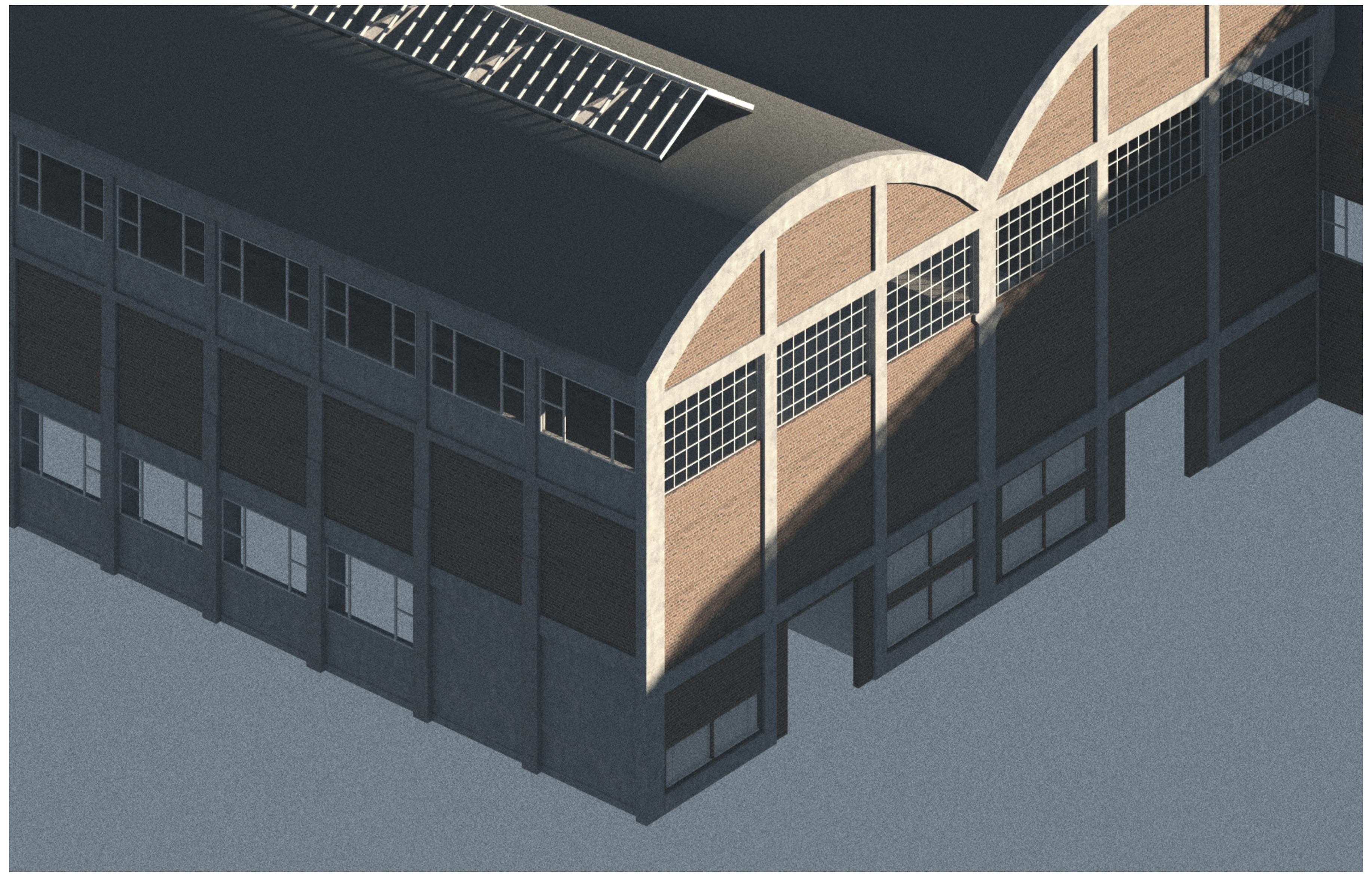
# Renew

## Urban Mining

Tor Anders Sudmeyer

The Oslo School of
Architecture and Design

*Autumn 2020*



*Gladengveien 8*
Illustrasjon by the author



# Contents


| *Page* | *Title* |
|---|---|
| 4 | Atlas of Reuse |
| 16 | Building Stock Analysis |
| 24 | Primary Structure |
| 26 | Arches |
| 28 | Horizontal Structure |
| 32 | Double T Element Schedule |
| 34 | Facade |
| 36 | Skylights |
| 38 | Reflections |

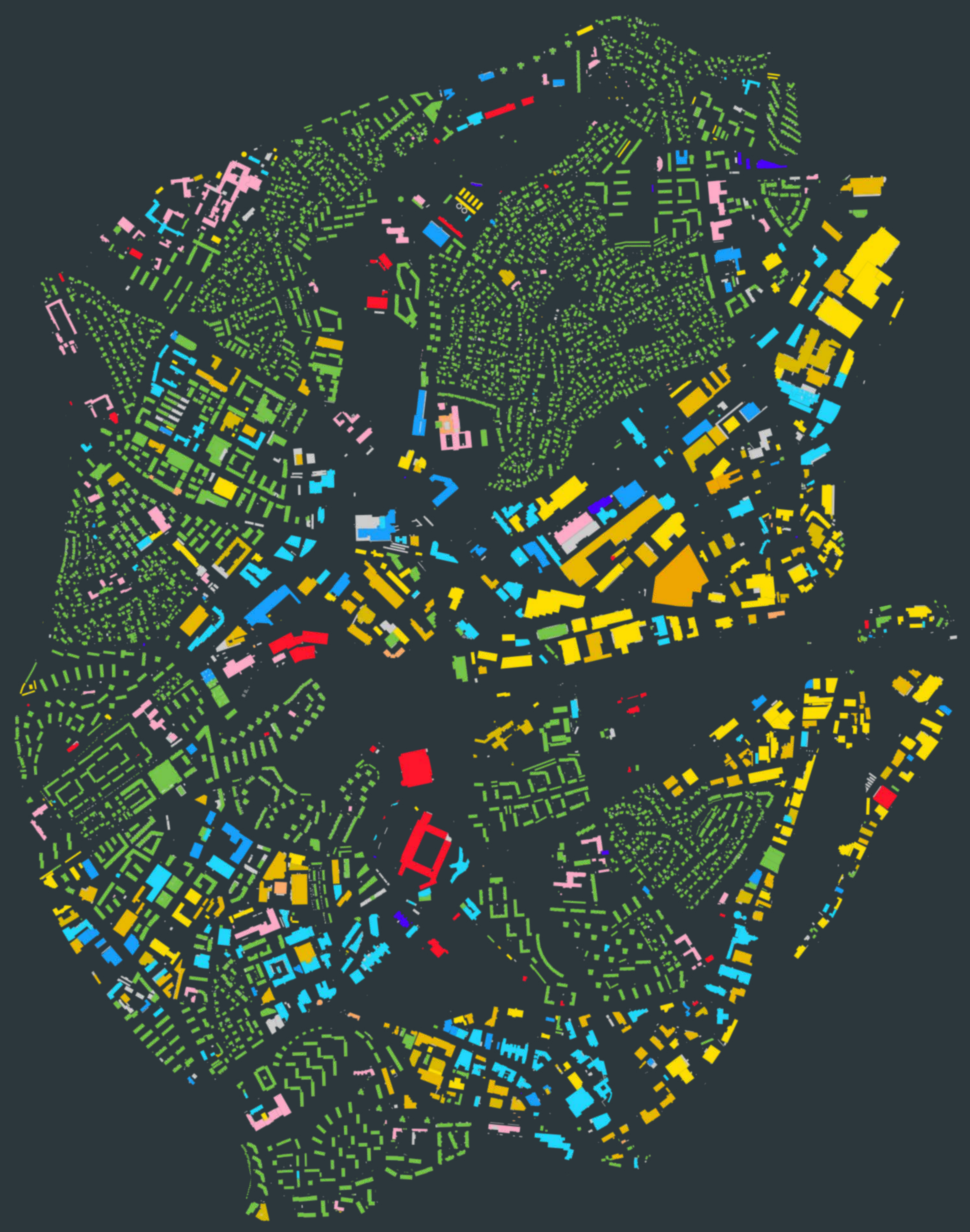
# Atlas of Reuse

When the urban fabric itself becomes the source, a repository of materials, the scouring of it for resources is akin to urban mining. This document is divided into two parts: an atlas of reuse, where Hovinbyen is analyzed in greater detail than the previous document; and a building stock analysis, where a building is dissected, its parts cataloged for their reuse potential in the main potential.

Although it also functions as a traditional understanding of the urban fabric, the atlas describes a method where reuse potential is identified. In that respect, it is intended as a tool for further work, a guide of sorts for locating reuse potential in other projects.

From the atlas, a building is chosen. The second part of this document, the building stock analysis, describes the process of investigating and understanding how that building is put together. From this, a material catalog is produced that is then put to (re)use in the main proposal.





01. *Hovinbyen, zoning*
Reproduced by author with GIS-data

*Zoning Atlas*

Hovinbyen consists of islands of residential, bulk-goods and industrial zoning separated by infrastructural barriers. The transformation of the area will involve clearing away the commerical and industrial building stock and replacing it with residential districts. Therefore, the majority of reuse potential lies in large-scale warehouses and factories.

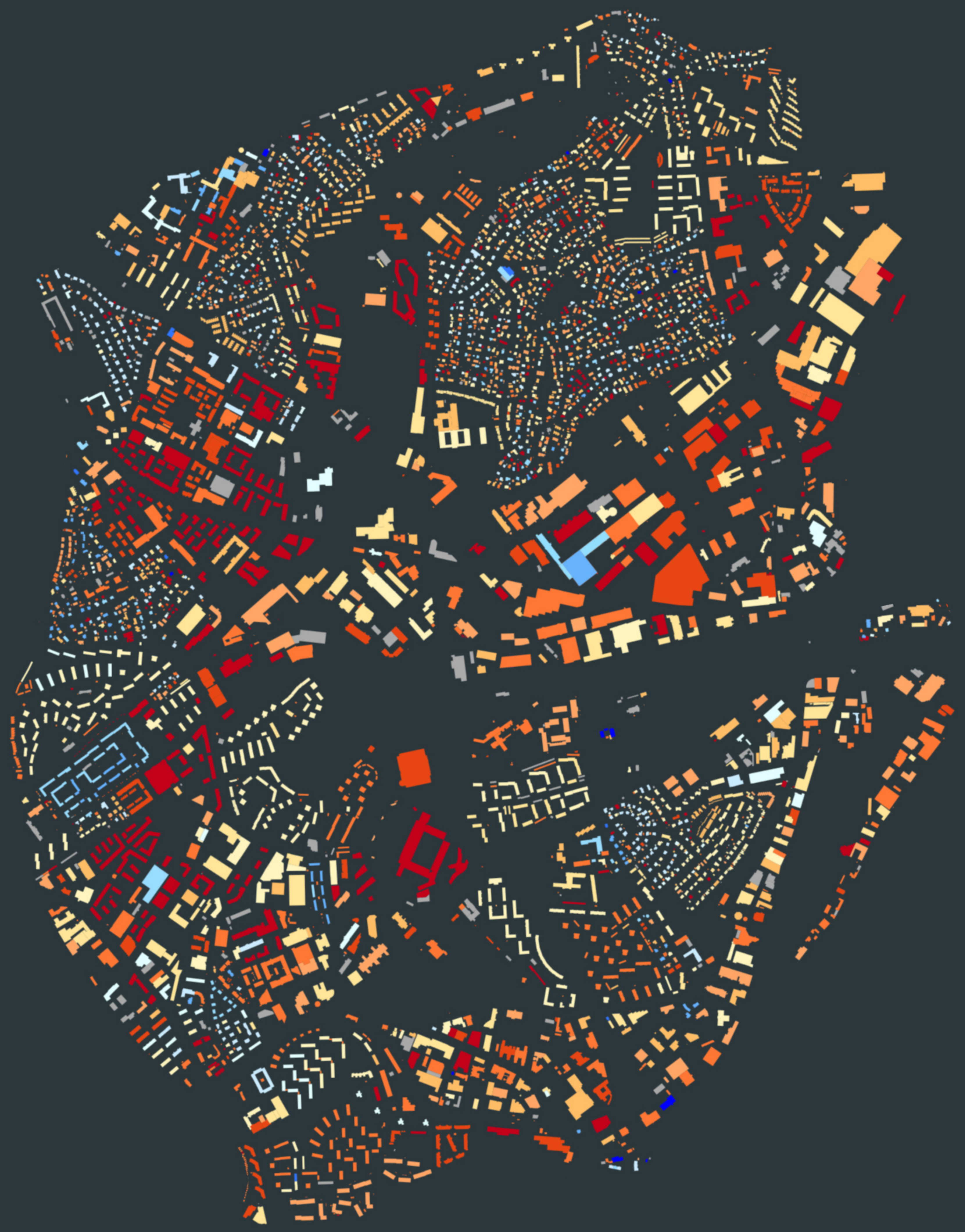
*Commercial*

*Residential*

*Industrial*

*Sport/Culture*

*Health/Education*

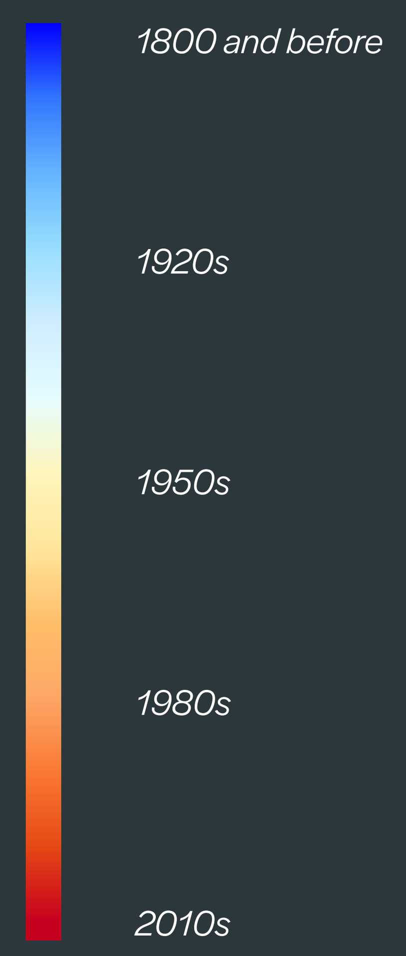


02. *Hovinbyen, build year*
Reproduced by author with GIS-data

*Building Year Atlas*

The industrial developments in inner city fringes tended to be built during the post-war period up to the late 80s and early90s, a trend seen also here in Hovinbyen. However, this is a generalization; outliers do exist. There are, for example, a few older factory buildings in Hovinbyen from earlier in the century. Many of the buildings built in the 2000s and onwards are new residential developments realized through the on-going transformation of the area.

Building age can also give an indication as to the material composition. For example, brick buildings built prior to the 1920s will in all likelihood have used lime mortar as opposed to a cement based mortar. These bricks are relatively easy to dismantle and clean, while cement mortars make the process all but impossible.



03. *Hovinbyen, development zones*
Reproduced by author with GIS-data and information from a various planning applications



*Development Atlas*

The map to the left illustrates the zones of development the Oslo Municipality has delineated. Individual plots have been emphasized by the author showing sites where the process has progressed to the point of concrete planning applications (as of Autumn 2020). As the planning process progresses, this atlas will be become outdated. However, within the scope of this project, it points in the direction of building stock that is likely to be made available through demolition in the near future.

04. *Hovinbyen, overlap*
Reproduced by author with GIS-data



*Overlap Atlas*

Illustrated on the opposing page are the buildings overlapping with the development sites previously shown. Here, they are color coded by zone type. This selection provides the foundation for the choice of building for futher anaylsis, aided by the information from the previous atlases.

*Commercial*

*Residential*

*Industrial*

# Building Stock Analysis

*Gladengveien 8*

Located in the southeastern portion of Hovinbyen, in a district known at Ensjø, is the large warehouse building at Glandengveien 8. It has been commonly referred to as the Old Steelworks despite never actually having had that function. In the early 20th century, there was an initiative driven by the government to make Norway self-sustaining in steel production. One of the culminations of this drive was the establishment of a steelworks in Oslo, a building that was at one point the largest in the country. It was constructed between 1917-1921. However, by the time it was built, WW1 had ended and the economy faltered. Demand for steel plummeted and the original purpose for the building never came to be.

Since that time, the building had varying use as a warehouse and industry, home to many different kinds of businesses. Notably, it was used as a garage and car service center from about the middle of century when the rest of the local district Ensjø became a hub for vehicle businesses, becoming known as “Car City”. To this day, the building functions as a car service center and warehouse.

As an object of reuse, the building has many promising properties for such an old structure, covered in more detail over the next few pages. At first glance, the arched roof is perhaps most notable. This is a construction that was common in many of Hovinbyens industrial buildings from the last half of the 20th century, but a motif that is in danger of disappearing altogether as these structures are cleared away. Therefore, the arch is considered to be an important carrier of a past industrial identity. Additionaly, there is a large amount of brick in the facade. As this was laid prior to the general adoption of cement mortar, this brickwork is considered to have high reuse potential.

1921
BUILT

Designer: Christiani & Nielsen
Jernbetongkonstruksjoner
As-built Area: approx. 10 000m²

1961
USE CHANGE

First official permit application for use change from warehouse to car service center. A new concrete floor, designed in car garage style, is added to one of the halls.

1978
NEW FLOOR

The second renovation to accommodate vehicles. A pre-fab concrete floor is added to two halls.

2007
NEW ZONING PLAN

Site and surroundings rezoned from industry to residential.

2020
A CHANGING CONTEXT

Surrounding area has largely been transformed to apartment blocks. Design work for new apartments on-site has begun and the building is marked for demolition.

202x
LIFE AFTER DEATH

Through a process of selective deconstruction, the building is salvaged and elements live on in new projects.



05. *Hovinbyen, Gladengveien 8 emphasized.*
Reproduced by the author with GIS-data.

06. *A changing context, Gladengveien 8 in 1937. It is unclear from the documentation history what use the building had at this point, although the aerial photography suggests little if any at all.*

Photography: Unknown, likely Oslo Municipality
Retrieved from Finn Kart historical map archive.

07. *A changing context, Gladengveien 8 in 1956. The immediate surroundings, Ensjø district, industrialize during the post-war period.*

Photography: Unknown, likely Oslo Municipality
Retrieved from Finn Kart historical map archive.

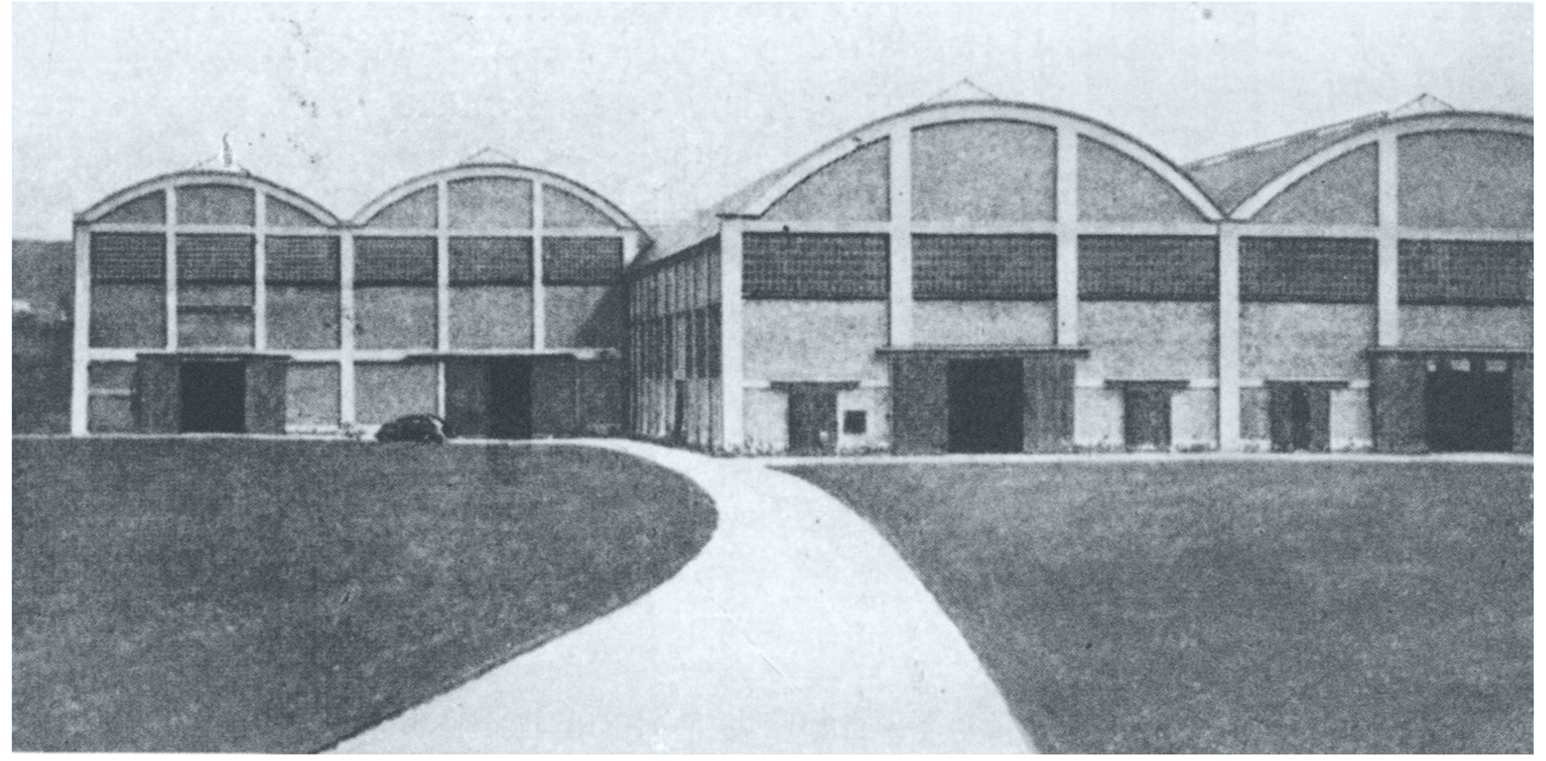
08. *A changing context, Gladengveien 8 in 1984. Ensjø industrializes further and it appears the area lives up to its moniker "Car City".*

Photography: Unknown, likely Oslo Municipality
Retrieved from Finn Kart historical map archive.



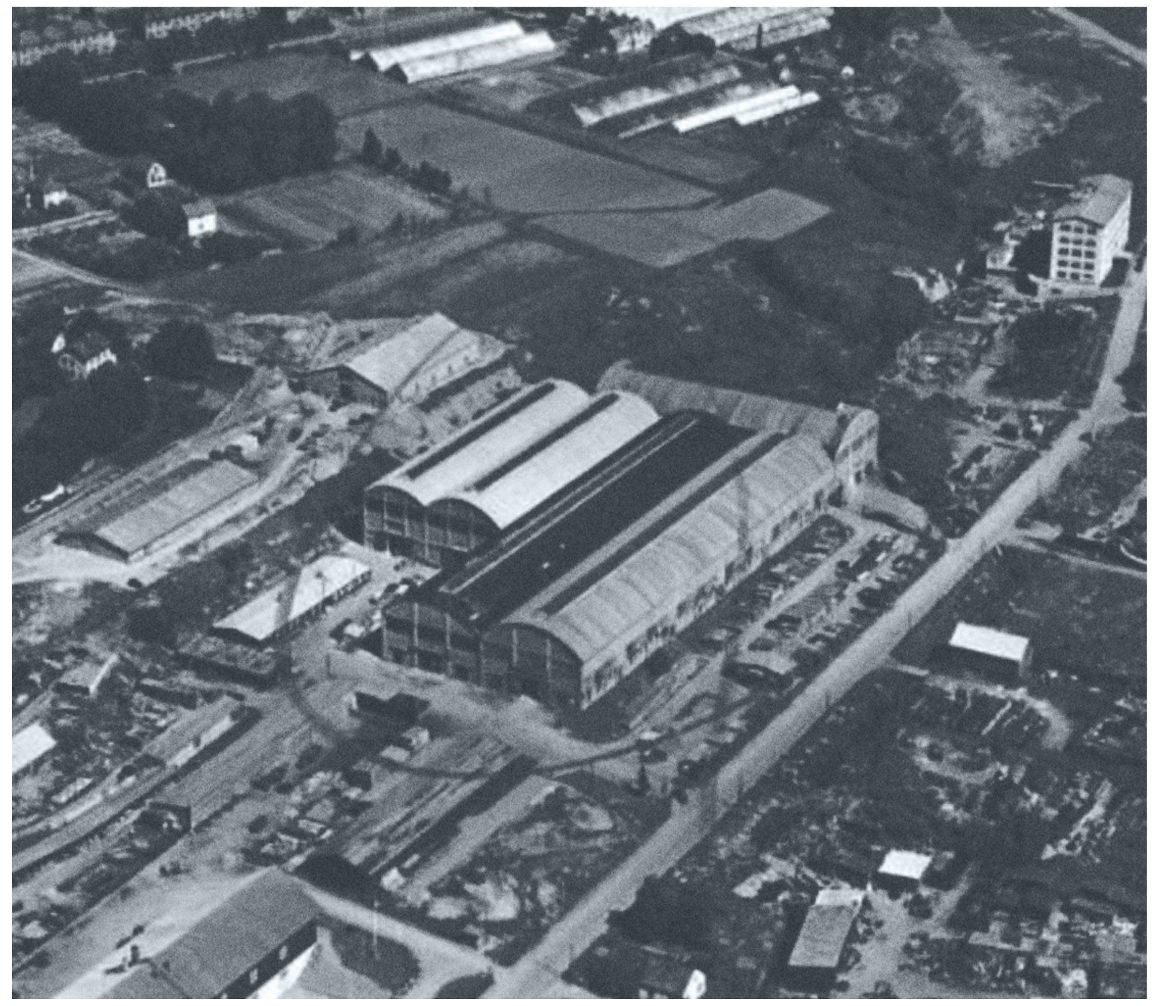
09. *A changing context, Gladengveien 8 in 2020. Two of the five halls have been removed, although it is unclear exactly when. Ensjø along with the rest of Hovinbyen shifts away from the industrial past. Apartment blocks are clearly visible here, changing the urban fabric. Most if not all of the remaining industrial buildings will be gone in the next 10-20 years.*

Photography: Oslo Municipality
Retrieved from Finn Kart historical map archive.


10.


11.


12.


13.

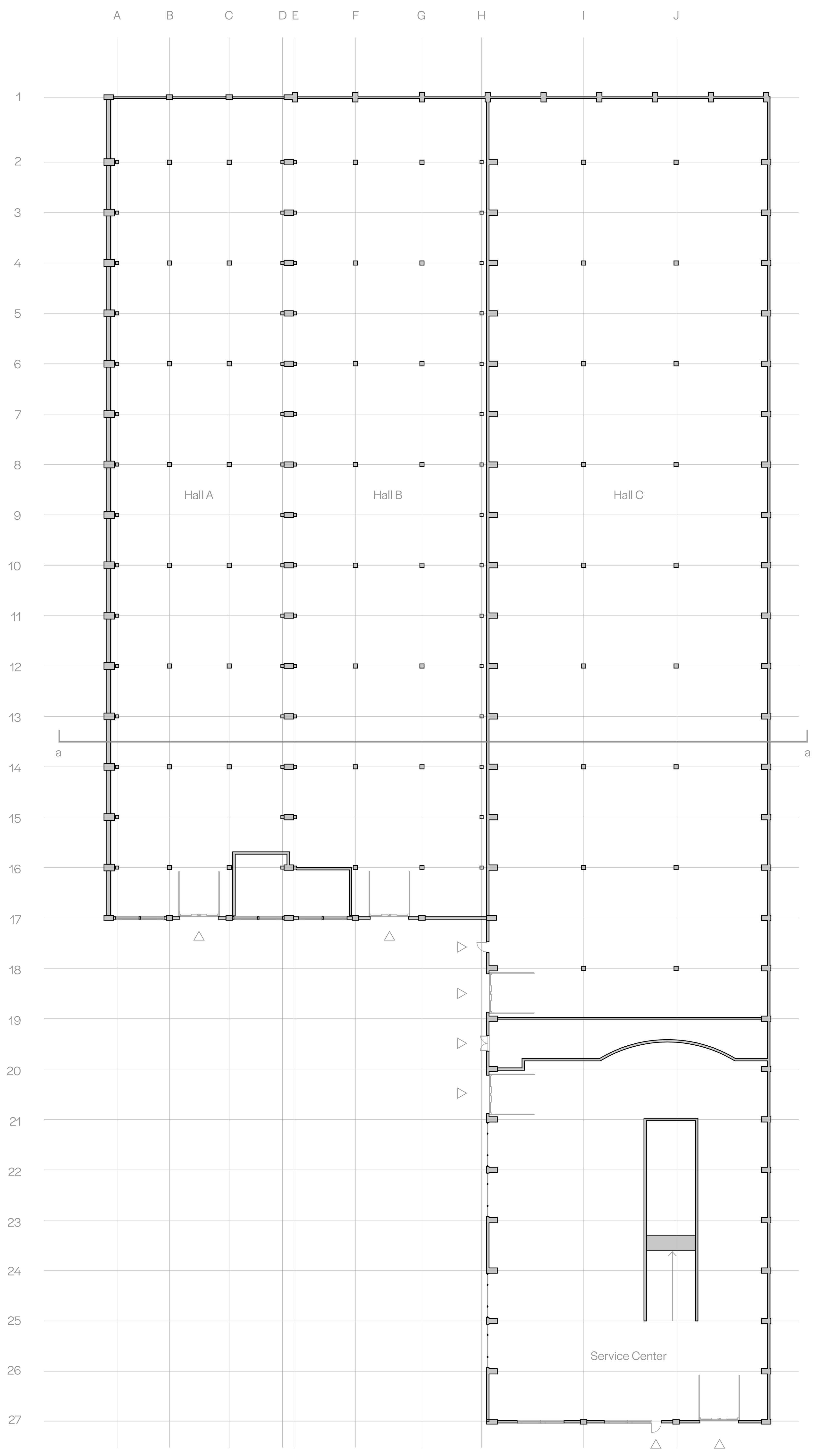
10. *Gladengveien 8.*
Photograhy: Kampens lagerhaller. 1955.

11. *Gladengveien 8, aerial photography.*
Photography: Gule sider kart. 2011.



12. *Gladengveien 8, facade hall A and B.*
Photograhy: Distribusjonspartner AS. 2017.

13. *Gladengveien 8, aerial photography.*
Photography: Widerøes flyveselskap. 1952.

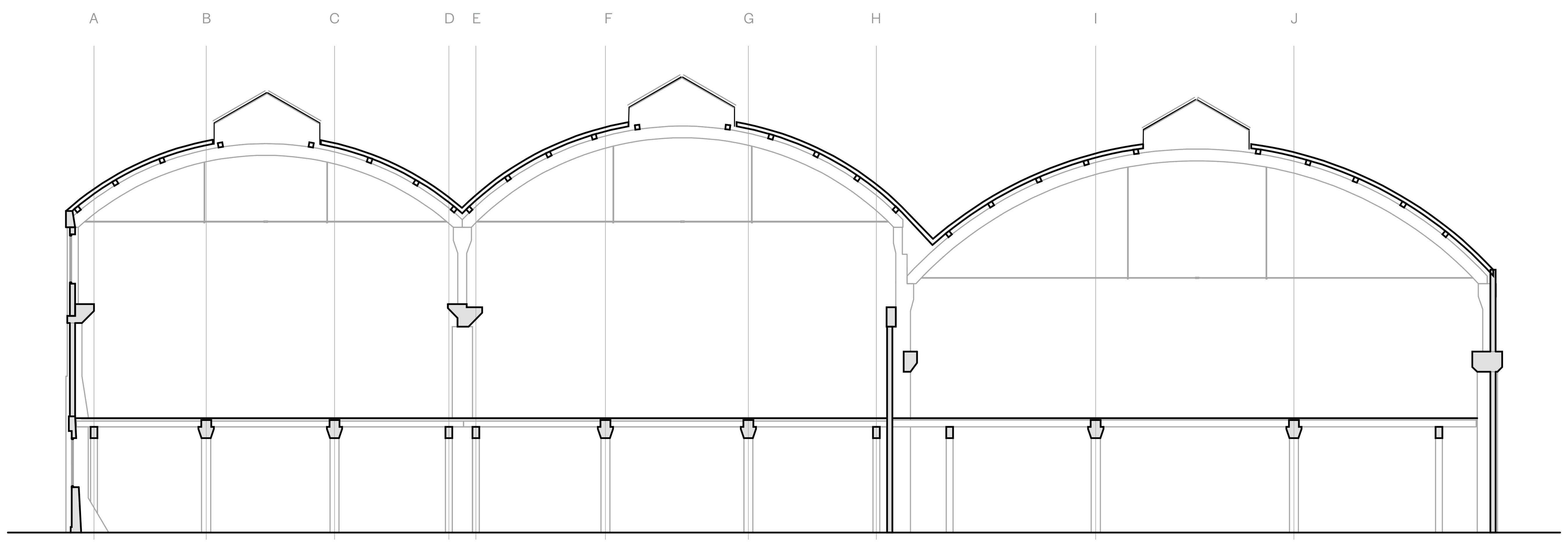



*Gladengveien 8, ground floor.*

Reproduced by the author from original documentation.

10m






*Gladengveien 8, section a-a*

Reproduced by the author from original documentation.

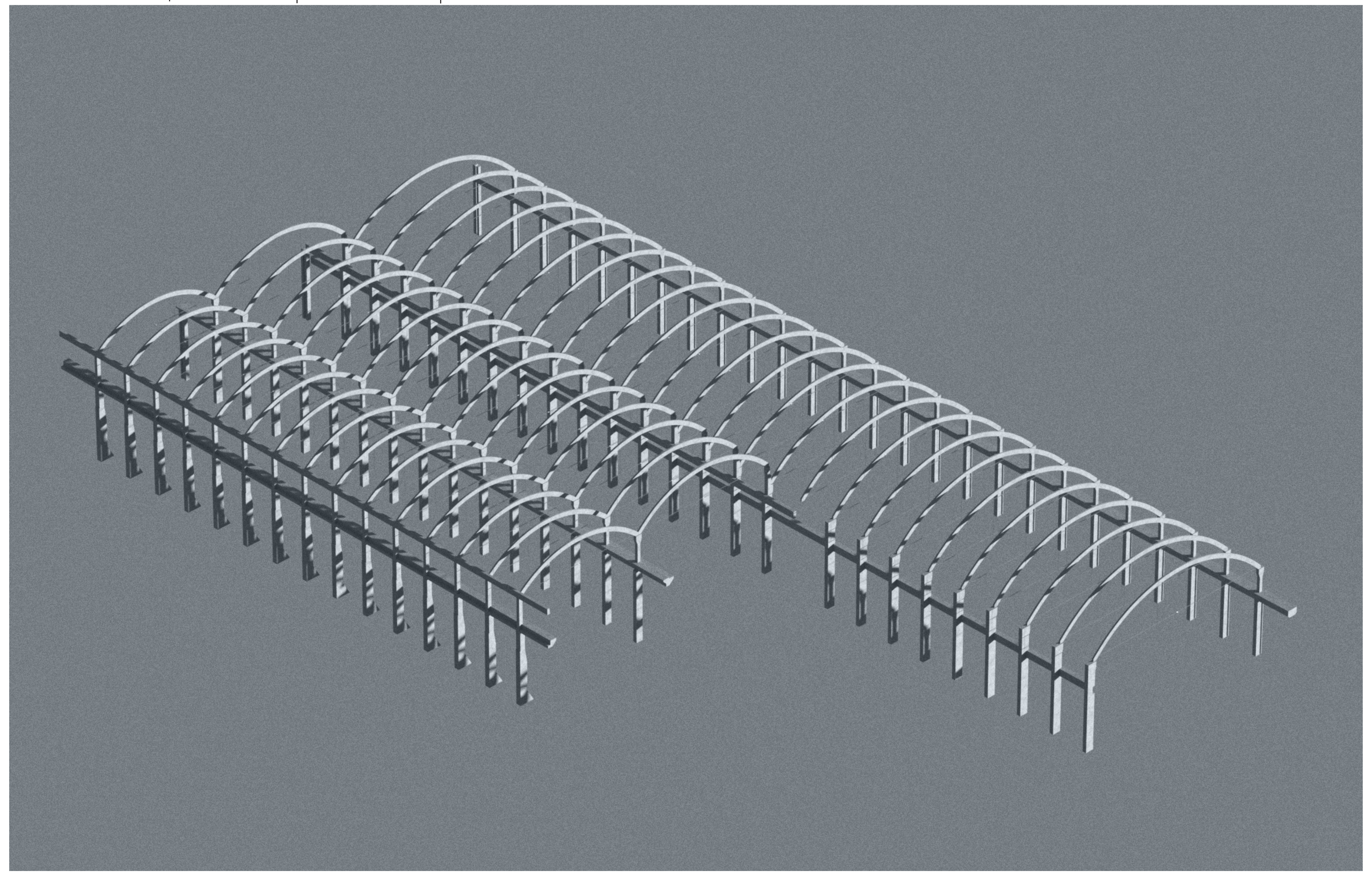
10m

*Primary Structure*

The primary structure is original from 1921 and consists of 4,8m bays. Cast in-situ columns with irregular profiles carry both the roof arches and beams for overhead cranes. As the building never functioned as a steelworks, and therefore was never outfitted with particulary heavy machinery, it is unclear whether overhead cranes were ever installed. These beams appear to also serve a stablizing function. Columns along facades are exposed to the exterior.

Reinforcement is shared between the columns and beams. Furthermore, columns are cast directly into the foundations. Due to the compound nature of the columns, beams and foundations, it is unlikely they can be selectively deconstructed and reused elsewhere. Crushing and recycling of the aggregate is a viable alternative.

Arch A
Arch B
Arch C





Crane beam

Column

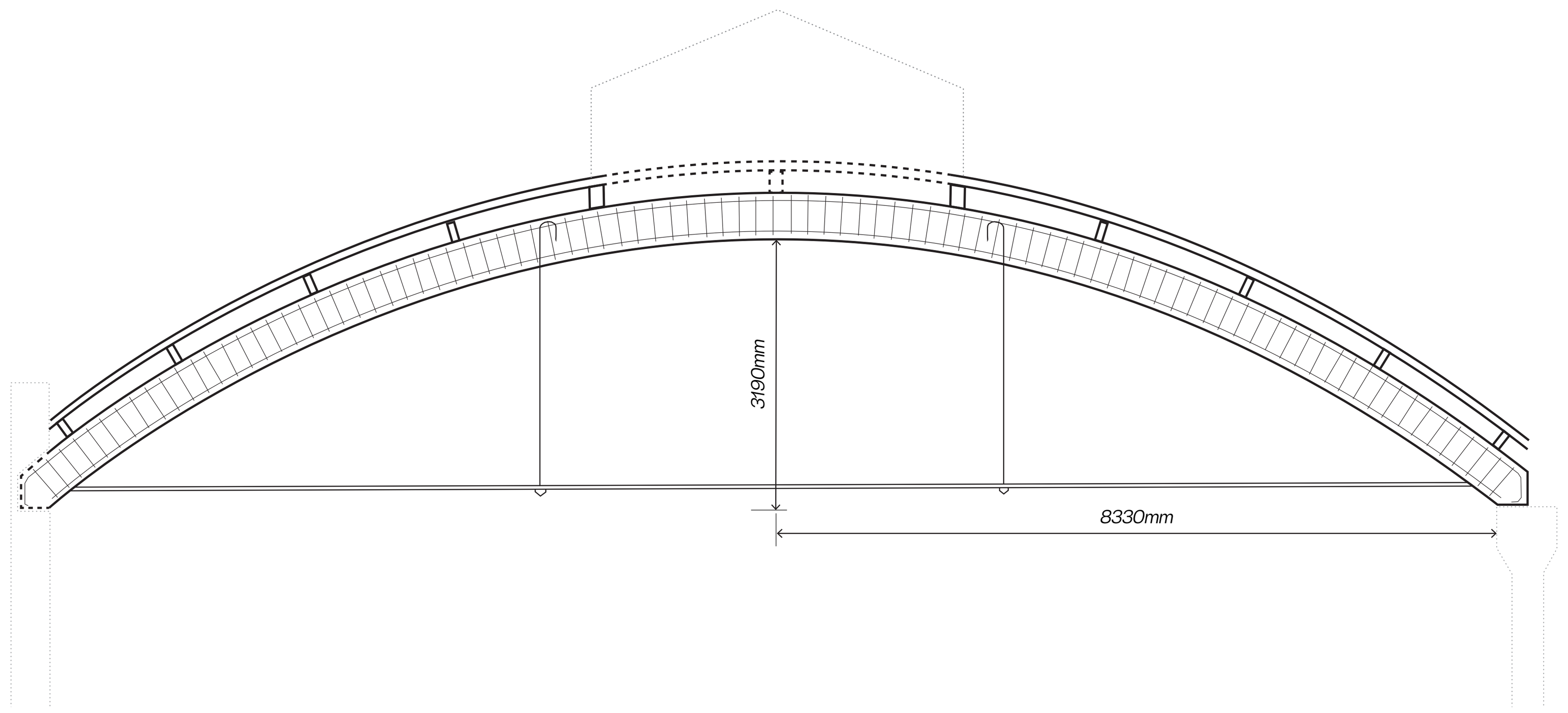
All images reproduced by the author from original documentation.

## Arches

Hall A, B and C are roofed by concrete arches, which span ~17m, ~19m and ~25m respectively. The connection arch-column is notably demountable. Angle irons cast into the column head join to the arch with bolts. Even though tension rods are cast directly into the arch in the vicinity, they are not structurally compound with the bolt connection and demounting should produce a functional element. Furthermore, the documentation describes the arches as having been "brought" to the site, indicating they were prefabricated and at one time mobile. There is, therefore, a high reuse potential, although the size and weight of the arches presents a logistics challenge.

Atop the arches is a relatively simple secondary construction in wood, which supports the sealant layers. Additionaly, there is a skylight construction that runs almost the length (-1 axis at each end) of each roof.

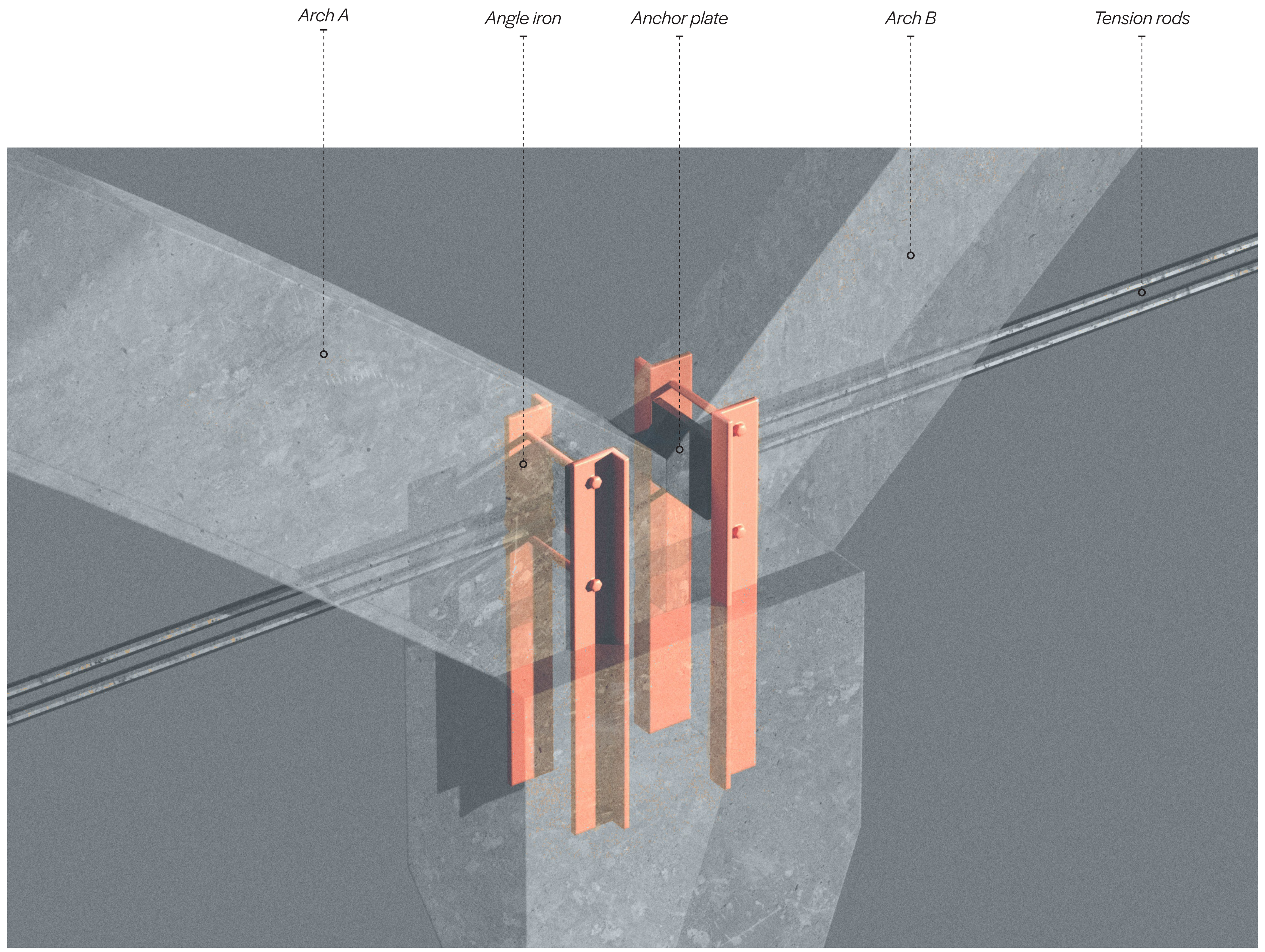
| *Element* | *Qty* | *Unit* | *Year* | *Comments* |
| --- | --- | --- | --- | --- |
| Arch A<br>522x200mm (section) | 15 | pcs | 1920 | 3,2x17m<br>Height from underside of arch to center of anchor point datum<br>Span relative to anchor points |
| Arch B<br>550x200mm (section) | 15 | pcs | 1920 | 4,0x19m<br>Height from underside of arch to center of anchor point datum<br>Span relative to anchor points |
| Arch C<br>550x200mm (section) | 15 | pcs | 1920 | 5,5x25m<br>Height from underside of arch to center of anchor point datum<br>Span relative to anchor points |

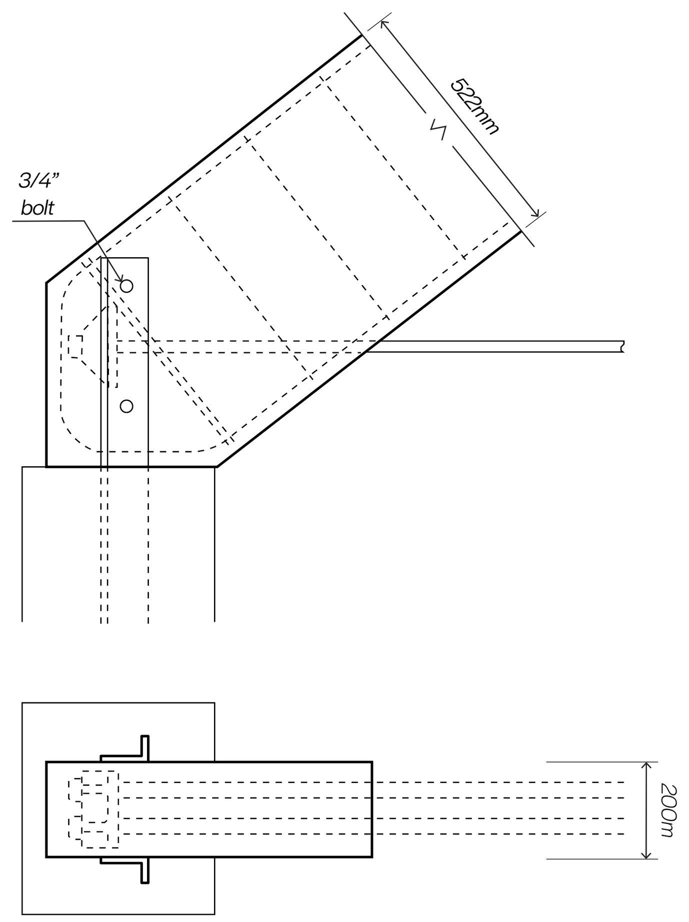



*Arch A*

Reproduced by the author from original documentation.






*Above: joint arch-column where Arch A and B meet*

*Left: typical joint arch-column*

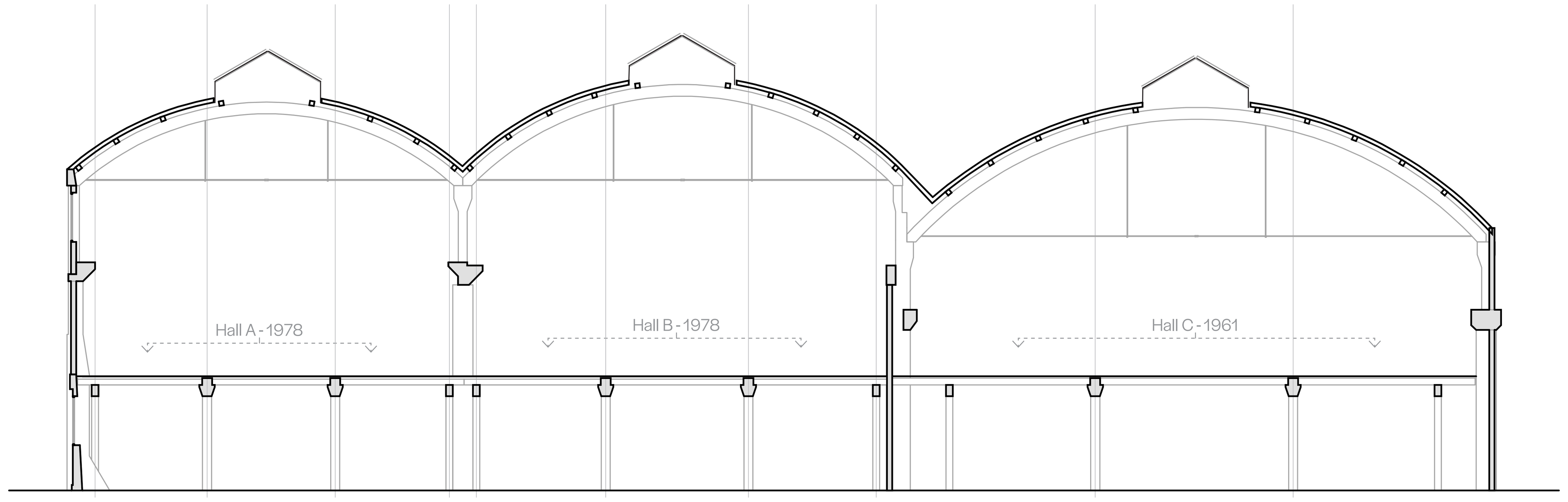
Reproduced by the author from original documentation.

*Horizontal Structure*

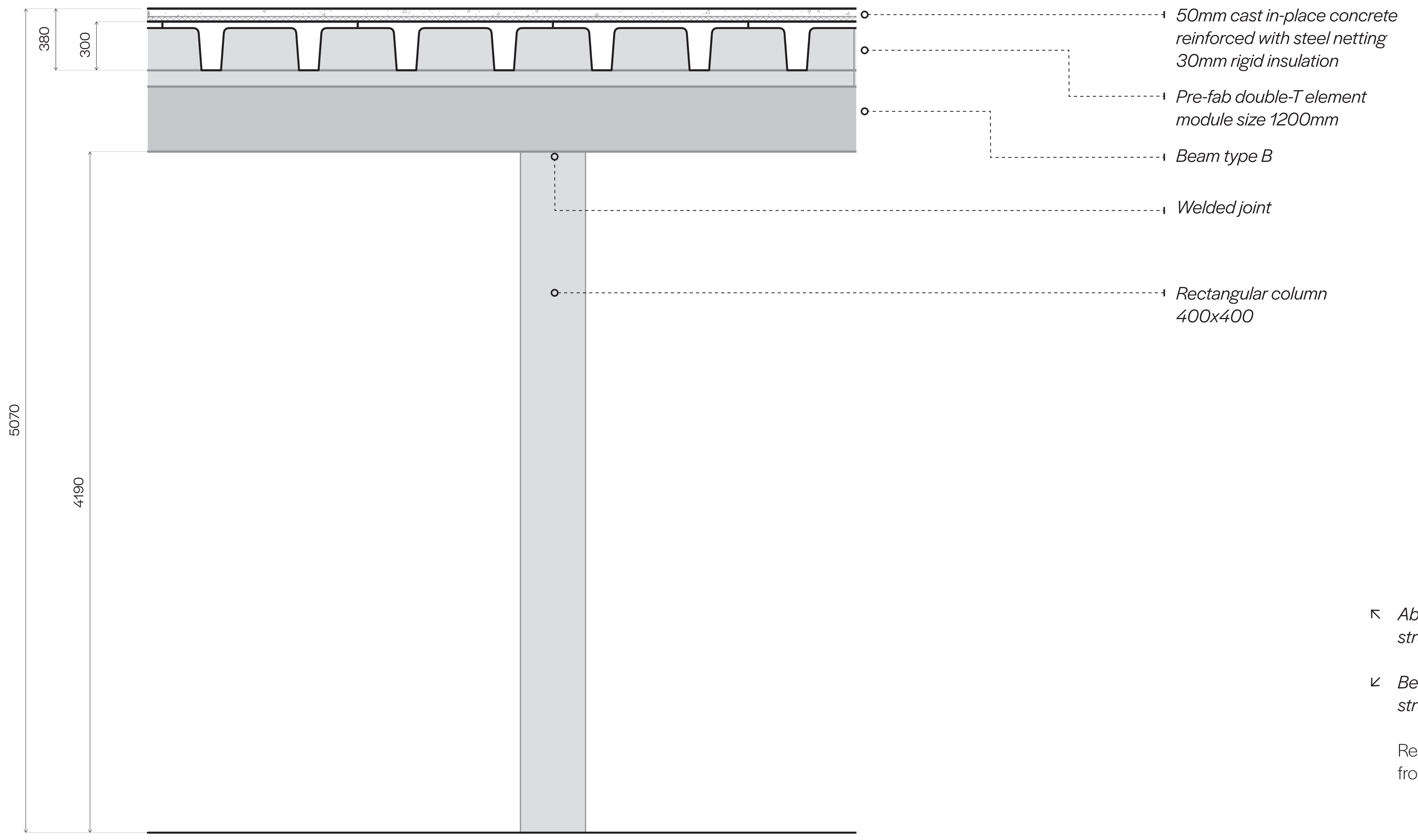
New flooring was added to Gladengveien 8 in 1961 and 1978. Despite the 17 year gap, these renovations are very similar in their design. Both make use of a beam and column structure (separate from the primary structure), which carries double-T floor elements. All elements used in this construction are prefabricated. However, their reuse potential is not a given; the deciding factor usually lies in how elements are joined together and feasibility of separation whilst still maintaining a functional piece afterwards.

Hall C was outfitted with a new floor in 1961. According to original documentation, columns are cast directly into both foundations and beams, forming a compound structure. The double-T elements in the floor have a rough, unfinished top surface on to which 50mm of reinforced concrete was poured, forming a single structural unit. These kinds of compound joins make reuse difficult, especially in the case of the screed atop the floor elements. Going forward, the elements in Hall C are not considered viable for reuse.

Hall A and B differ in a few key ways. The double-T elements in the floor are topped with rigid insulation followed by concrete screed. Removal of the top layers is far less troublesome in relation to Hall C, at least with respect to extracting functional floor elements. The beam-column joint is welded as a opposed to cast. Although this is still a compound join, there is no sharing of rebar and the weld can be removed without affecting the structural properties of the element. This indicates that the pre-fab beams are well-suited for a reuse. The columns, however, are cast directly into foundations, making separation difficult and therefore not as suitable for reuse.



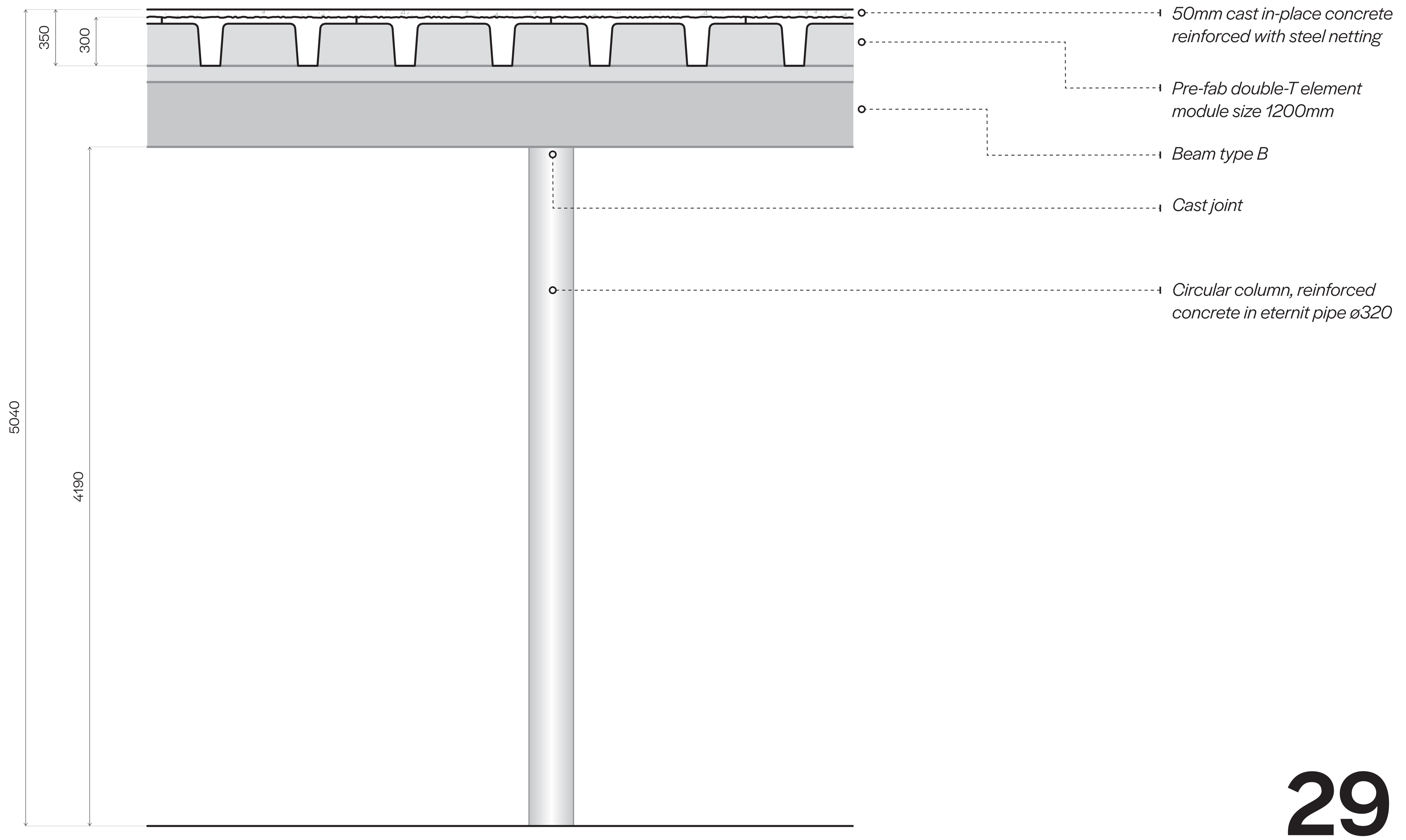


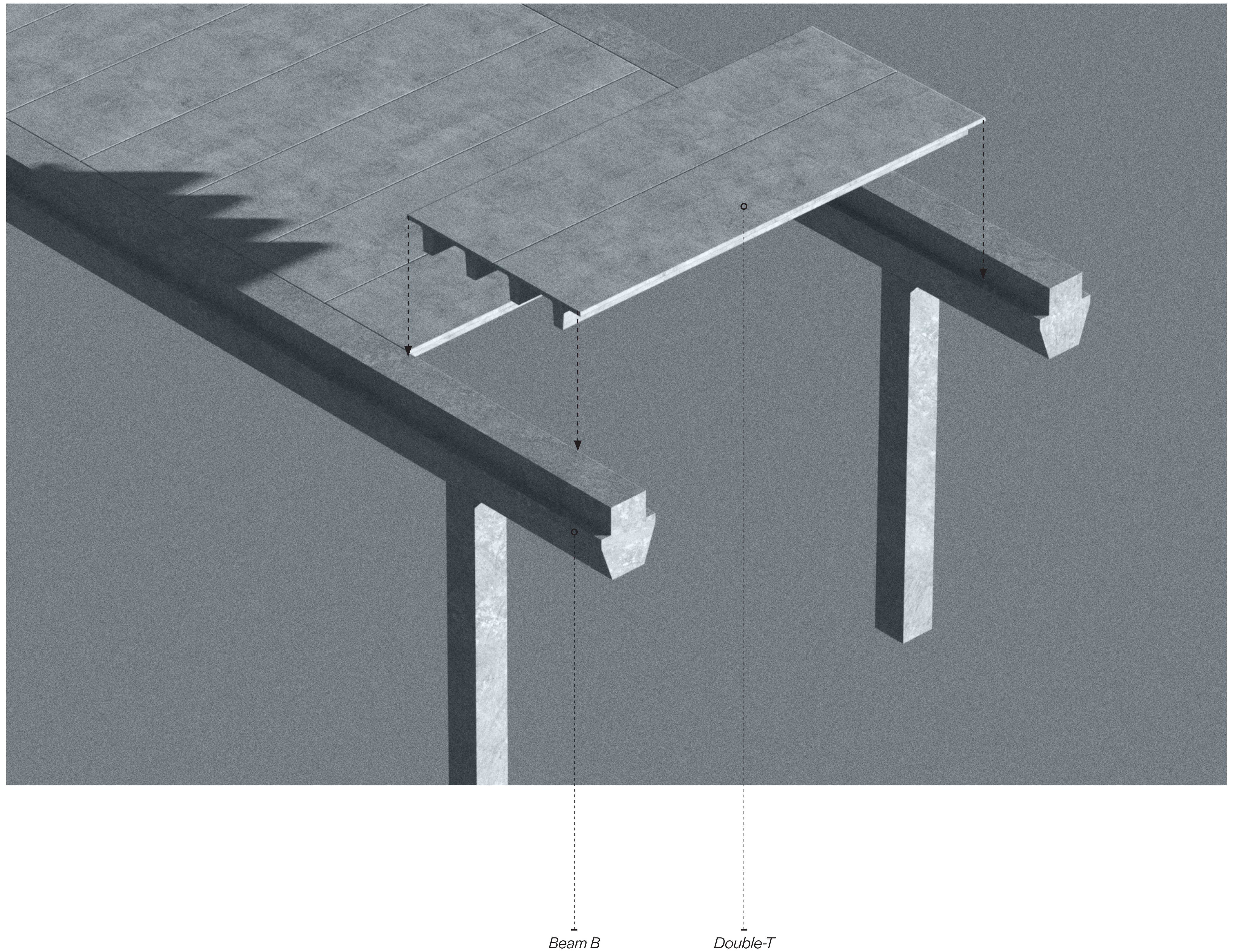




↖ Above: section horizontal structure from 1978

↙ Below: section horizontal structure 1961

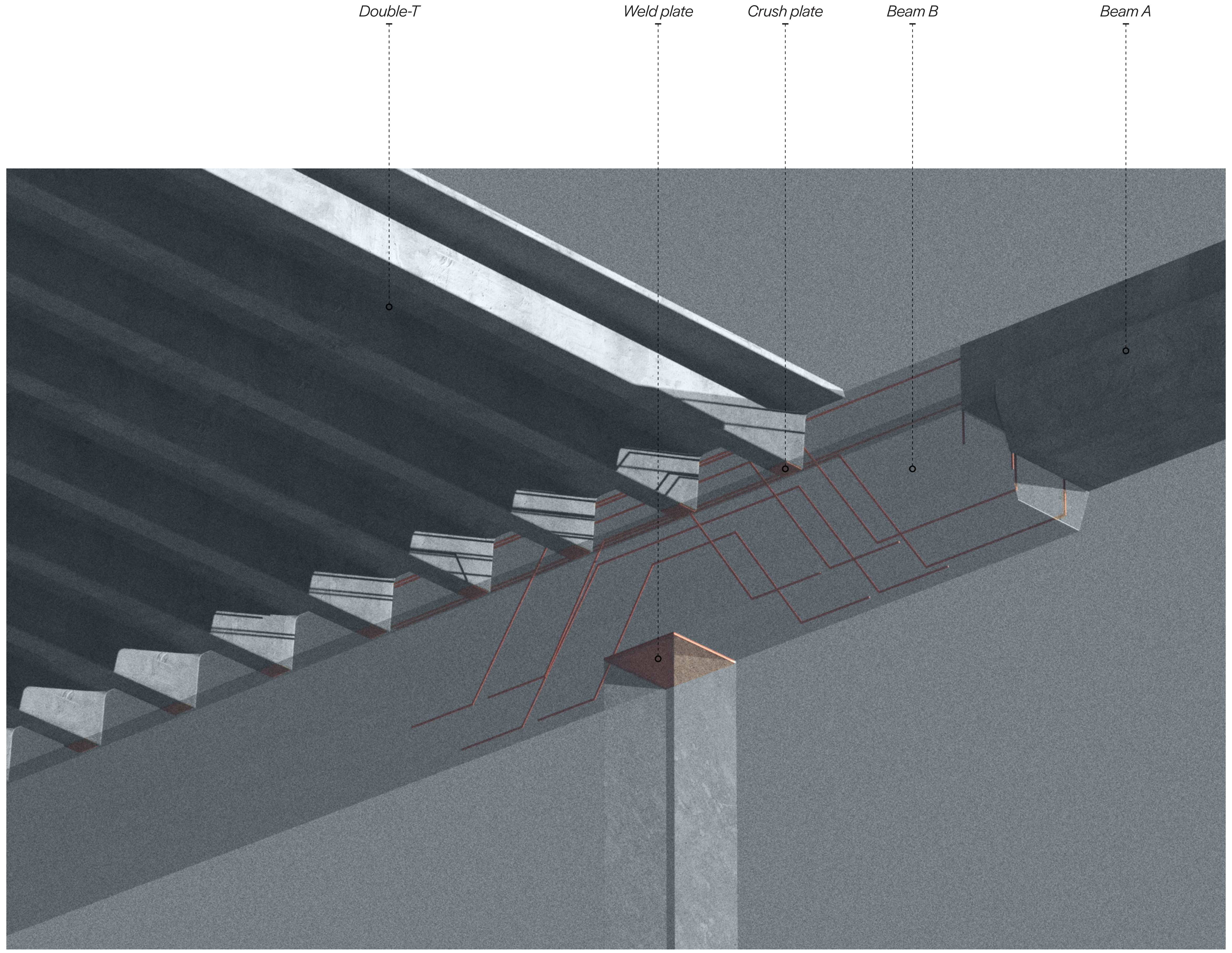
Reproduced by the author from original documentation.





Beam B
Double-T

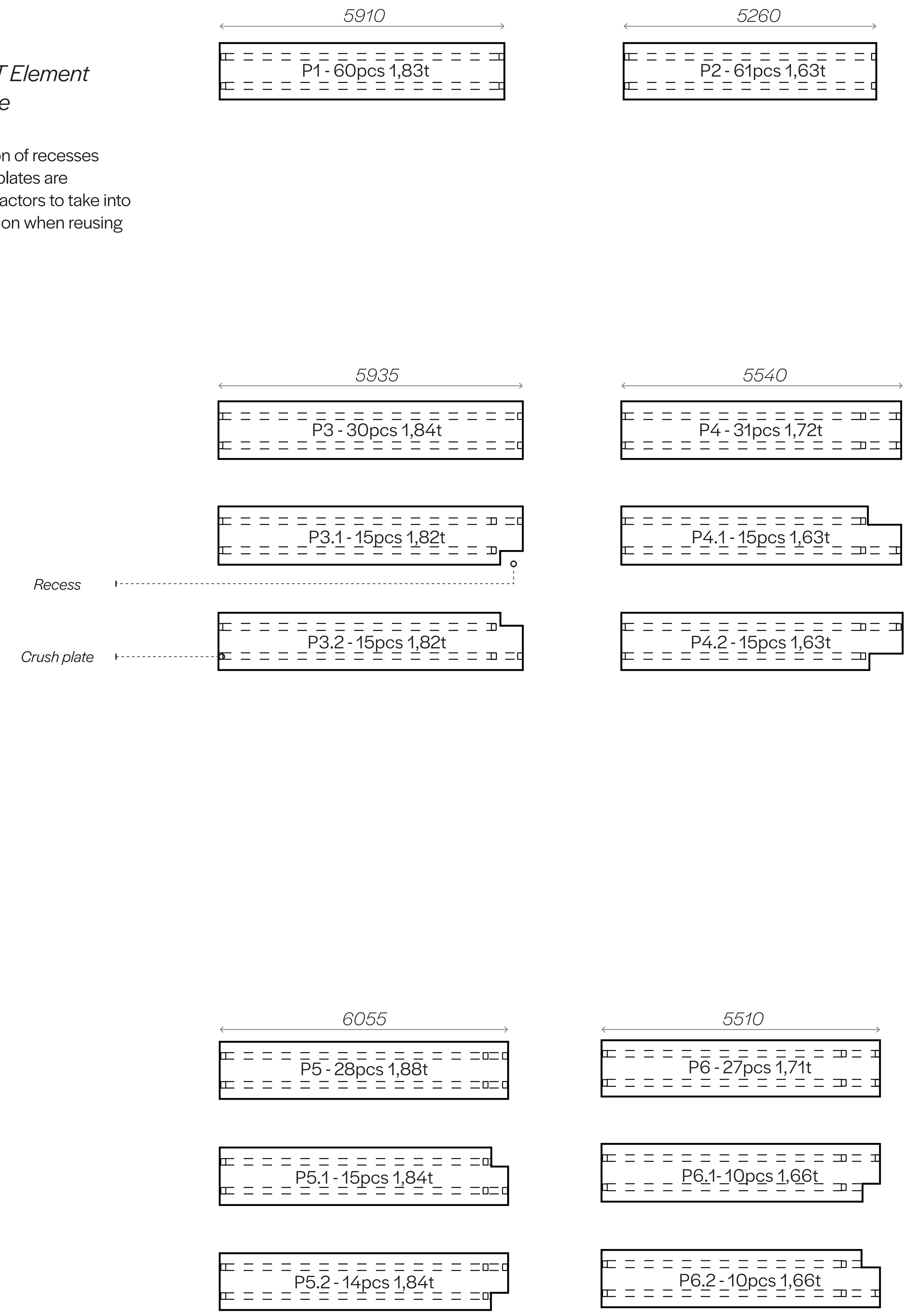


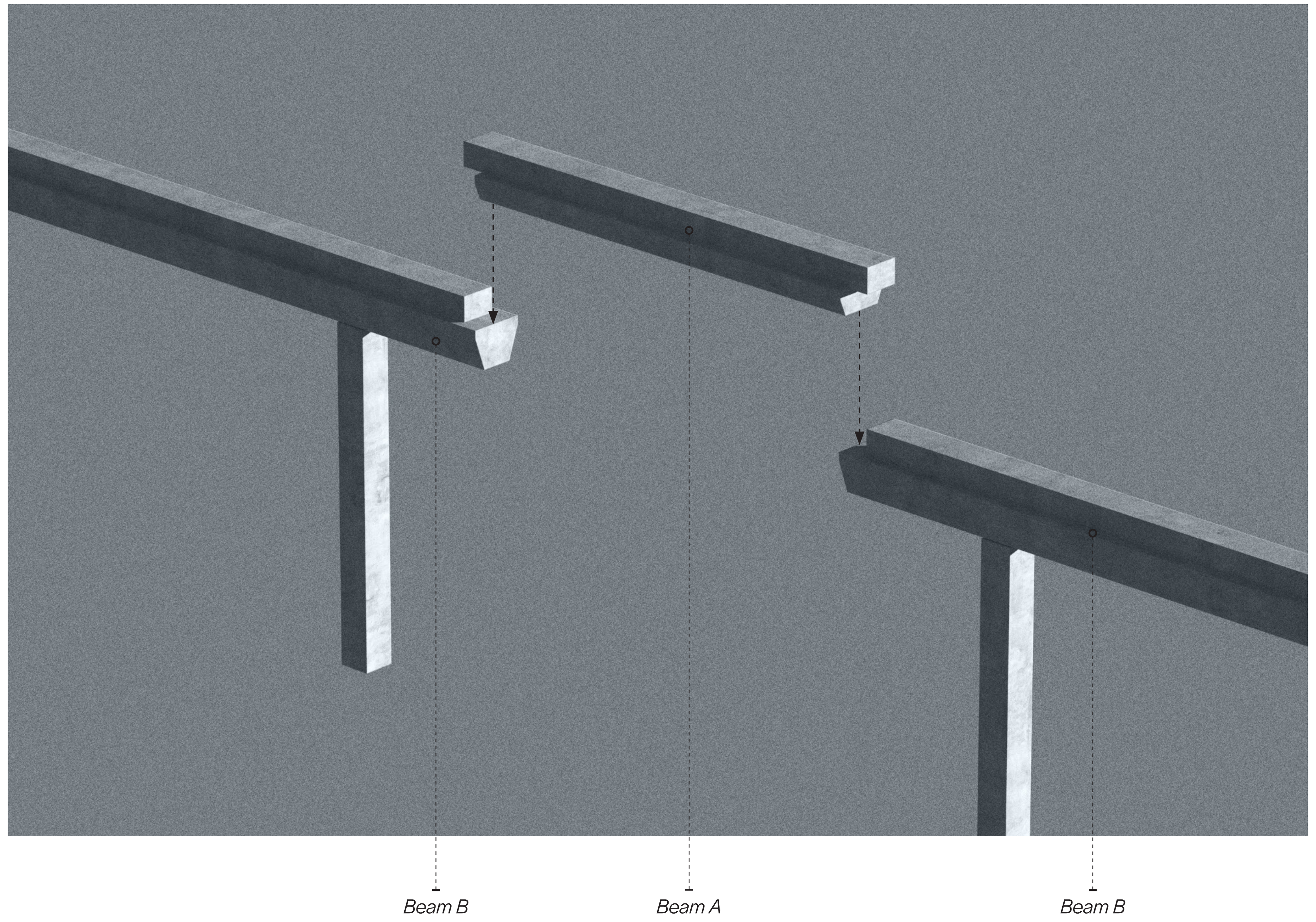
Double-T
Weld plate
Crush plate
Beam B
Beam A

*Double-T Element Schedule*

The location of recesses and crush plates are important factors to take into consideration when reusing






Beam A is suspended between two Beams B, which are supported by two columns each. A third beam type C (not shown here) is a simple rectangular member, supporting double-T elements where the horizontal structure meets the primary construction from 1921.

$L^{BeamA}$ = 5,4m 12 pcs

$L^{BeamB}$ = 13m 16 pcs

$L^{BeamC}$ = 4,8m 56 pcs

*Facade*

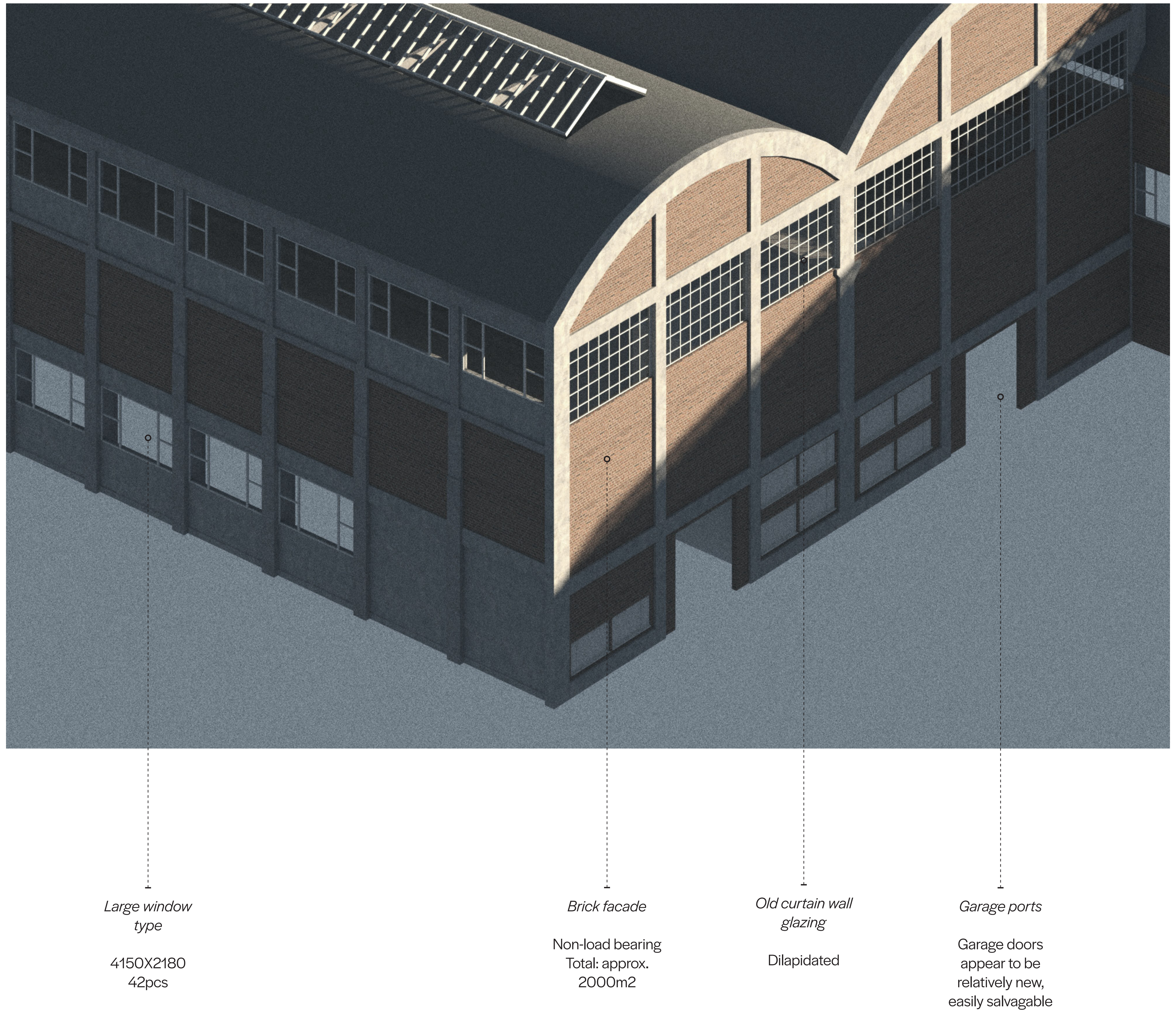
Bricks are a well-standardized, robust material with a long lifetime and, therefore, in principle well-suited for reuse. However, the disassembly process is done brick-by-brick and the stones must be cleaned of mortar. During the period of 1925-1955, there was shift in practice where lime-based mortar was replaced with cement-based mortar. As lime-based mortar is soft, it is relatively easy to deconstruct and manually clean the brickwork On the other hand, from around 1955, bricks were laid almost exclusively with cement-based mortar. In practice, this means that disassembling and cleaning cement mortar brickwork is near impossible because the brick will break before it is separated.

Originally, the building consisted of five halls. Today, only halls A, B and C remain. Where the earlier halls D and E once stood along the SE and part of the NE facade, in-situ concrete was used to seal the building. All other facades contain, for the most part, brick likely from the original construction date. There is no documentation detailing changes to the facade other than minor interventions such as new doors and windows. As this brickwork was laid before the cement-mortar period, it is considered to have high reuse potential.

Furthermore, the brickwork is directly exposed to the exterior and is likely frost-resistant. It is important to note, however, this brickwork is not structural.

Windows and doors are considered for reuse, although it is important to also take into consideration the possibility of encountering hazardous chemicals in the glazing. To achieve a degree of flexibility, windows are to be disassembled, extracting the glass panes and building a new frame on-site in the new project. This method eliminates the need for new glass (an energy-intesive production process), though should be restricted to indoor use or otherwise where thermal resistance requirements are low.





*Skylights*

Allthough skylights are present in the original documentation from 1921, they have certainly been replaced in the relatively recent past. Unfortunately, there is no documentation pertaining to the installation of the new skylights but they appear to be a standard glazing construction.

As the skylights are a singular construction running almost the length of each hall, reuse can be challenging with regards to new axis widths, lengths, etc. A viable solution is to remove the glass from the frames and reframe it on-site in the new project.

Approx. size of glass panes: 800x2400 624 pcs



*Skylights*

Module size: approx. 800x2400