



P5 Bram Hulshof

***“Crafting for Knowledge”***

Date: 30-01-2020

*Heritage & Architecture*  
*Revitalising Heritage - Hembrug Peninsula*

Tutors: ir. Lidy Meijers  
ir. Ger Warries





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# Preface

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This graduation project was part of the studio 'Revitalising Heritage: Hembrug Peninsula', an architecture studio by the department of Heritage & Architecture of the faculty of Architecture and the Built Environment at the TU Delft.

The location of the project is the Hembrug terrain which is located in Zaandam alongside the North Sea Canal. The Hembrug terrain has been the stage of ammunition and weapon production for over 100 years until all activities ceased at the end of the last century. Nowadays the site has been abandoned by the military and a new connection to society has to be created in order to safeguard the heritage. New uses for the vacant buildings have to be developed without losing the essence and values of the buildings and the in between space.

An ensemble in the south east of the Hembrug terrain called "Green Head of the Cape South" (as defined by the studio tutors) was the main focus of this graduation project. This ensemble forms the green tip of the Hembrug terrain towards Amsterdam and is enclosed by the North Sea Canal and side canal G. The ensemble includes four buildings: a 1930's bomb shelter, a 1960's storage building, a 1960's factory building and a 1980's Romney Hut (storage shed).

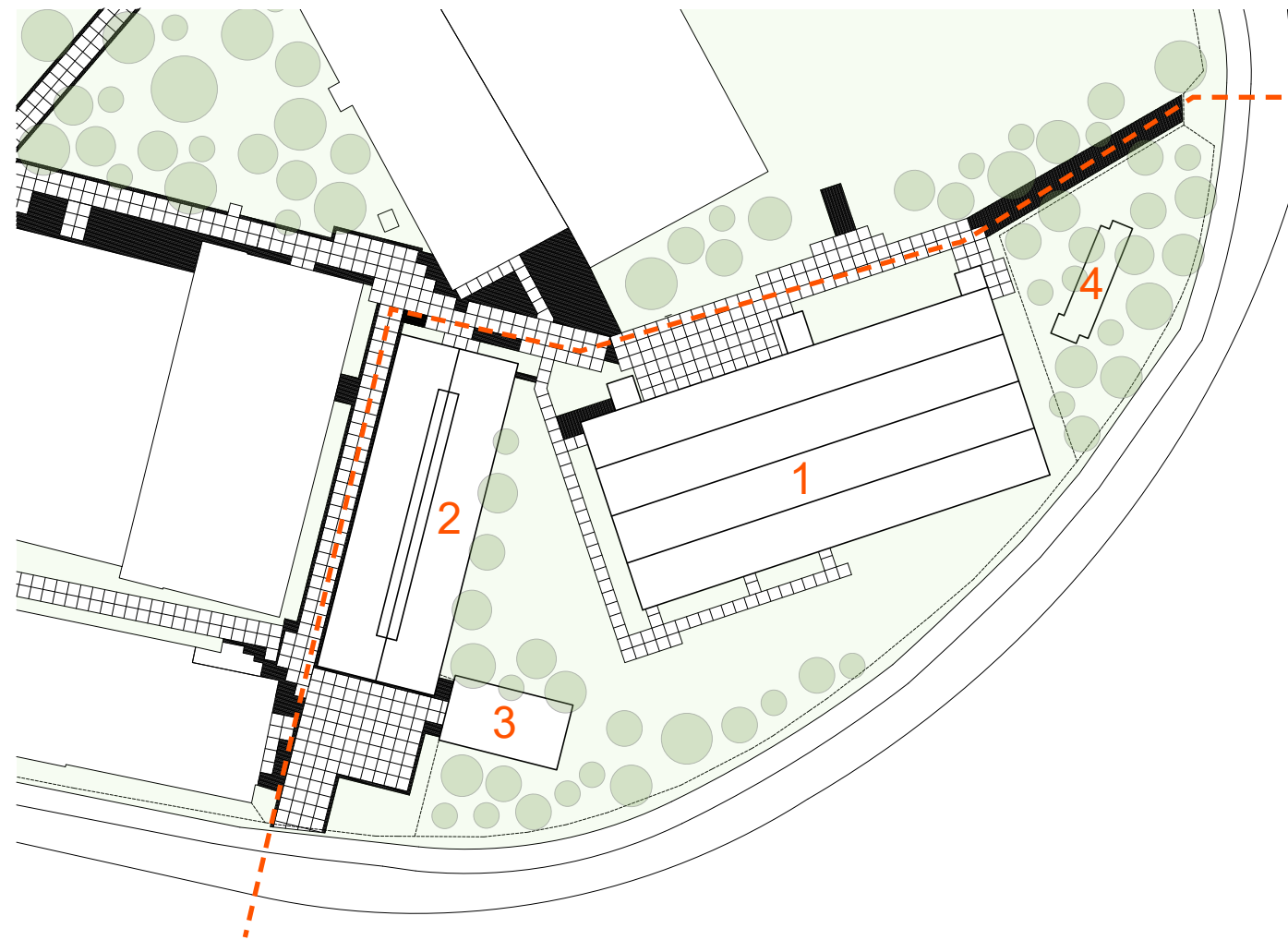
In this booklet an overview is given of the masterplan and design developed to revitalise the ensemble and the buildings. For the full (historical) research please consult the analysis reports. Within the 'project journal' an overview of the sketches leading up to this design can be seen.

I want to express my gratitude towards my tutors Lidy Meijers (main tutor), Ger Warries (building technology) and Charlotte van Emstede (cultural value) for guiding me in developing and completing this graduation project.



# Ensemble - existing situation

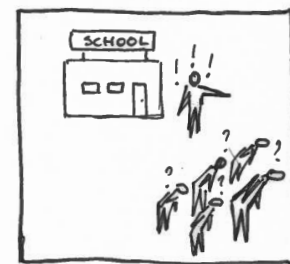
6



The ensemble, as defined by the tutors of the graduation course, holds four buildings. For a complete analyses and value assessment of the ensemble and the buildings please consult the analysis booklets. The four buildings reflect the divers character of the ensemble while they all have different typologies, materialisations, building ages and former functions. Some buildings are located within the orthogonal grid of the main factory complexes of the Hembrug terrain while others (like the Factory and the Shelter) are placed off grid. The ensemble is furthermore holds a variety of greenery, some parts are dense with trees and bushes while other parts are open and spacious with grass fields.

# Ensemble - new function

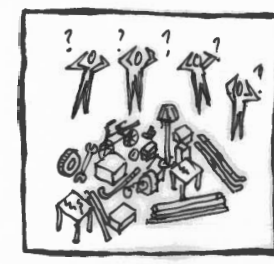
7



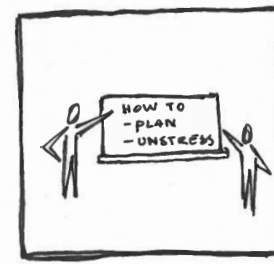
Underprivileged children



Professional craftsmen



Public



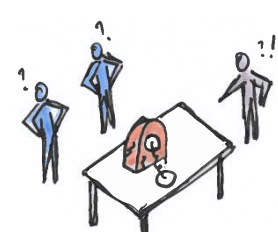
Educative/personal tutors



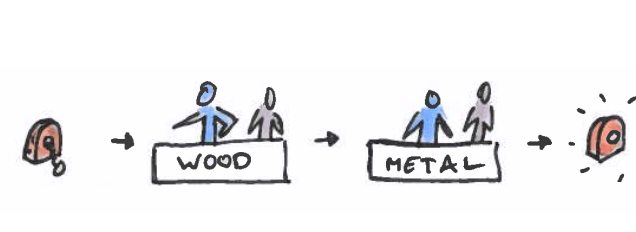
1



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4



5



1



2



3



4



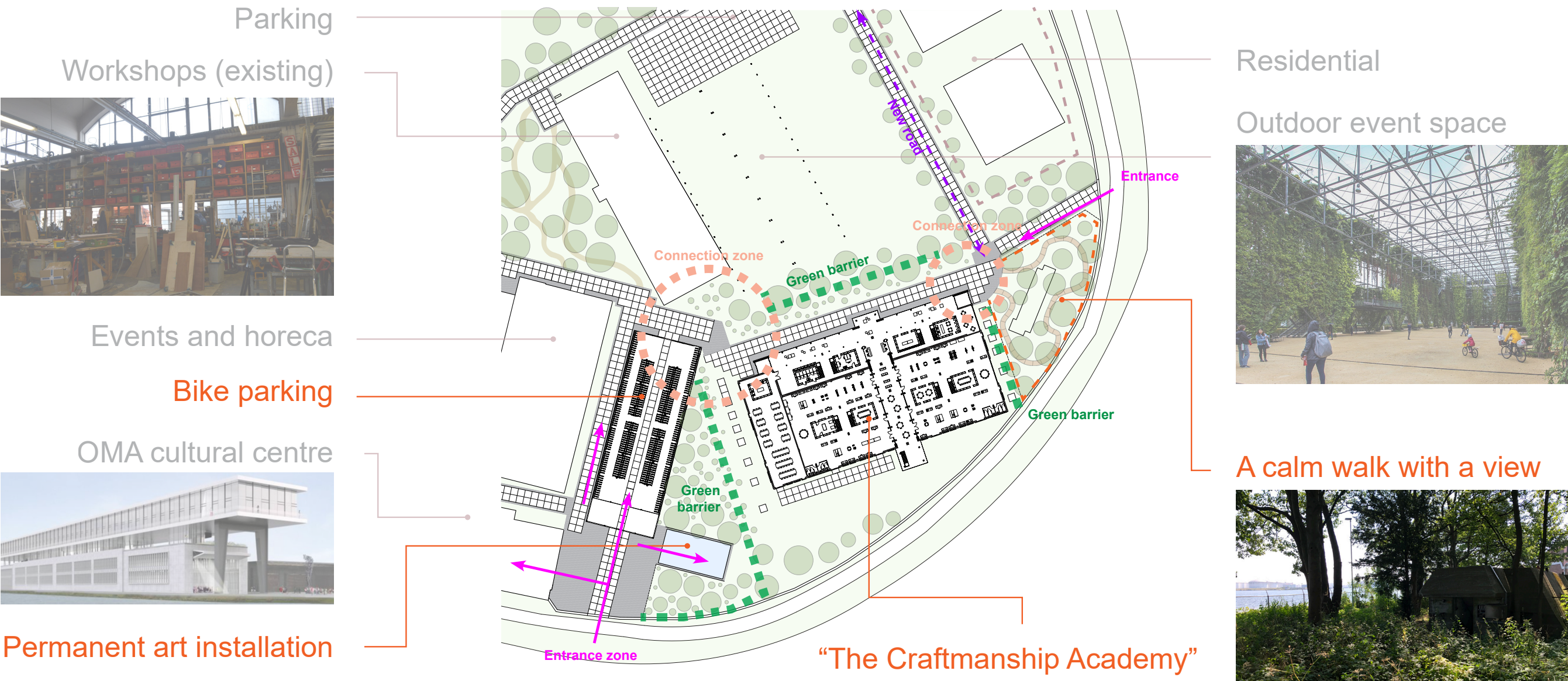
5

The new function of the ensemble stays close to the essence of the Hembrug terrain as a production estate. The ensemble will house a Craftmanship Academy where underprivileged children (who cannot fit in with our current educational system) can learn to work with there hands by professional craftsmen. They will work on actual projects for the public (upcycling/repairing/ect). This will all take place in a secure environent with professional guidance. This new programme will put craftmanship back on the agenda and give an sustainable respons to the consumer society.



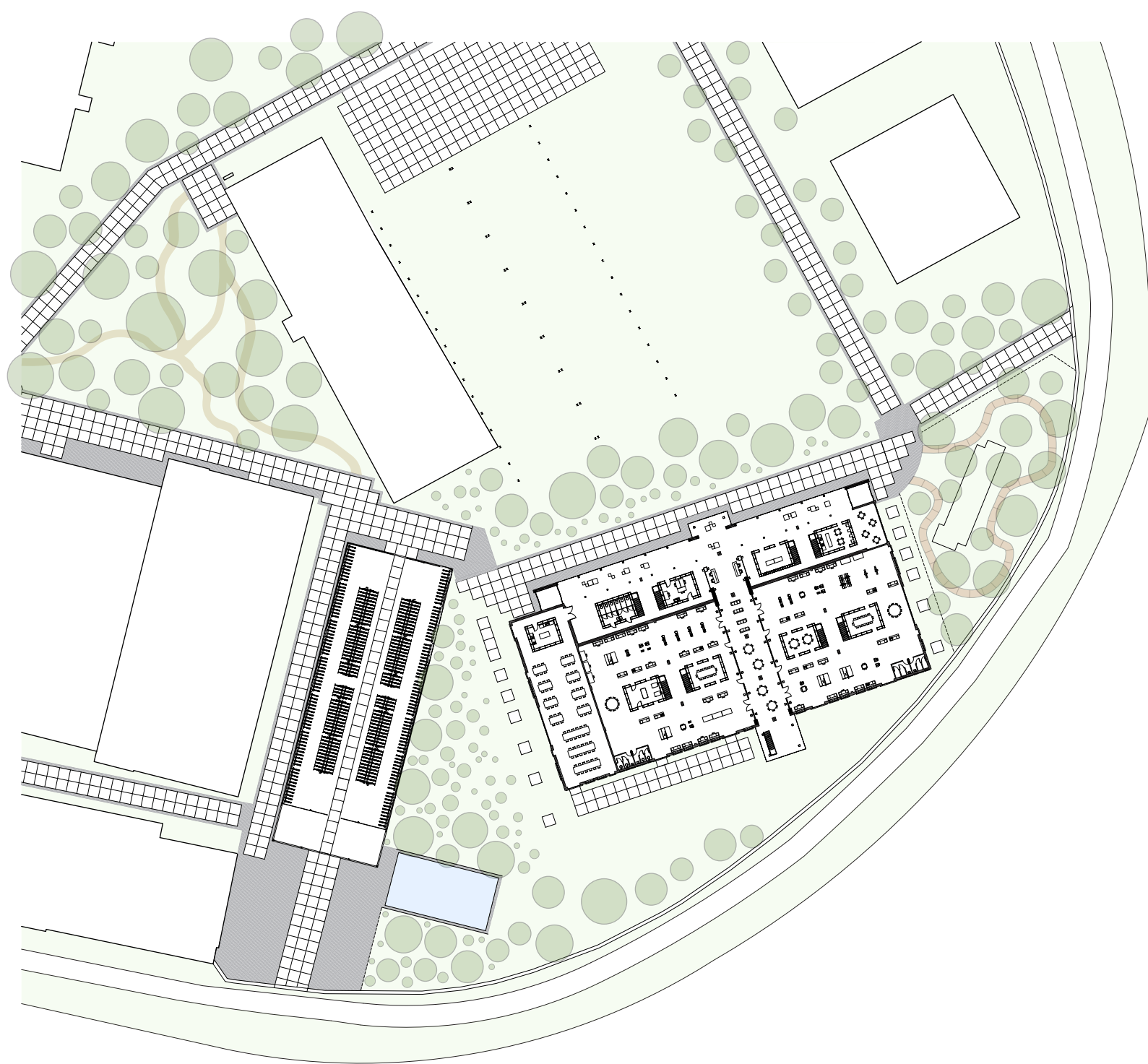
# Ensemble - masterplan

8

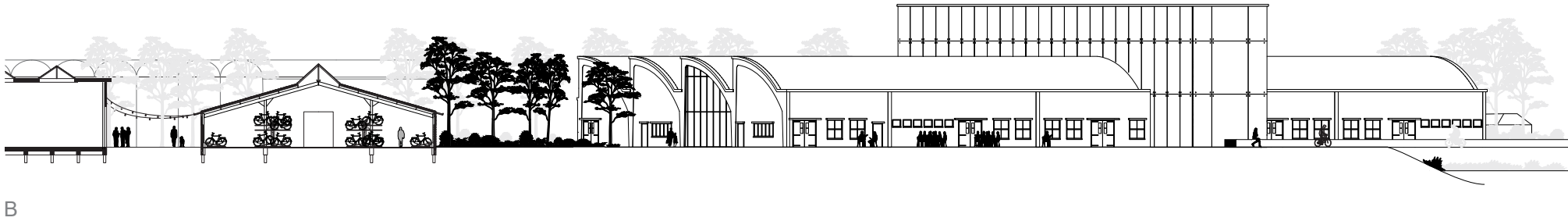
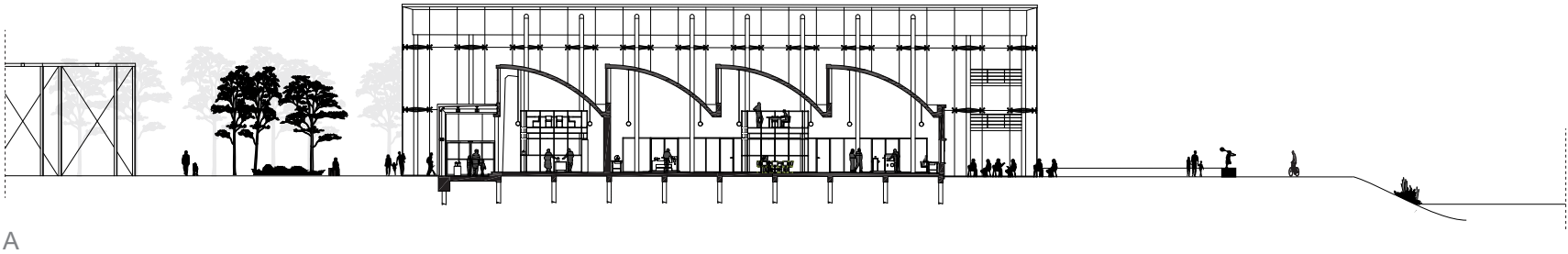
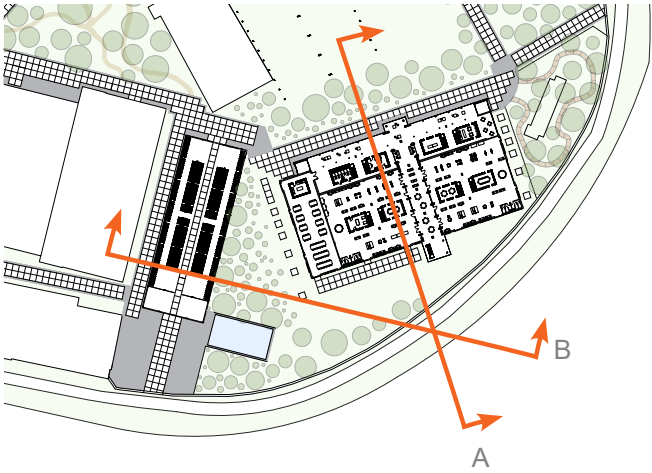


Spatially the essence of the ensemble as an aloof part of the Hembrug terrain will be maintained and strengthened. The Factory will house the Craftmanship Academy and will remain to be the main building that sets itself apart from the neighbouring grid systems. The direct surroundings will be connected to this building and show that the system of the Hembrug comes to an end at the tip of the terrain. The Warehouse will house bike parking for this Craftmanship Academy but primarily for the OMA cultural centre and will be connected to the public domain and the grid system. The Romney hut and the Shelter will become part of the public domain while their essence lies within the embedment within the green.

Ensemble - plan 1:1000



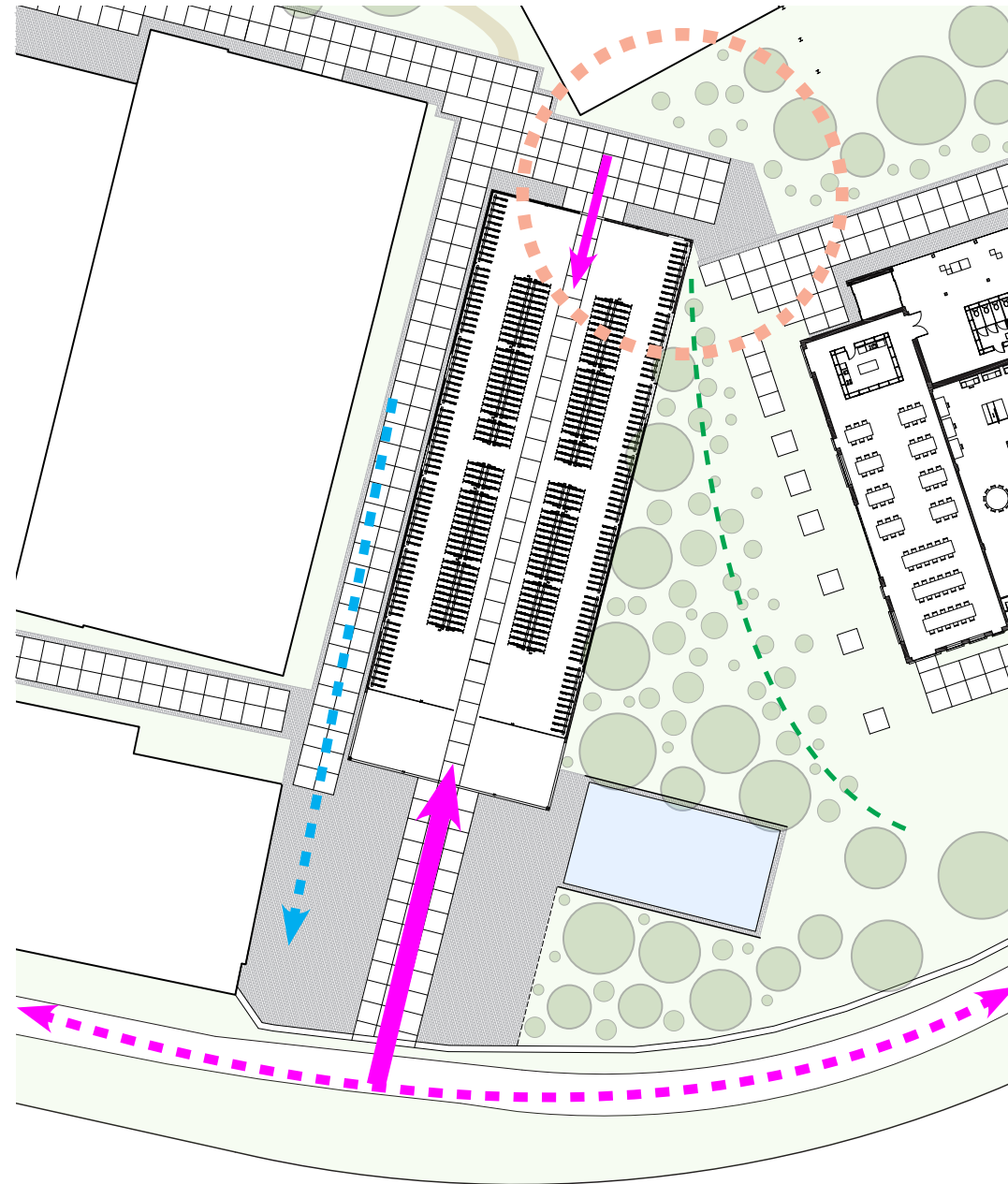
# Ensemble - sections 1:500





# Bike Storage - overview

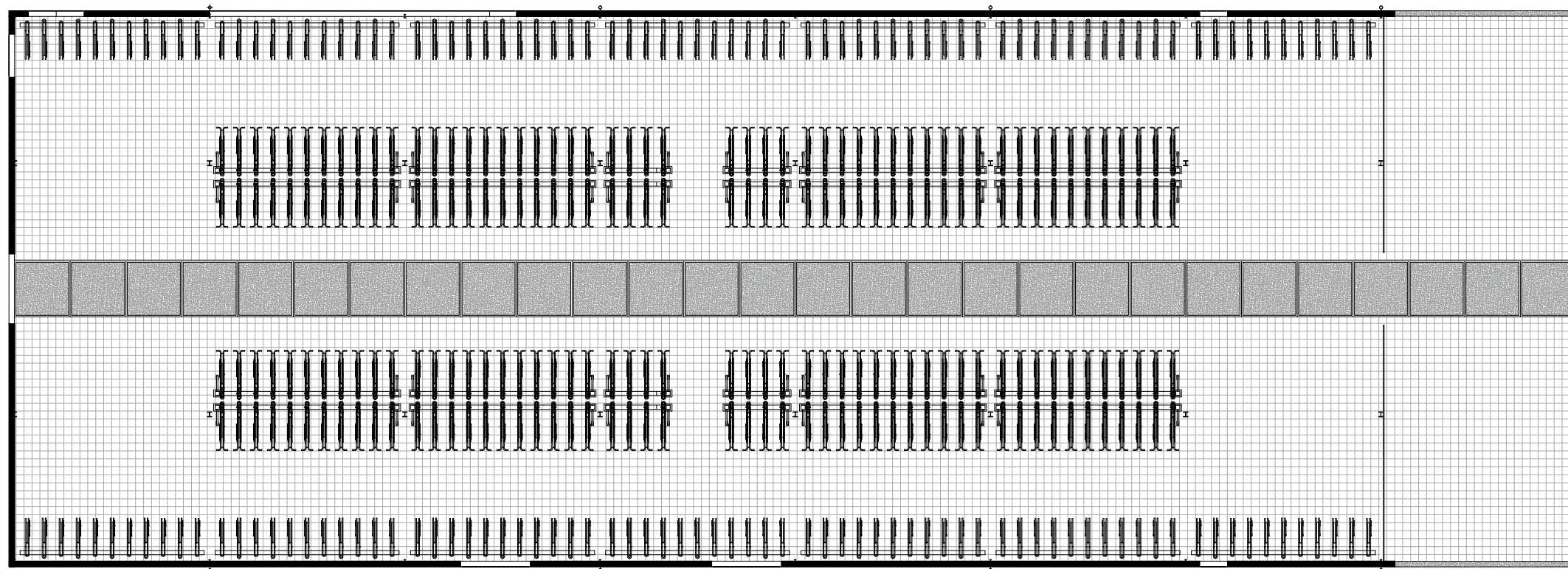
11



The Warehouse will be transformed into a bike storage. By doing this the character of the buildings as a facilitator is preserved. Both the Craftmanship academy as well as the new OMA cultural centre will benefit from this bike parking. Interventions include the reestablishment of the spatial experience of the length and symmetry, the closing of all non original openings by recognisable perforated panels and the redesign of one front facades.

# Bike Storage - plan 1:200

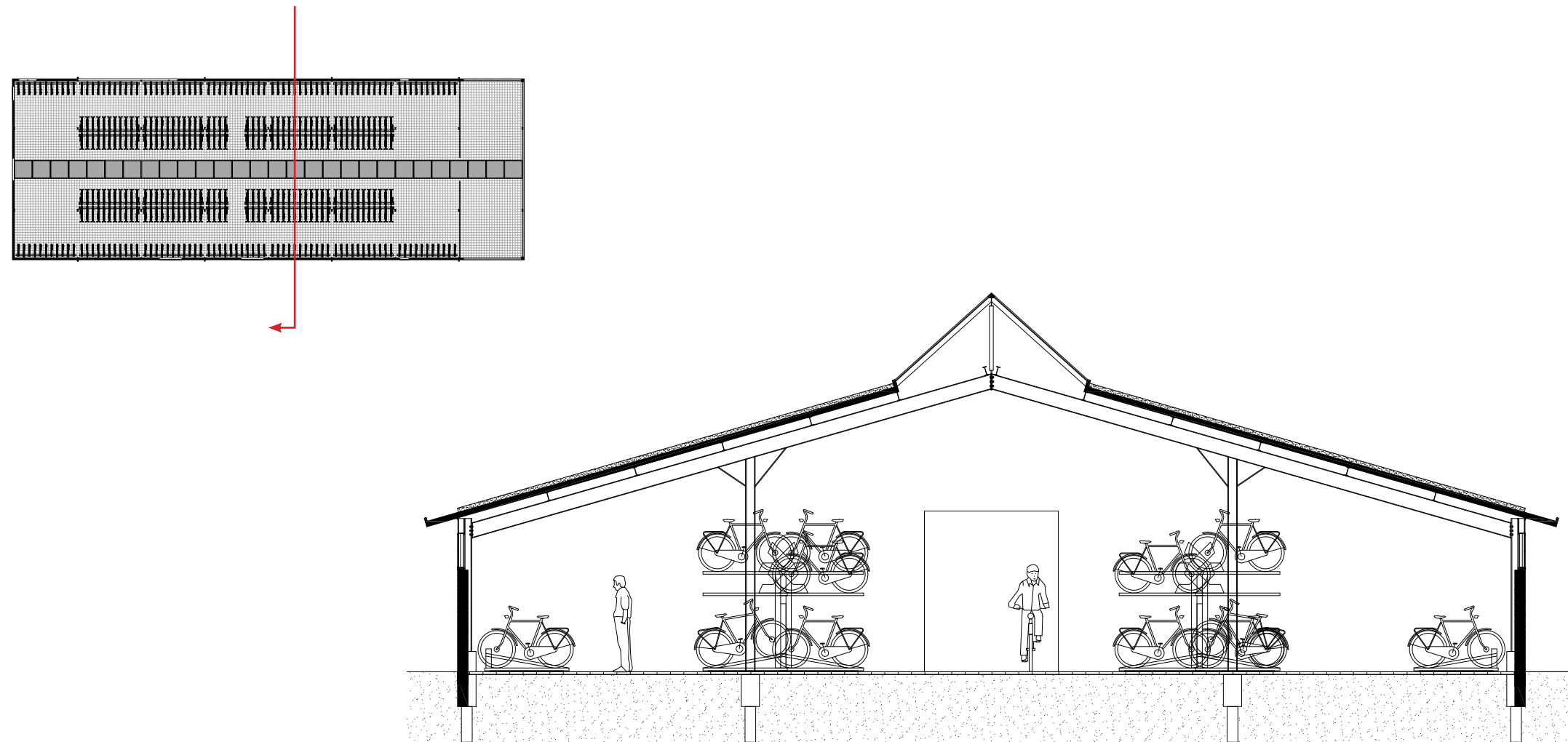
12



Stelcon plates are used to highlight the central axis of the bike storage, strengthening the symmetry of the layout as well. In addition, the stelcon plates connect the bike storage to the infrastructure of Stelcon plates at the Hembrug terrain. By doing this the bike storage becomes part of the public domain, emphasising it's public funtion. Alongside the Stelcon plates the existing interior flooring (sidewalk tiles) are retained.

# Bike Storage - section 1:100

13

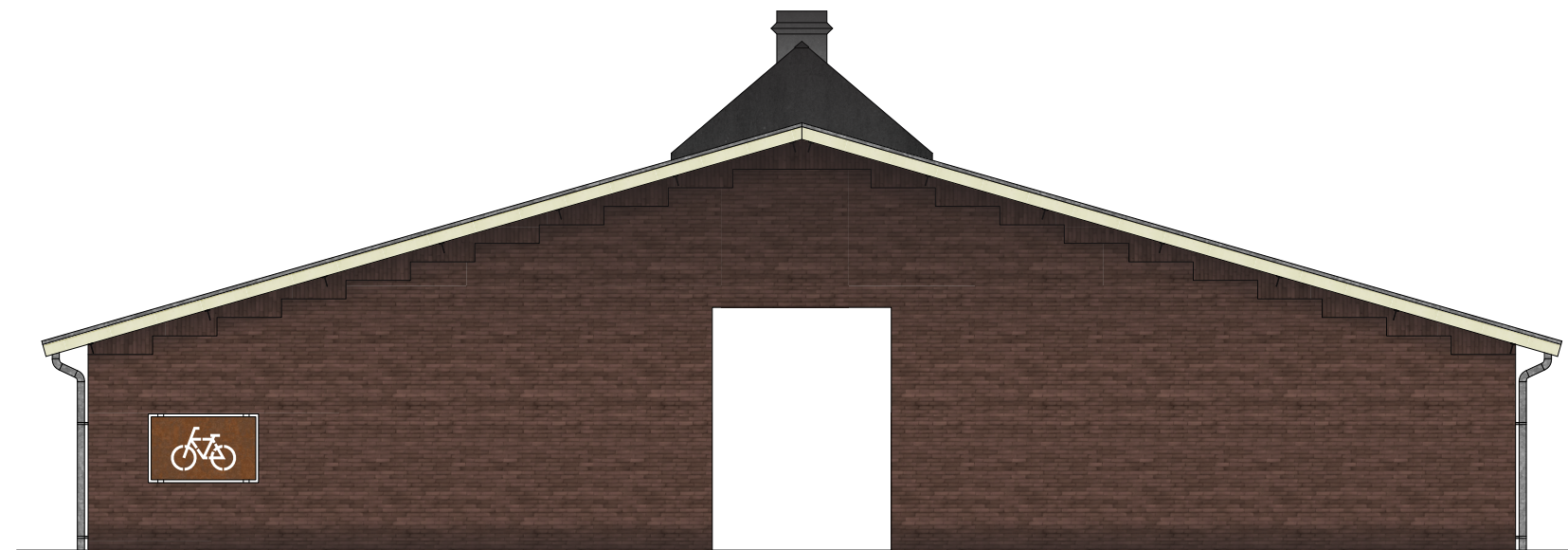


The bike racks are placed in such a way that the symmetry of the building is not diminished. The height of the building and the windows furthermore dictated the layout. On the sides there are single storey bike racks allowing daylight to enter through the long horizontal windows. On either side of the central axis double storey racks are placed, making good use of the height in the middle of the building while the overhead skylight provides sufficient lighting of the central axis.



## Bike Storage - north facade 1:100

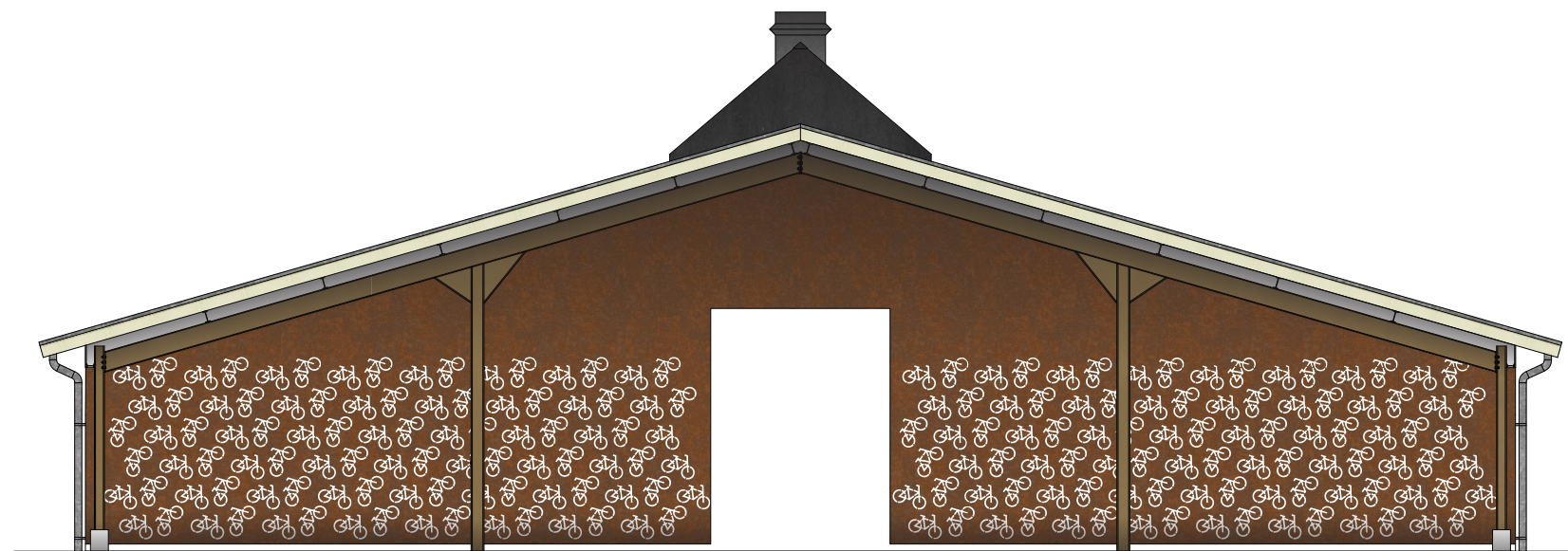
14



At the north facade minimal interventions are taken: the non original sliding doors will be removed creating an open connection to the public domain. Next to that, a former window opening at the left of the facade will be opened up again and holds a new panel showing the function of the building as a bike storage. The reason for these minimal interventions are the fact that out of the two front facades this north facade will be used as the 'back entrance' and therefor it does not need emphasising as much as the south facade (which will form the main entrance). Next to that, the north facade has seen less previous interventions which makes preserving the original masonry worth while.

## Bike Storage - south facade 1:100

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The south facade is the main entrance of the bike storage and therefore this facade is emphasised. First of all the existing masonry facade will be demolished. A new wall out of rusting panels will be placed about 8 meters inwards in order for a canopy to be created. This canopy allows an uninterrupted view from the alley behind the OMA cultural centre, through the Romney Hut towards the North Sea Canal. The new facade will have an opening reflecting the original opening on the north facade. The rusting plates will be perforated with small bicycles revealing the function of the building while the perforations create a better connection between inside and outside strengthening the feeling of the building as a bike shed.



## Bike Storage - impression north facade

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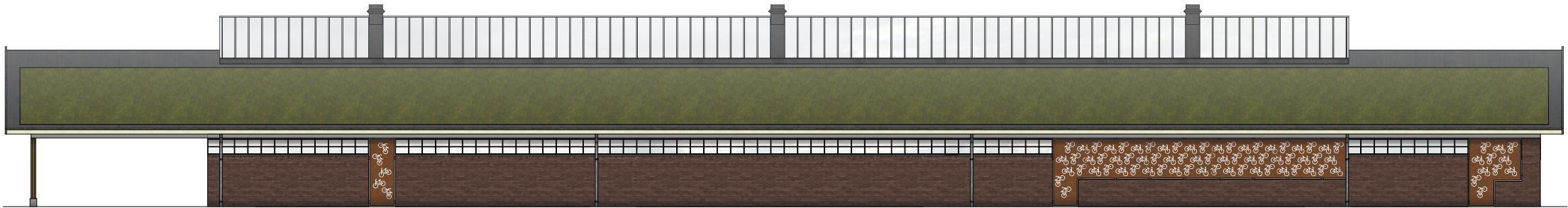


## Bike Storage - impression south facade

17



# Bike Storage - east facade 1:200

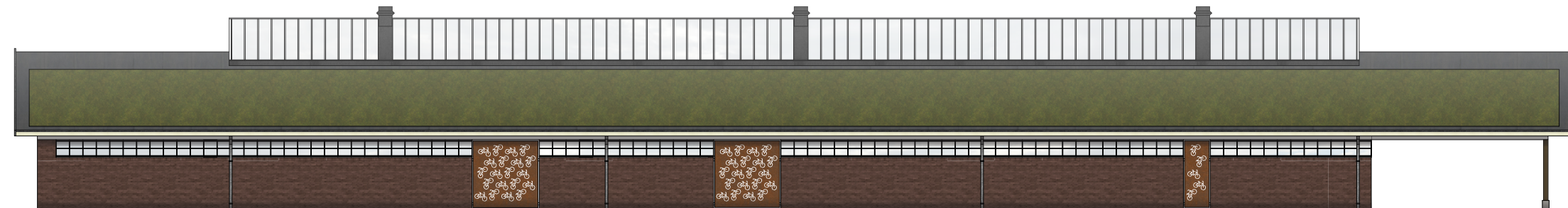


The side facades will both be treated in the same way. All openings other than the continuous horizontal window will be closed off with rusting panels. In this way the horizontal windows will be emphasised while at the same time the other openings will be visible as ‘scars’ from the past. If needed these openings can be opened in the future. The rusting panels will be perforated in the same way and for the same reasons as the perforations in the new south facade. All facades will have some of the rusting panels clearly showing this new layer of interventions.



## Bike Storage - west facade 1:200

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Another intervention visible from the sides of the building is the addition of a green sedum roof to the existing roof. Among others, this green roof minimises the attribution of the building to the heat stress effect. In a way the green roof can also be considered to be a nod to the past while in the 40's the ensemble was covered with hiding shelters which were all covered with grass and greenery.

## Bike Storage - interior impression side aisle

20





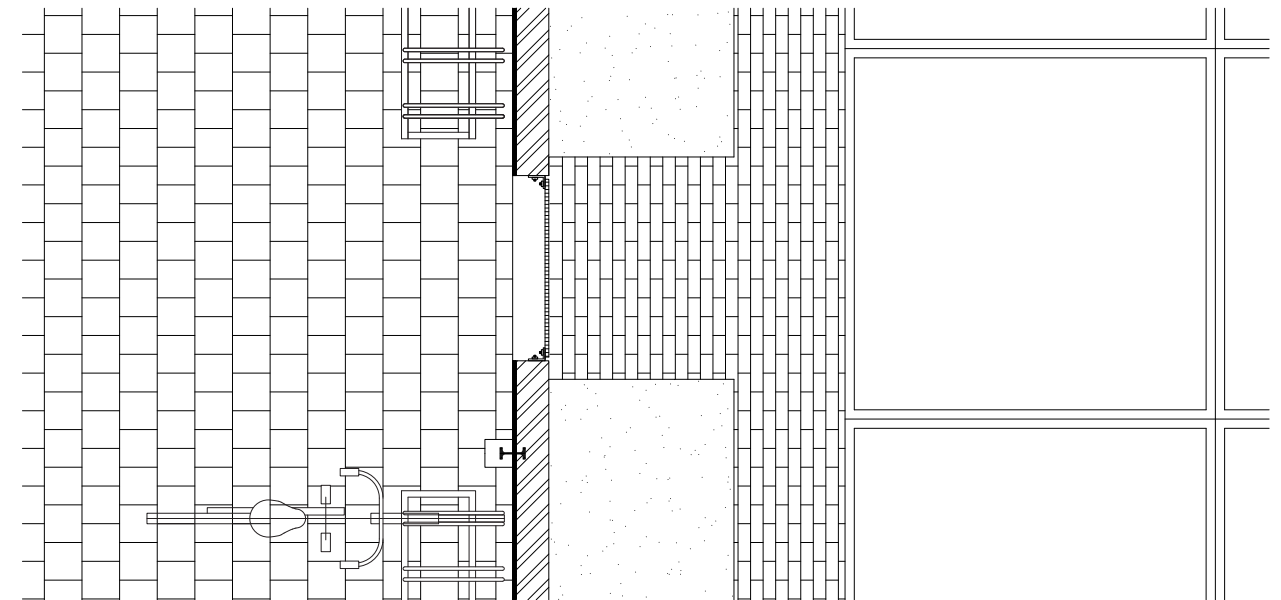
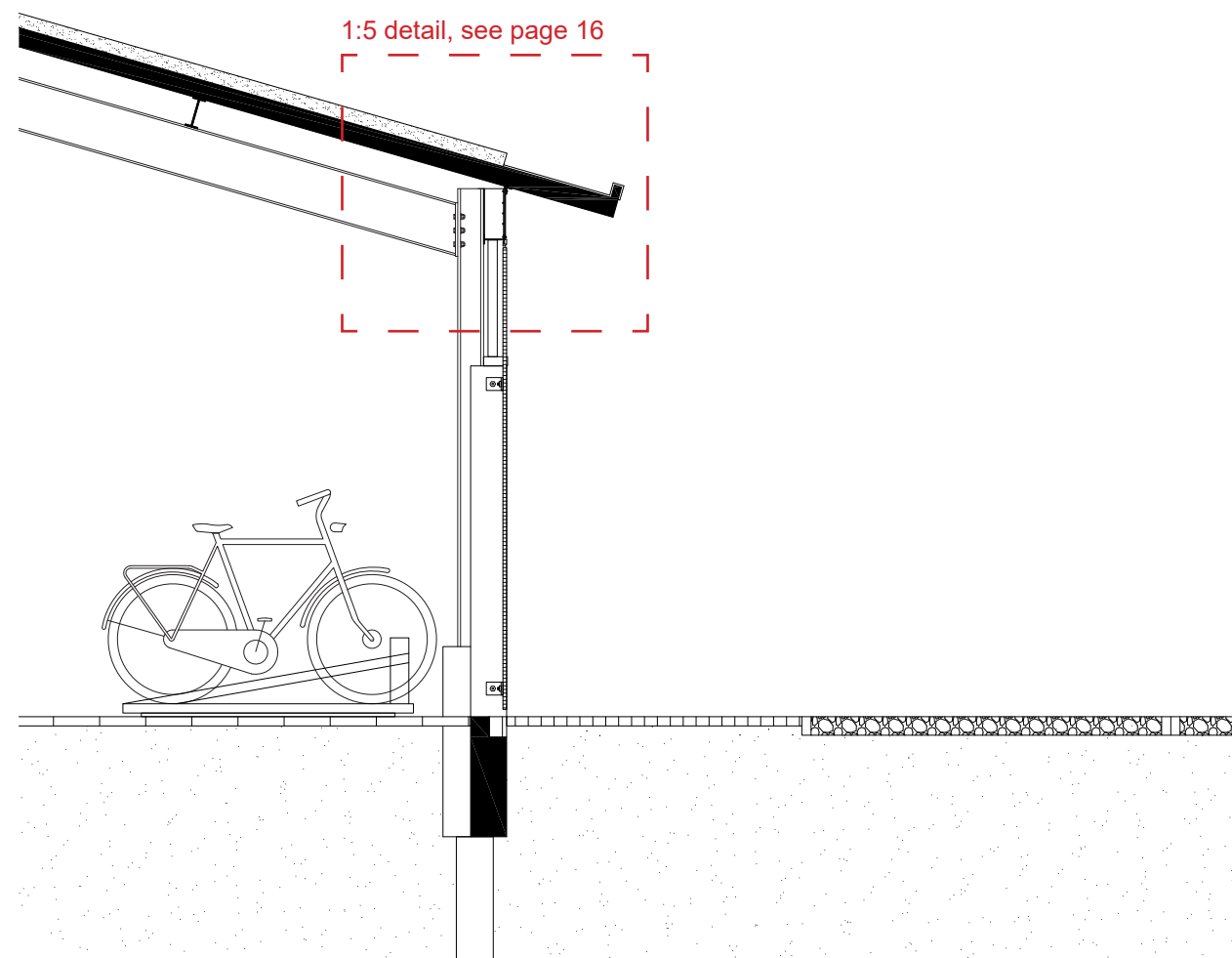
## Bike Storage - interior impression central axis

21



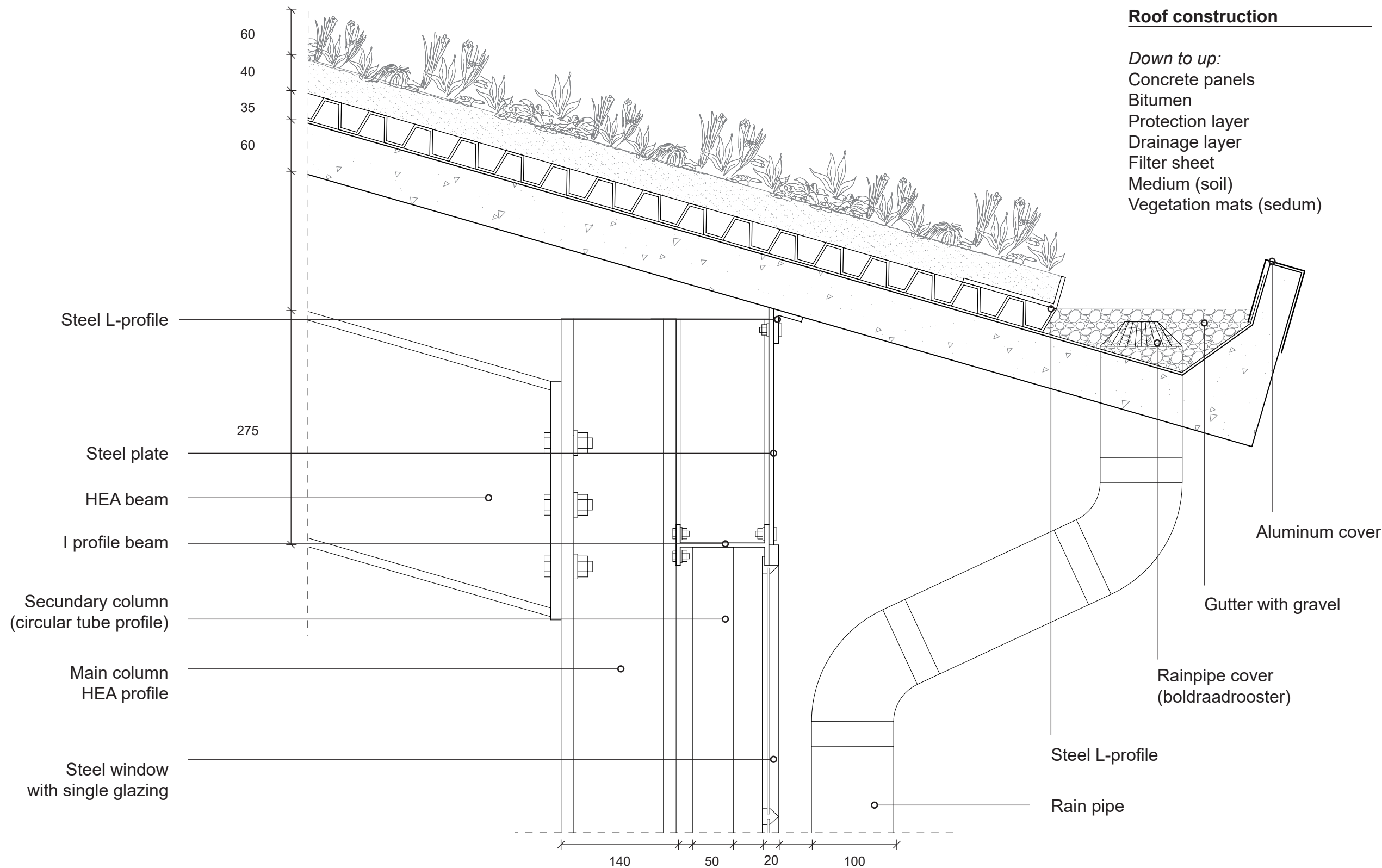
# Bike Storage - 1:20 detail

22



Except for the horizontal windows all openings will be closed of by new perforated panels. The removed doors, windows and frames will be brought to a recycling warehouse on another part of the Hembrug terrain to be reclaimed in another project. The new panels will be mounted by mounting hooks to the sides of the masonry on either side of the opening. The panels are flush to the existing walls but they will have small gaps on all sides to show the original opening.

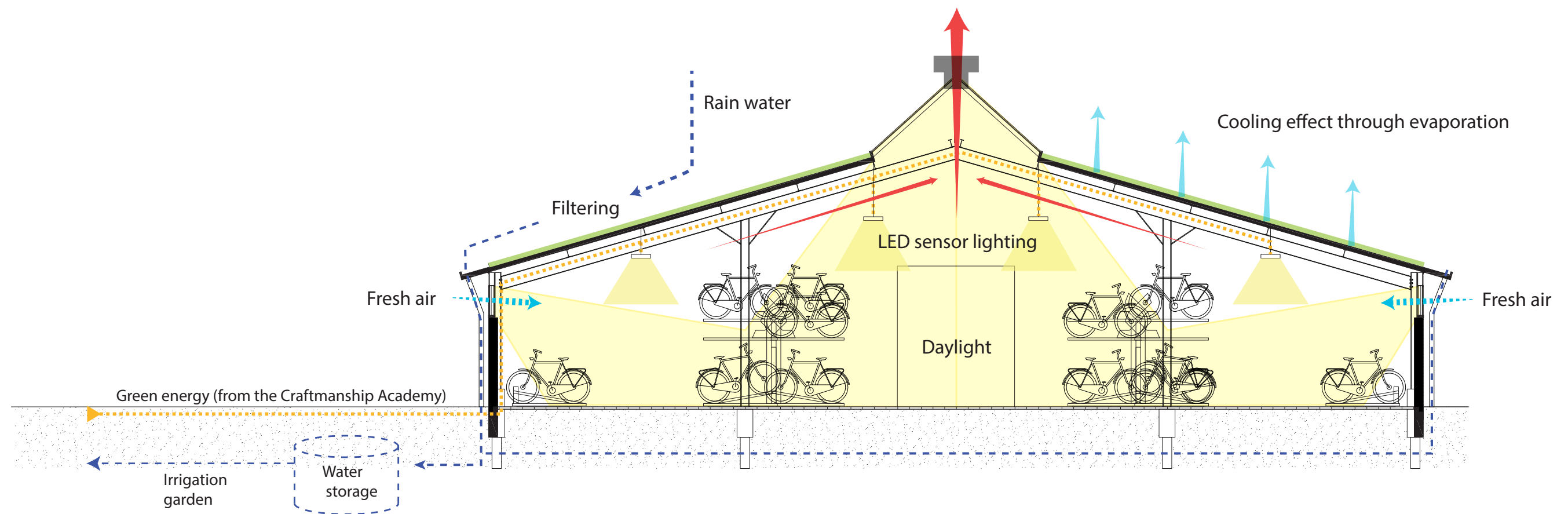
# Bike Storage - 1:5 detail





# Bike Storage - climate principle

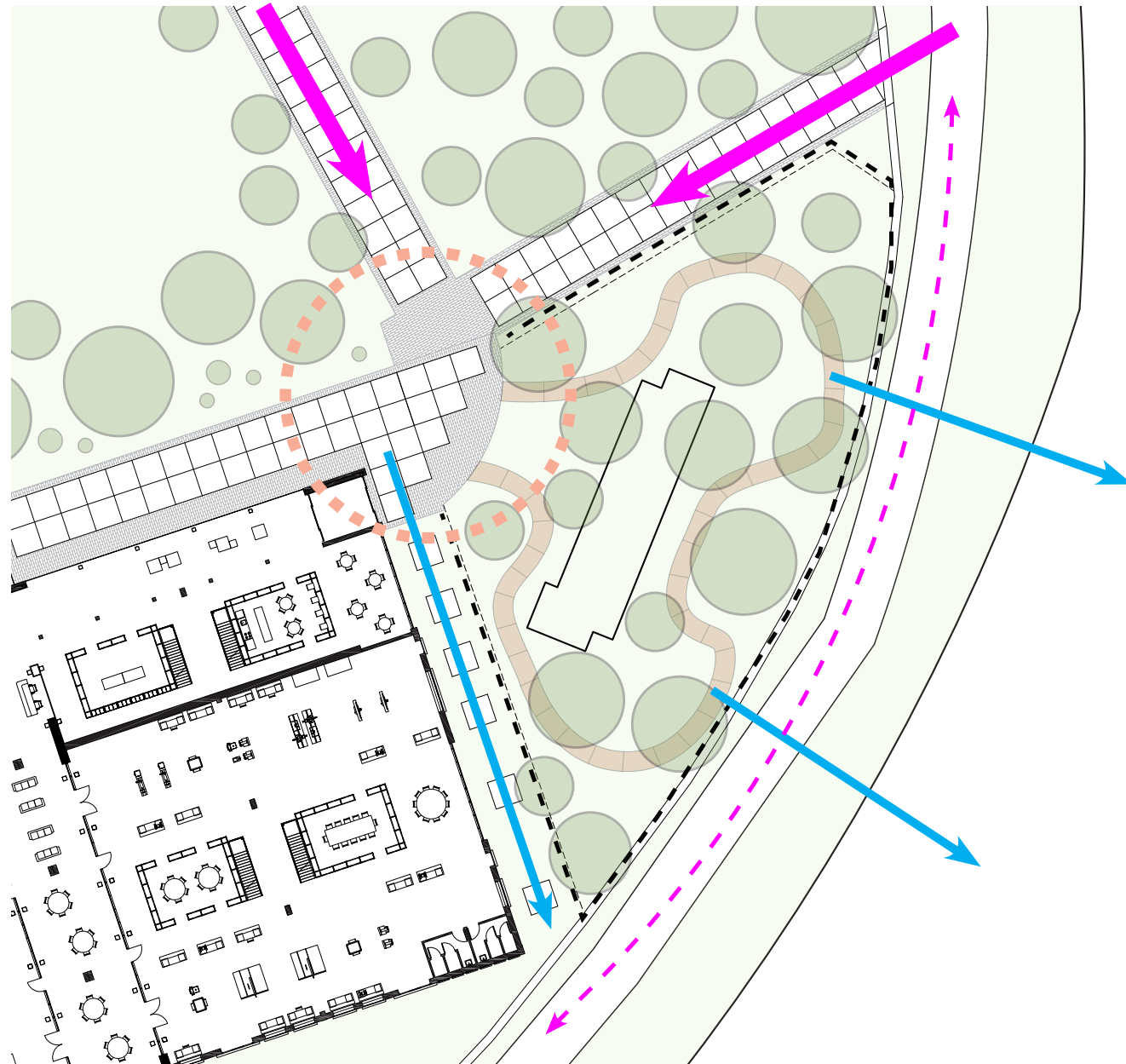
24



The Bike Storage will have an outdoor climate due to its direct connection to the surroundings. The original ceiling finish and the connection of the walls to the ceiling won't have to be altered by the addition of insulation. The ventilation principle of the existing building will be supplemented by the perforated panels and the two openings on the front facade. During the research the roof structure turned out to be strong enough to carry the load of a sedum roof. This roof will contribute to the reduction of the heat stress effect, store and filter water and provide more green at the green cape. The lighting will form the only energy demanding aspect of the building, but the main building (the Craftmanship Academy) will provide more than enough energy to provide this energy to the Bike Storage. In this way the Bike Storage has the lowest impact on its surroundings as possible.

# Shelter - overview

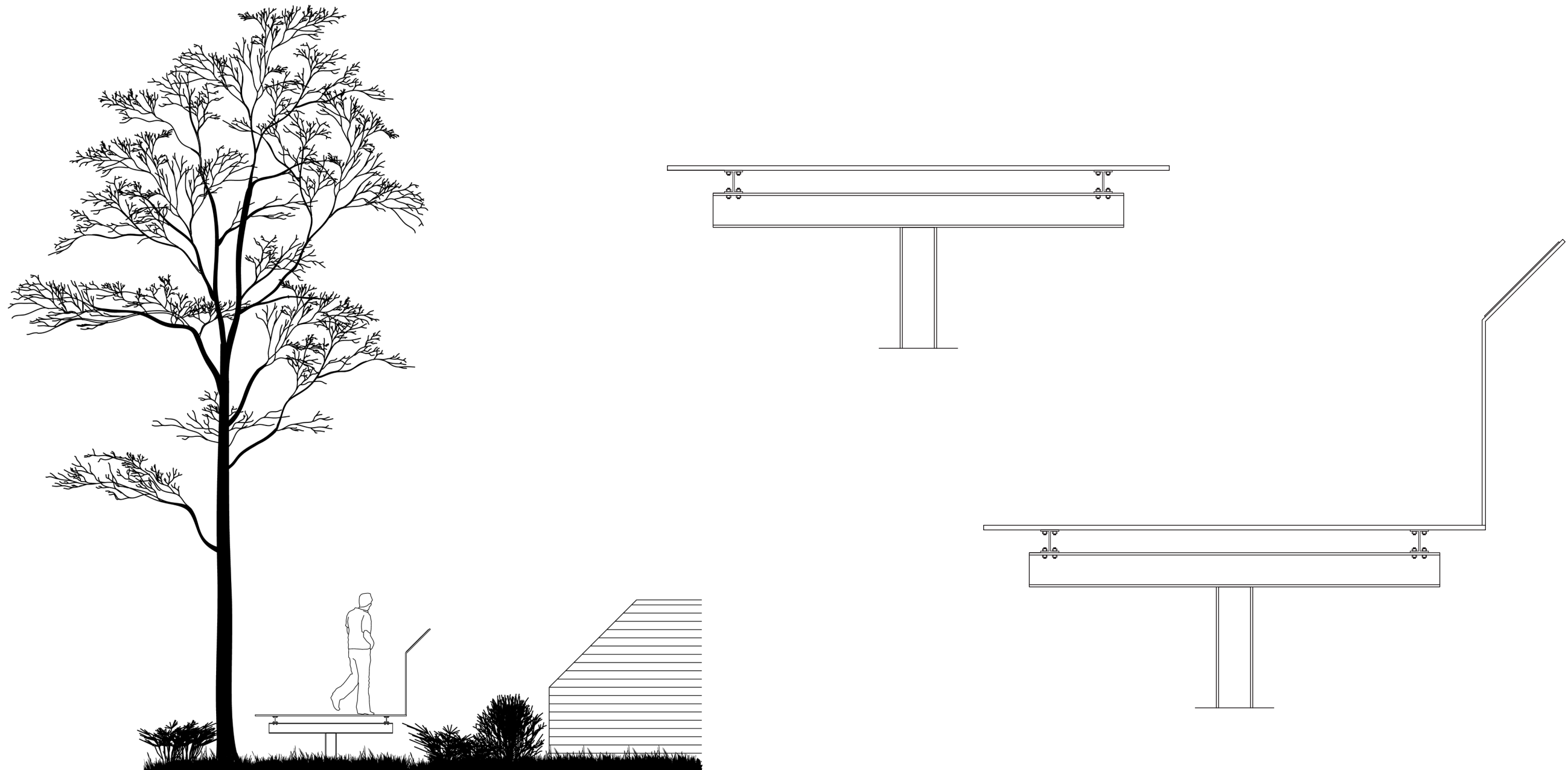
25



The shelter remains to be the hidden relict of the past. For people to experience the calm and green atmosphere of this intriguing part of the Hembrug terrain, a path is created sweeping along the trees and hovering above the ground. The path enables pedestrians to get a little bit closer to the shelter but still there is a distance to this monolithic monument. The path also enables a unblocked view towards the water from the very tip of the terrain.

# Shelter - sections 1:50 and 1:20

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The new path will allow people to come a little bit closer to the shelter but at the same time a distance to the shelter and the green will be retained. The images above present a possible design for this walkway. It consists of steel plates seemingly floating over the greenery. Informative posts could be mounted to the path in order for the public to read about the shelter or the view of the North Sea Canal from the raised path.



# Shelter - impression and reference

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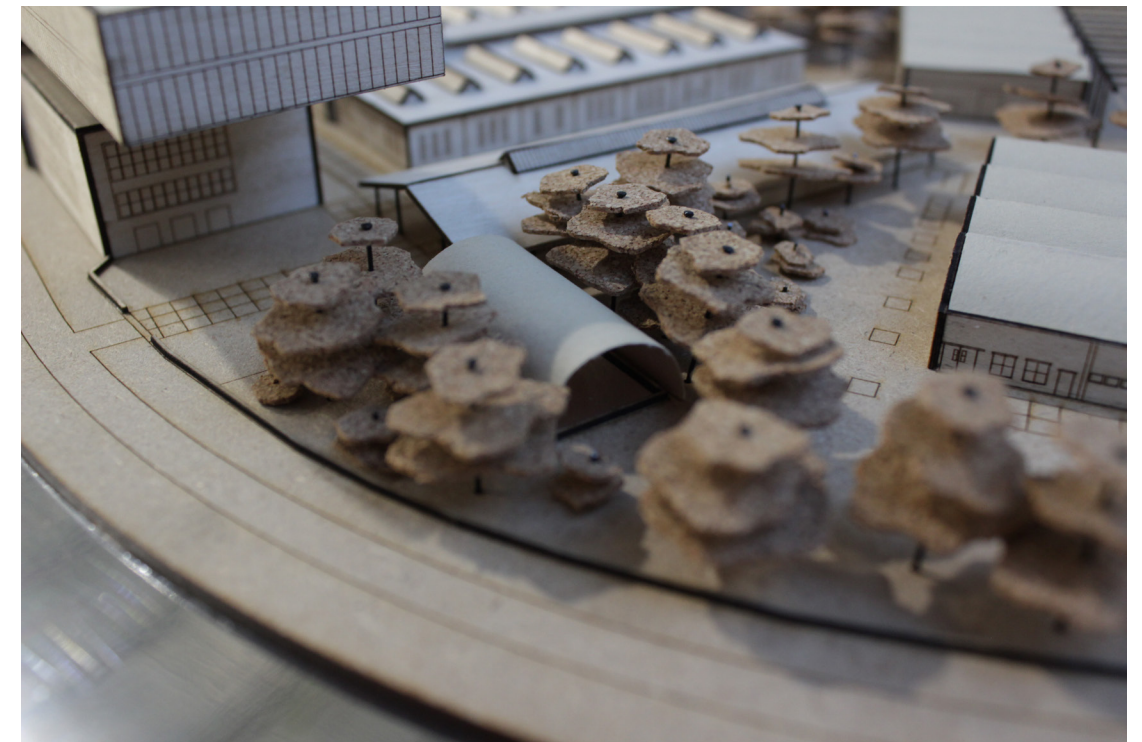
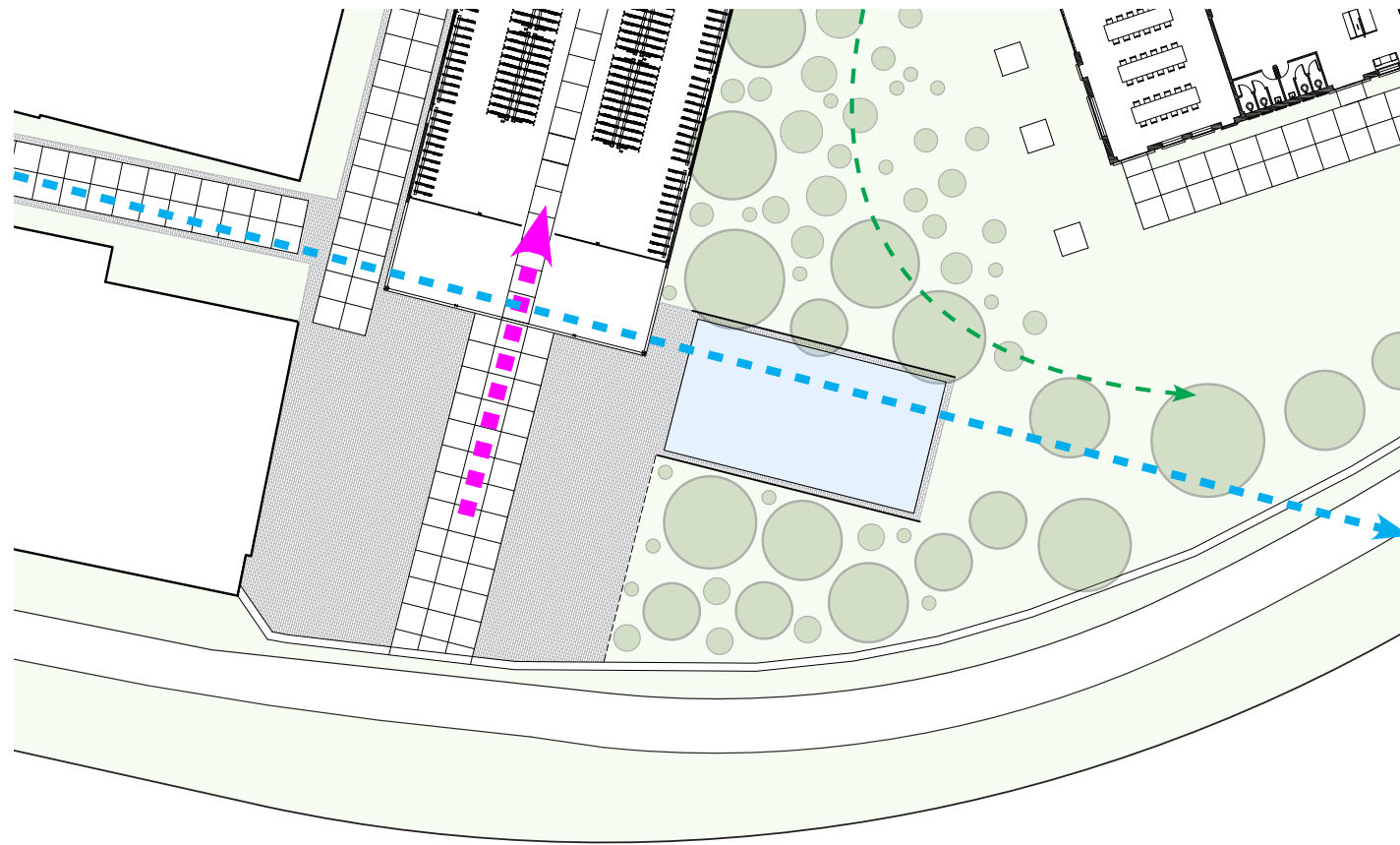


Source: [www.landazine.com](http://www.landazine.com)



# Romney hut - overview

28

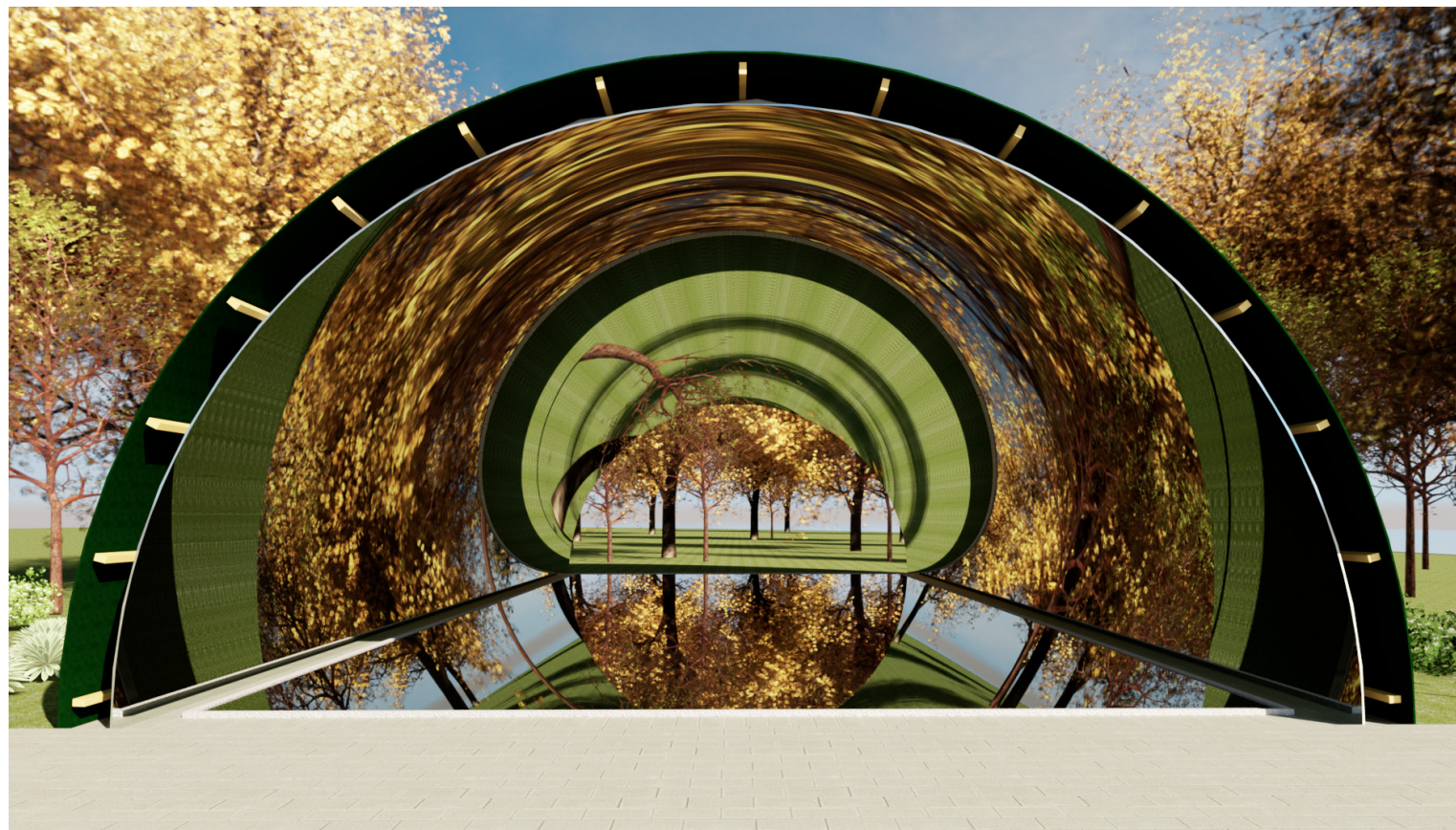


The Romney Hut will be given a double function. The curved facade will remain to be a space divider while both front facades will be removed enabling a continuous view from the alley behind the OMA cultural centre towards the North Sea Canal. The interior of the Romney Hut will become a permanent art installation as part of the cultural centre. This art installation will be all about this continuous view.



# Romney Hut - impression and reference

29

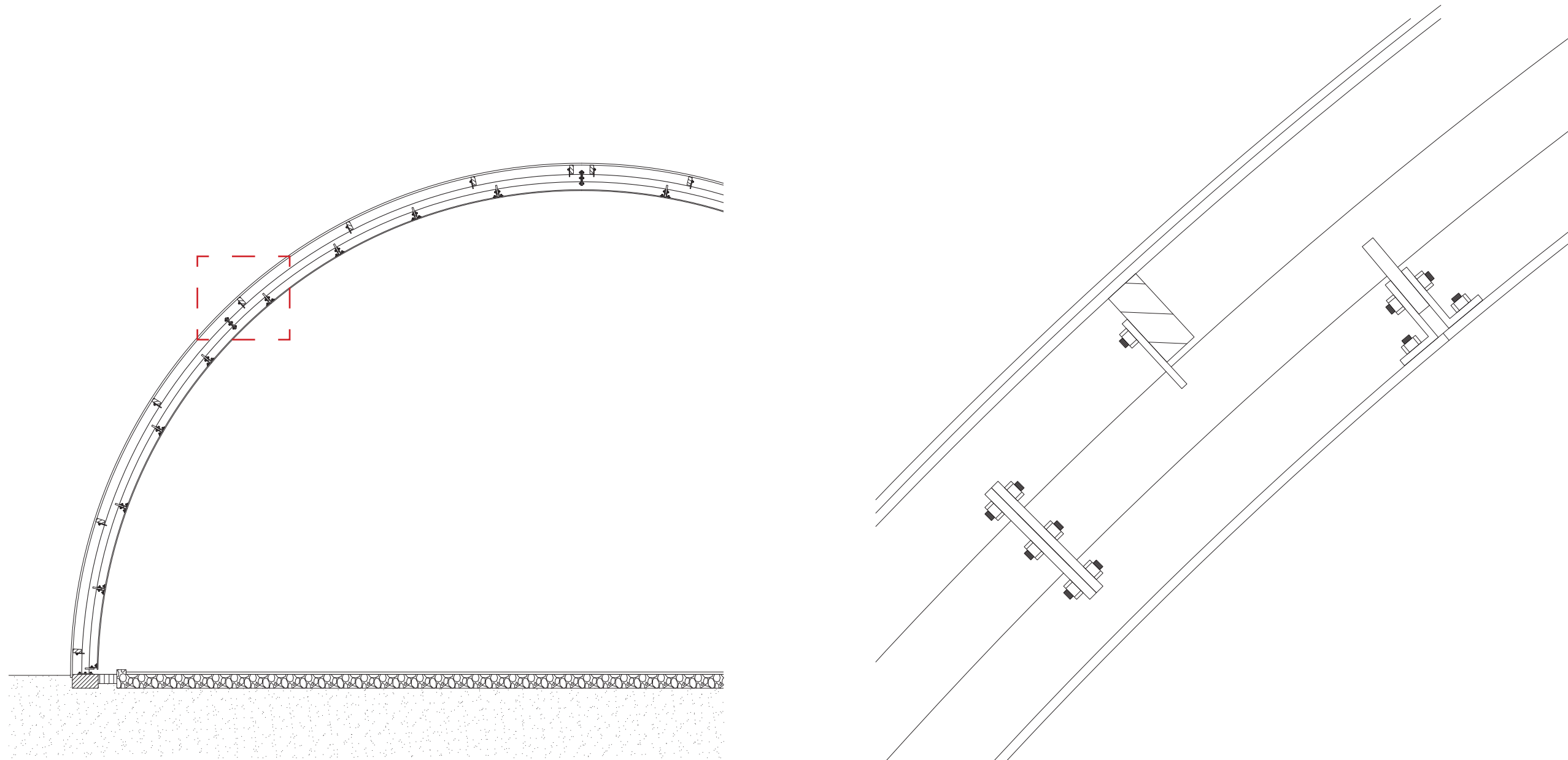


Kiyotsu Gorge Tunnel by MAD. Source: [www.i-mad.com](http://www.i-mad.com)



# Romney hut - section 1:50 and 1:5

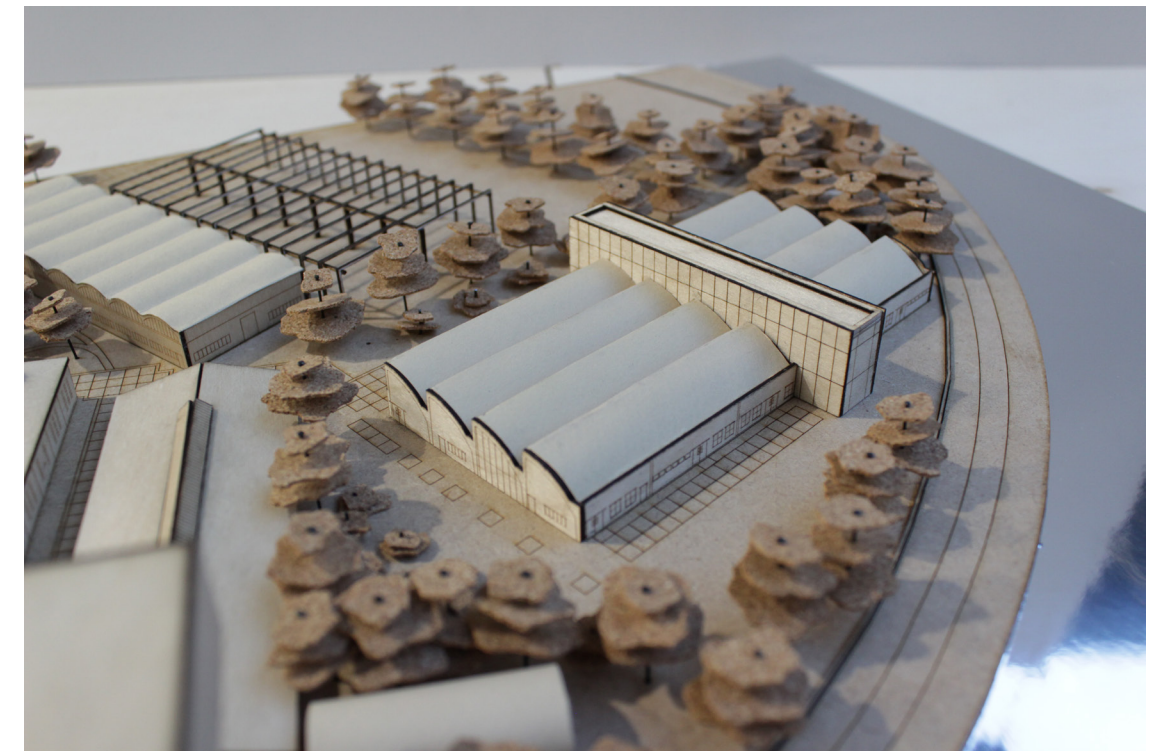
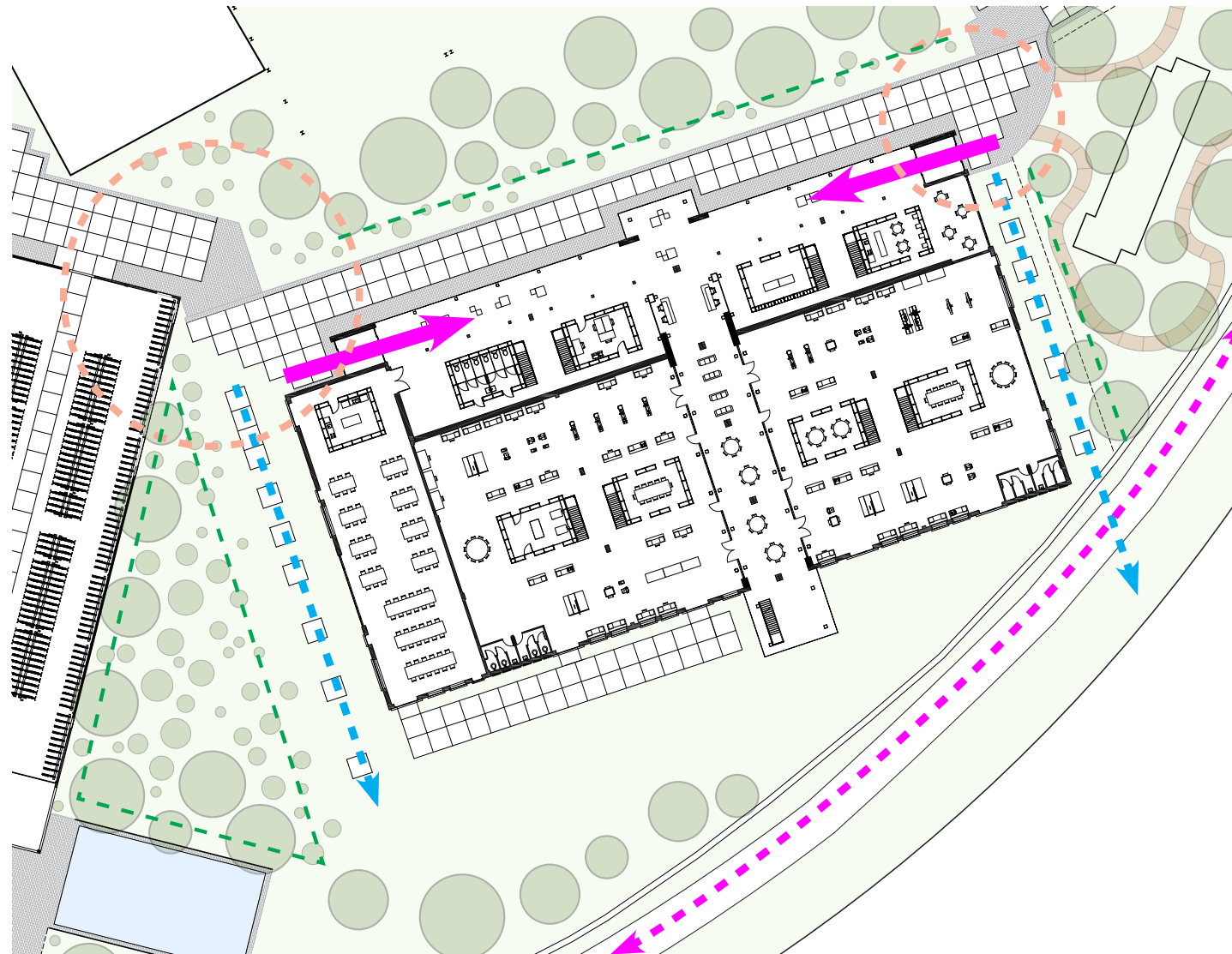
30



The exterior of the Romney hut will be retained but the interior will be cladded with mirrored panels. These panels are connected to the main load bearing trusses by the means of welding connection points onto them. In order for the romney hut not to become a tunnel from the entrance plaza to the cape south a basin of concrete is placed on the entire floor of the Romney hut which will hold a layer of water (2-3 cm). This layer of water reflects the view towards the North Sea Canal as well as the mirrored panels. To go on, the layer of water prevents the Romney hut to become a place for hobo's or hanging youth.

# Craftmanship Academy - overview

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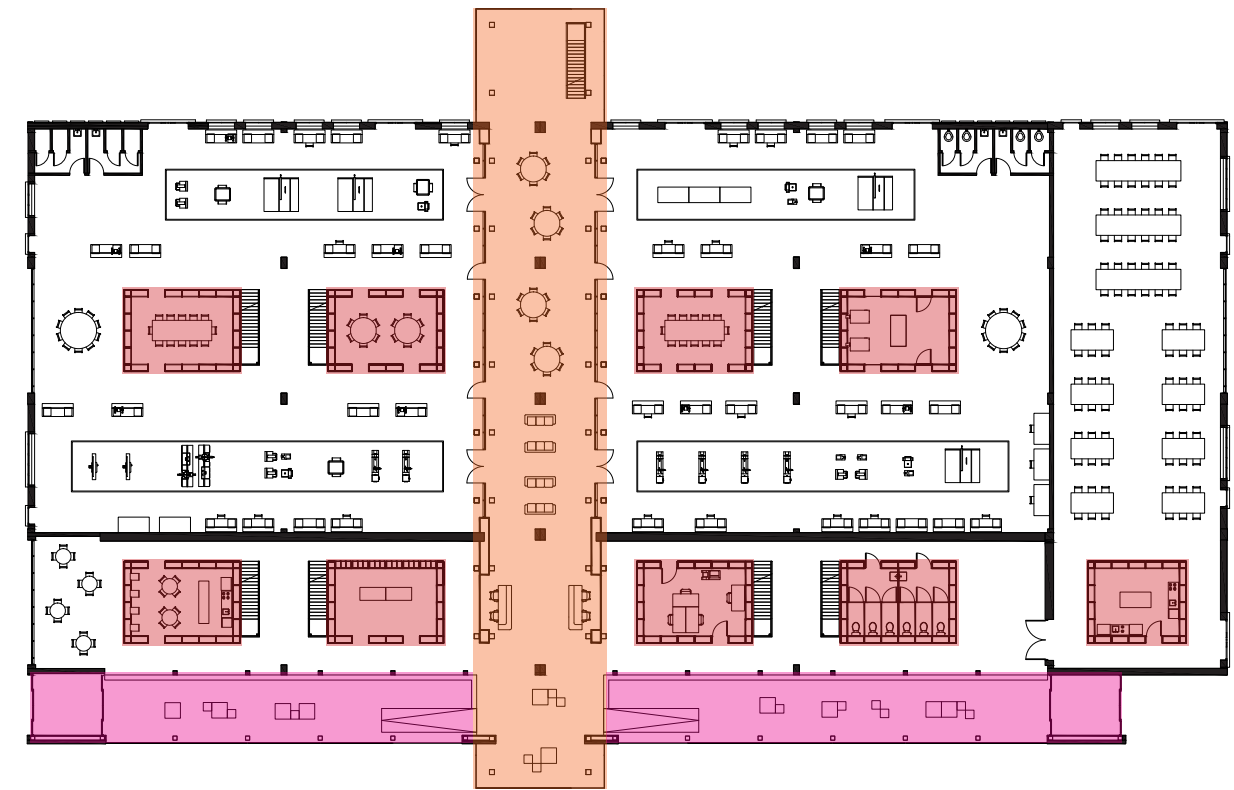
The Factory will remain to be the main building of the ensemble housing the Craftmanship Academy. The main interventions of this former production building are: the addition of a glass entrance zone at the public street side, a main hallway splitting the big volume and marking the building from the in- and outside and lastly the addition of frames to add multifunctional and adaptable spaces within the existing building.

# Craftmanship Academy - plan 1:200





Existing divisions in plan



Main interventions

The existing building layout formed the basis for the new plan. In the left image above the green lines highlight the used deviation. The continuous lines are concrete walls from the original design and these walls are retained in the design. The dotted line shows the location of the gap between the first building part and the second building part that was built 4 years after the first part was completed. A wall has been at this dotted line for a long time until in recent years it was demolished. From the location of this 'gap' the idea of the central hallway was created (highlighted in orange on the image to the left). This central hallway will function as the connecting heart of the building. Within its context it will display the concrete structure of the building and function as a landmark. The new public hall on the north of the existing building (highlighted in pink) functions as a public transition zone. In this area the public functions like the exhibition and the shop are located. Highlighted in red are the interior frames which provide multifunctional and adaptable spaces within the existing building. These frames could be removed without leaving a trace to the existing building. The frames close to the public hall hold the reception, a coffee corner, a shop and offices. The frames within the two workshops house meeting places and special facilities such as painting cabins.



# Craftmanship Academy - north facade 1:200

34

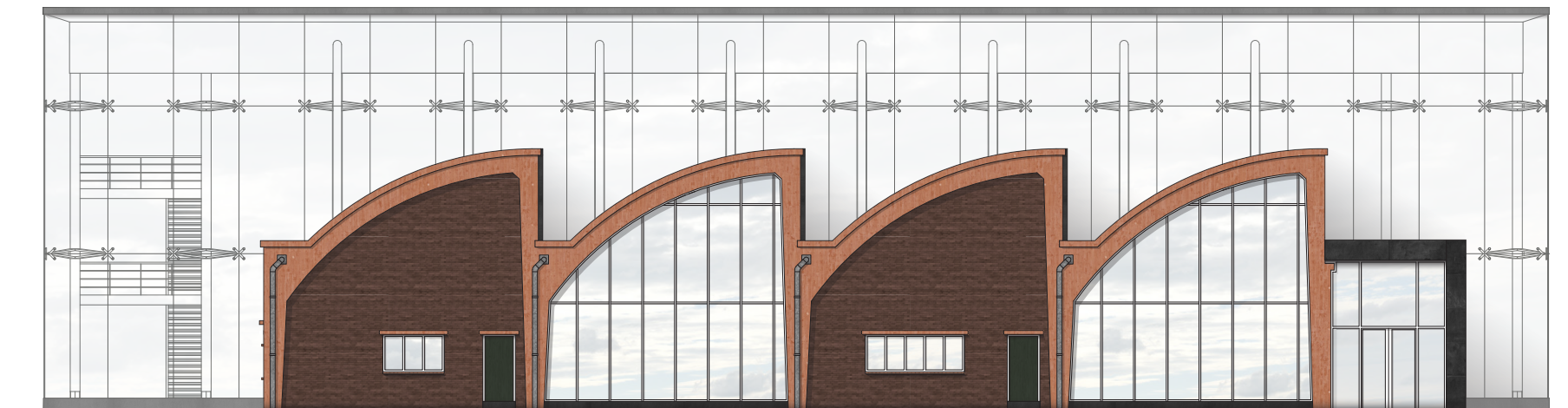


The existing facade is cladded with non original corrugated plating hiding the original concrete articulation of the facade. By removing these plates the concrete structure is revealed again creating a transparent facade. By the means of creating a transition zone a glass public hallway is connected to the existing concrete beam. The original building will still stick out above this new zone. Reconstructed windows will be placed in the window openings above. The location of the main hallway and both entrances (on either side of the north facade) reflect the position of the demolished storage rooms. At those places non transparent steel plating is used to emphasise the demolished volumes. Creating transparency and revealing the original concrete structure is the main aim of the interventions to this facade.



# Craftmanship Academy - east facade 1:200

35



The interventions to the facade facing the shelter include the removal of the infill of two shell segments. Large glass curtain walls are placed within the concrete structure allowing light to enter the building and enabling views from the interior to the green of the shelter. The two chosen segments reflect the interventions to the interior organisation by revealing the segments in which the frames are placed. While the frames may block daylight from the shell roof windows, in addition the curtain walls compensate for that.

# Craftmanship Academy - south facade 1: 200

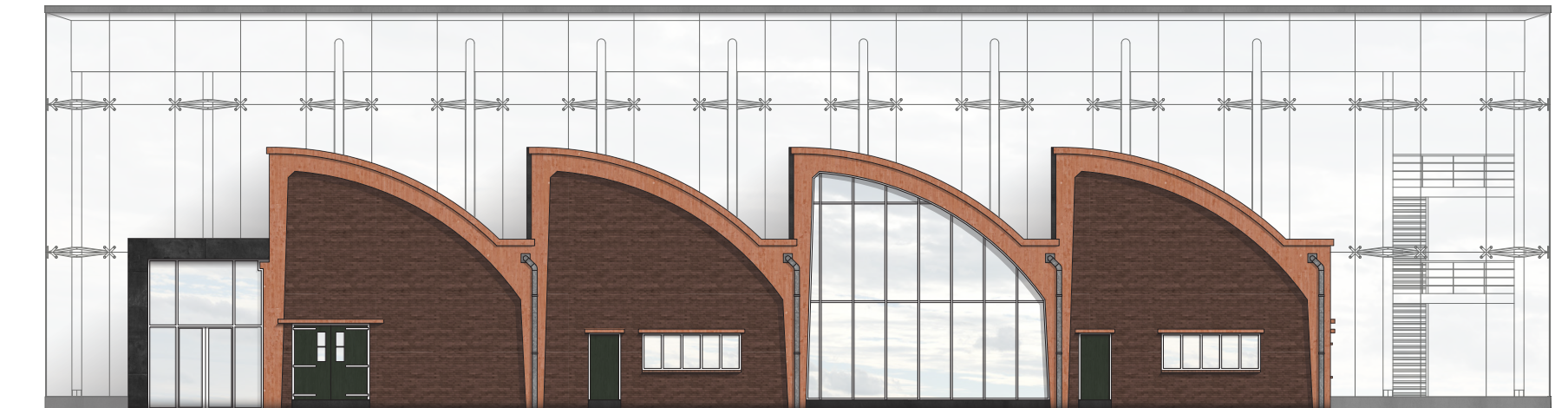
36



The south facade remains largely untouched. The brickwork will be restored and the non original services attached to the facade over time will be removed. The windows and doors will be insulated from the inside so the exterior expression is retained. The main change to this facade is the new glass hallway sticking through the south facade. This addition will show the new timelayer to this building and enable a view to the inside as well. It's positions reflects the location where the second part of the existing building was build against the first part. In terms of demoishment, just a part of the masonry and two windows will be demolished. The windows however will replace two non original windows in the same facade. The concrete roof edge will not be interrupted and connects both sides of the south facade through the glass hallway in the same way the structure does this in the interior.

# Craftmanship Academy - west facade 1:200

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The west facade resembles the east facade but just one segment contains the new curtain wall. The infill of the other segment is not removed to retain the original expression of the building at the north west corner while this corner is at the end of an important viewpoint to the building from the main road on the Hembrug terrain. The entrance volume at this corner is pushed back from the original west facade allowing the existing corner to stand out even more. In the background of the east and west facades, the rhythm of the new glass hallway which is derived from the rhythm and the dimensions of the shell segments is clearly visible.



# Craftmanship Academy - impresion of north facade

38





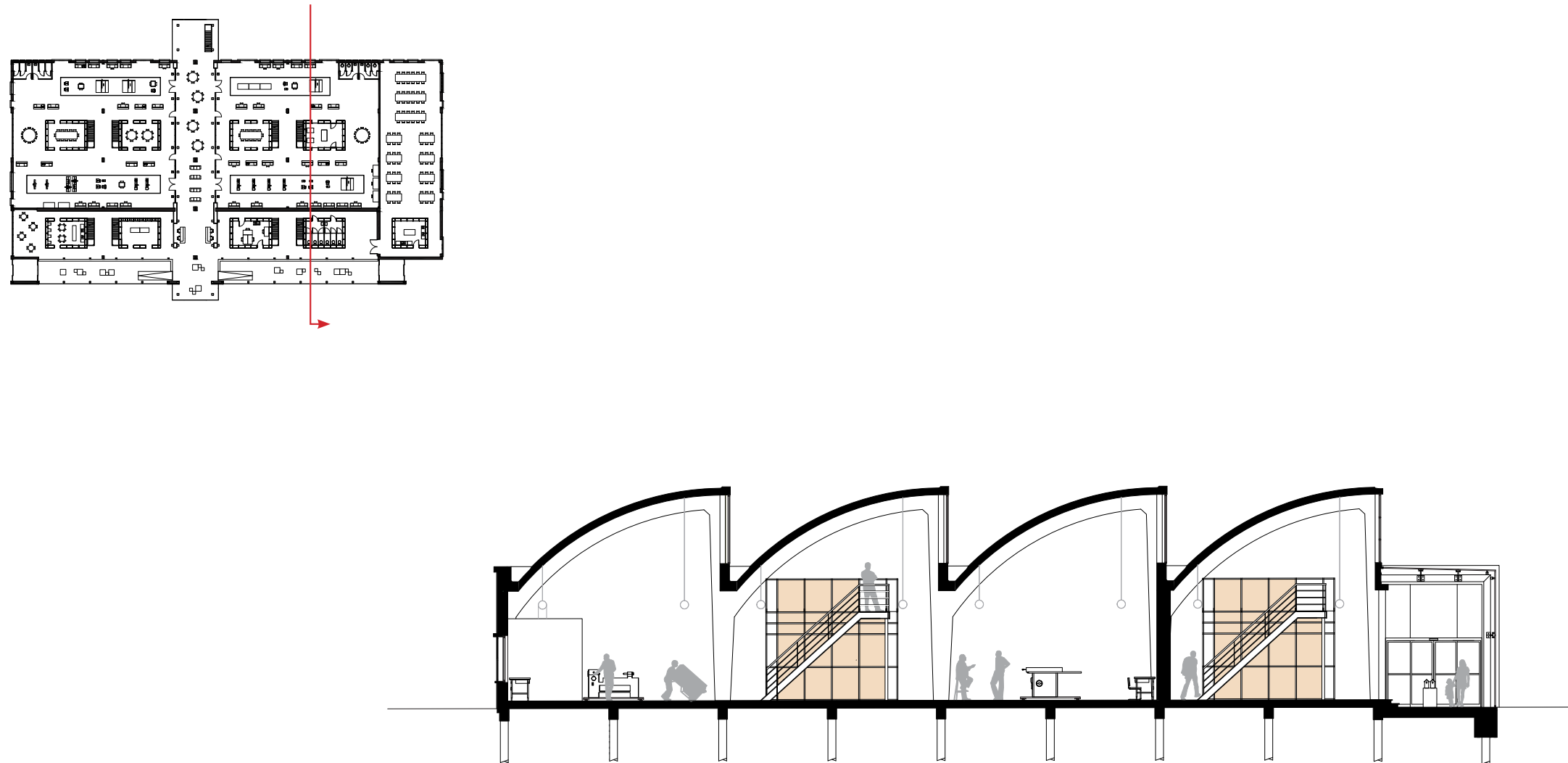
# Craftmanship Academy - impression of south facade

39



# Craftmanship Academy - section A, 1:200

40

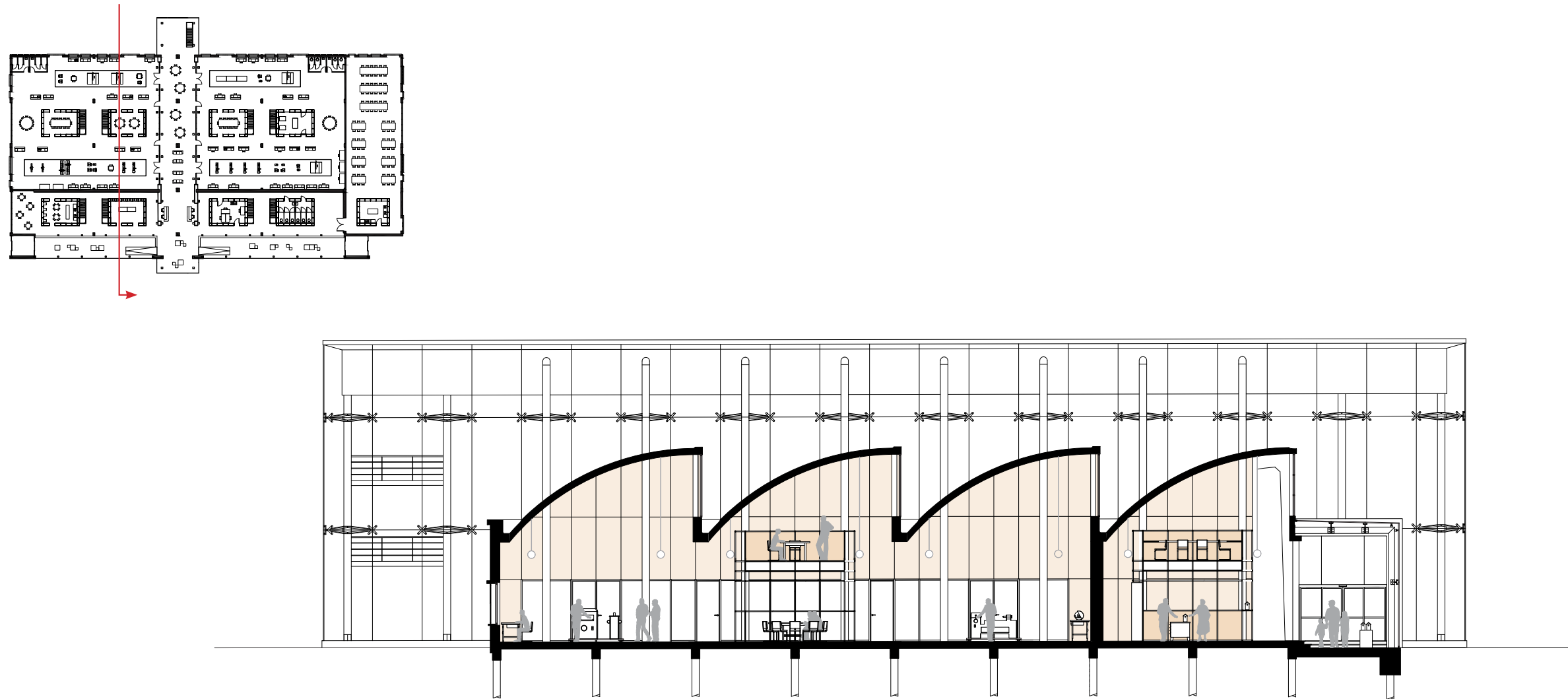


In this cross section the placement of the interior frames is visible. Each of the frames is placed in such a way that the beams and columns of the existing building are not touched. In this way the spatial experience is not interrupted too much while the continuation of the beams and columns is clearly visible. The height of the platform in the frames allows people to look through the shell roof windows and sitting down allows for a secluded environment underneath the ceiling. The relatively high railings attribute to this as well.



# Craftmanship Academy - section B, 1:200

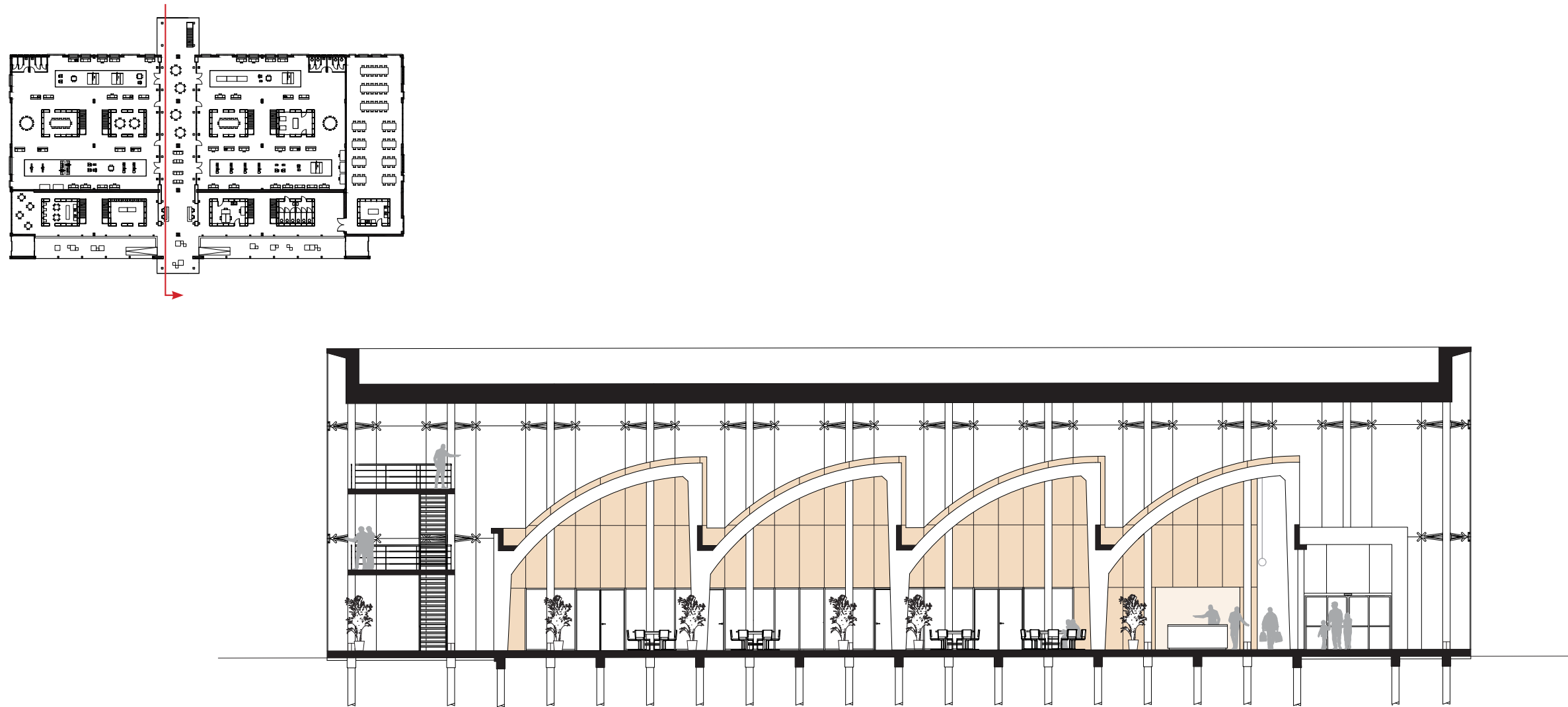
41



The frames are placed in the same grid system as the new square columns. This enables views along the frames through the horizontal window towards the workshops on the other side of the main hall. The dividing walls in between the workshops and the main hall are clad with wooden panels which are acoustically activated. The spacing of the panels correspond to the spacing of the horizontal window and the glass panes of the main hall.

# Craftmanship Academy - section C, 1:200

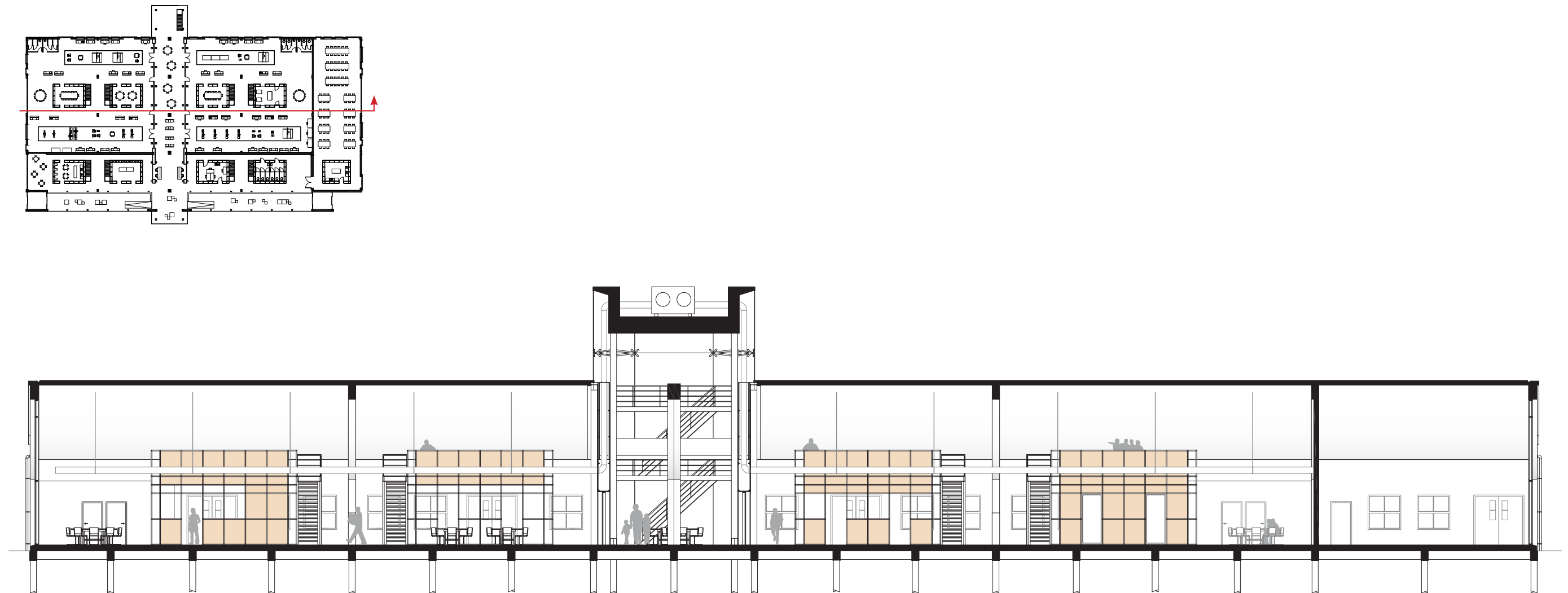
42



The central hallway forms an impressive space for the existing structure to be displayed in. It also houses two viewing decks at the south end. The sides of the workshops are closed off with walls clad with wooden panels. Above these walls glass panes allow light to enter the main hallway. This contrast in open and closed emphasises the typology of the existing building. Within the closed wall a horizontal window creates a connection while it ties together the three segments which form the workshops.

# Craftmanship Academy - section D, 1:200

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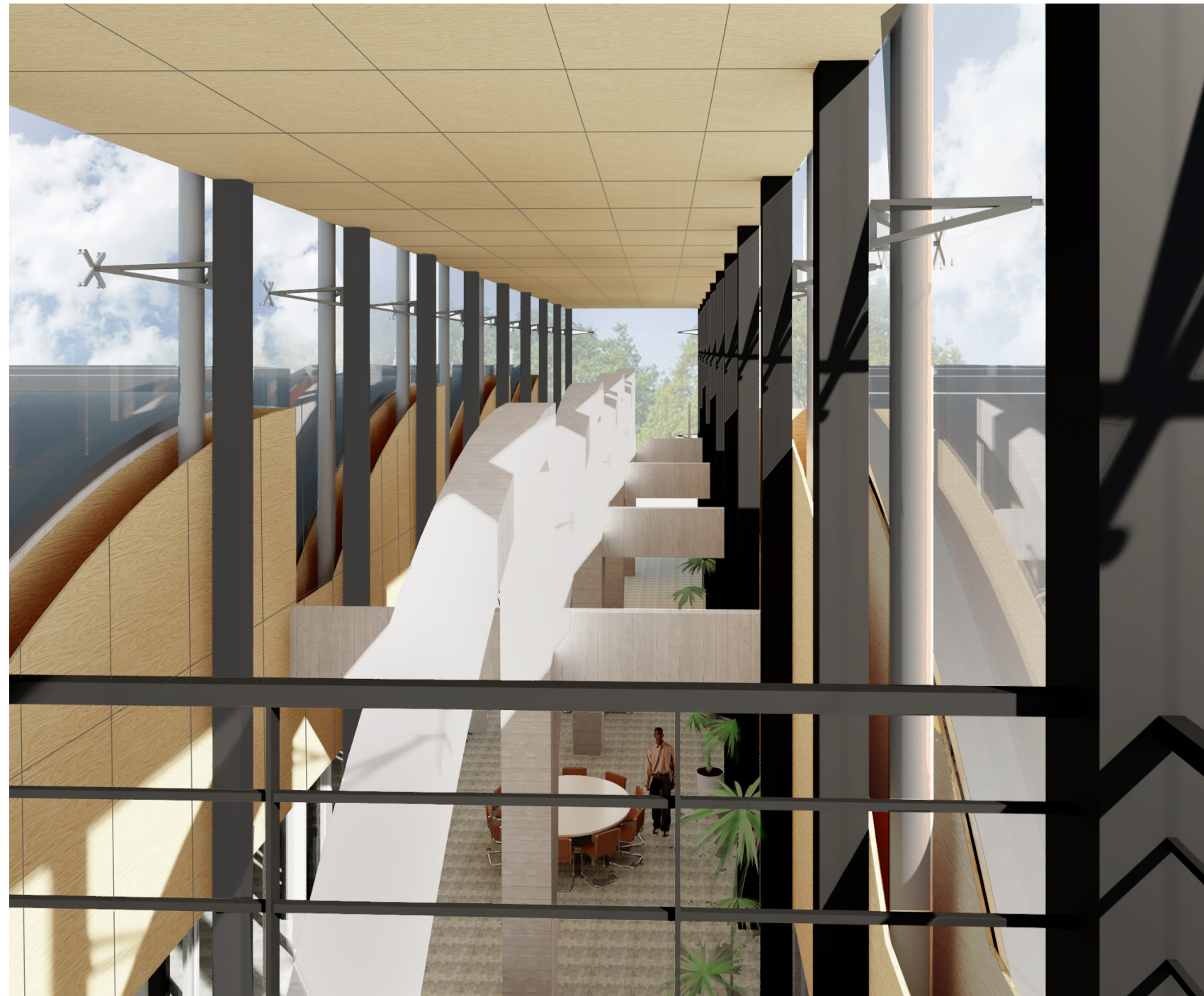


In this longitudinal section the relation between the main hall and the workshops can be seen. Although the main hall forms an impressive space, from within the workshop the closed walls allow the spatial experience of the workshops not to be diminished by the dominance of the new hallway. The horizontal windows however do allow a visual connection through the full length of the building. The frames are placed in such a way that the continuous columns are untouched. The staircases towards the platforms are placed around these columns for people to experience the shape of the shell typology while going to the platforms.



# Craftmanship Academy - impression of central hallway

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# Craftmanship Academy - impression of central hallway

45





# Craftmanship Academy - impression of platform view

46





# Craftmanship Academy - impression of public hall

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# Craftmanship Academy - impression of west workshop

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# Craftmanship Academy - impression of east workshop

49



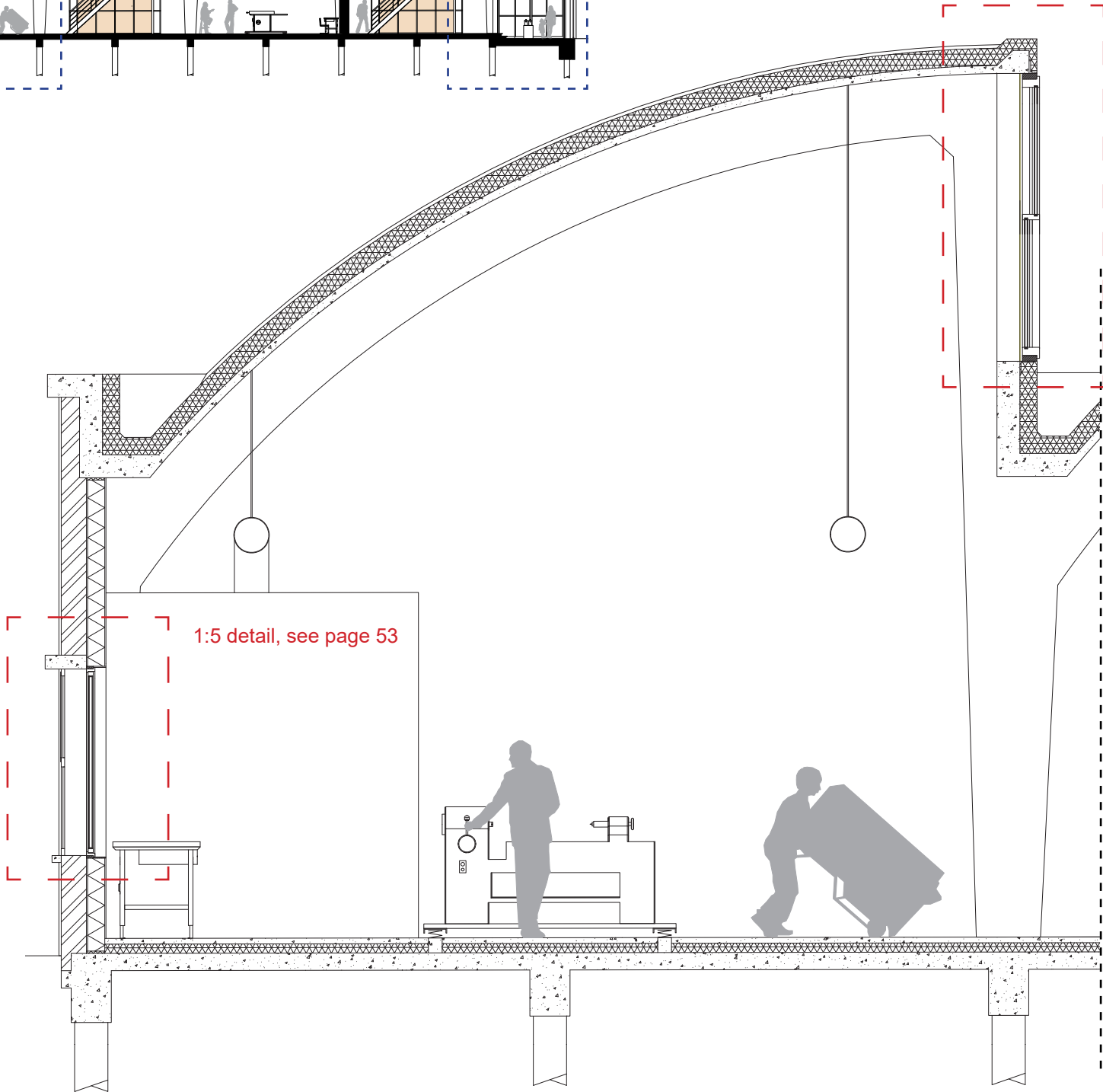
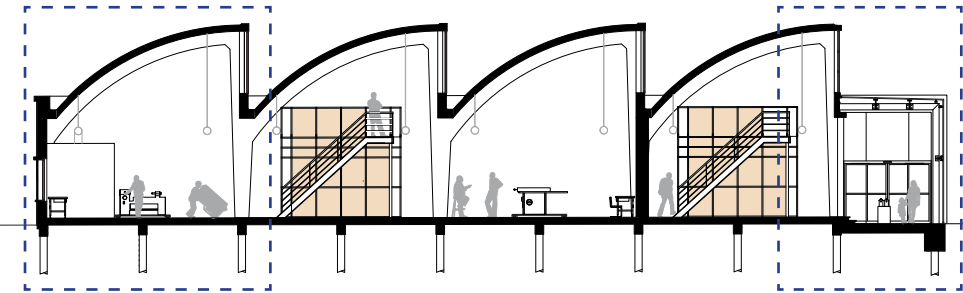


# Craftmanship Academy - impression of west workshop

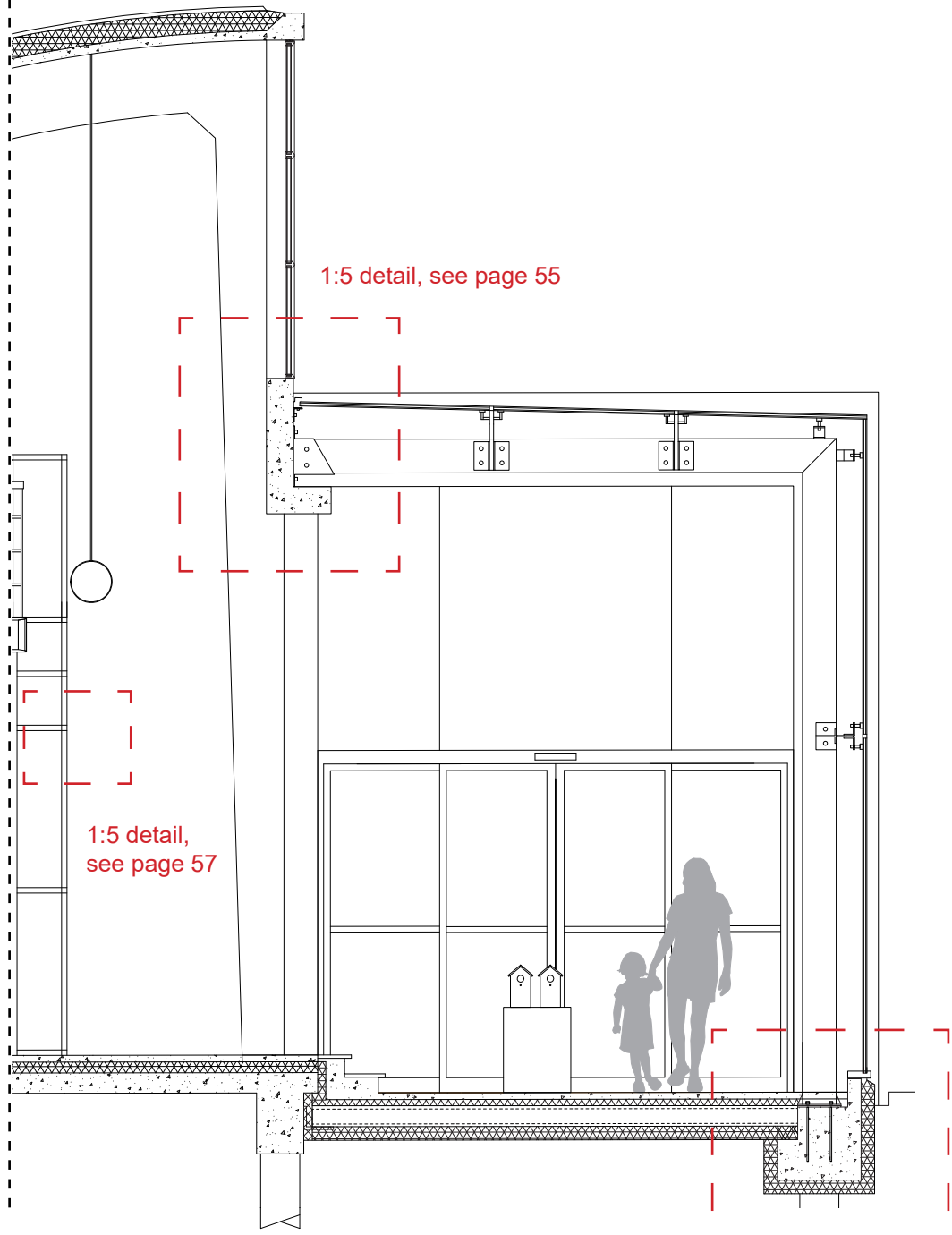
50



# Craftmanship Academy - 1:50



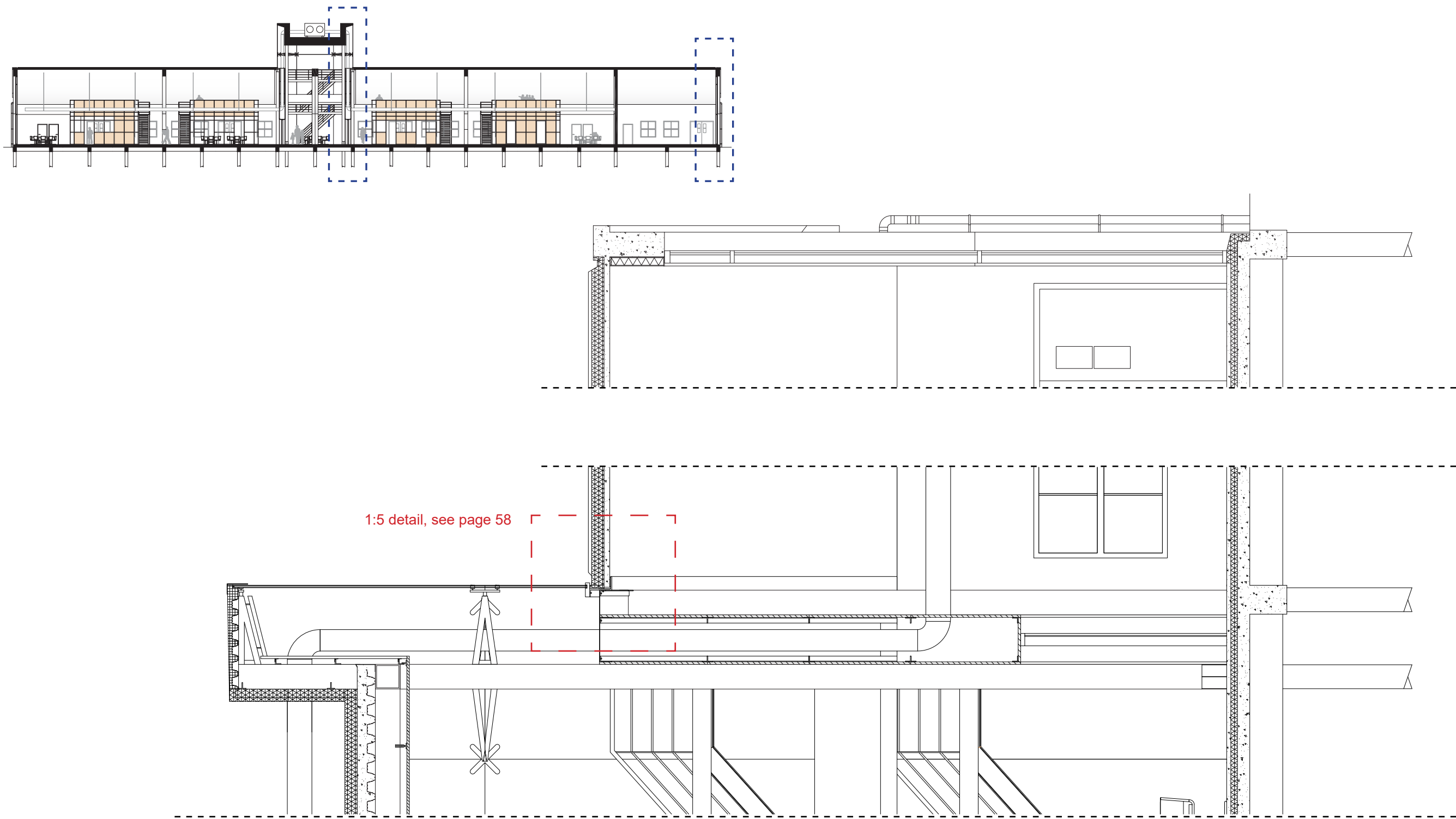
1:5 detail, see page 54



1:5 detail,  
see page 57

1:5 detail, see page 56

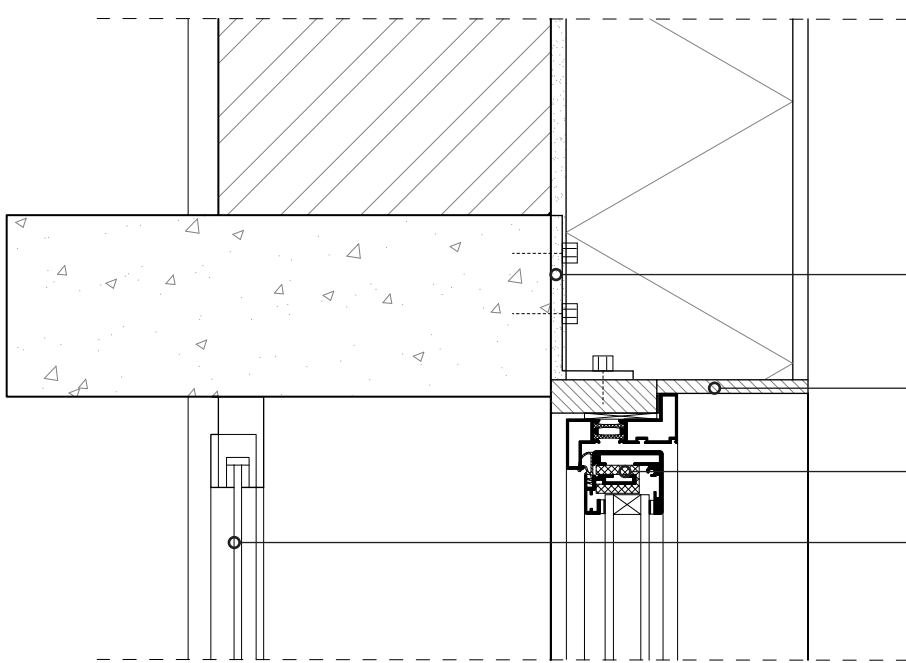
# Craftmanship Academy - 1:50



Note: the images are rotated 90 degrees against the clock in order for them to fully be displayed on this page.



# Craftmanship Academy - detail 1:5



Steel mounting hook

Wooden trim (painted white)

Insulated aluminum frame with double glazing

Existing steel window with single glazing

## Wall construction

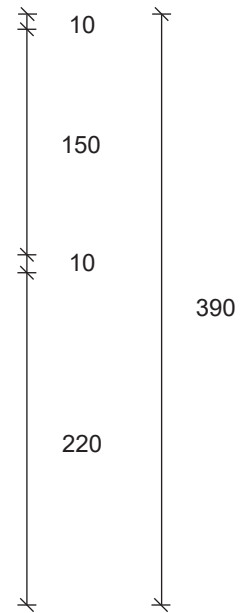
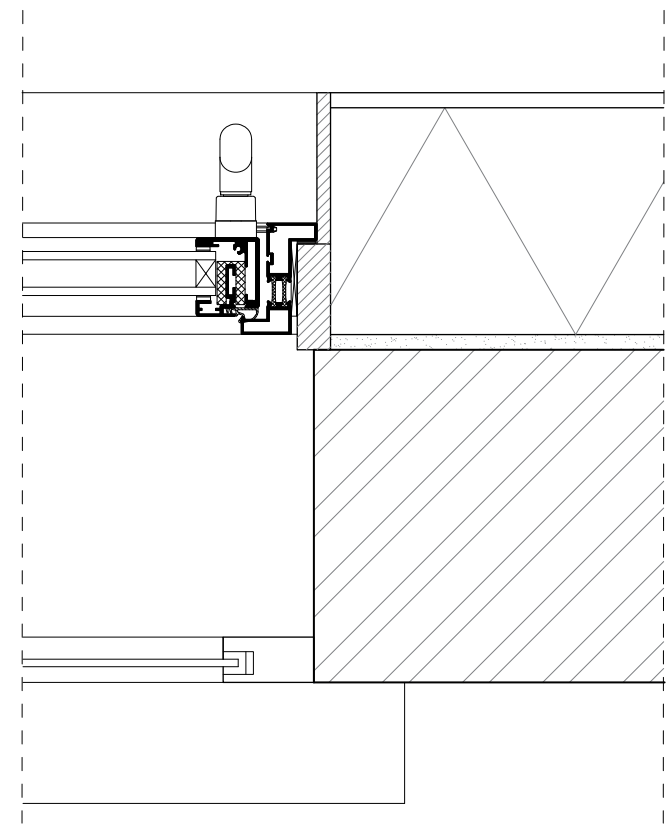
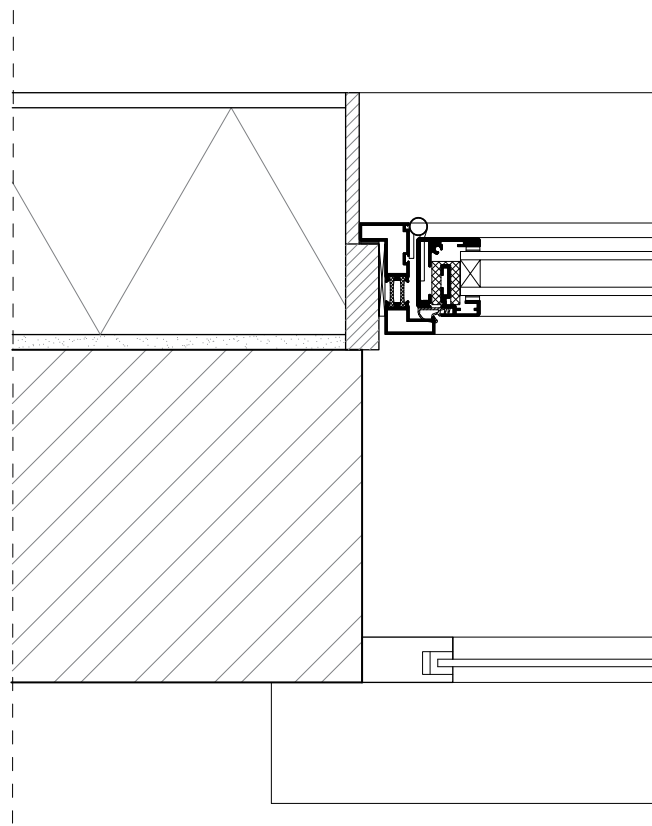
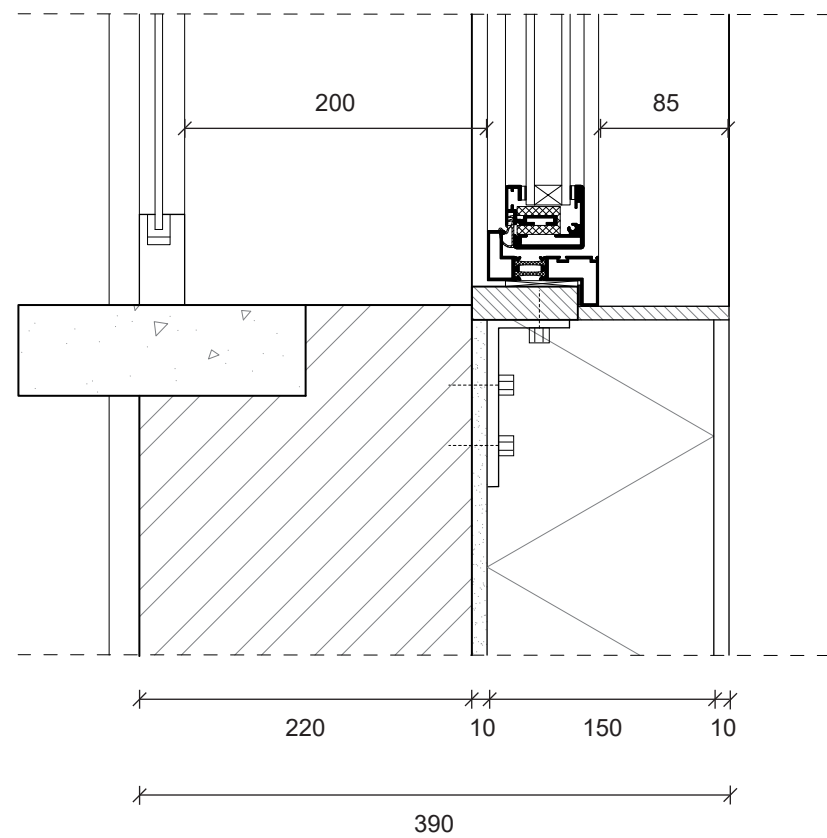
*Exterior - interior:*

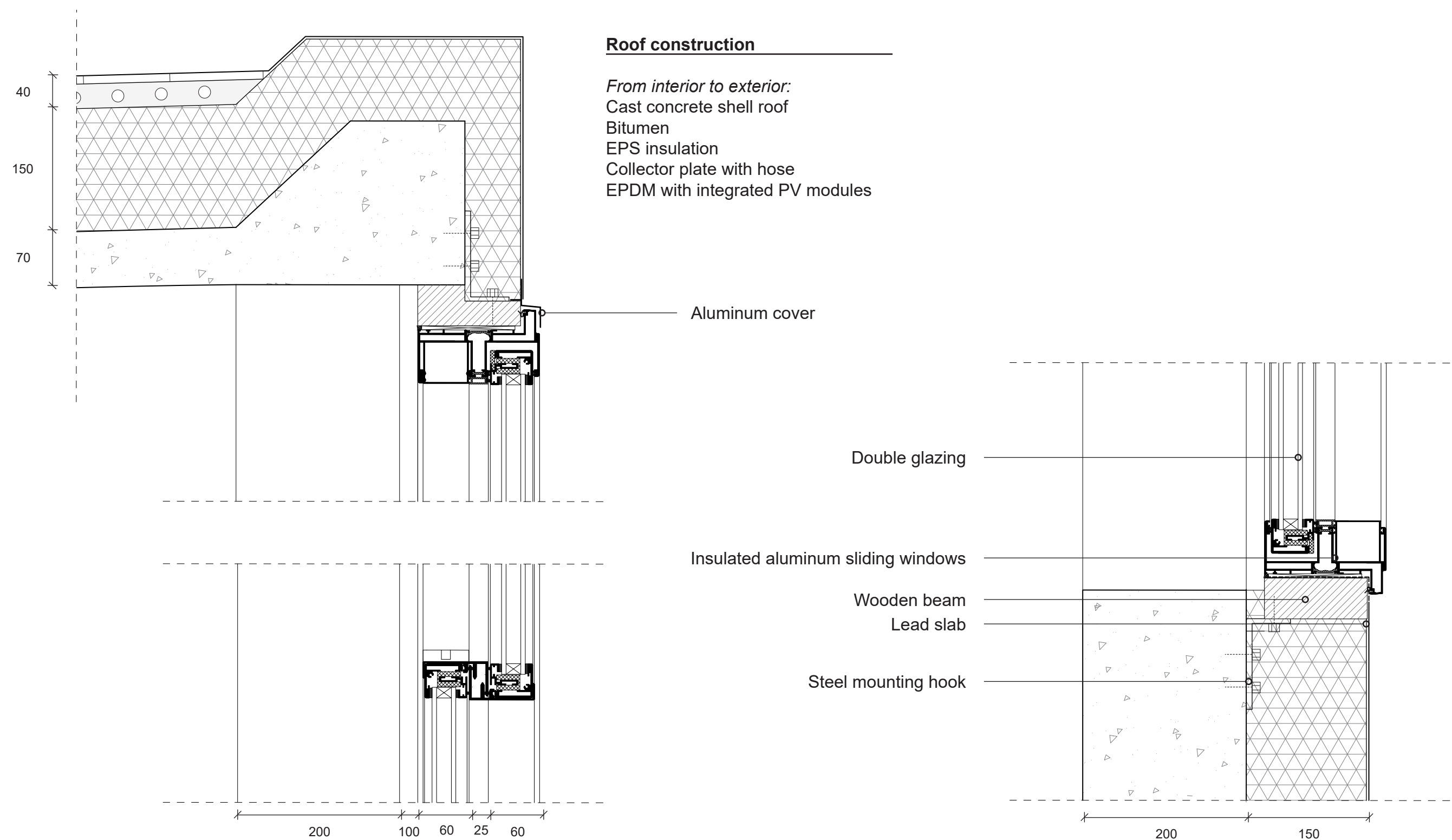
Brick facade (single brick stone)

Mortar

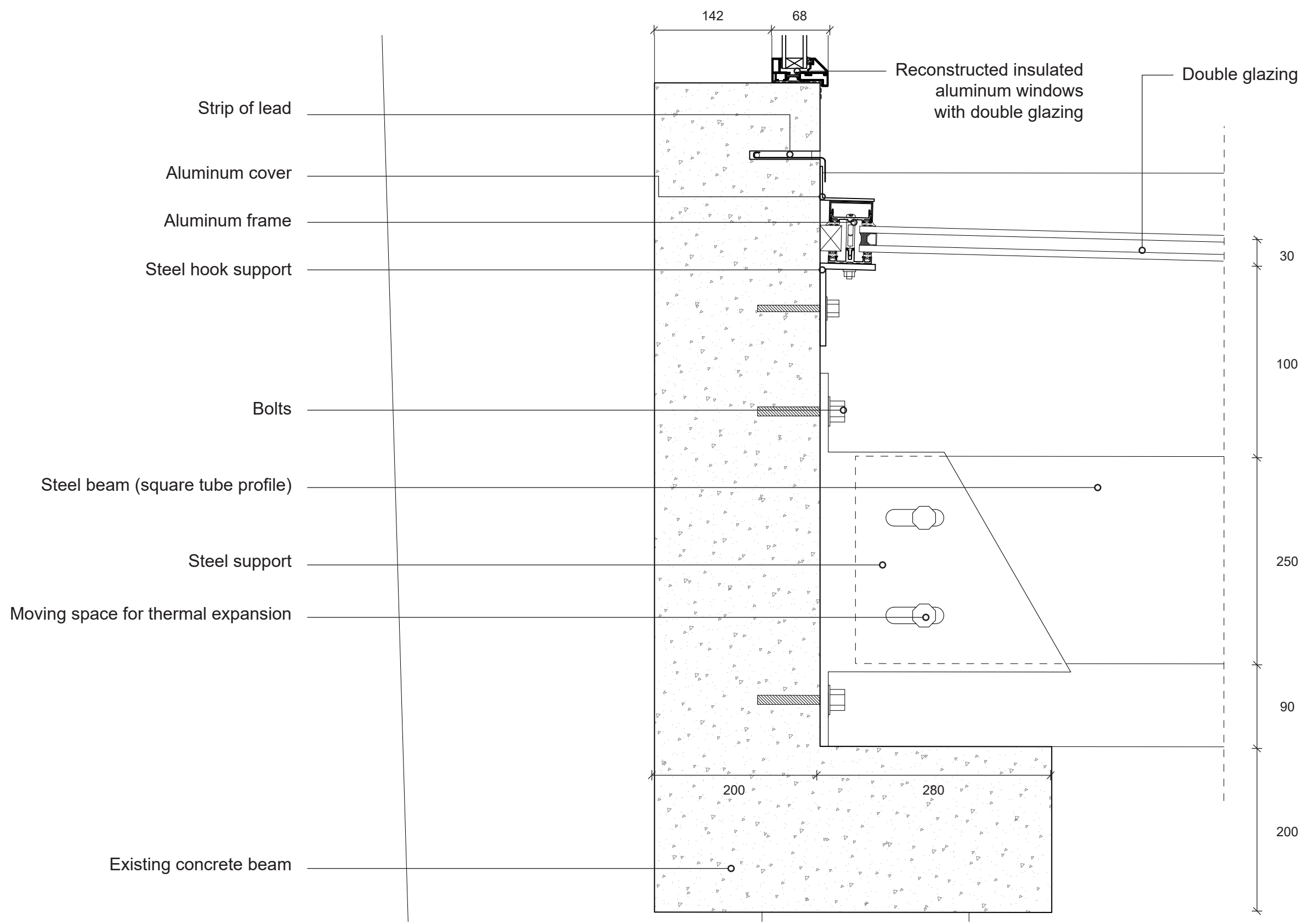
Multipor insulation

Acoustically activated render

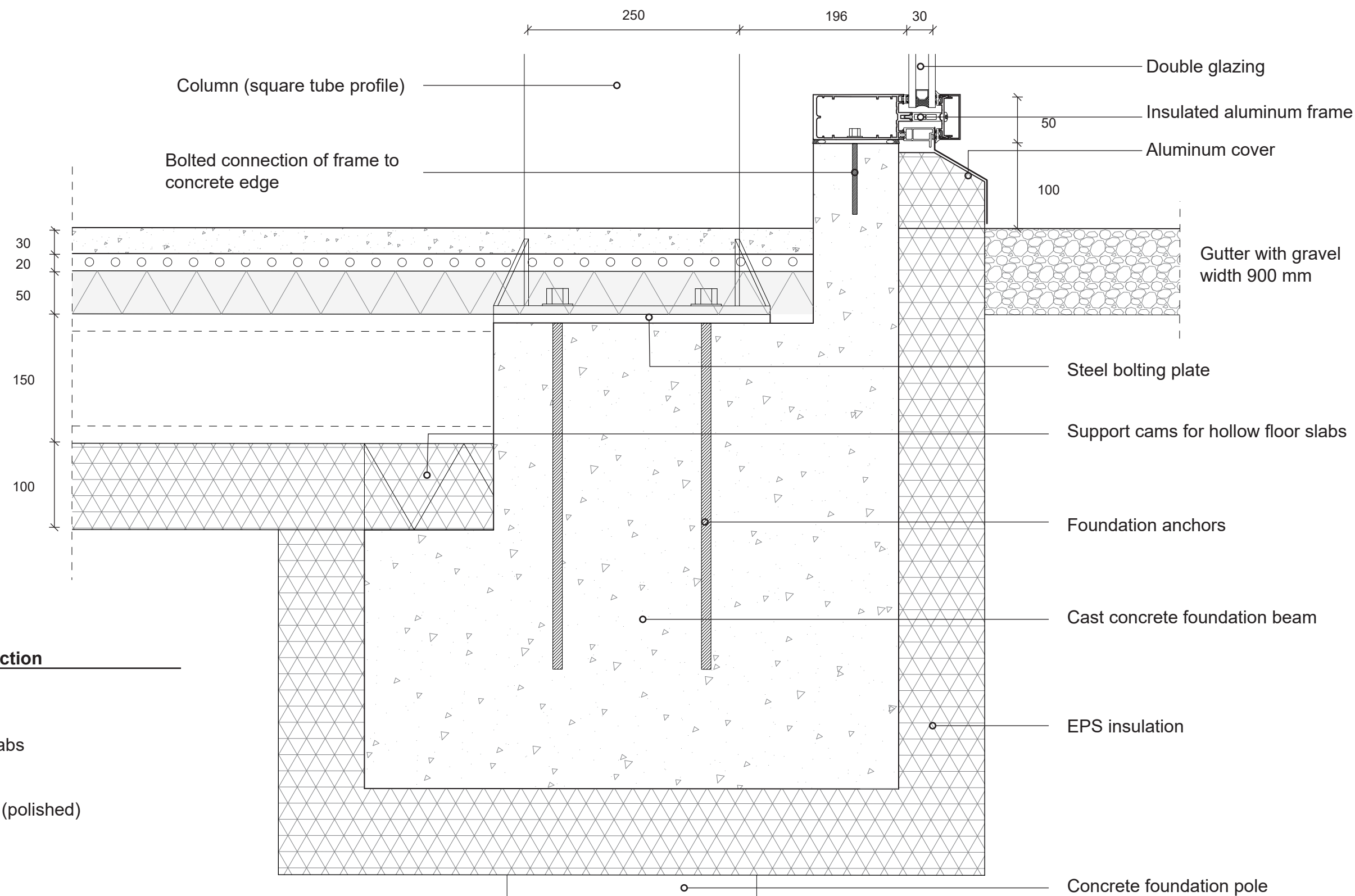


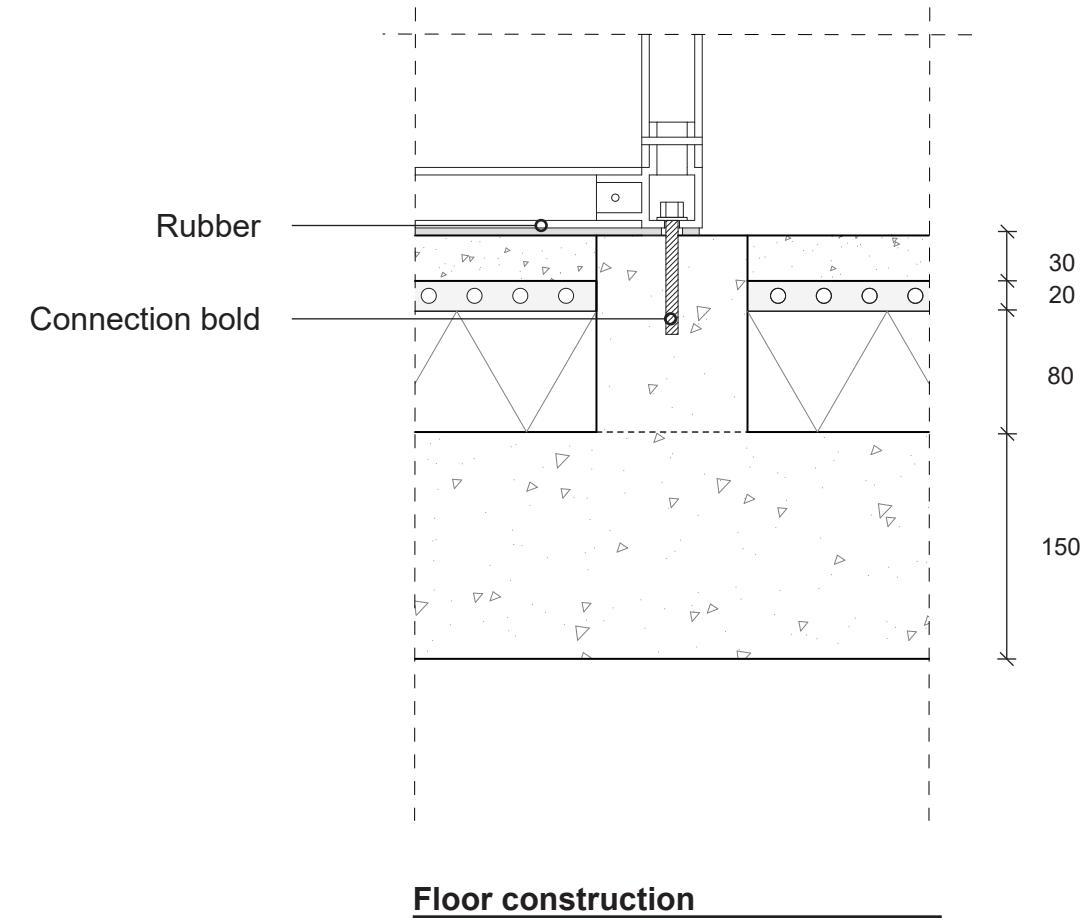
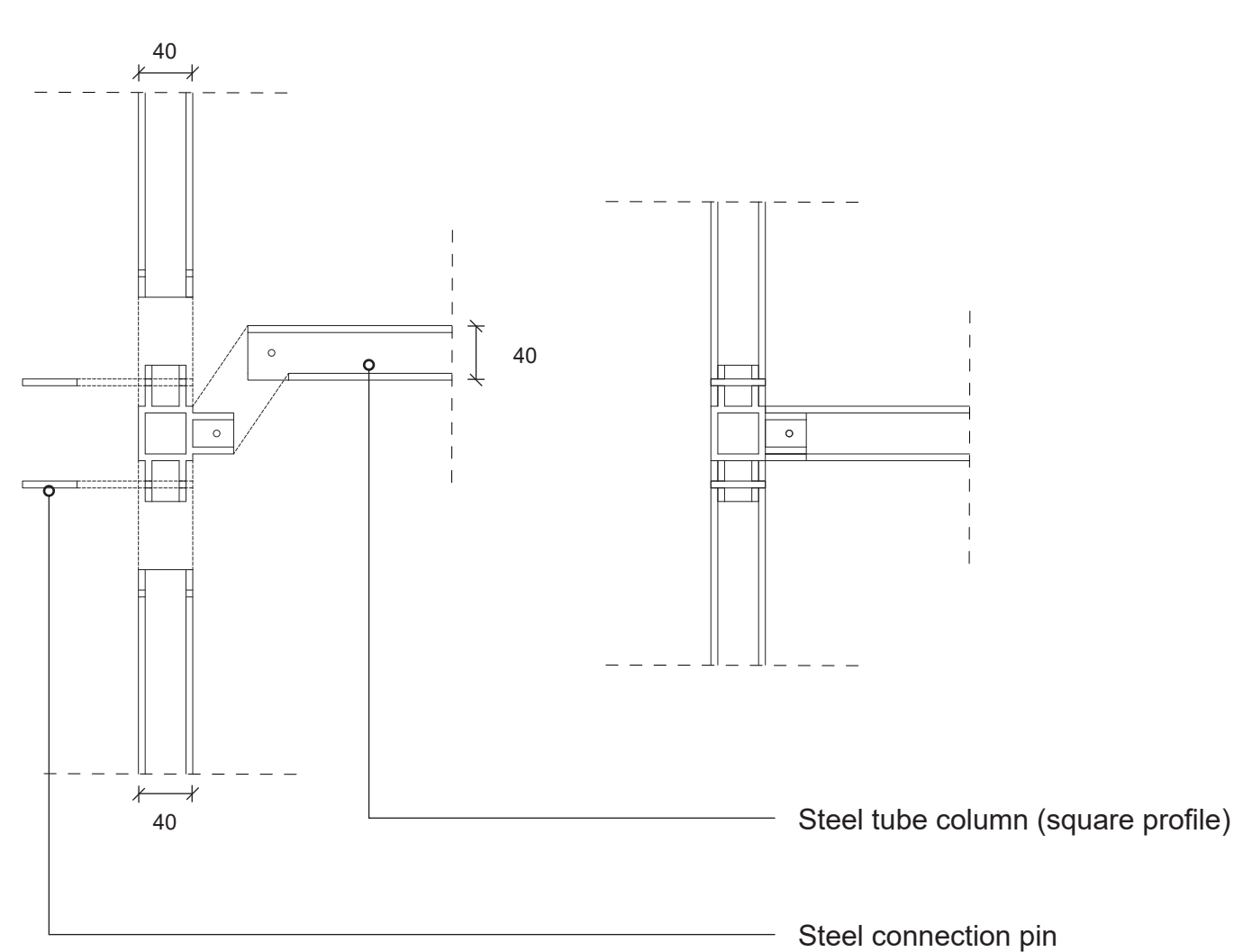


# Craftmanship Academy - detail 1:5





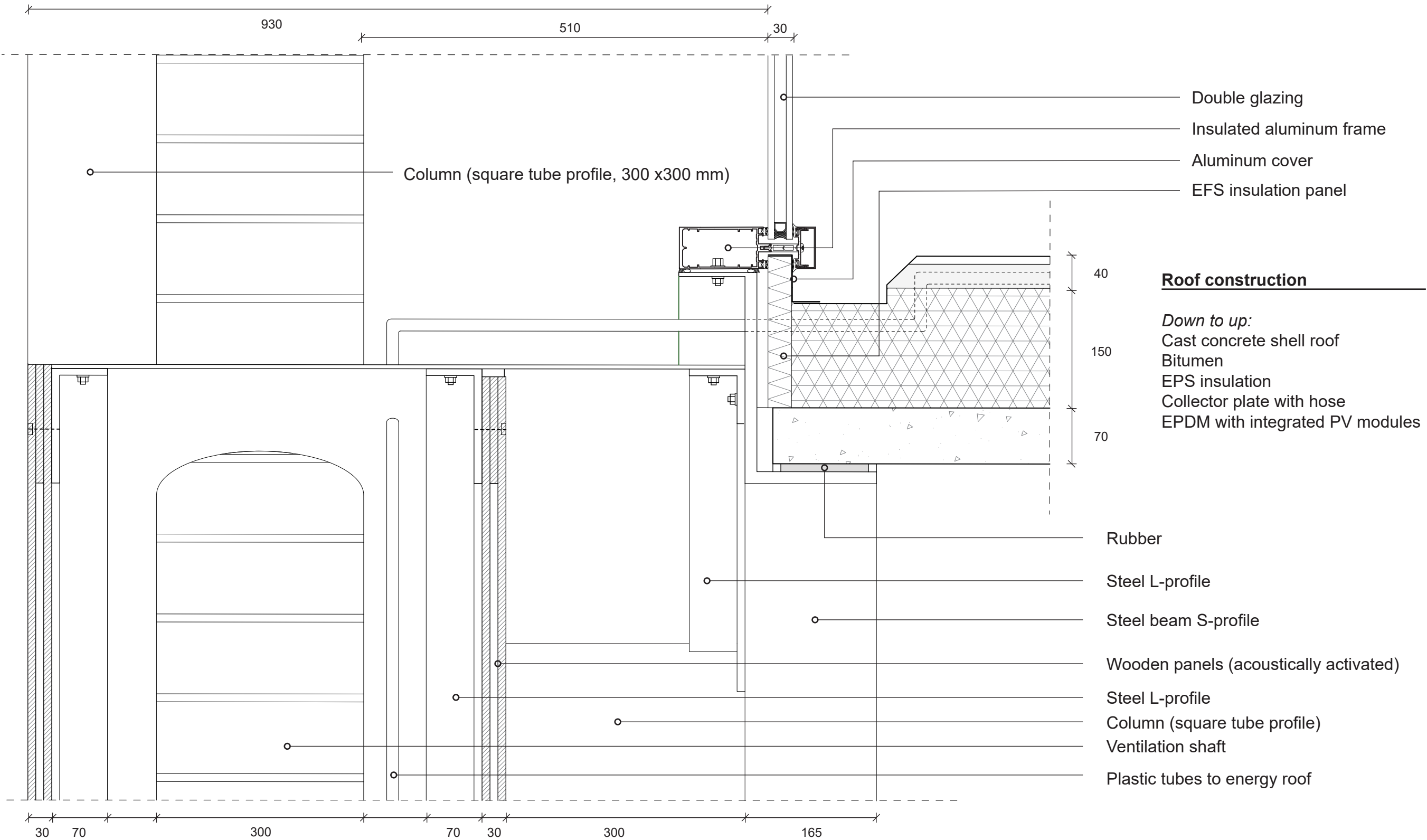




**Floor construction**

*Down to up:*  
Cast concrete floor  
EPS insulation  
Floor heating  
Concrete floor (polished finish)

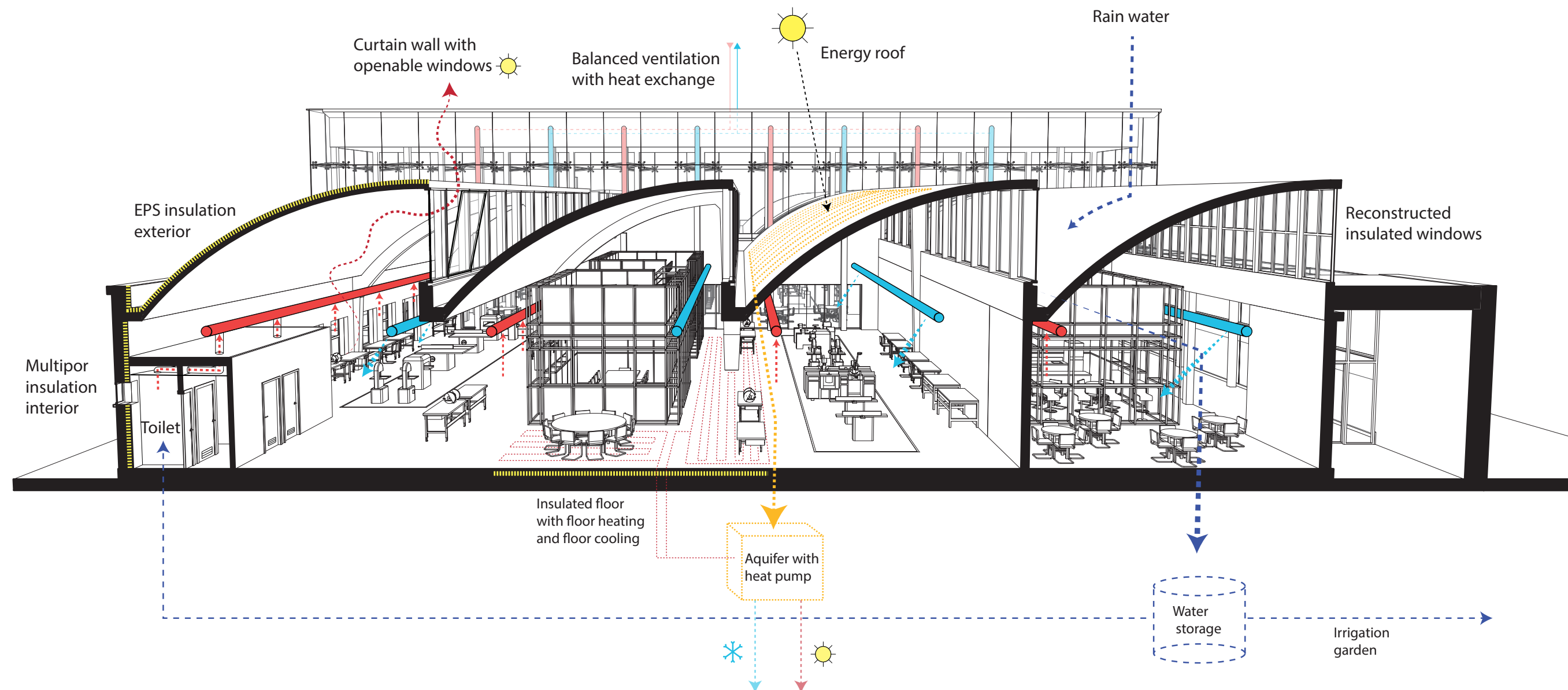
# Craftmanship Academy - detail 1:5





# Craftmanship Academy - overview of climate concept

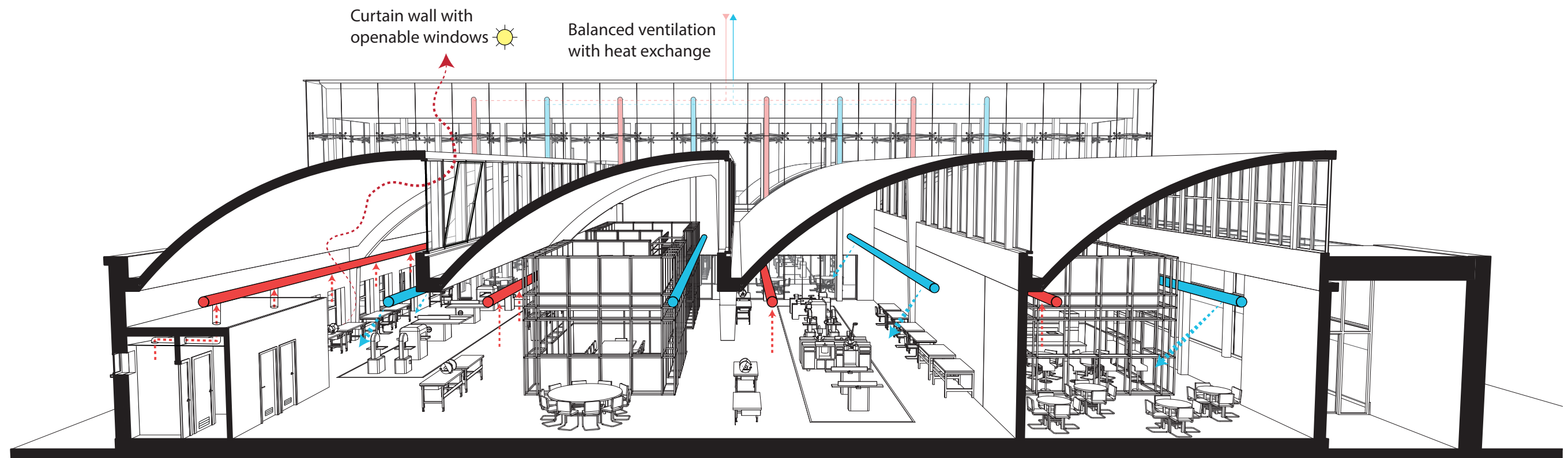
59



In essence the Factory is a dominating individual. This essence is architecturally strengthened in the design of the Craftmanship Academy and the aim is to emphasise this essence through the building technological concept as well by making the building self-sufficient. This means that the building should provide it's own energy, water, heating and cooling. Furthermore it should do so as sustainable as possible and the demand should be reduced by for example nsulating the existing (non insulated) facades.

# Craftmanship Academy - ventilation concept

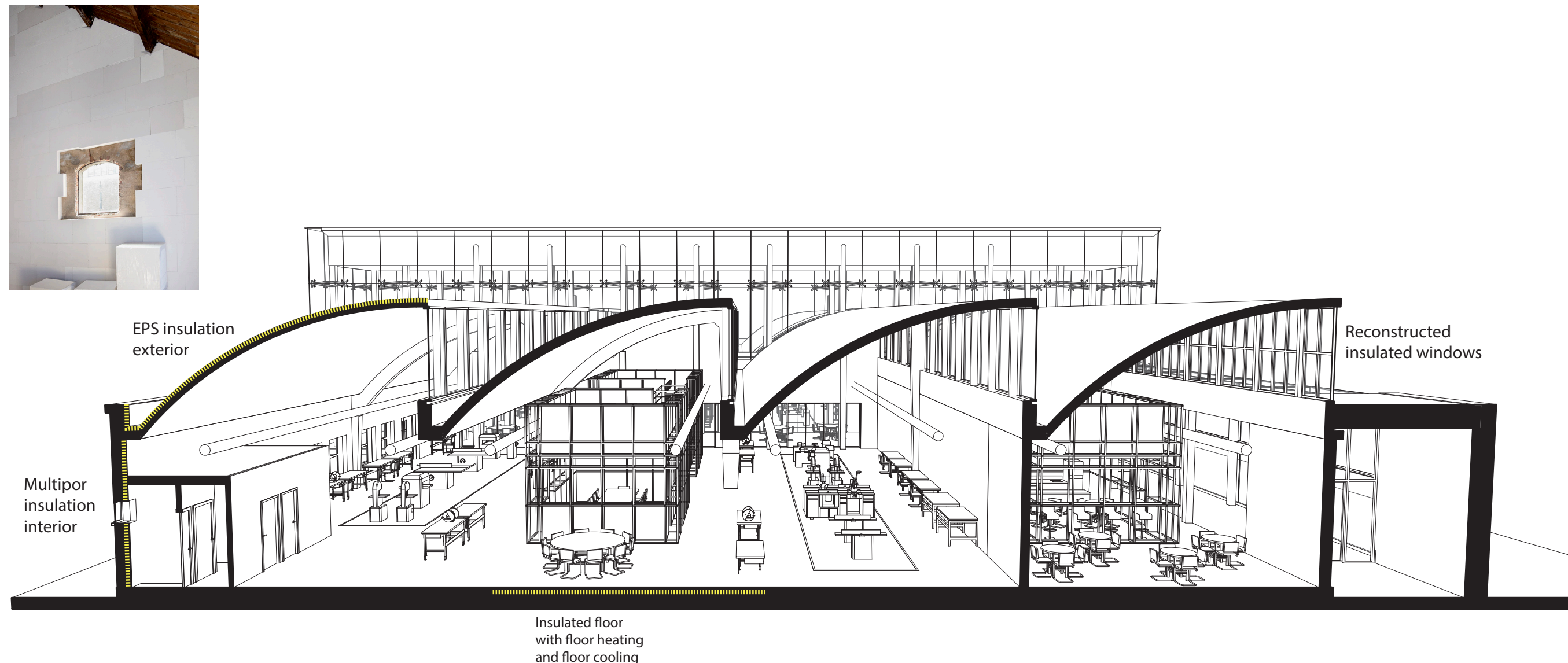
60



Currently there is no mechanical ventilation in the building. In order for a comfortable air quality and heat exchange to take place, a balanced ventilation system (mechanical) will be installed. The machines will be placed on the roof of the new central hallway and ventilation ducts will distribute and collect air through and from the spaces at either side. The ducts will run alongside the frames enabling enclosed spaces within the frames to be connected to the ventilation system. In this way spaces with special climate needs (like paint and spray booths) can be simply placed within the frames. Machines providing dust can be attached to special exhaust ducts. In summer openable windows will provide extra exhaustion of hot air.

# Craftmanship Academy - insulation

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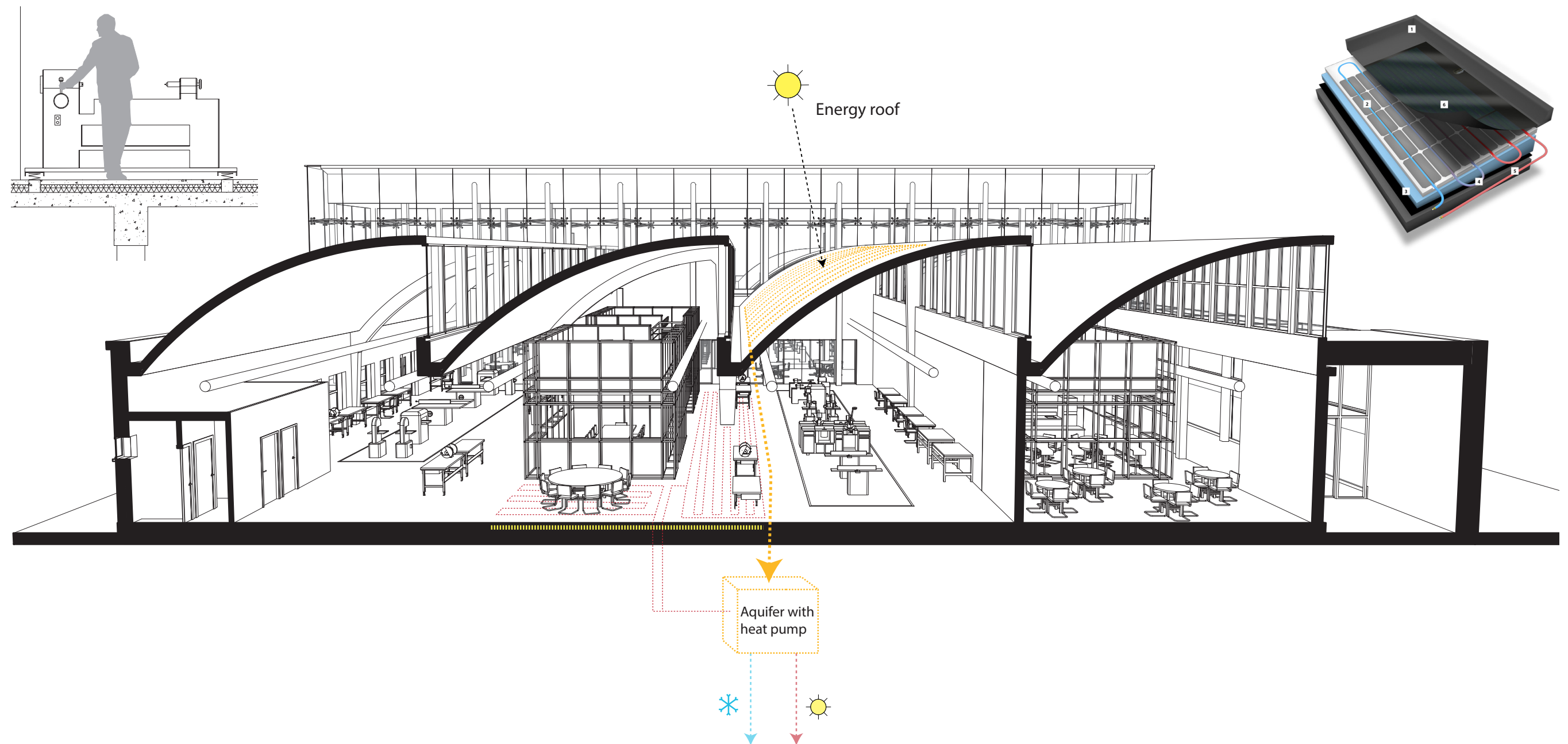


In order for the building to have a comfortable interior climate the building will be insulated. This will also reduce the energy demand drastically. The shell roofs will be insulated on the exterior so the existing ceiling finish (cast concrete) will remain visible. The floors will be insulated on top while there are no crawling spaces to insulate the floors from underneath. The walls will be insulated from the inside with Multipor insulation blocks. These blocks will be finished with plaster just as the current wall finish. On the scale of the building the 20 cm of interior insulation will not be very noticeable. The original windows in the facades will remain while new insulated windows will be placed on the interior within the insulation line of the Multipor blockwork. The non original shell roof windows will be replaced by insulated curtain walls placed on the exterior of the concrete structure to be in line with the insulation layer on the shell roofs. Some cold bridges will occur (at the connections of the walls and roofs for example) but on the scale of the building they won't have a big impact on the interior climate.



# Craftmanship Academy - heating

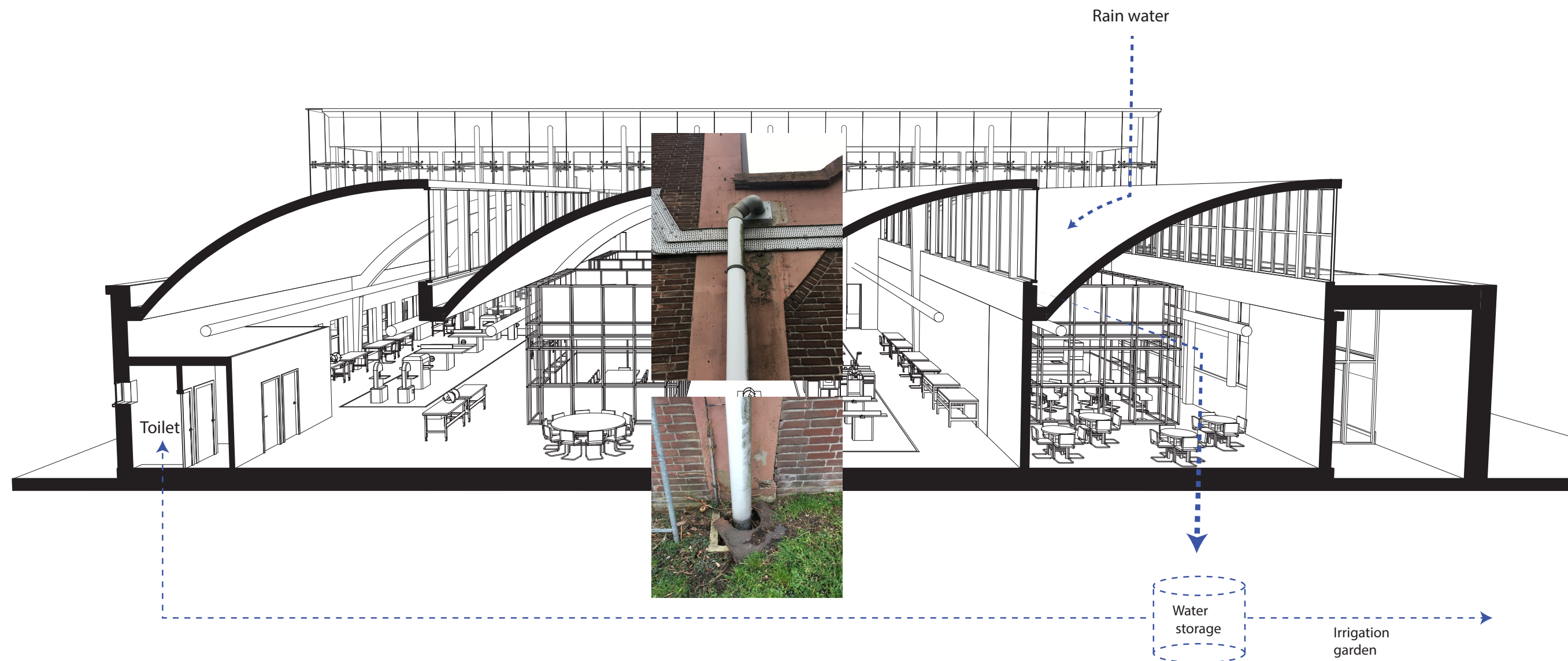
62



Within the newly insulated floors floor heating will be implemented. This system will be connected to an energy roof embedded in the newly insulated rooflayer. The sun provides heat in summer which can be stored through an aquifer with a heat pump. The heat can be recovered in winter to run through the floor heating pipes. Through the reversed principle the spaces can be cooled in summer as well. The machines will be placed on ridges on the floors so the floor heating will not be damaged and the heat can flow underneath the machines. The placement of the machines on ridges also allows them to be placed on vibration-free cams. Next to heat and cold, the energy roof also provides energy through the integrated PV modules.

# Craftmanship Academy - rainwater

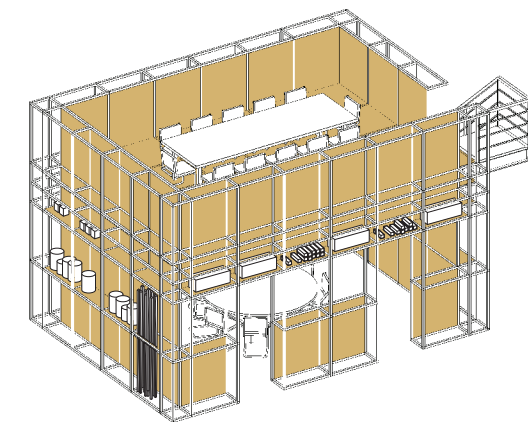
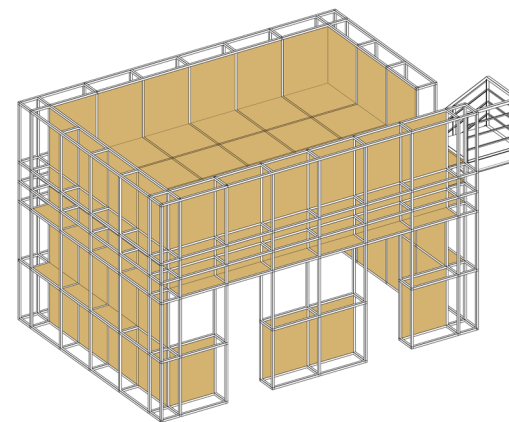
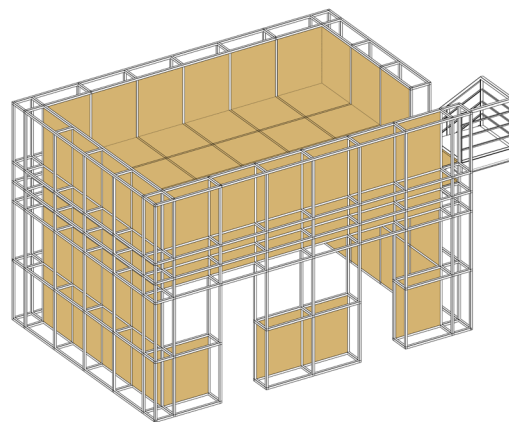
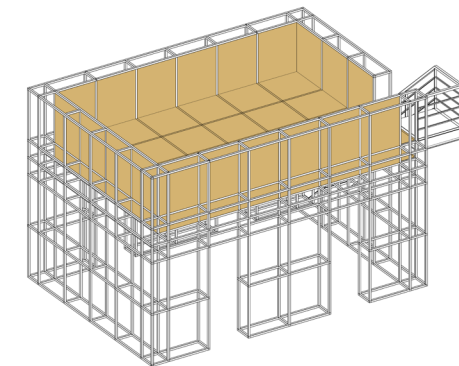
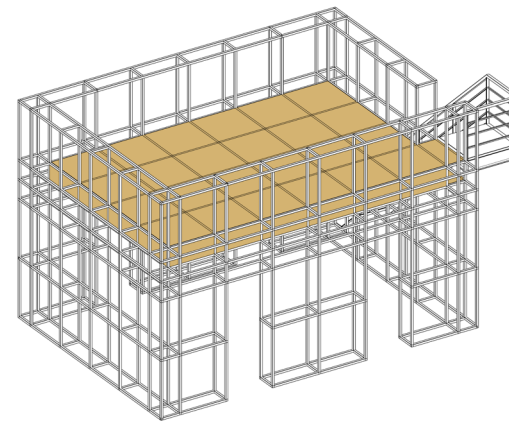
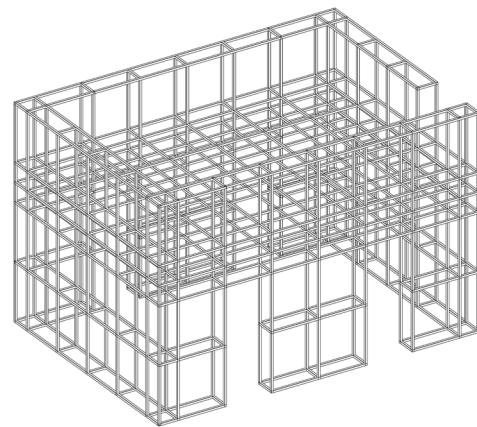
63



Rainwater will be collected through the existing gutters and rain pipes. It will flow to buried watertanks underneath the lawns on the east and west side of the building. Here water is stored and filtered to be used again to flush the toilets or irrigate the gardens..

# Craftmanship Academy - construction of frames

64

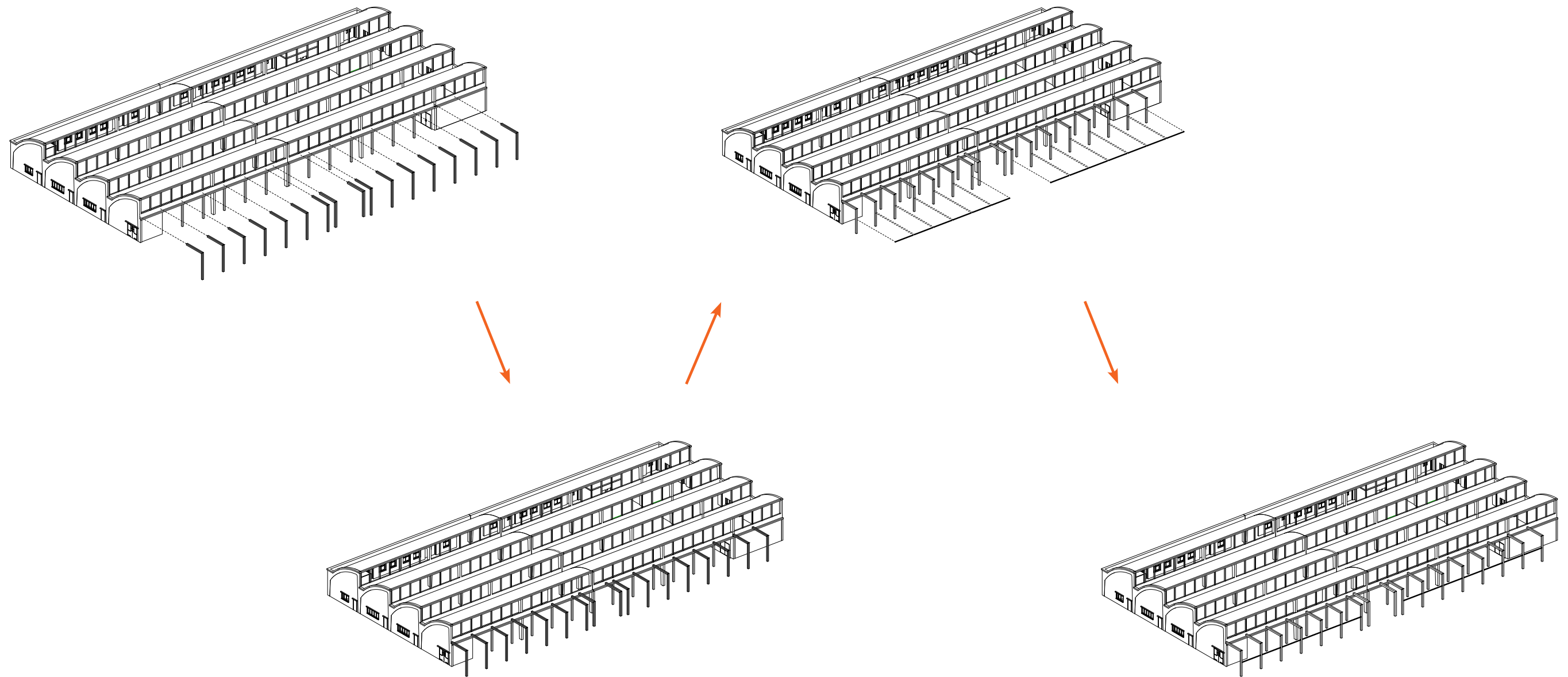


All frames will have the same basis construction consisting of square tubes (40 mm by 40 mm). These tubes can be simply be assembled trough an 'pen-system' (see detail 1:5). All frames will get a platform and a railing but other than that the infill of every individual frame is adaptable to the needs of the users. Three different sizes of wooden panels allow adaptability of the frames. The outer frame of the dubble framed walls will always remain without infill so the transparant character of the frame will remain visible. However, horizontal panels can be attached in order to create storage space. The frames can be completely dismantled and reused in other projects once the need for the frames is no longer present.



# Craftmanship Academy - construction principle of public hall

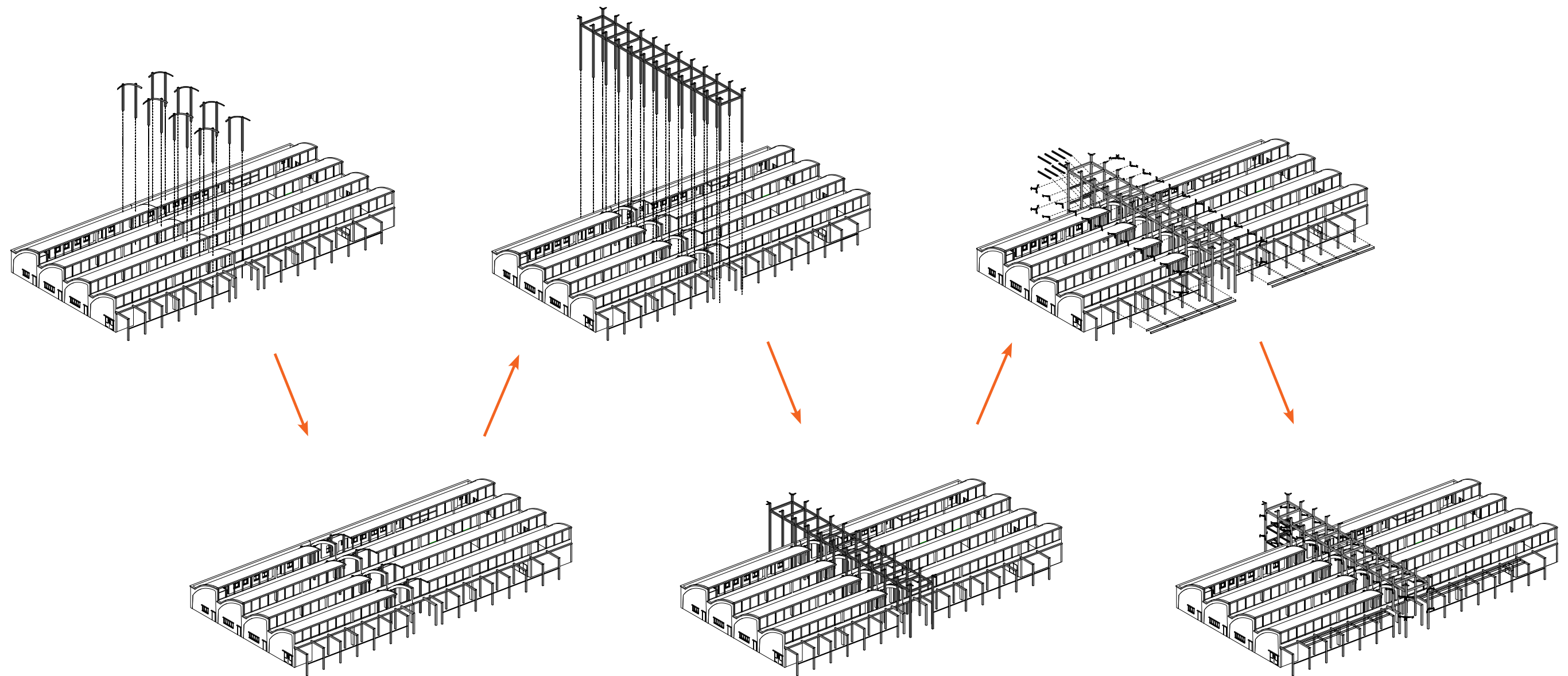
65



The structure of the public hall consist of steel columns with beams connected to the existing concrete beam on the north facade of the building. The beams and columns will be welded together to create stability in one direction. Horizontal beams welded in between the colums will provide stability in the other direction. This structure could be completely removed if nessecary leaving hardly any traces to the building.

# Craftmanship Academy - construction principle of central hallway

66

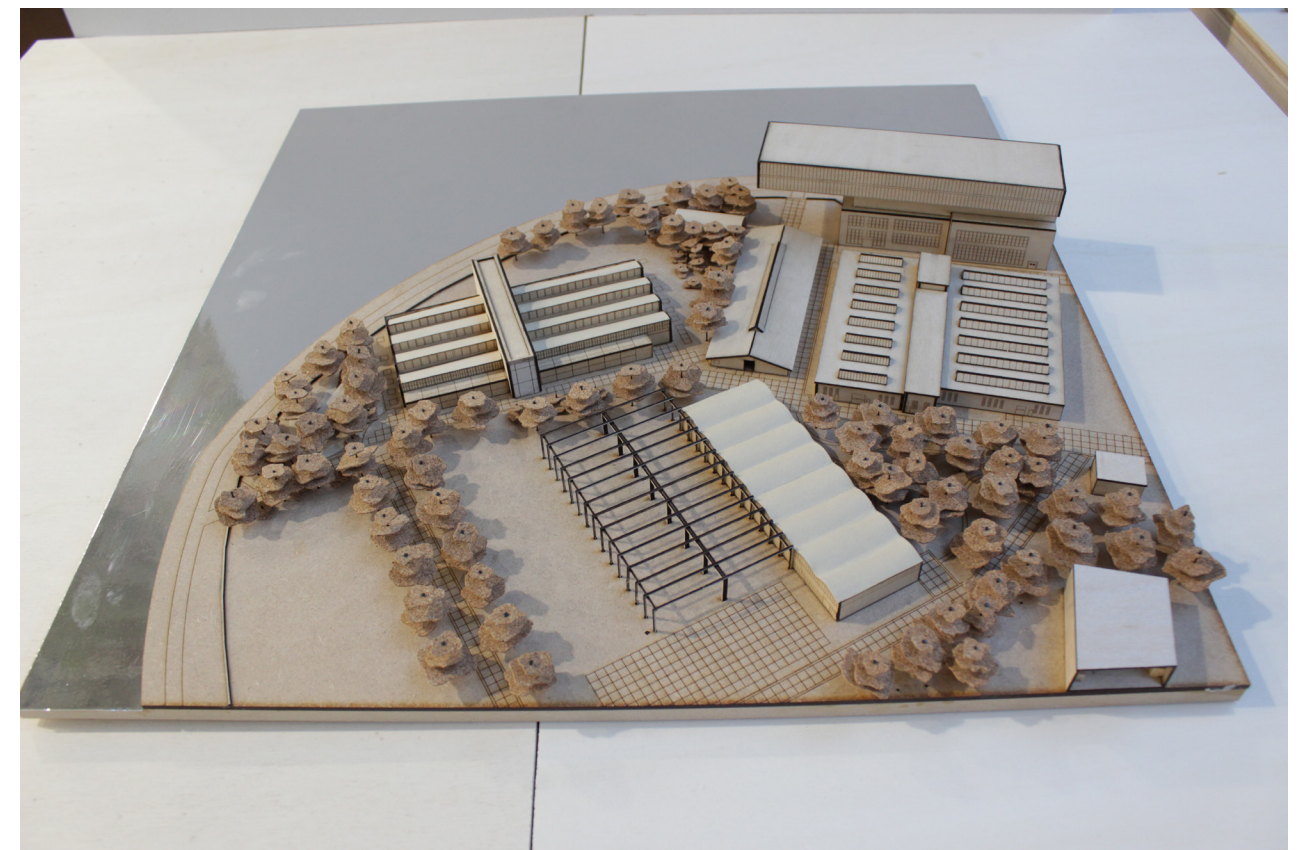
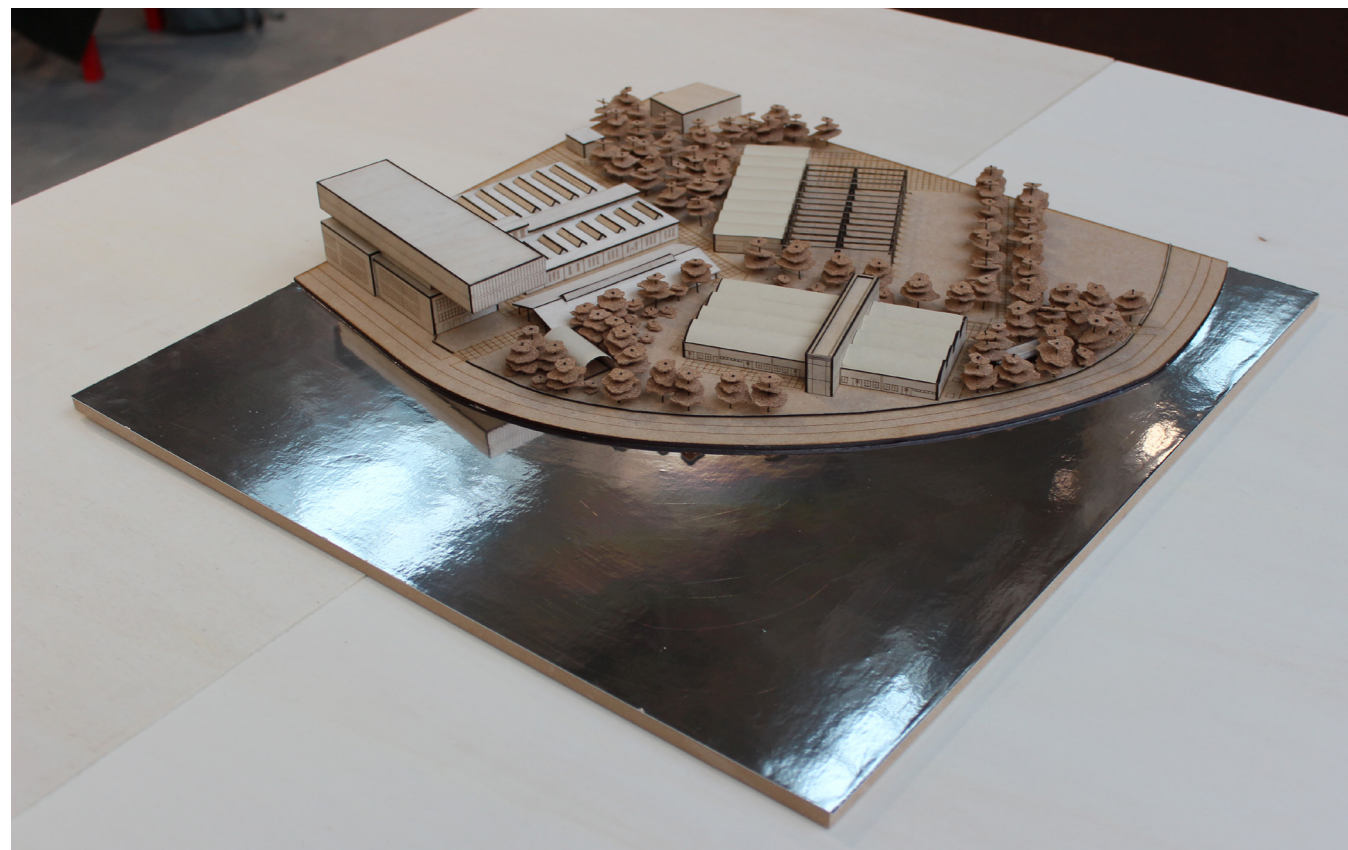


In order for the central hallway to be constructed part of the shell roofs have to be demolished. A structure of columns and bended beams holds the cut shells. These columns will be placed on top of existing foundation beams. Secondly a structure of square tube columns and beams (with welded connections for stability in all directions) will be placed within the newly created space on top of new foundation pillars. In this way two structural systems (that of the existing building and that of the new hallway) are standing next to each other allowing the central hall to be removed if once nessecary without demolished the remaining parts of the shell roofs.



# Physical model - 1:500

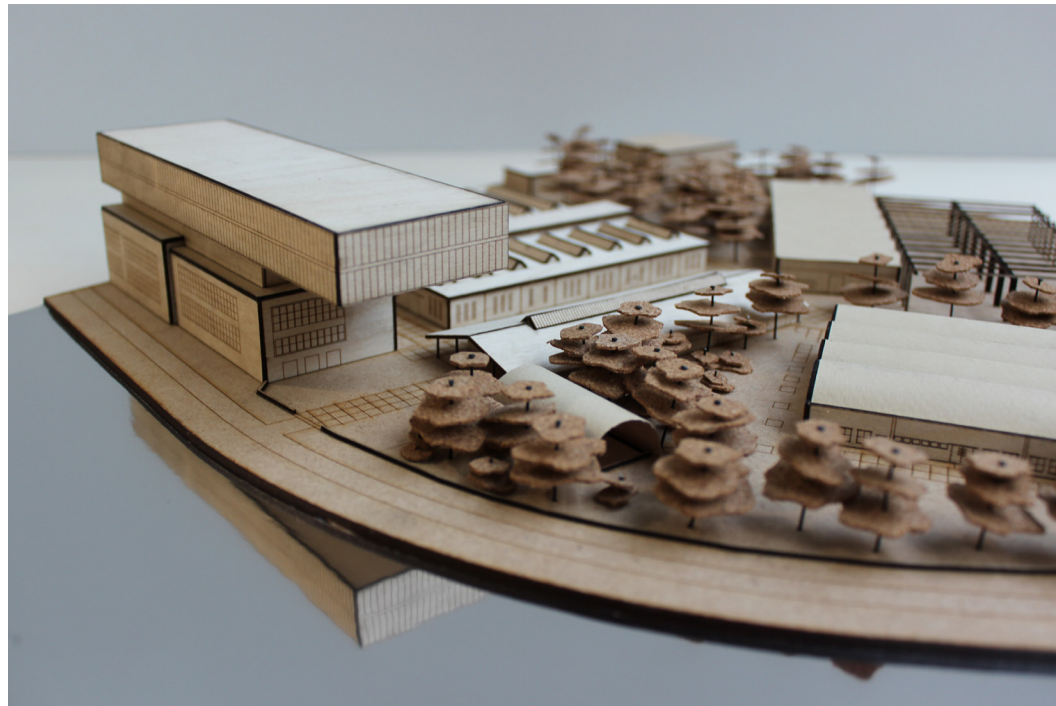
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# Physical model - 1:500

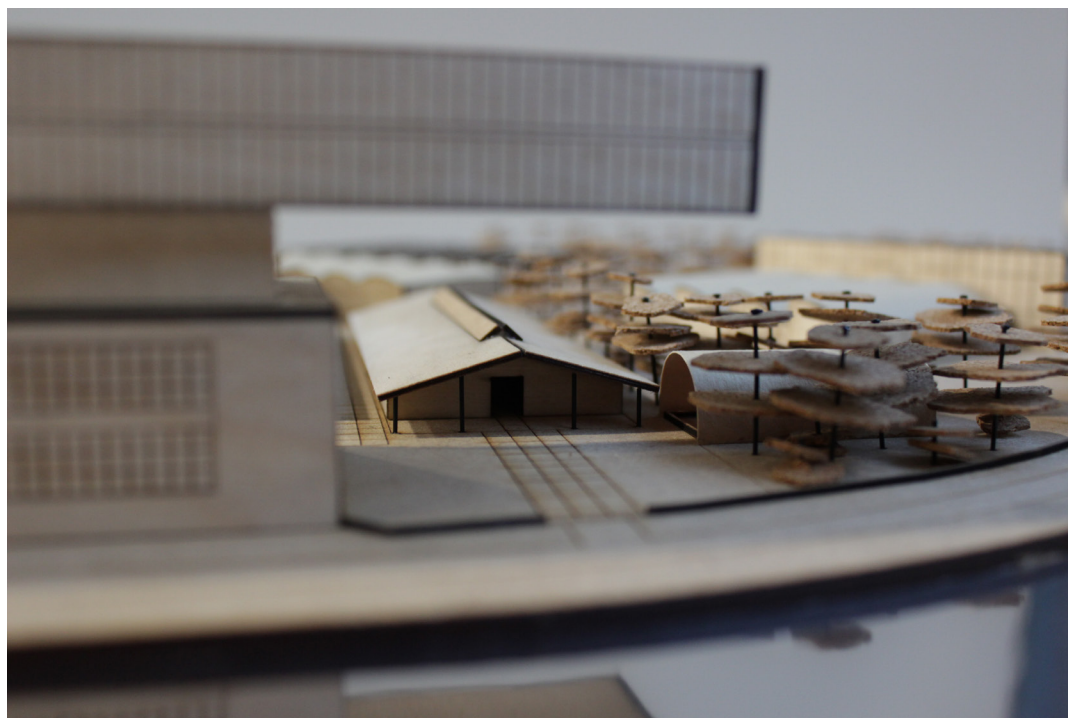
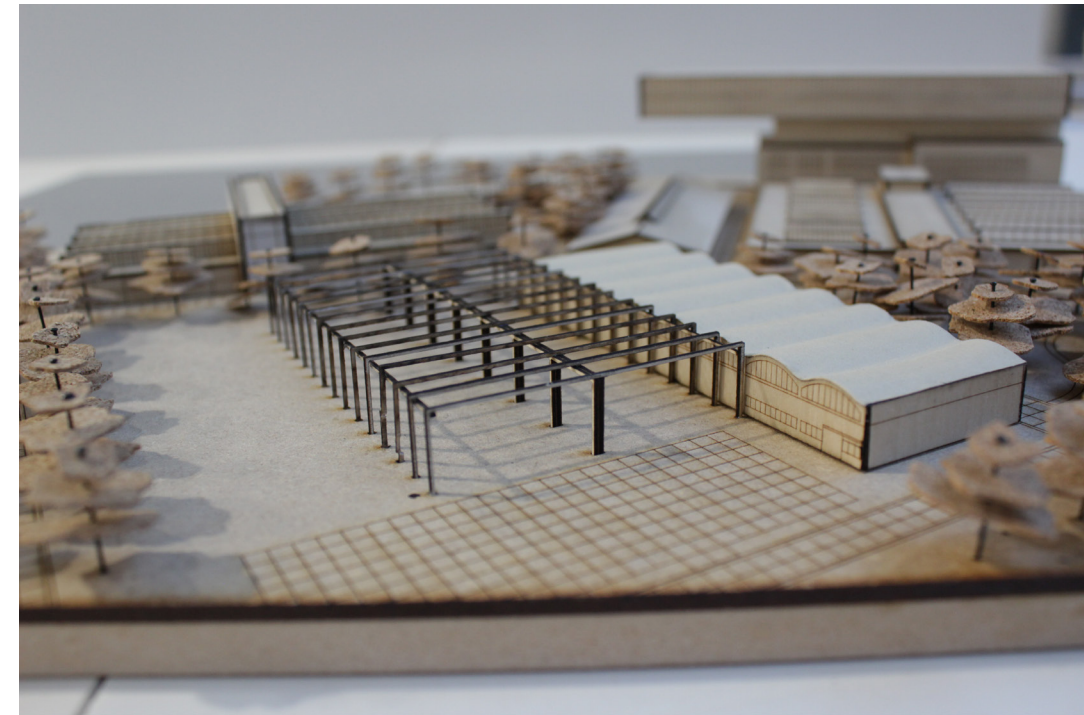
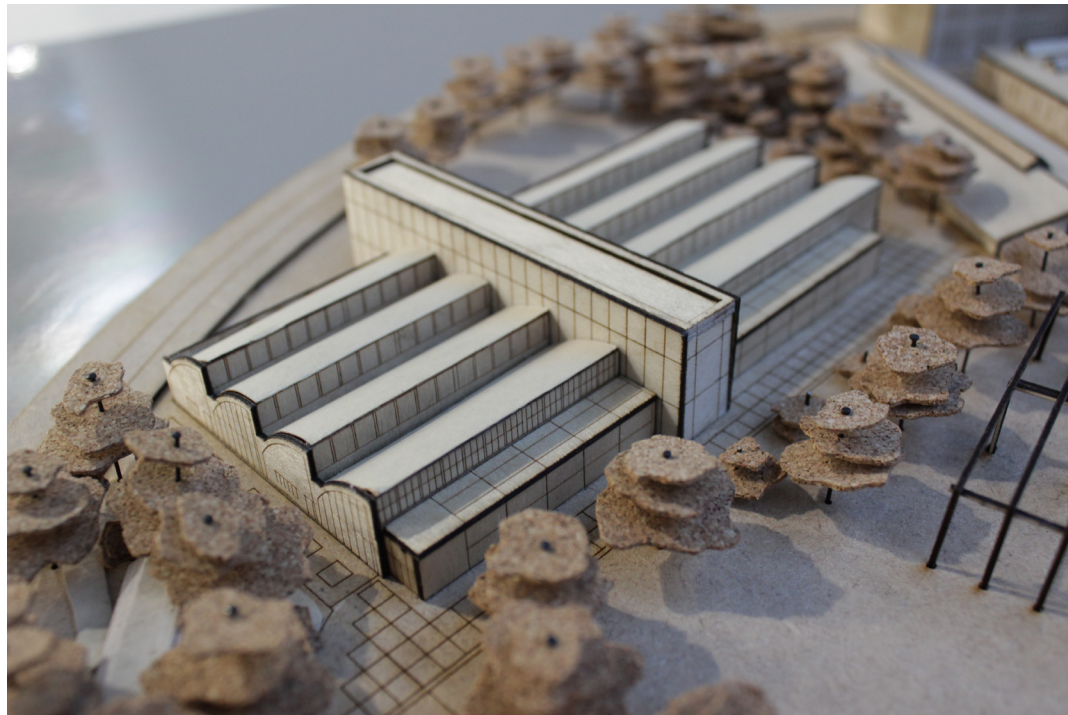
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# Physical model - 1:500

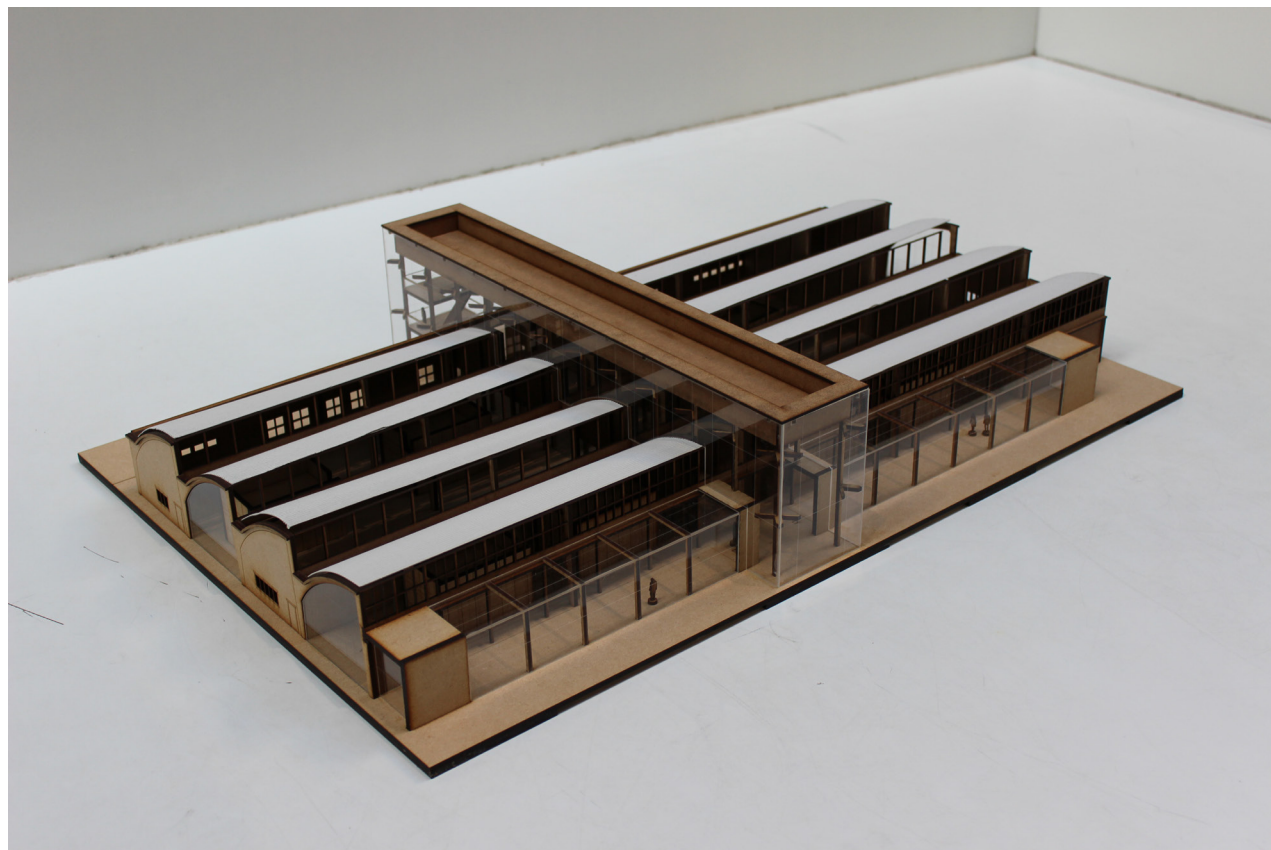
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# Physical model - 1:100

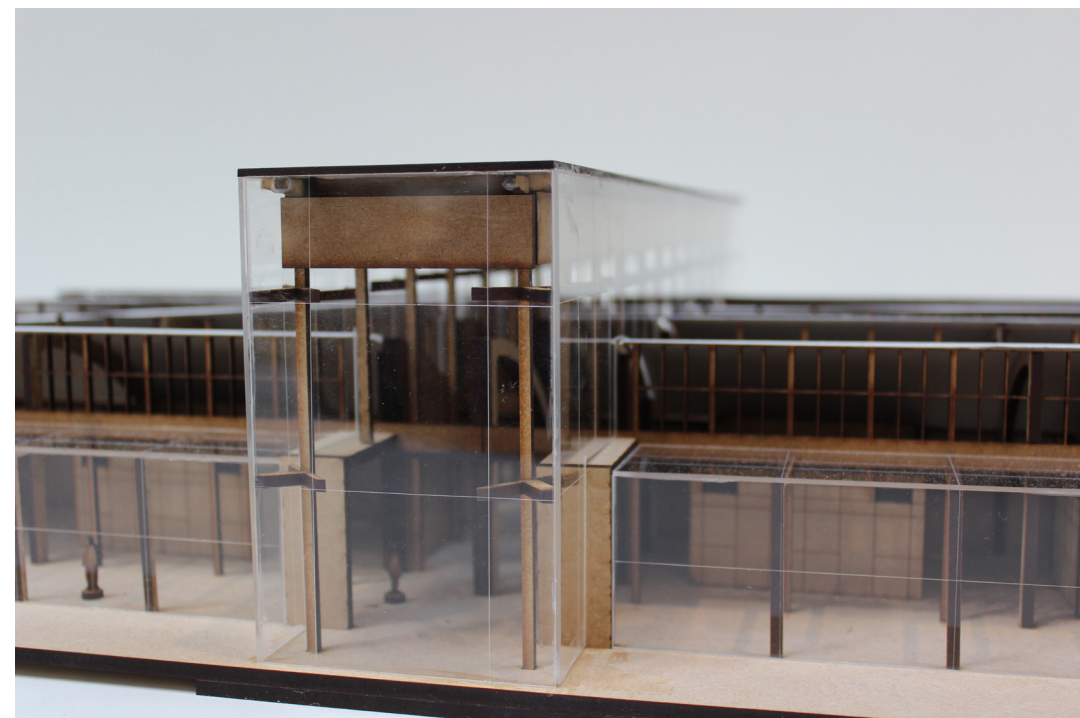
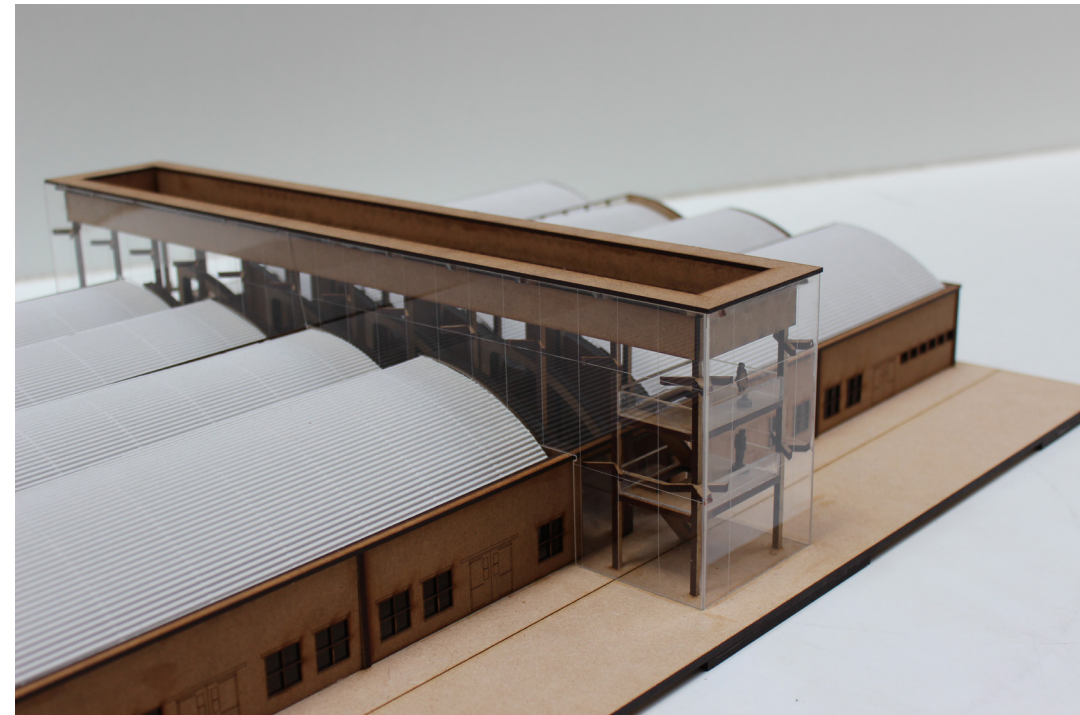
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# Physical model - 1:100

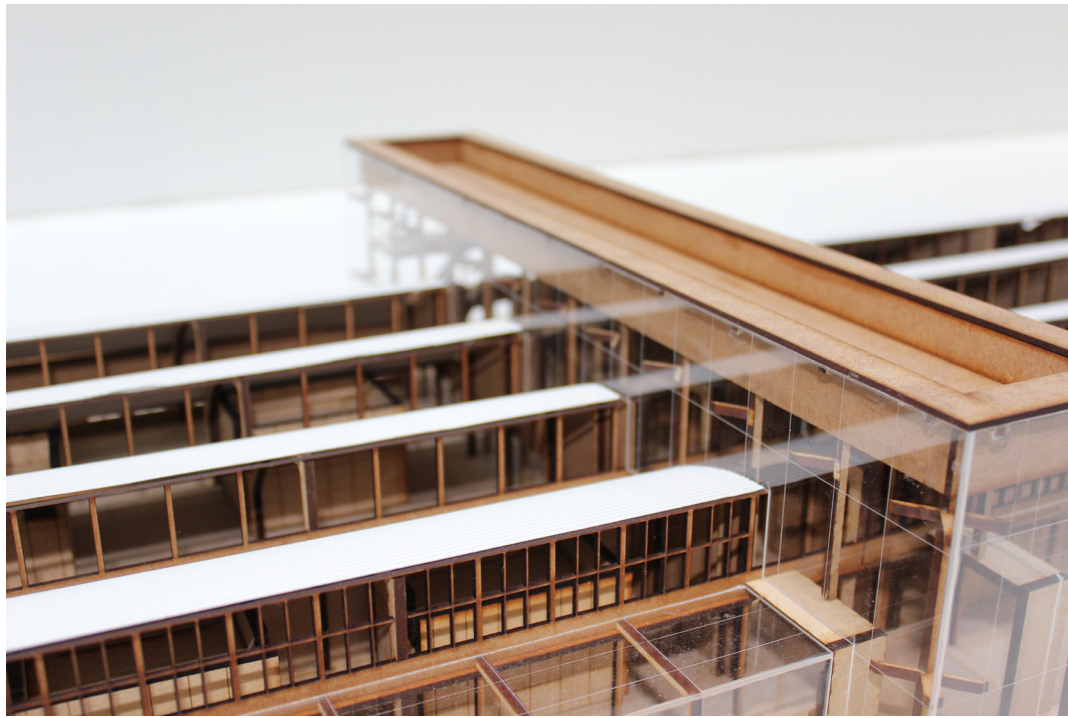
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# Physical model - 1:100

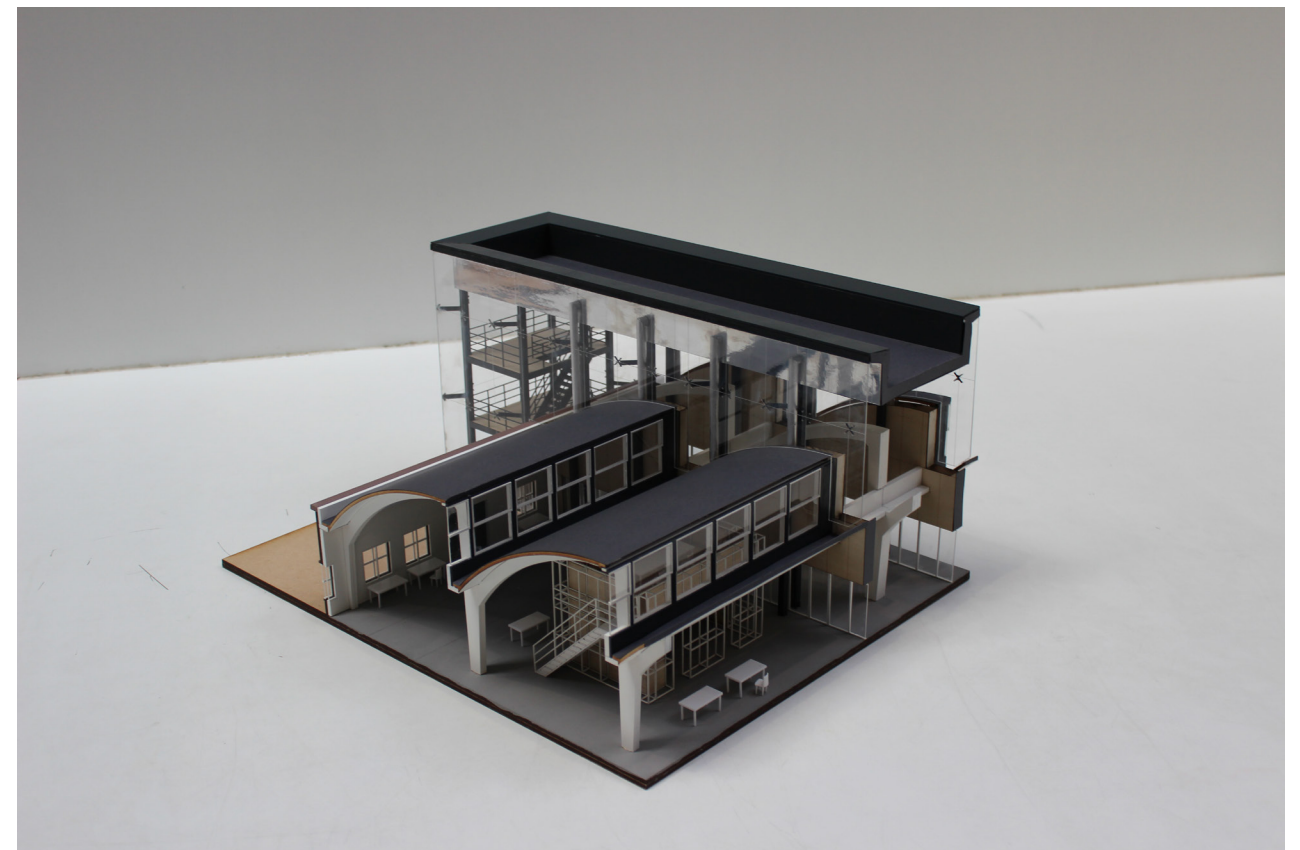
72





# Physical model - 1:50

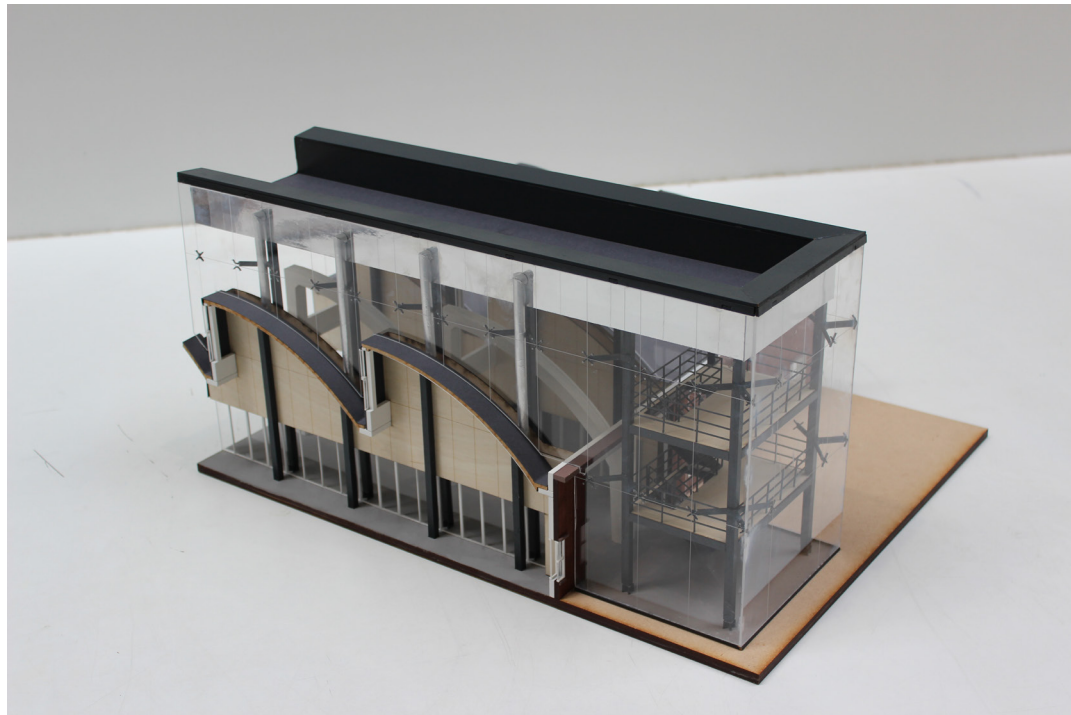
73





# Physical model - 1:50

74





# Physical model - 1: 50

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