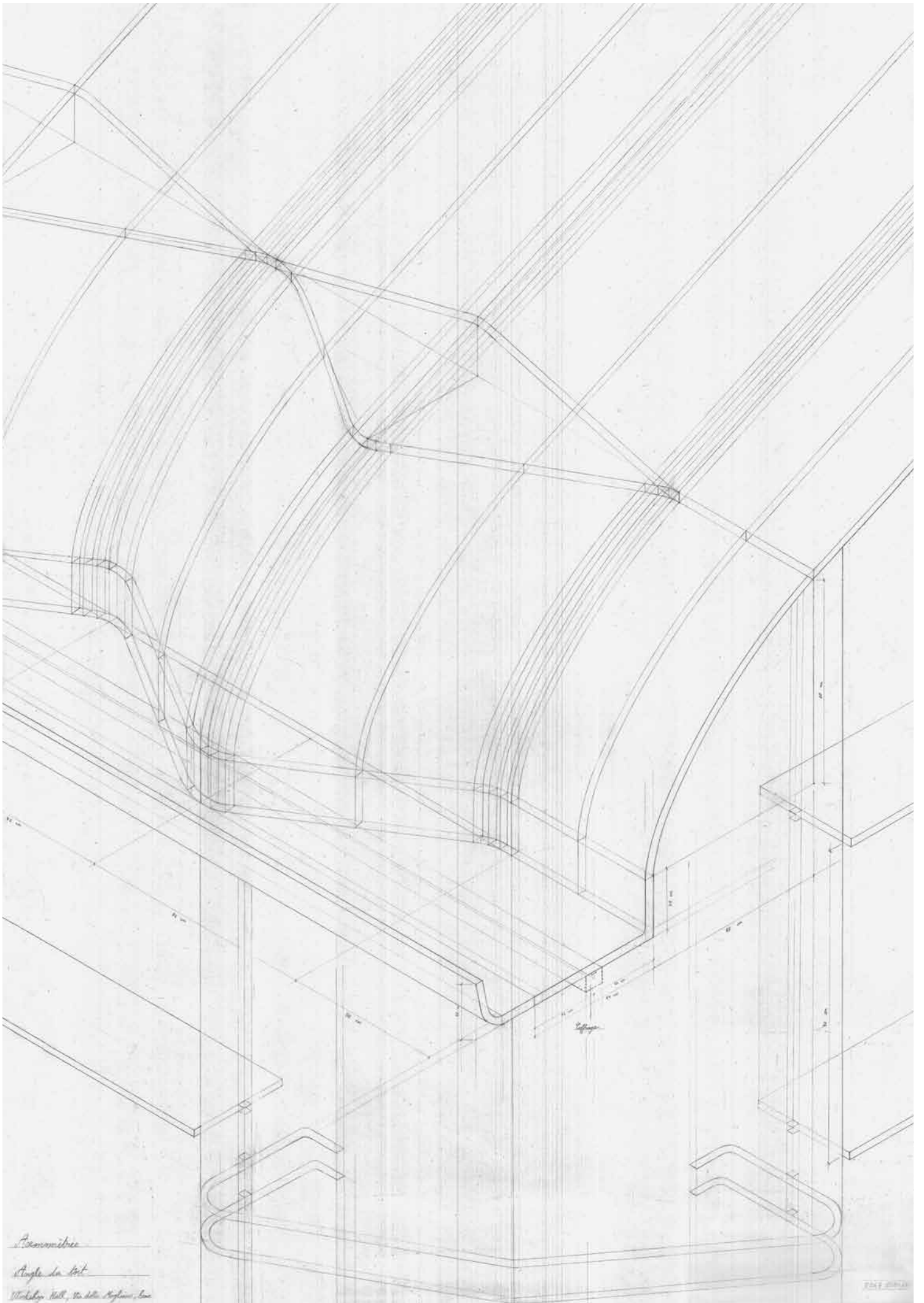
Schema de la piece representee à l'echelle 1/10
Dimensions en mm



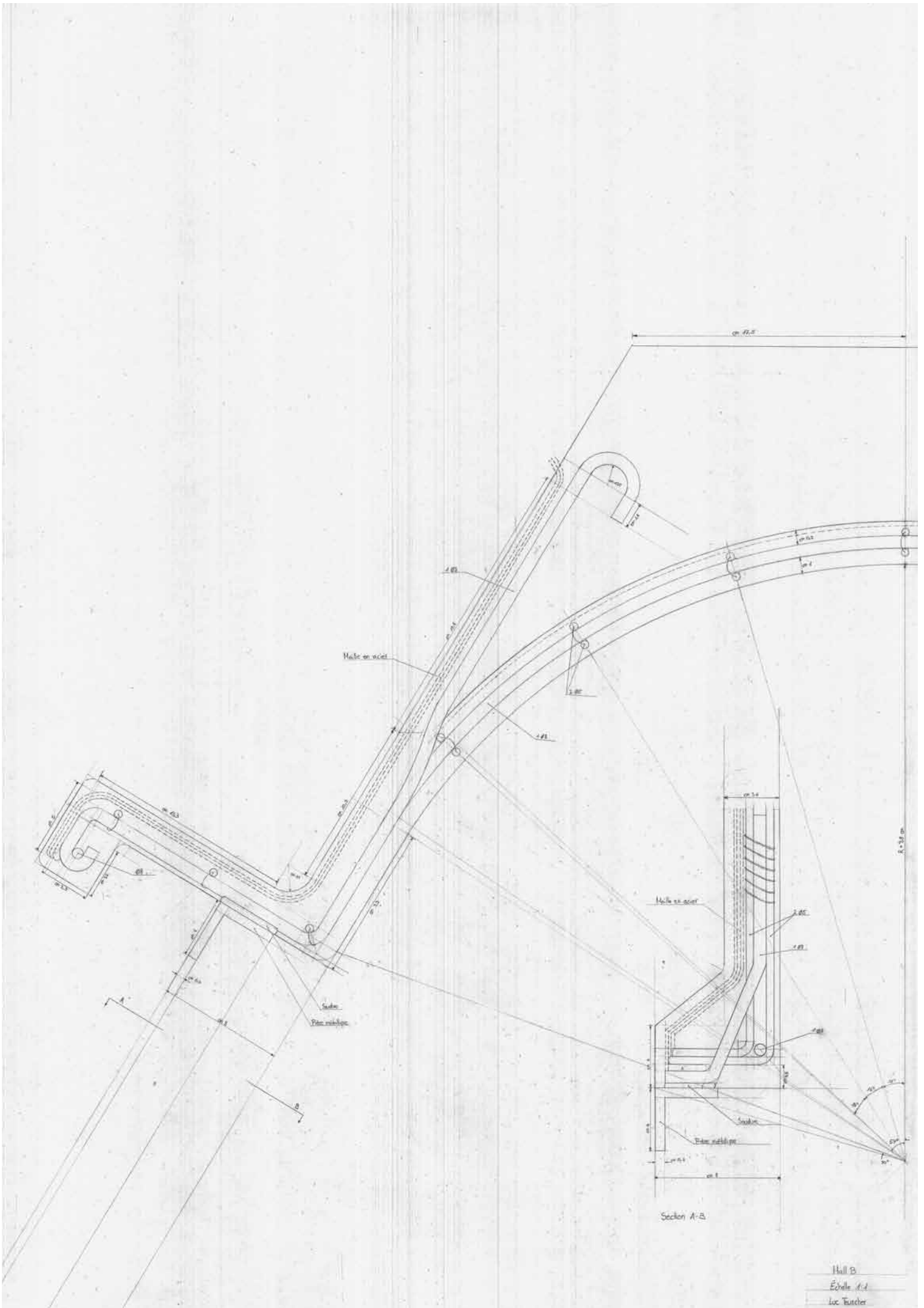


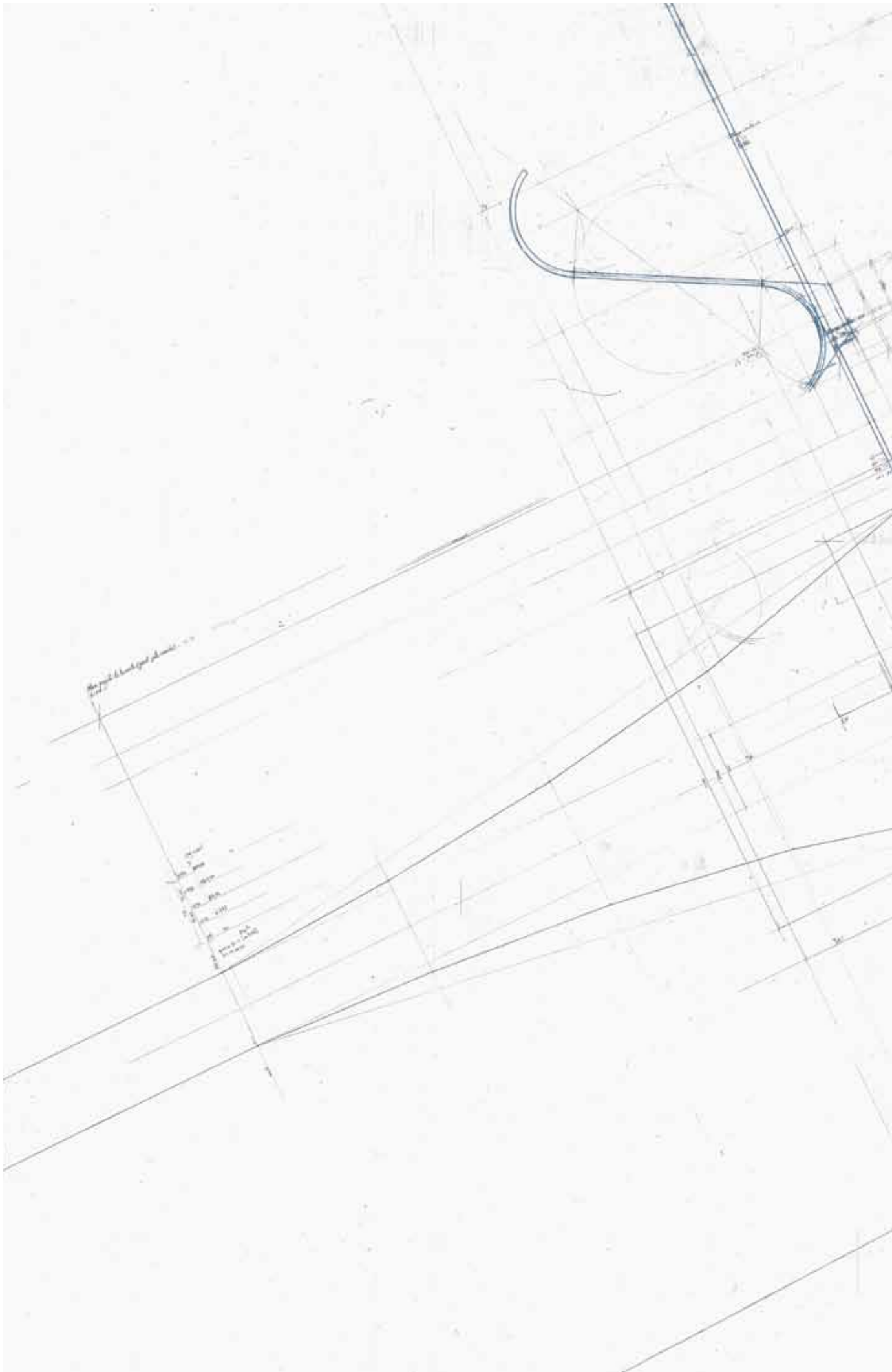
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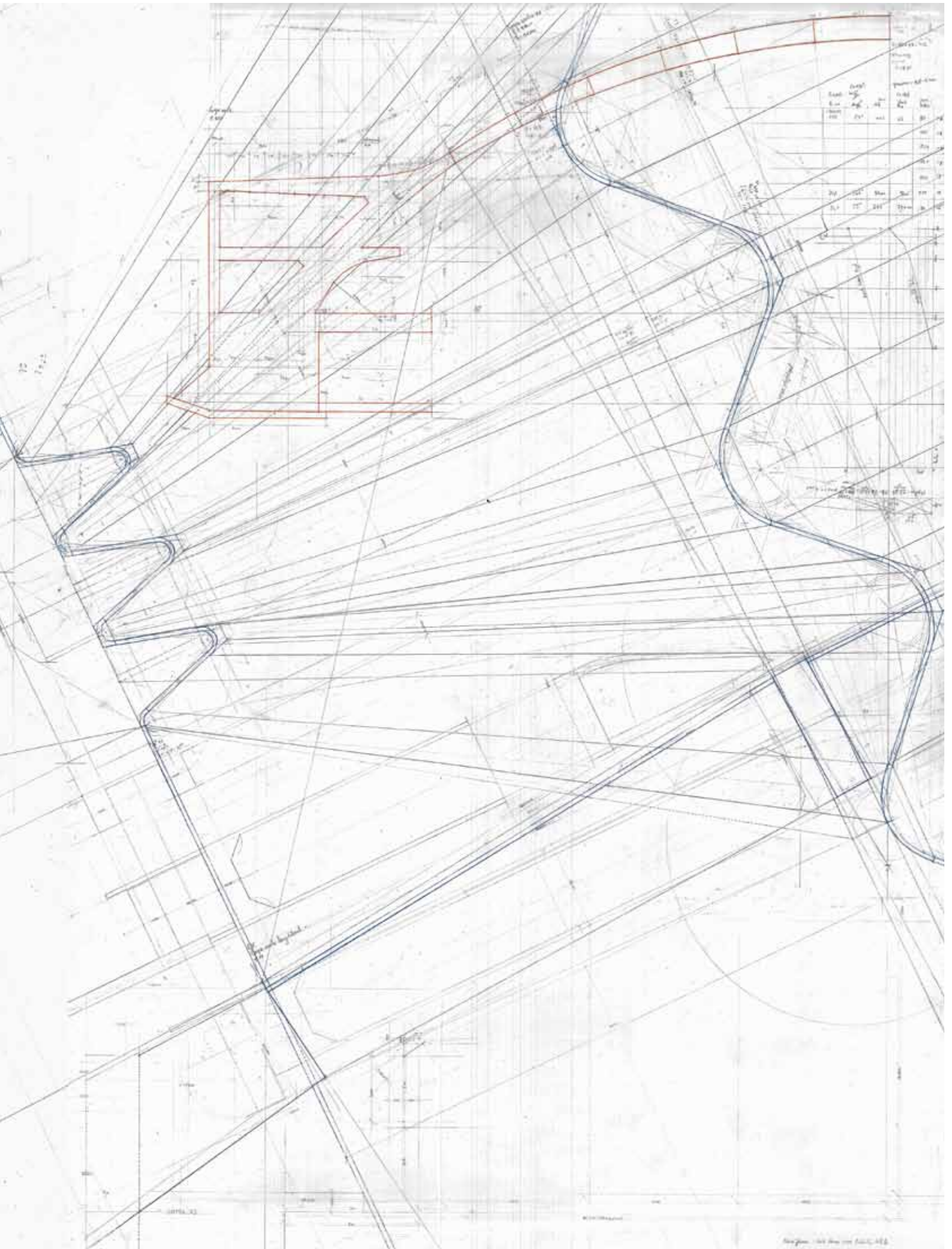


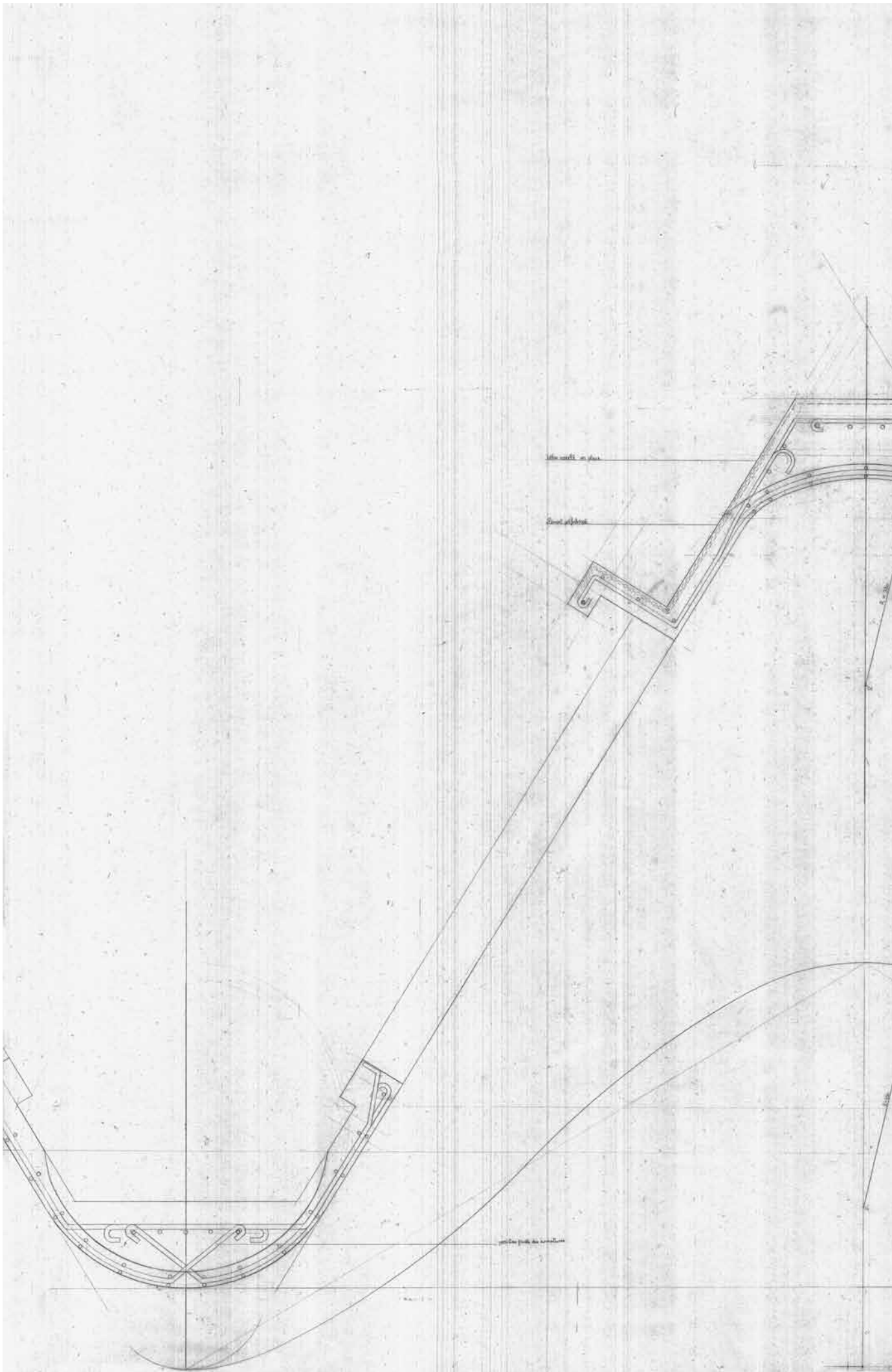


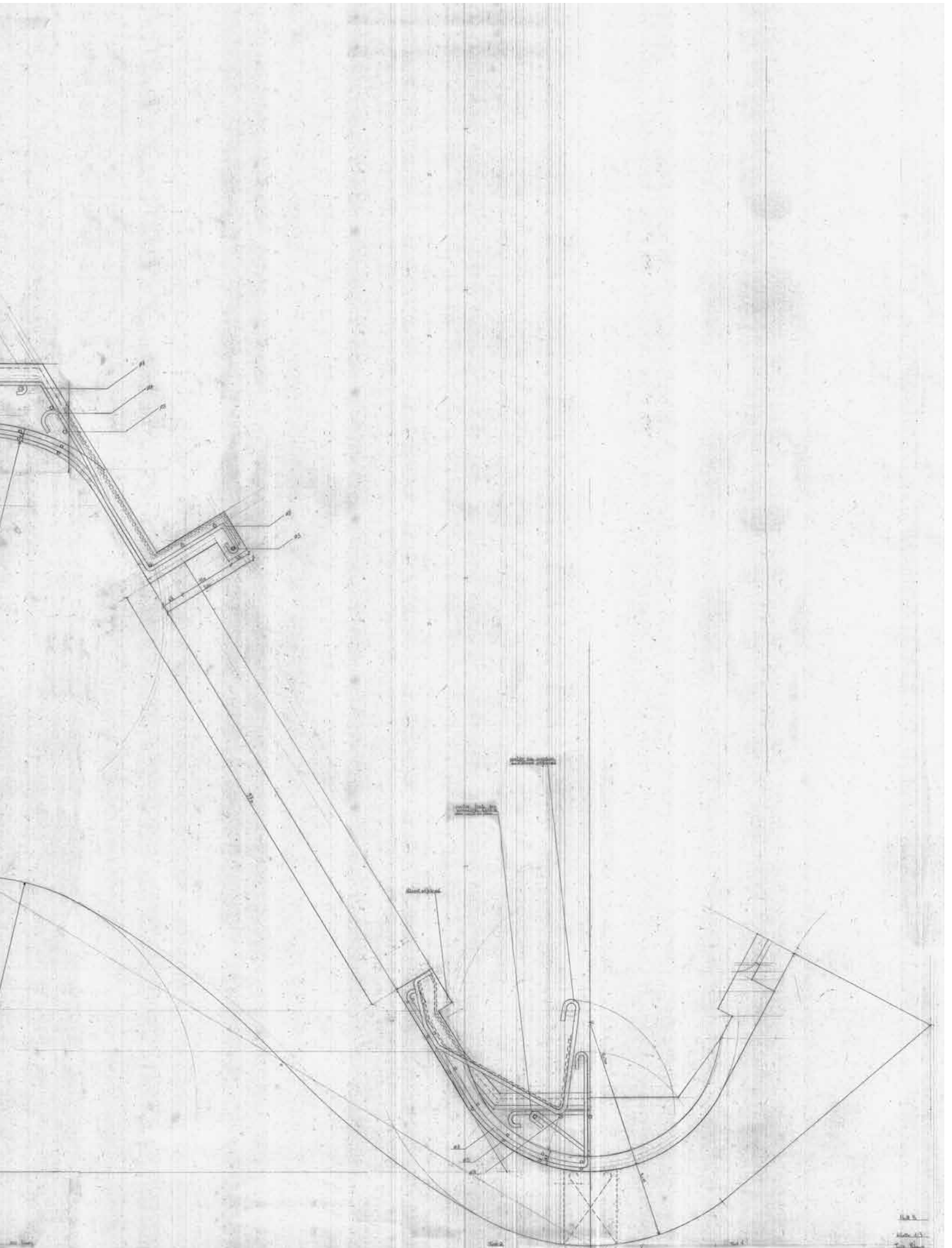
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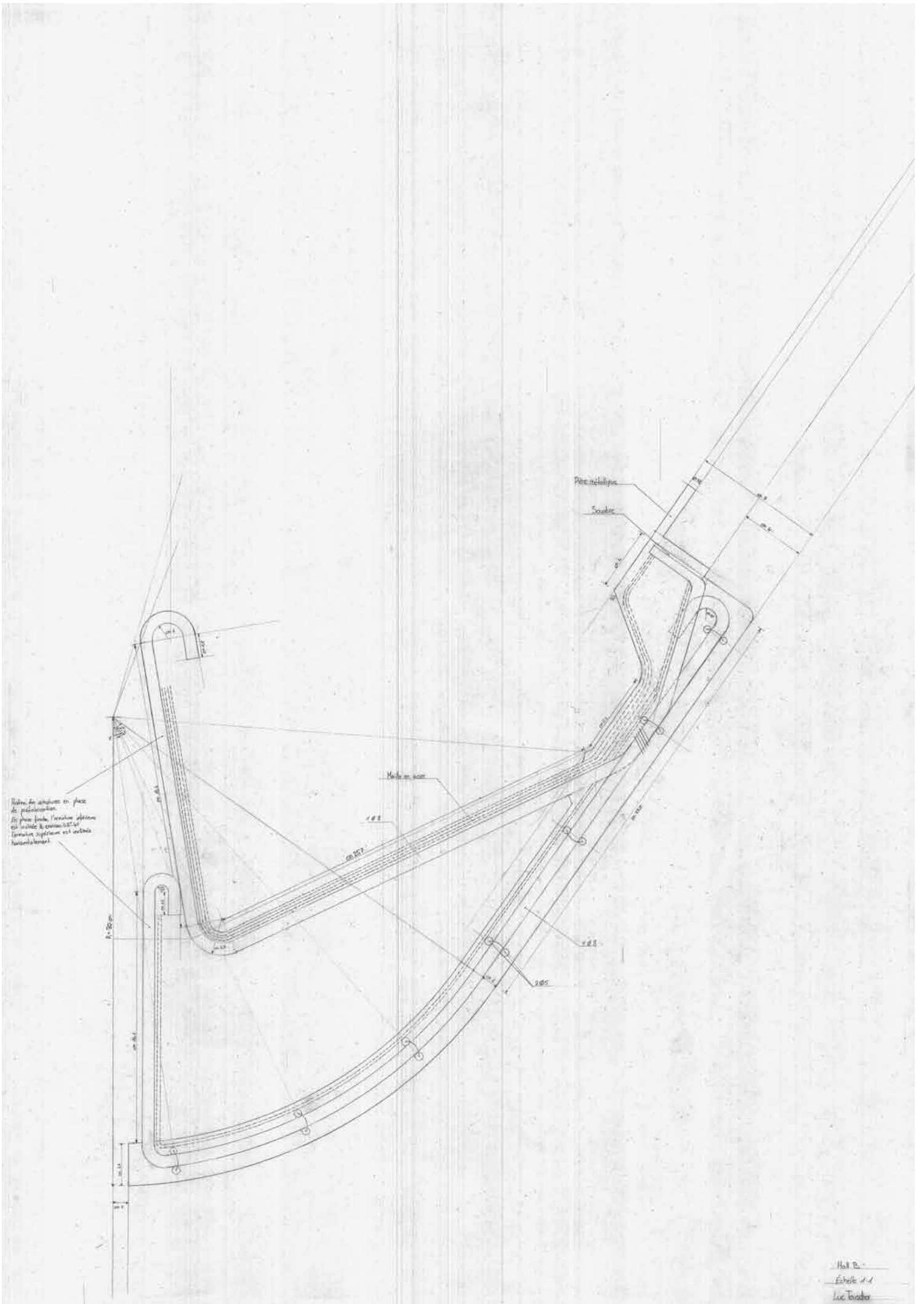




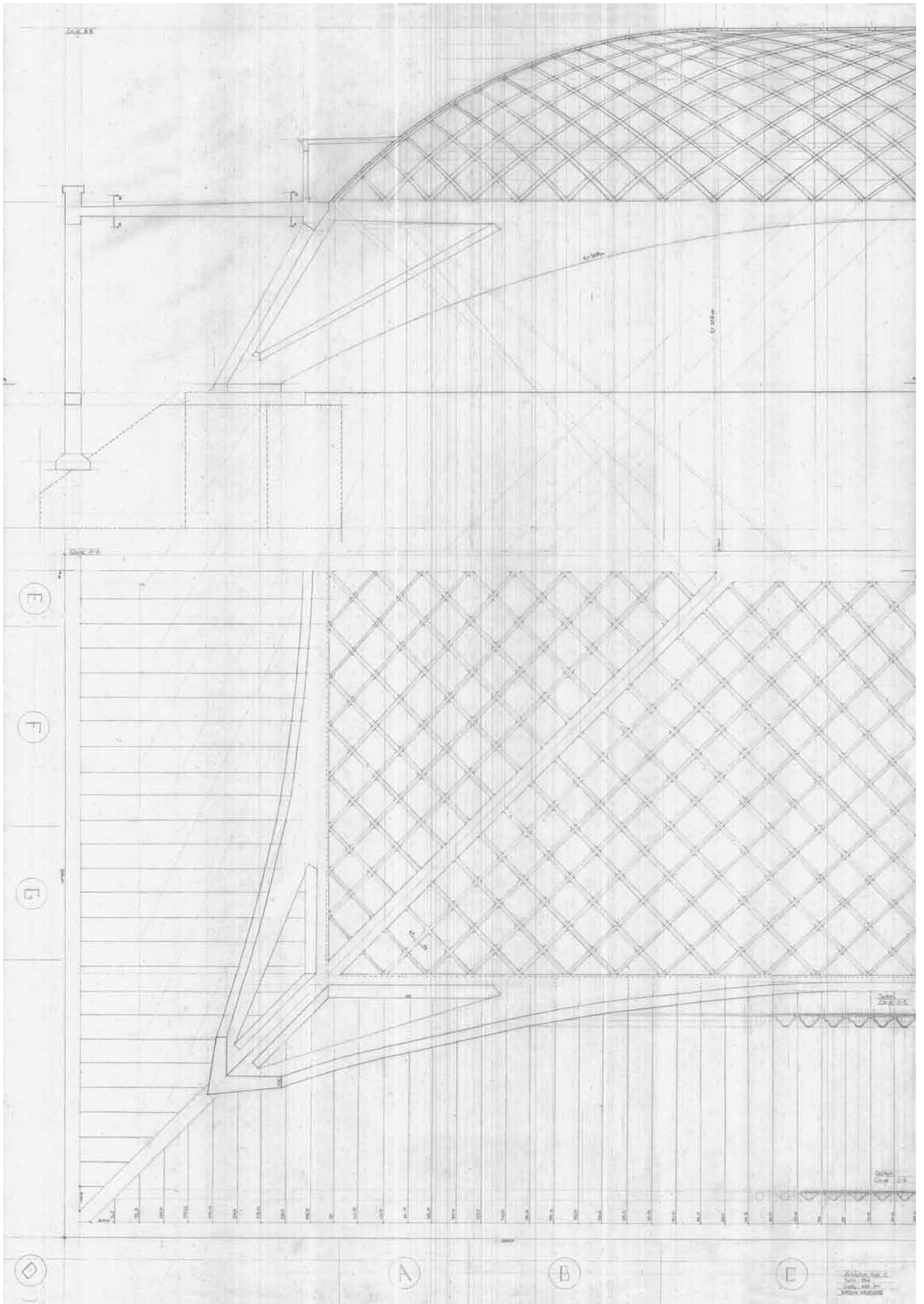


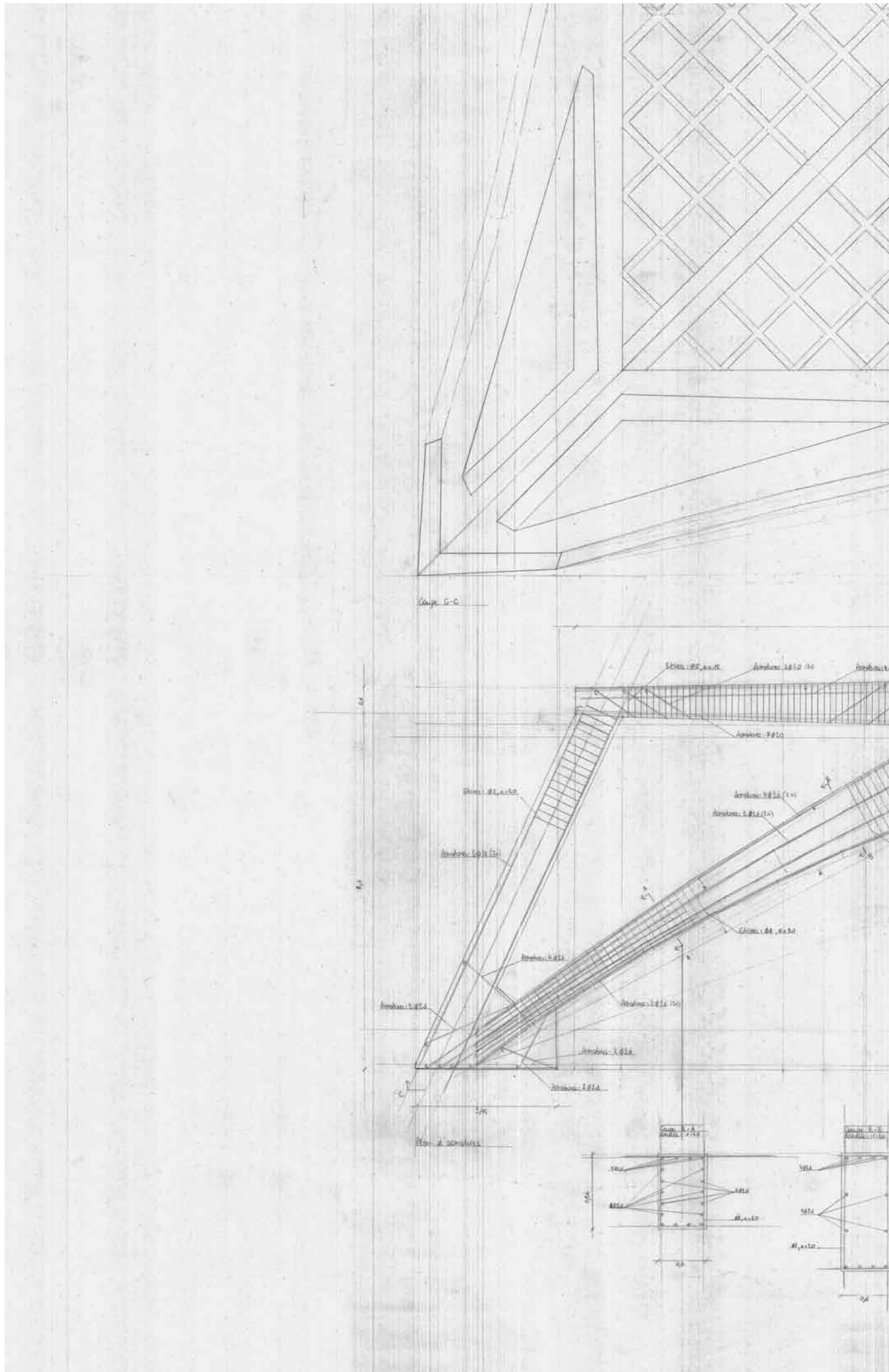


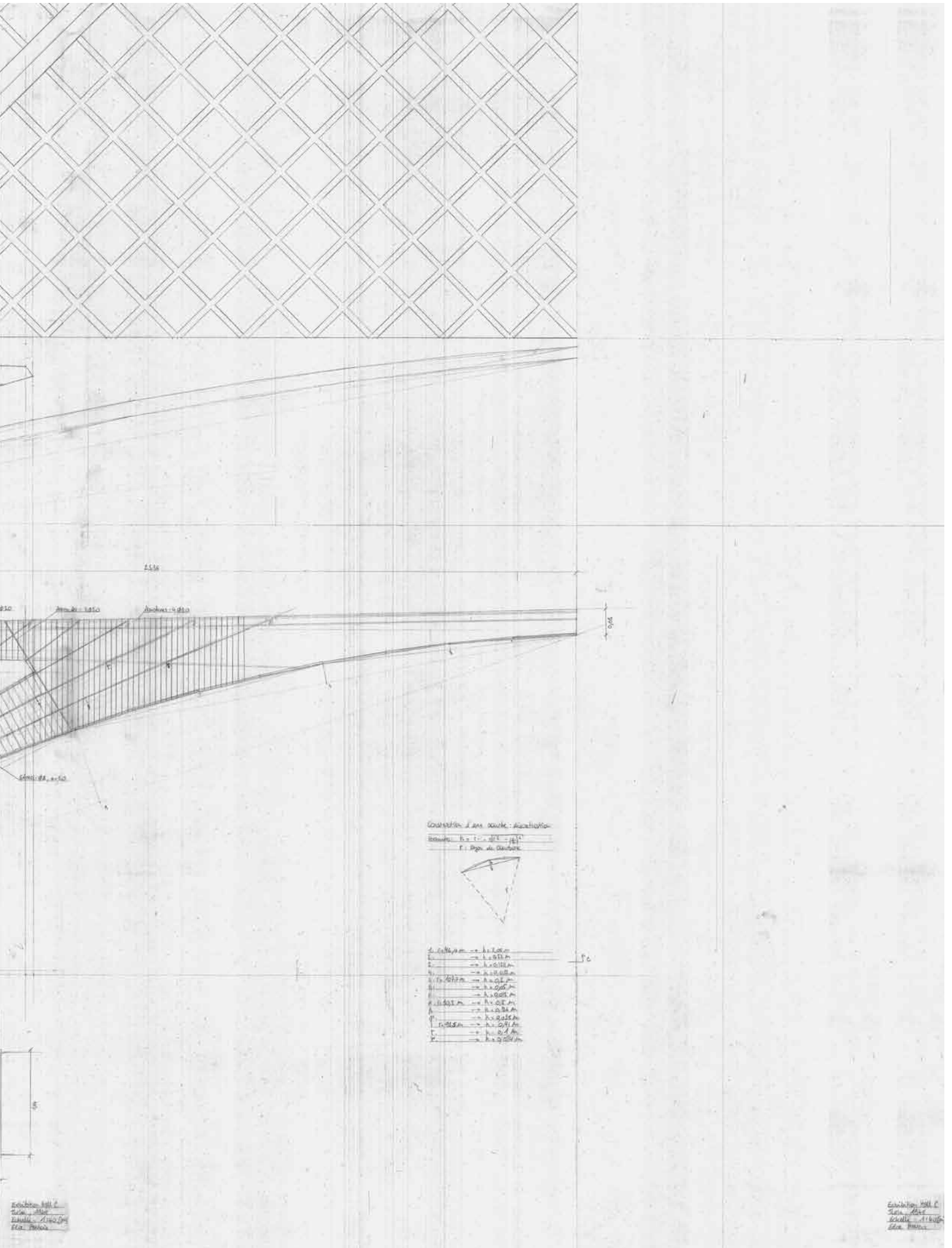


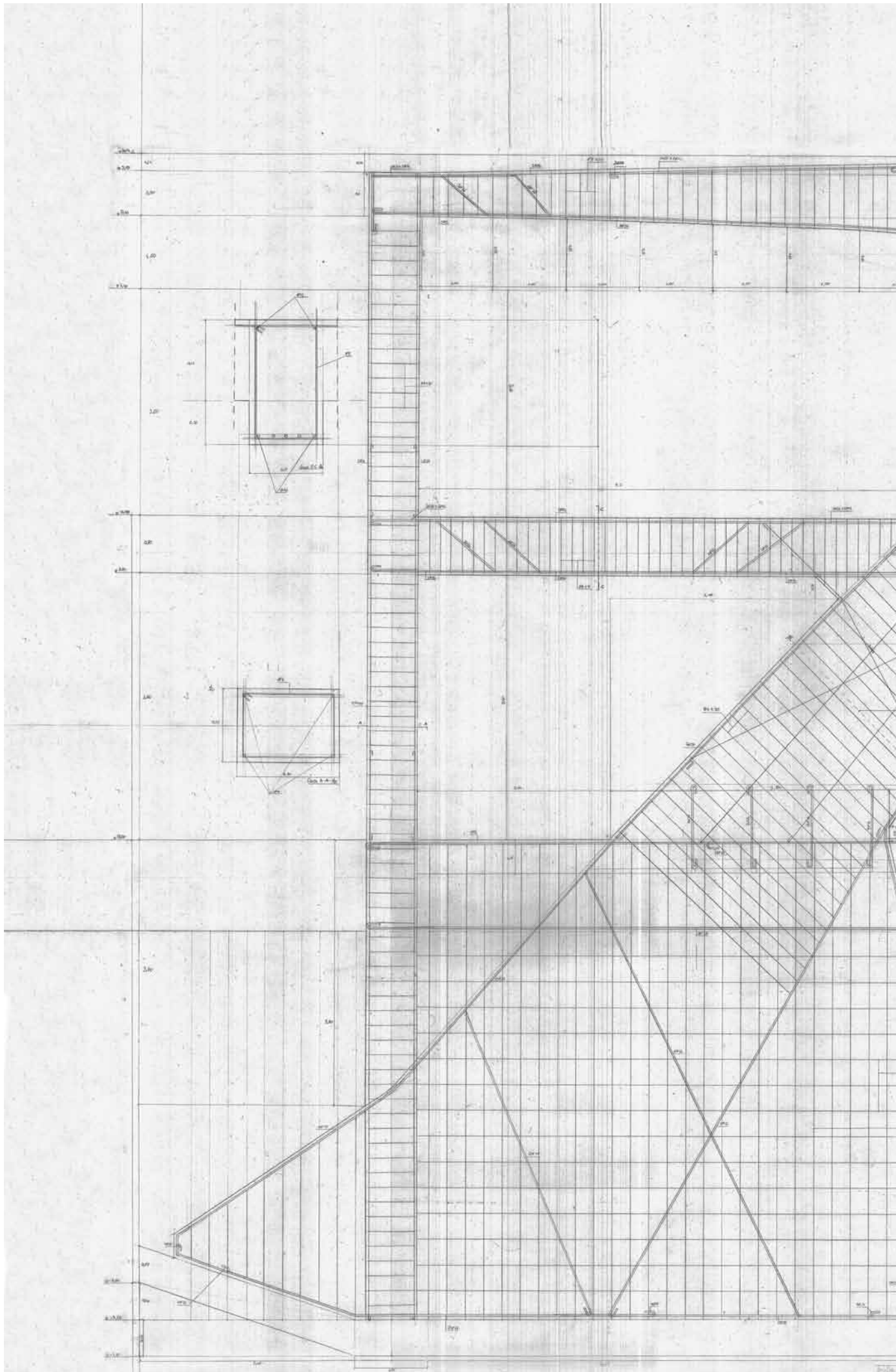


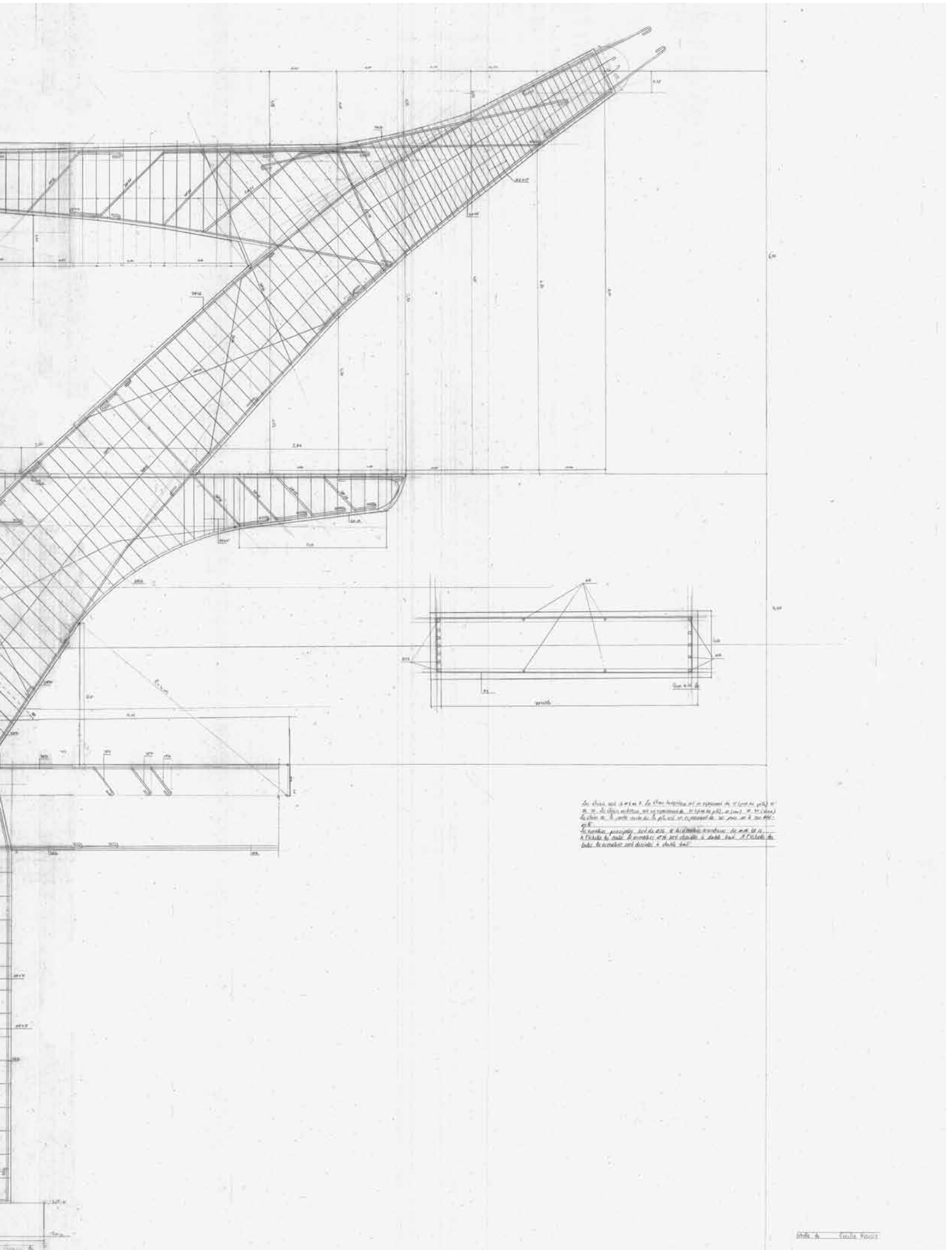
EXHIBITION HALL C,
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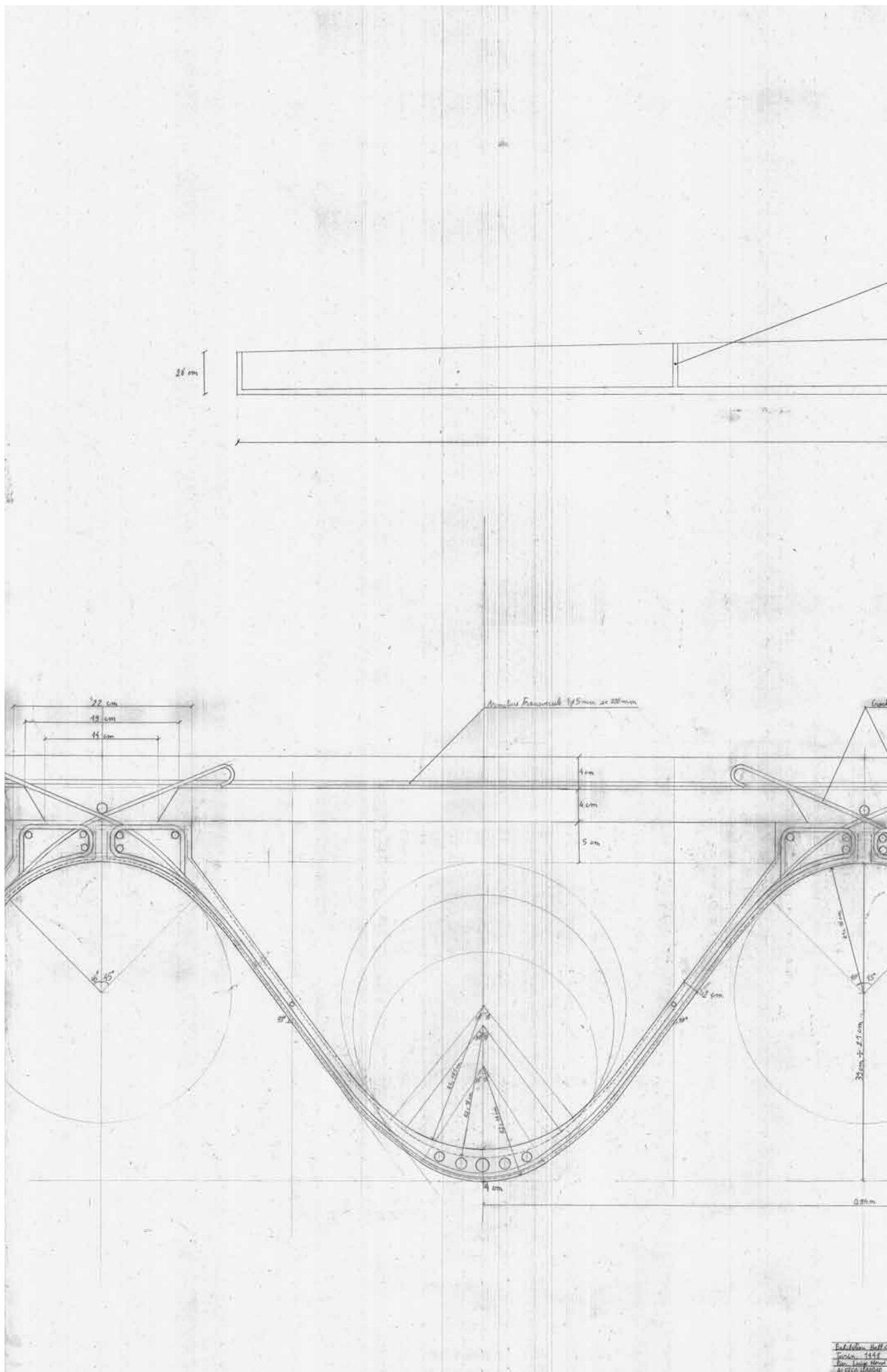


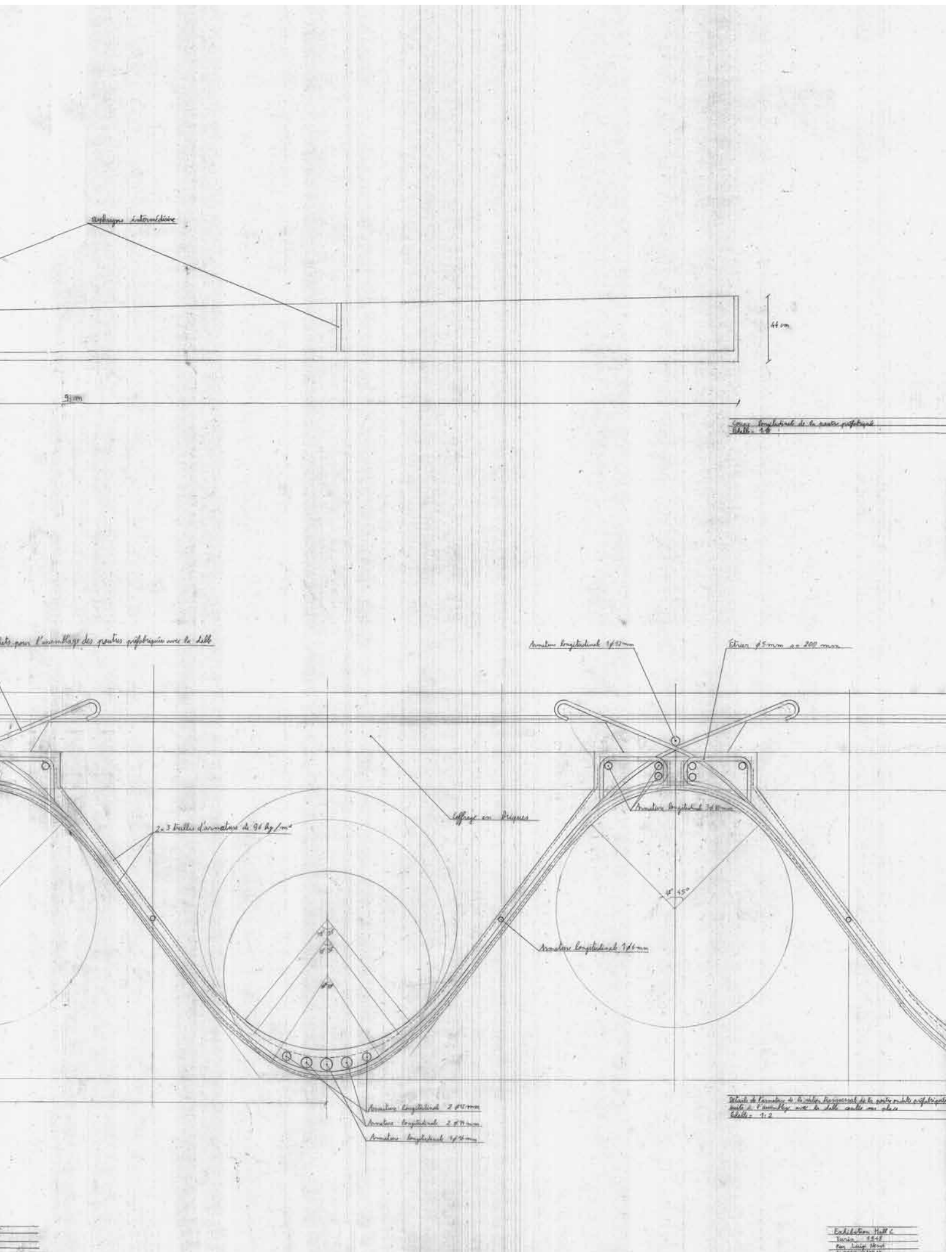




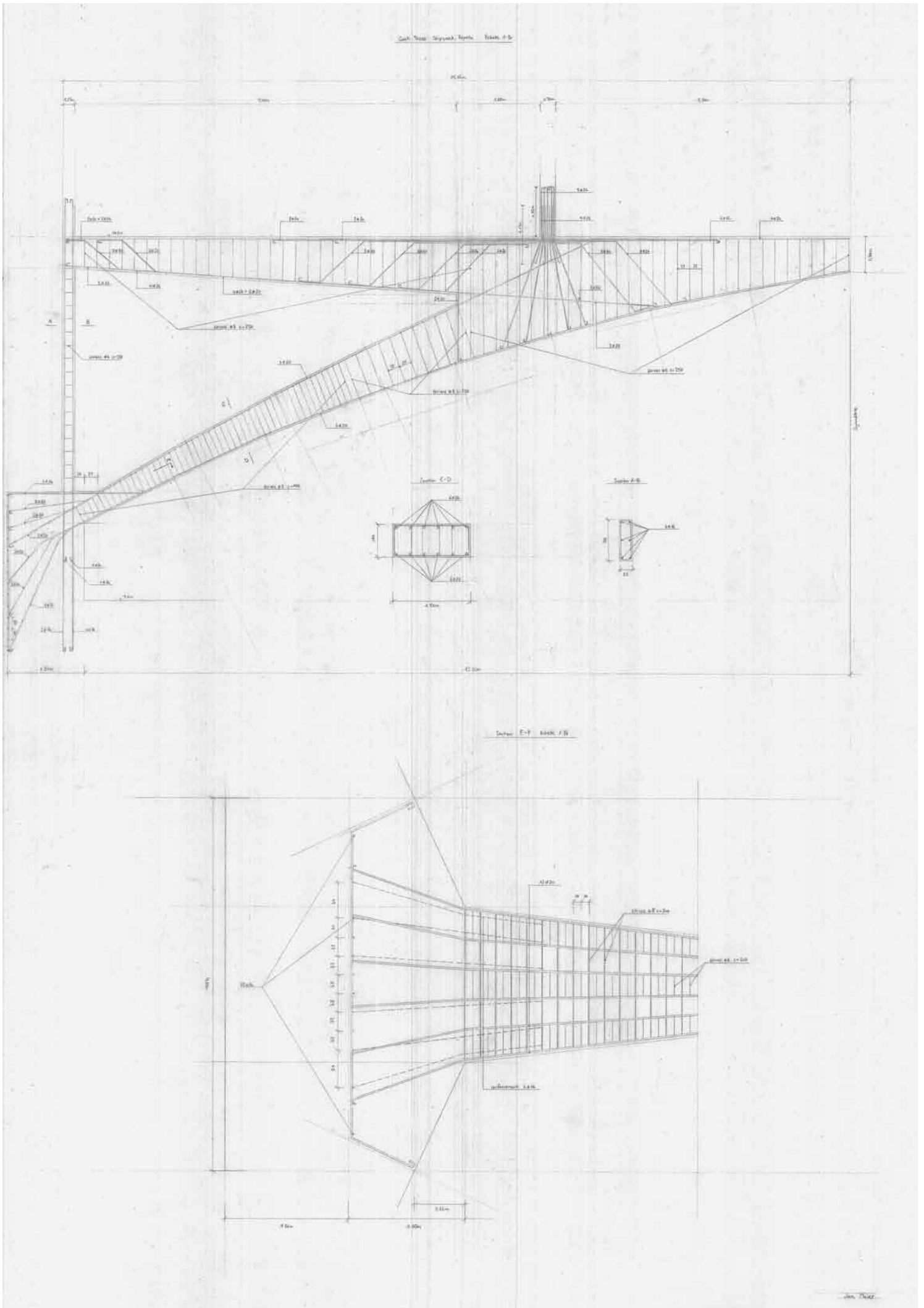


*Se il traliccio non è in acciaio, si deve utilizzare un tipo di acciaio che si deformi a caldo, e si deve
prevedere un sistema di protezione contro la ruggine. Il traliccio deve essere progettato in modo da
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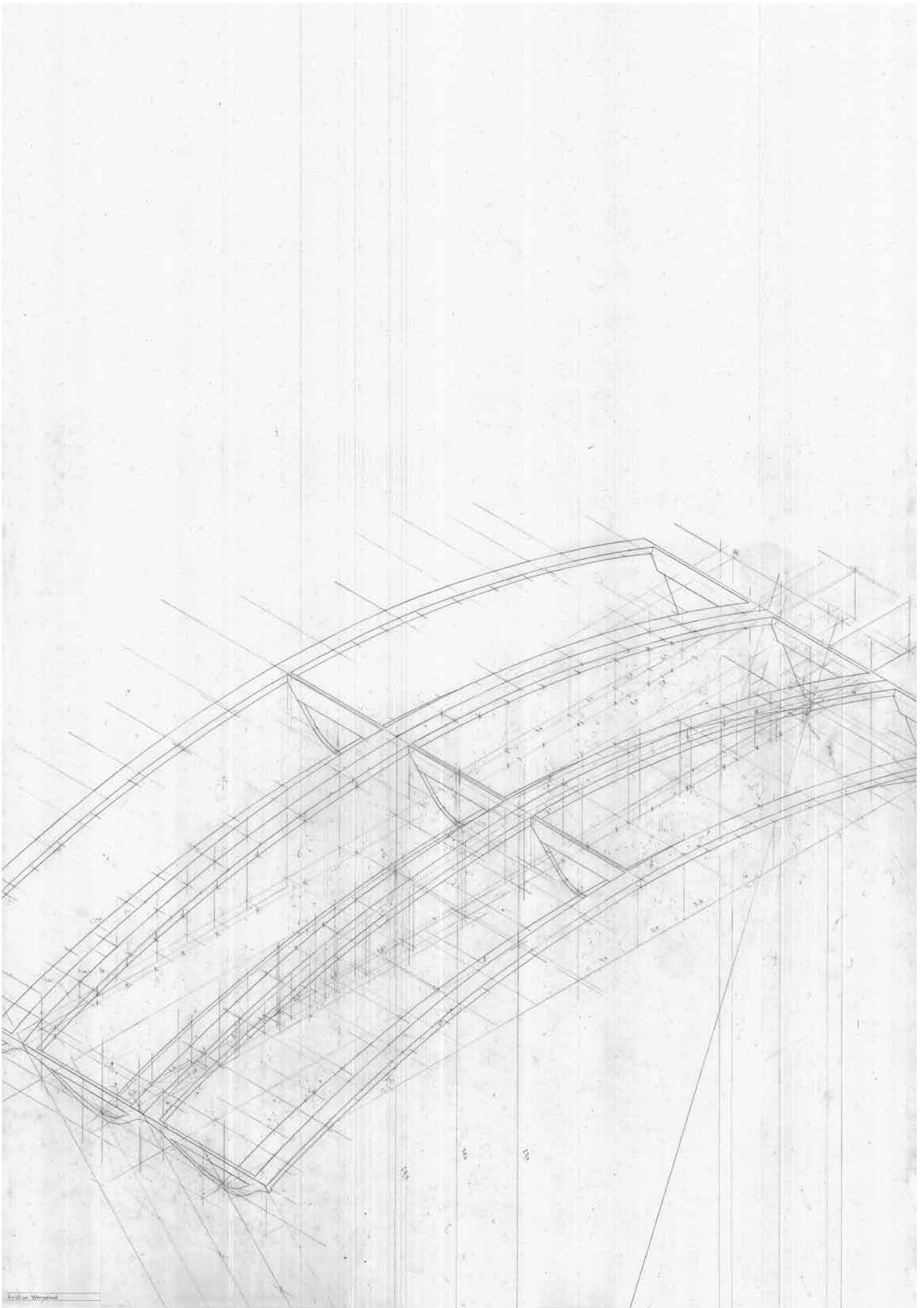


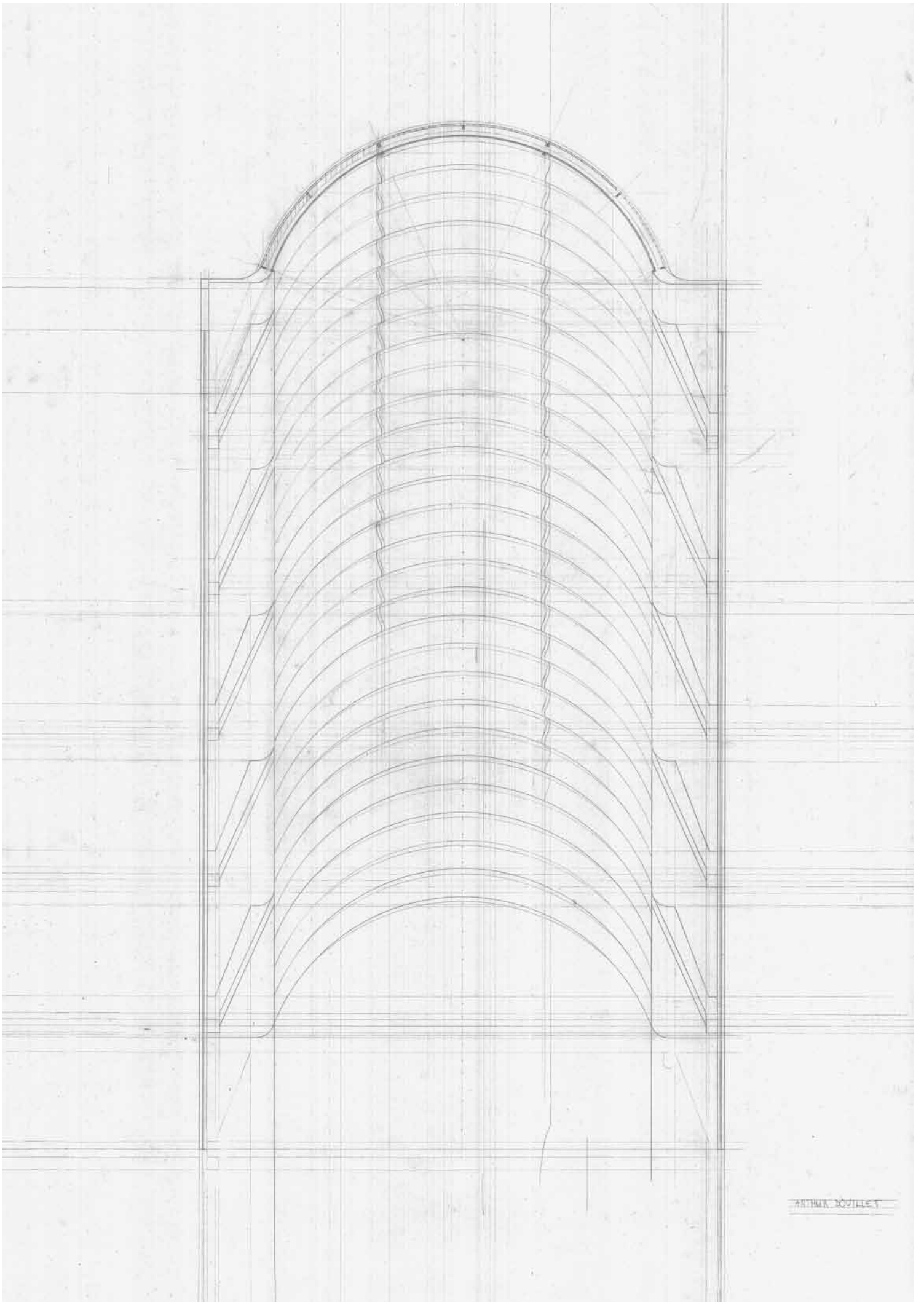


CONTI-TROSSI SHIPYARD,
1947-48

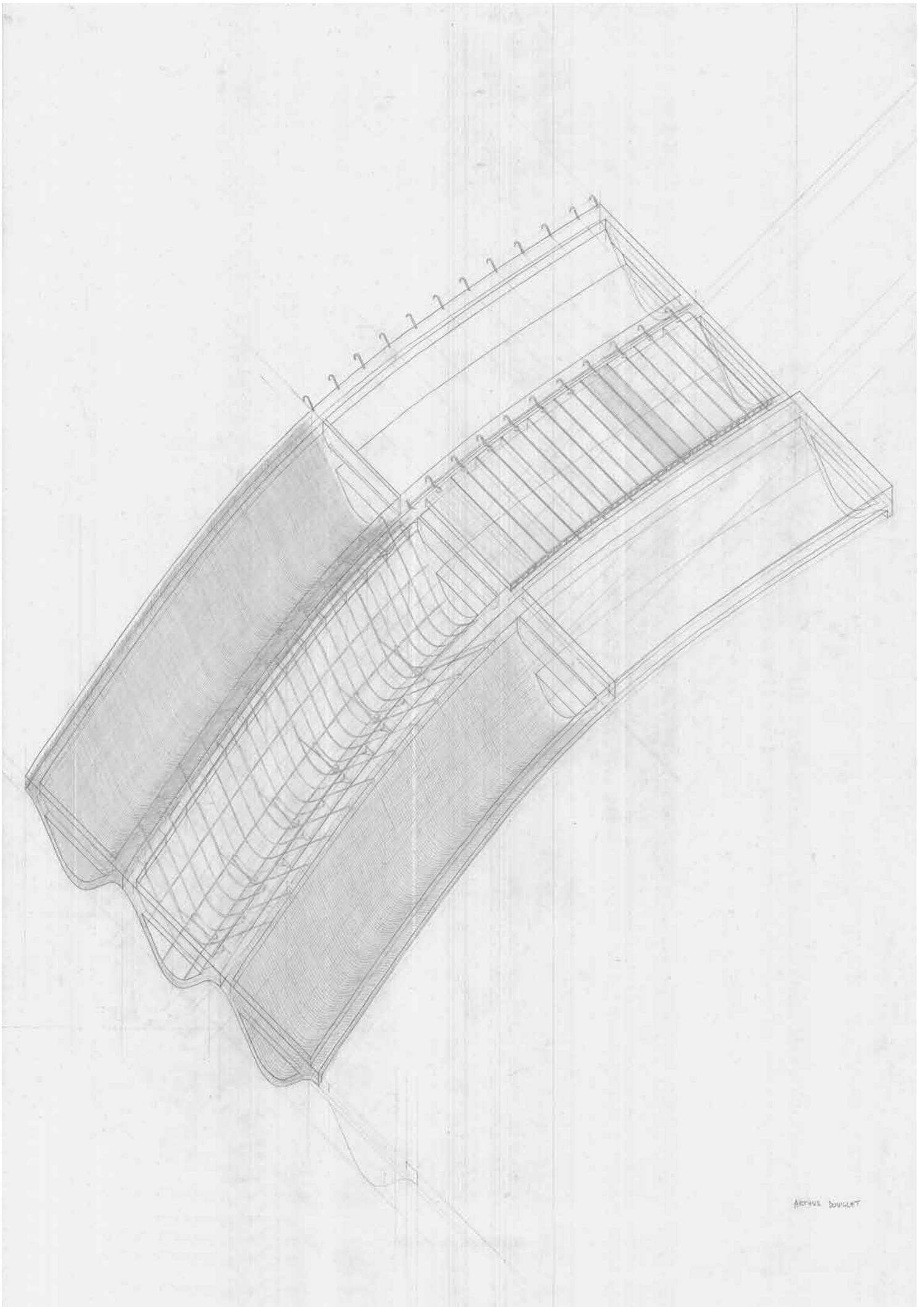


SWIMMING POOL,
LIVORNO, 1948-50



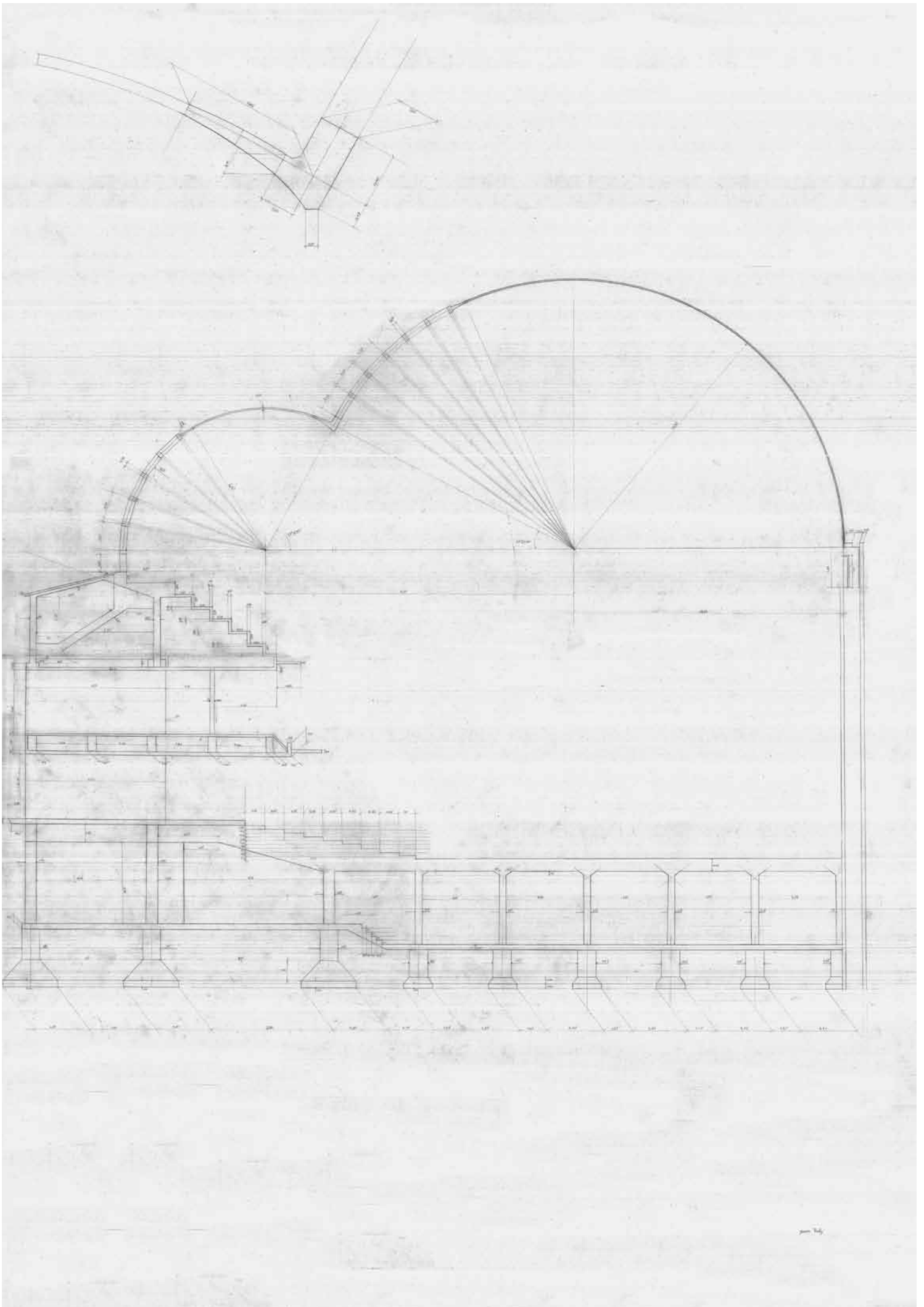


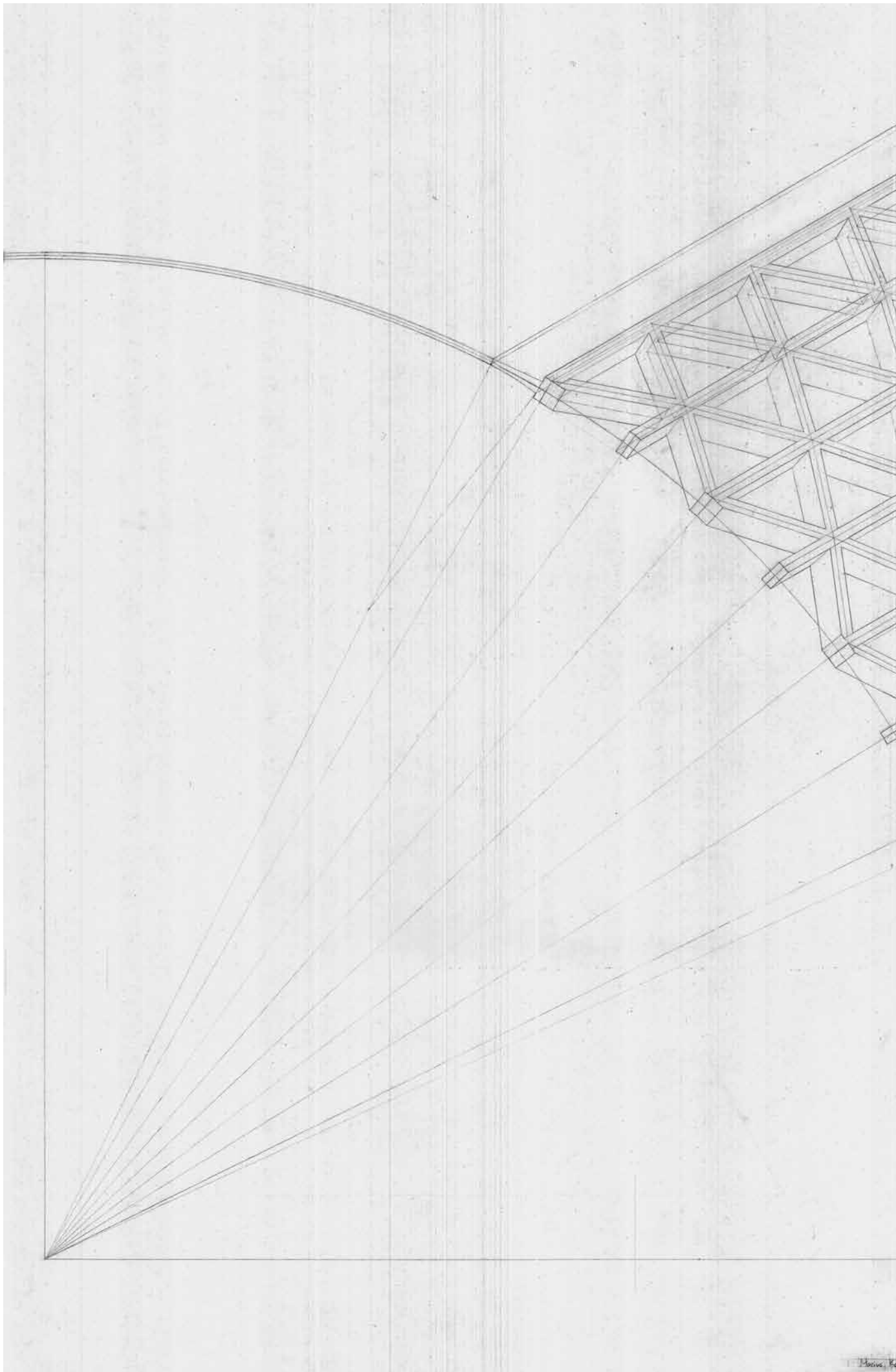
ARTHUR DOUILLET

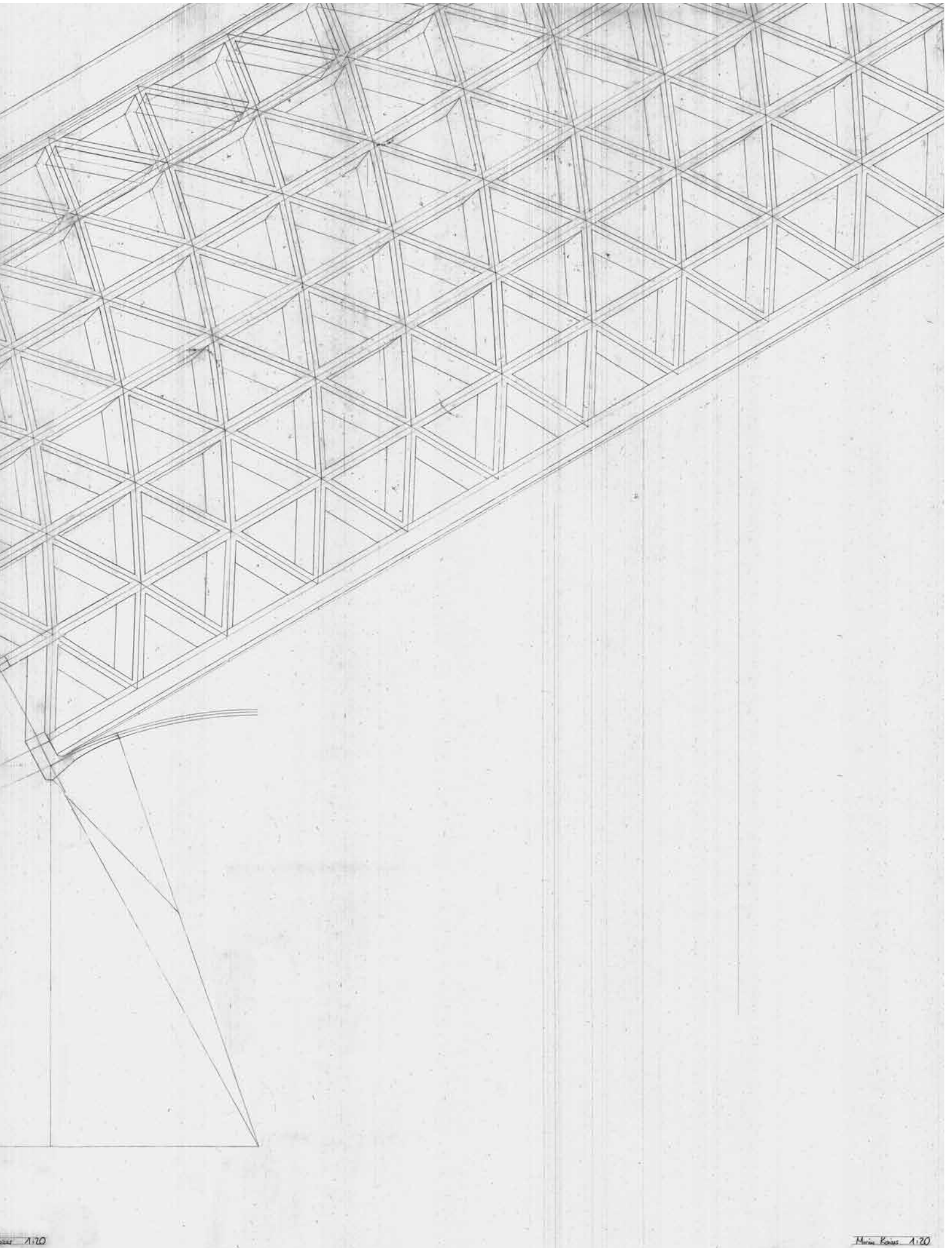


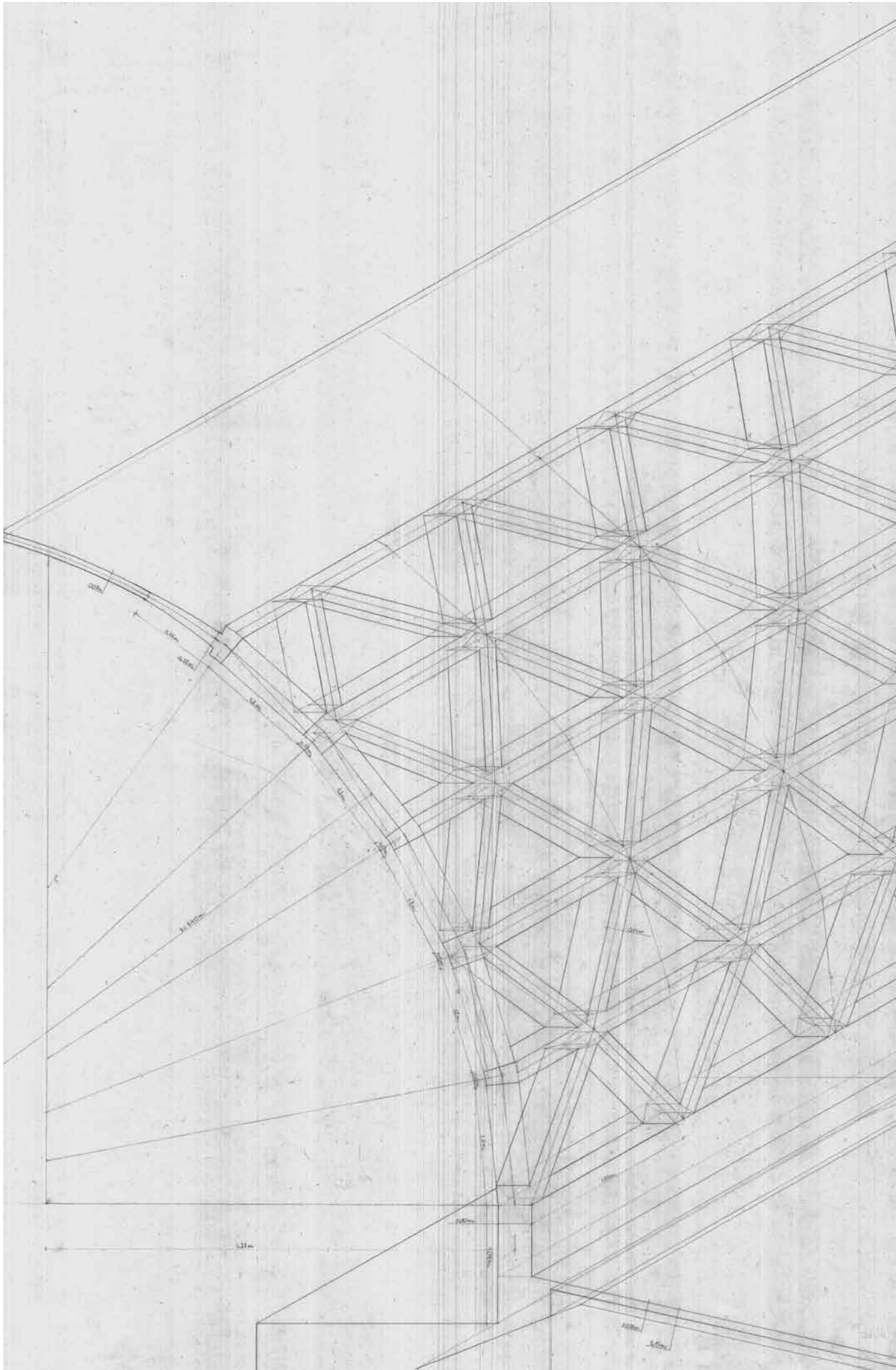


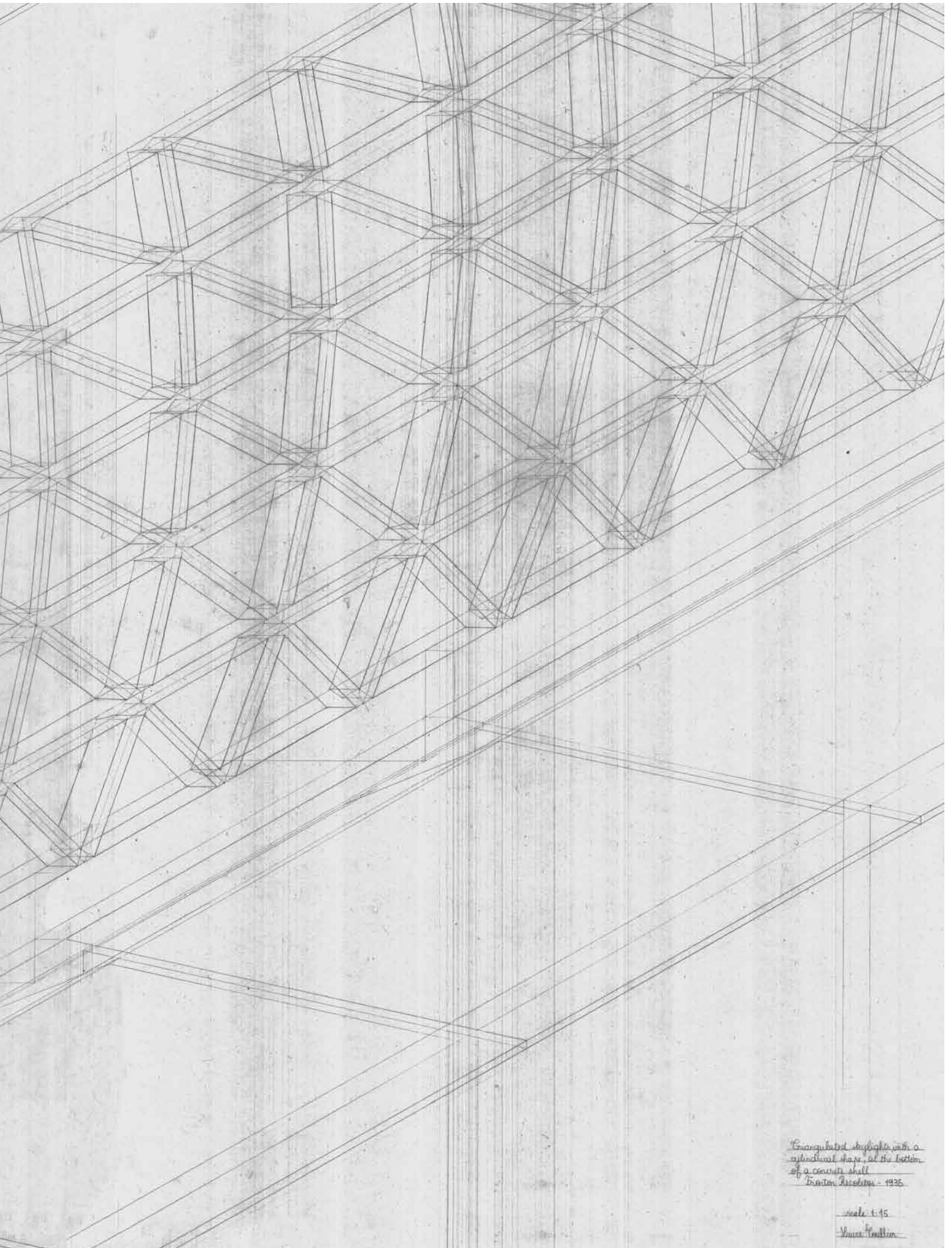
FRONTÓN RECOLETOS,
MADRID, 1935







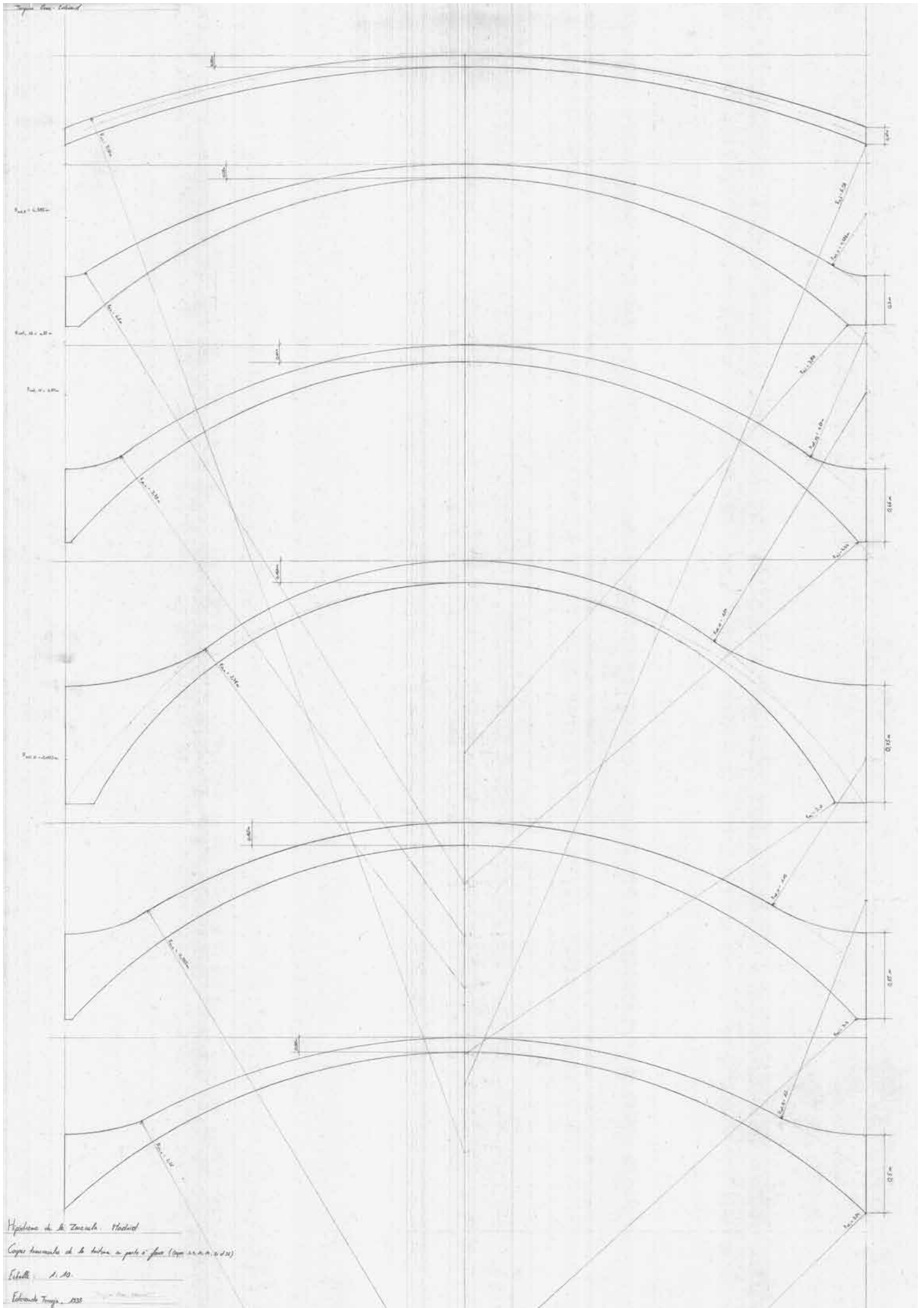


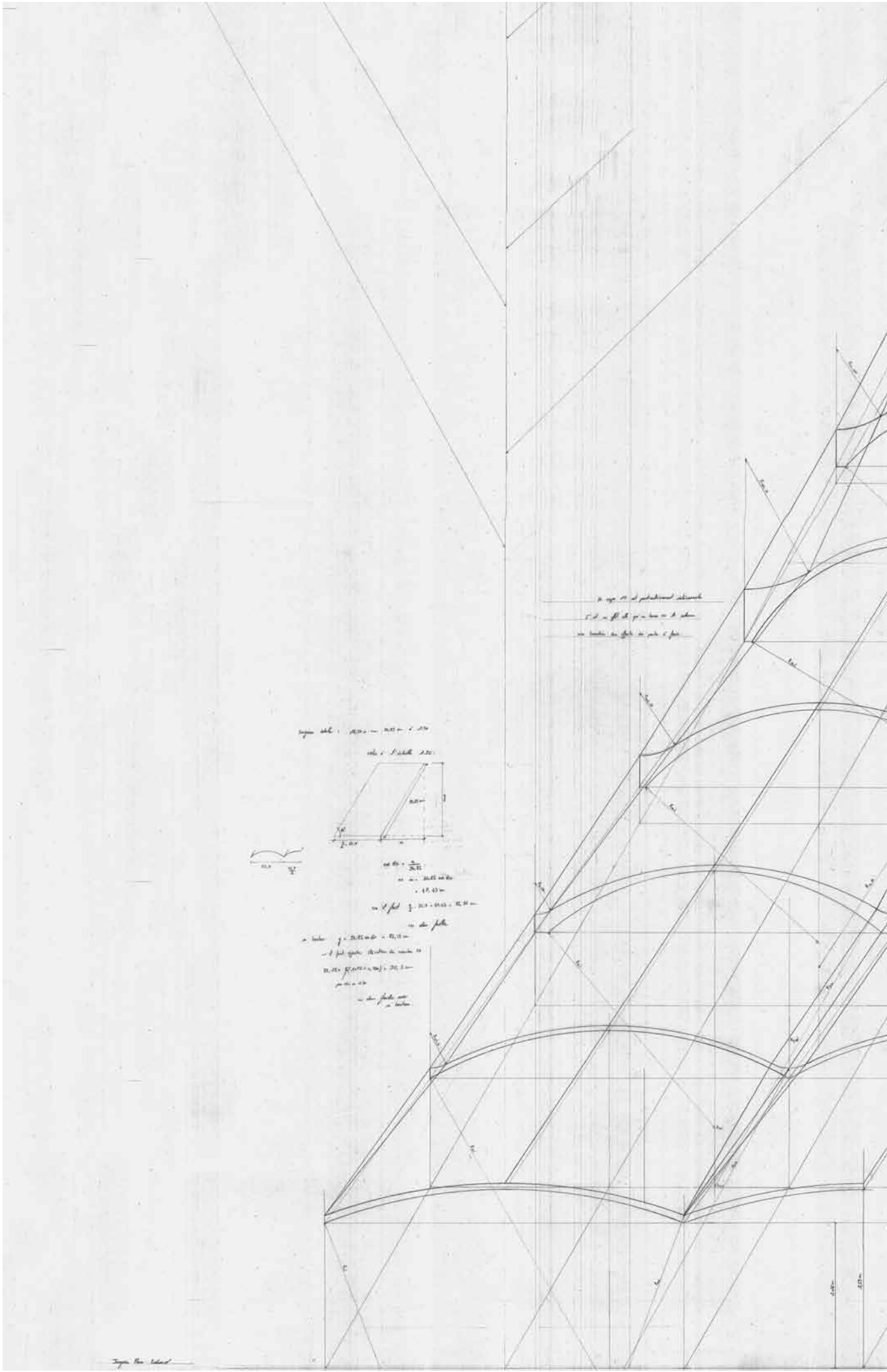


Triangulated skylights with a
cylindrical shape at the bottom
of a concrete shell
Frontón Recoletos - 1935

scale 1:15
Laure Toullier

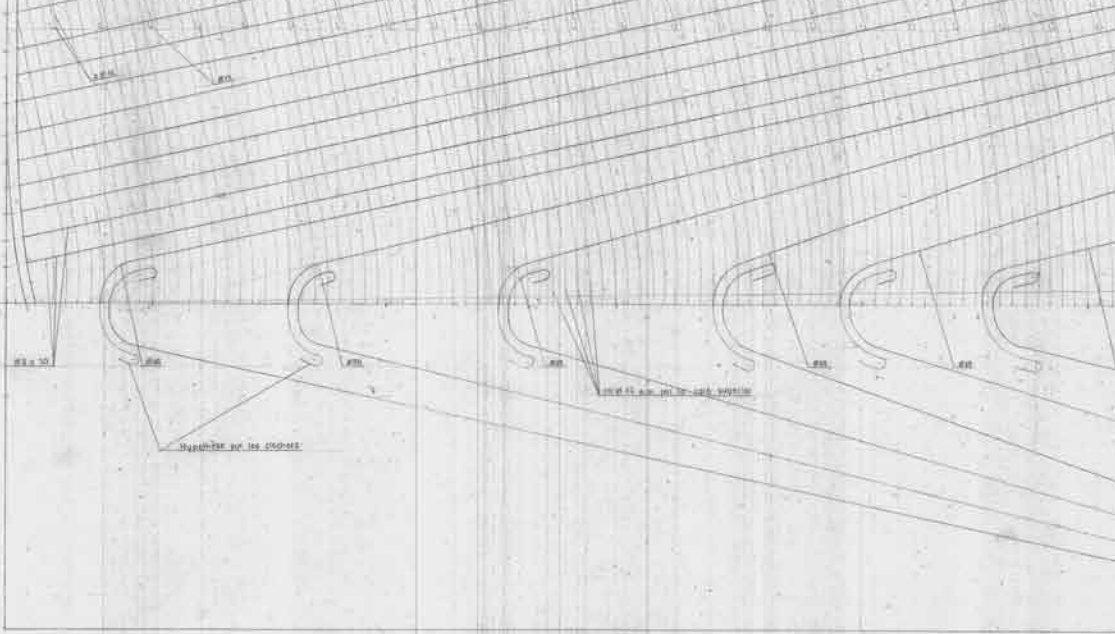
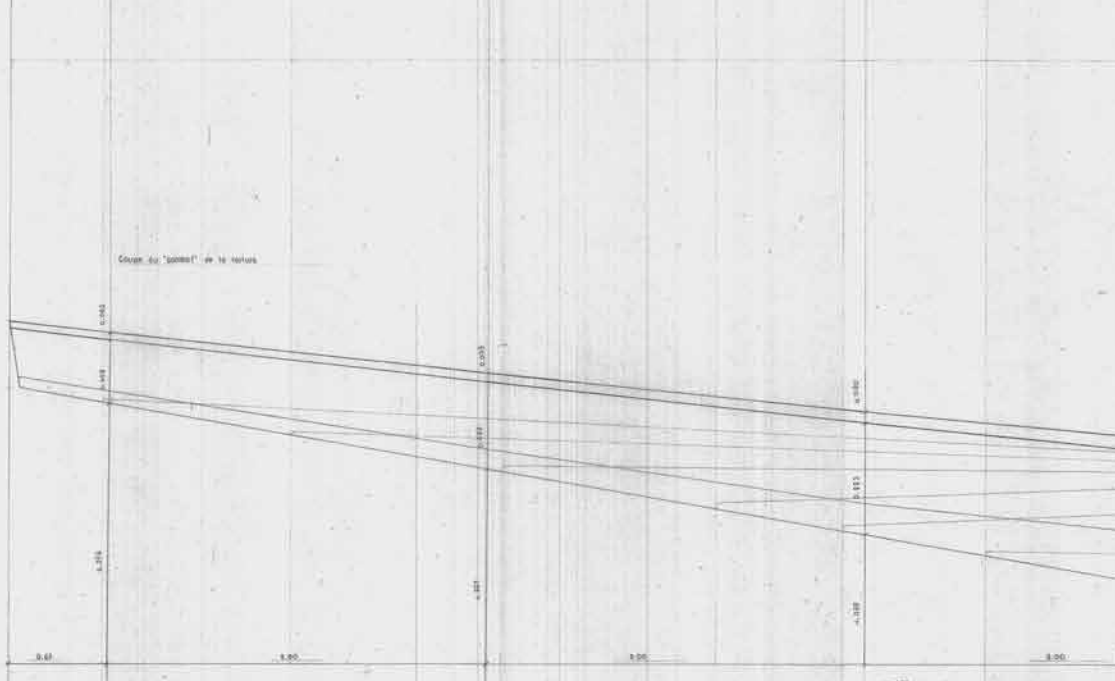
HIPÓDROMO DE LA ZARZUELA,
MADRID, 1935

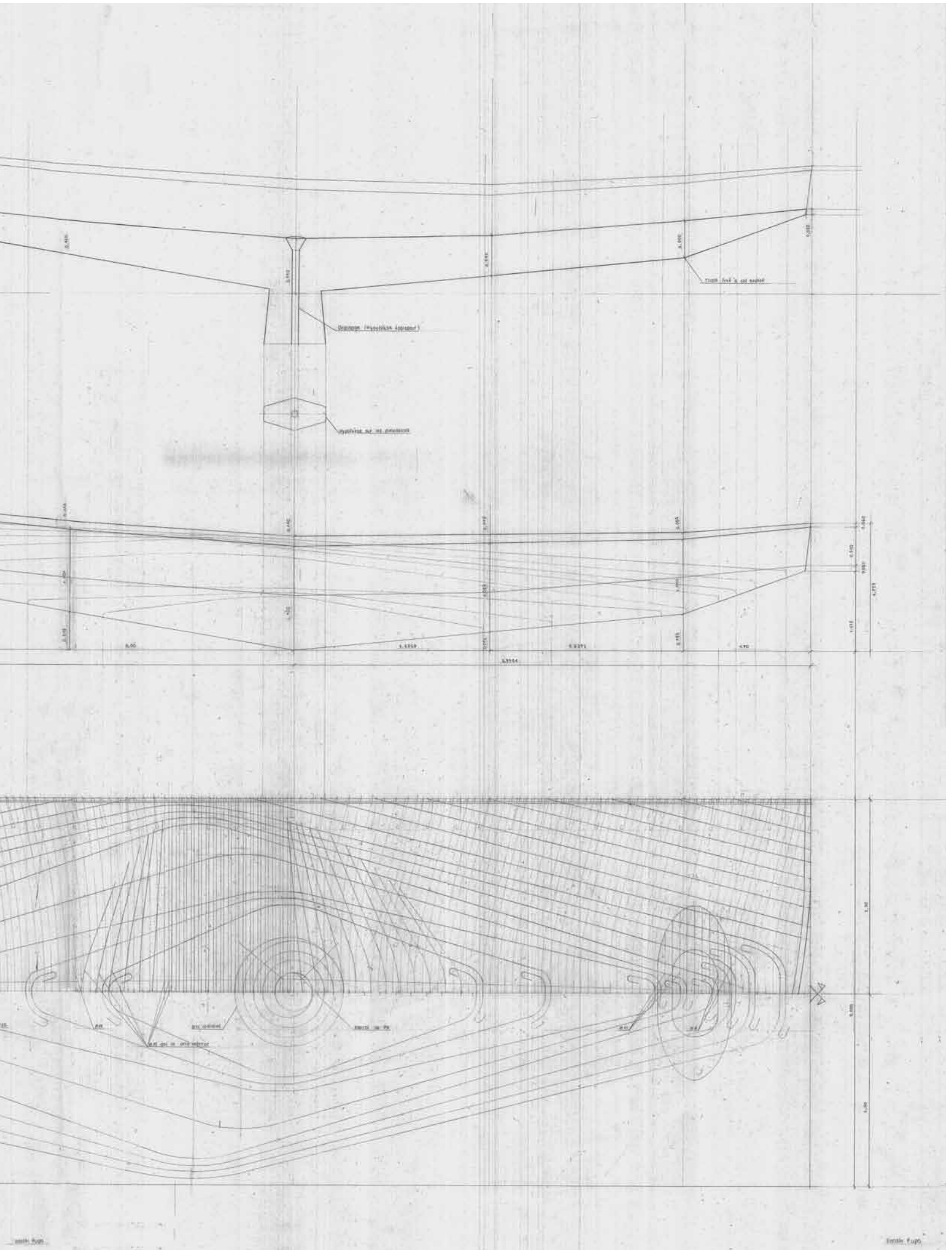


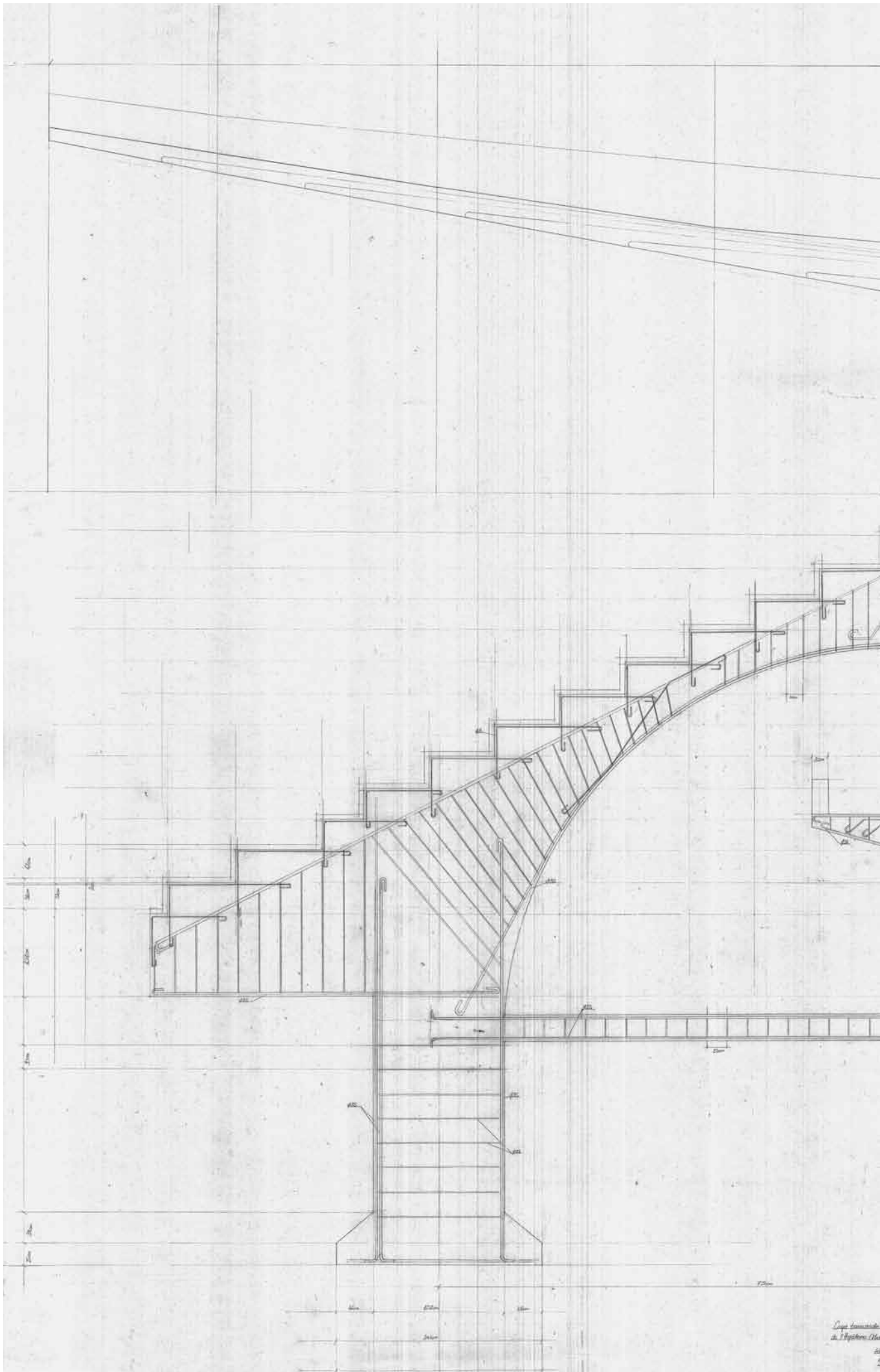


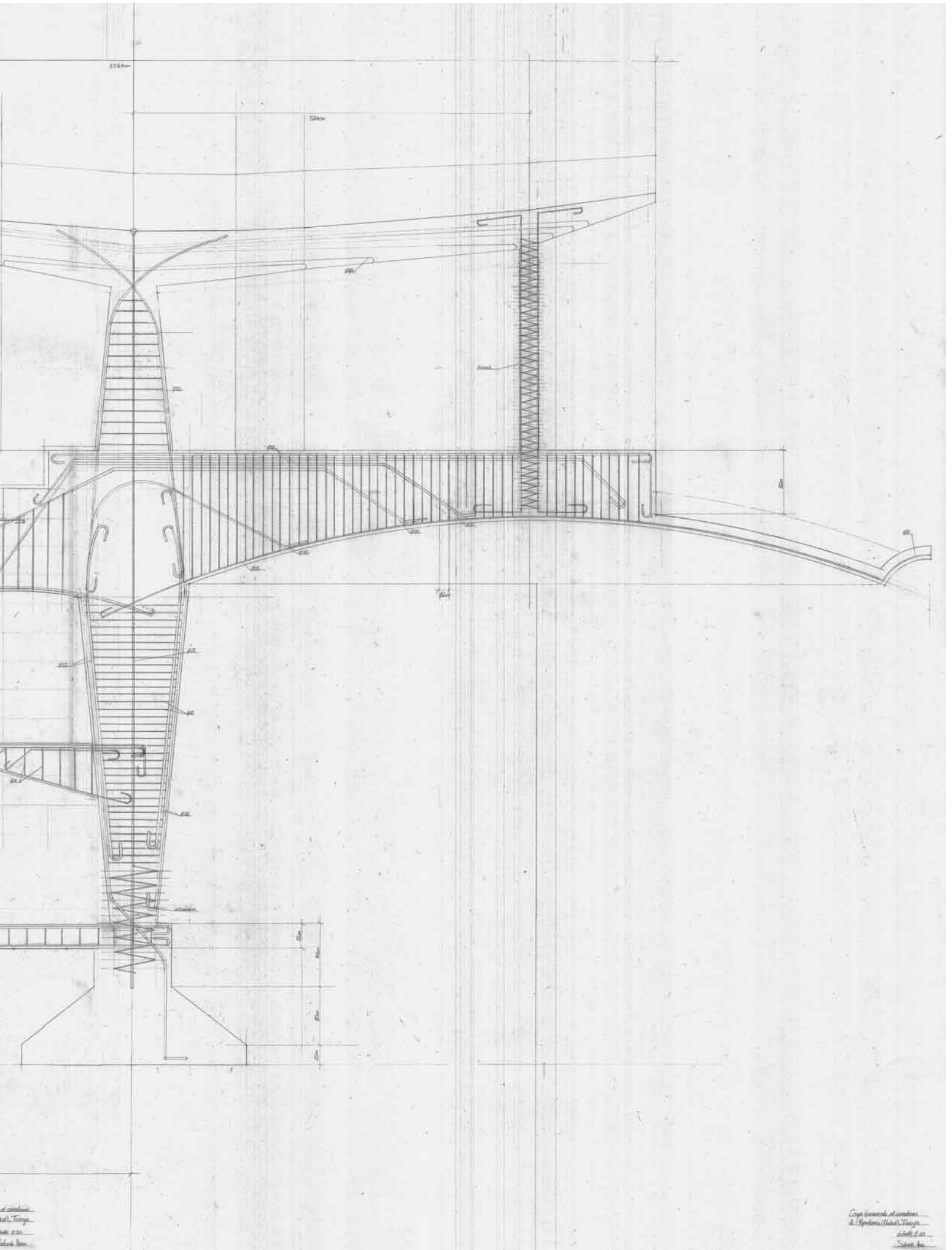


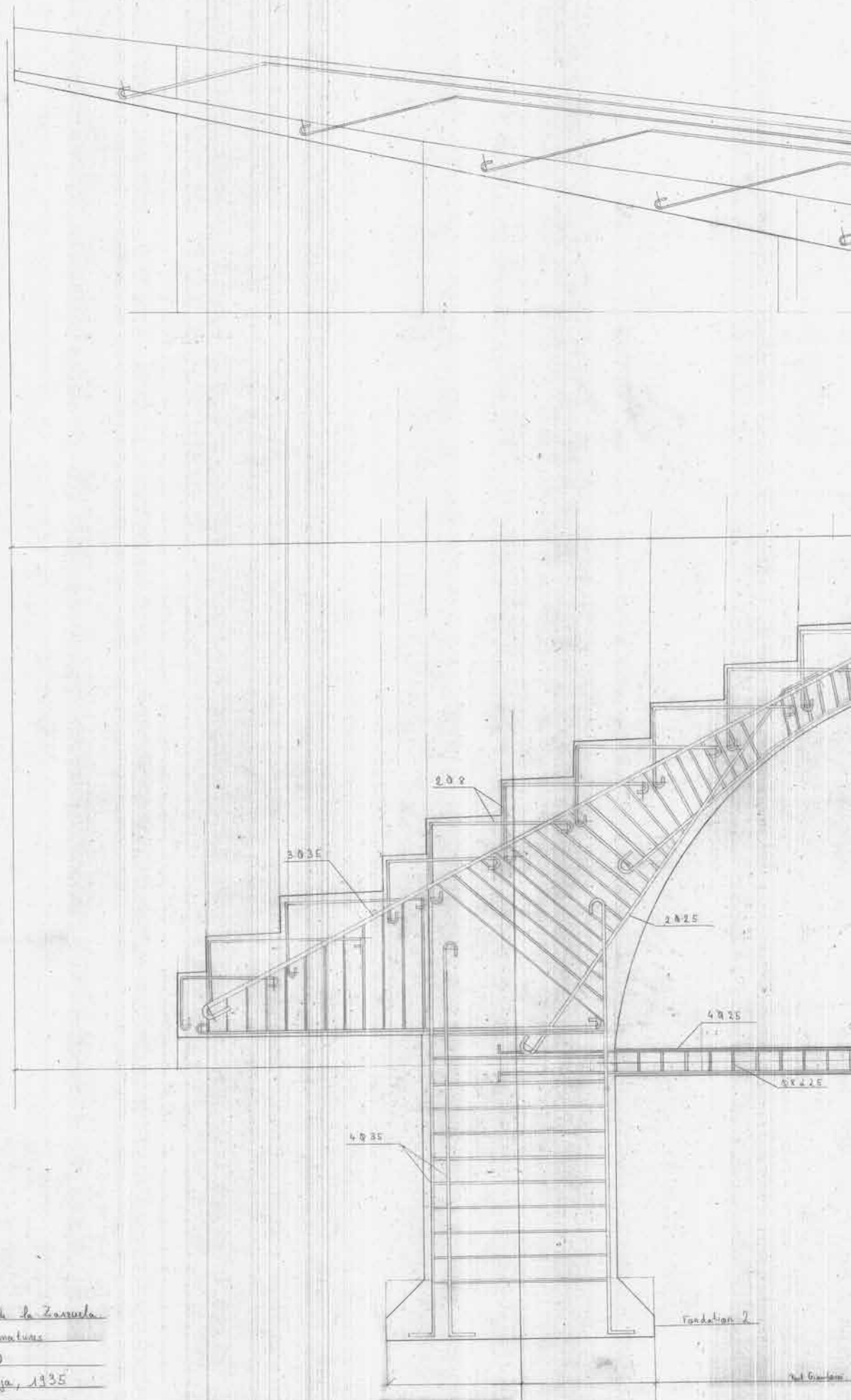
Reparto in la Veranda - Model
The Terrace Balcony in Madrid.
1:10



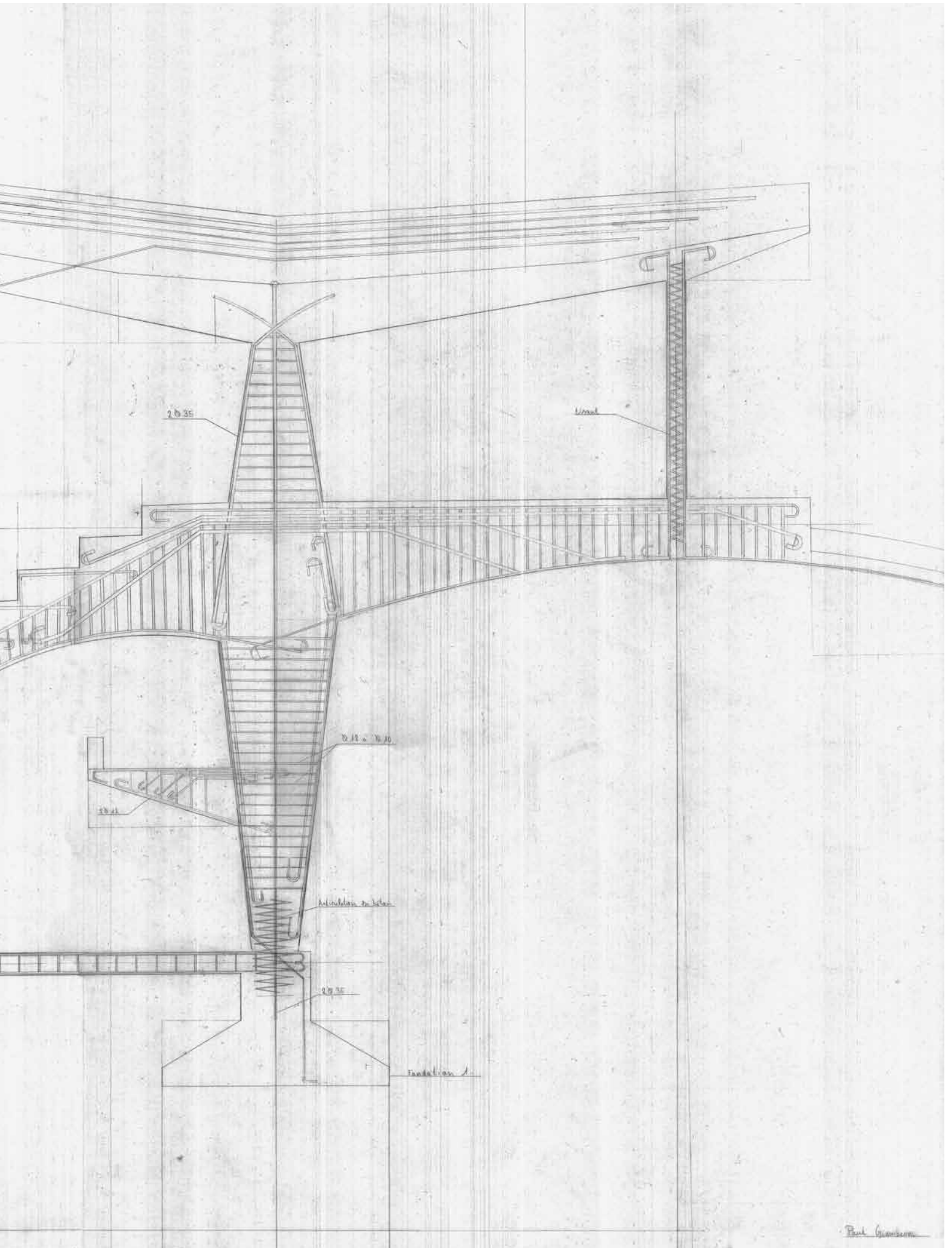


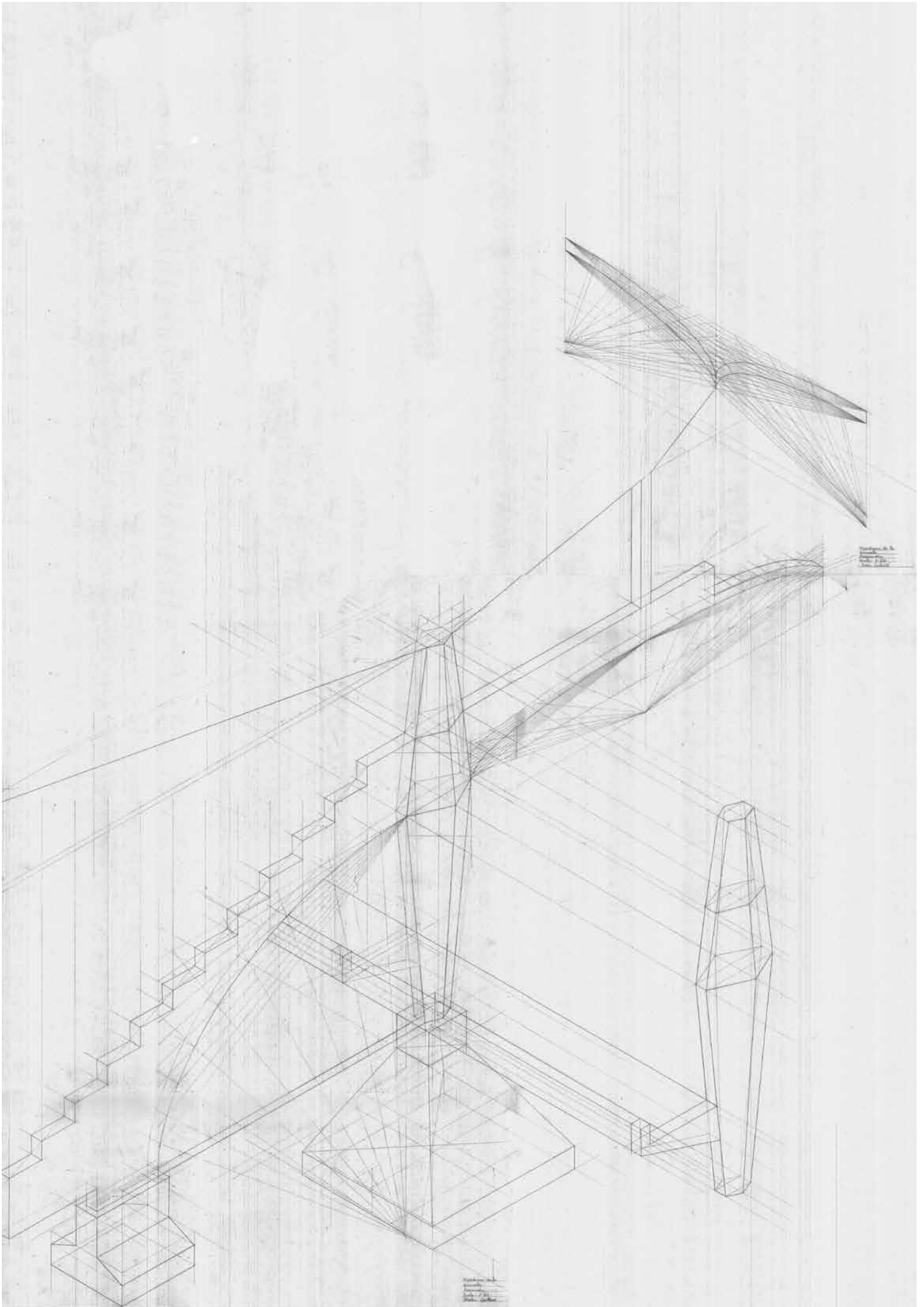






Hippocrate à la Zaccaria
 Coupe avec armatures
 Echelle 1:20
 Eduardo Torroja, 1935





DOCTA MANUS
DRAWING STRUCTURES #4

UE GC – EPFL

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