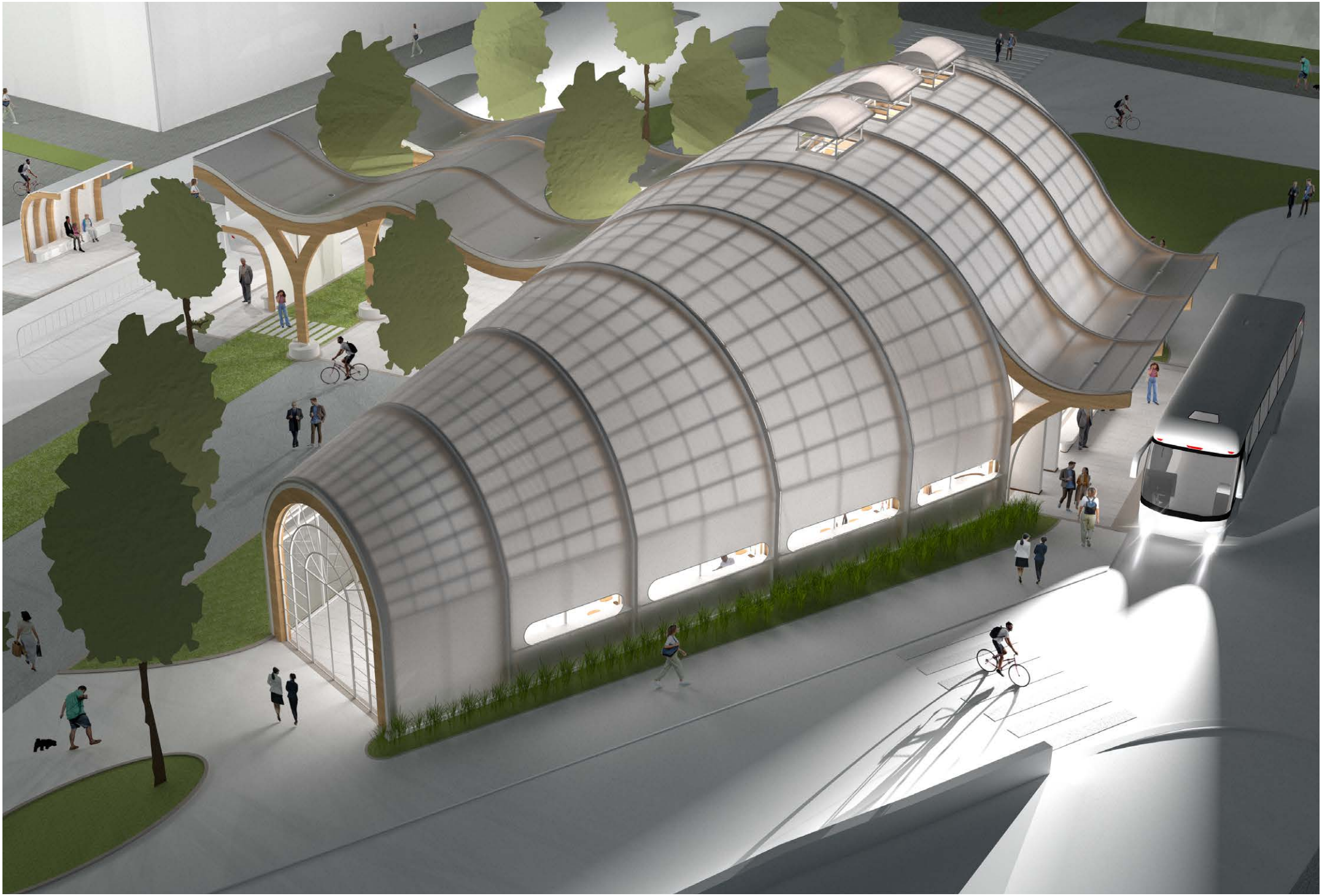

CHALMERS
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-Capturing Movement- The New Heden Bus Terminal

Exploring spatial qualities that translucent façade skins bring
in transportation architecture

Irfan Meric, Master Thesis, Spring 2022

Supervisor: Björn Gross
Examiner: Mikael Ekegren

Department of Architecture & Civil Engineering, Chalmers University of Technology, Gothenburg, Sweden

Cover picture: Render of the project The New Heden Bus Terminal

I. INTRODUCTION

Abstract

TRANSLUCENY

”At the two ends of the spectrum of light control and transmission stand transparency and opacity.

Translucency inhabits the broad middle ground between those two.

Translucent surfaces permit the passage of light while visually obscuring what’s behind it.

Translucency promotes ambiguity; a sense of mystery and a complexity that allows for multiple understandings of what a space can be.”

[Translucency, An Architect’s Guide, 2016]

DESIGN PERSPECTIVE:

The cognitive and spatial effect of in-betweenness created with translucent materials by allowing light to pass through; however filtering it, so that the transferred visual is modified by the material qualities of that translucent material.

CAPTURING MOVEMENT

Translucent surfaces screen casted shadows and create a game of shadows in which one would be able to see and track the movement of an object or a change in the position of a light source behind the surface.

RELATION TO TRANSPORTATION ARCHITECTURE

In transportation architecture, - where dif-ferent types and scales of of bodies move in relation - translucent surfaces has a special place by limiting the view for people and creating spatious, lighted spaces and reducing the stress of being in between the movement happening around.

HEDEN BUS TERMINAL

Heden Bus Terminal is a neglected corner at Heden, which is a commercially and culturally active area in central Göteborg and holds a contextual potential to experiment on movement and translucent skins,

Keywords;

translucent,
PTFE skin,
transportation,
terminal,
Heden

Table Of Contents

Student Background

“I am a student of MSc. Architecture and Urban Design program. Having obtained my BSc Architecture in 2014 at Yeditepe University in Istanbul;
I had completed two of my interships which one of was in an architectural design office and the other was in a construction company during my Bachelor’s studies in Istanbul.

After taking a gap year with my art practices that evolved around upcycling materials, refurbishing and making furnitures & art pieces;
I began my Master’s studies at Chalmers University in 2020.

I believe architectural design should be both thought provoking and emotionally moving by maintaining sensitivity in scales, textures, colours that are composed with materials forming the architecture itself.
My ultimate motivation is bringing out the characteristics of every materials that can possibly be used in architecture and hopefully work with recyclable and low-climate-impact materials to introduce these materials for a future architecture.”

Irfan Meric

Research Question

What Can Be The Relevance Of Translucent Materials Related To Spatial Qualities In Transportation Architecture ?

Aim

The aim of the research is to explore the relevance of translucent materials in architecture, specifically in transportation architecture in terms of movement and what spatial qualities that translucent materials bring in relation with movement of people, and the vehicles and also the exposure of stable building elements.

Delimination

The research does not expand on materiality and material design or theoretical approaches around transluceny in architecture; rather focueses on an exploration and experiment in the spatial qualities that translucent skins can bring into transportation architecture in a bus terminal building.

Methodology

Background research on translucent materials and the architectural projects that has translucent design components and building an archive of materials and architectural projects as a background,

-

Driving from the background, framing the relevance of translucent materials and the spatial qualities that they bring into architecture,

-

Searching for a site to be able to implement the initial concepts, analizing the site and propose a design,

-

Reflecting on the final product through the research outcomes,

II. BACKGROUND

A. Start of the Investigation:

- Transluceny -

TRANSLUCENY

"At the two ends of the spectrum of light control and transmission stand transparency and opacity.

Translucency inhabits the broad middle ground between those two.

The word "translucent" is derived from the Latin "trans" ("through") and "lucere" ("to shine").

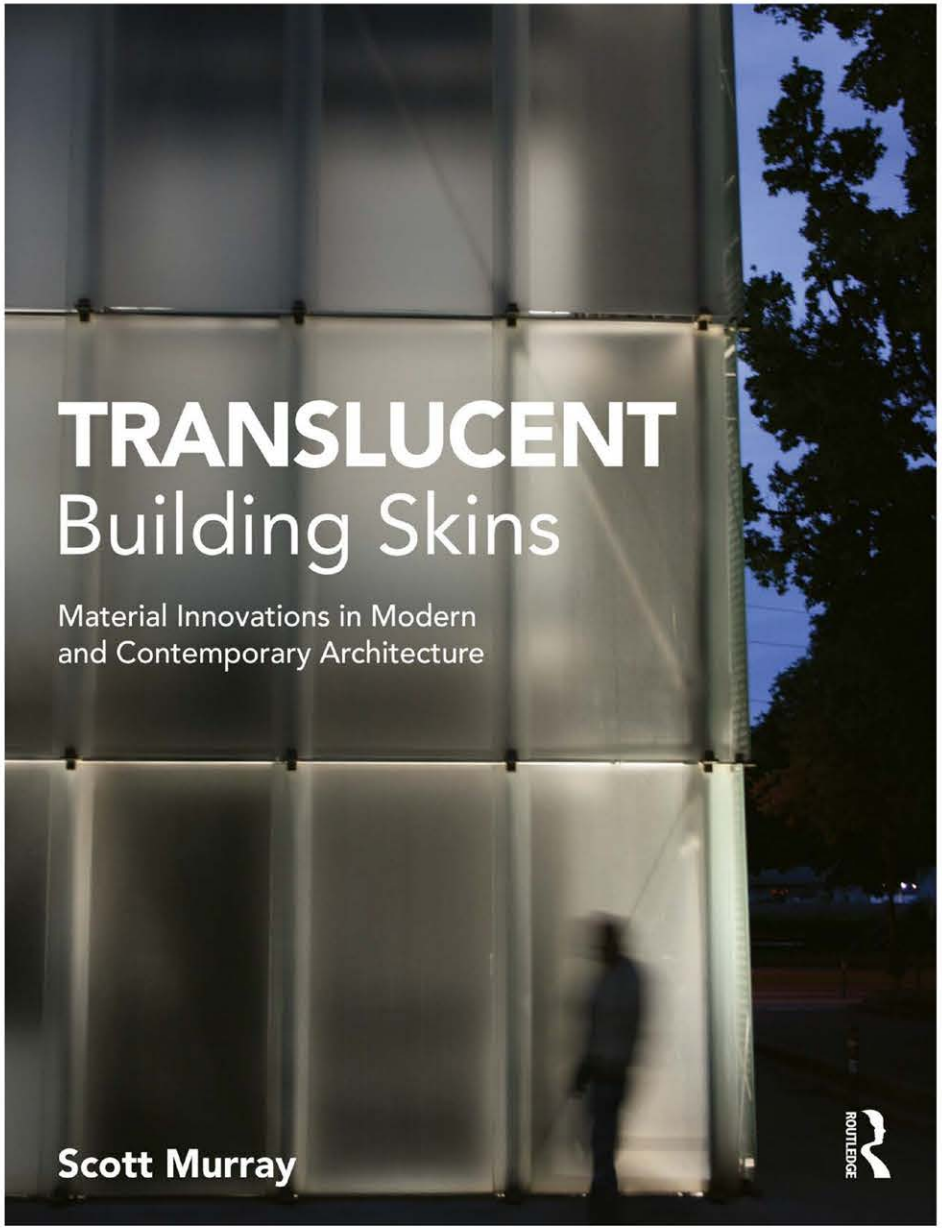
Translucent surfaces permit the passage of light while visually obscuring what's behind it.

Translucency promotes ambiguity;
a sense of mystery and a complexity that allows for multiple understandings of what a space can be."

(30x40 Design Workshop, 2016)

NARRATION PERSPECTIVE: The cognitive and spatial effect of in-betweenness created by translucent materials allowing light to pass through; however filtering, so that the transferred visual is modified by the qualities of that translucent material:

TRANSLUCENT MATERIALS →



Cover picture of the book "Translucent Building Skins" by Scott Murray *figure 2.1*

TRANSPARENCY / TRANSLUCENCY / OPACITY

Depending on their reaction to light, materials can be classified in 3 major categories, which are Transperent Materials, Translucent Materials and Opaque Materials. (figures 2.1-3)

While opacity means the transference of light is stopped by the material, on the other side transperency means openness and transmission of light.

Transluceny occupies the scale in between these two and can mean manipulation of light through the material and can affect refraction causing light to be transfered in various ways depending on the translucent materials themselves.

" translucency is rarely a fixed state and may be perceived as nearly transparent, nearly opaque, or an apparently equal blurring of the two, with such variations dependent upon the material itself (the degree of roughness of a glass surface, for instance) or the ambient environmental conditions (the angle or intensity of sunlight, for example)." (Murray, Scott, 2013)

Transluceny holds a special place in architecture in terms of expanding the determined roles of conventionally excepted building elements such as walls, floors, ceilings and façades, into having a conversation with either the natural light passing through; or artificial lighting.

The relation between light, radiation and heating and thermal comfort were already discovered and experimented in such as greenhouses however It is not a usual practice that contemporary architects experimenting on building façades and skins with translucent materials in urban context.

The major subjects such as privacy, leaves translucent materials' use limited with public buildings and even in that case, it's often that a public building would expected to be as open as much as it could. However, the unknown that translucent materials provide can be intriguing and create attraction.

" the interface between interior and exterior space, that it exerts its most significant influence." (Murray, Scott, 2013)

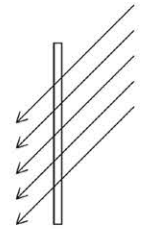


figure 2.2
Transparency

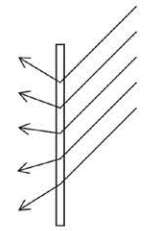


figure 2.3
Translucency

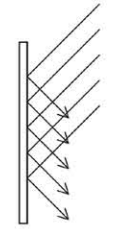


figure 2.4
Opacity

Figures showing the relatiin of fraction and material qaulities

TRANSLUCENT MATERIALS

Various types of materails may have translucent qualities and they can be categorized into three by the materials themselves being translucent; the materials can be processed to have translucent qualities; or composition of materials into creating translucent effects in terms of transfering light in different ways due to the composition they have.

The material itself being transclucent

Glass
Plastics
Textile
Natural stone
Recine
Paper

polycarbonate plastic sheets
figure 3.1

textile
figure 3.2

3D printer polymer
figure 3.3

textile
figure 3.4

Processed materials

Metal
Wood
Glass

printed and/or stained glass
figure 3.5

stainless steel mesh
figure 3.6

corrugated plastics
figure 3.7

perforated metal sheets
figure 3.8

Composition of materials

Metal
Wood
Glass

repeated wooden profiles
figure 3.9

composed plywood
figure 3.10

repeated aluminium profiles
figure 3.11

corrugated glass modules
figure 3.12

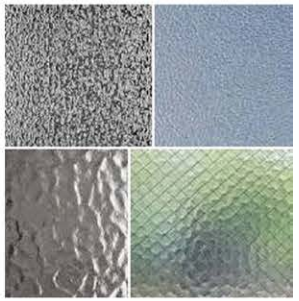
TRANSLUCENT MATERIALS

When it comes to conventionalized use of translucent materials, there are various of materials being processed and composed, which some of them are;

fiberglass sheets *figure 4.1*

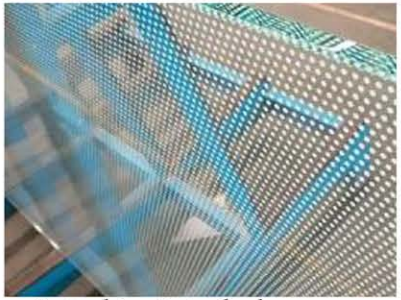
glass bricks *figure 4.2*

frosted glass *figure 4.3*

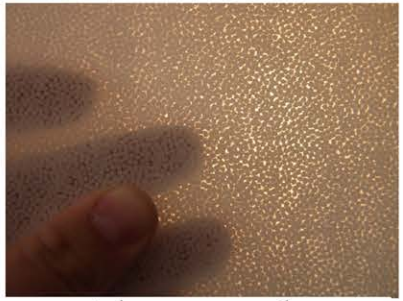


obscured glass *f. 4.4*

stained glass *figure 4.5*

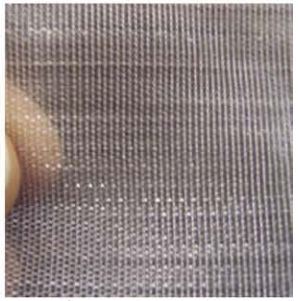


printed/painted glass *figure 4.6*



material compounds *figure 4.1*

light-active stones: alabaster *f. 4.8*



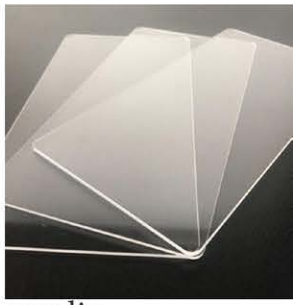
mesh *f. 4.9*

open-textured textile *f. 4.10*

perforated aluminum sheet *f. 4.11*

composed plywood *figure 4.12*

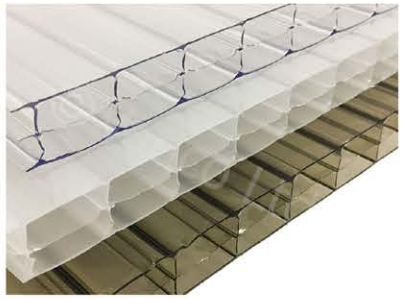
composed profiles *f. 4.13*



acrylic *f. 4.14*

3D-printed polymers *f. 4.15*

polyurethane fabric *f. 4.16*



polycarbonate plastics *f. 4.17*

PVC corrugated sheet *f. 4.18*

PTFE *f. 4.19*

PTFE - Teflon coated fiberglas

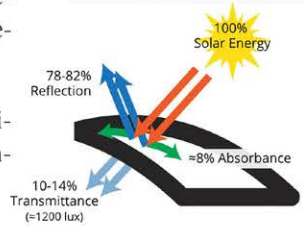
PTFE Teflon Coated Fibreglass	
Means of Fabrication	Heat Sealing
Life Expectancy (years)	45+
Translucency	10-14%
Waterproof	✓
UV Protection	●●●
Cleanability	●●●
Recyclable	×

table of PTFE qualities *figure 4.20*

" PTFE is a high quality woven fibreglass membrane coated in Teflon (Poly tetra fluoro ethylene), and is an ideal fabric for tensile membrane structures. PTFE fabric is high quality, weather, fire and UV resistant, and extremely durable. The Teflon coating creates a smooth surface that allows the fabric to be 'washed' by the rain, reducing the need for frequent cleaning. The membrane behaves elastically under normal conditions, does not creep or stress relax, and has a life expectancy exceeding 30 years. " (fabritecture.com, 2022)

figure 4.21

figure 4.22



A standart of up to 15% translucency that a PTFE fabric can have, It is possible the fabric to receive shadows and project them from interiors to the exteriors. Due to the material structure, a PTFE fabricdisperses light evenly into the interiors and create a nuetrally lit environment and prevent glaring and uneven lighted areas.

figure 4.23

figure 4.24

figure 4.25

Polycarbonate

Strengths	Limitations
◦ Highly transparent. Offers light transmission as good as glass ◦ High toughness even down to -20°C ◦ High mechanical retention up to 140°C ◦ Intrinsically flame retardant ◦ Offers good electrical insulation properties that are not influenced by water or temperature ◦ Possesses good abrasion resistance	◦ Easily attacked by hydrocarbons and bases ◦ Post prolonged exposure to water at over 60°C, their mechanical properties start to degrade ◦ Proper drying is required before processing ◦ Low fatigue endurance ◦ Yellowing tendency post exposure to UV

figure 4.26

Polcarbonate, depending on the compounds that would be added to its manifacturing, can be produced in colours and a range of clarity. Polycarbonate panels are light in weight and can provide an easy installation.

The material is classified in the group of plastics that are recyclable.

(fabritecture.com, 2022)

figure 4.27

Depending on the layering, thickness, clarity and colours of a polycarbonate panel, the spatial qualities that it can bring to a space, may varry. In below figures, are a collection of applications of polycarbonate façades and walls:

figure 4.28

figure 4.29

figure 4.30

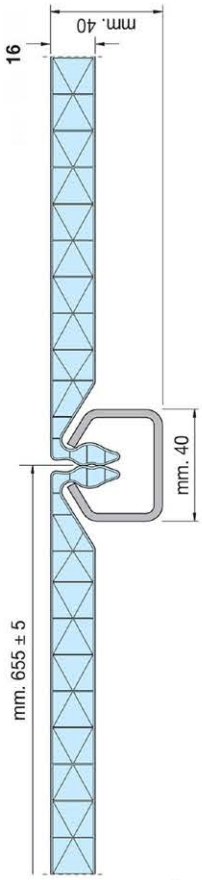


figure 4.31

CONTEXT CREATED THROUGH THE COMPOSITION OF TRANSLUCENT MATERIALS

When it comes to conventionali- zed use of translucent materials, there are various of materials being processed and composed, which some of them are;

PROVIDING PRIVACY IN BETWEEN SPACES

Filtering the direct visual contact to hide without completely visually blocking

figure 5.1

figure 5.2

figure 5.3

EXPOSING THE INTERIORS TO THE EXTERIOR

Leaving the visuals of objects inside as silhouetts on the translucent surface

figure 5.4

figure 5.5

figure 5.6

figure 5.7

CAPTURING THE MOVEMENT THROUGH PROJECTION

Translucent surface acting as a projection screen that provides a shadow show

figure 5.8

figure 5.9

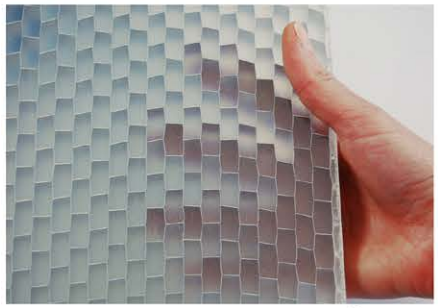
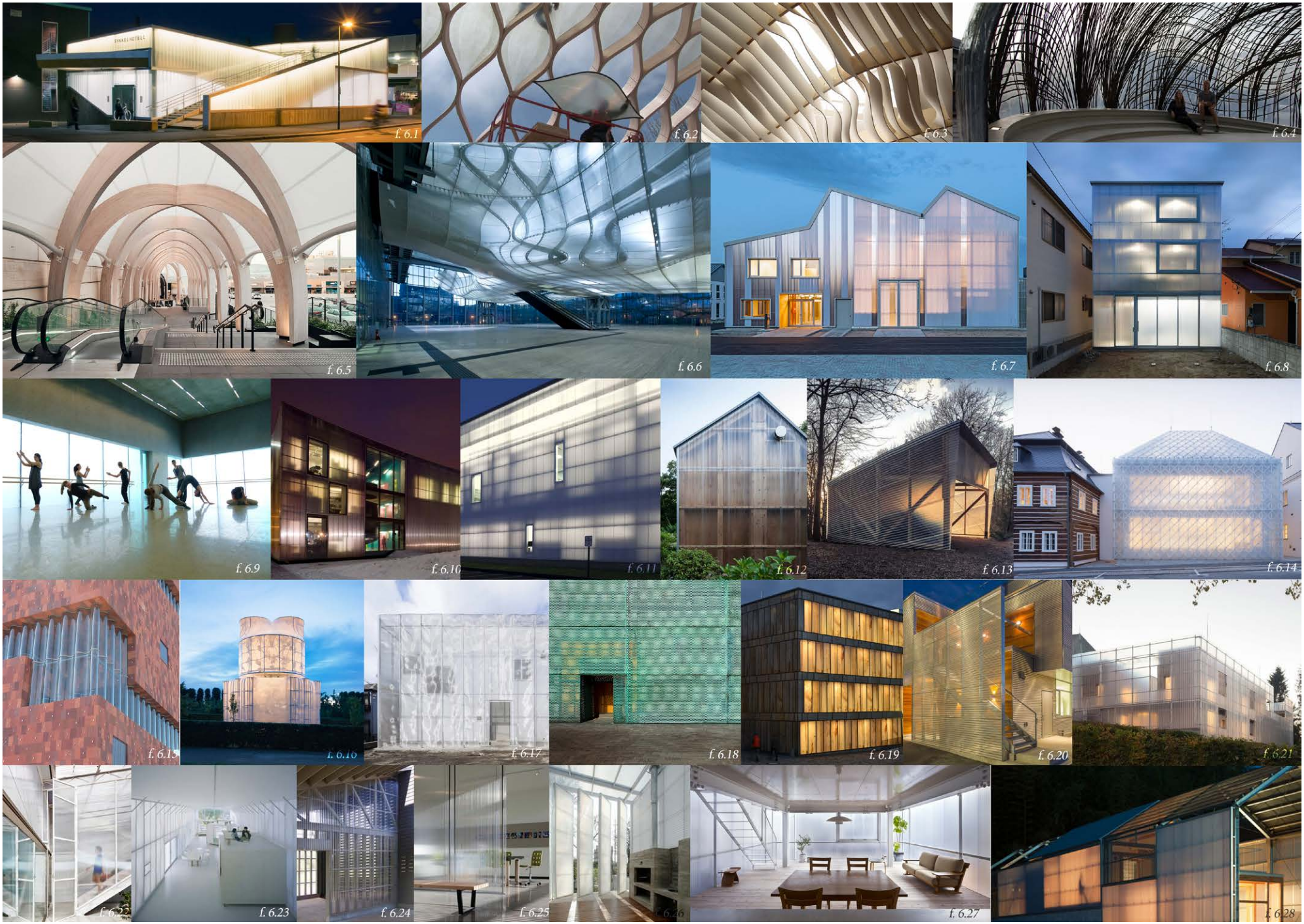


figure 5.10


f. 6.1
f. 6.2
f. 6.3
f. 6.4
f. 6.5
f. 6.6
f. 6.7
f. 6.8
f. 6.9
f. 6.10
f. 6.11
f. 6.12
f. 6.13
f. 6.14
f. 6.15
f. 6.16
f. 6.17
f. 6.18
f. 6.19
f. 6.20
f. 6.21
f. 6.22
f. 6.23
f. 6.24
f. 6.25
f. 6.26
f. 6.27
f. 6.28

Façade:

Visibility and through that, make it easier to find in the night

Shelter:

Protecting from radiation while keeping the space below daylighted

Façade:

Controlling daylight in the interiors

-

Providing shading

Shelter:

Preventing the space below the roof from overheating while keeping the space lighted

Skin:

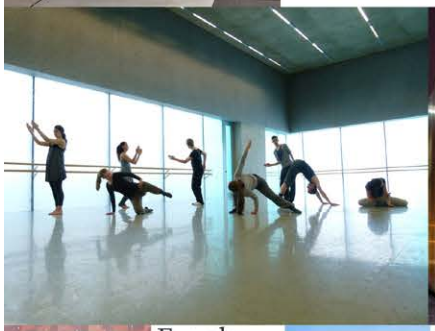
Poetic effects that the translucent material is composed to,

Façade:

For a commercial use building to make the façade more transparent and welcoming

Façade:

Maintaining privacy while keeping the interiors daylighted in a private house



Façade:

For public use building to make the building more transparent and light while maintaining privacy

Façade:

Benefiting from the green house effect to heat up colder façades

Façade:

For small buildings to have the interior spaces feel more spatious with the translucent skin

Façade:

An architectural commentary on the stiffness and heaviness of the building technology of the old and the ligtness of the new

Façade:

To bend and change the light coming in and create spatial effects in the interiors

Skin:

To provide greenhouse effect to support fauna

Façade:

To provide privacy between the interiors and the exterior

Façade:

To hide and cover up the layers of a rough façade finish

Façade:

To bend and change the light coming in and create spatial effects in the interiors

Façade:

To provide privacy between the interiors and the exterior

Façade:

To provide privacy between the interiors and the exterior

Seperator:

To seperate spaces without effecting the lighting conditions

-

For small buildings to have the interior spaces feel more spatious

Seperator:

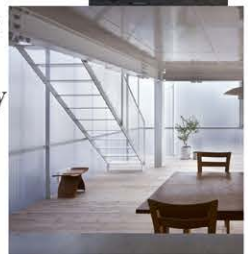
To provide privacy between the interiors and the exterior

Seperator:

To seperate spaces without effecting the lighting conditions

Seperator:

To provide privacy between the interiors and the exterior



Façade:

For small buildings to have the interior spaces feel more spatious with the translucent skin

Façade:

To provide privacy between the interiors and the exterior

Initial Concept

Initial Concept_

CAPTURING THE MOVEMENT

The relation between light and translucent materials has a special effect on how movement is projected upon surfaces and the intriguing effect of shadow plays in motion due to the movement of objects and the exposure of stable structures may hold a special relevance with transportation architecture where movement and stable objects are main characters defining the spaces.

Through material

Through Architecture

Test Model

Shadow plays, *figure 7.1*

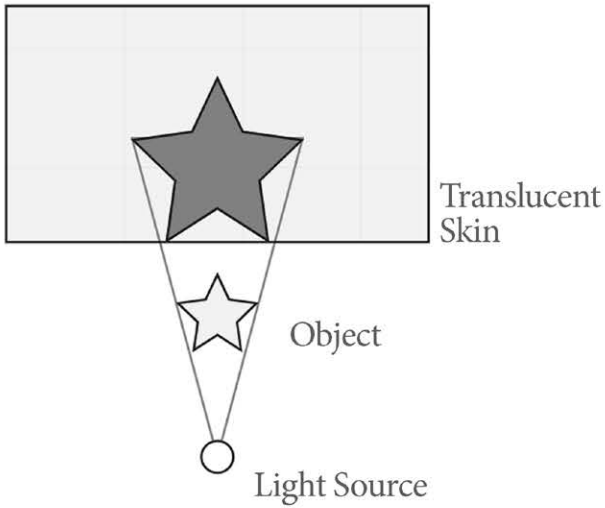


Diagram of projection, *figure 7.8*

Structure forming the space with translucent skin

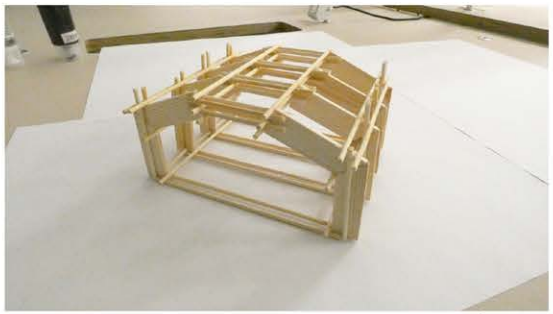


figure 7.2

figure 7.4

figure 7.6

The space lighted with a point light source

figure 7.3

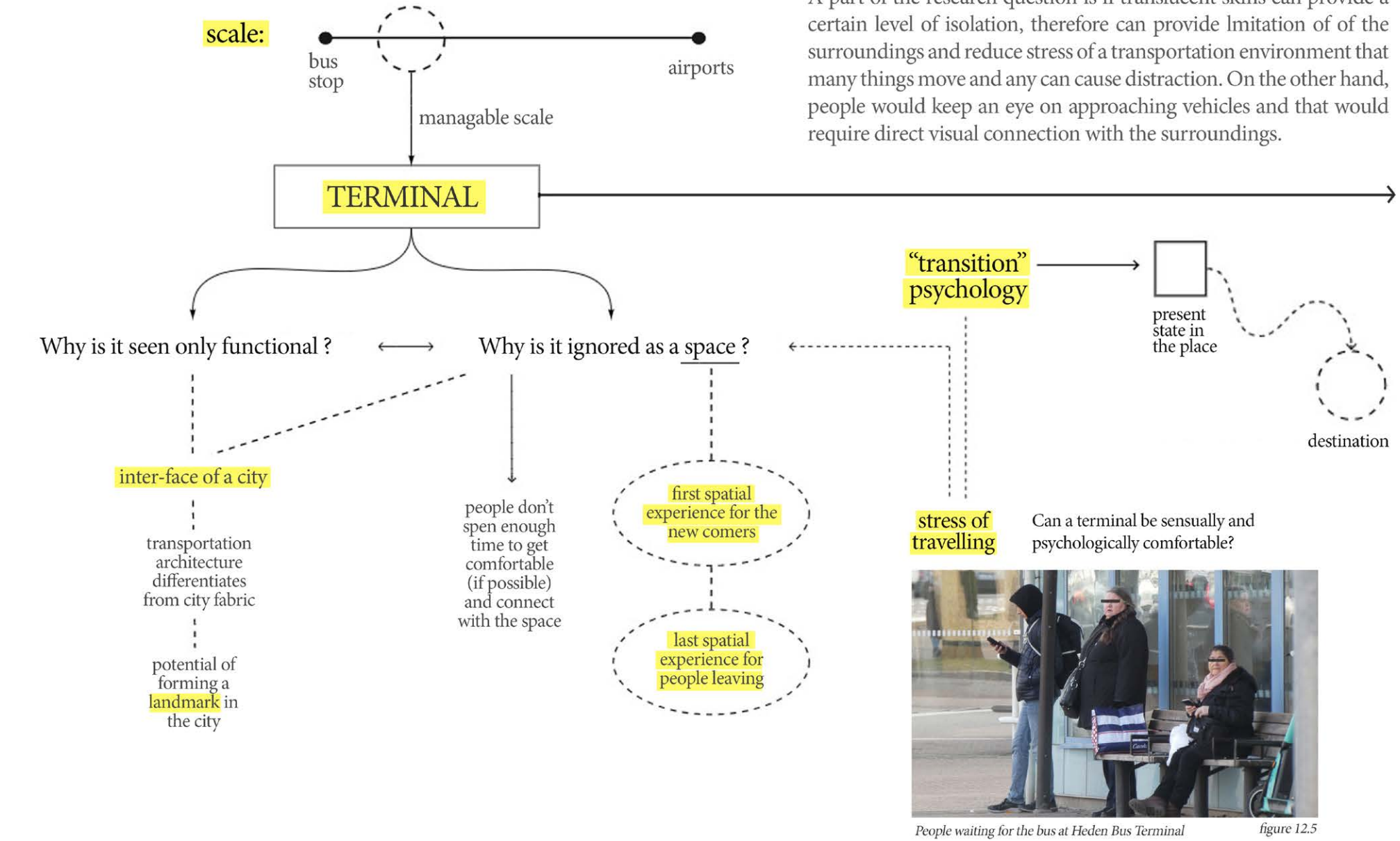
figure 7.5

figure 7.7

B. Relation to Transportation Architecture

TRANSPORTATION ARCHITECTURE : where different types and scales of of bodies move in relation

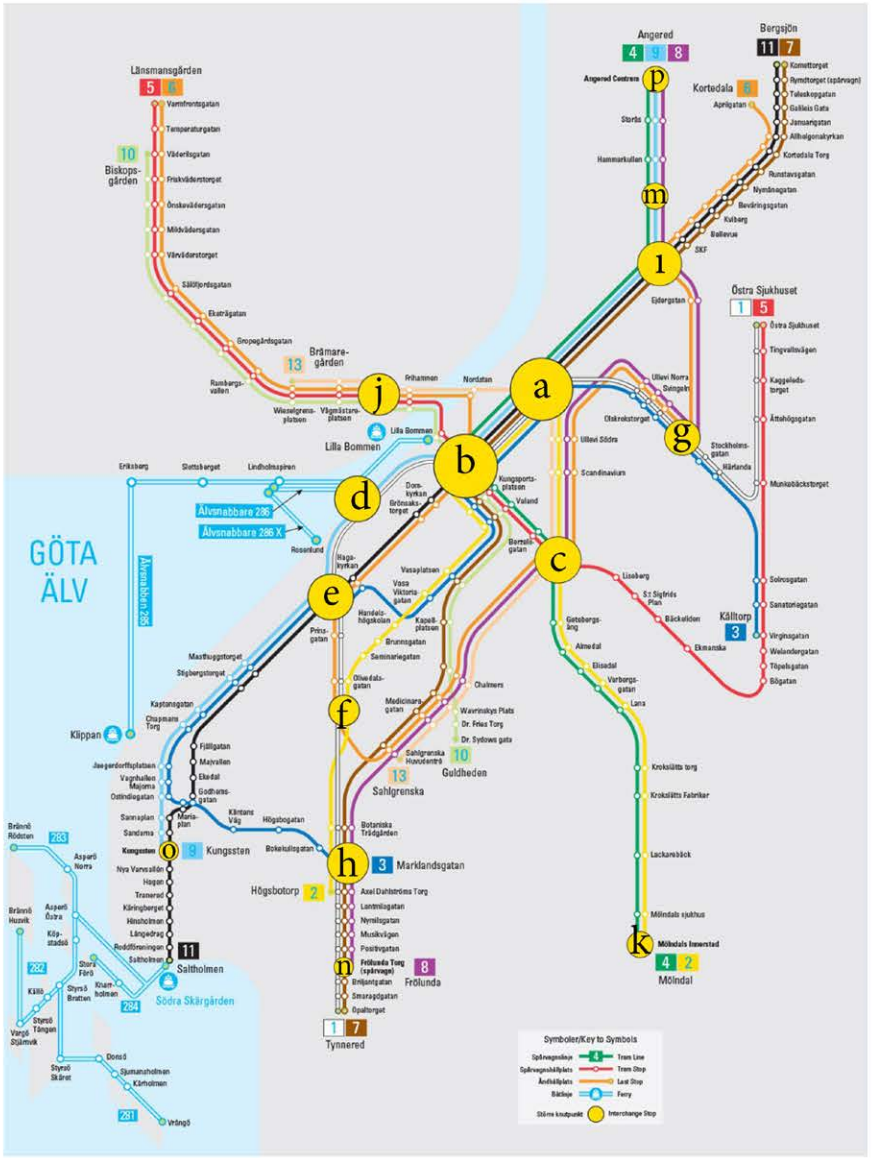
A part of the research question is if translucent skins can provide a certain level of isolation, therefore can provide lmitation of of the surroundings and reduce stress of a transportation environment that many things move and any can cause distraction. On the other hand, people would keep an eye on approaching vehicles and that would require direct visual connection with the surroundings.



People waiting for the bus at Heden Bus Terminal *figure 12.5*

TRANSPORTATION AND TRANSPORTATION ARCHITECTURE IN GÖTEBORG

To explore the relevance of translucent materials in transportation architecture, the booklet follows with the look on the transportation infrastructure in Gothenburg.



Map of the public transporrtation in Gothenburg *figure 8*

NODES

a. Centralstation

b. Brunnsparken

c. Korsvägen

d. Stenpiren

e. Järntorget

f. Linnéplatsen

g. Redbergsplatsen

h. Marklandsgatan

i. Gamlestads Torg

j. Hjalmar Brantings Platsen

k. Mölndals Innerstad

l. Gamlestads Torg

m. Hjälbo

n. Förlunda Torg

o. Kungsten

p. Angered Centrum

TERMINALS

Centralstation

Nils Ericson Bus Terminal

Stenpiren Terminal

Åkareplatsen Resecentrum

Heden Bus Terminal

Linnéplatsen Facility Hub

Korsvägen Resecentrum + Metro Station

Redbergsplatsen Facility Hub

Angered Resecentrum

Gamlestaden Resecentrum

NILS ERICSON BUS TERMINAL

“ The bus terminal is divided into a movement zone and a seating zone in connection with the 'streets' facing Nils Ericsonsplatsen, as is evident from the asymmetric section above. The long, main space and an intimacy that provides a direct link with the original railway hall. “

(Niels Torp Architects, 1995)

In one of the most significant transportation buildings in Göteborg is spatious and follows a sequence both in structure and planning of the interiors to suggest to movement.

“ The aim of the bus terminal itself is to upgrade the experience of the bus journey, and we have tried to imbue the terminal with something of the anticipatory sense of travel. ”

(Niels Torp Architects, 1995)

The transperent structure has indicating doors to the bus platforms through solid blocks to clarify the movement. Also the solution to the over-heating preventing modules diffirentiates the linear docking area and waiting areas.

figure 9.1

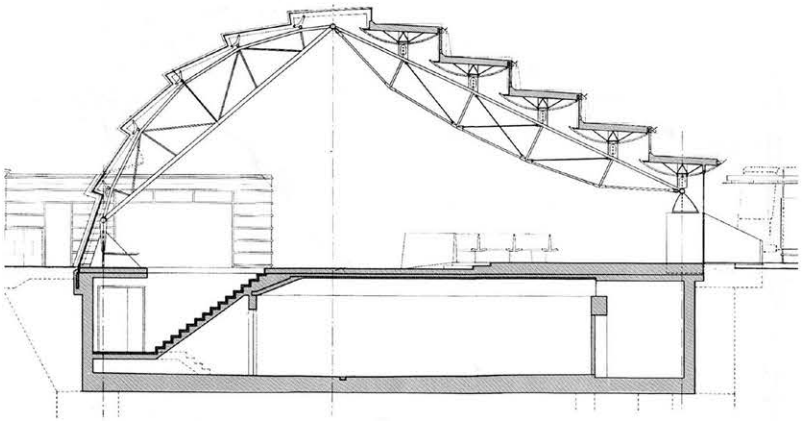


figure 9.2

figure 9.3

clear indication of entrances & exits

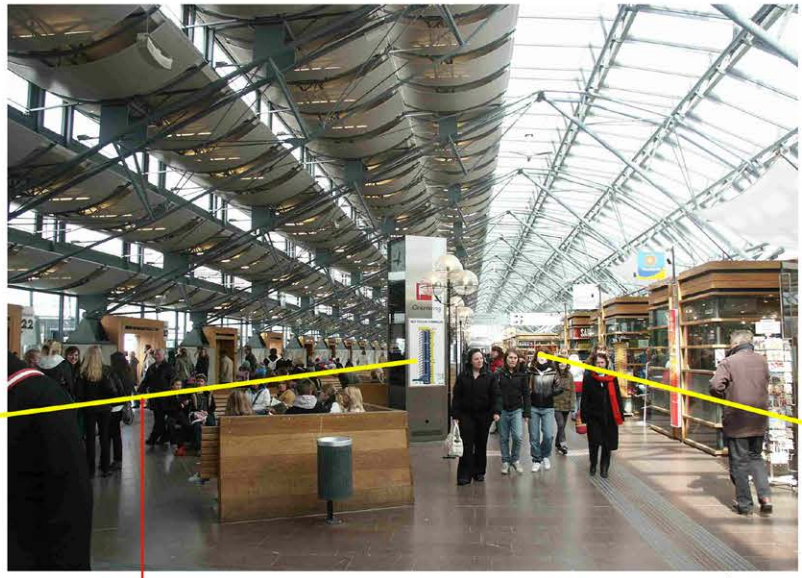


figure 9.4

linear space and sequence of structures as a characteristic for transportation architecture

STENPIREN RESECENTRUM

"A MEETING PLACE BY THE RIVER

The Stenpiren public transport hub is an example of urban renewal. The people of the city have embraced this fact and the place is well visited and highly appreciated by the public."

(Stenpiren Transport Hub, 2016)

The publicity of a terminal building may also suggest a bigger scale landscape project where the terminal may be an infrastructure for the surroundings, depending on what context that the terminal would be in.

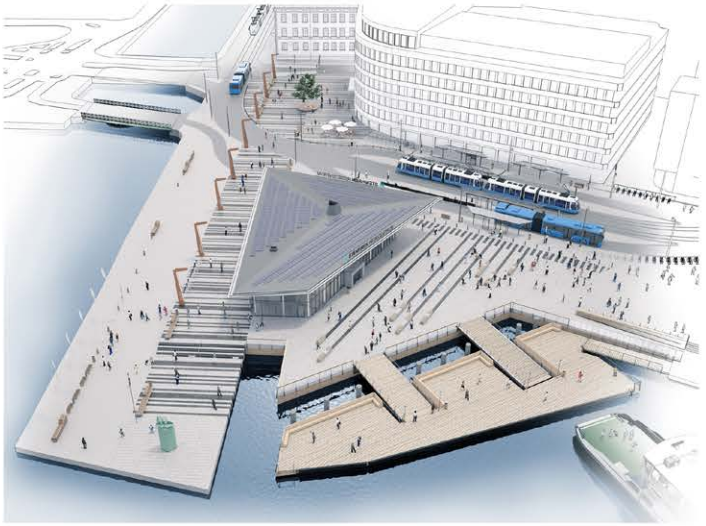


figure 10.1

figure 10.2

large eaves for protection

lighted in the night-time

" LIGHTING - SECURITY AND EXPERIENCE

Lighting of the area has been of major importance in shaping Stenpiren, from both a security and user experience standpoint."

(Stenpiren Transport Hub, 2016)

During nighttime, lighting and security support a functioning environment for people during night time.

figure 10.3

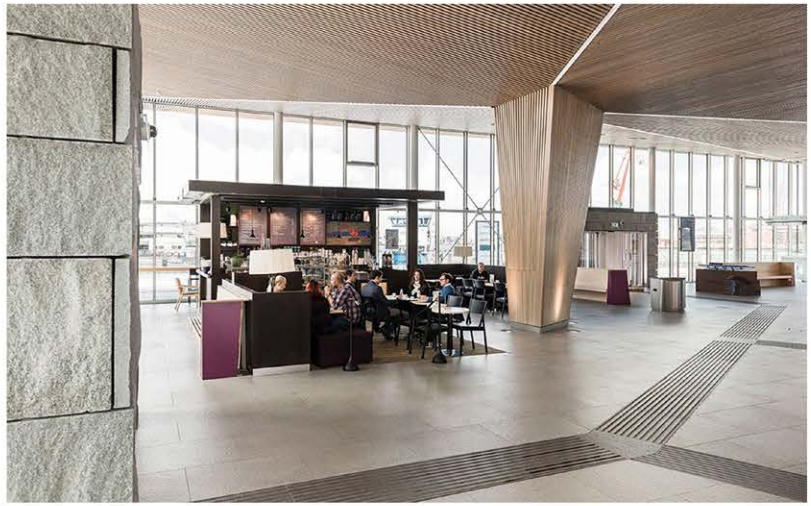


figure 10.4

The characteristics of the building is large eaves, transperent façades and interiors that provides climatic comfort for the passengers waiting or for people who would like to spend time in this public space.

RESECENTRUM TYPOLOGY

The city has a building typology that is called Reseccentrum, meaning "travel hub", which are usually compact spaces and buildings with waiting areas in the interior, also may accompanied with a shop either a part of the building or attached to the main body of the Resecentrum building, with eaves to provide shelter when the Resecentrum is closed after its work hours.

Korsvägen Resecentrum *figure 11.1*

interior waiting spaces

Åkareplatsen Resecentrum *figure 11.3*

Angered Resecentrum *figure 11.2*

Järntorget

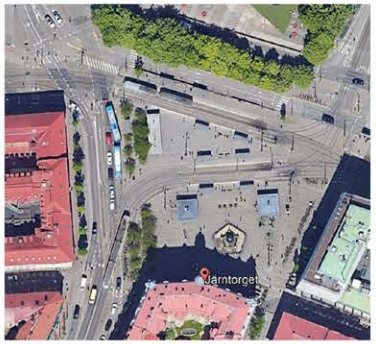


figure 12.1

figure 12.2

Opennes is the strong character of Jarntorget and there are two small hubs in the middle of the area with train and bus lines crossing. There might be a need for a terminal building with those facilities included, however the stations in the area are scattered across platforms and rather than one large terminal building, the already existing small hubs and stations seem to be working for Jarntorget.

Redbergsplatsen

figure 12.5

figure 12.6

Redbergsplatsen service hub is in the middle of two train lines and bus stations nearby. The hub seems to be functioning well in terms of providing a shelter and shops.

Linnéplatsen

figure 12.3

figure 12.4

The stations are scattered acroos the platforms and in a large area and there is a building with shops underneath. While waiting for a bus or a train in one of the stations, the building seems in distance and the passengers wouldn't actively use the building unless they would have a need to visit. There may be a need for a terminal building but it would require a compact organization of the stations around and it seems complex and unfunctional.

Heden →

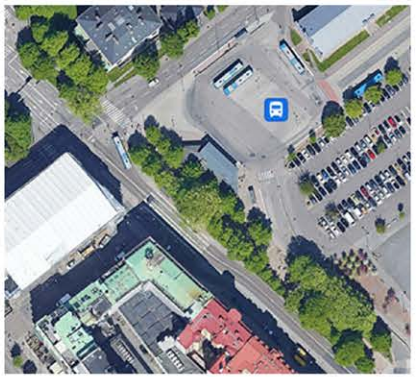
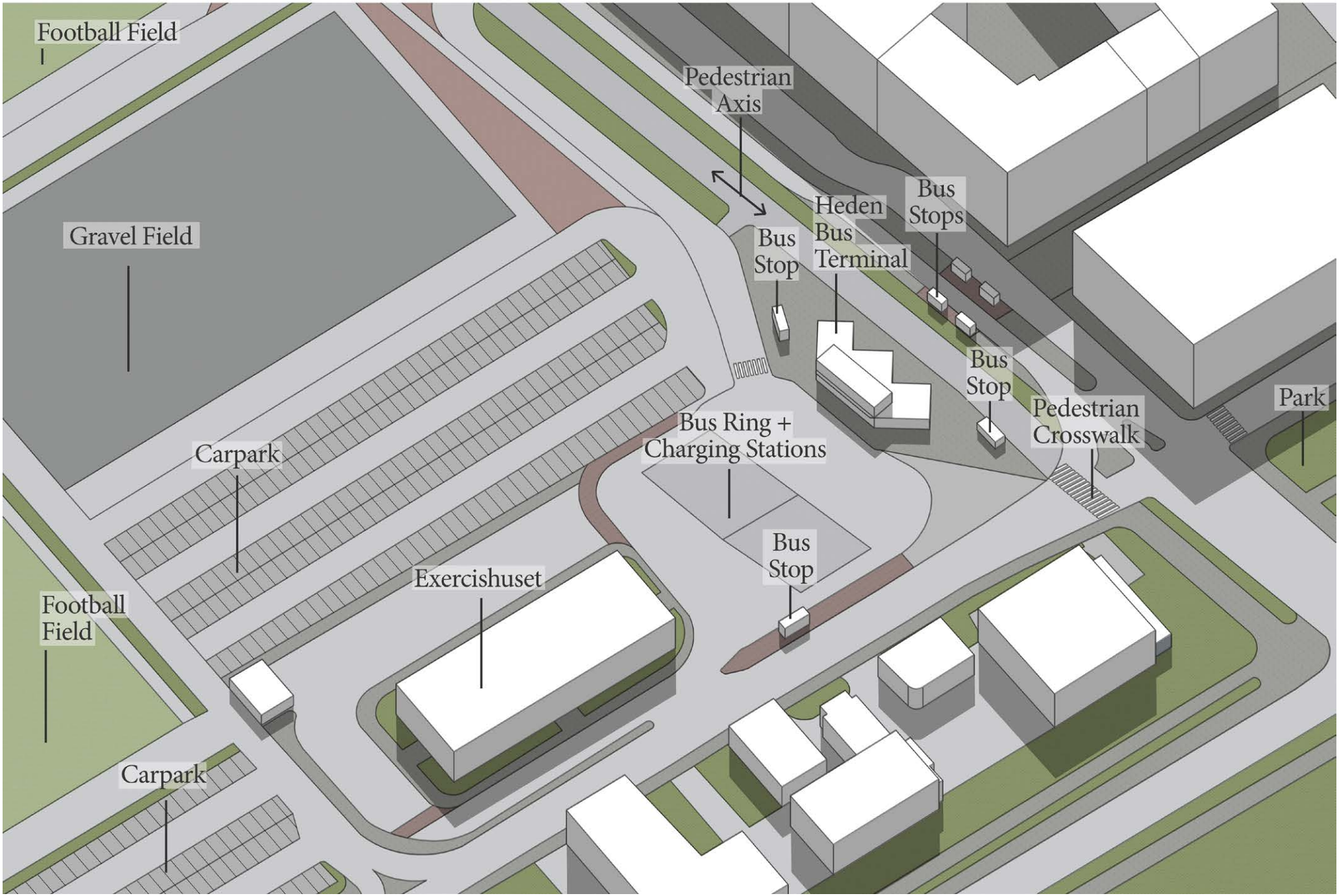


figure 12.7

figure 12.8

Heden Bus Terminal is at the west corner of Heden, which is considered as an "open activity space" for Göteborg. The existing building has a shop, cafe and a Vasttrafik office however it doesn't provide a large enough shelter for passengers waiting.

III. THE SITE


Football Field
Pedestrian Axis
Gravel Field
Bus Stop
Heden Bus Terminal
Bus Stops
Bus Stop
Park
Pedestrian Crosswalk
Carpark
Bus Ring + Charging Stations
Bus Stop
Exercishuset
Football Field
Carpark

Heden Bus Terminal is at the west corner of Heden, facing Exercishuset.

The area is considered as an "open activity space" for the city of Göteborg and the open areas including gravel fields and football fields provide an open air gathering and activity space during summertimes.

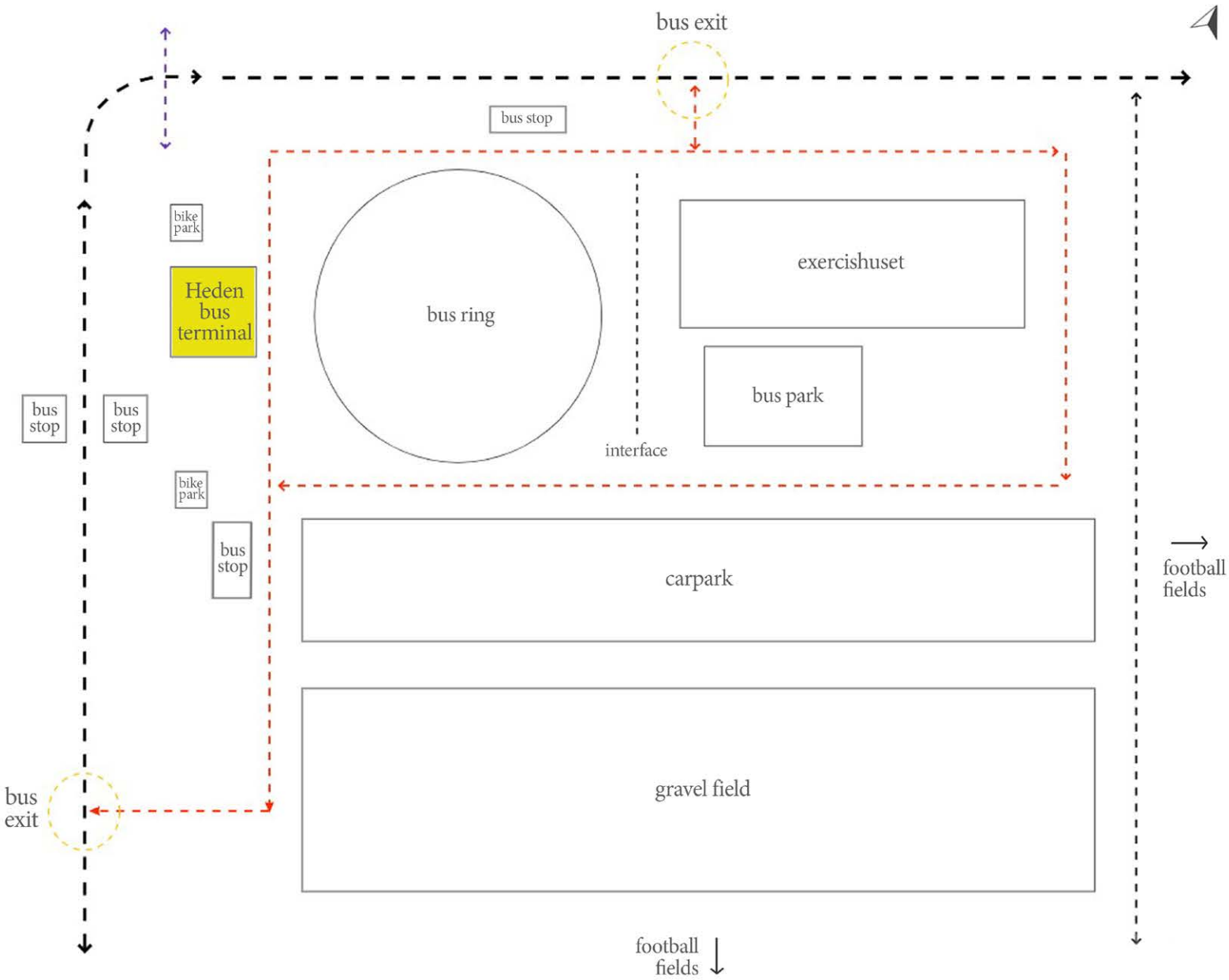
(Göteborg Stad, 2017)

The bus terminal is at the corner where two main axis roads are crossing.

The existing bus terminal building has a shop, cafe and a Vasttrafik office, however it doesn't provide a large enough shelter for passengers waiting.

Waiting comfortably in the interiors is important and the least distance between waiting areas and buses, also the visual connection between the waiting areas and the bus deck

It is a need for large eaves acting as shelter in the night time when servicing interiors are closed.



Existing Heden Bus Terminal, viewed from north figure 13.1

Existing Heden Bus Terminal, viewed from south figure 13.2

Exercishuset on the opposite side of Heden Bus Terminal figure 13.3

Existing Heden Bus Terminal, viewed from west figure 13.4

The bus ring and charging stations in between Heden Bus Terminal and Exercishuset figure 13.5

people waiting for the bus outside of Heden Bus Terminal in front of the north-east façade figure 13.6

Heden area host events and sports activities during summertime and it is a socially active open space. A new proposal may support the social activeness by providing an interior space larger than a bus terminal would require and may contain a cafe, bistro or a small restaurant to both host people enhence the building as an attaraction point in the city.

VISUAL CONNECTIONS AND PHYSICAL CONTINUATION

The relation of the building with the west side of the plot is visually seperated with the old padestrian walkwal crossing and the row of trees.The visual seperation from the the paralel main axis, that is The Avenue, leaves this area disconnected and a proposal should include both the visual and physical connections.

Existing Heden Bus Terminal, viewed from north

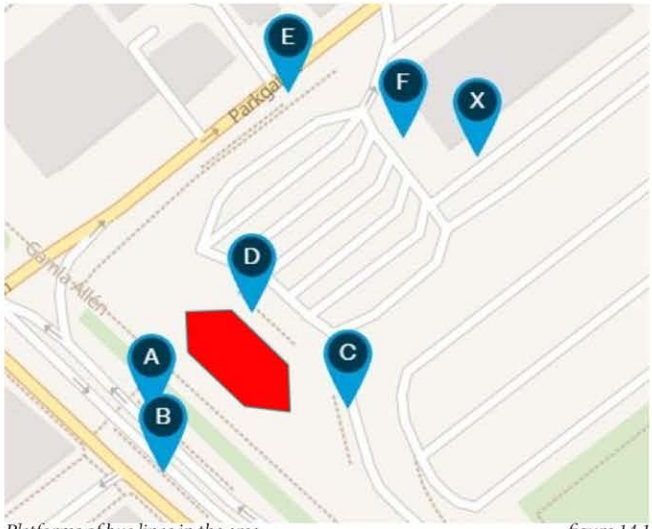
figure 13.1

PROVIDING SHELTERING

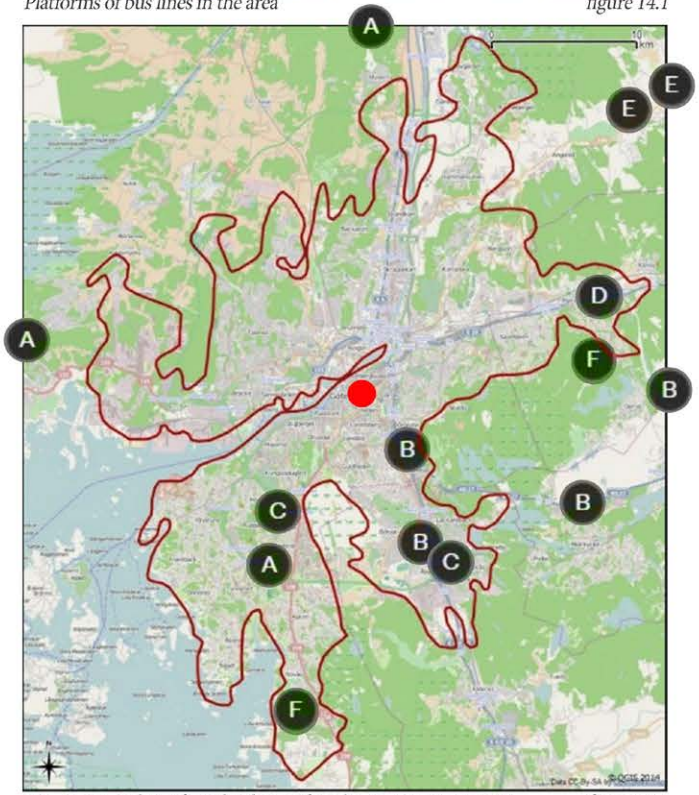
The eaves does not provide efficient sheltering on the outside, especially after the facility is closed in the evening there is a need for sheltering.

POTENTIAL AS AN ATTRACTION POINT

The two lower-storey parts of the building are functioning as a pizzeria and a shop with seating outside. These two commercial functions suggest that a new proposal should contain these functions and enhence them spatially.



Platforms of bus lines in the area *figure 14.1*



The-municipality-of-Gothenburg-after-the-expansion-in-1974 *figure 14.3*

västtrafik **The present** **15:58**

Line		Next (min)	Then	Location	Line		Next (min)	Then	Location
510	Partille center via Utby	5	15	D	X3	Mugwort	1	35	E
503	Furulund	8	28	F	758	Mölndals bro	2	32	C
753	Mölndal via Chalmers	9	24	C	X4	High Halls via Mölnlycke	2	14	B
173	Courtyard	9	31	D	RED	Lilla Varholmen	2	6	A
X3	Olofstorp	11	40	E	X4	Mölnlycke	3	6	B
758	Marklandsgatan via Mölndals bro	12	22	C	RED	Landvetter center	5	26	B
52	Linnaeus Square	Now	10	D	RED	Önneröd via Landvetter center	13	30	B
513	Partille center via Sävedalen	Now	10	D	258	Skintebo	16	46	F
X4	Kungälv	1	5	A	X3	Stenared	22	51	E
258	Brottkärr	1	31	F	753	Mölndal via Helenedal	29	59	C
50	Frölunda Torg	2	3	A	50	Kallebäck	2	6	B

Timetable of the busses *figure 14.2*

* maximum waiting time to be 30 minutes

The bus stops and the platforms are scattered around the area and a new proposal may bring some of the stops together to physically enhence the efficiency and the need for the bus terminal that is there today however reached and used by a lmited number of people that are using the facility while they wait for their busses to commute every weekdays (Platforms D, C, F, X)

On the weekends, the user profile changes to receiving passengers from the Avenue, especially at the platforms A and B.

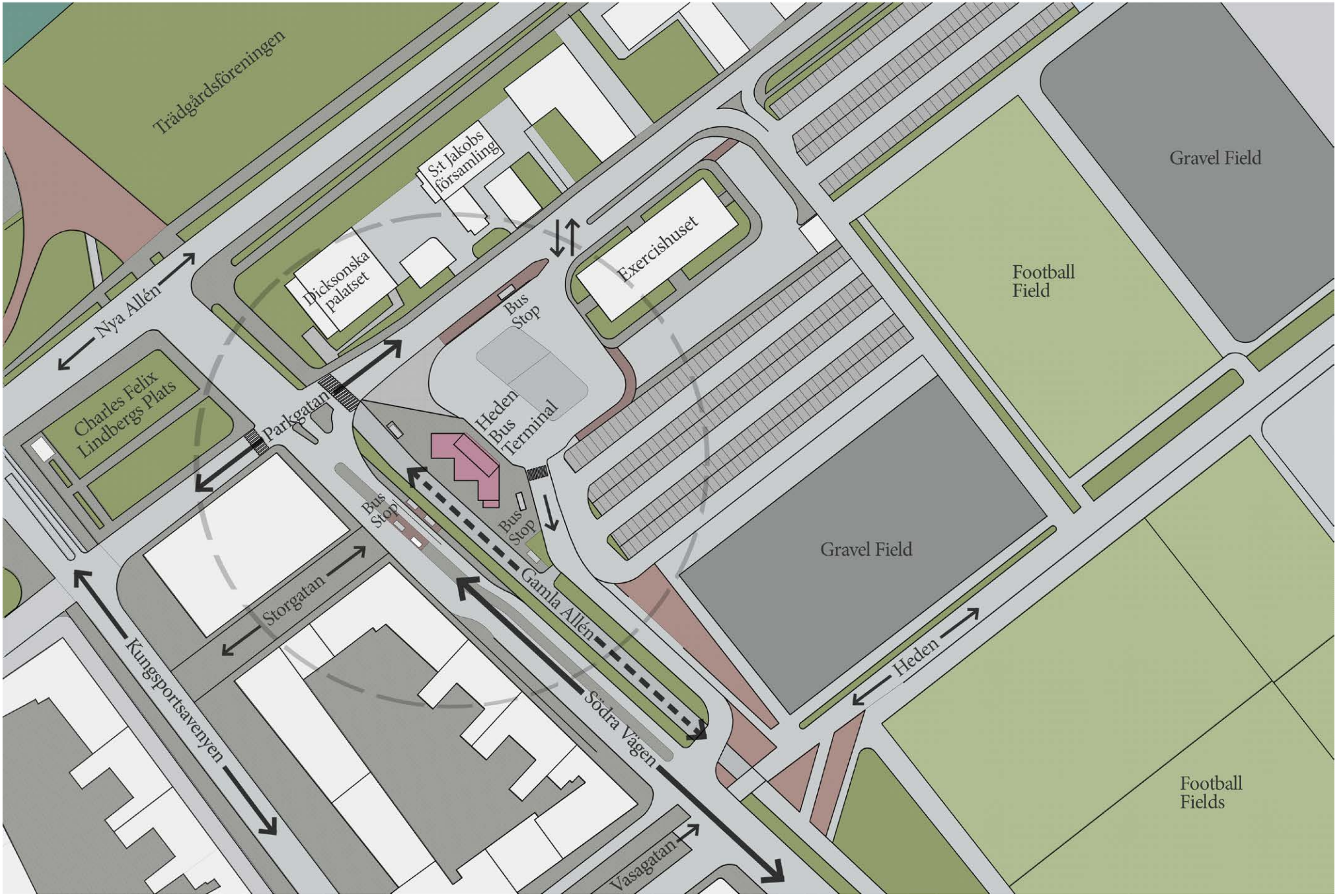
The busses are mainly used by commuters (Platforms D, C, F, X) and for short distances within the city (Platforms A,B ,E).

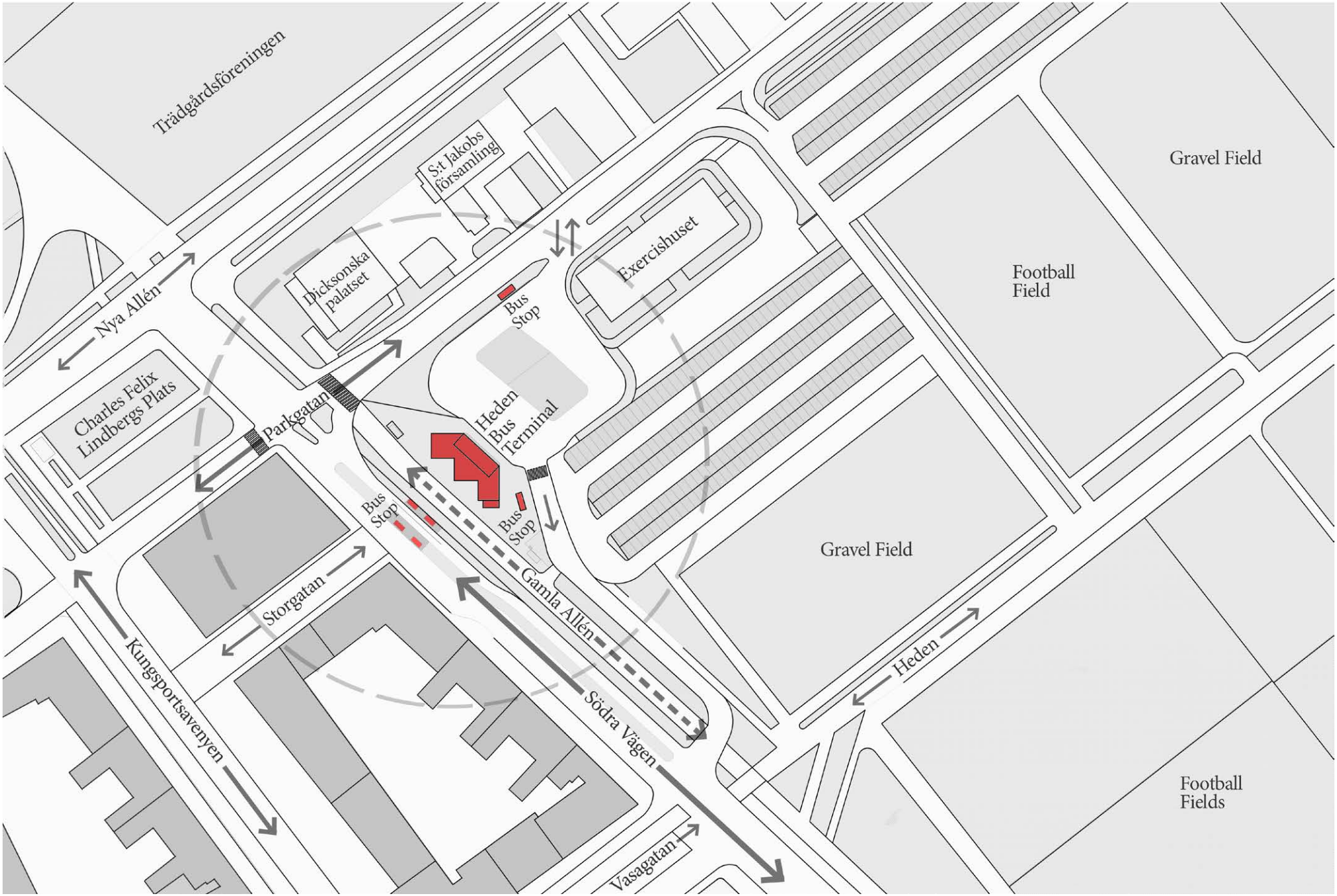
The corner has a road connection with Korsvagen, which is one of the main transporatatio nodes in the city.

IV. THE DESIGN

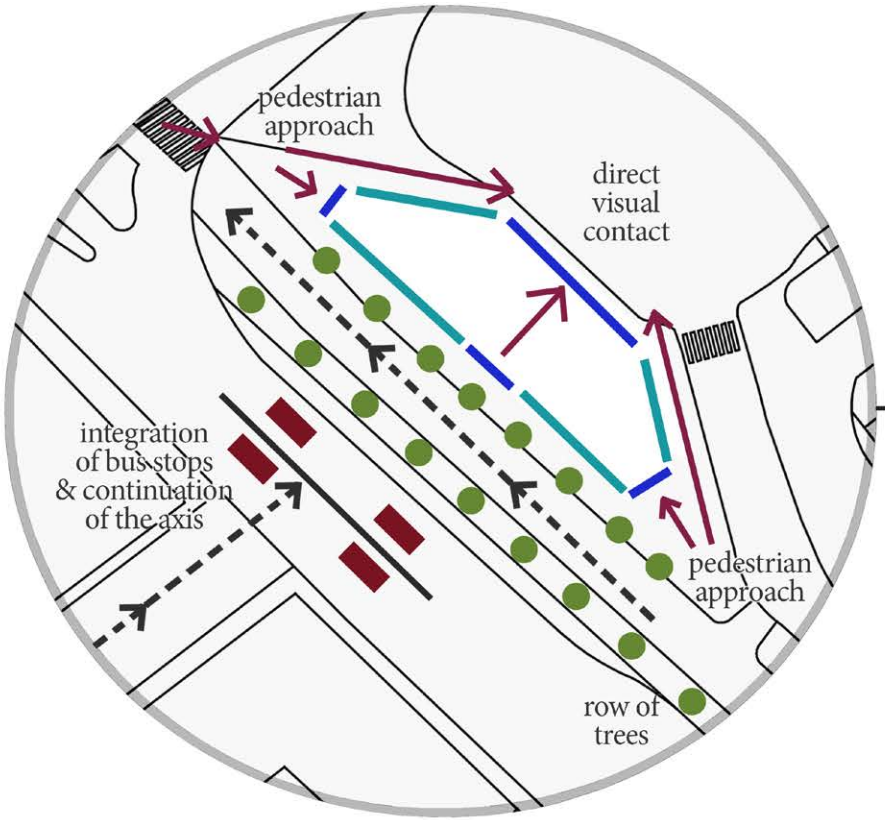
HEDEN BUS TERMINAL | Existing Context - Directions and Placement

(1:1000)




Trädgårdsföreningen
S:t Jakobs församling
Dicksonska palatset
Exercishuset
Nya Allén
Bus Stop
Football Field
Gravel Field
Charles Felix Lindbergs Plats
Parkgatan
Heden Bus Terminal
Bus Stop
Bus Stop
Gravel Field
Storgatan
Gamla Allén
Kungsportsavenyen
Södra Vägen
Heden
Football Fields
Vasagatan

The design process started off with an analysis of the plot in terms of visaul directions, physical connections and proposing a suggestion for the translucent skin, where it would be relevant and where the clear vision and façade is a necessity.



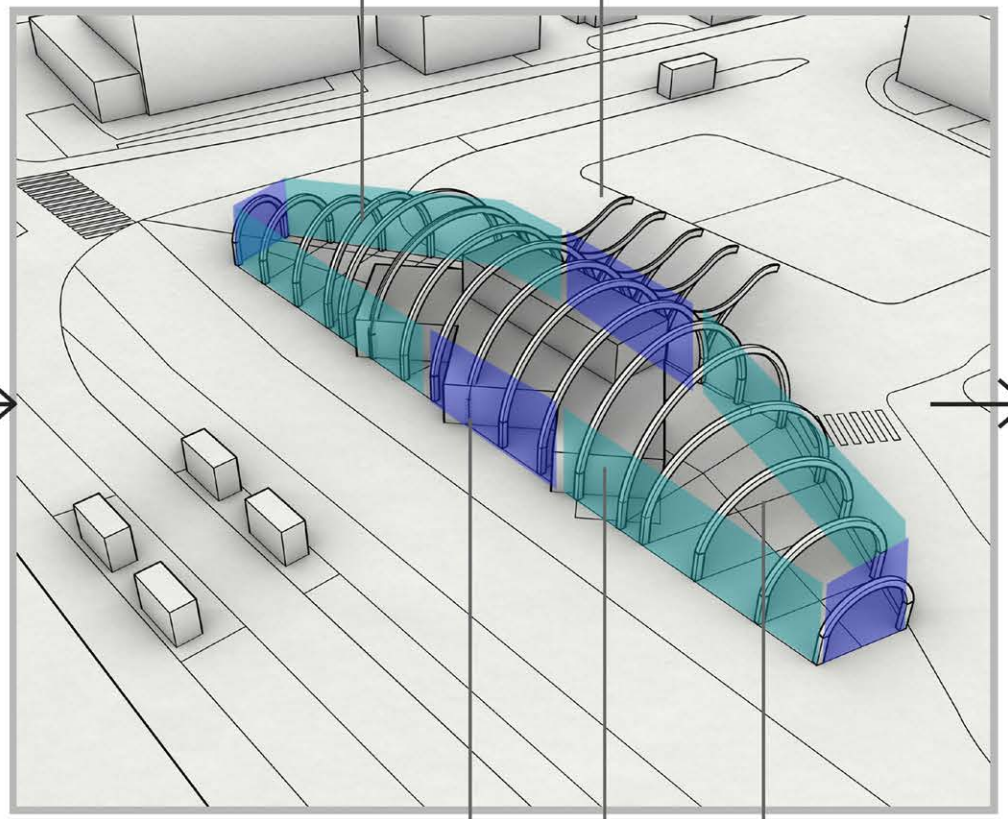
Translucent Skin

Clear Glass Façade

Visual Directions

Rib structure in sequence to give a sense of movement which is a characgteristic in terminal buildings

Eaves to provide sheltering on the outside



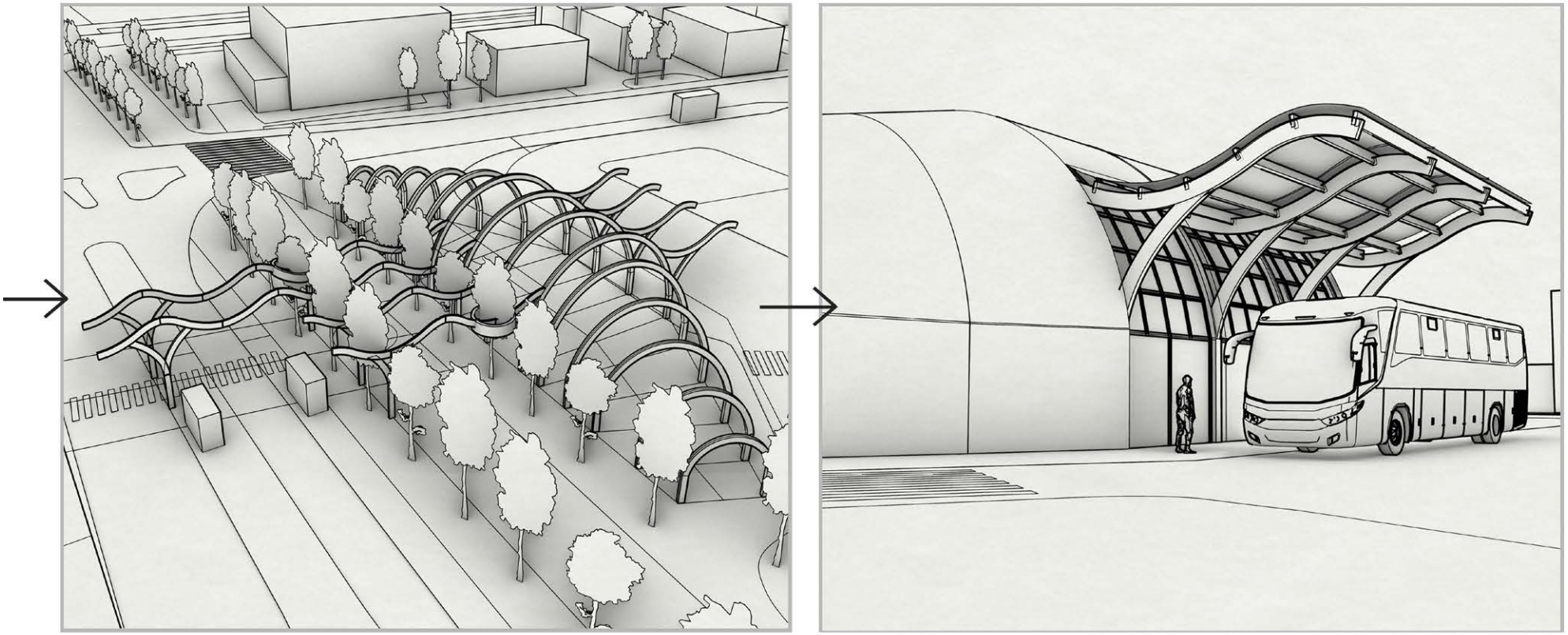
Clear Glass Façade

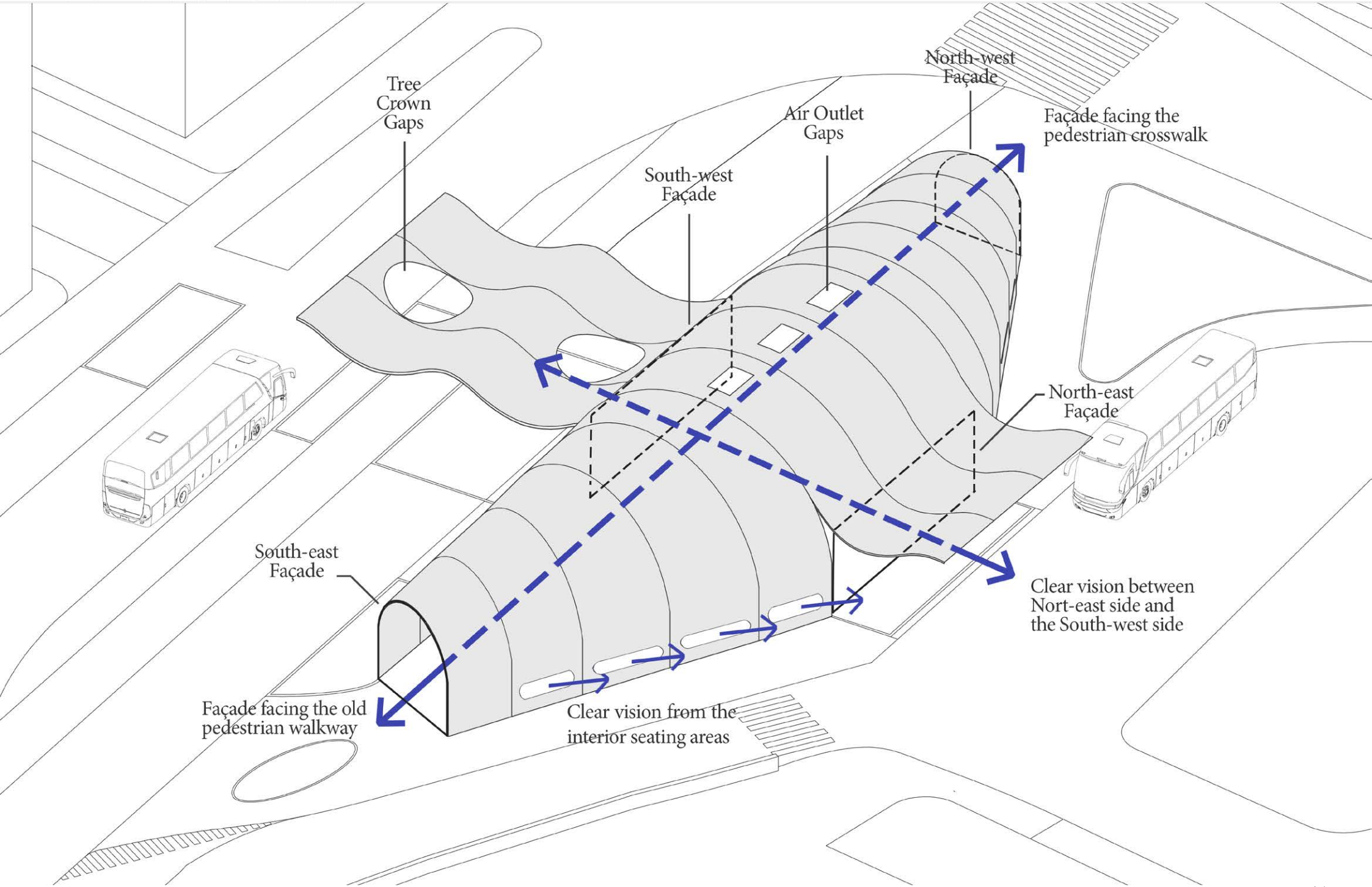
Translucent Skin

Roofing to be continuos with the façades and covered with translucent skin

The rib structure expand on north-east side of the structure and the south-west side to provide sheltering and reach. South-west side is put special emphasis because the side has a potential to visually make the terminal visible from the Avenue and raise the attaraction.

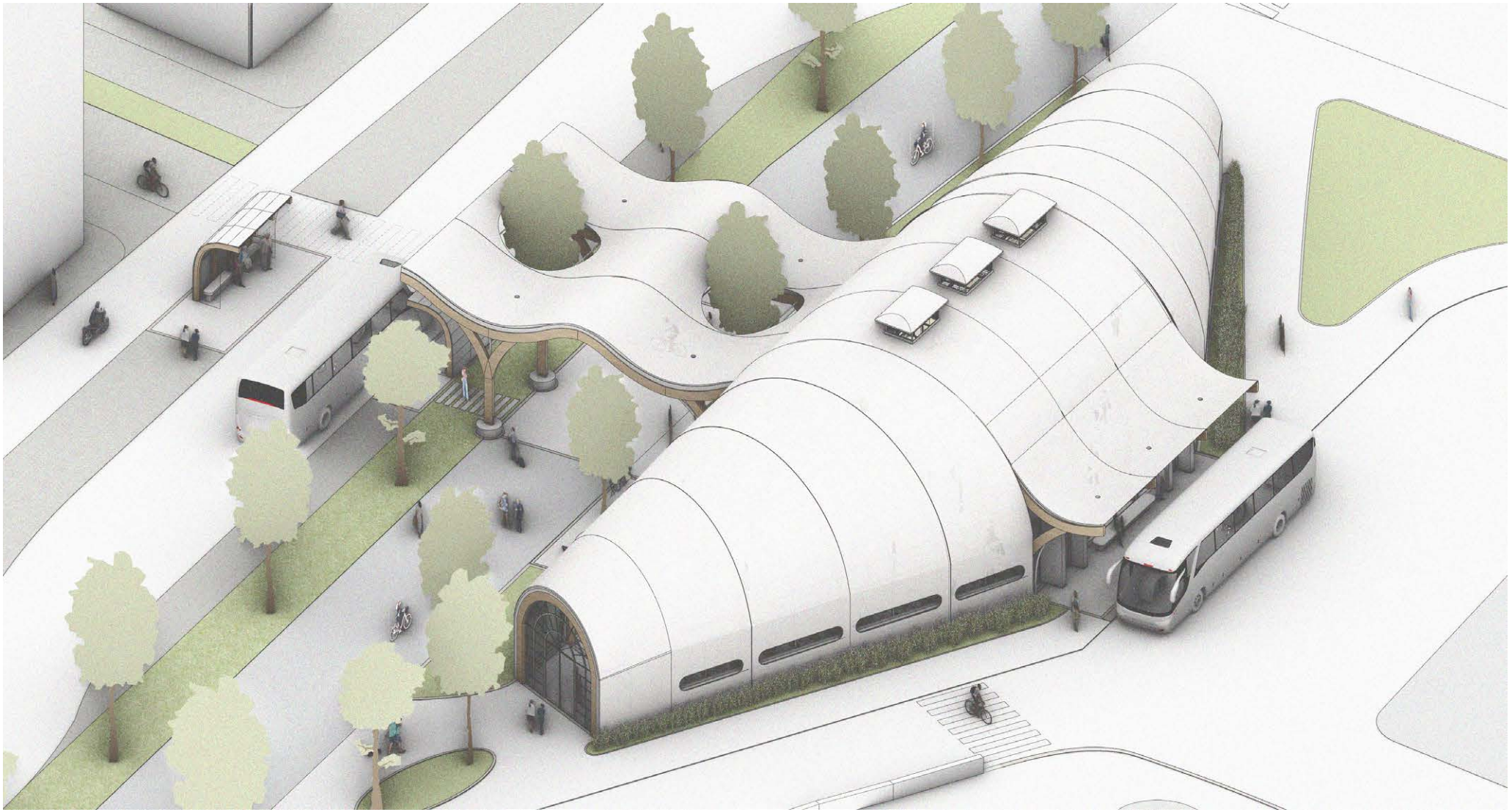
Translucent skin opens up and makes a gesture to form sheltering also make it clear to indicate where the busses would stop and pick the passengers.




Tree
Crown
Gaps
South-west
Façade
Air Outlet
Gaps
North-west
Façade
Façade facing the
pedestrian crosswalk
North-east
Façade
South-east
Façade
Clear vision between
Nort-east side and
the South-west side
Façade facing the old
pedestrian walkway
Clear vision from the
interior seating areas

OVERVIEW 1

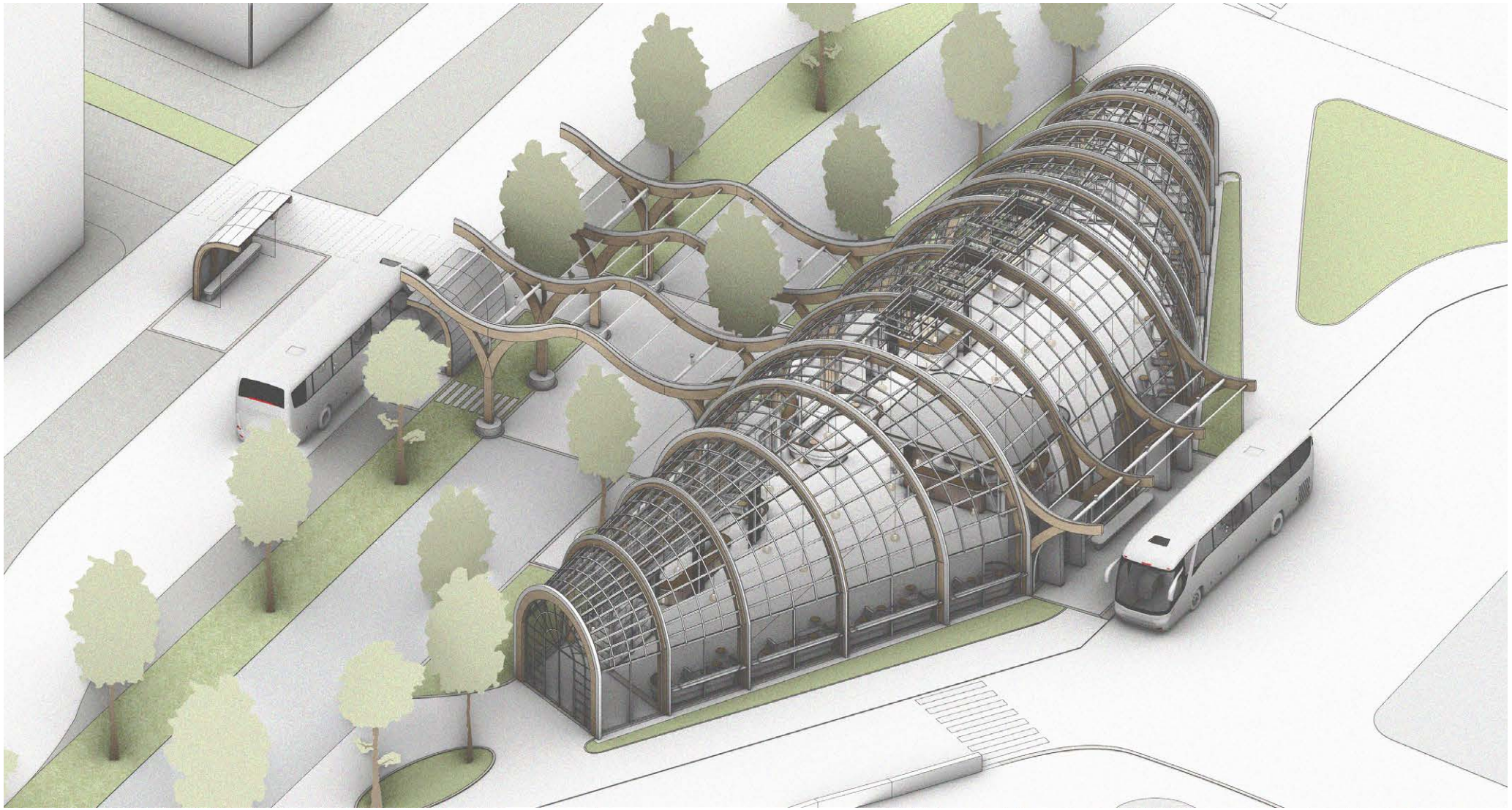
Translucent skin is the material PTFE (Teflon coated fiberglass)



PTFE is coated fiberglass and resillient to tension, therefore suitable for tensile structures and also water repellent, so it acts as roofing to lead the rainwater and keep the inner structure safe from rainwater.
Air outlets are a part of the design due to the greenhouse character of the interior space that is formed by the translucent PTFE skin and the polycarbonate inner-climate shell.

OVERVIEW 2

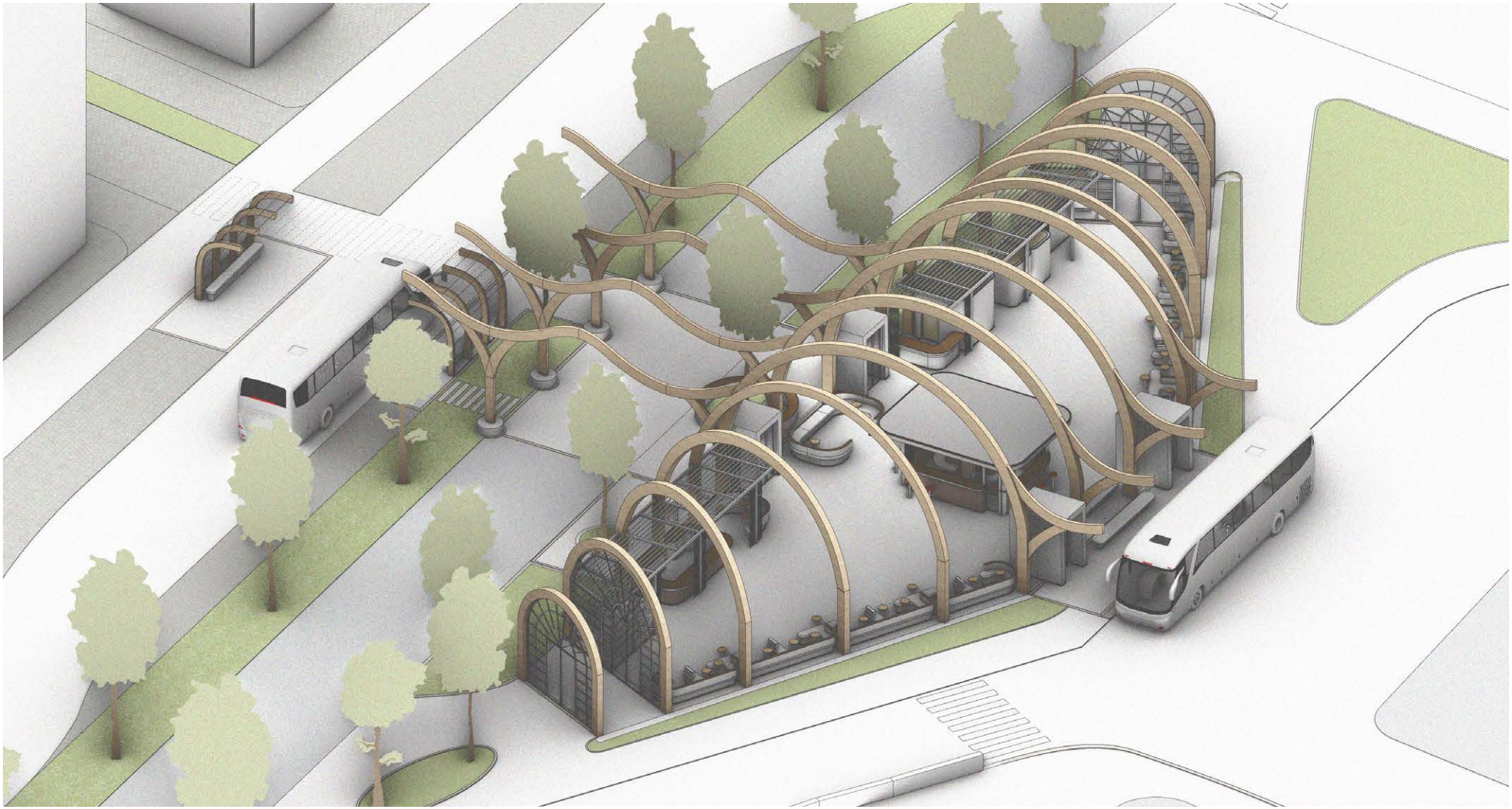
The primary structure consists of glulam ribs and the covering panels are clear polycarbonate panels supported with steel gridal structure.



Polcarbonate is easily installable and light in weight and helps the steel tructure to be lighter as well, while as a secondary structure; steel profiles stabilizes the glulam ribs against the lateral forces.

OVERVIEW 3

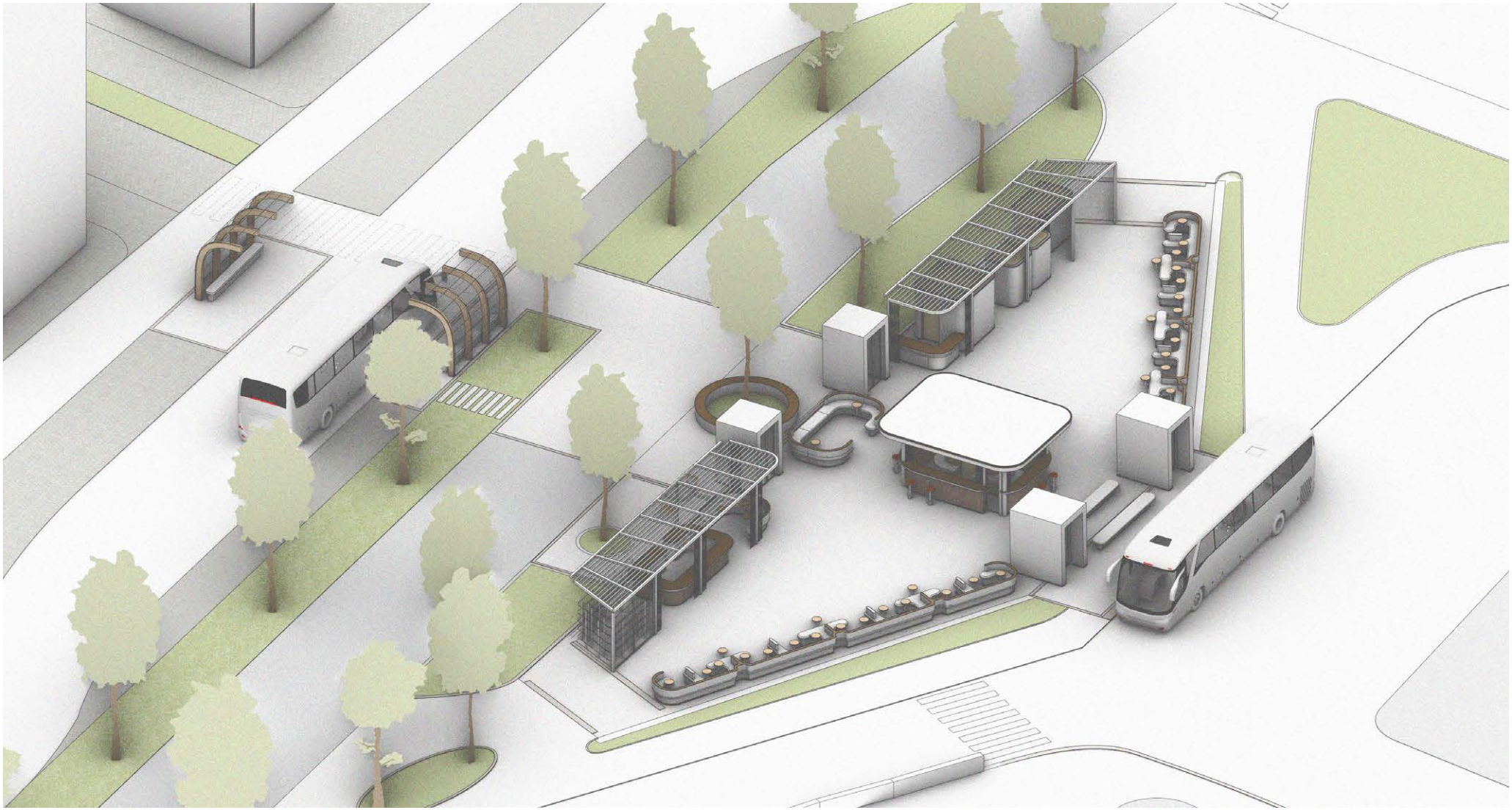
The side gates are clear glass in frames and the base level façade is clear glass all around.



From the interior perspective, glulam rib structures are visible and covers the spaces repeatedly in a sequence.

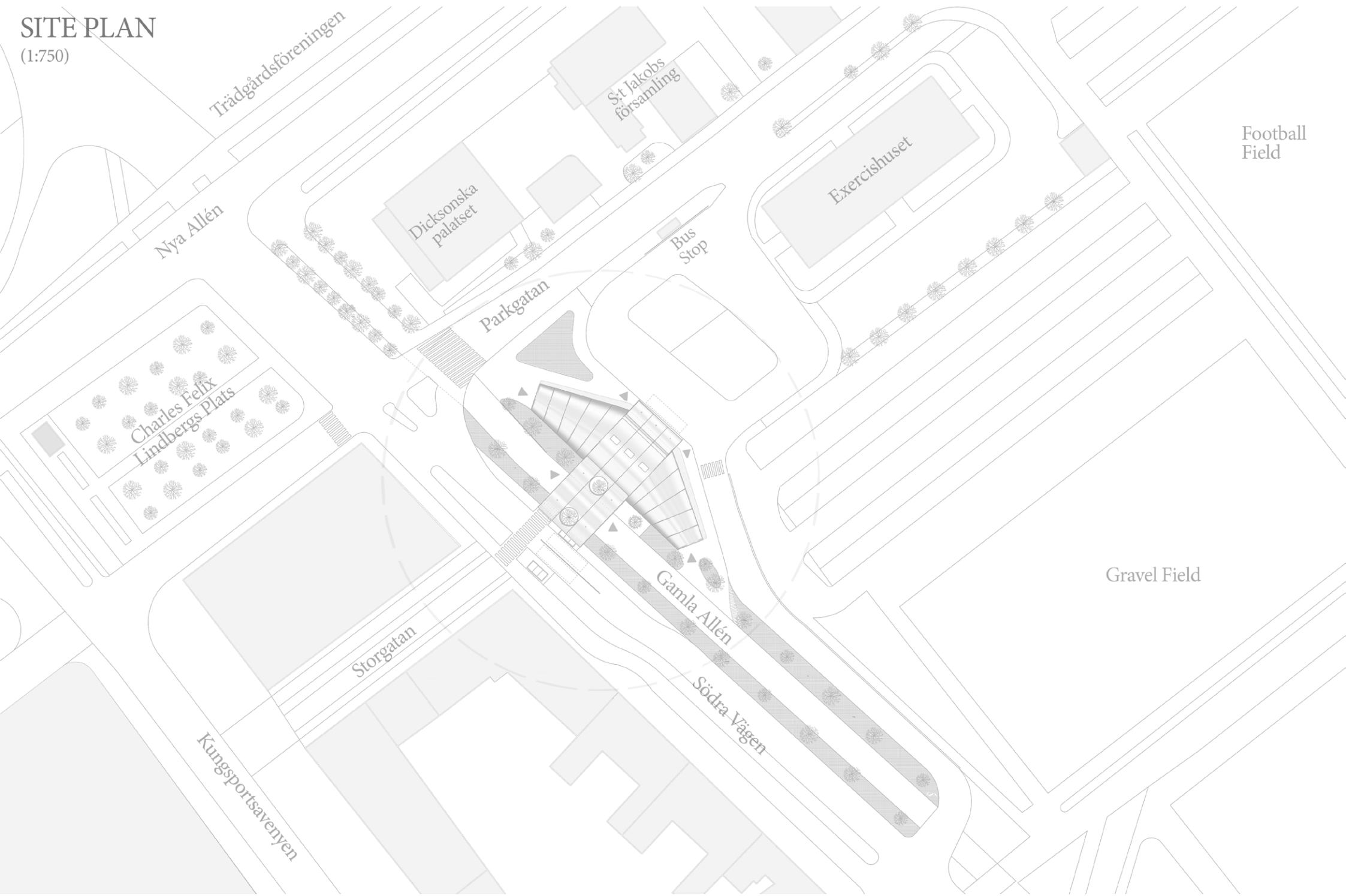
OVERVIEW 4

The interior design is drived from the idea of having modules of small structures and furnitures that are detaching from the general sense of the design.

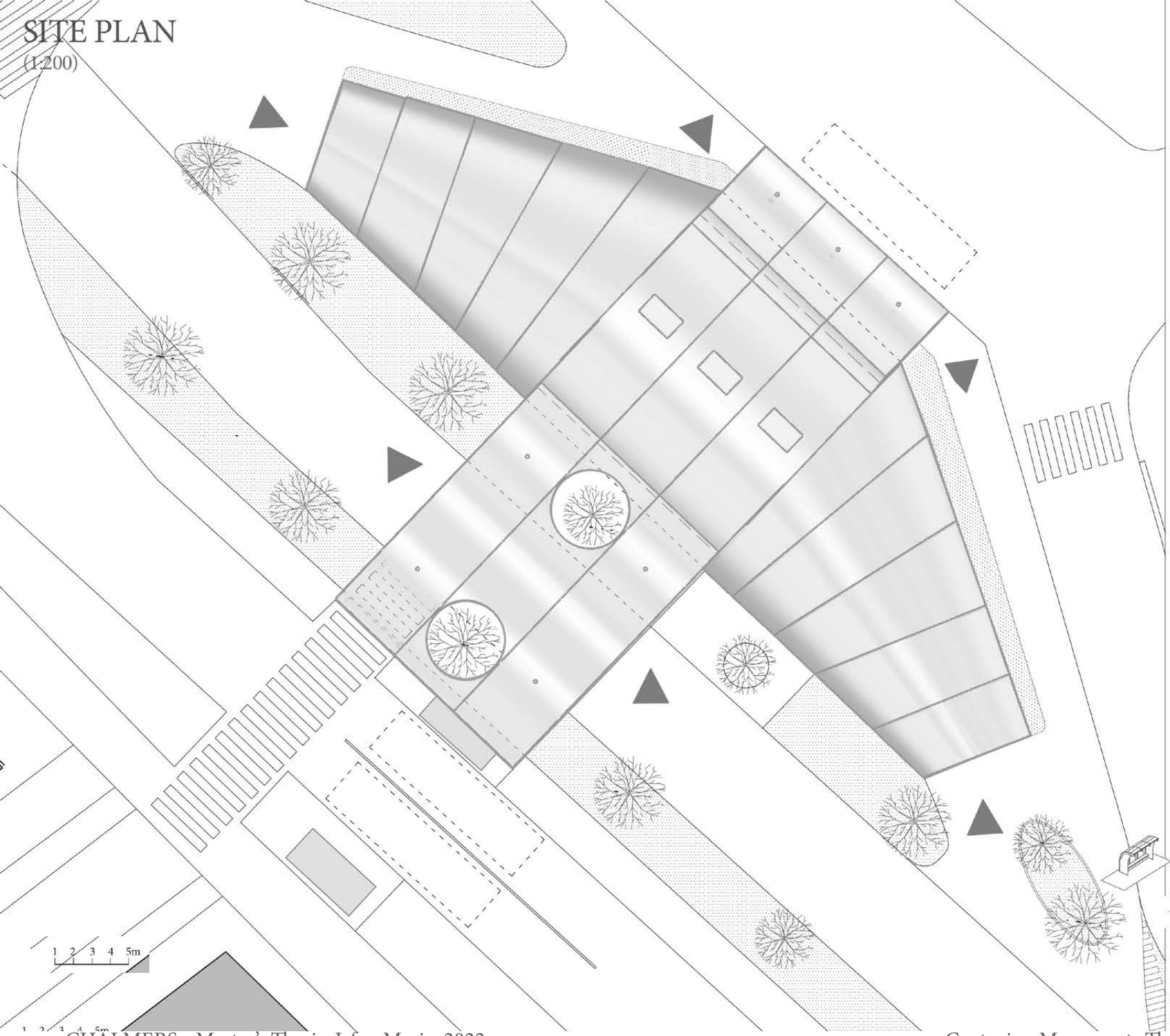


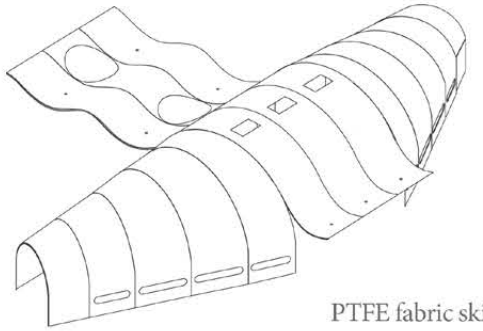
Since the translucent skin and interior climate would keep heat and humidity inside, the building is going to act in greenhouse principles.
On the other hand, to prevent over-heating, air outlet modules on top level, are also considered as a part of the design.

SITE PLAN
(1:750)

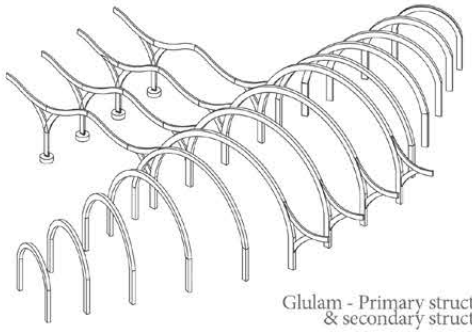


SITE PLAN
(1:200)

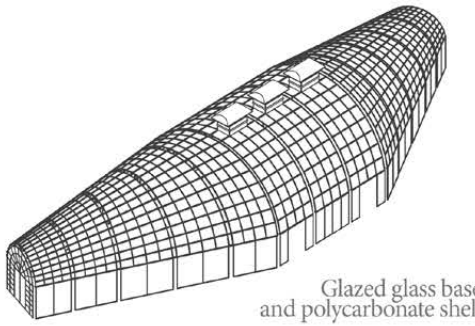




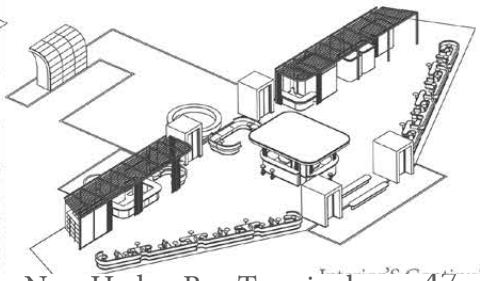
PTFE fabric skin

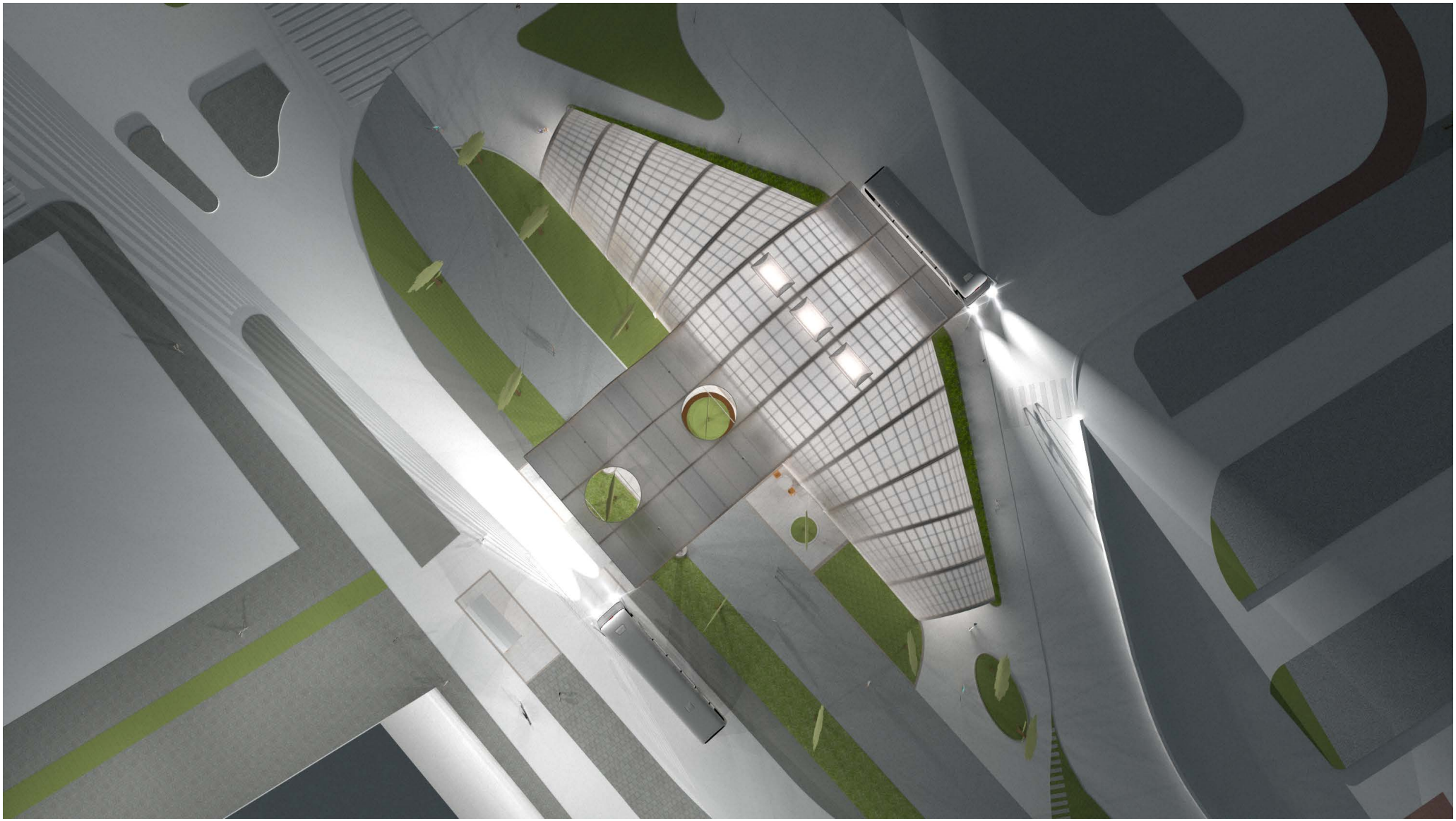


Glulam - Primary structure
& secondary structure



Glazed glass base
and polycarbonate shell



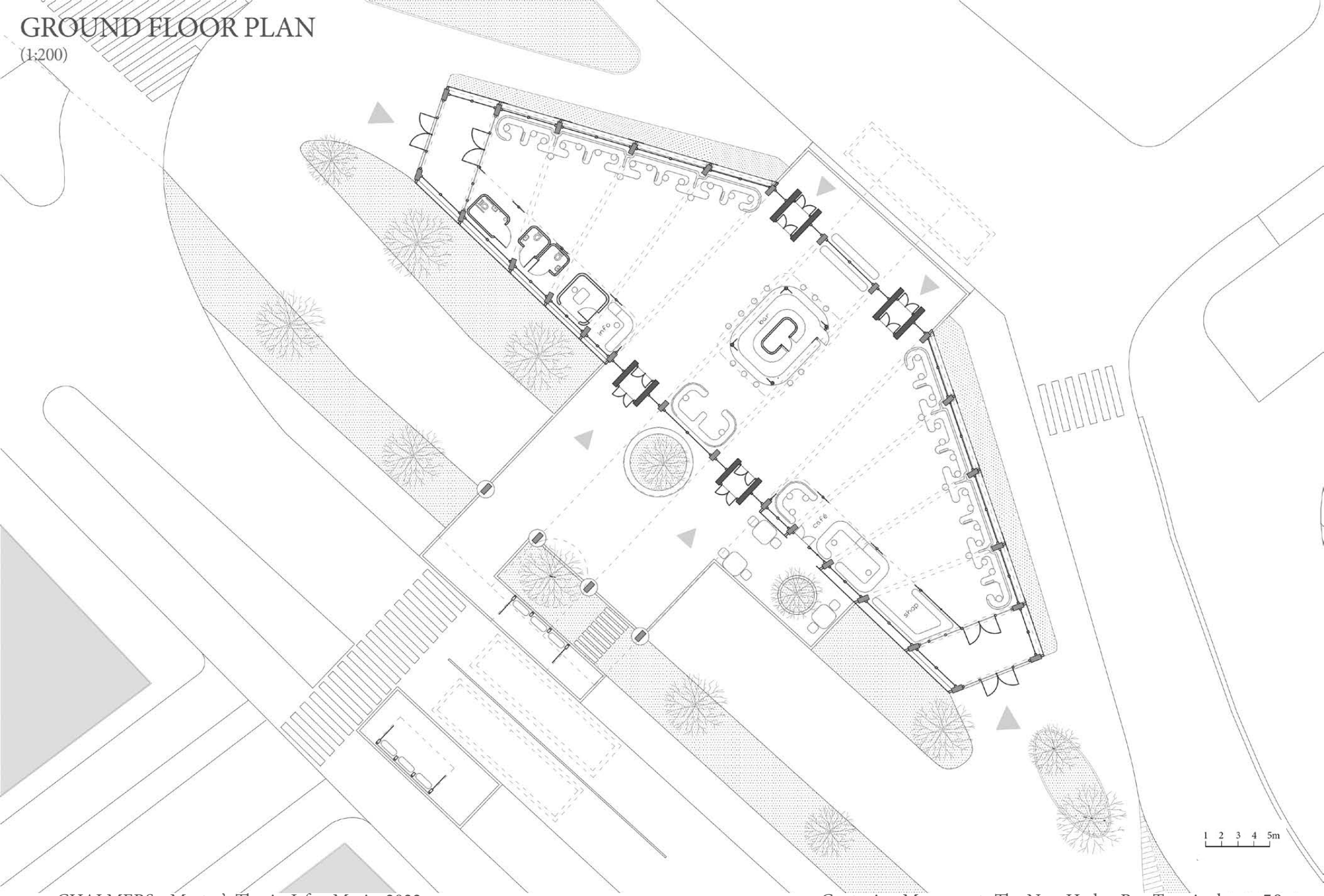


Render- Exterior - Night time - Top View

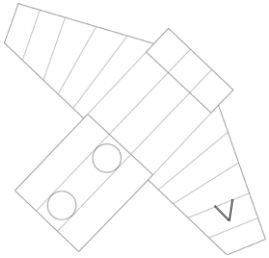
Render- Exterior - Night time - 1

GROUND FLOOR PLAN

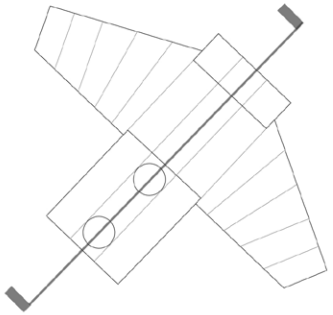
(1:200)



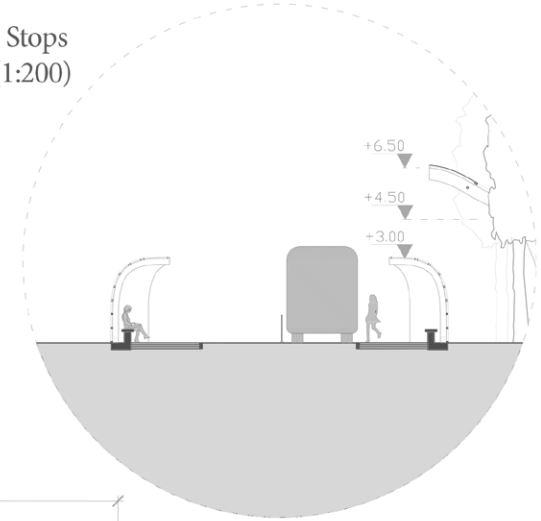
Render- Interior - Night time - 1

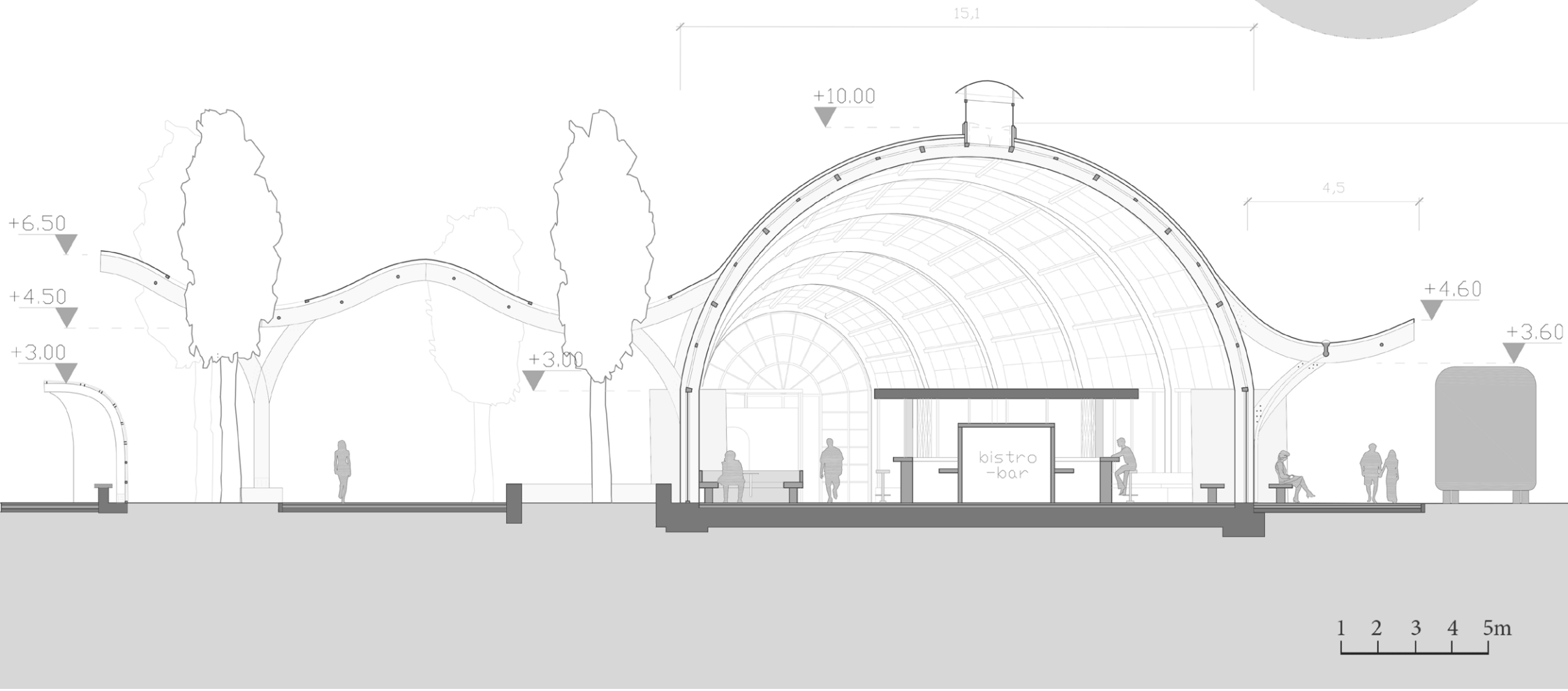


CROSS SECTION
(1:100)

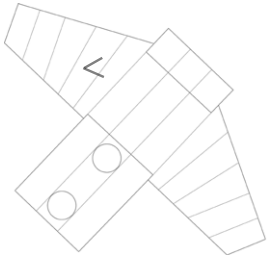


Bus Stops
(1:200)



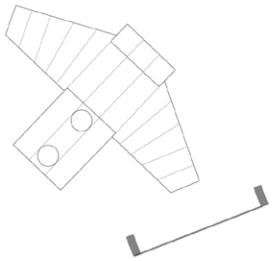


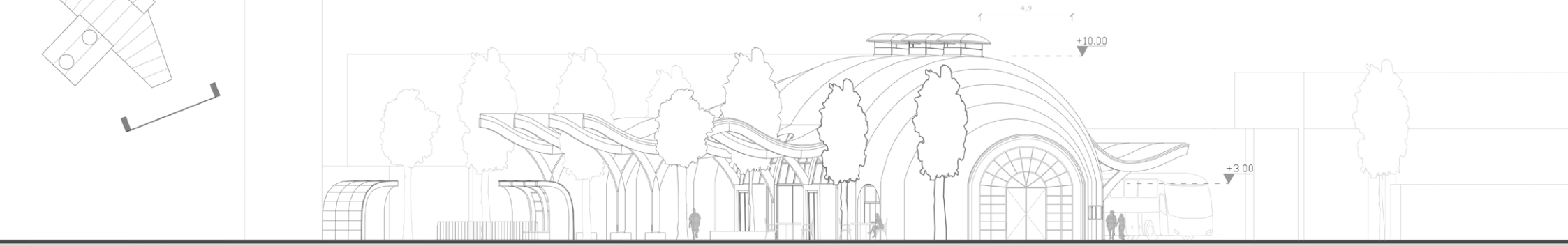
Render- Interior - Night time - 2



ELEVATION - south-east

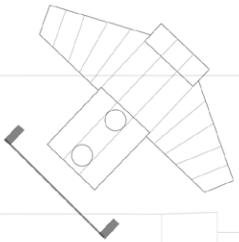
(1:200)

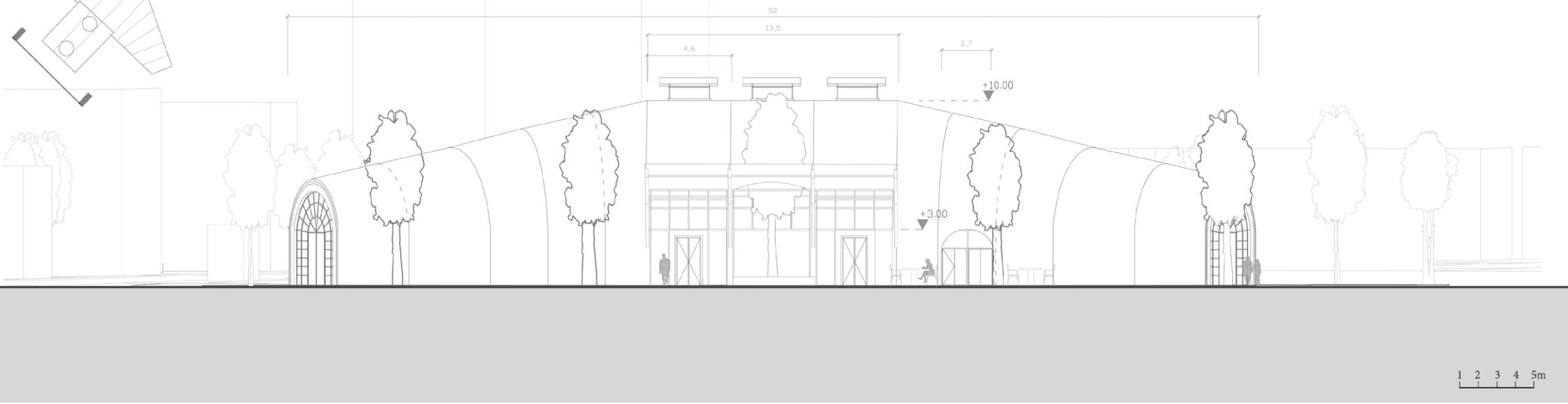




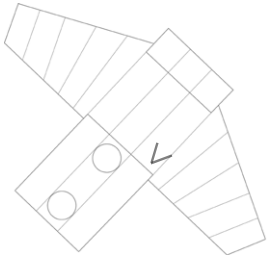
ELEVATION - south-west

(1:200)

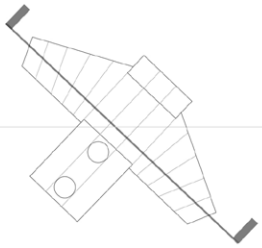


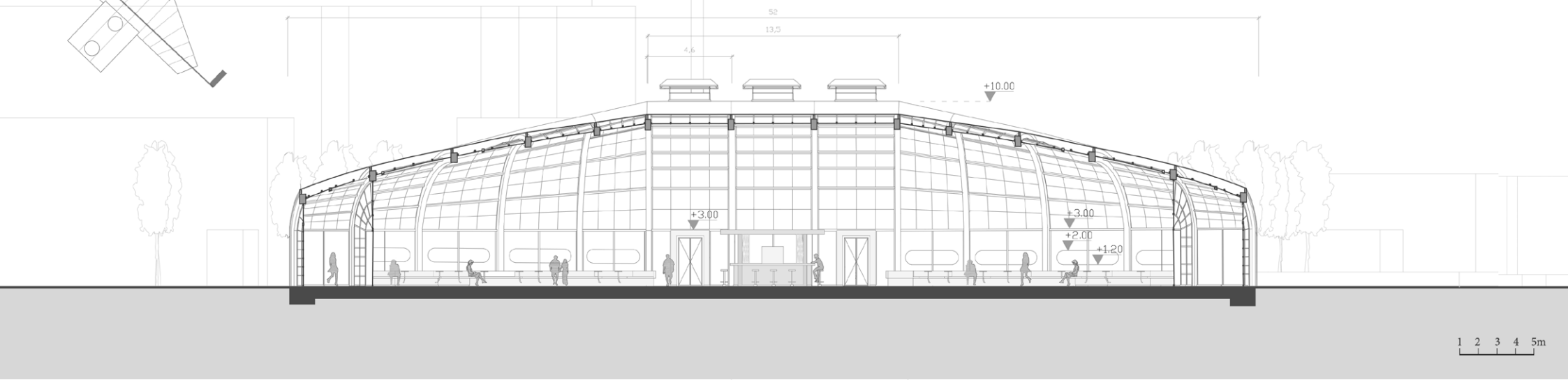


Render- Interior - Night time - 3

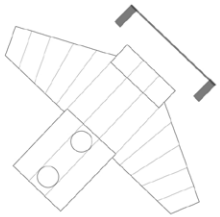


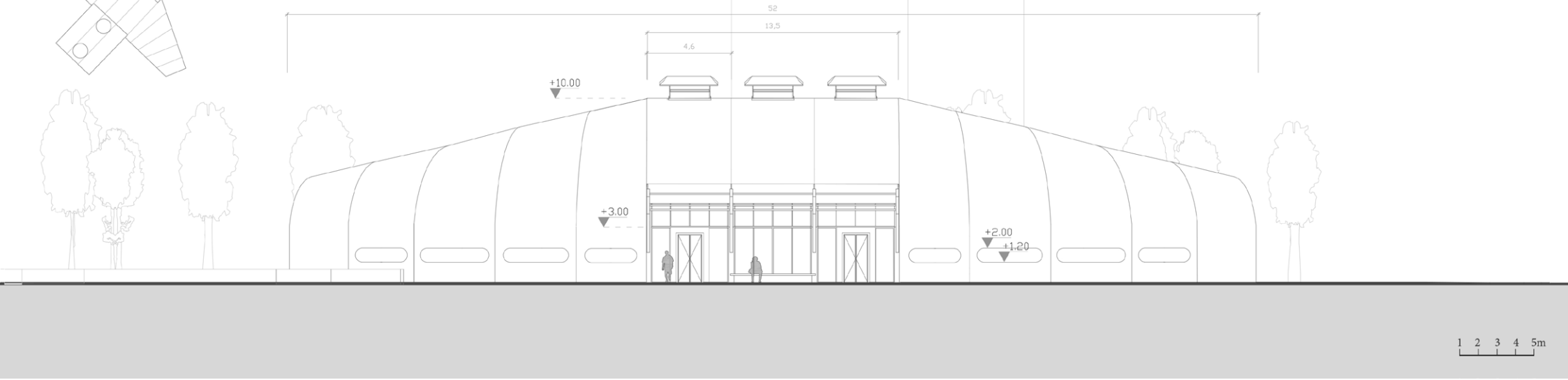
SECTION ALONG (1:200)



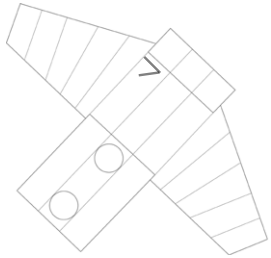


ELEVATION - north-east (1:200)



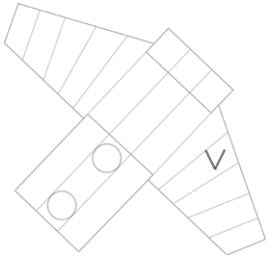


Render- Interior - Night time - 4



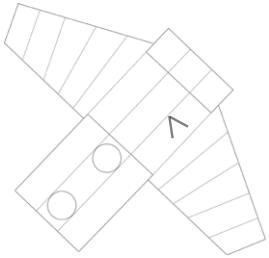
Render- Interior - Night time - 5

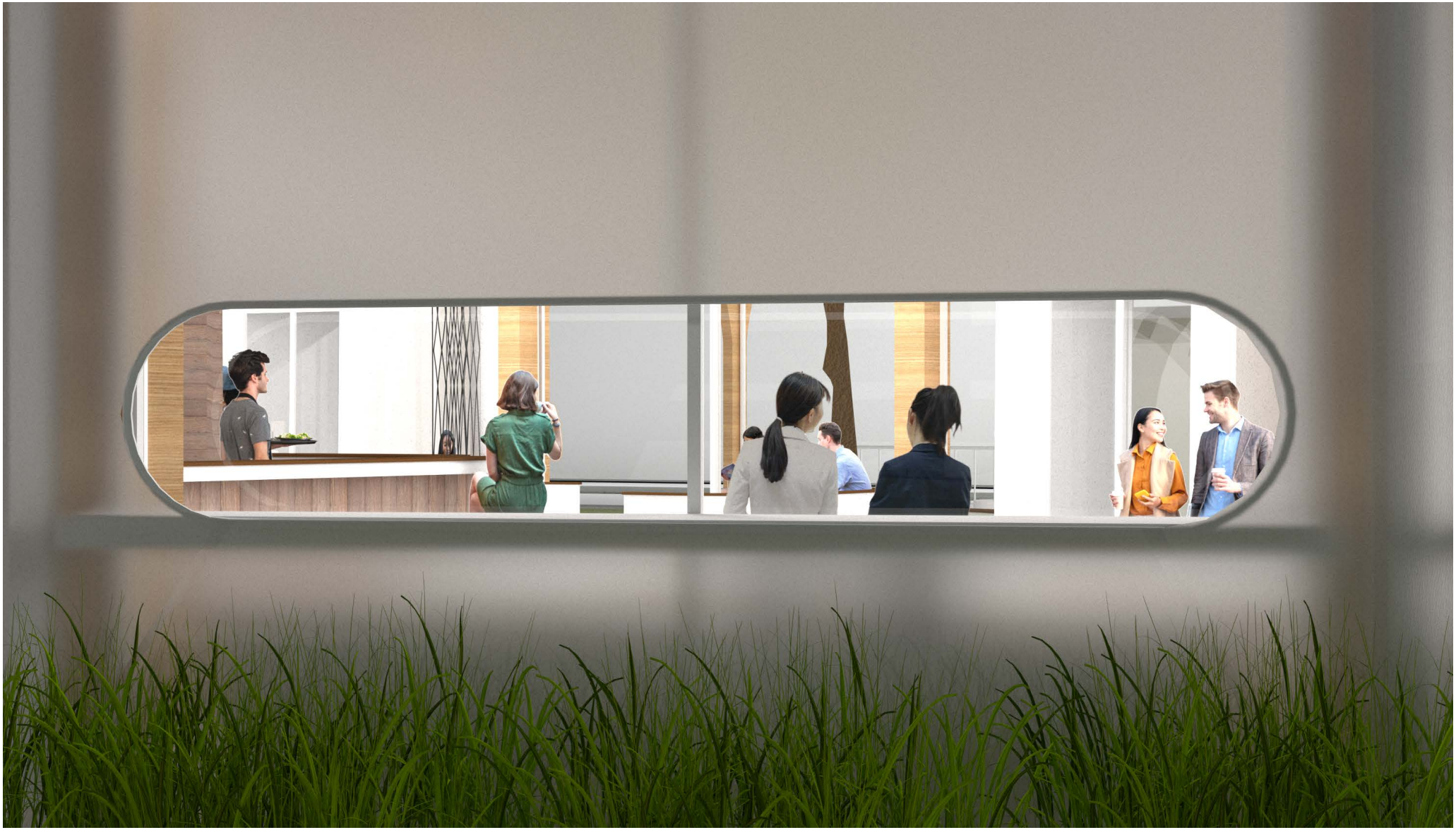
Render- Interior - Night time - 6



Render- Interior - Night time - 7

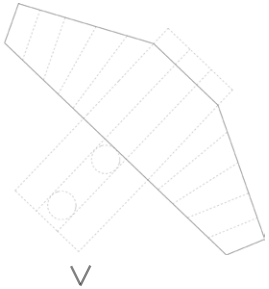
Render- Interior - Night time - 8



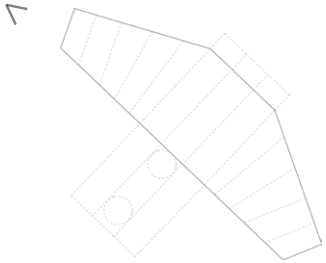


Render- Exterior - Night time - 2

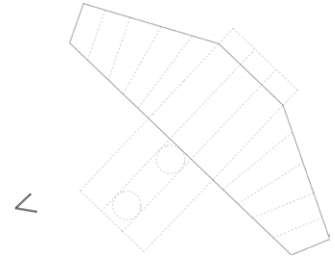
Render- Exterior - Night time - 3



Render- Exterior - Night time - 4



Render- Exterior - Night time - 5



Interior - Daytime -1

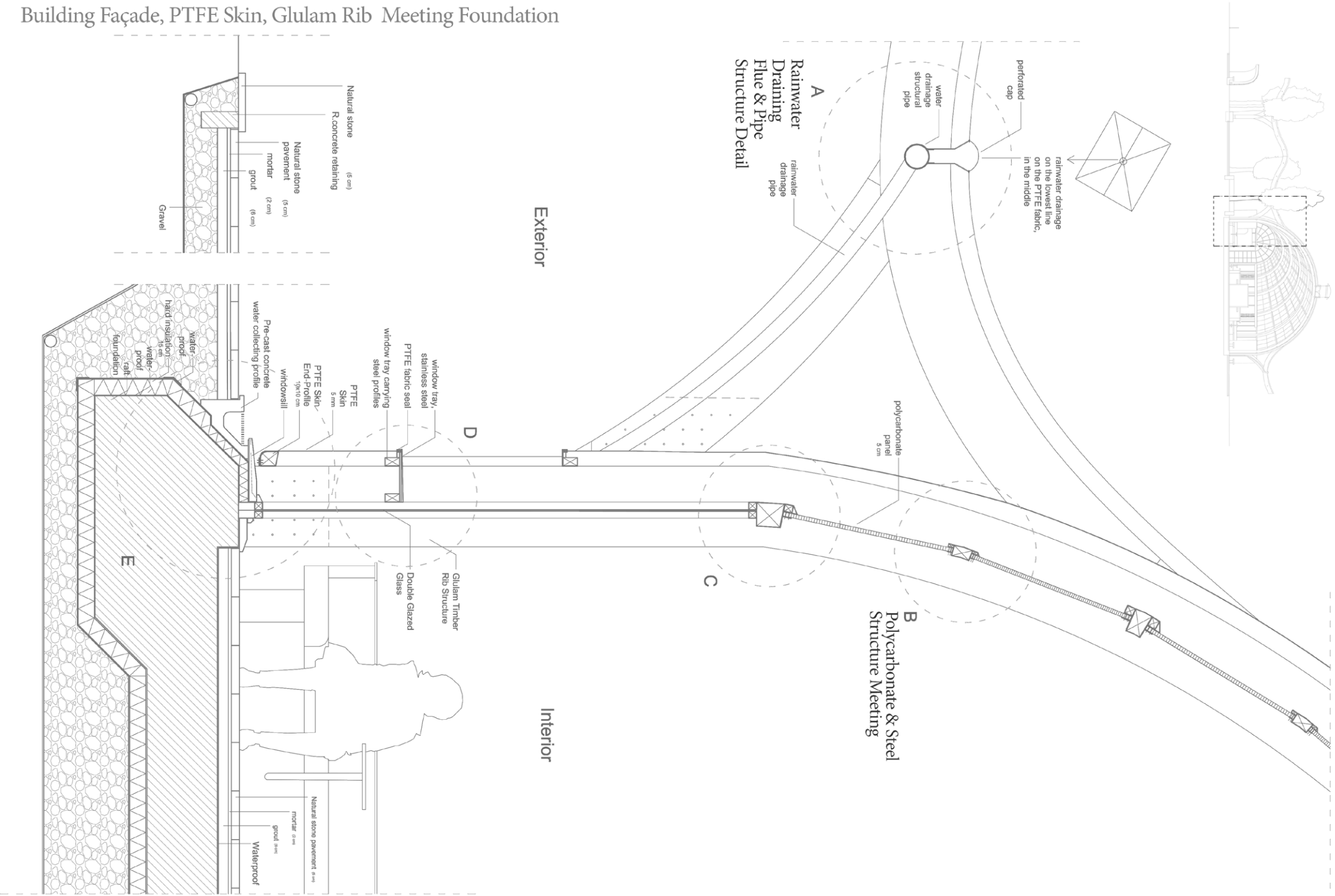
Interior - Daytime -2

Exterior - Daytime -1

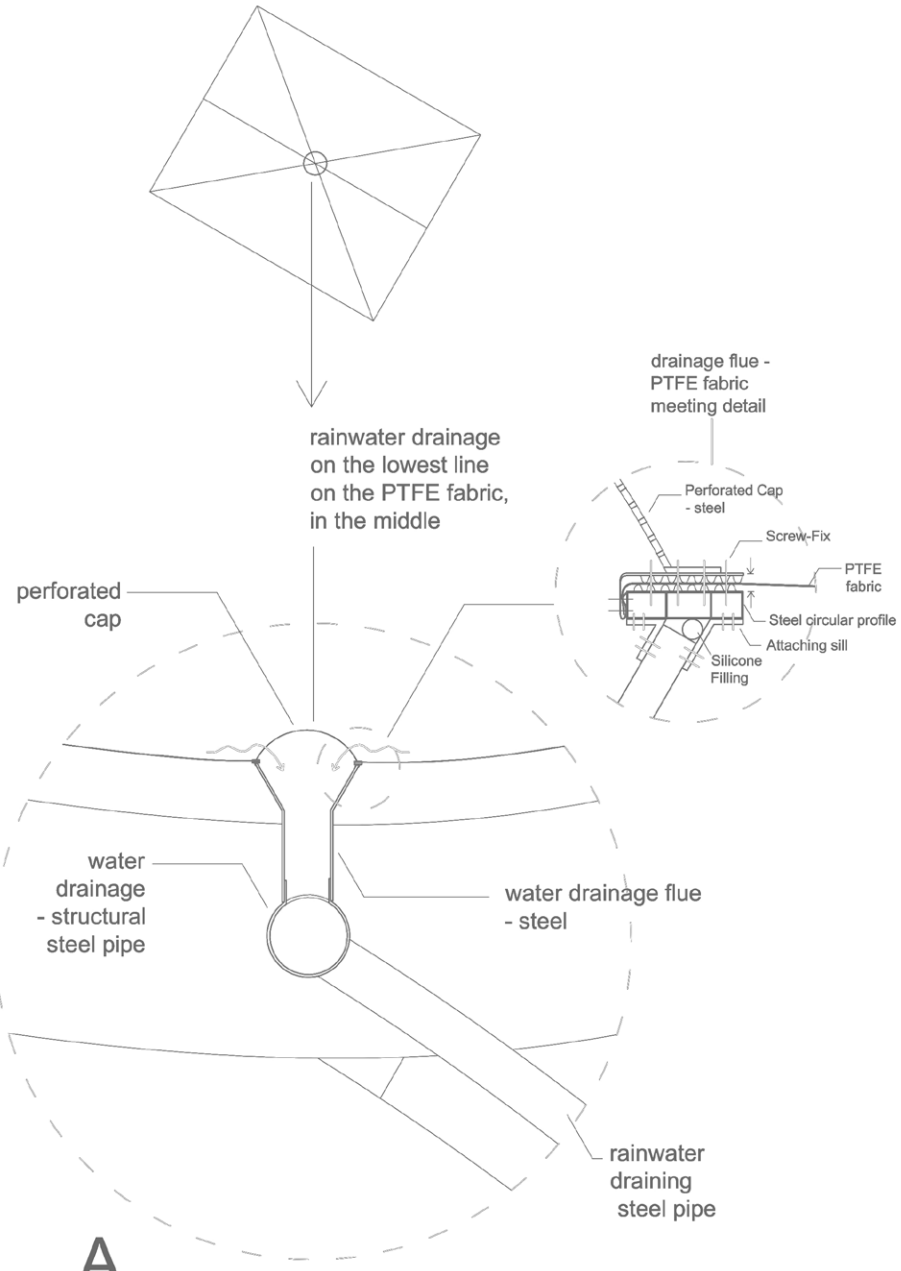
Exterior - Daytime -2

CONSTRUCTION DETAIL (1:20)

Building Façade, PTFE Skin, Glulam Rib Meeting Foundation

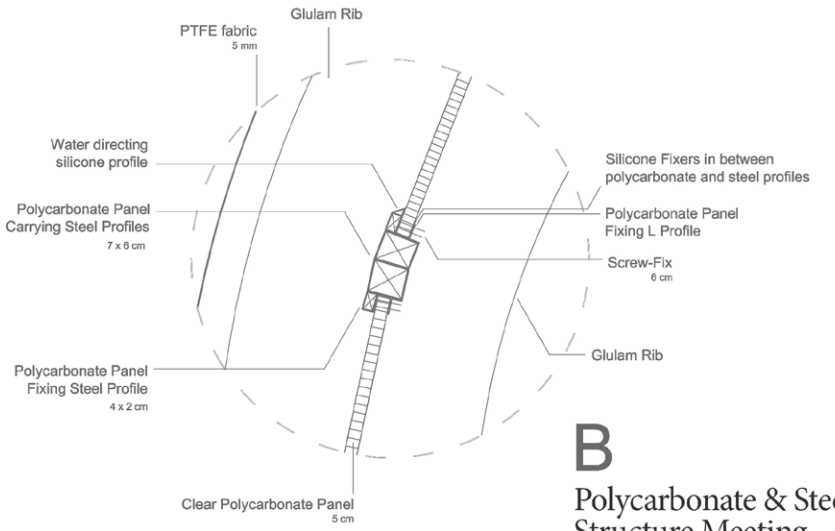


CONSTRUCTION DETAIL (1:10)



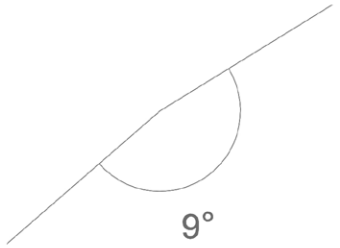
A

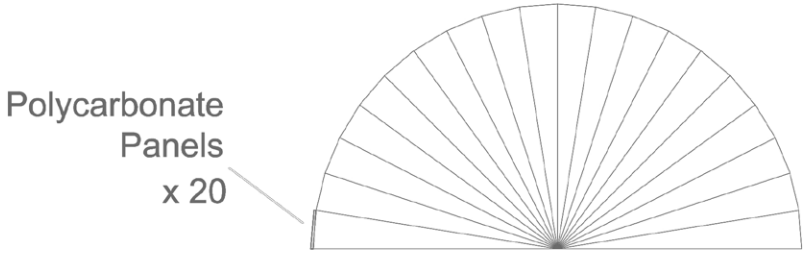
Rainwater Draining
Flue and Pipe Structure Detail



B

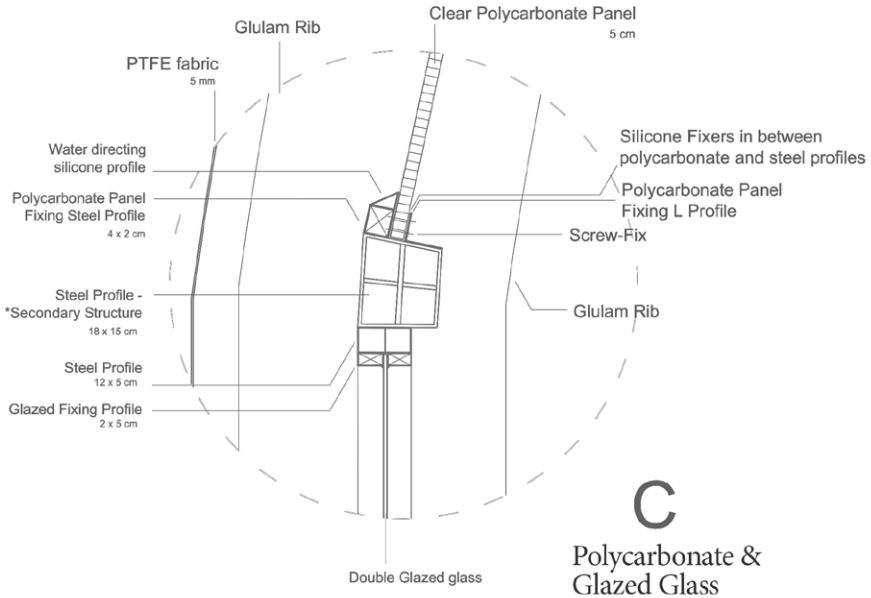
Polycarbonate & Steel
Structure Meeting





Arches covering
the space

CONSTRUCTION DETAIL (1:10)

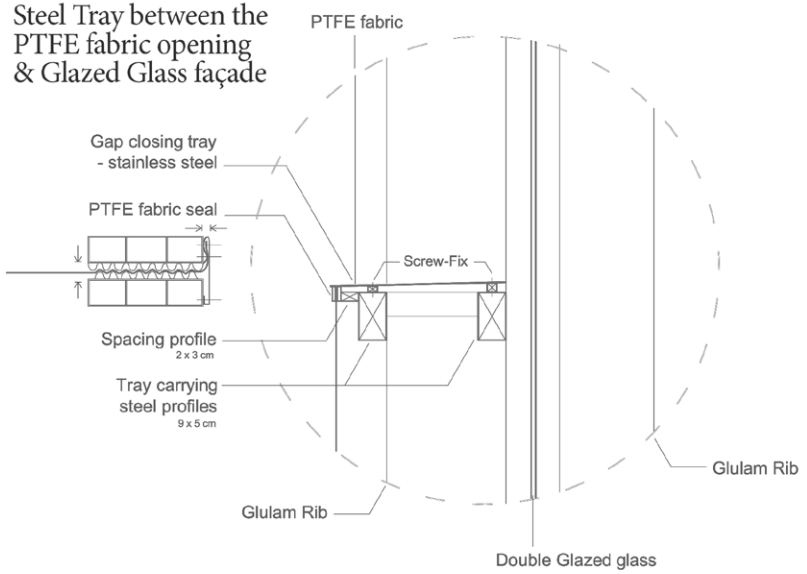


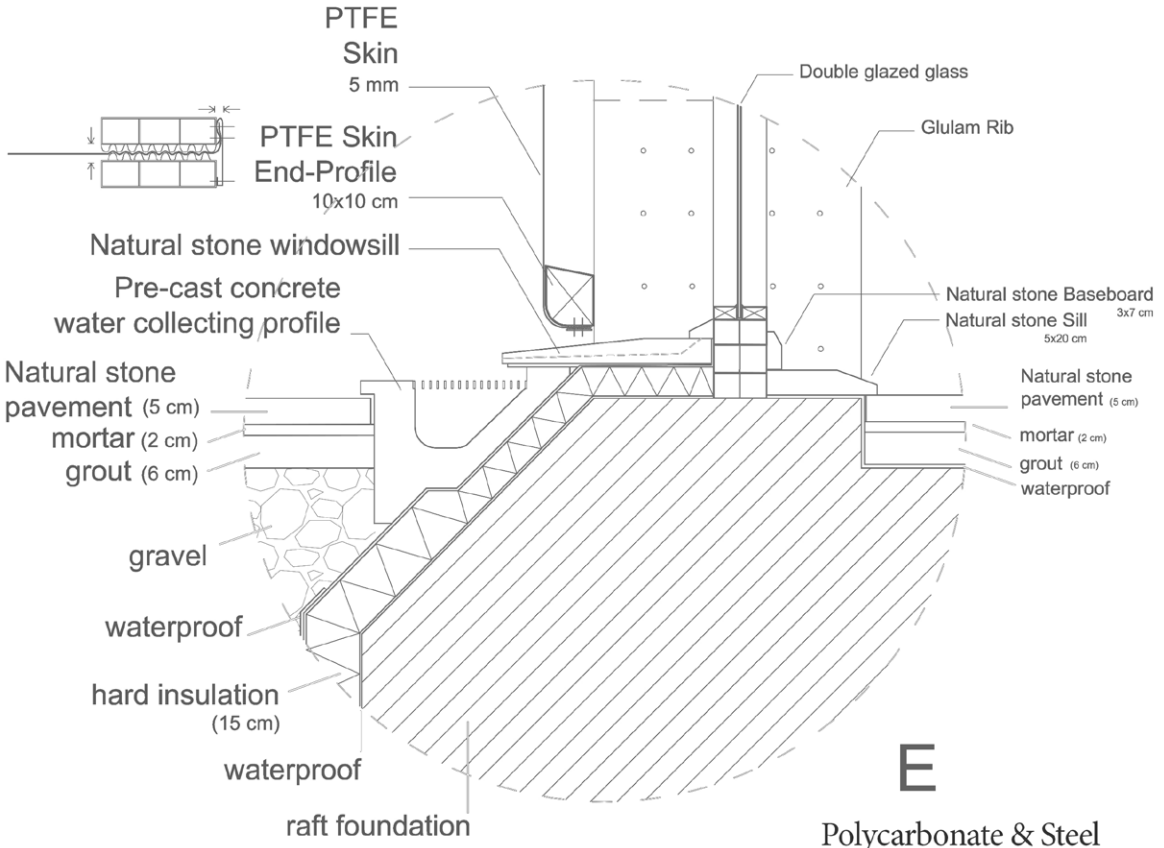
C

Polycarbonate &
Glazed Glass
Meeting Detail

D

Steel Tray between the
PTFE fabric opening
& Glazed Glass façade



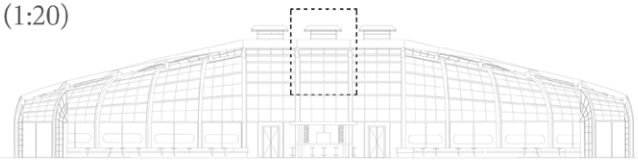


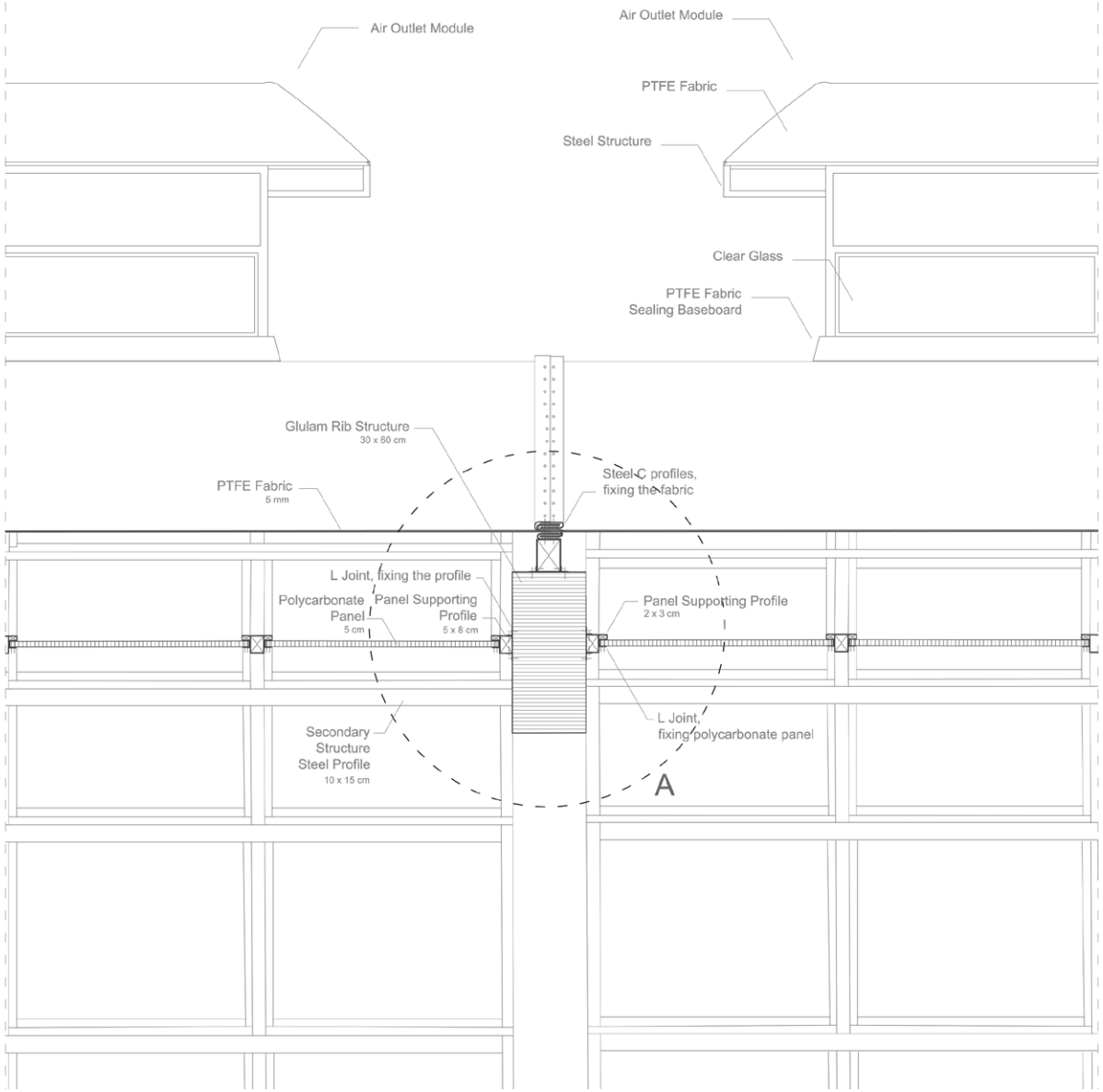
E

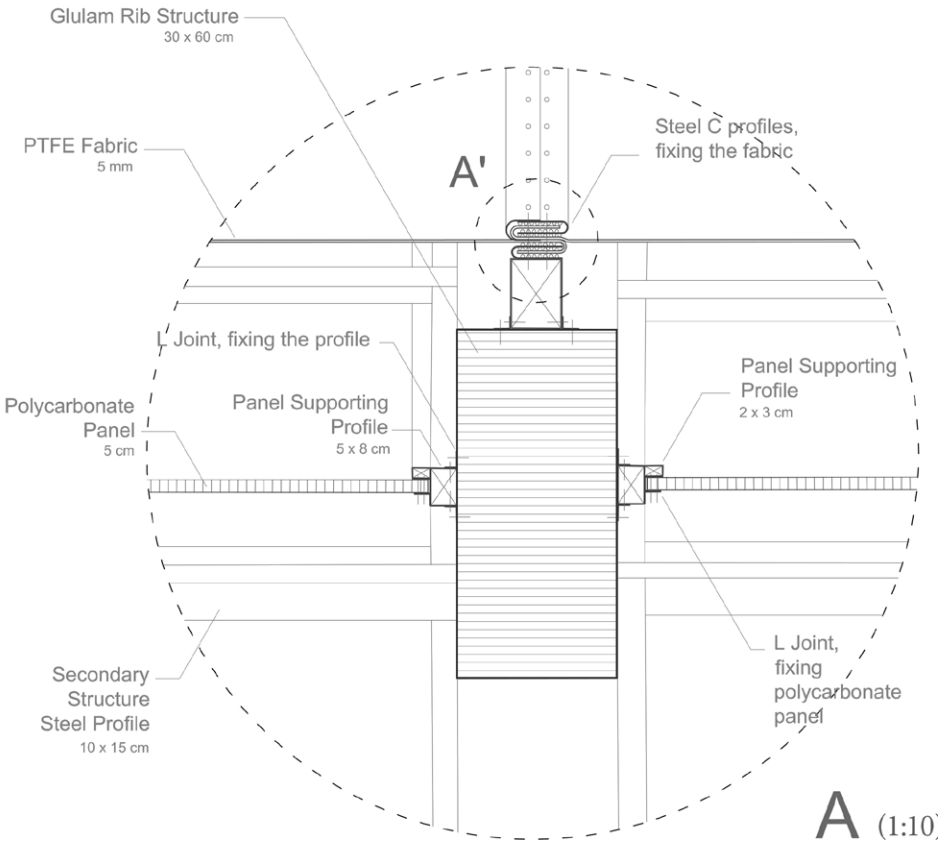
Polycarbonate & Steel
Structure Meeting

CONSTRUCTION DETAIL (1:20)

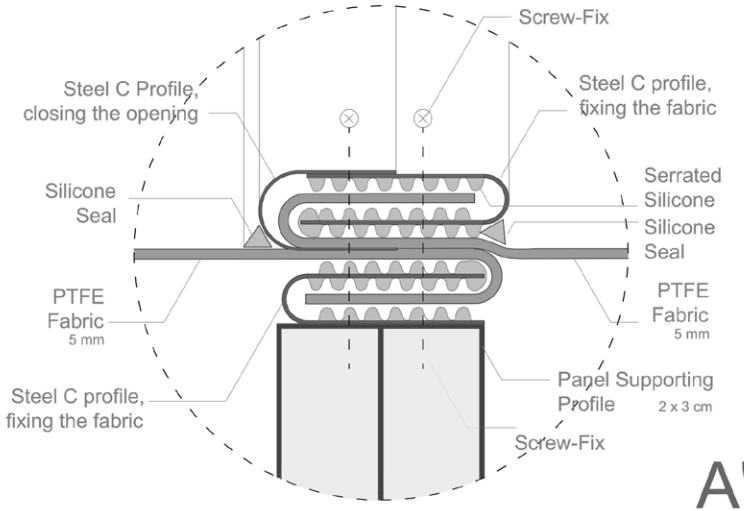
Relation of Glulam Rib Structure, PTFE Fabric & Polycarbonate Panels







A (1:10)



A' (1:2)

V. CONCLUSIONS

Summary - Discussions

Going back to the idea of “capturing movement”;

The exposure of the interiors, the clear & unclear (through the translucent skin) visions providing visual contact of the exteriors and the interiors; allow the play of shadows through the lighting setting of the interiors and while busses pass by at night time.

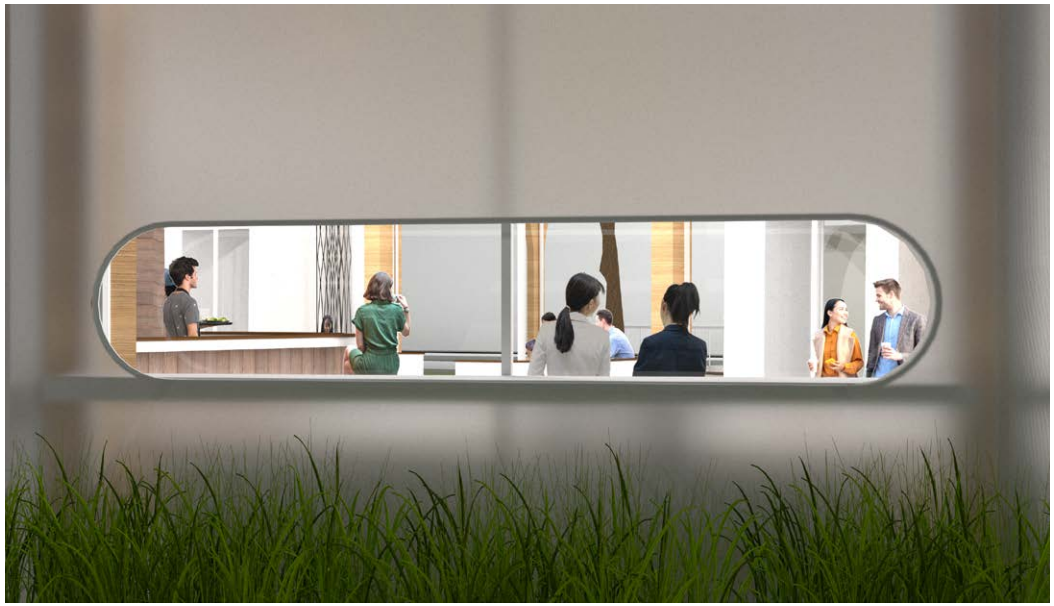
The early mentioned goals of the research meet the context and showcase:

“*Relevance Of Translucent Materials Related To Spatial Qualities In Transportation Architecture*”.

Summary - Discussions

The thesis question:
"*What Can Be The Relevance Of Translucent Materials Related To Spatial Qualities In Transportation Architecture ?*"
had started to take form while researching translucent materials and their applications in architecture, which later became a focus in the search for possible spatial qualities that translucent materials can bring into architecture.

After forming a library and looking through relevant projects, a brief list of spatial qualities were formed and driving from the phenomenon of translucent skins acting as screen that were projected upon of the shadows of objects (either stable or moving); the research took a direction in terms of spatial investigations.



The idea of "capturing movement" was found relevance with transportation architecture, which can be described as the architectural field dealing with different types and scales of bodies move in relation.

The main challange with composing the building skin with translucent materials is that, they would also limit the clear vision, which is a necessity in transportation architecture.

Another point that was made in the research is also the psychological benefits of spaces that were composed with translucent materials due to the spatial qualities they bring.

The research project focuses on these two and tries to reach to a hybrid which benefits from the spatial qualities that translucent materials bring and also characteristics of transportation building when it comes to directions and visions.

The final proposal suggests a building that is hybrid in its building skin in which translucent surfaces are limited to where clear vision was necessary to have. The building is visually open to the surroundings in the middle part to keep the visual connections in between the two sides of the plot but also allow the passengers to keep an eye on the arriving busses. While clear vision is a necessity in transportation architecture; in this particular case of the west corner of Heden, isolation is the character of the plot and the existing Heden Bus Terminal today, due to it being visually disconnected from the busy main axis which is The Avenue and the rows of trees. Arguing these points; the character of the plot being partly isolated however the necessity of opennes and visibility are the main goals of the proposal project.

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figure 4.6: Translucent material, printed/painted glass

figure 4.7: Translucent material, material compounds

figure 4.8: Translucent material, light-active stones: alabaster

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-Capturing Movement- The New Heden Bus Terminal

Exploring spatial qualities that translucent façade skins bring
in transportation architecture

Irfan Meric, Master Thesis, Spring 2022

Supervisor: Björn Gross
Examiner: Mikael Ekegren

Department of Architecture & Civil Engineering, Chalmers University of Technology, Gothenburg, Sweden