



Lûte Biesheuveld



complex projects

11/01/2022

P5

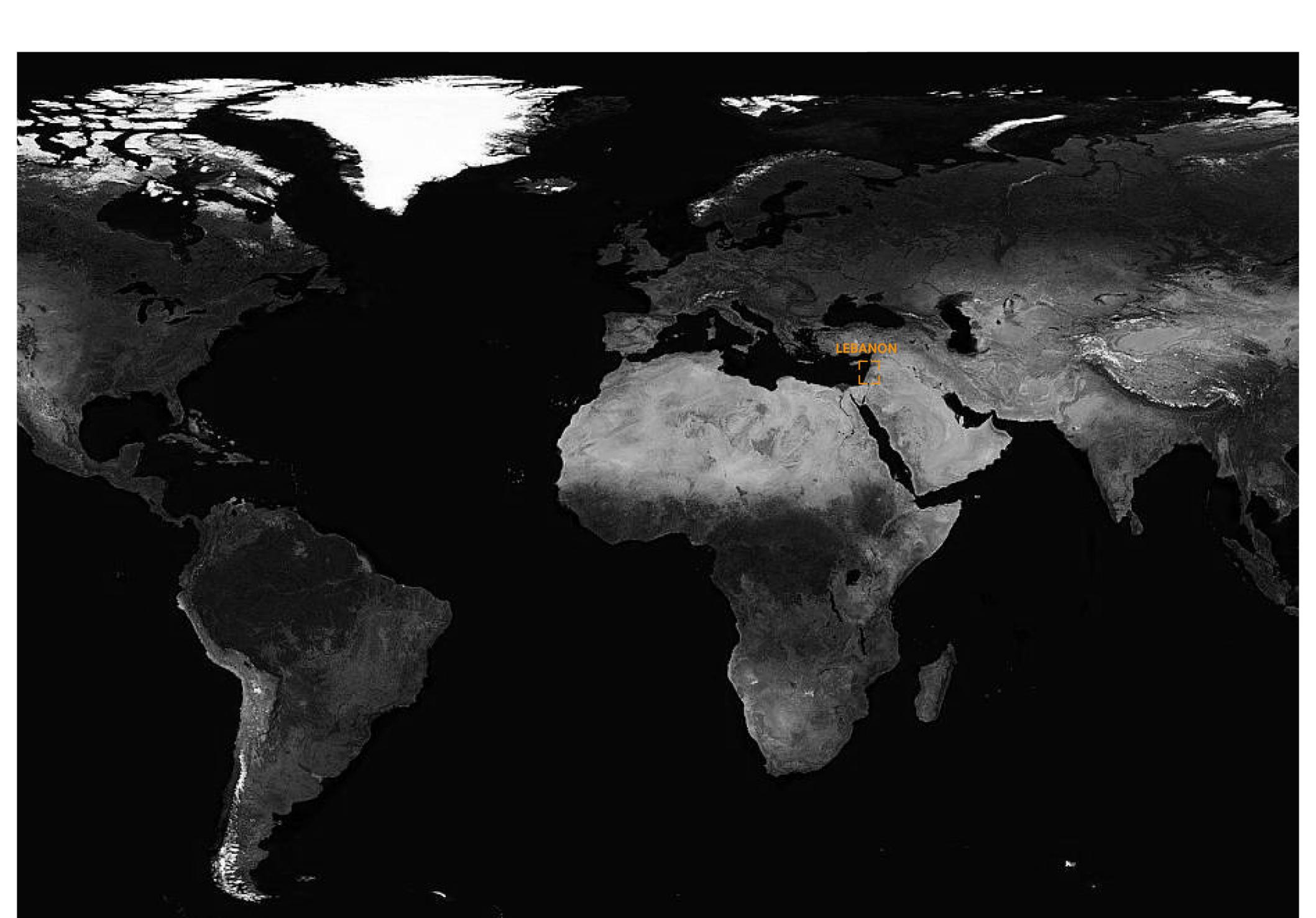
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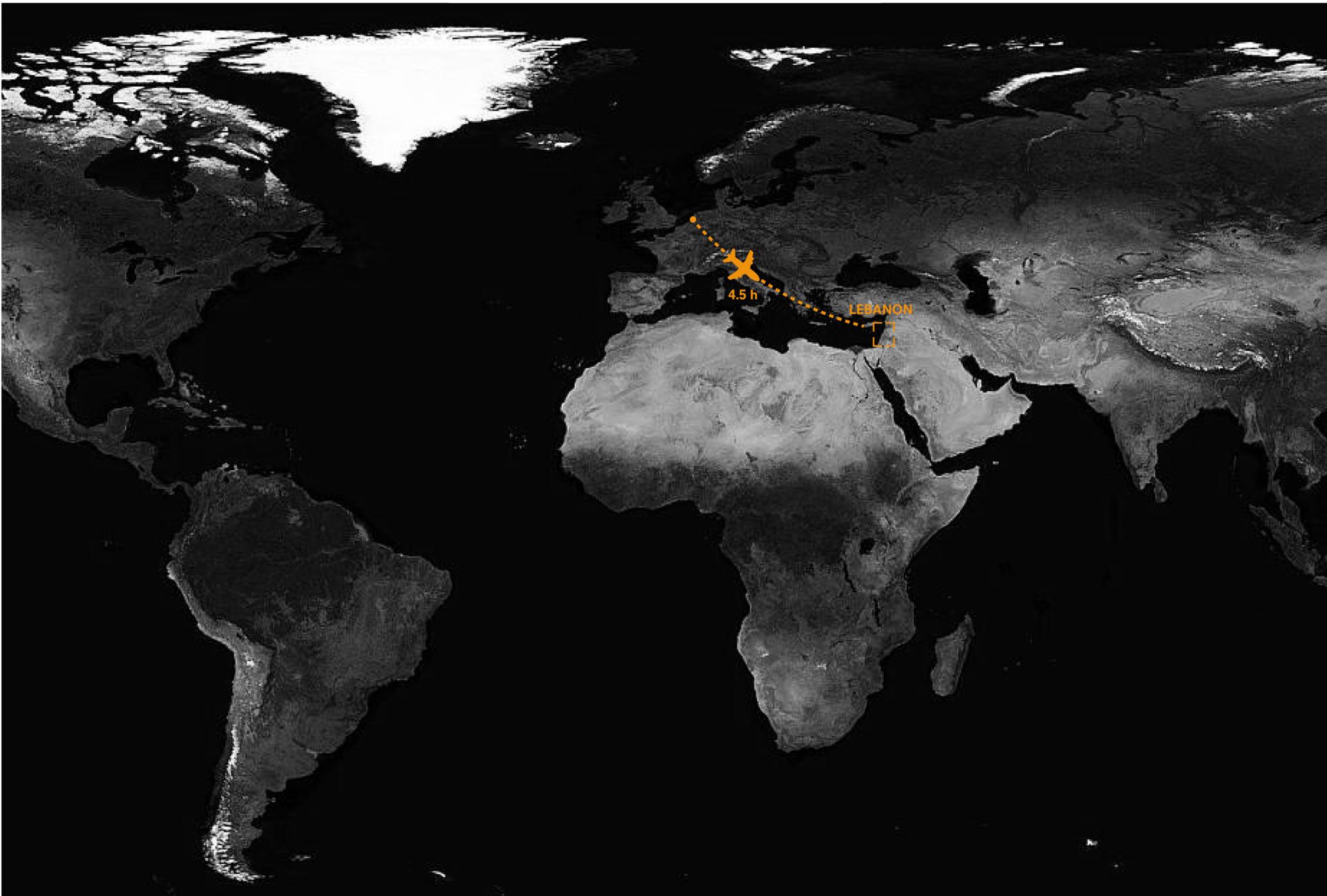
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LEBANON





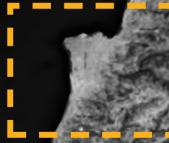


BEIRUT

**BEIRUT**  
**GREATER BEIRUT AREA**  
**LEBANON**

**19.8 KM<sup>2</sup>**  
**67 KM<sup>2</sup>**  
**10,452 KM<sup>2</sup>**

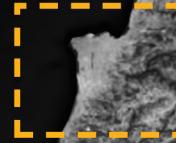
**BEIRUT**



**BEIRUT CITY  
GREATER BEIRUT AREA  
LEBANON**

**361,000 INHABITANTS  
2.2 MILLION INHABITANTS  
6.825 MILLION INHABITANTS**

**BEIRUT**

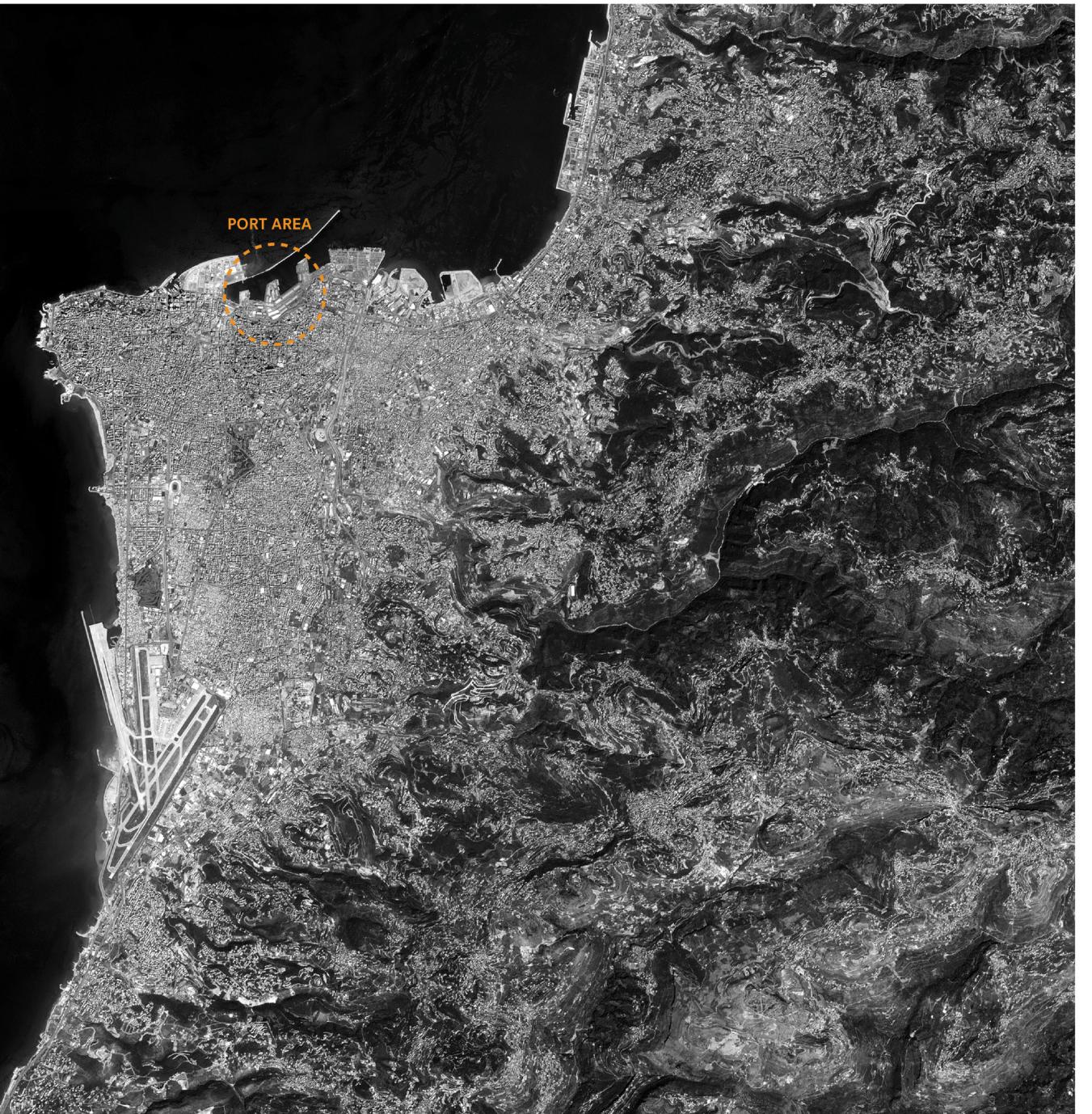


## 'PARIS OF THE MIDDLE EAST'



## CITY WITH SCARS







**4TH OF AUGUST 2020**



4TH OF AUGUST 2020



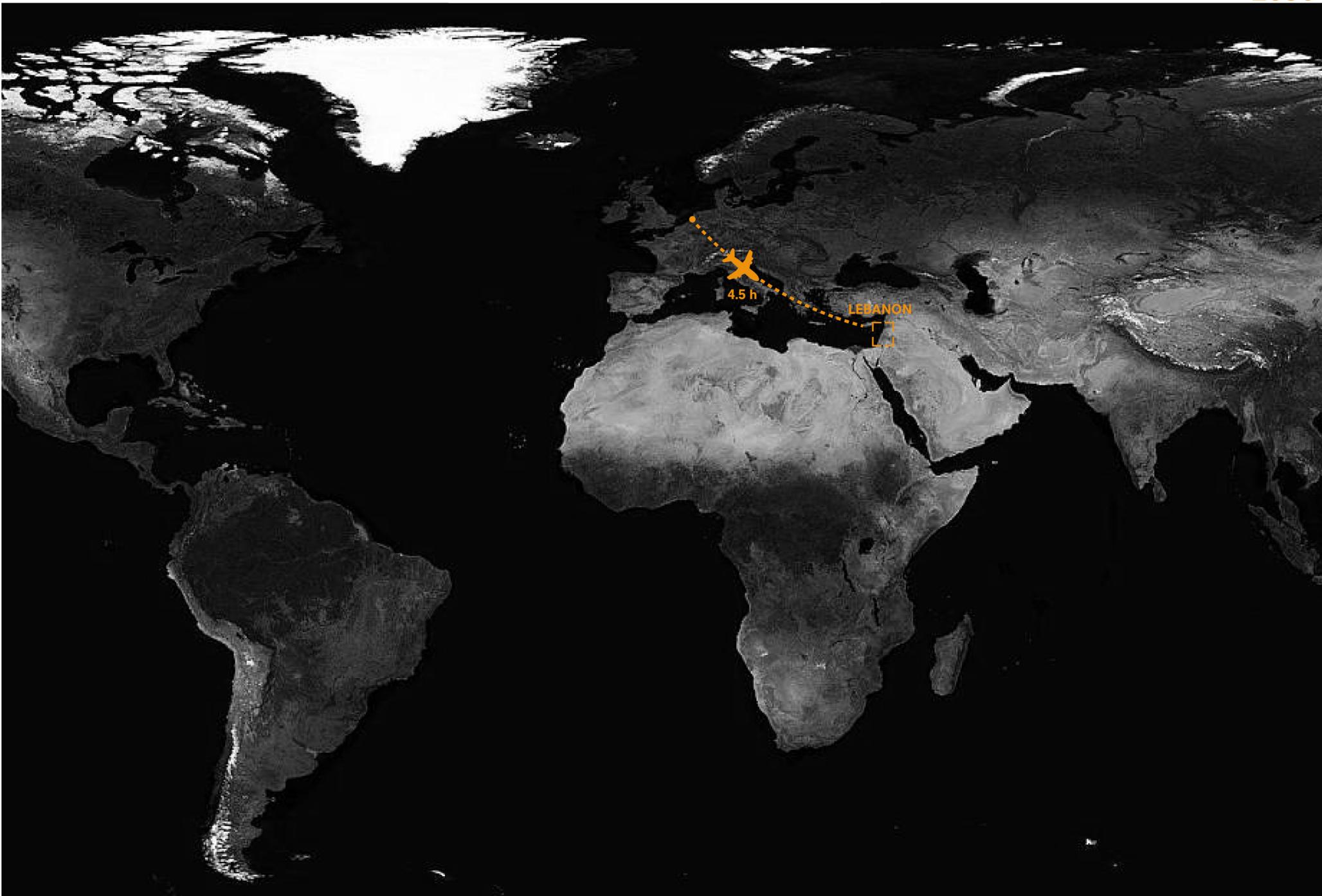
## PORT AREA AFTER THE BLAST



## PORT AREA AFTER THE BLAST



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## BEIRUT RAFIK HARIRI AIRPORT



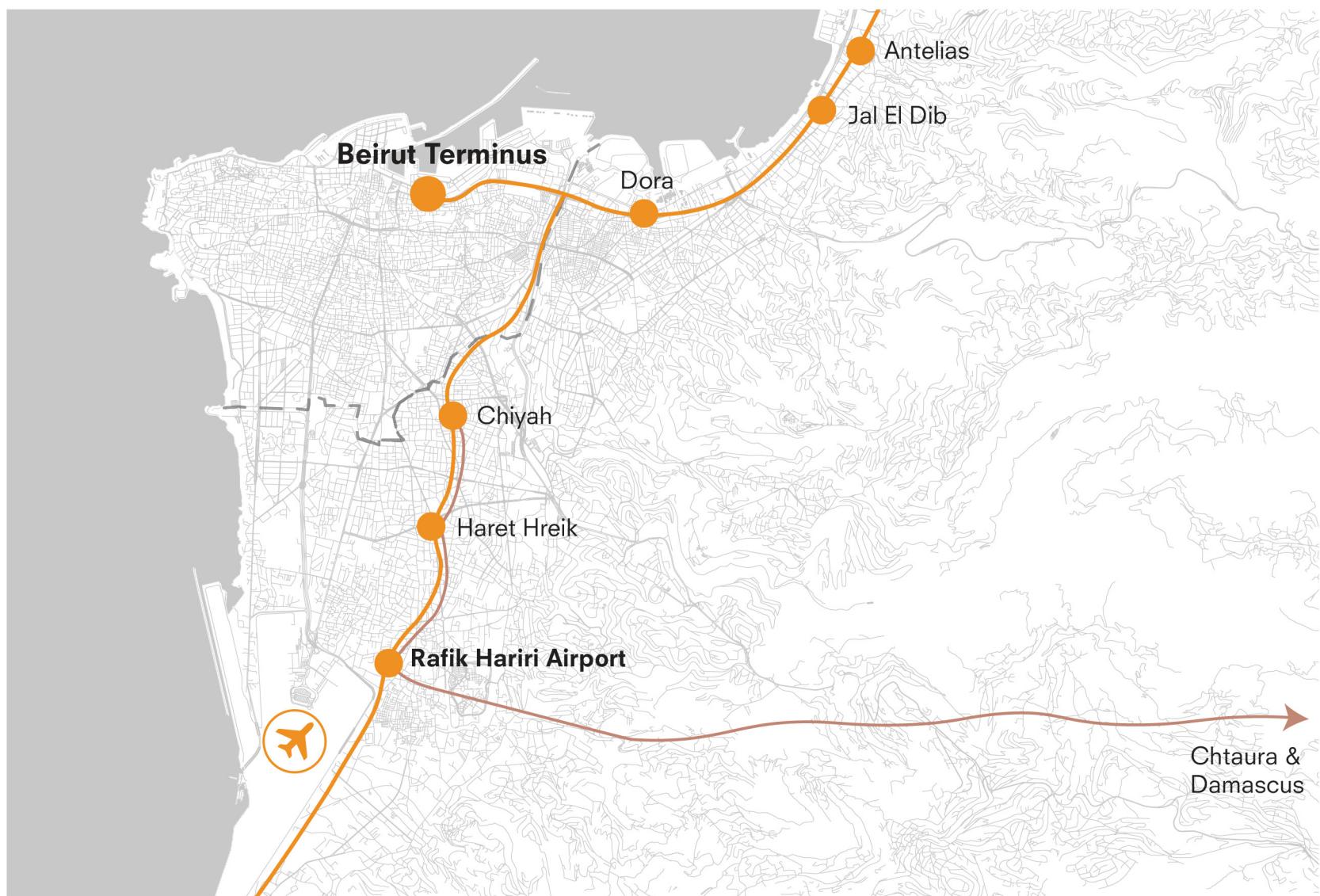
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## BEIRUT RAFIK HARIRI AIRPORT



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## TRAIN CONNECTION BEIRUT



Based on: Train Train Lebanon

Beirut Terminus



Lüte Biesheuvel



0

2500

5000



**THE CAR IS KING**

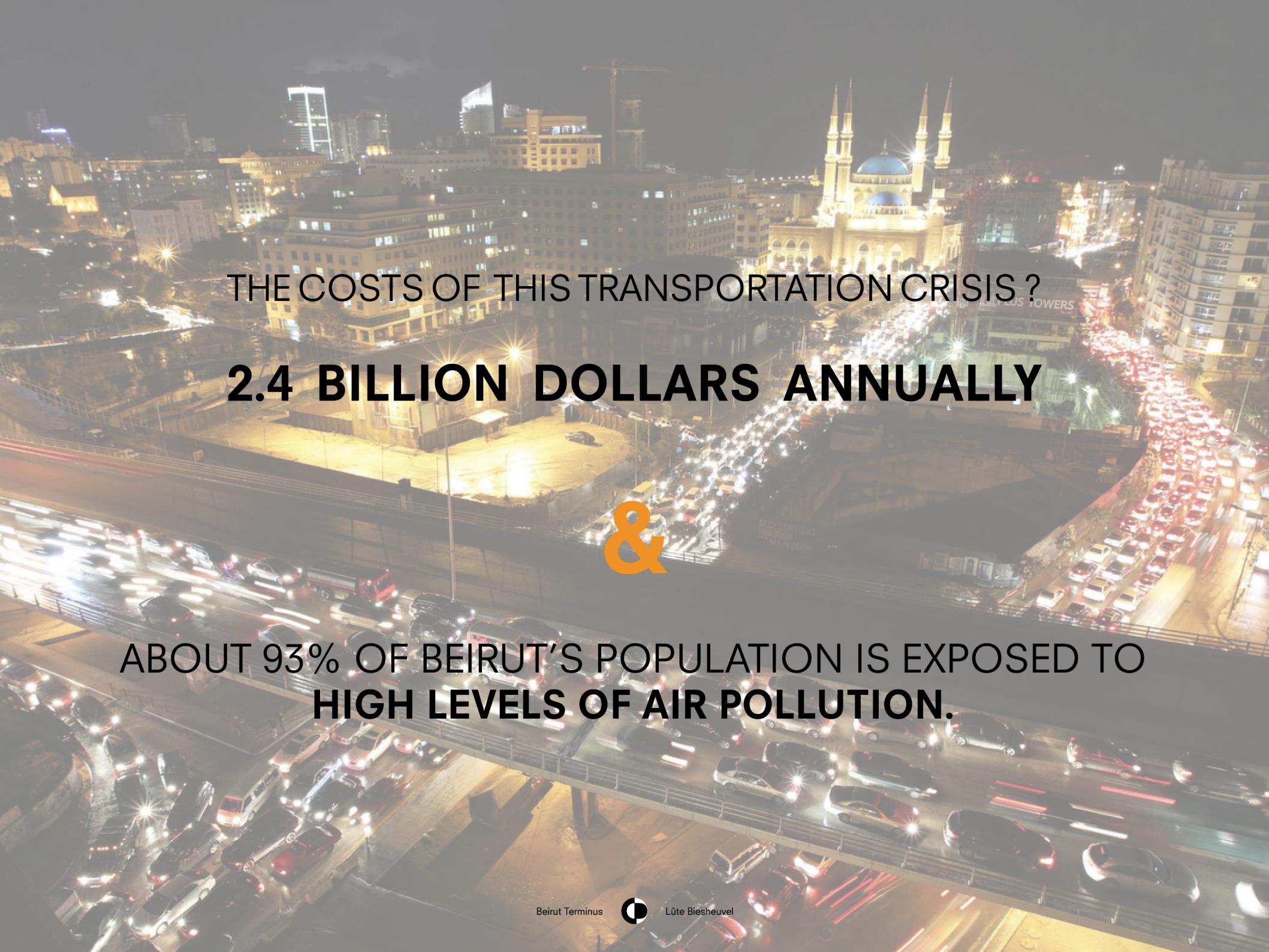






THE COSTS OF THIS TRANSPORTATION CRISIS ?

**2.4 BILLION DOLLARS ANNUALLY**



THE COSTS OF THIS TRANSPORTATION CRISIS ?

**2.4 BILLION DOLLARS ANNUALLY**

&

ABOUT 93% OF BEIRUT'S POPULATION IS EXPOSED TO  
**HIGH LEVELS OF AIR POLLUTION.**



## DISUSE OF PUBLIC TRANSPORT



1.8%

## DISUSE OF PUBLIC TRANSPORT



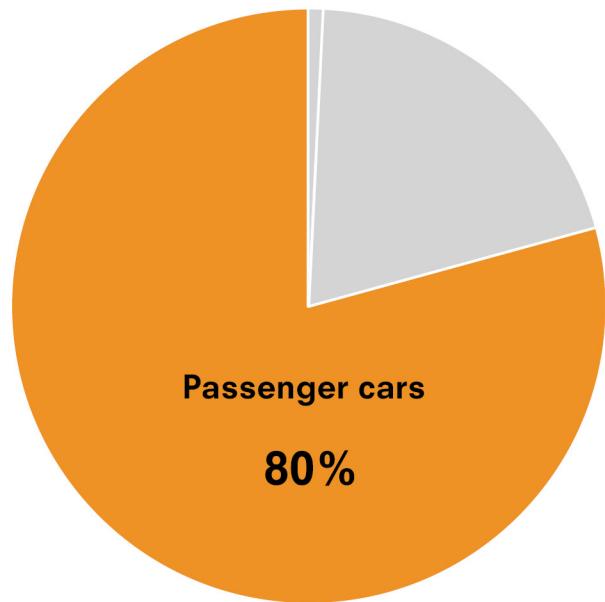
DUE TO UNRELIABLE BUSES AND THE SOCIO-CULTURAL STIGMA ASSOCIATED WITH BUS RIDING.

## LACK OF OPPORTUNITY FOR SOFT TRANSPORT



DUE TO INADEQUATE INFRASTRUCTURE FOR PEDESTRIANS AND CYCLISTS AND UNSAFE BEHAVIOUR IN TRAFFIC.

## USED MODE OF TRANSPORT FOR TRIPS IN BEIRUT AND GBA





600,000 DAILY COMMUTERS

## CHARLES HELOU HIGHWAY



**600,000 DAILY COMMUTERS**

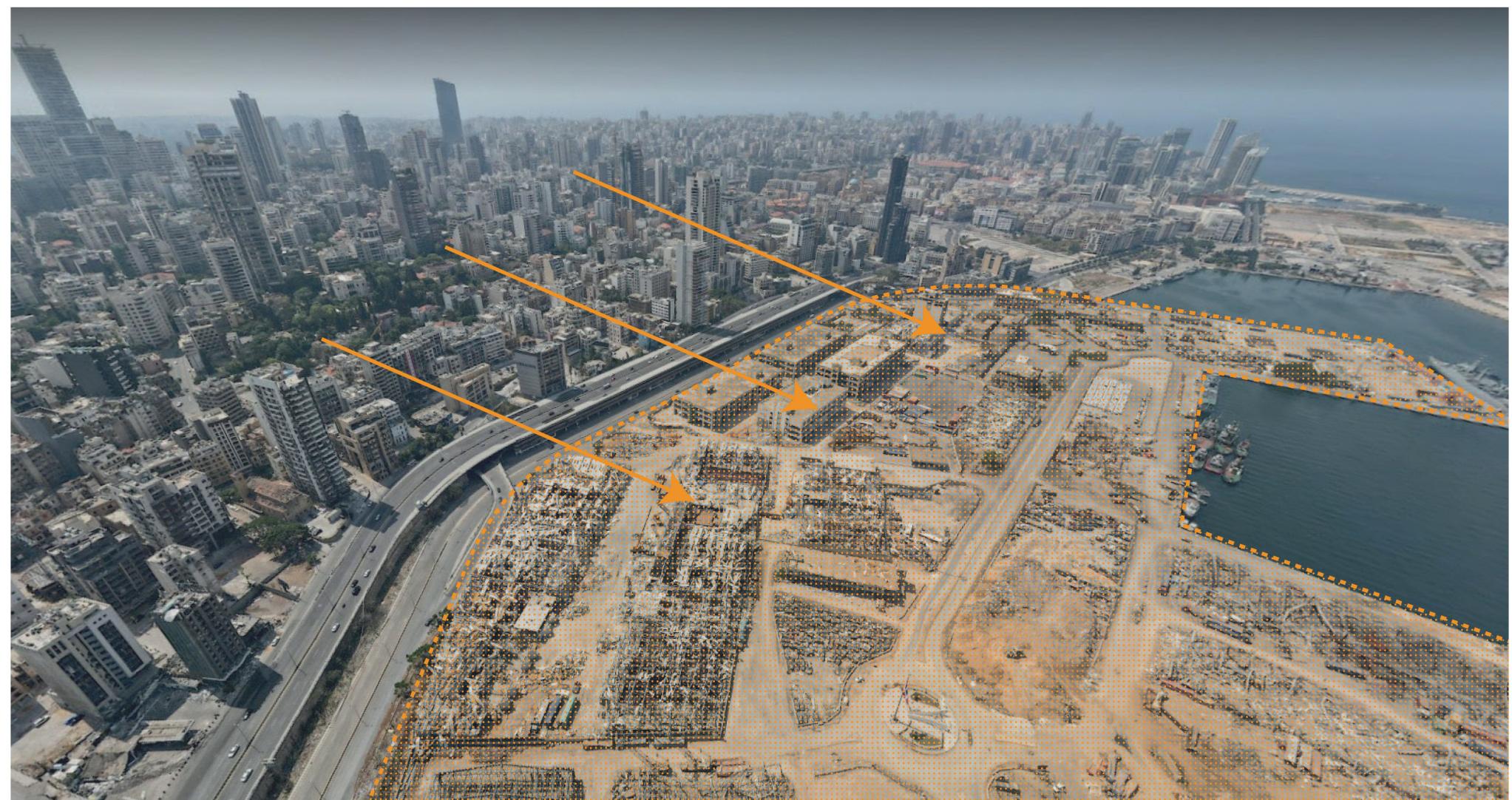
## CHARLES HELOU HIGHWAY



## REGENERATING THE AREA



## REGENERATING THE AREA



## REGENERATING THE AREA



## BLAST AREA ONE YEAR LATER







A PROTAGONIST FOR THE REGENERATION OF THE  
PORT AREA AND A CATALYST FOR INCREASING  
PROSPERITY IN BEIRUT.



A PROTAGONIST FOR THE REGENERATION OF THE  
PORT AREA AND A CATALYST FOR INCREASING  
PROSPERITY IN BEIRUT:

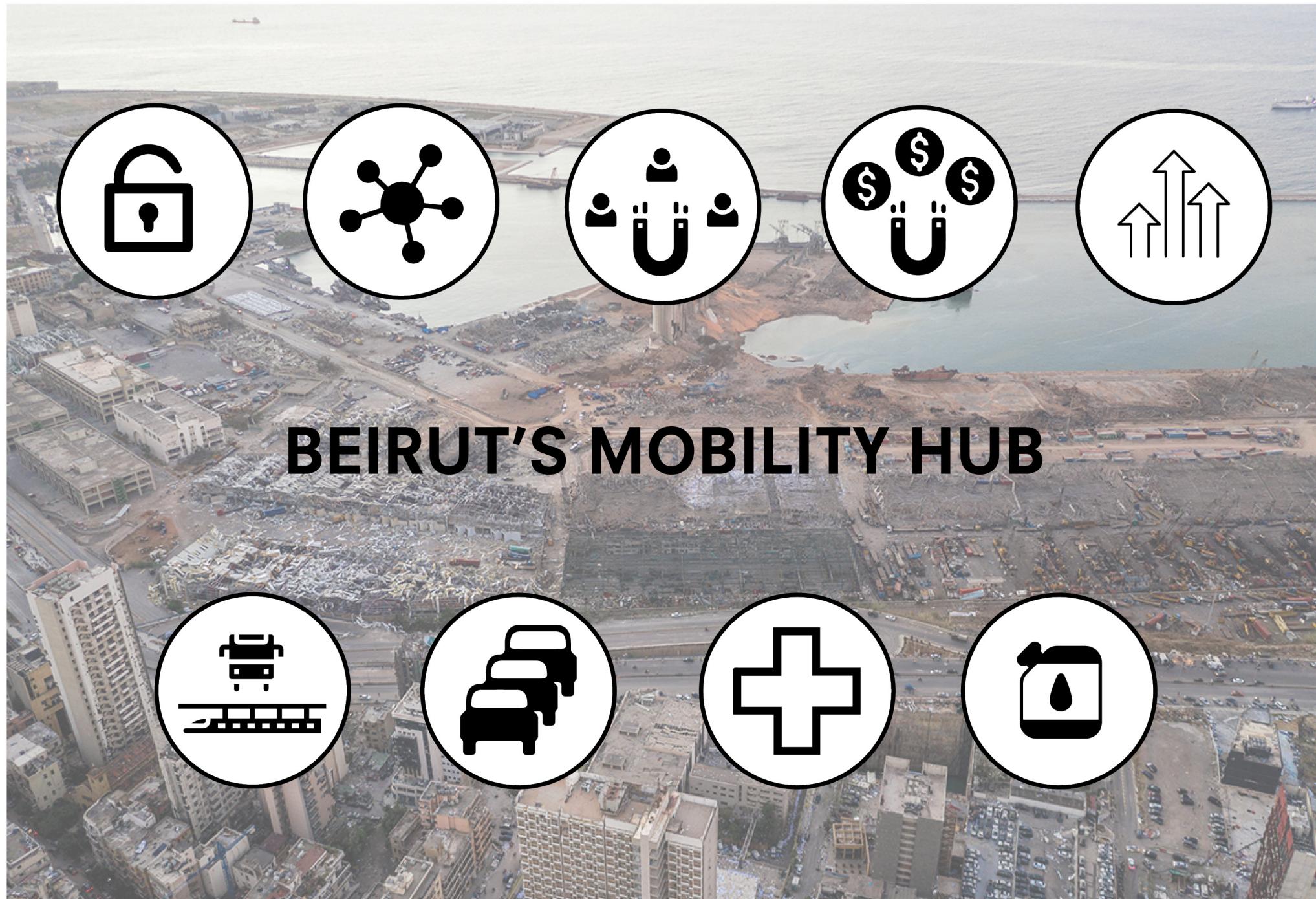
A MOBILITY HUB

## RESEARCH QUESTION

WHAT ROLE CAN A MOBILITY HUB PLAY IN THE RECONSTRUCTION PROCESS OF BEIRUT?



# BEIRUT'S MOBILITY HUB



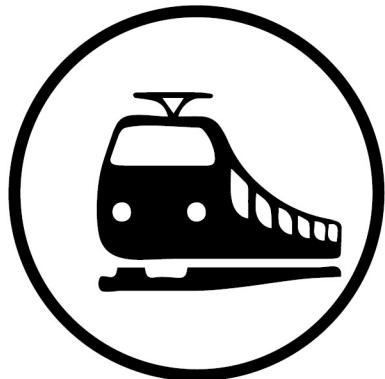
# BEIRUT'S MOBILITY HUB

**3 INTERVENTIONS**

**BEIRUT'S MOBILITY HUB**

## 3 INTERVENTIONS

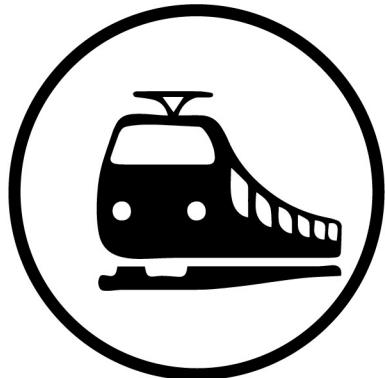
A NATIONAL RAILWAY SYSTEM  
CONNECTING LEBANON'S  
CITIES AND THE NEIGHBOURING  
COUNTRIES.



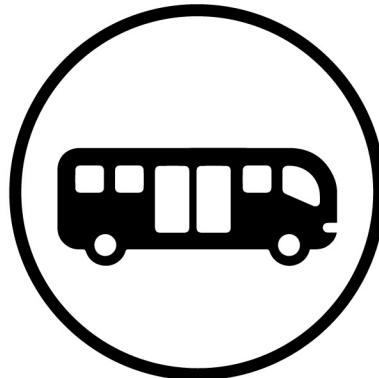
# BEIRUT'S MOBILITY HUB

### 3 INTERVENTIONS

A NATIONAL RAILWAY SYSTEM  
CONNECTING LEBANON'S  
CITIES AND THE NEIGHBOURING  
COUNTRIES.



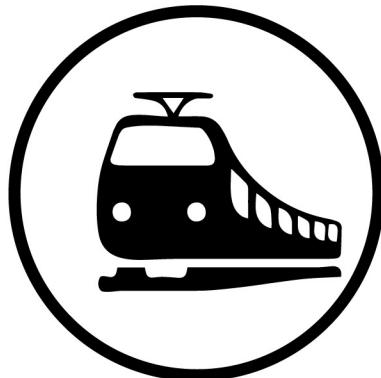
A RAPID BUS SYSTEM FOR  
CONNECTION WITHIN THE CITY.



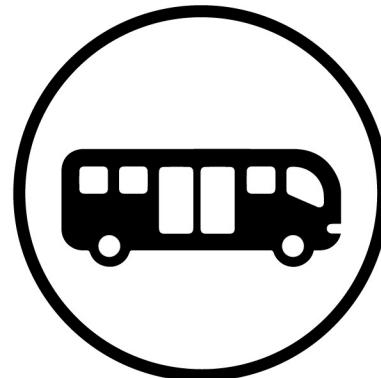
## BEIRUT'S MOBILITY HUB

### 3 INTERVENTIONS

A NATIONAL RAILWAY SYSTEM  
CONNECTING LEBANON'S  
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A RAPID BUS SYSTEM FOR  
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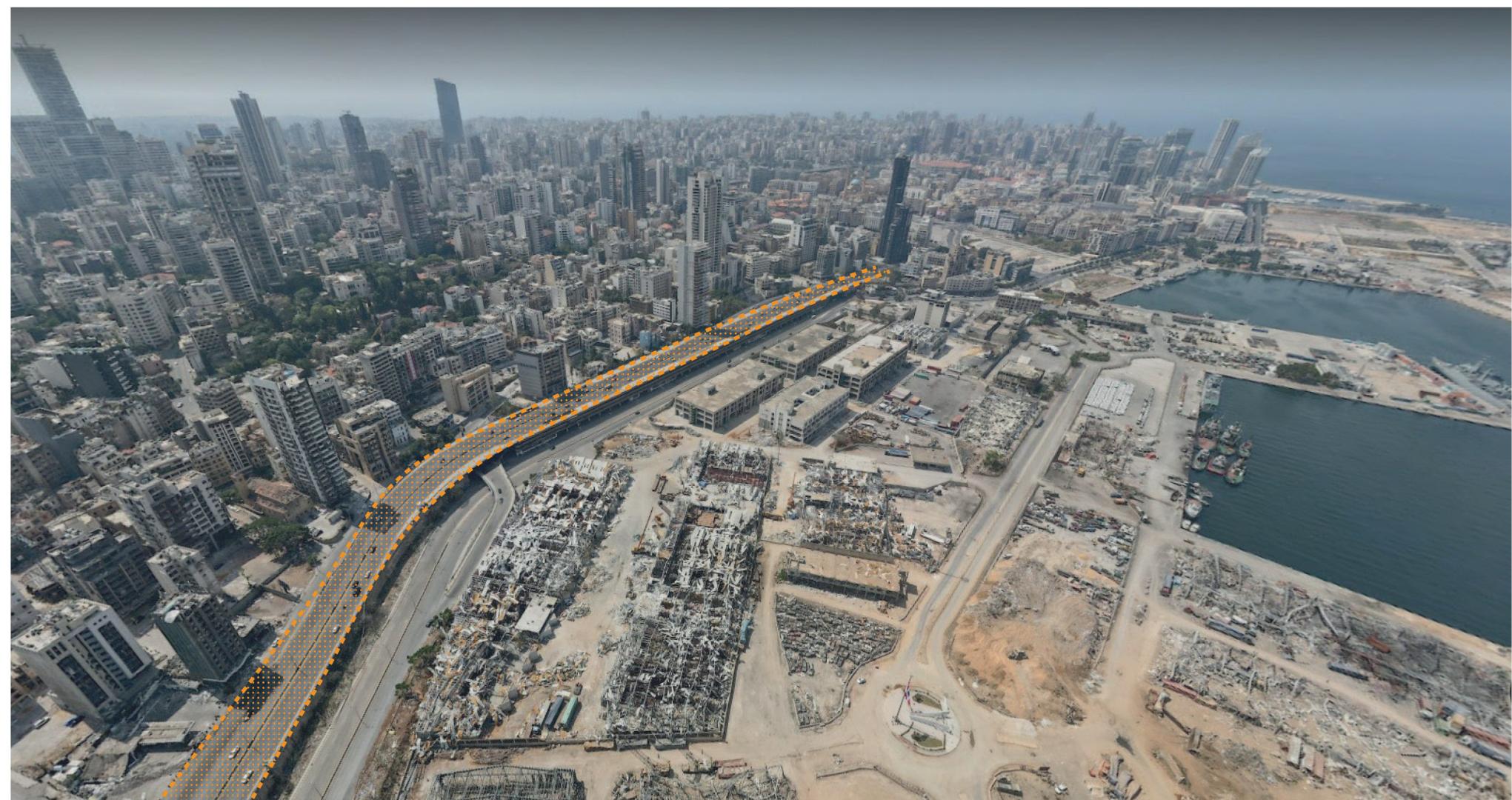


A SAFE, DEDICATED SPACE FOR  
PEDESTRIANS AND CYCLIST TO  
CONNECT WITH THE STREETS AND  
ITS PEOPLE.



# BEIRUT'S MOBILITY HUB

# CHARLES HELOU HIGHWAY





# CHARLES HELOU





## THE AMBITIONS

### ARCHITECTURAL AMBITIONS



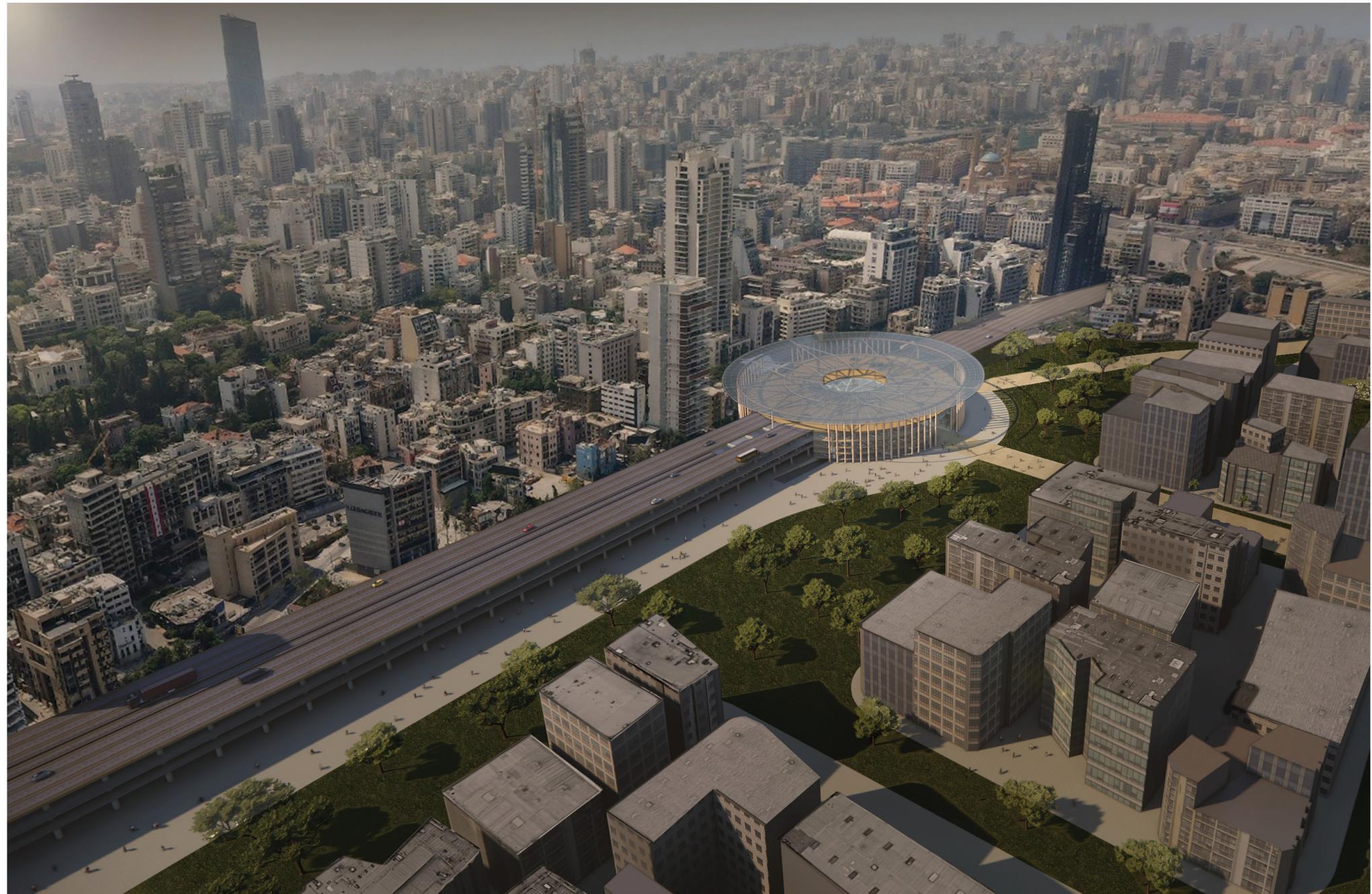
### SUSTAINABILITY AMBITIONS



THE AMBITION FOR THIS PROJECT IS TO  
BECOME A SUSTAINABLE EYE-CATCHER  
WHICH CONNECTS THE CITY AND ITS PEOPLE.

# 2030

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# A CONCEPT



A CONCEPT

5 ARCHITECTURAL RULES FOR THE DESIGN

## CONCEPT

WHAT DO THE PEOPLE IN BEIRUT REALLY NEED?

## CONCEPT

WHAT DO THE PEOPLE IN BEIRUT REALLY NEED?



THEY NEED A SHELTERED, COOL, GREEN PUBLIC SPACE.

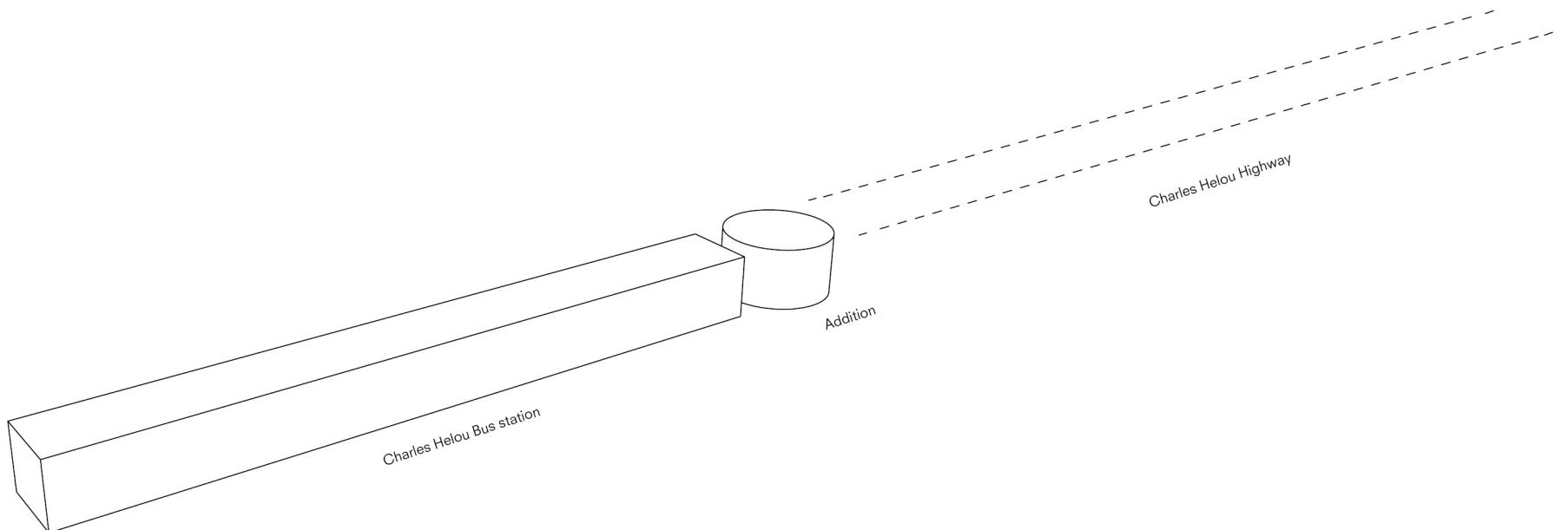
## CONCEPT



'RAILWAY STATIONS ACROSS LEBANON HAVE TRANSFORMED  
INTO WILD GARDENS, AND THEIR RAIL YARDS INTO  
**NATURAL GREEN CORRIDORS.**'

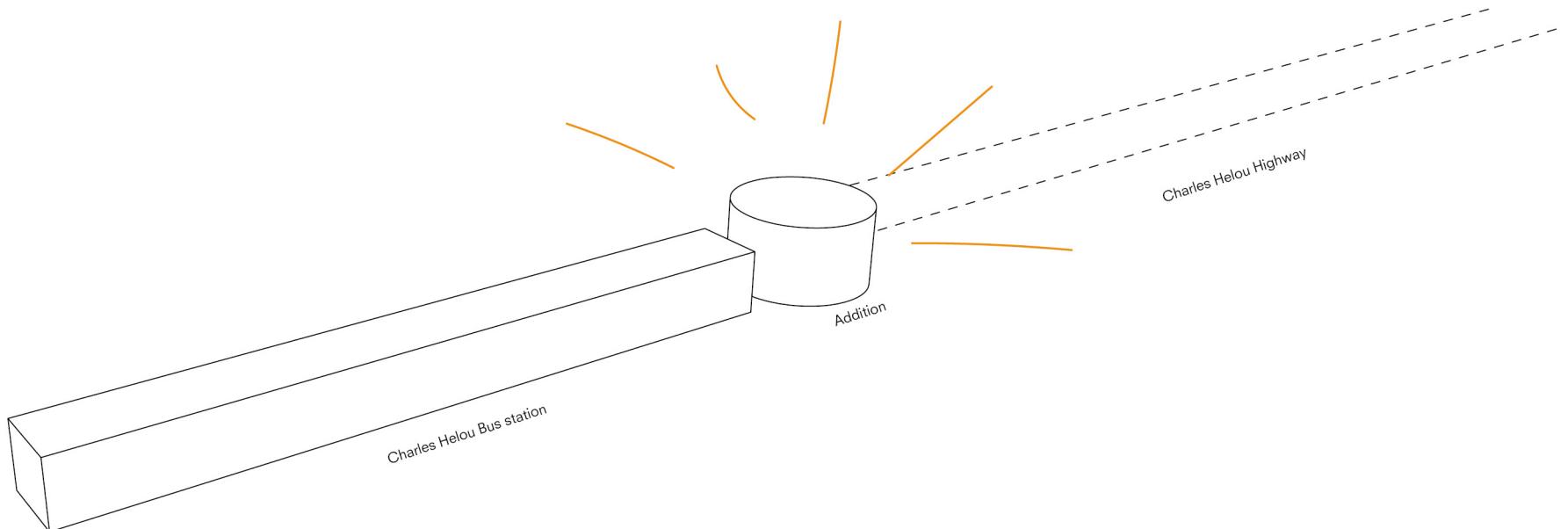
Beirut Re-collected, 2015

## 5 RULES FOR BEIRUT'S MOBILITY HUB



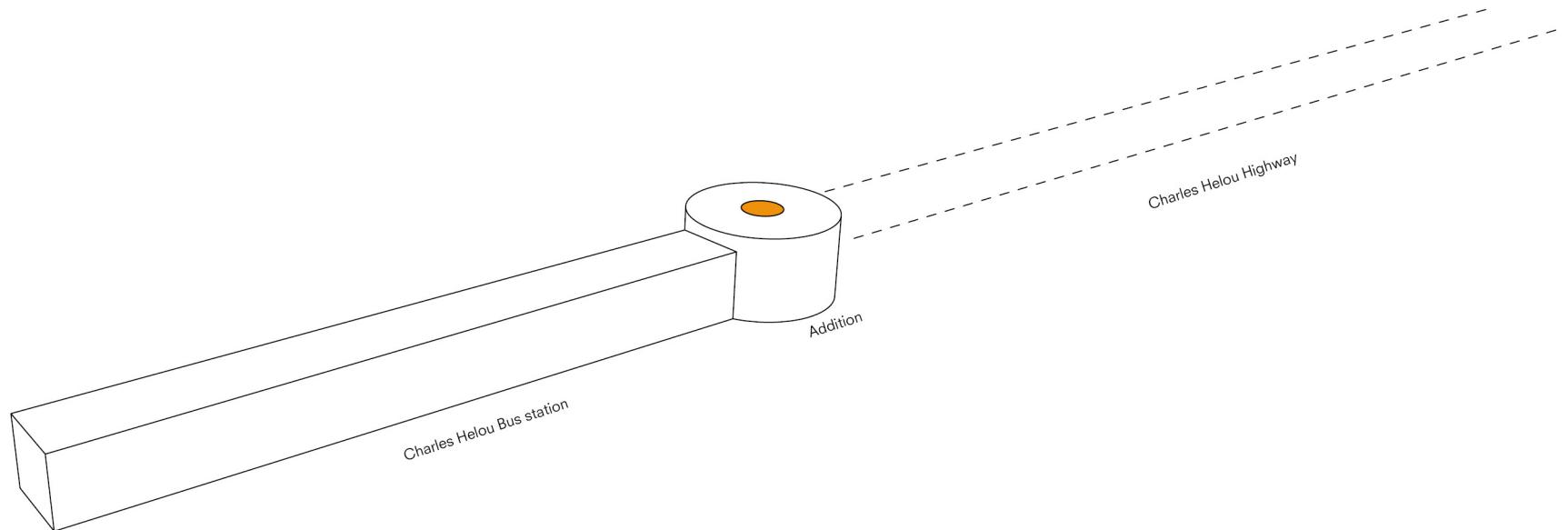
1. THE NEW AND EXISTING COMPLEMENT EACH OTHER WITH **HIGHLY CONTRASTING AESTHETICS.**

## 5 RULES FOR BEIRUT'S MOBILITY HUB



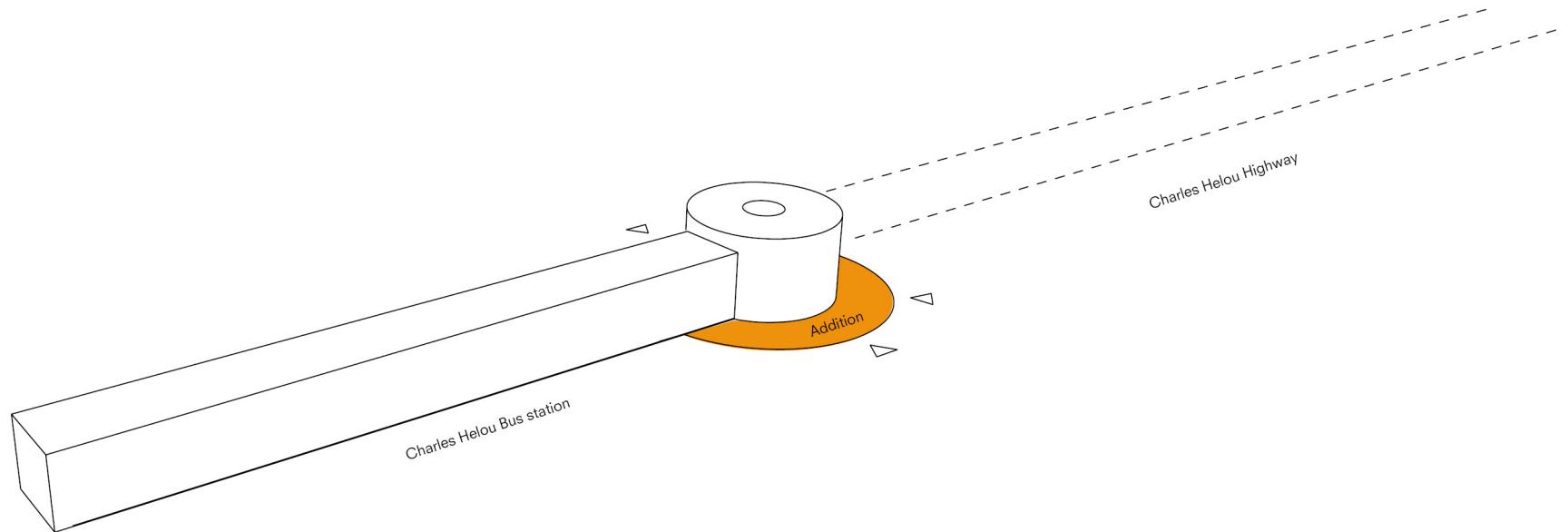
2. SINCE THERE ARE HARDLY ANY LANDMARKS IN THE AREA, IT NEEDS  
**TO STAND OUT & BE RECOGNIZABLE**

## 5 RULES FOR BEIRUT'S MOBILITY HUB



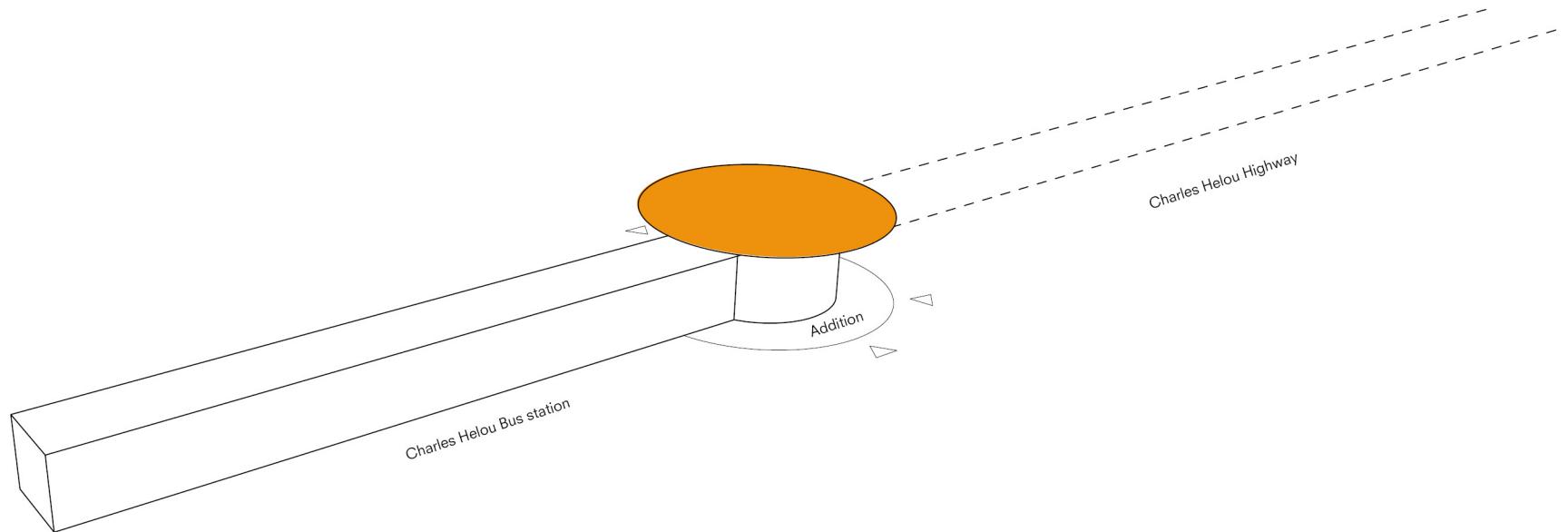
3. THE CIRCULATION NODE IS THE **CENTRE OF THE FLOWS**  
& THE BUILDING.

## 5 RULES FOR BEIRUT'S MOBILITY HUB

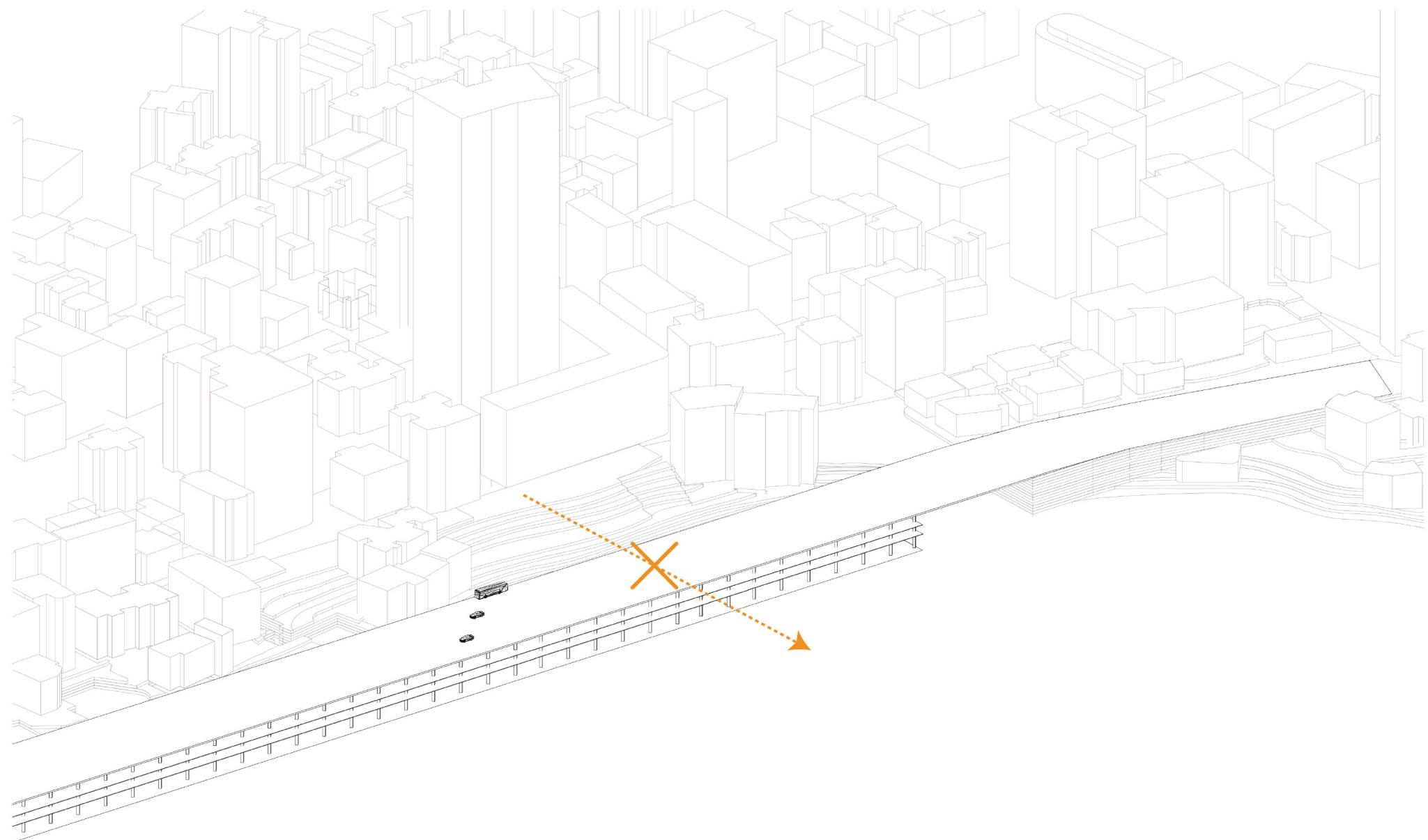


4. PLAZA ACCESSIBLE FROM ALL ENTRANCES, TO MAKE THEM EQUAL

## 5 RULES FOR BEIRUT'S MOBILITY HUB



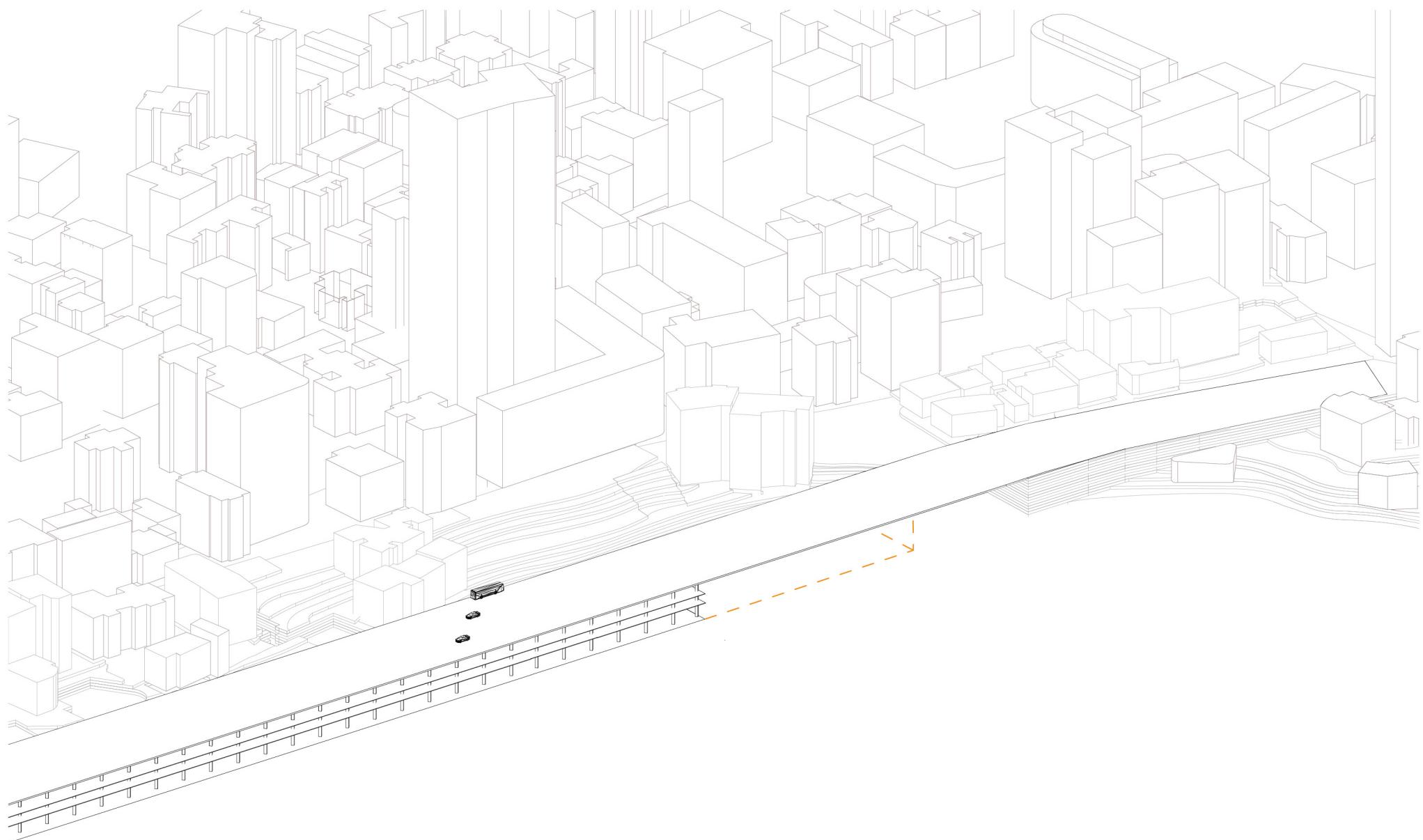
**5. A CANOPY UNIFIES THE DIFFERENT PARTS OF THE BUILDING AND OFFERS SHADE FROM THE SUN.**



Beirut Terminus



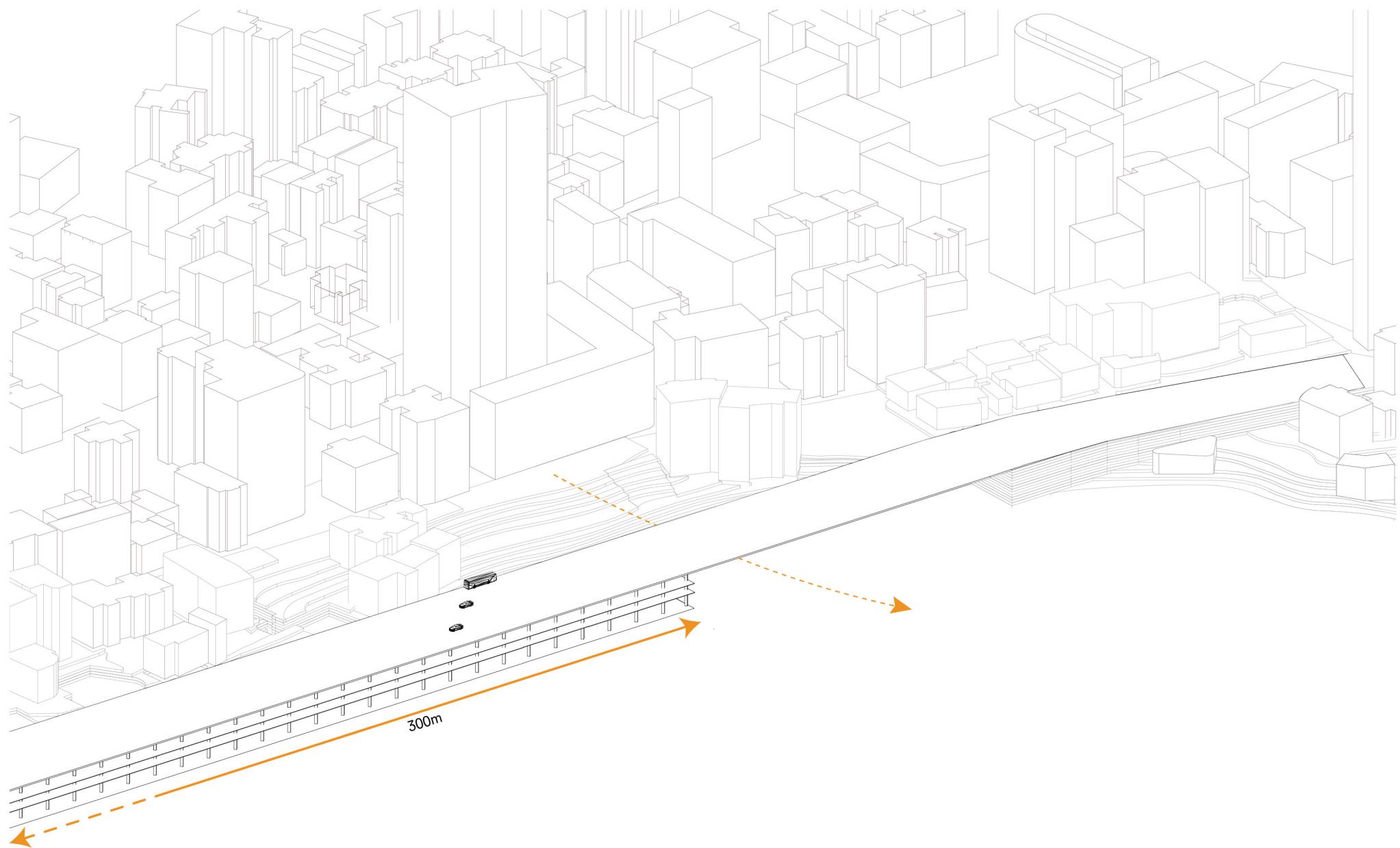
Lüte Biesheuvel



Beirut Terminus



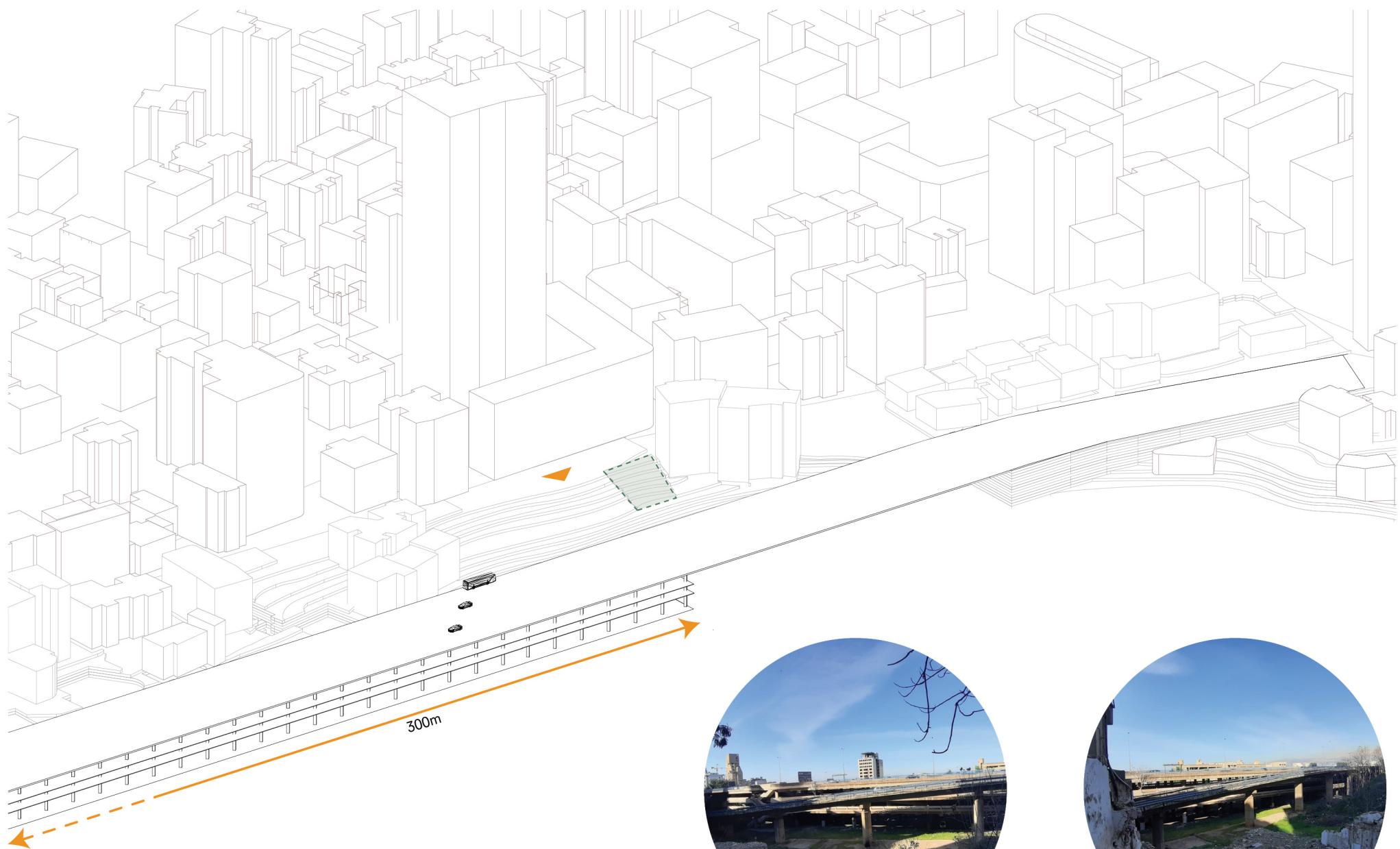
Lüte Biesheuvel

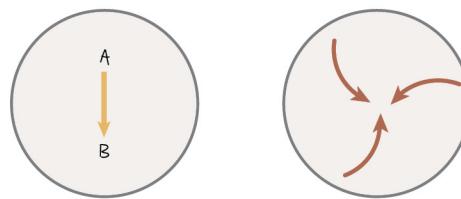
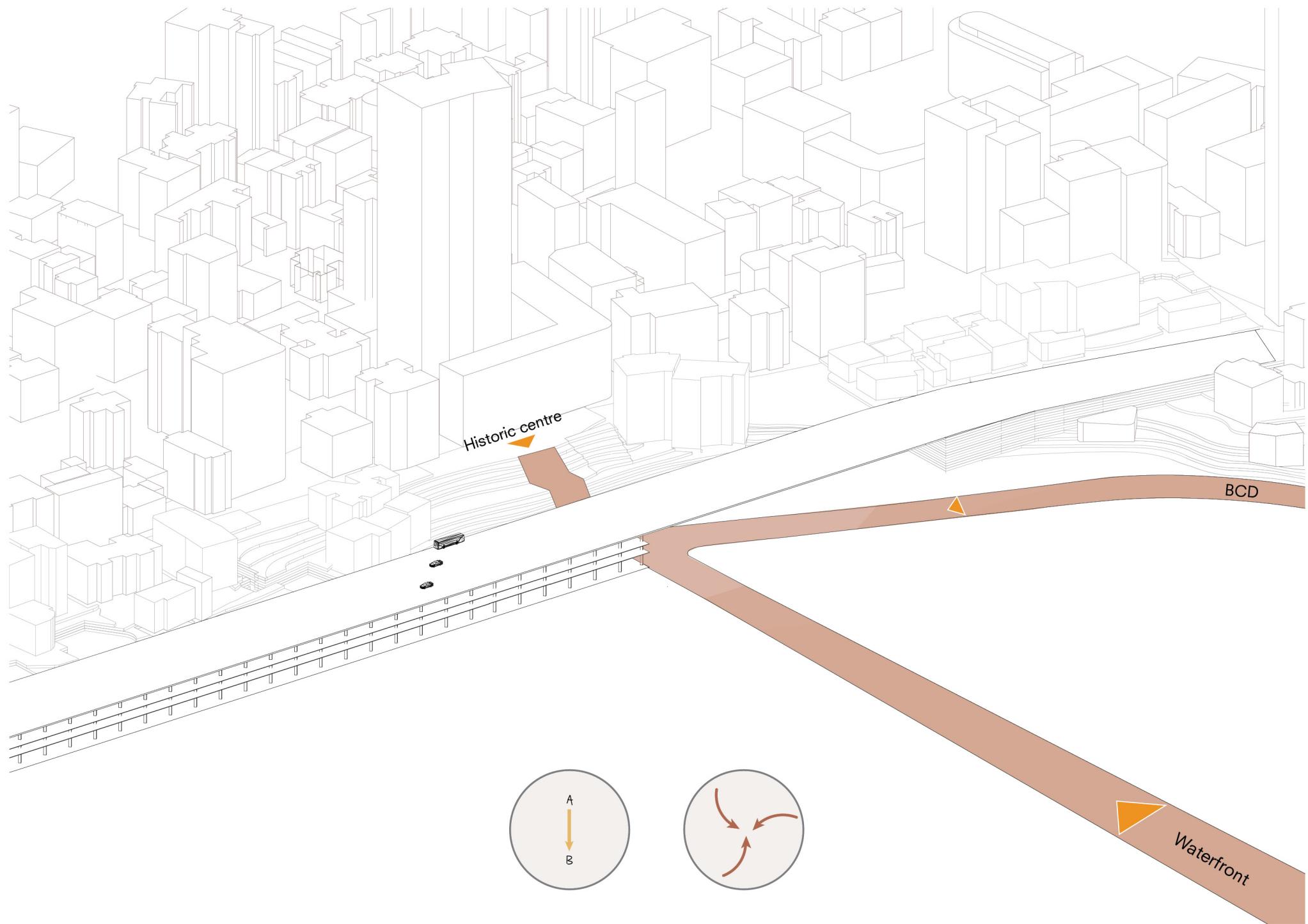


Beirut Terminus



Lüte Biesheuvel

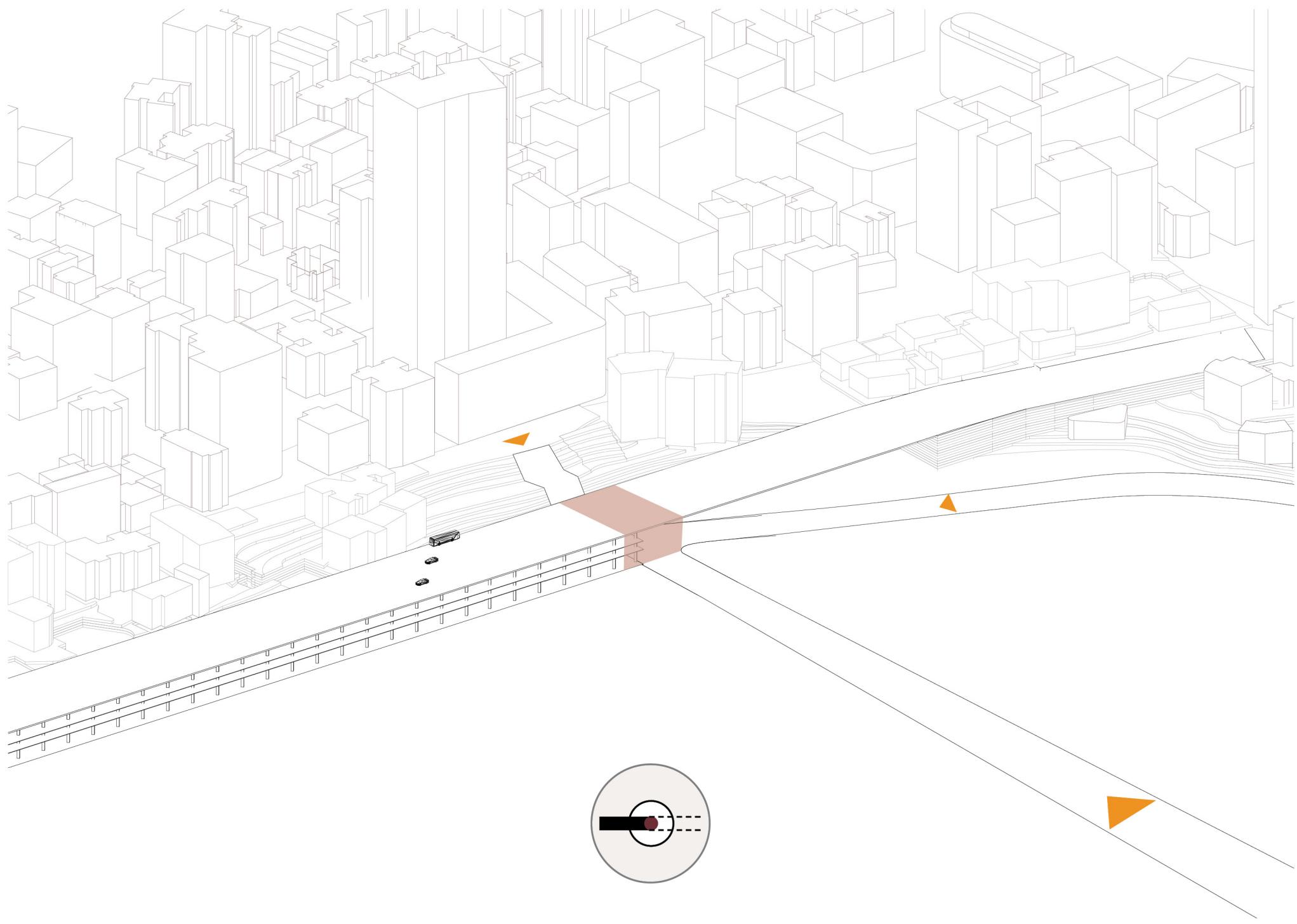




Beirut Terminus



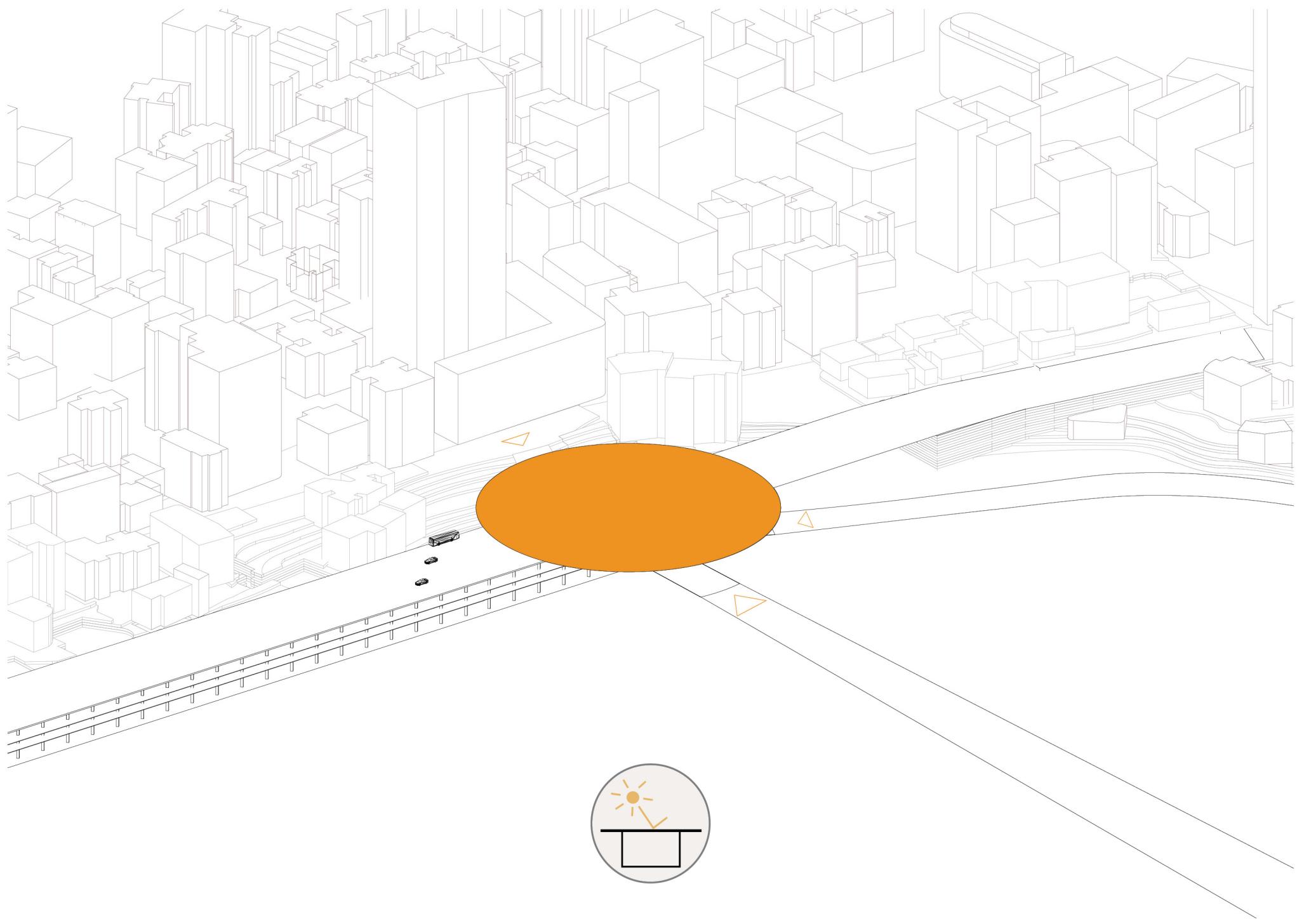
Lüte Biesheuvel



Beirut Terminus



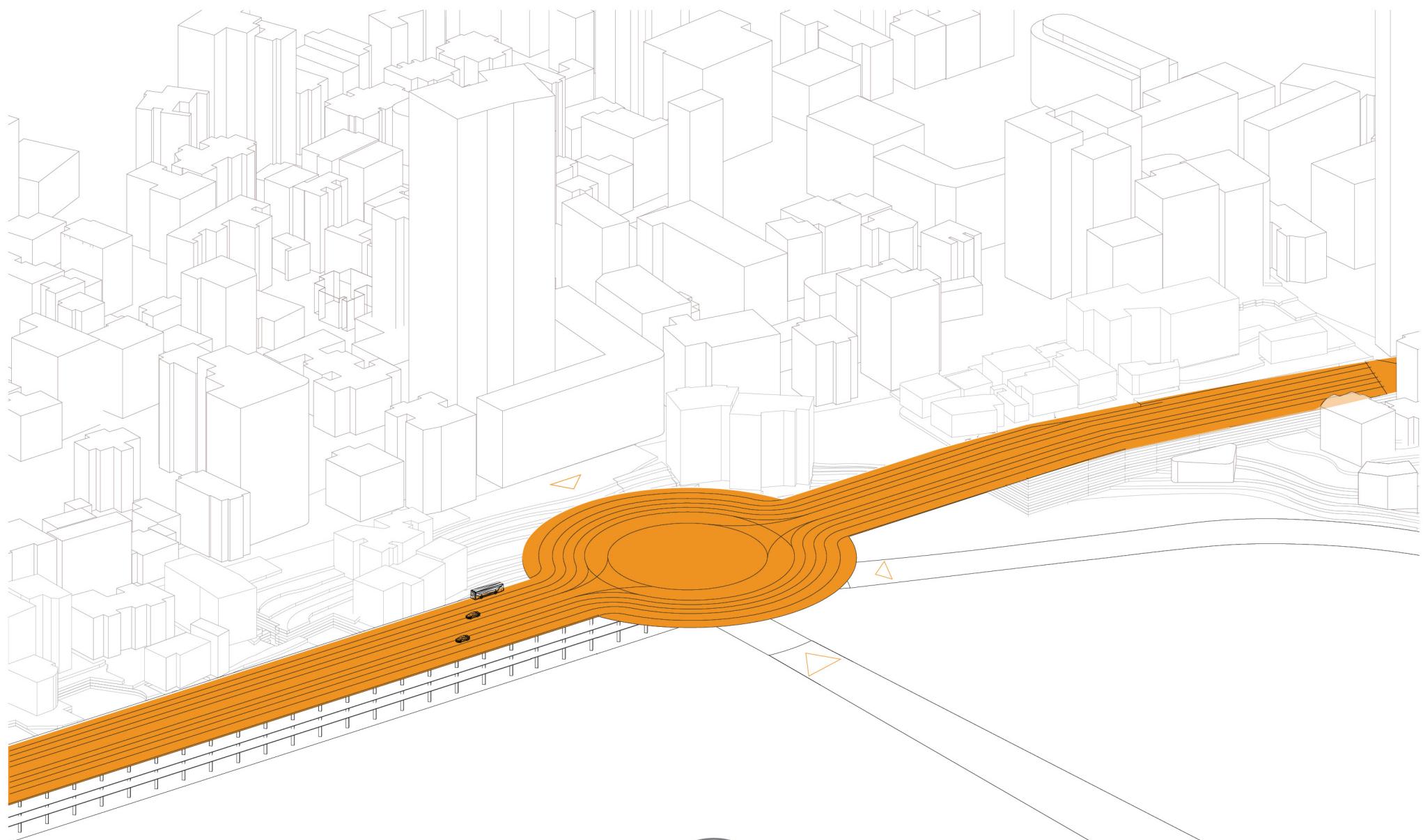
Lüte Biesheuvel



Beirut Terminus



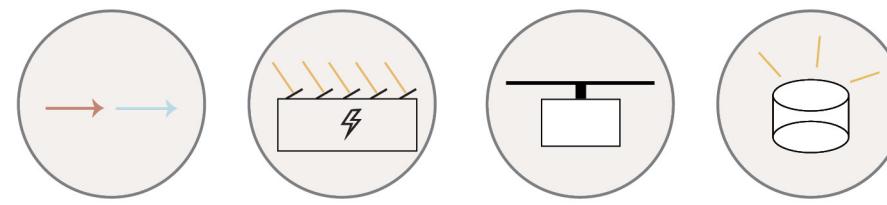
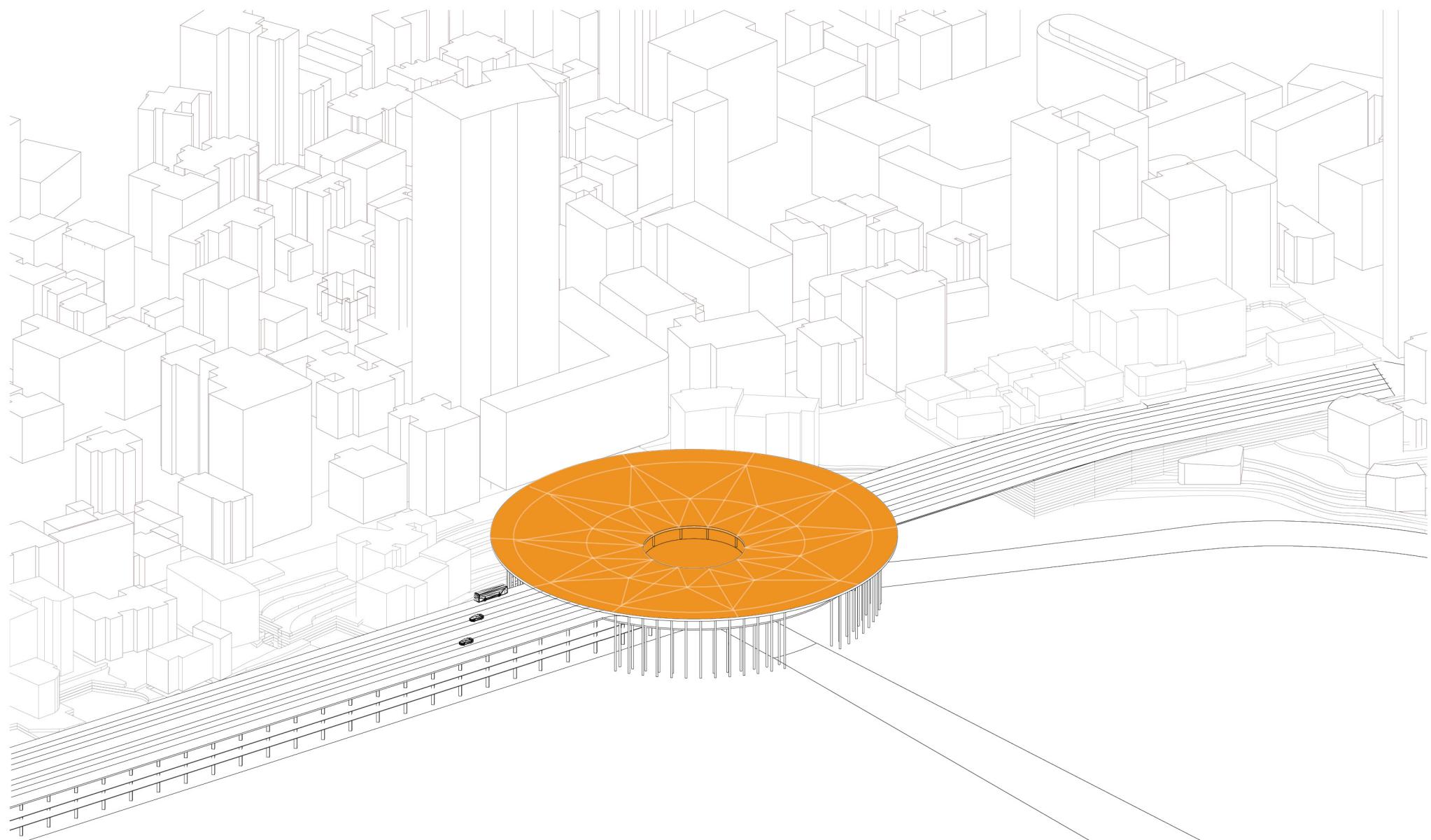
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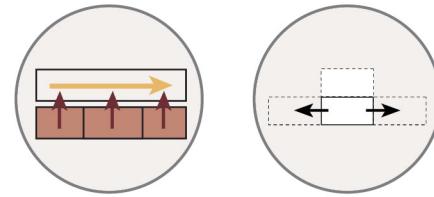
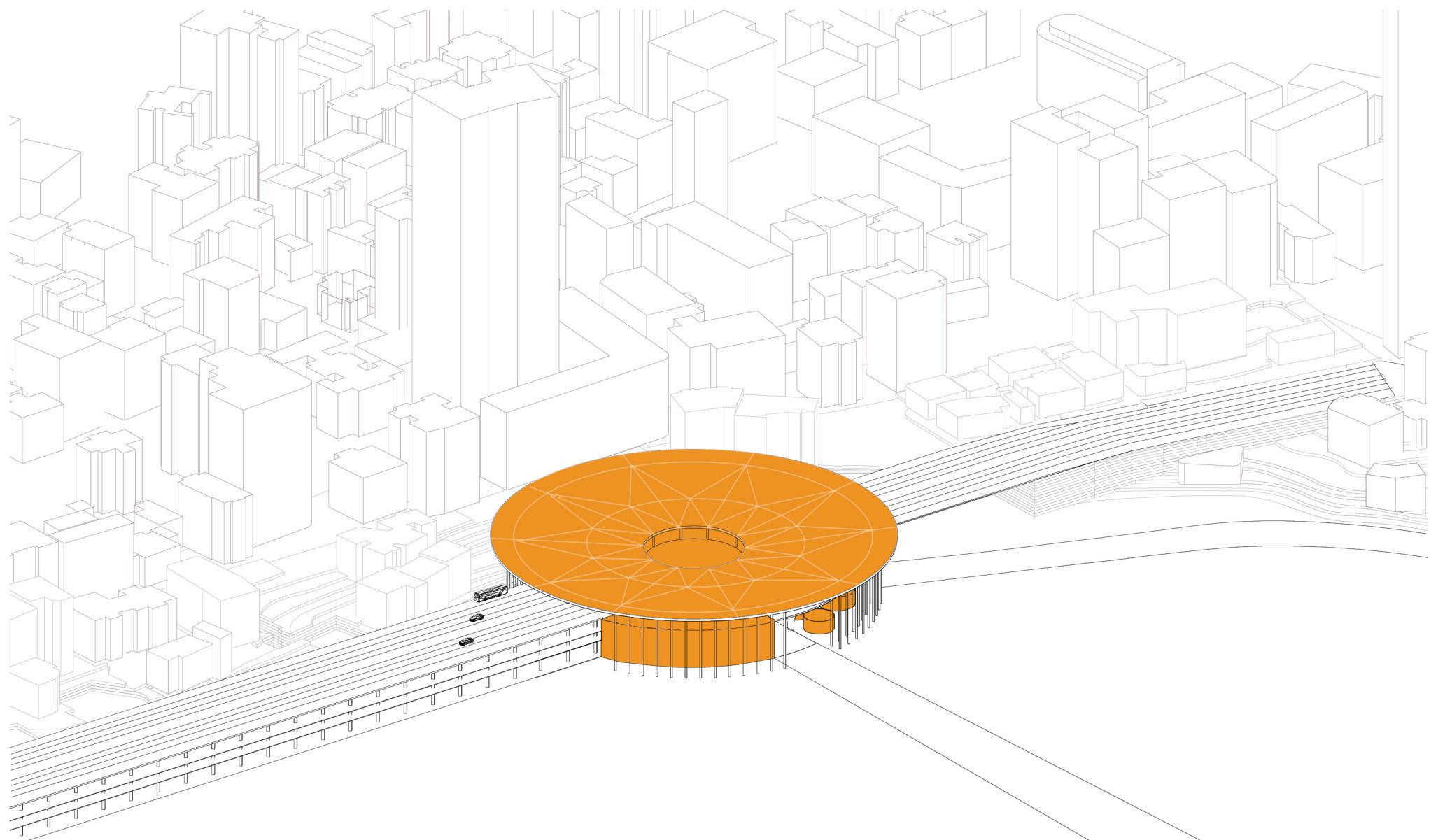


Beirut Terminus



Lüte Biesheuvel

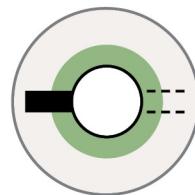
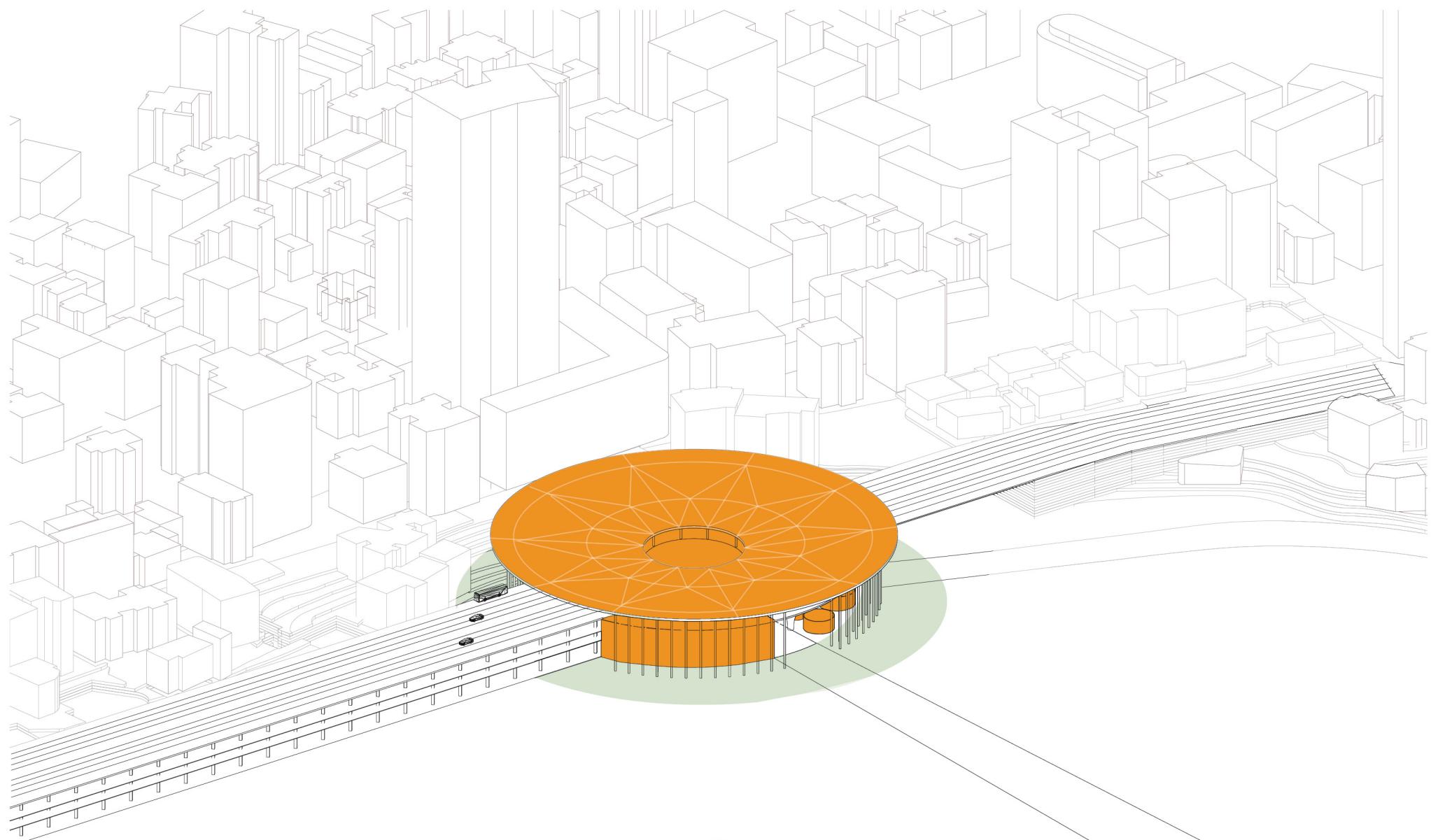




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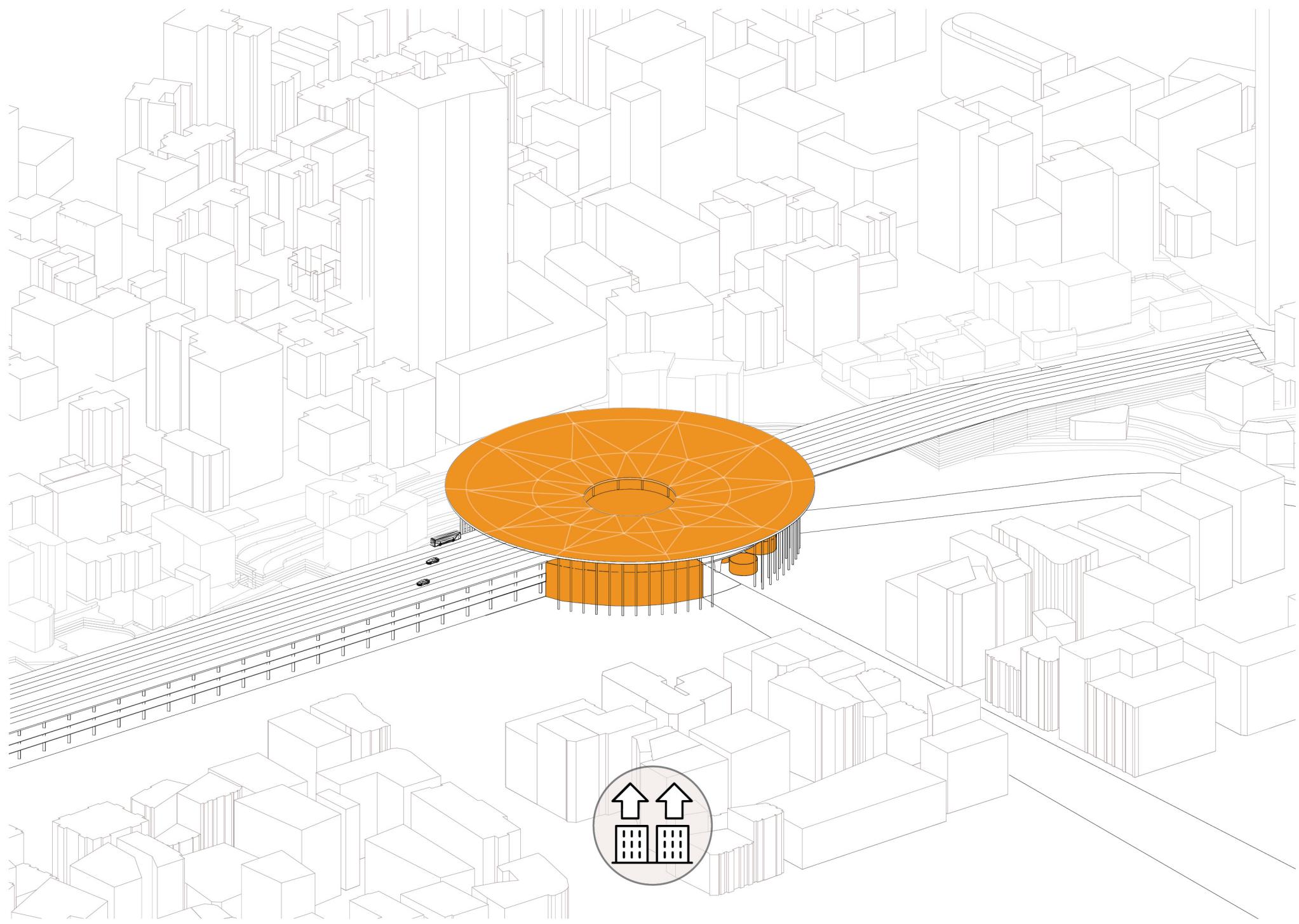
Lüte Biesheuvel



Beirut Terminus



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Beirut Terminus



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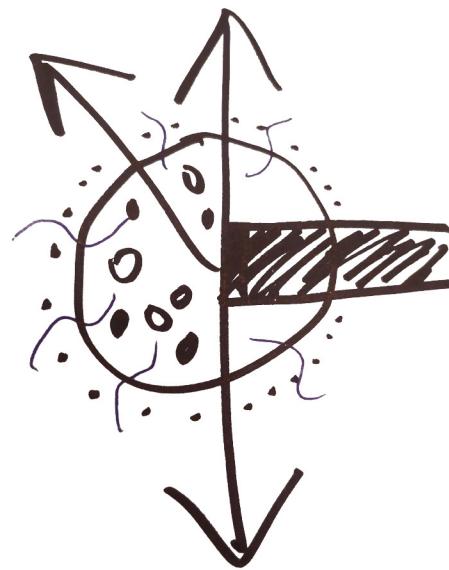


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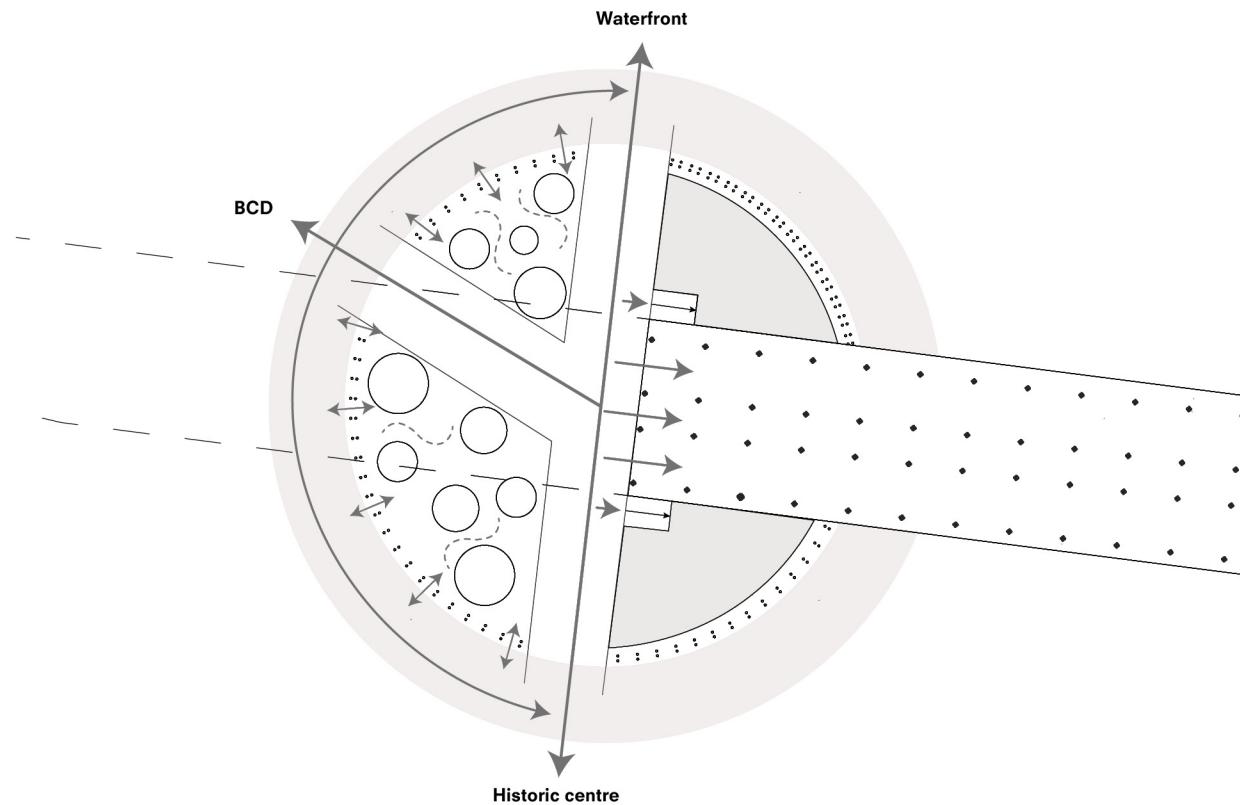


Lotte Biesheuvel

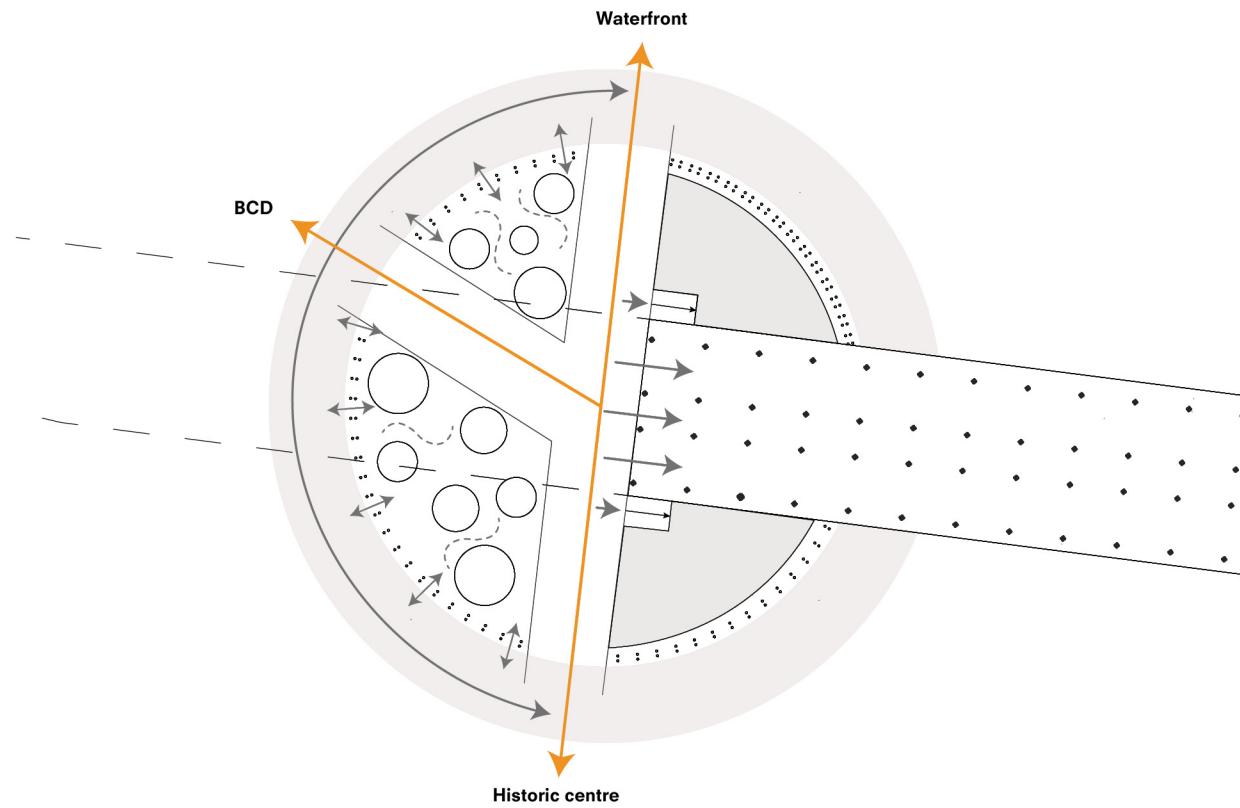
## INTERIOR FLOW CONCEPT



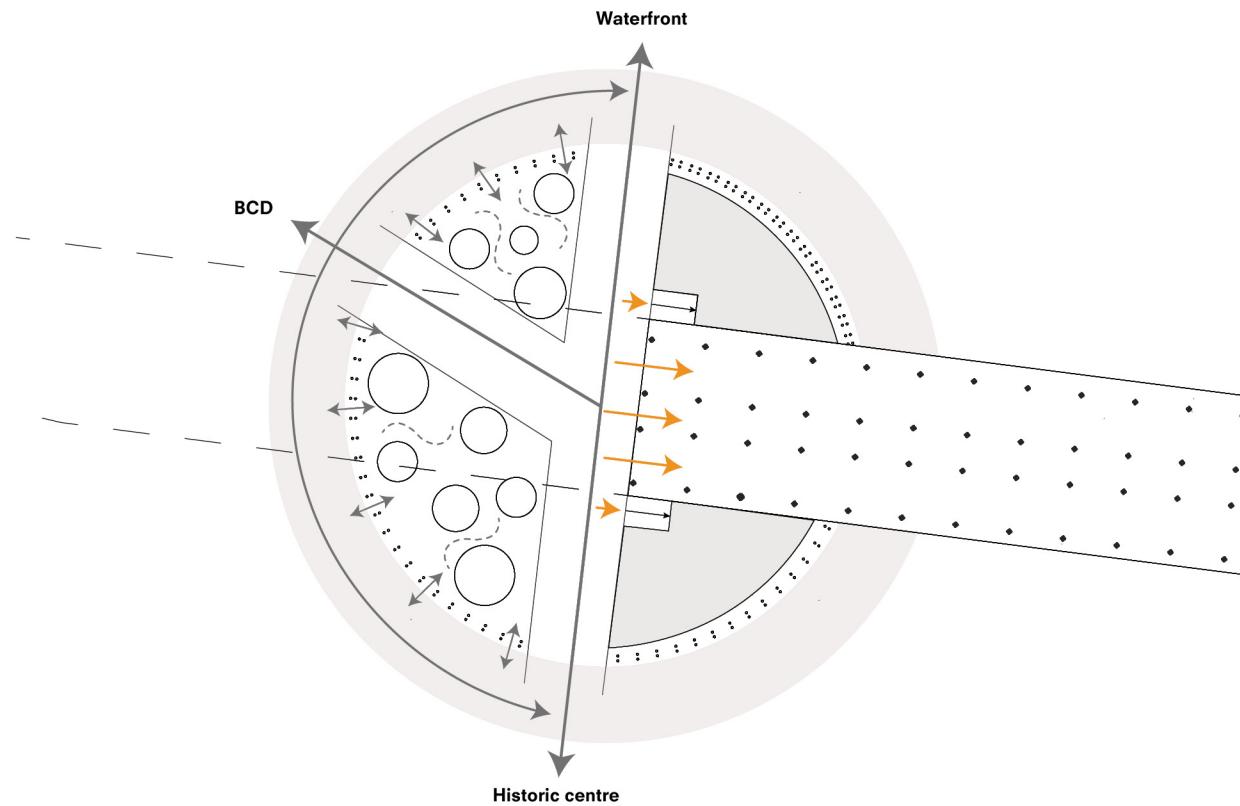
# INTERIOR FLOW CONCEPT



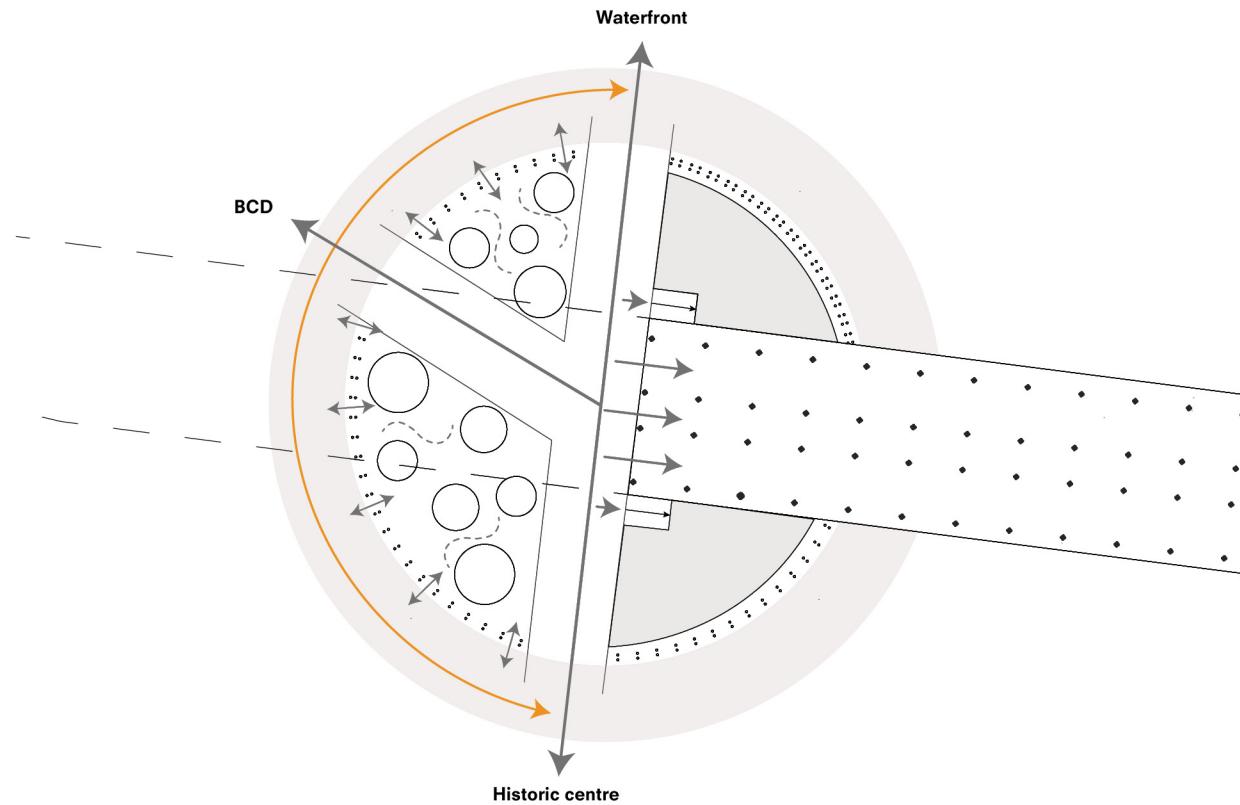
# INTERIOR FLOW CONCEPT



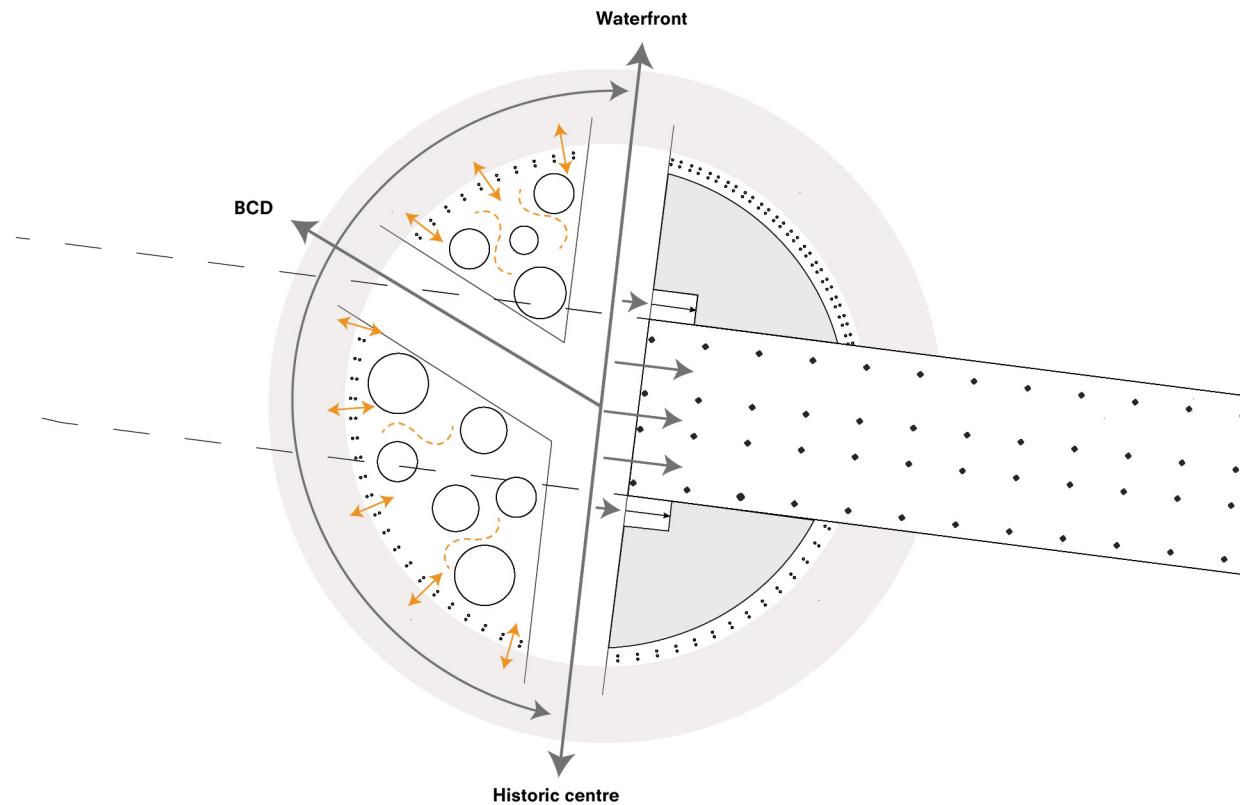
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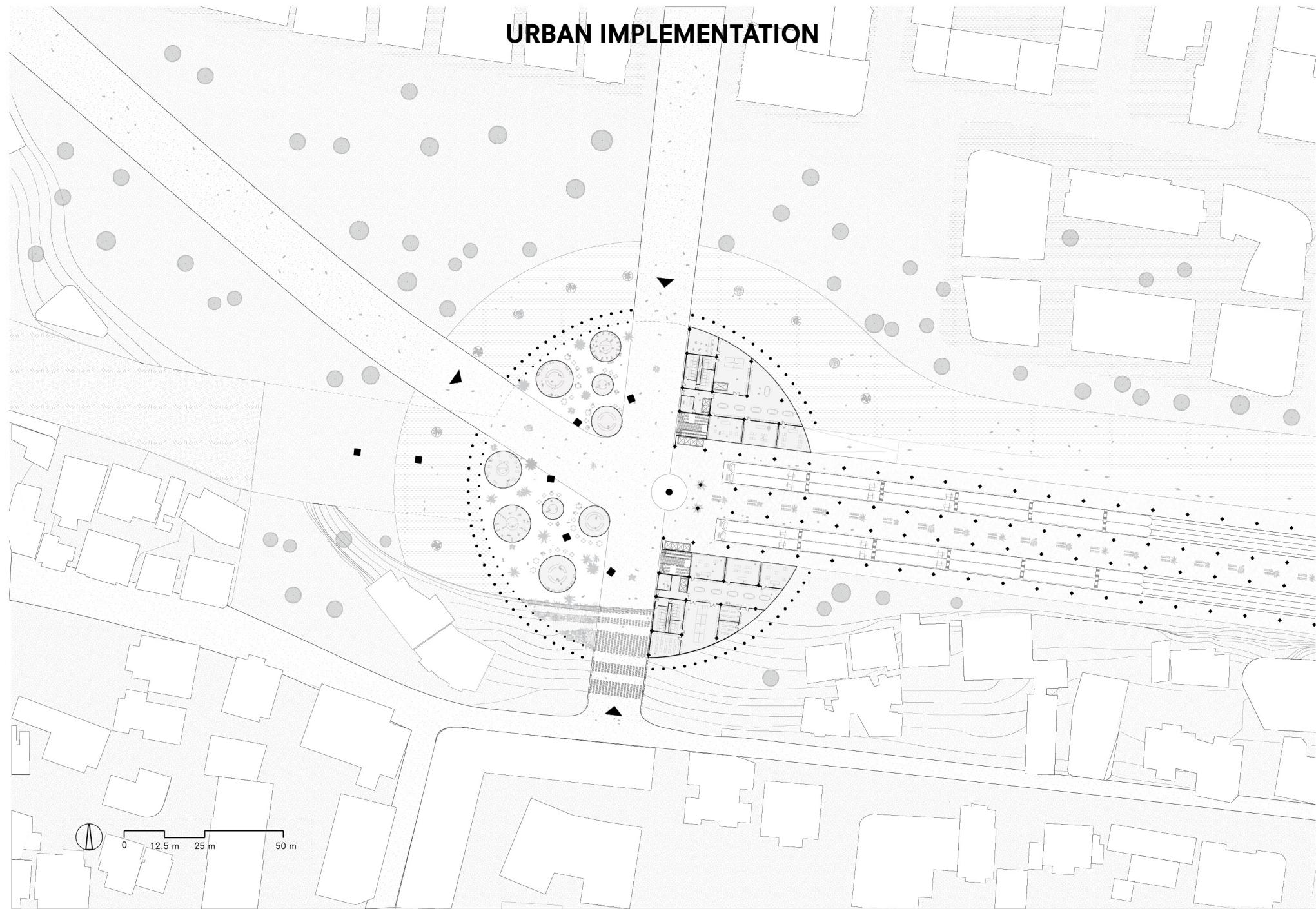
# INTERIOR FLOW CONCEPT



# INTERIOR FLOW CONCEPT



# URBAN IMPLEMENTATION

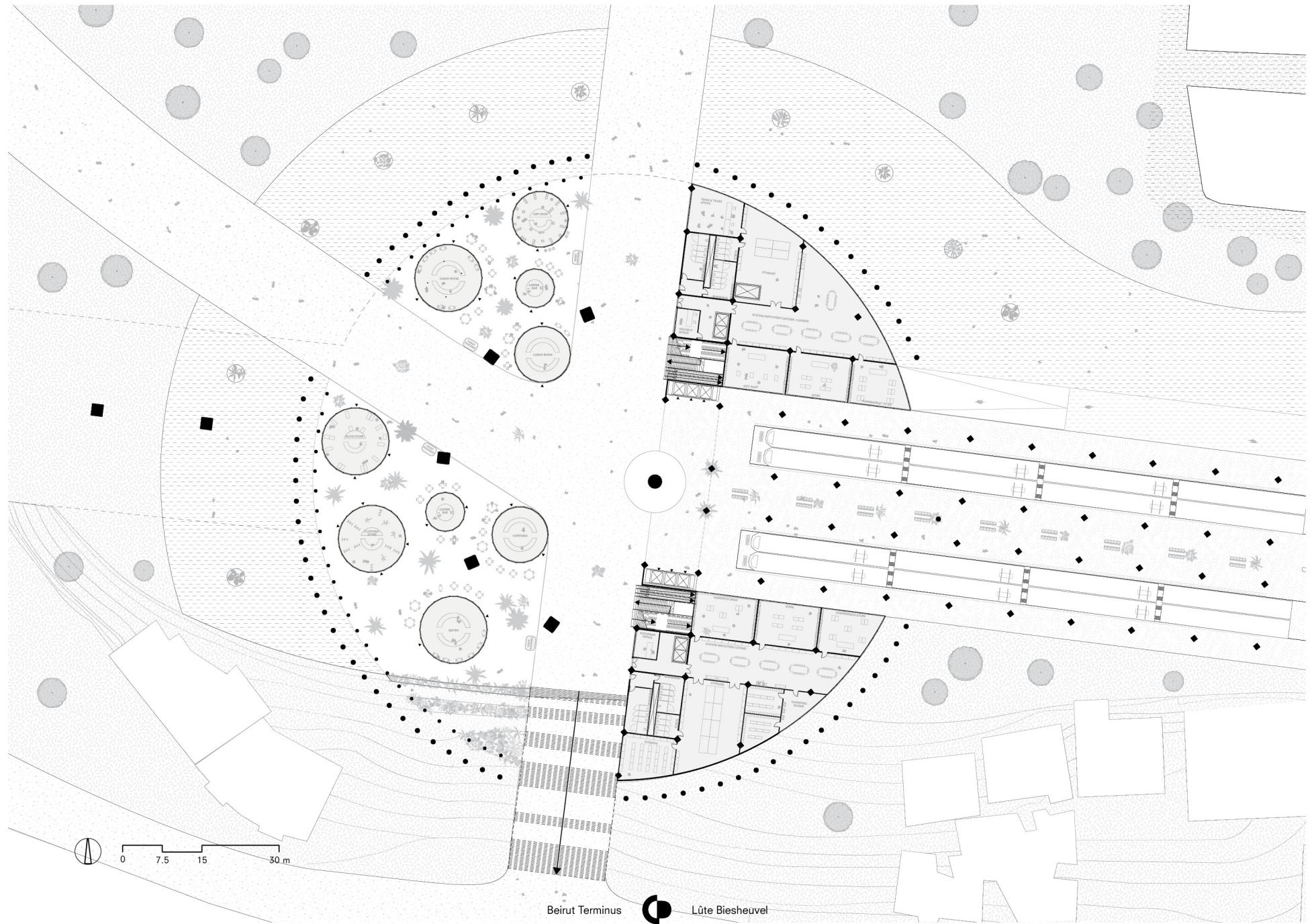


Beirut Terminus

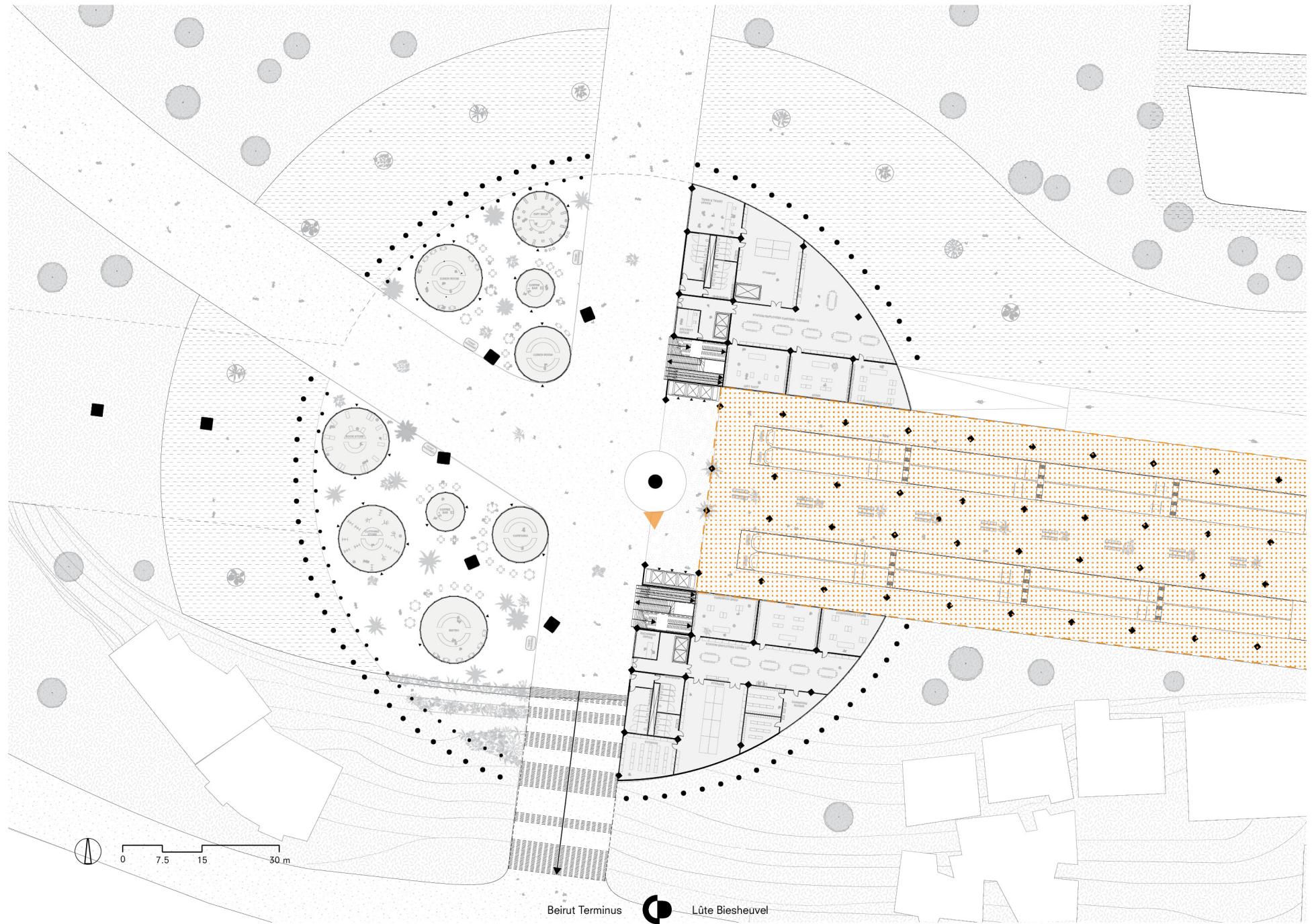


Lüte Biesheuvel

## FLOOR PLAN LEVEL 0



## FLOOR PLAN LEVEL 0



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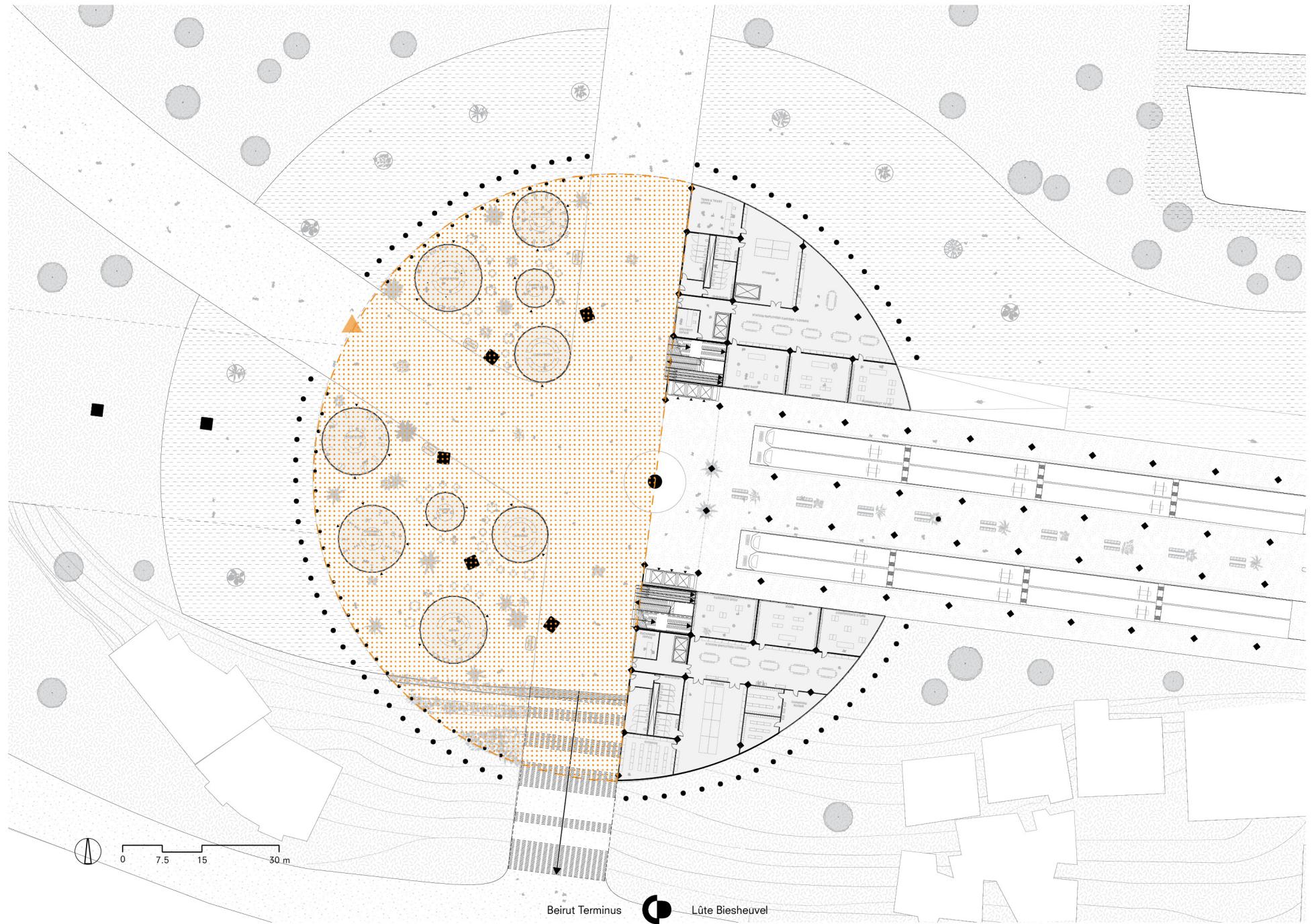
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## FLOOR PLAN LEVEL 0



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## FLOOR PLAN LEVEL 0



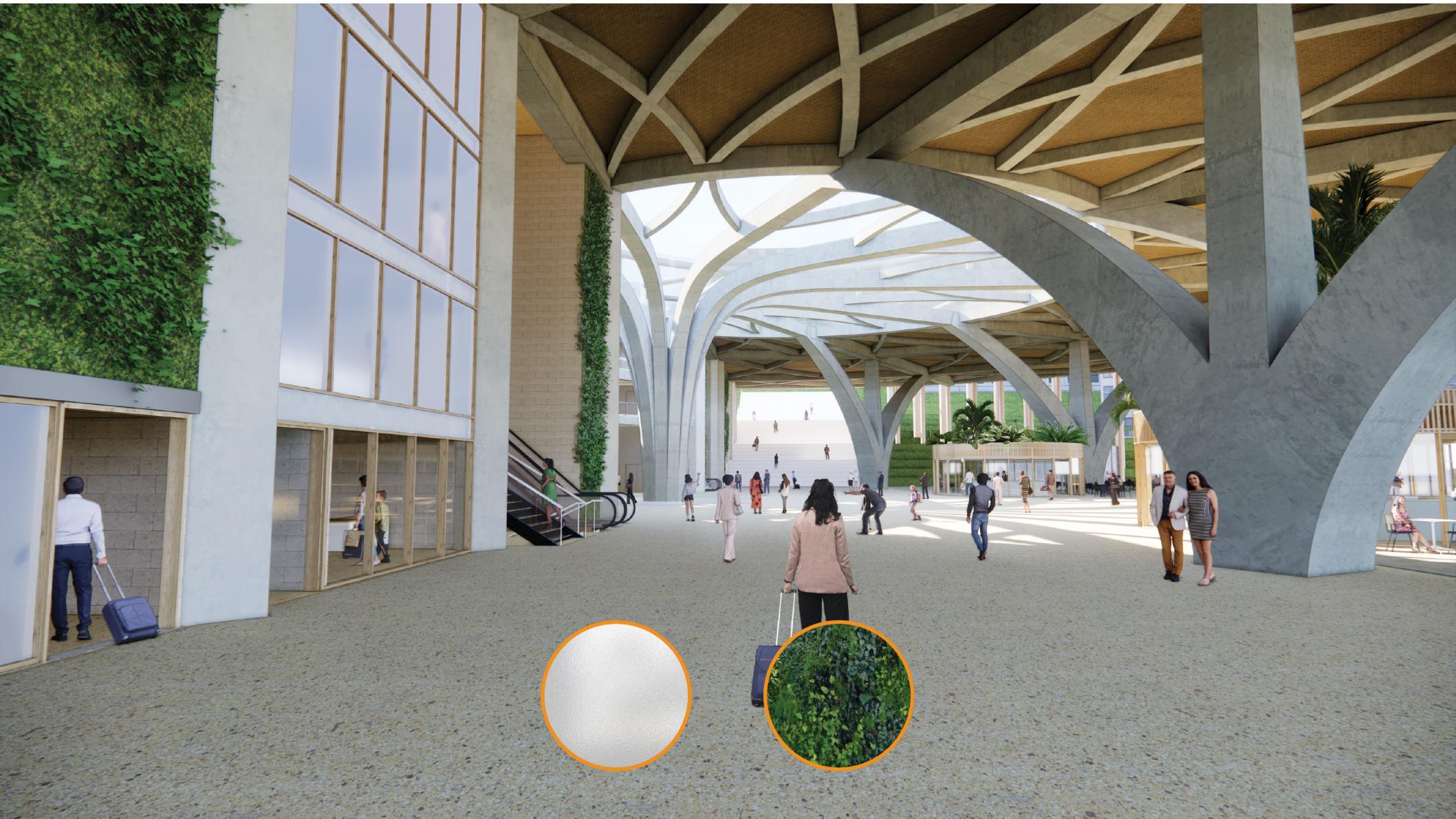
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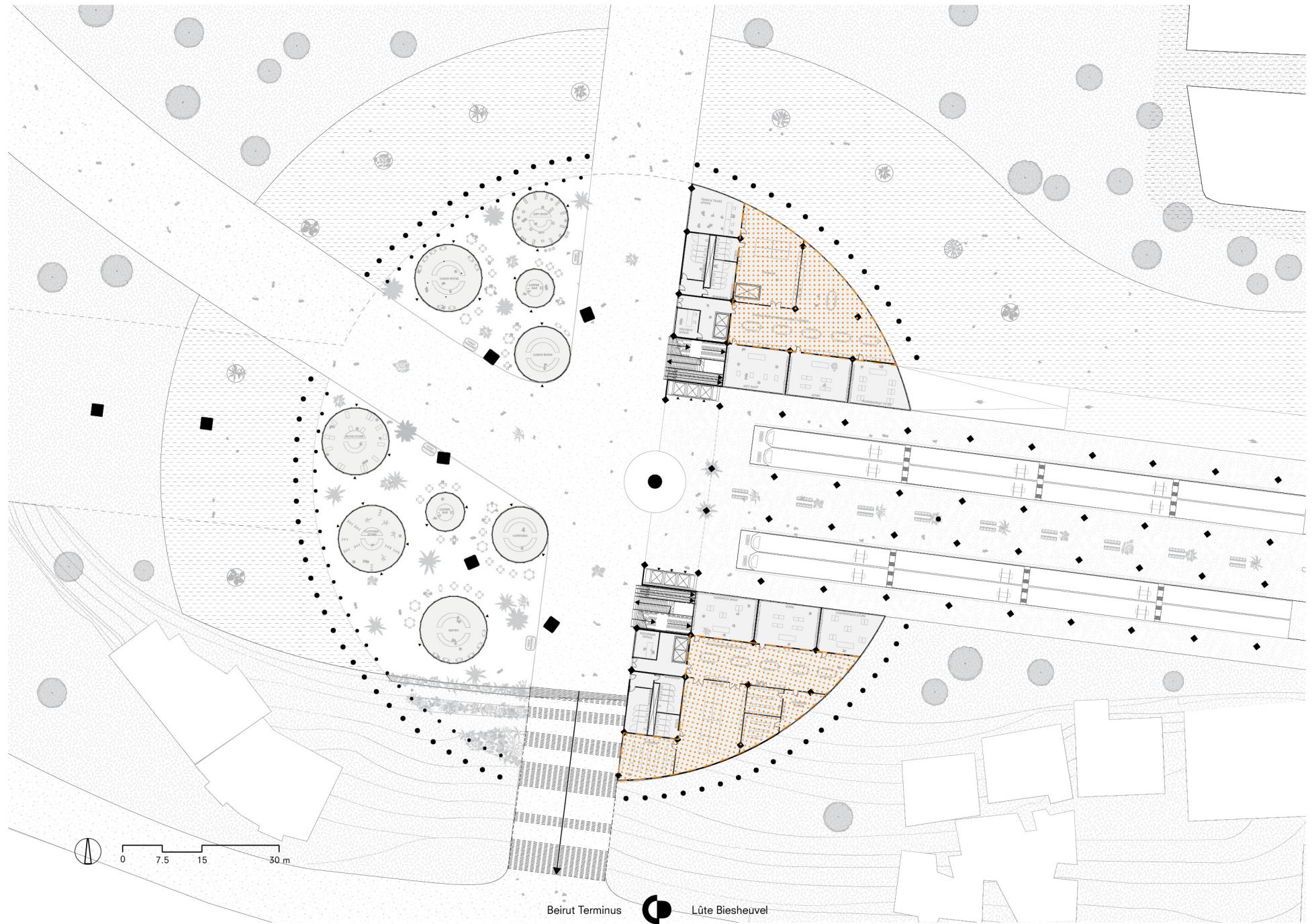
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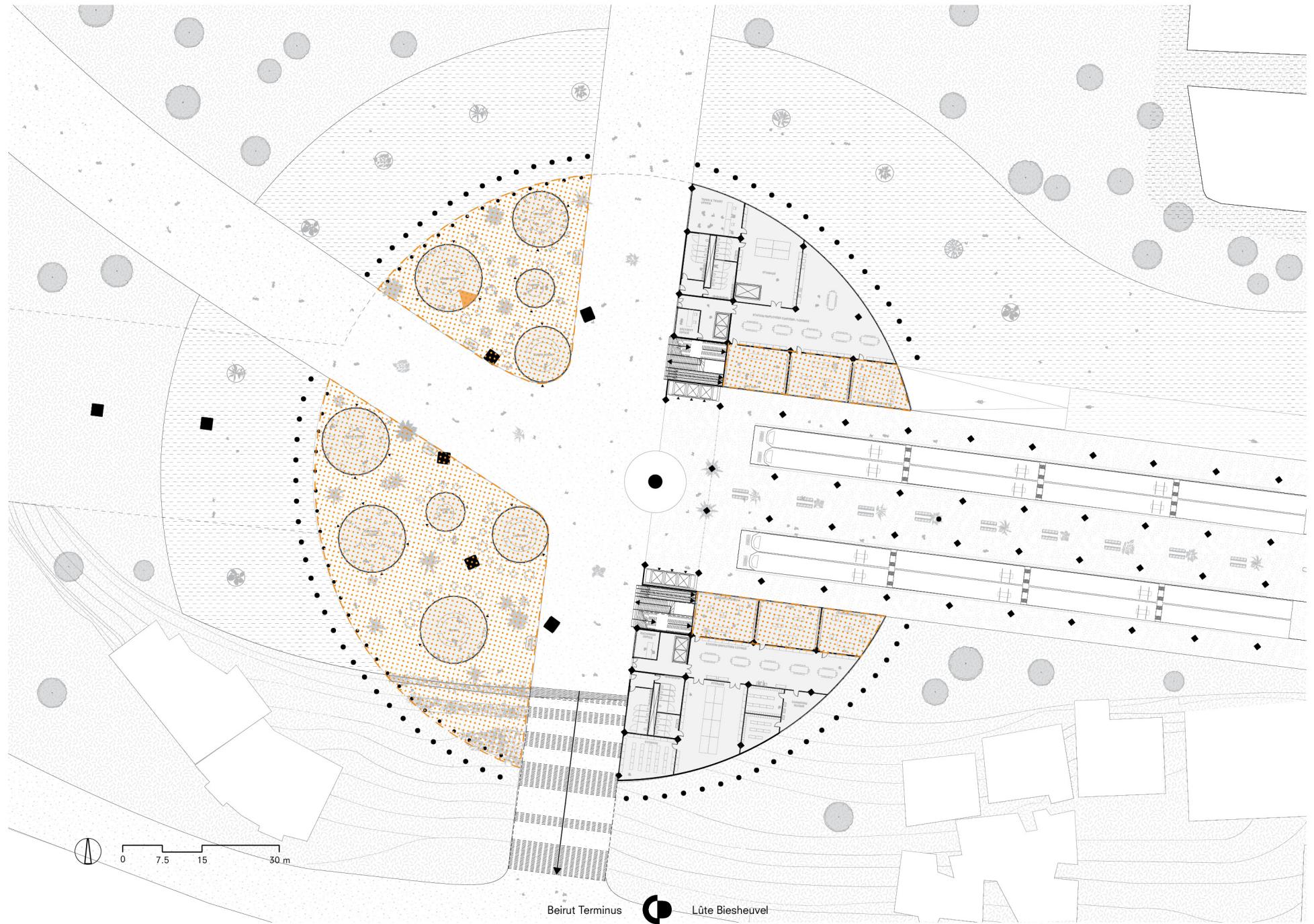
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## FLOOR PLAN LEVEL 0



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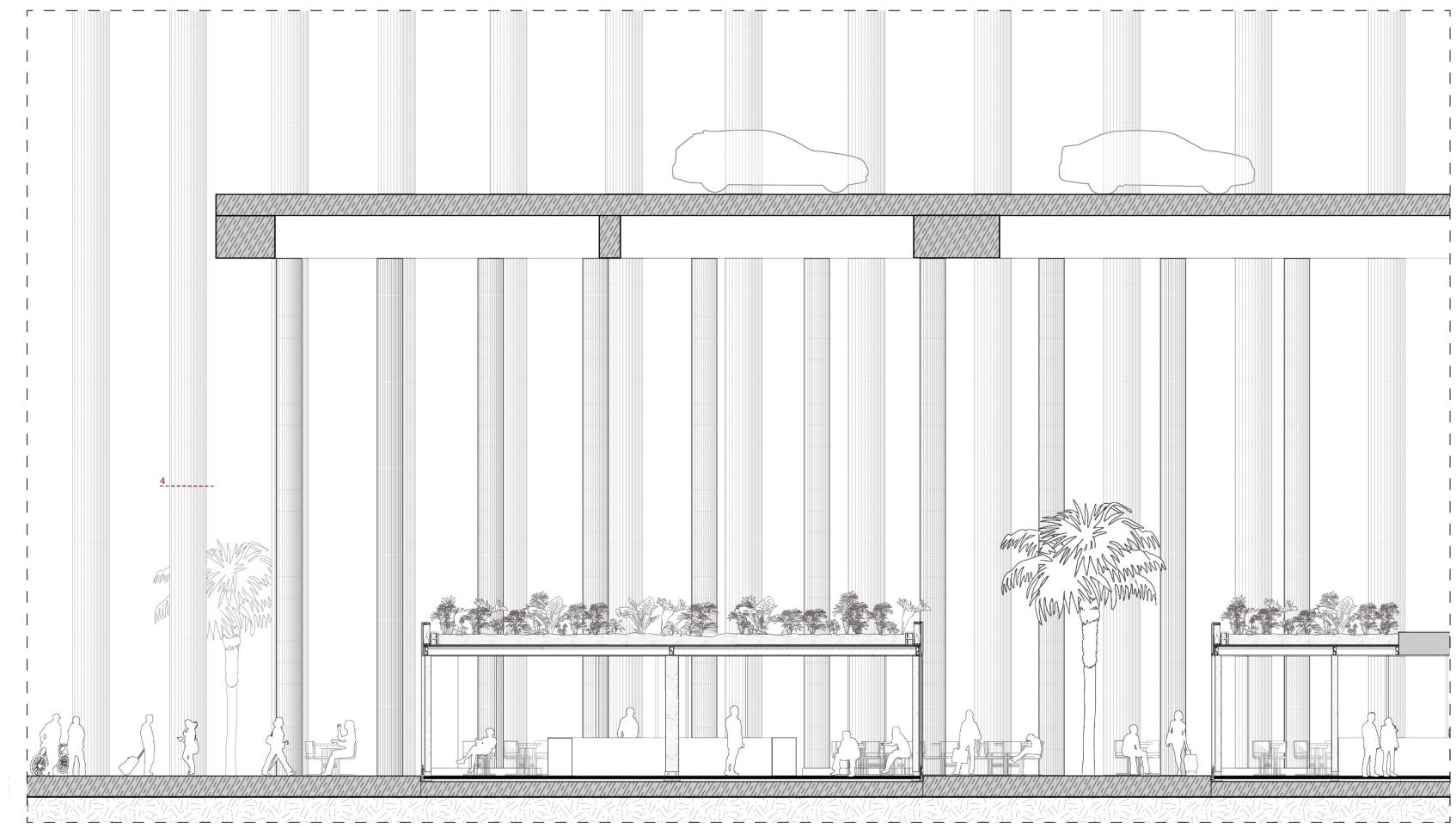
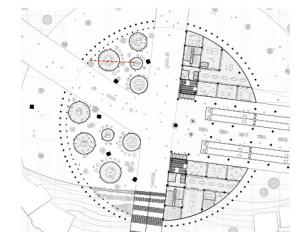
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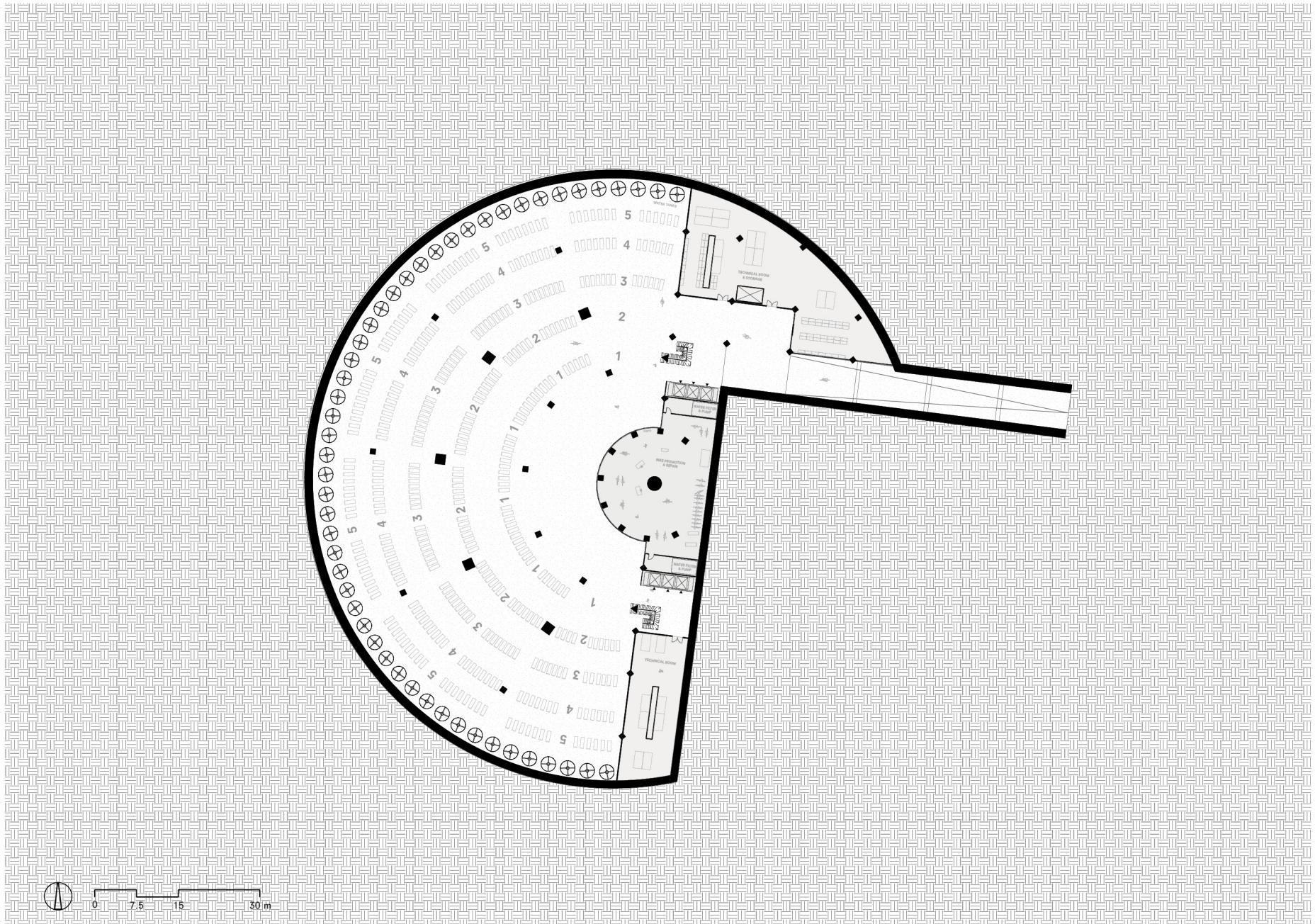


# 1:50 INTERIOR FRAGMENT



0 1.25 m 2.5 m 5 m

## FLOOR LEVEL -1



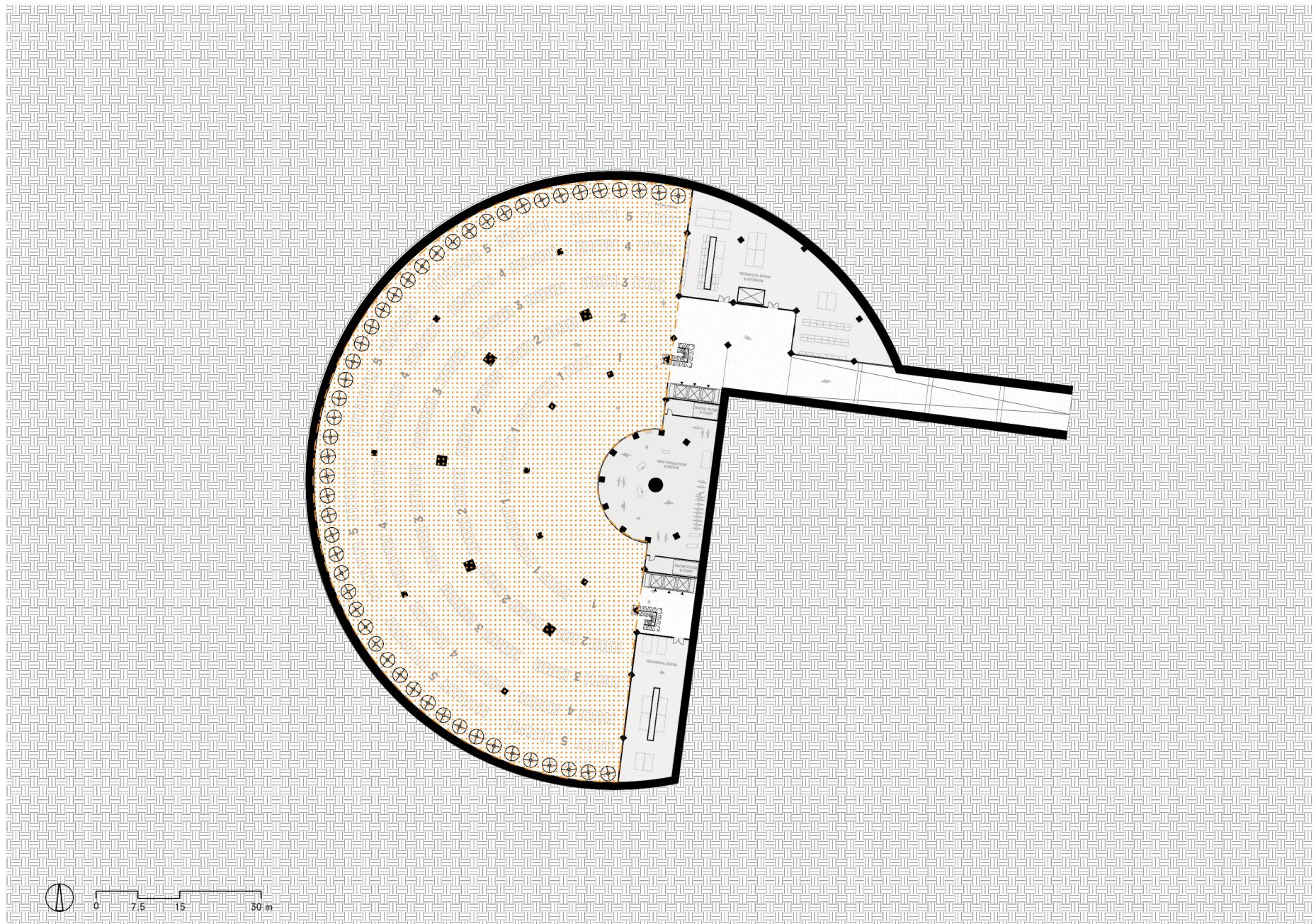
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7,5

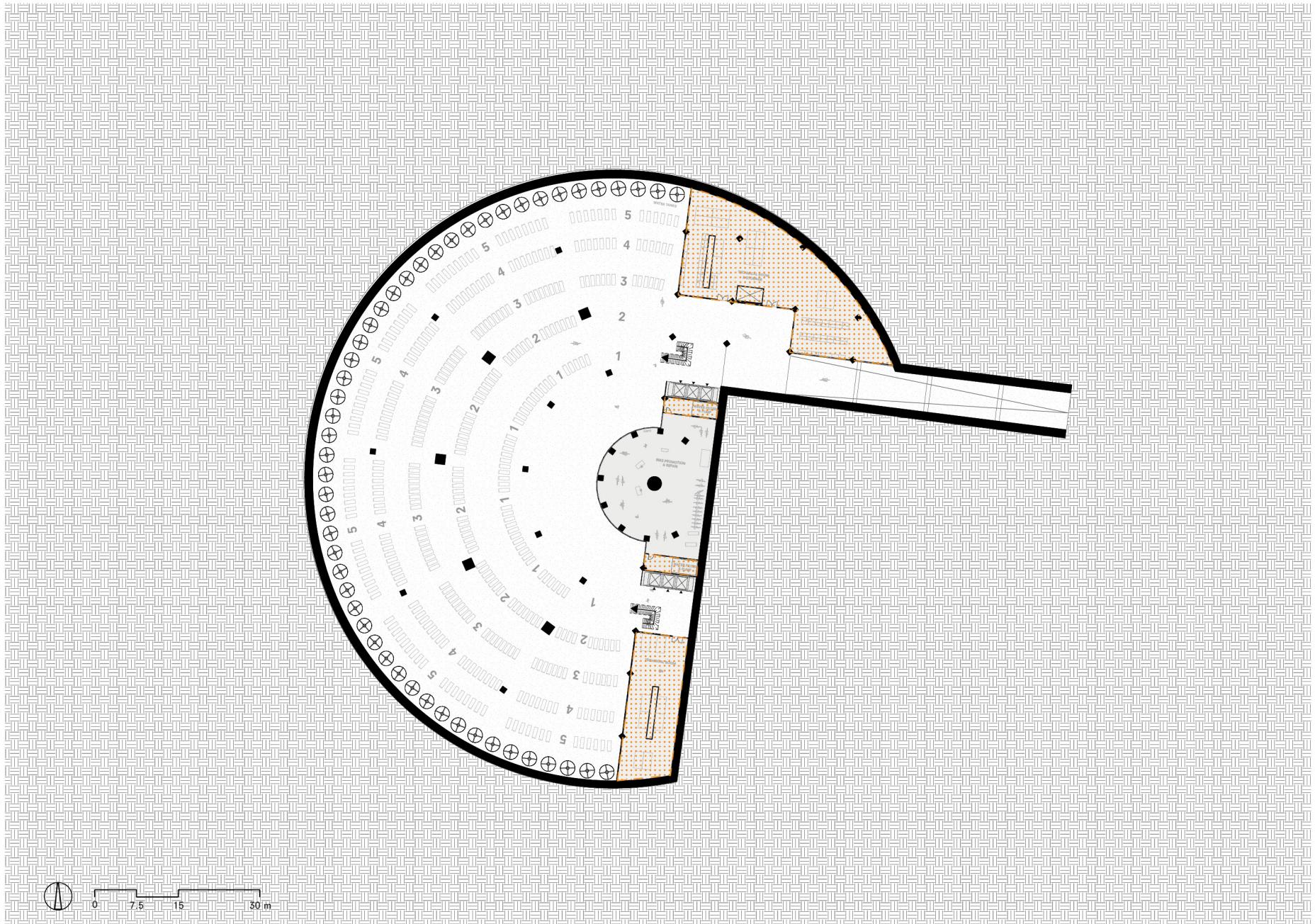
15

30 m

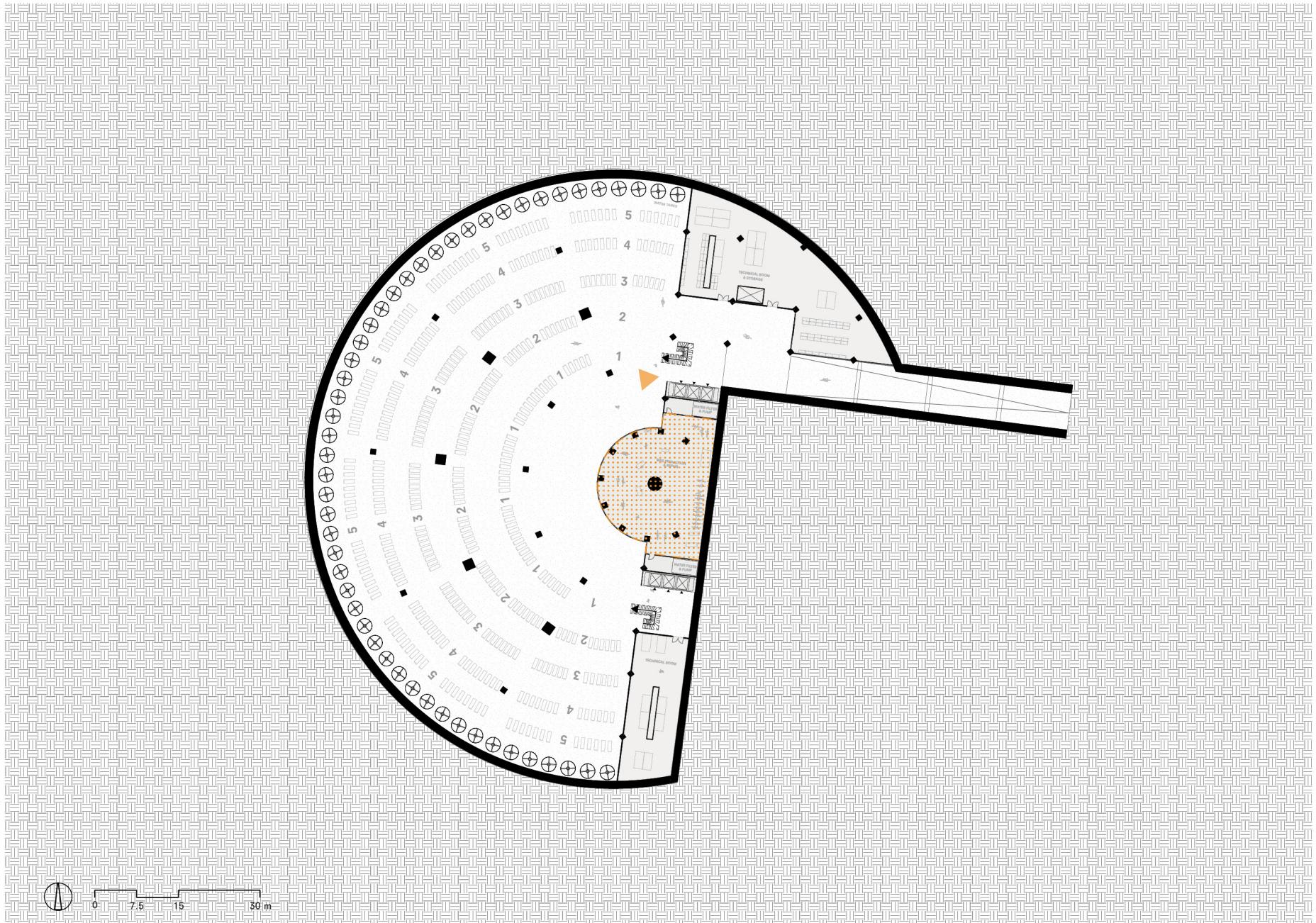
## FLOOR LEVEL -1



## FLOOR LEVEL -1



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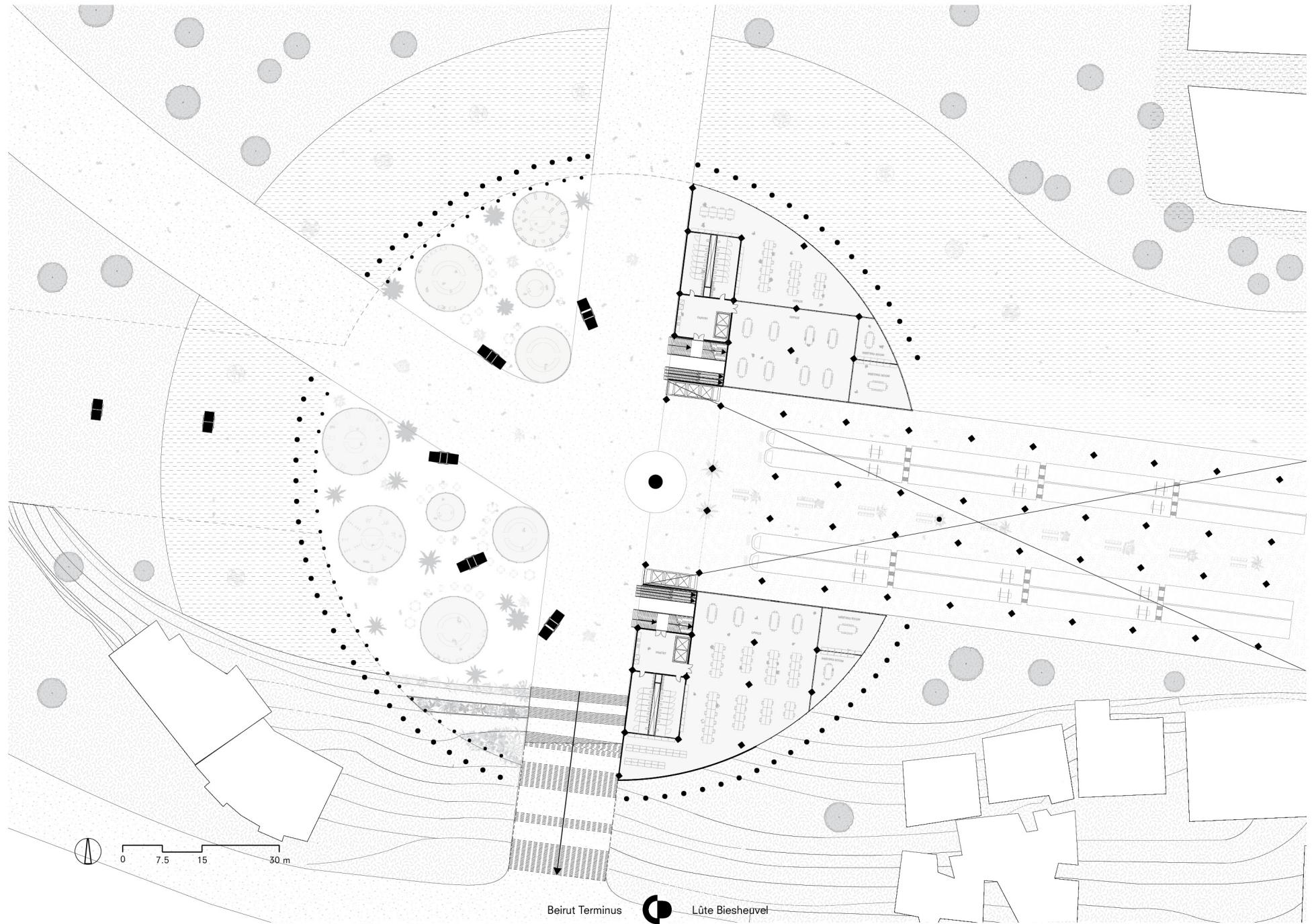
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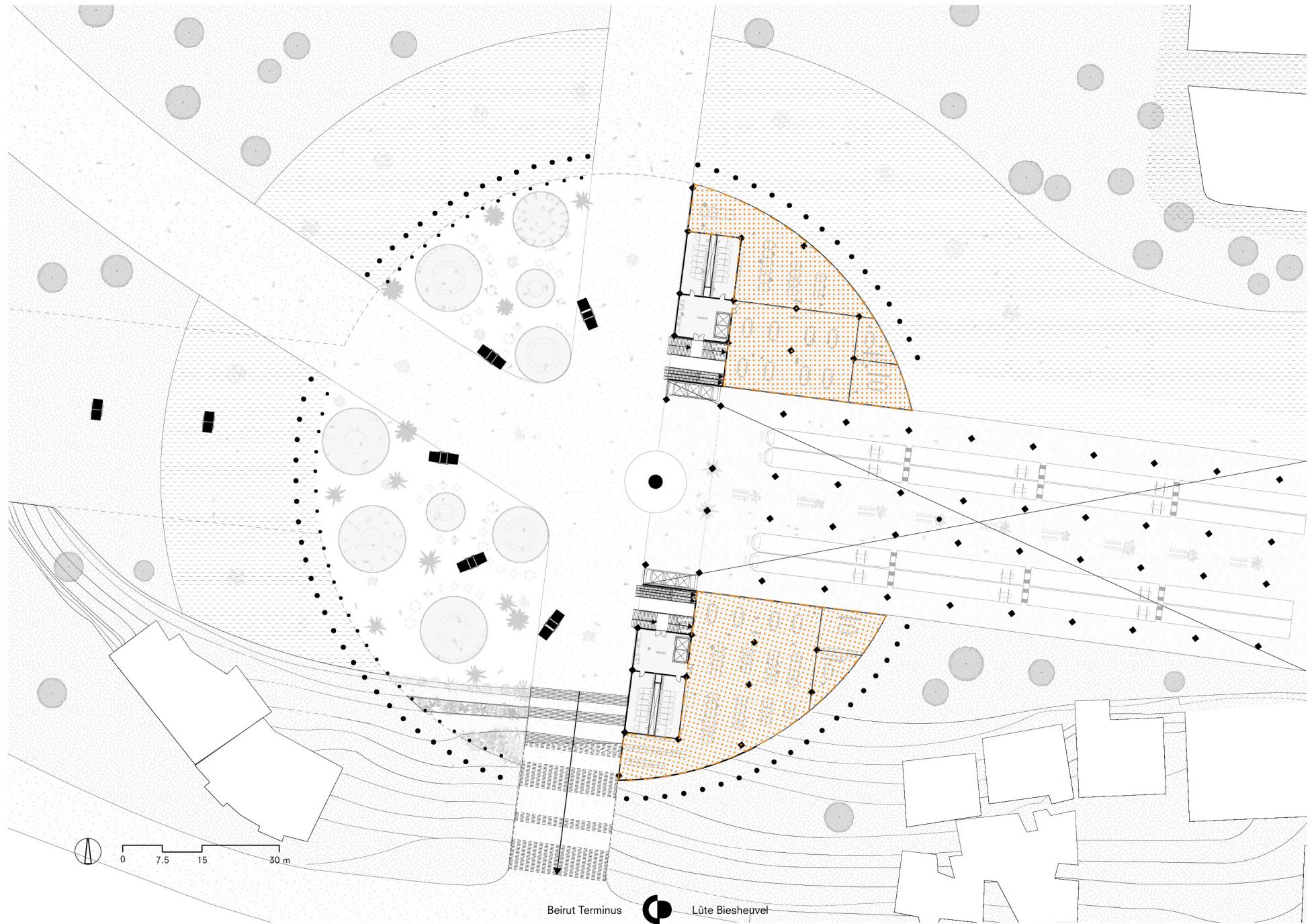
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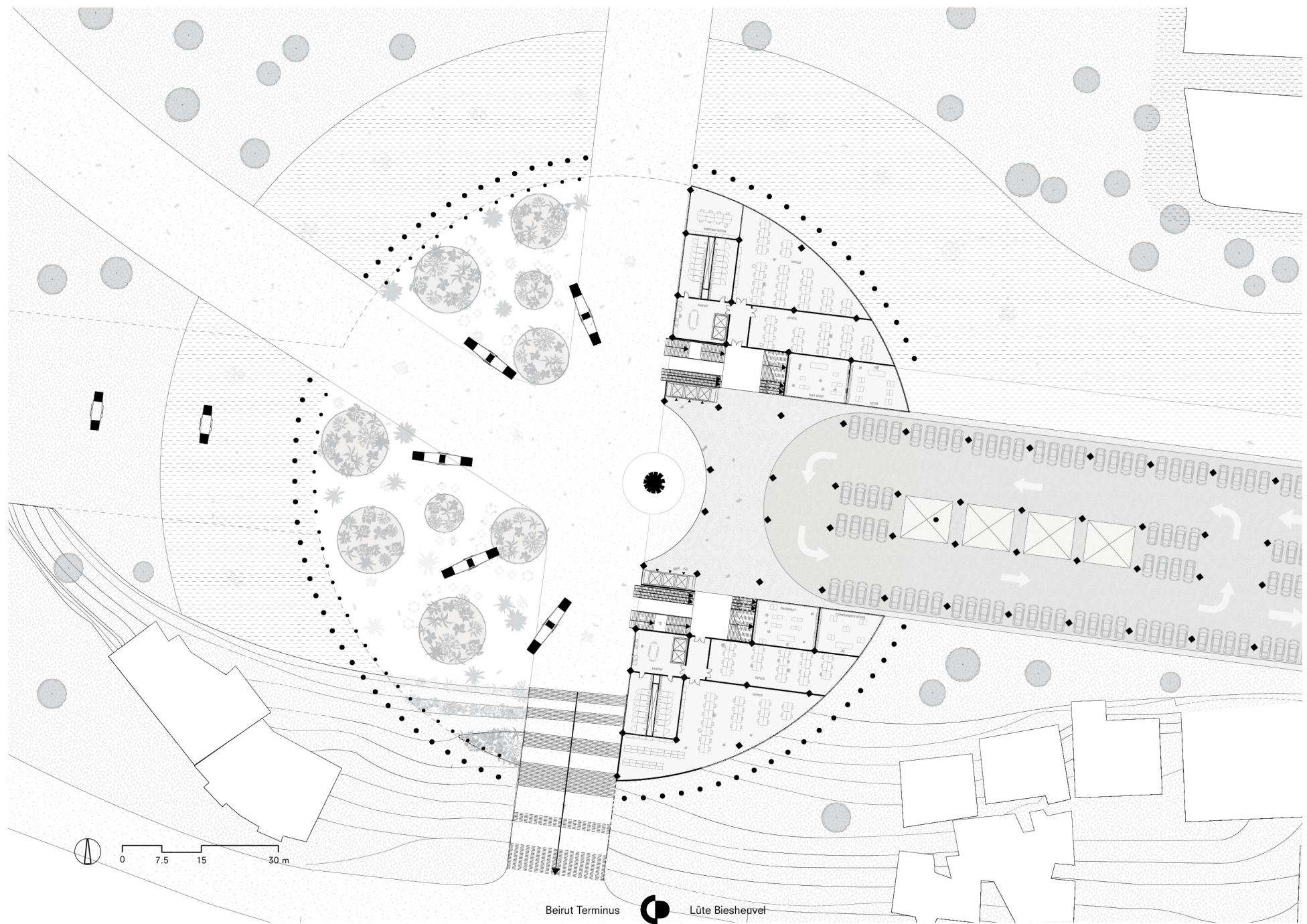
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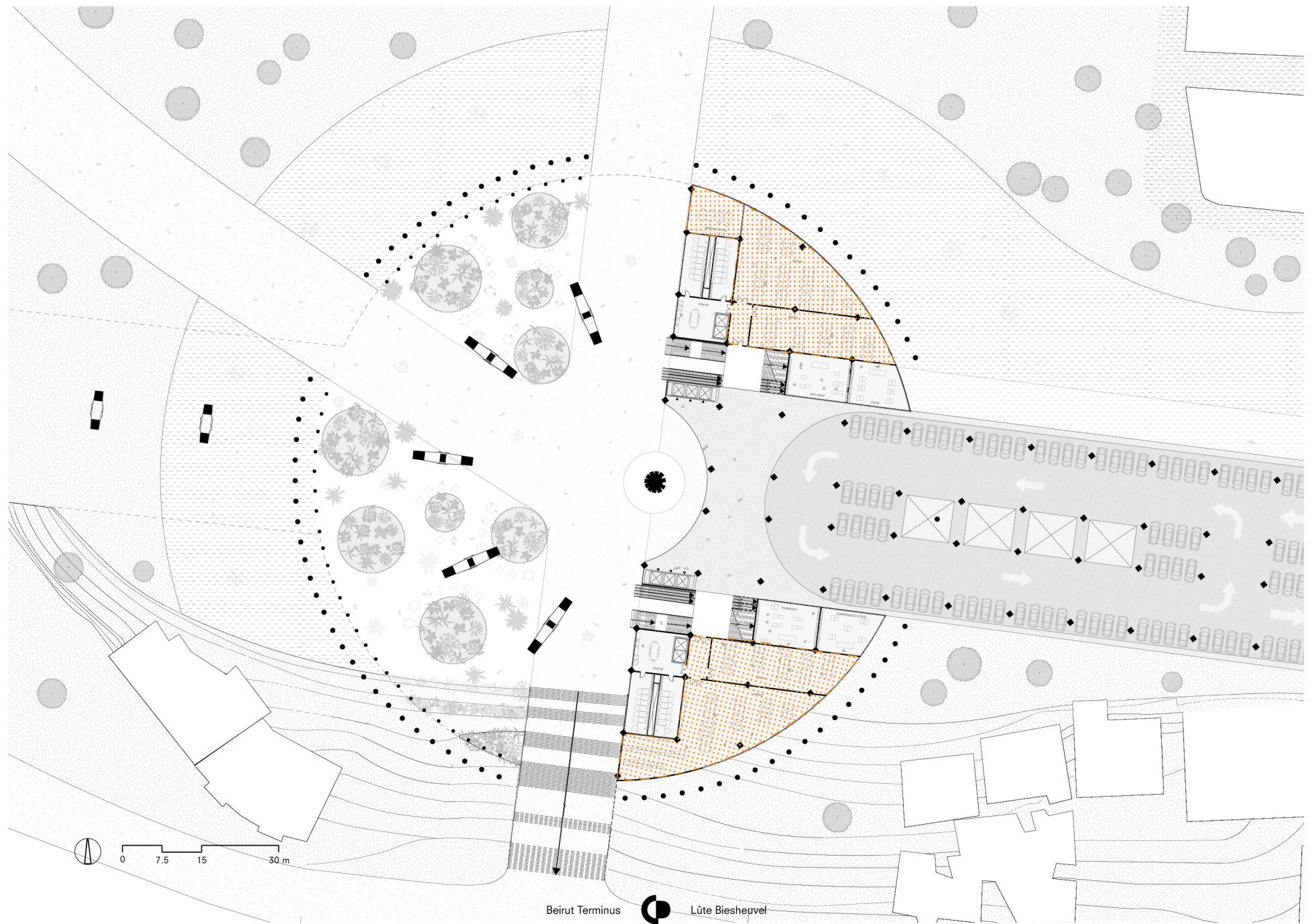
## FLOOR PLAN LEVEL 1



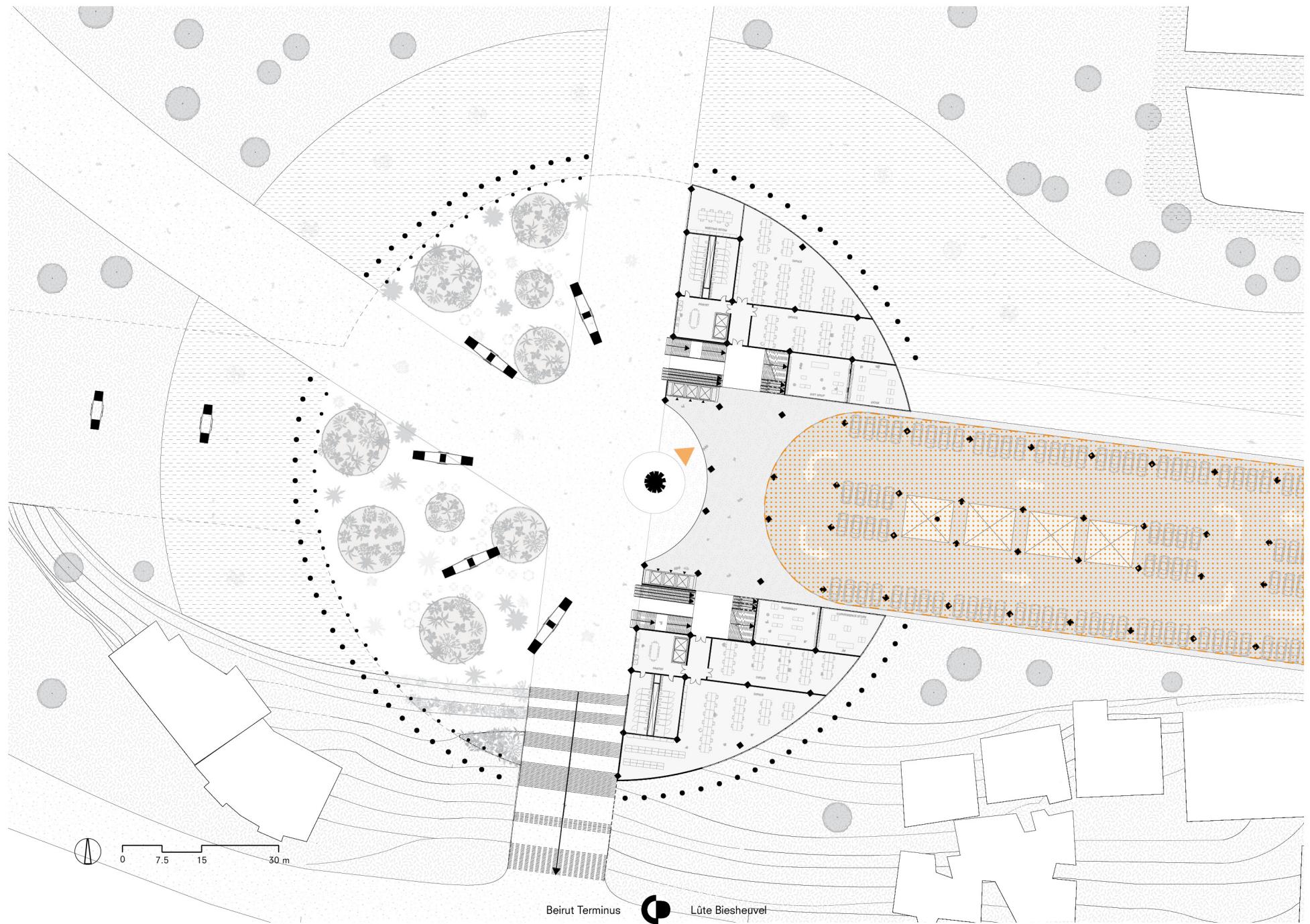
## FLOOR PLAN LEVEL 2



## FLOOR PLAN LEVEL 2



## FLOOR PLAN LEVEL 2



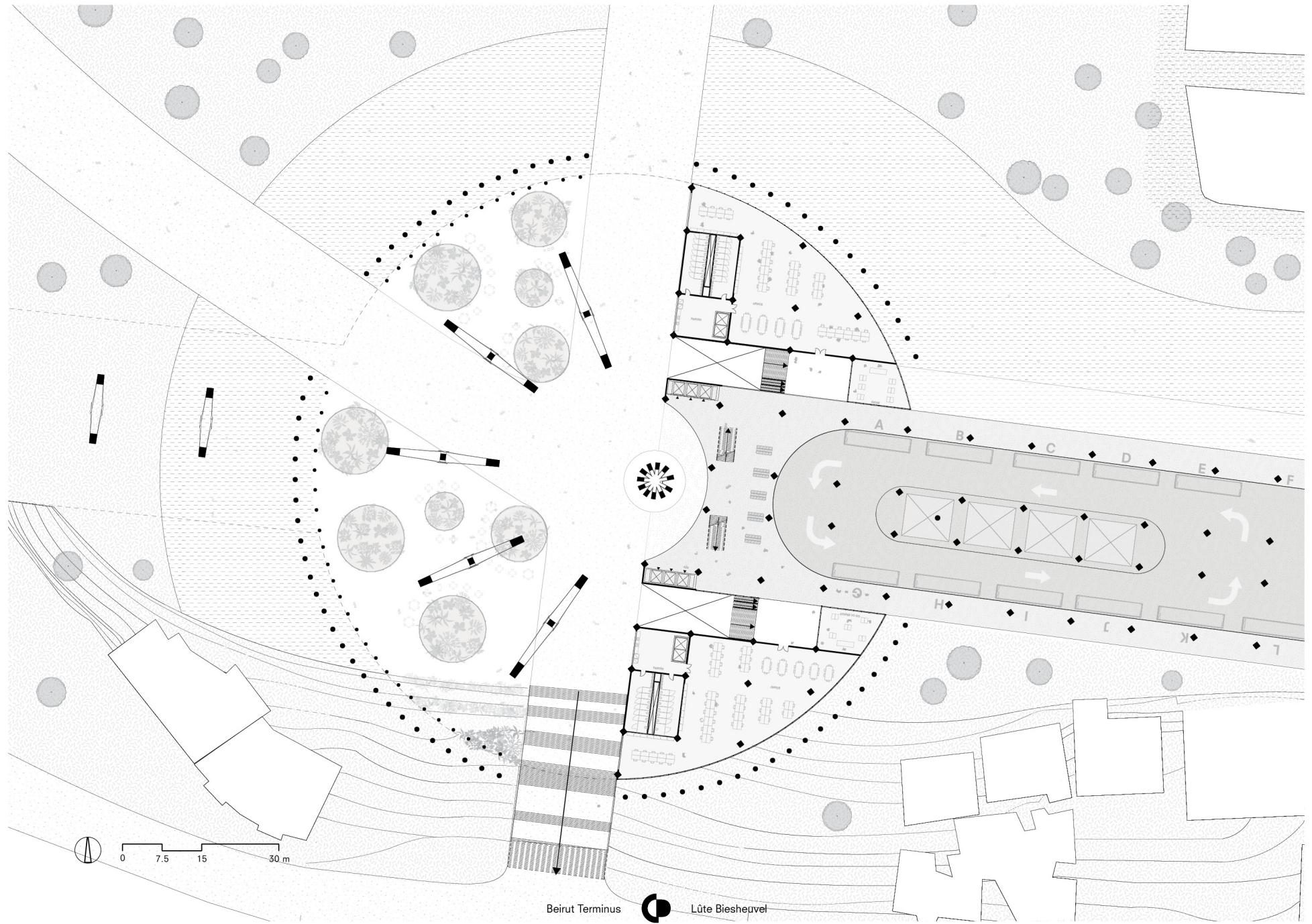
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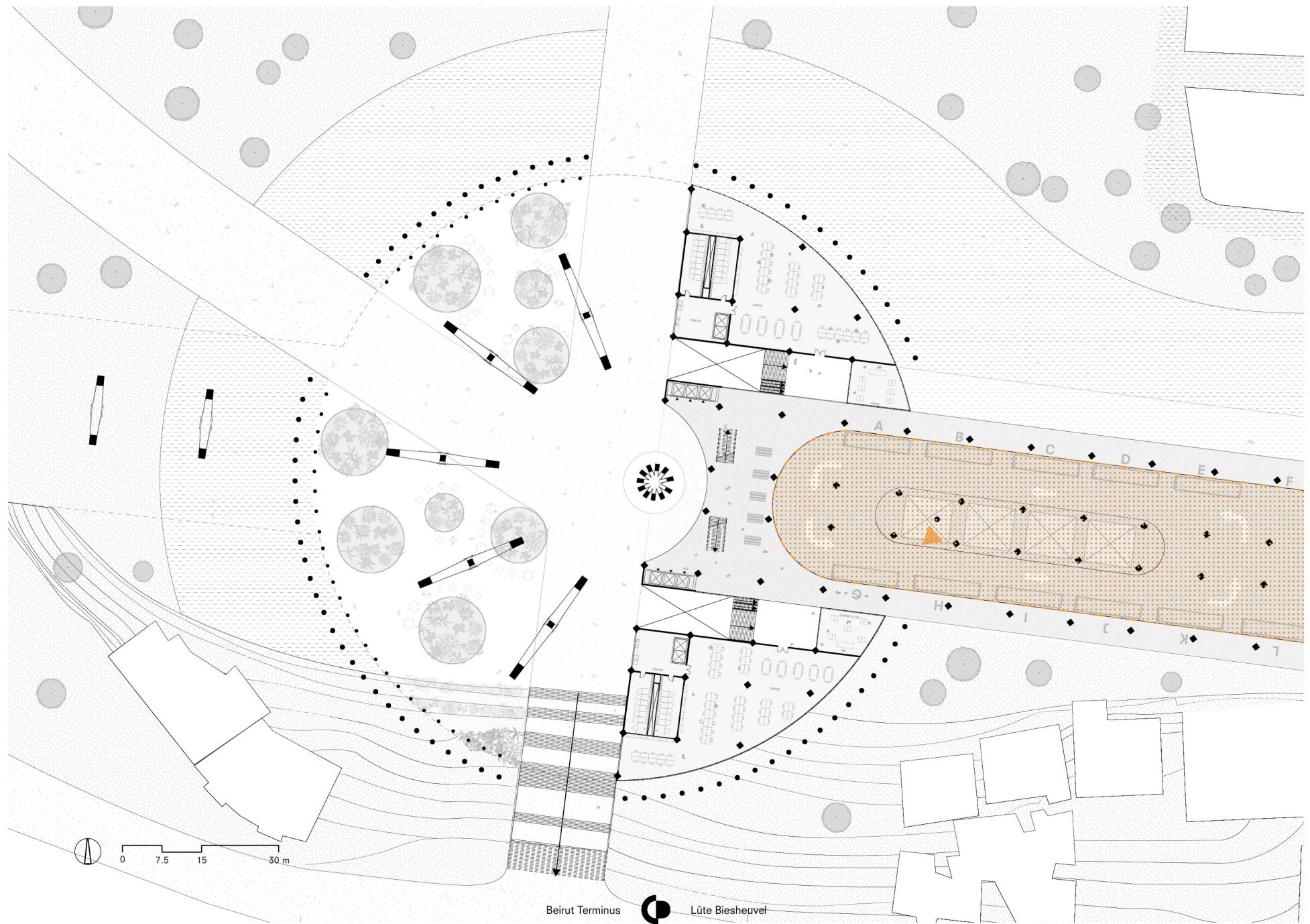
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## FLOOR PLAN LEVEL 3



## FLOOR PLAN LEVEL 3



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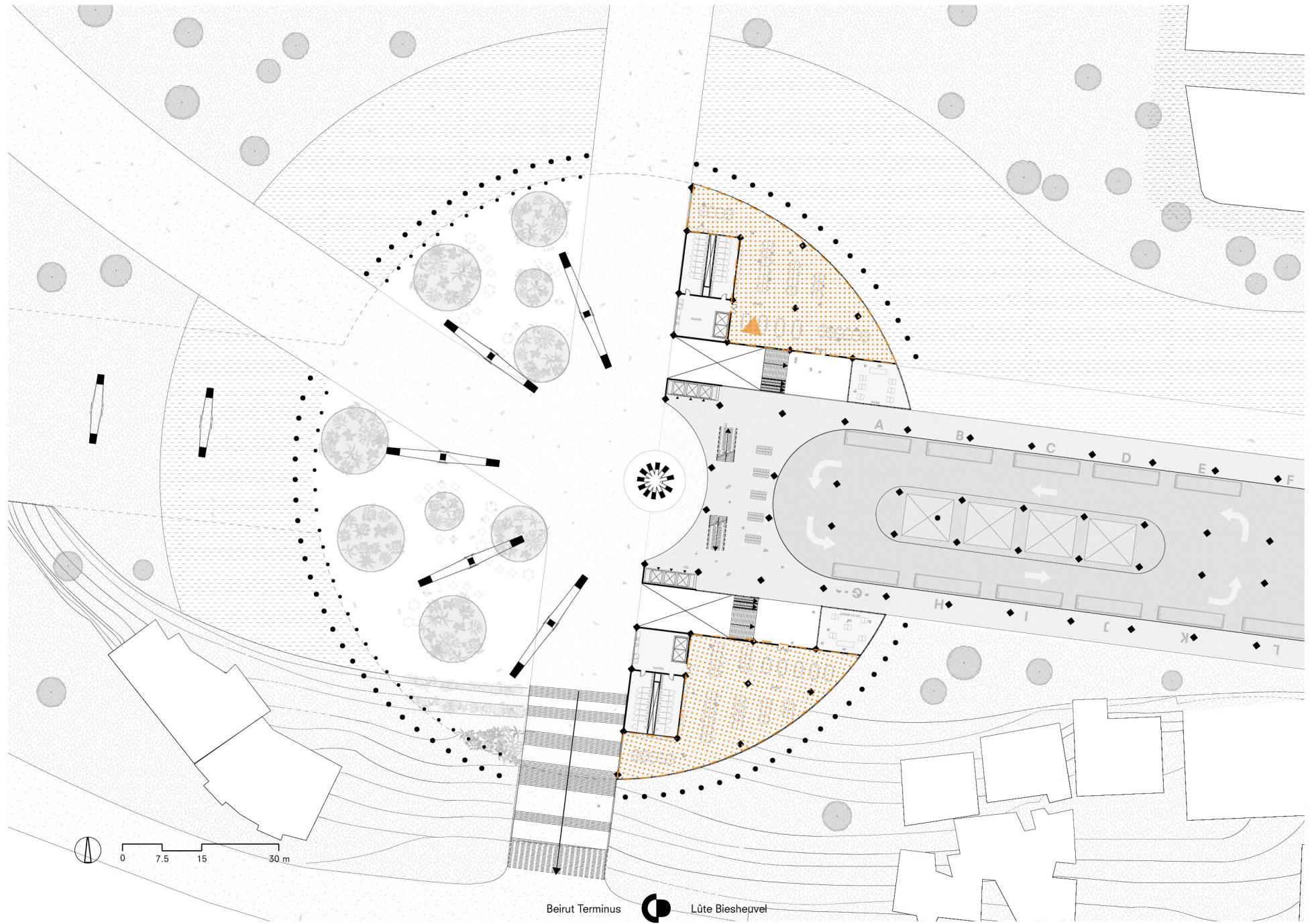
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## FLOOR PLAN LEVEL 3



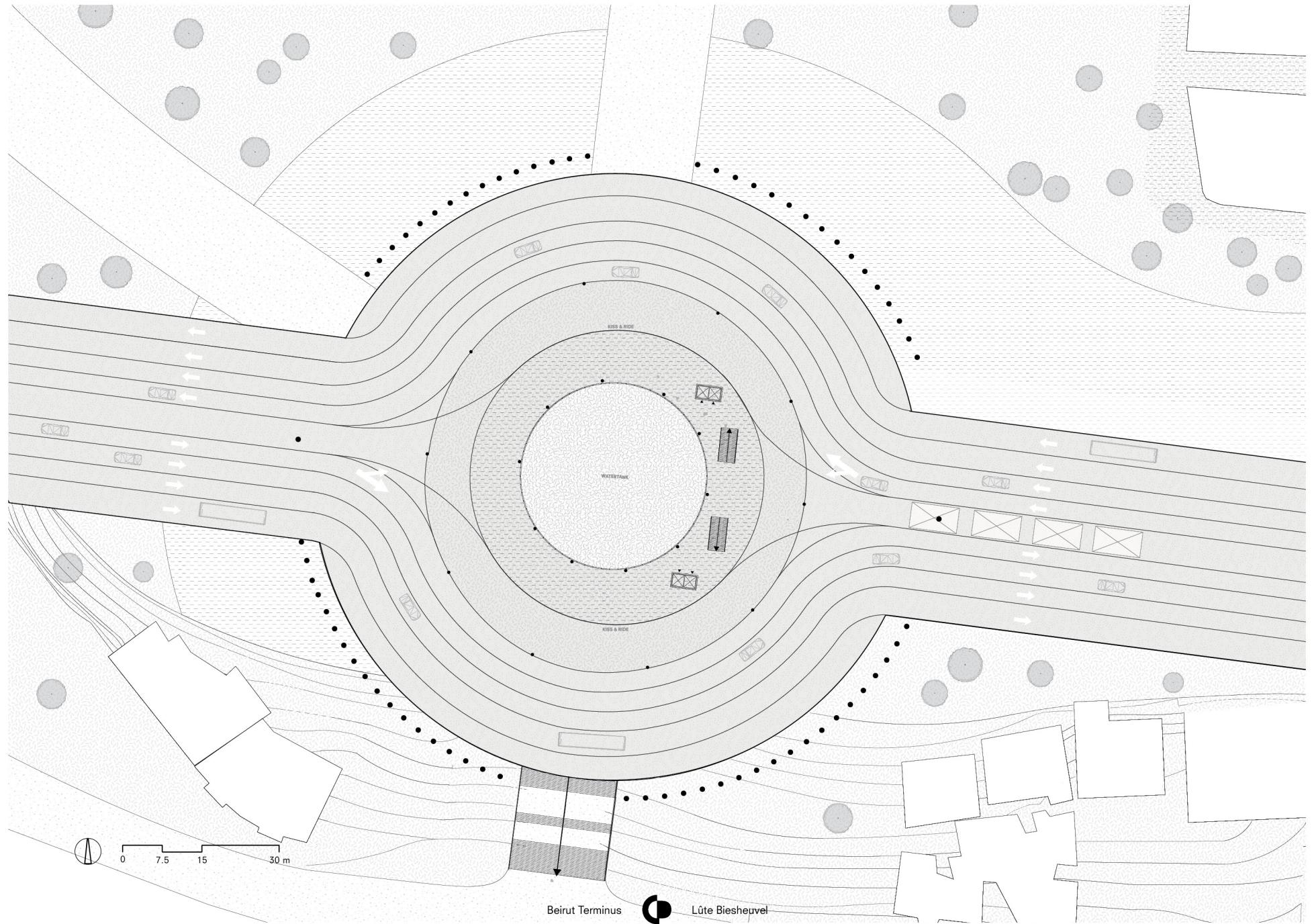
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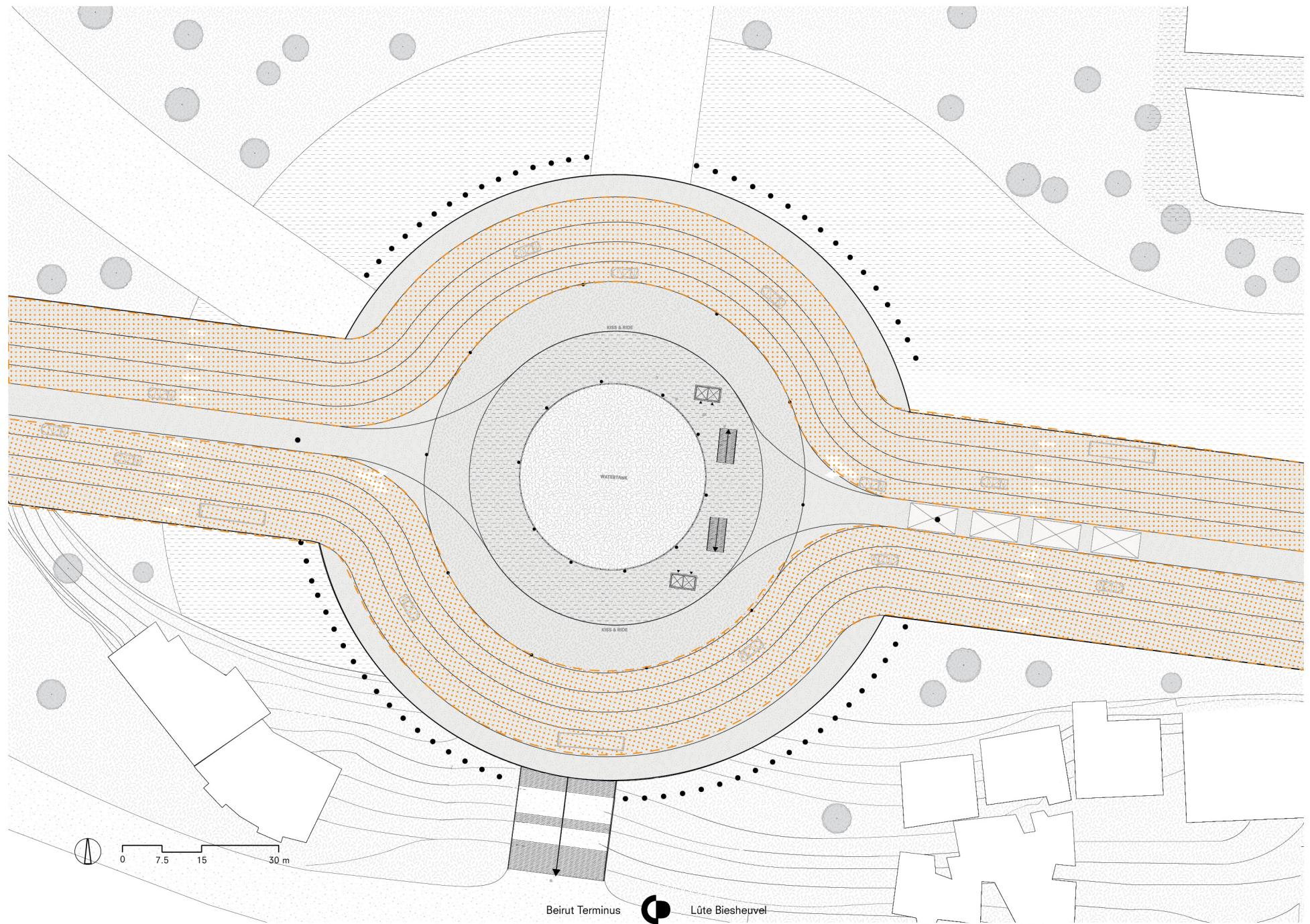
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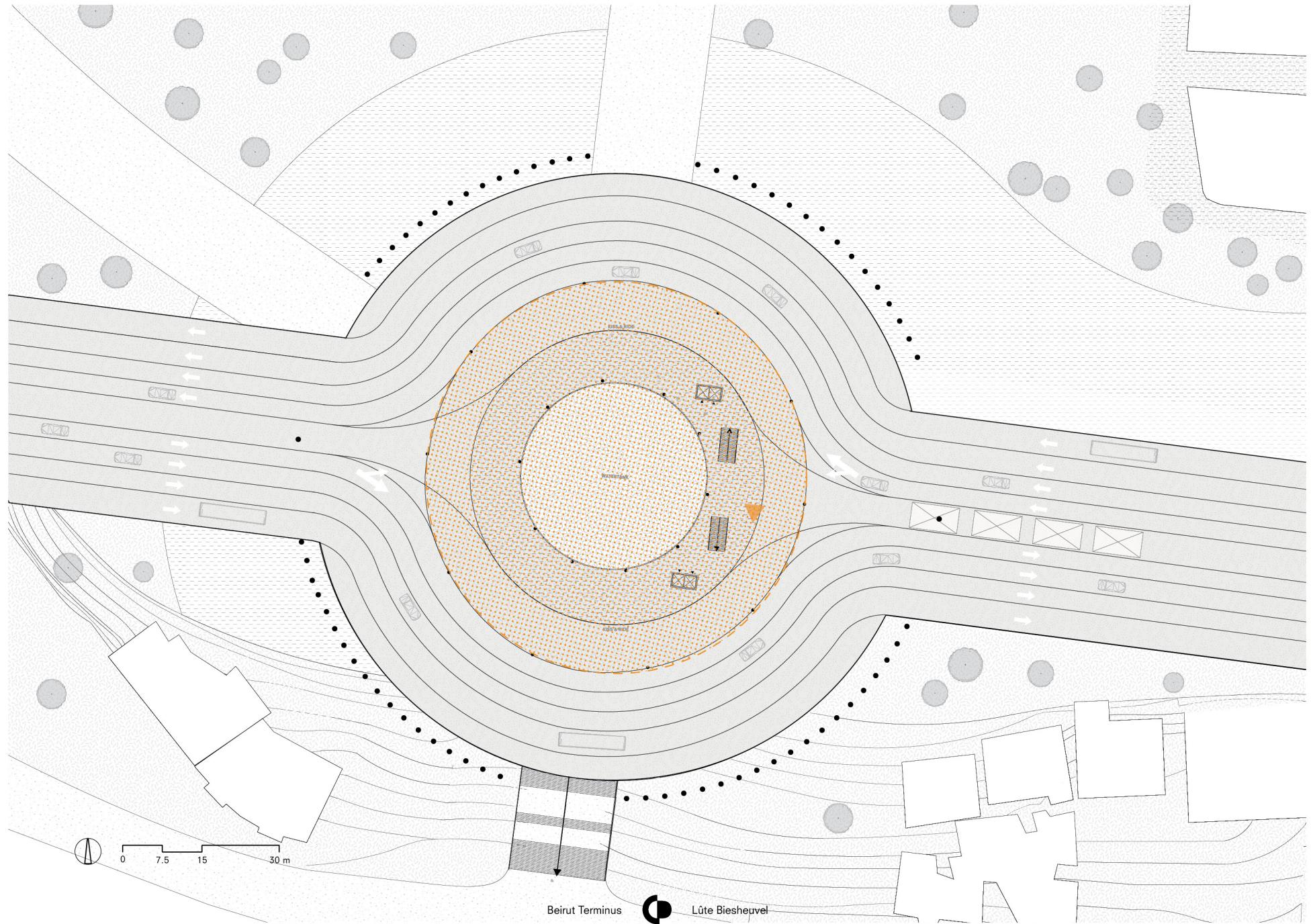
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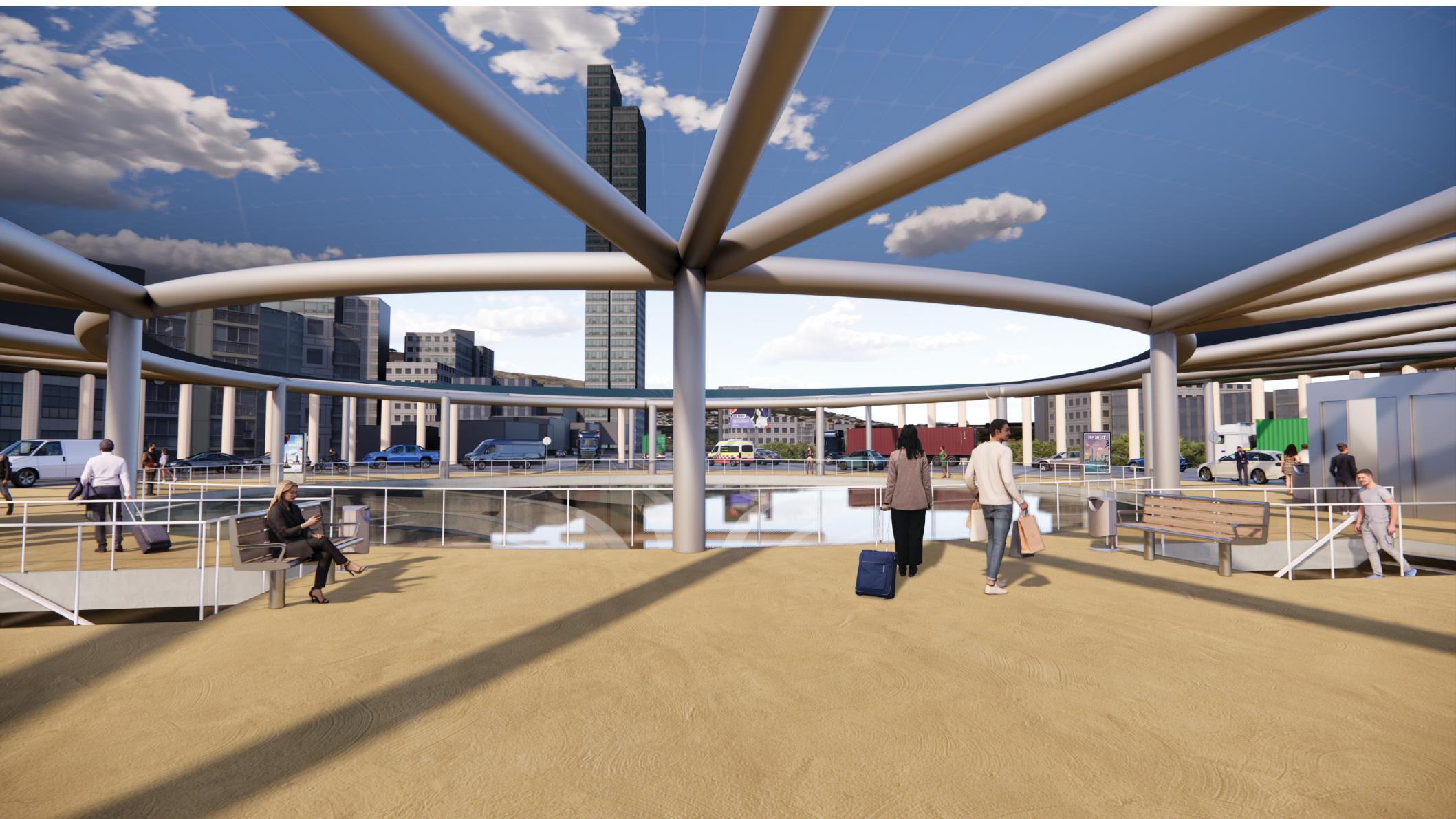
## FLOOR PLAN LEVEL 4



## FLOOR PLAN LEVEL 4



2030



# **CLIMATE & SUSTAINABILITY DESIGN**



## CLIMATE & SUSTAINABILITY CONCEPTS



SHADING CANOPY

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SHADING CANOPY



EVAPORATIVE COOLING THROUGH  
INTEGRATED VEGETATION

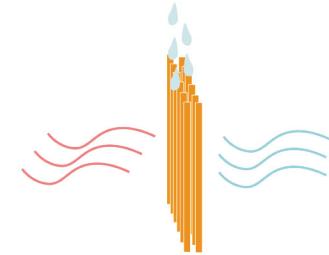
## CLIMATE & SUSTAINABILITY CONCEPTS



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INTEGRATED VEGETATION



EVAPORATIVE COOLING  
THROUGH 'FAÇADE'

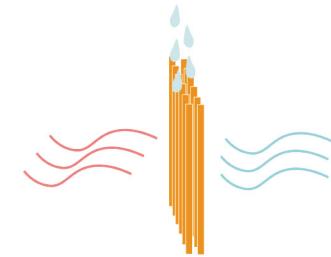
## CLIMATE & SUSTAINABILITY CONCEPTS



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EVAPORATIVE COOLING  
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HARVESTING RAINWATER

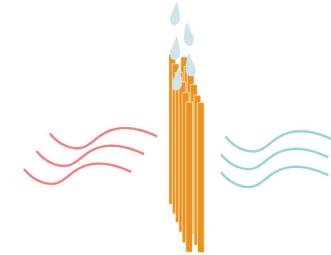
## CLIMATE & SUSTAINABILITY CONCEPTS



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HARVESTING RAINWATER



NET POSITIVE

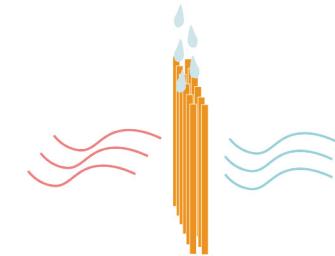
## CLIMATE & SUSTAINABILITY CONCEPTS



SHADING CANOPY



EVAPORATIVE COOLING THROUGH  
INTEGRATED VEGETATION



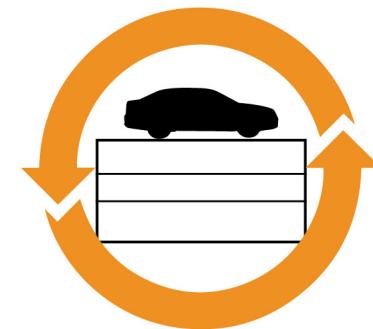
EVAPORATIVE COOLING  
THROUGH 'FAÇADE'



HARVESTING RAINWATER



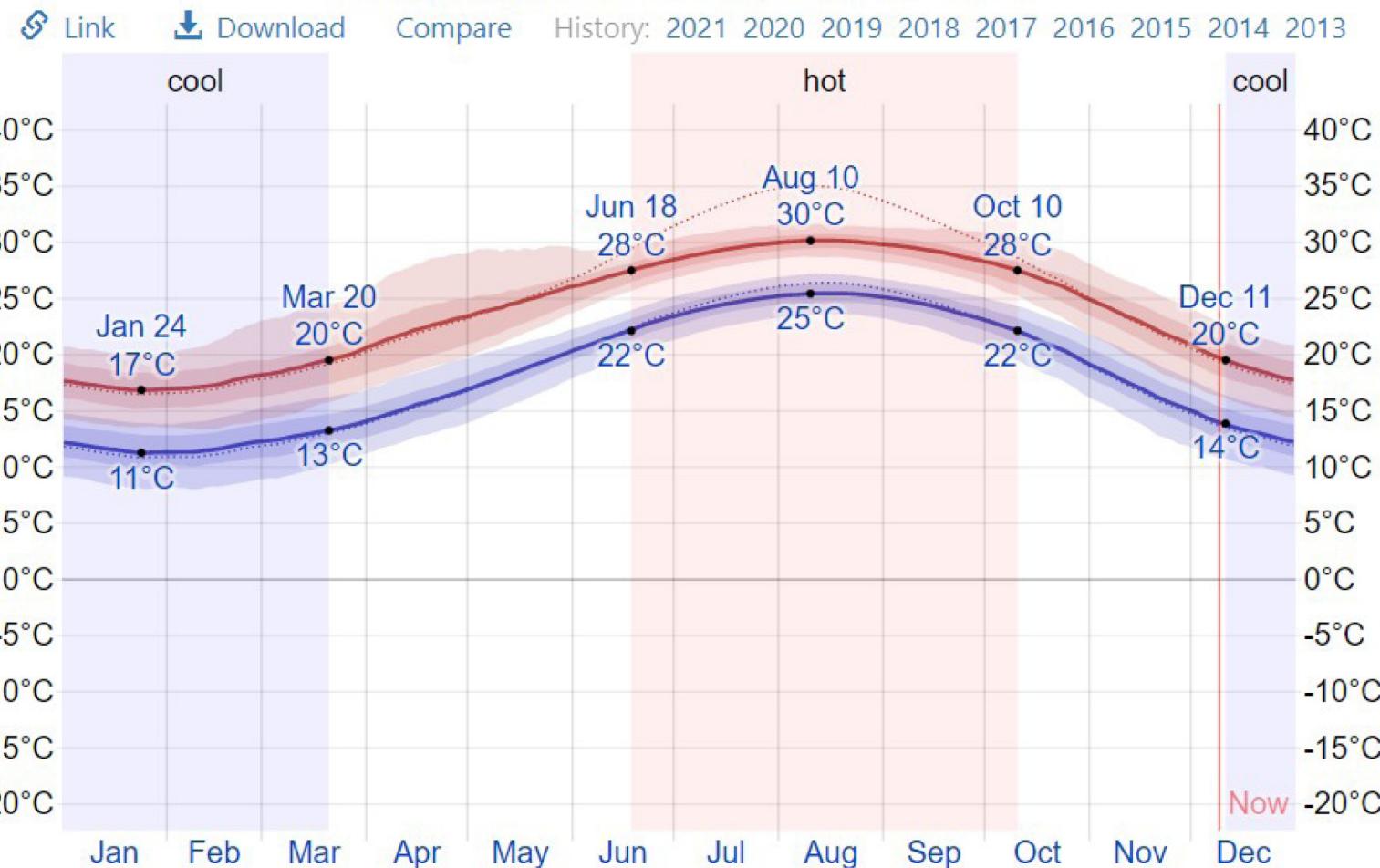
NET POSITIVE



REUSING CHARLES HELOU

# CLIMATE IN BEIRUT

## Average High and Low Temperature in Beirut

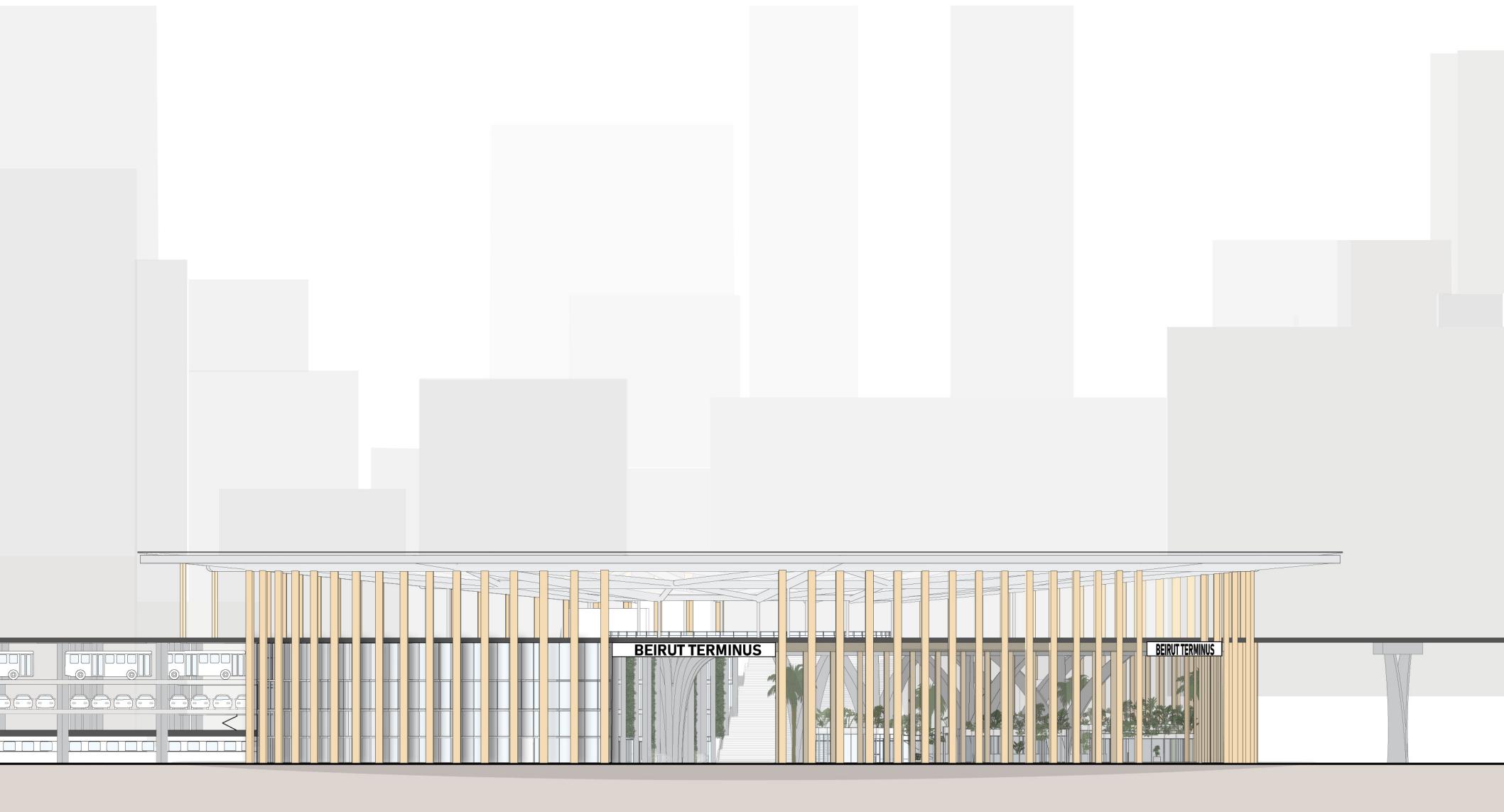


# EVAPORATIVE COOLING



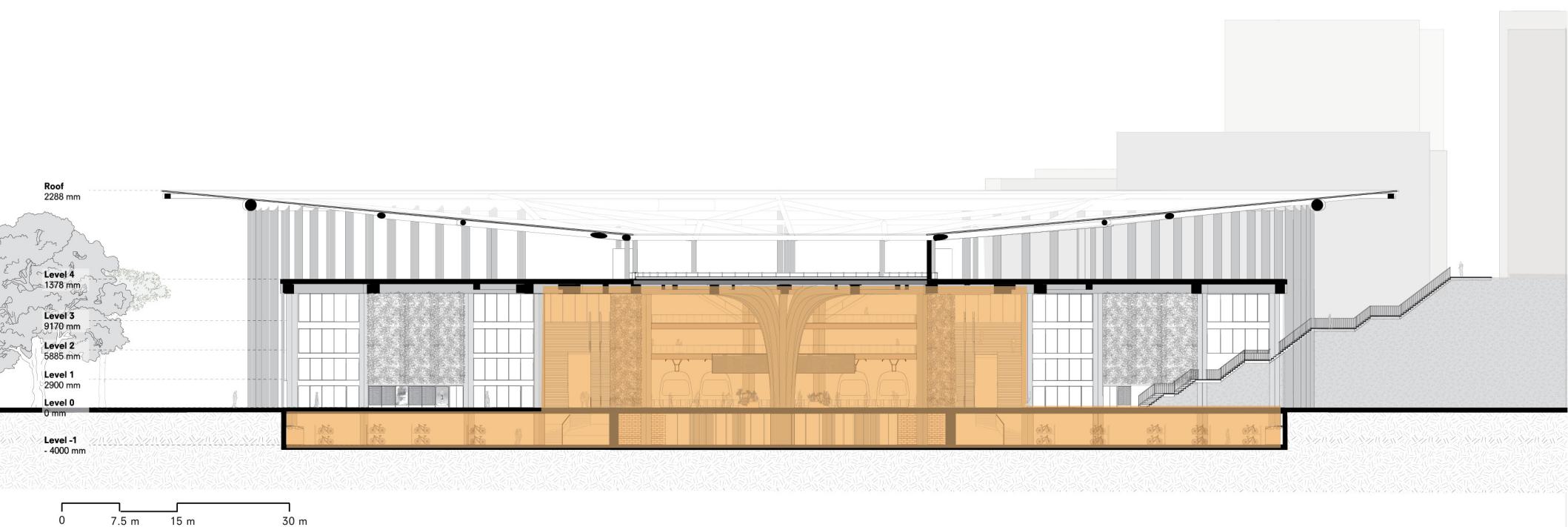
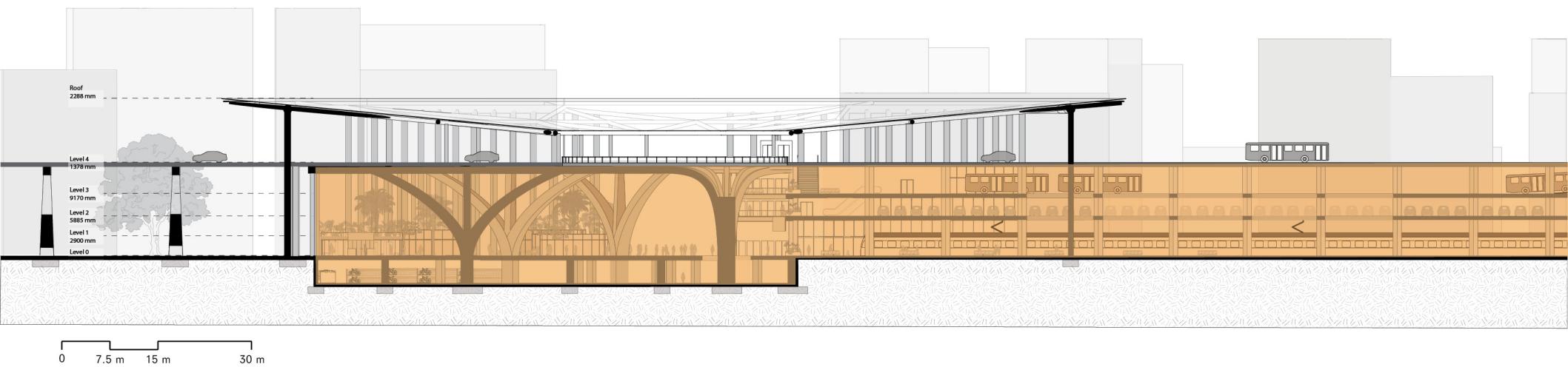
0      7.5 m      15 m      30 m

# EVAPORATIVE COOLING

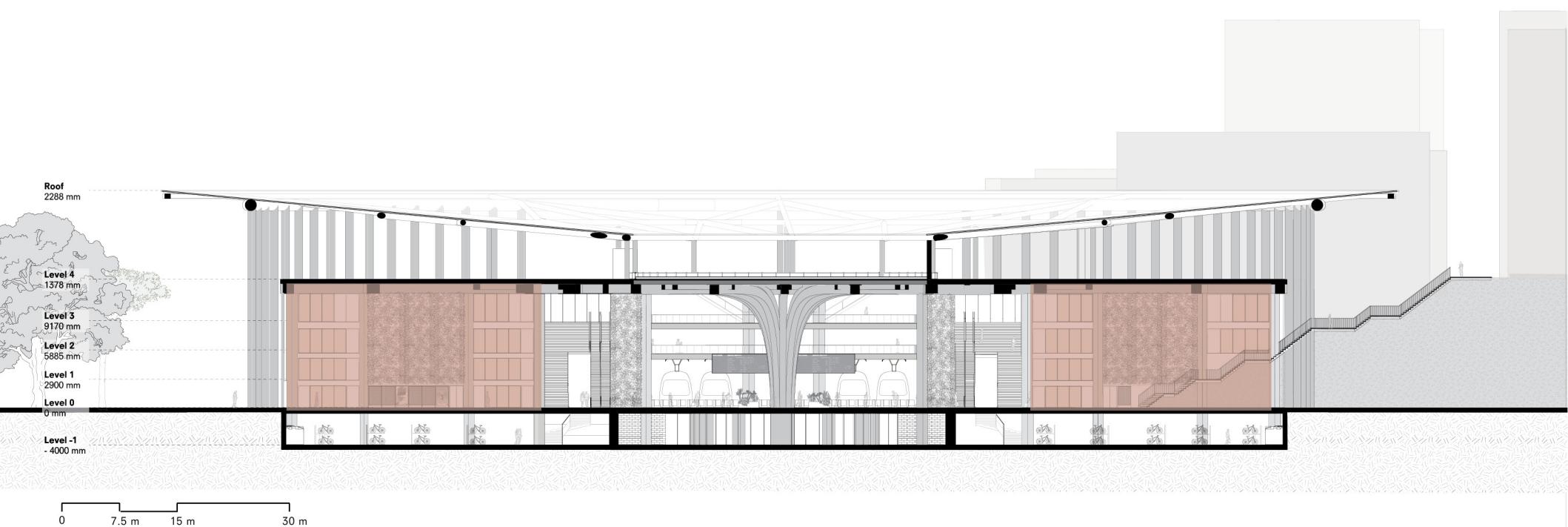
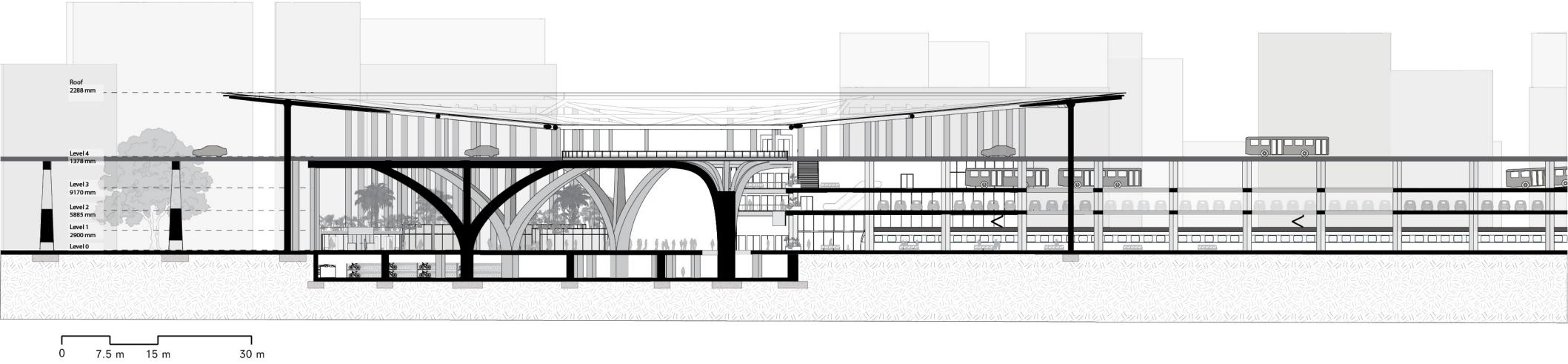


0 7.5 m 15 m 30 m

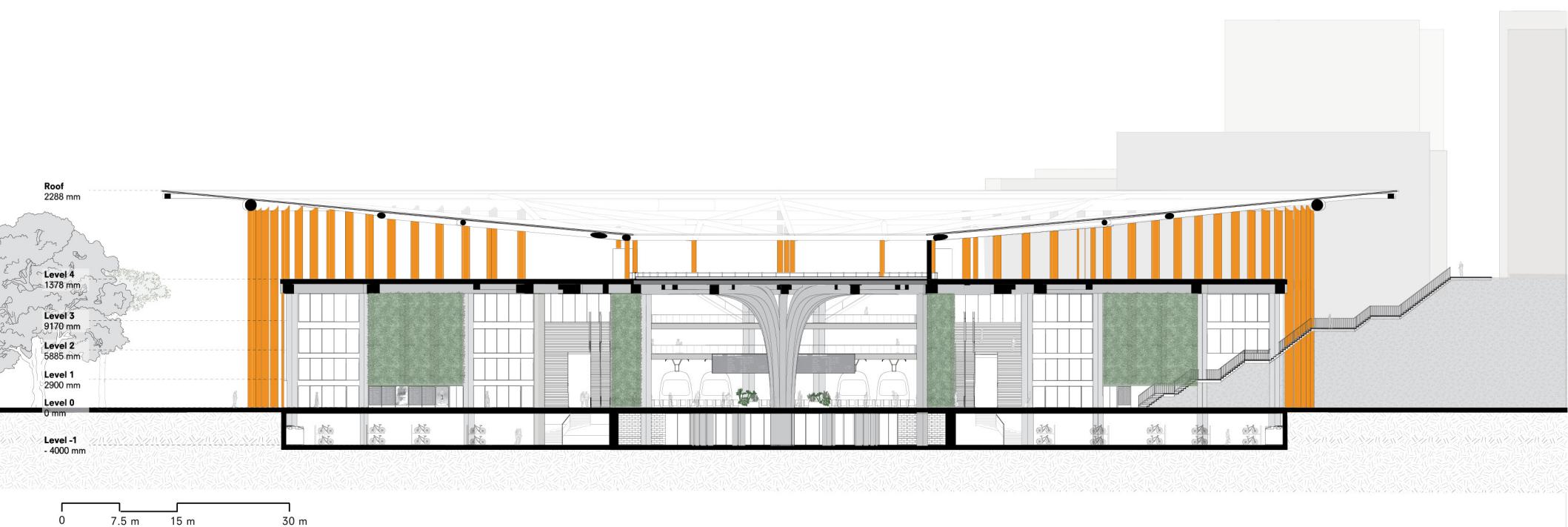
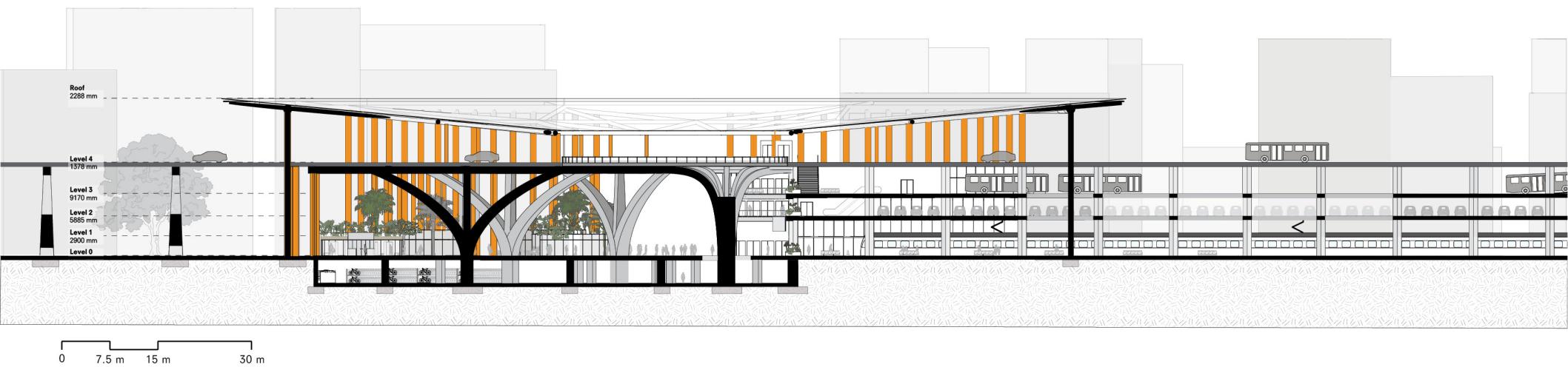
## NON - CLIMATIZED ZONES



## CLIMATIZED ZONES



# EVAPORATIVE COOLING



## COOLING COLUMNS



Spanish Pavilion Expo Zaragoza 2008 / Francisco Mangado

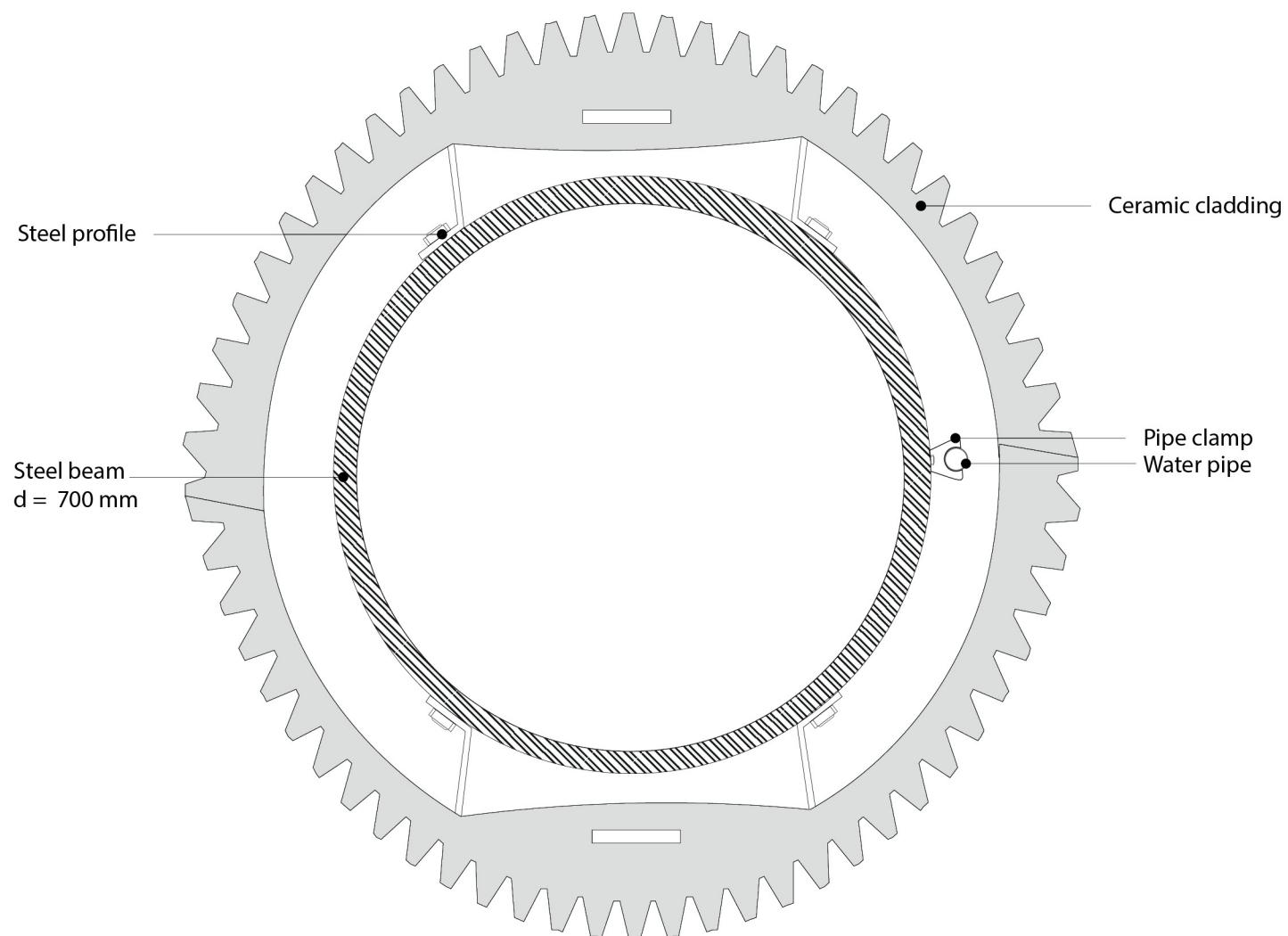


## COOLING COLUMNS



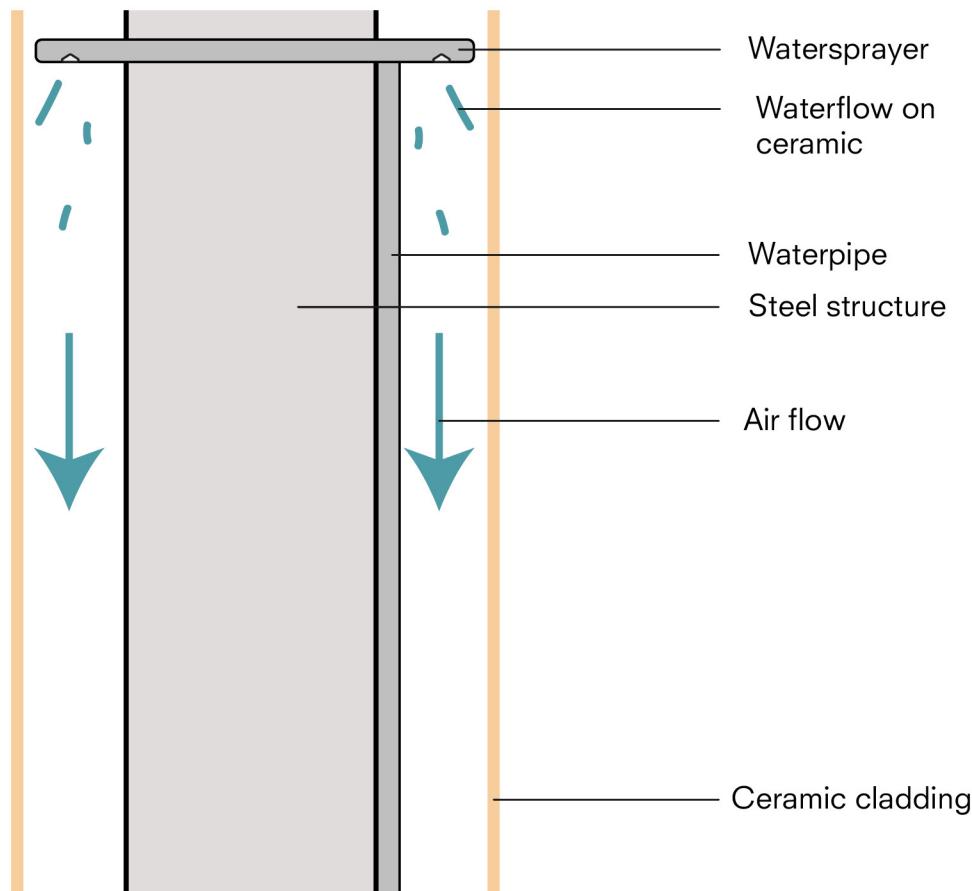
**LOCAL TEMPERATURE DROP:  
6 DEGREES CELSIUS**

## COOLING COLUMN DETAIL 1:5



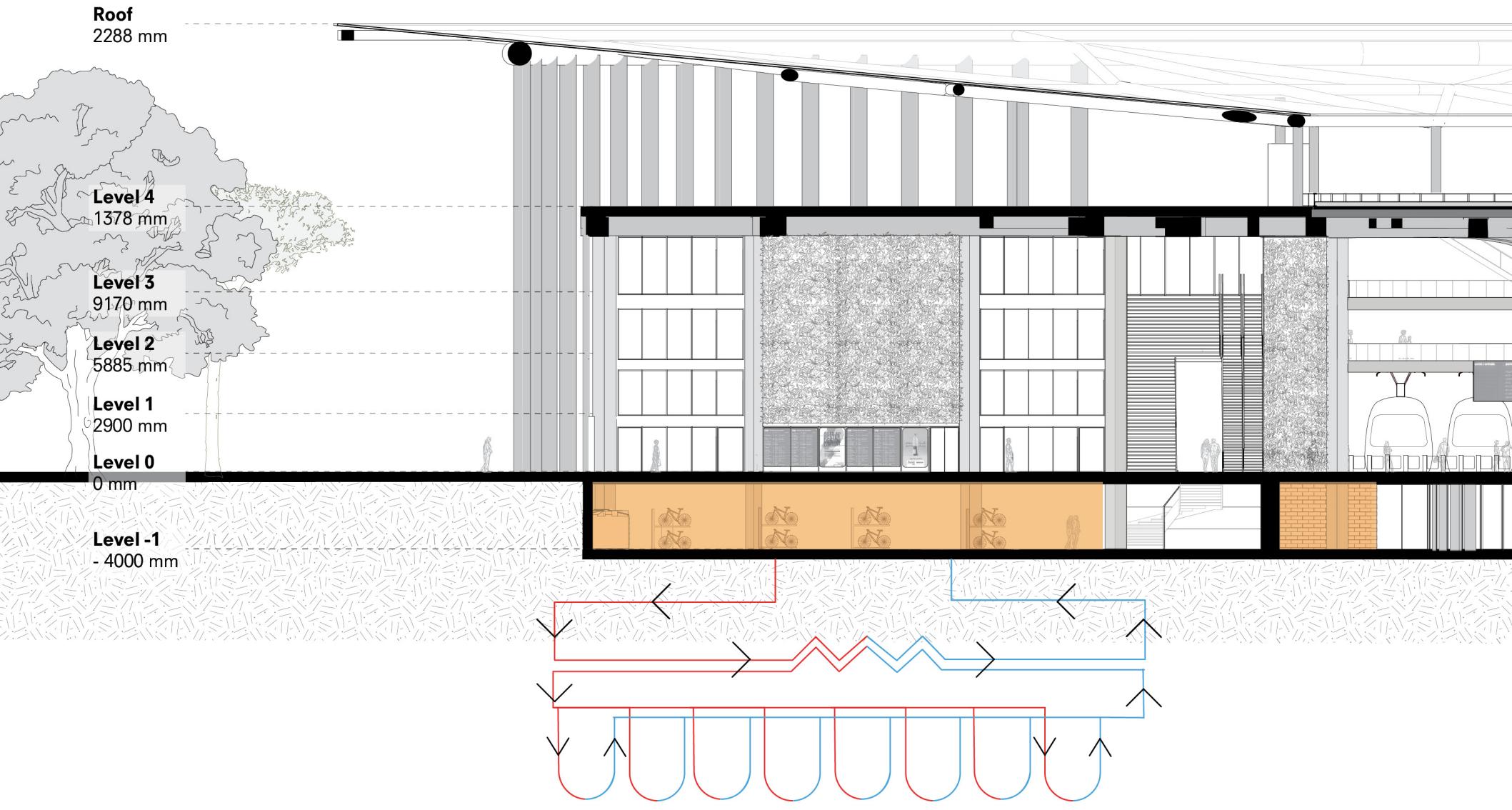
0 125mm 250mm 500mm

## COOLING COLUMN SYSTEM



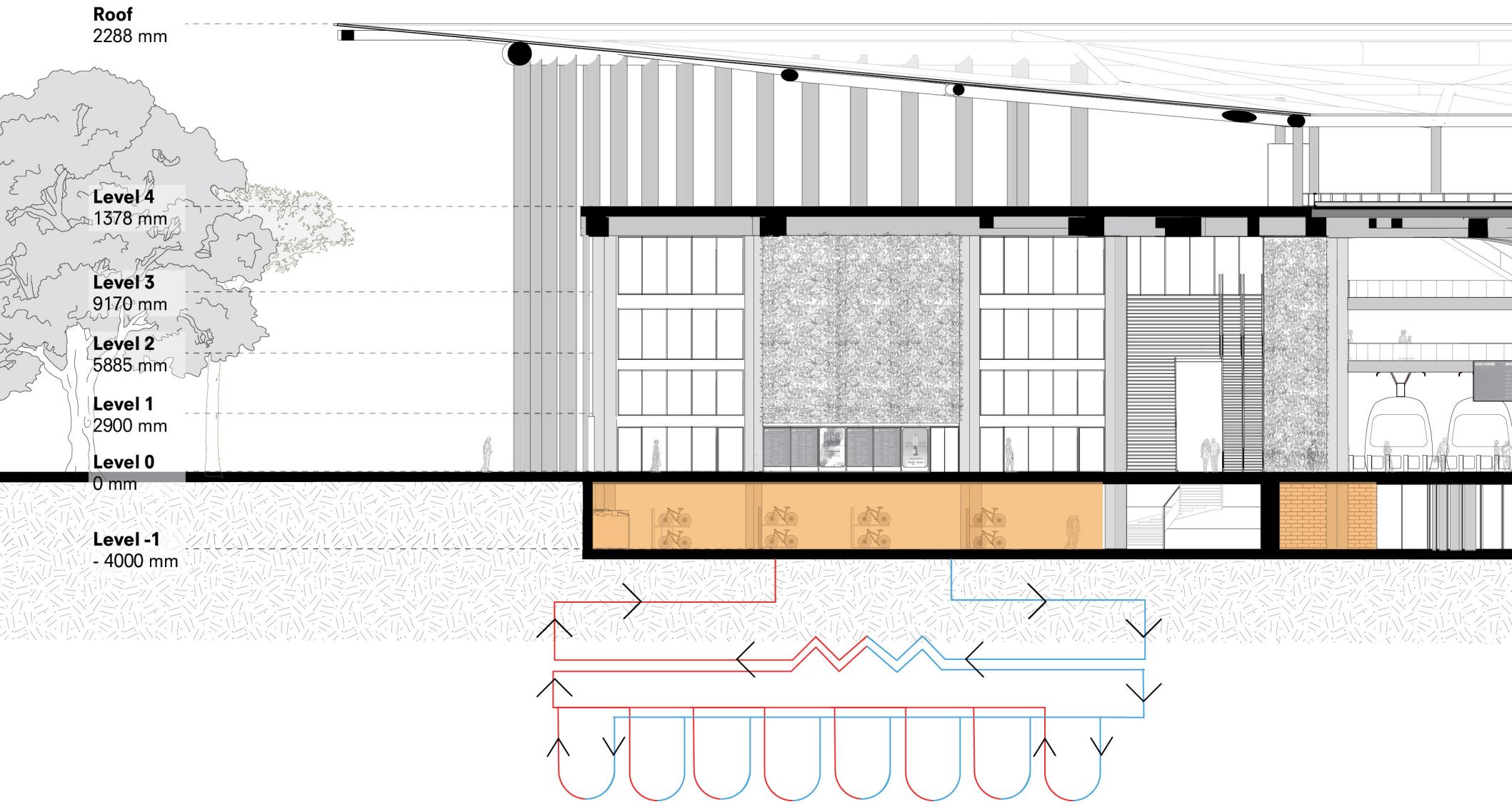
# HEATING AND COOLING OF OFFICES

SUMMER

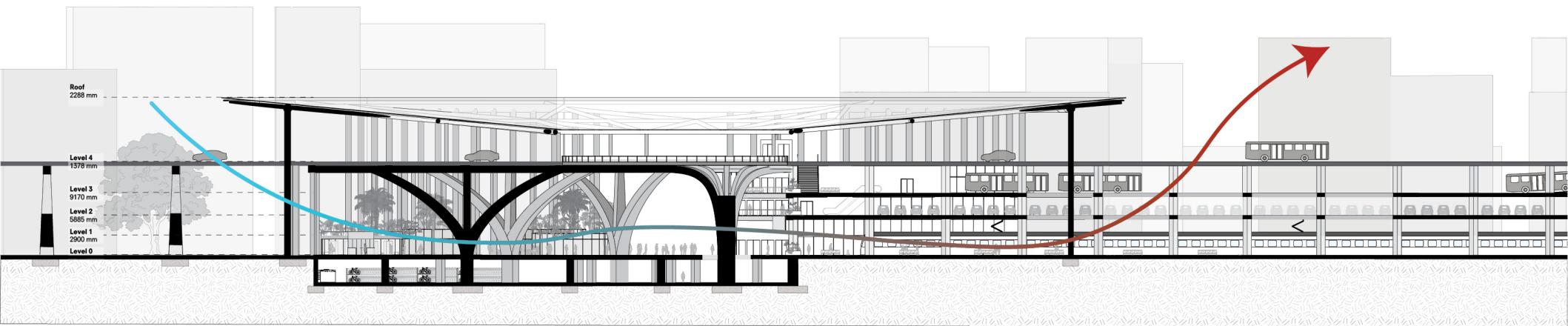


# HEATING AND COOLING OF OFFICES

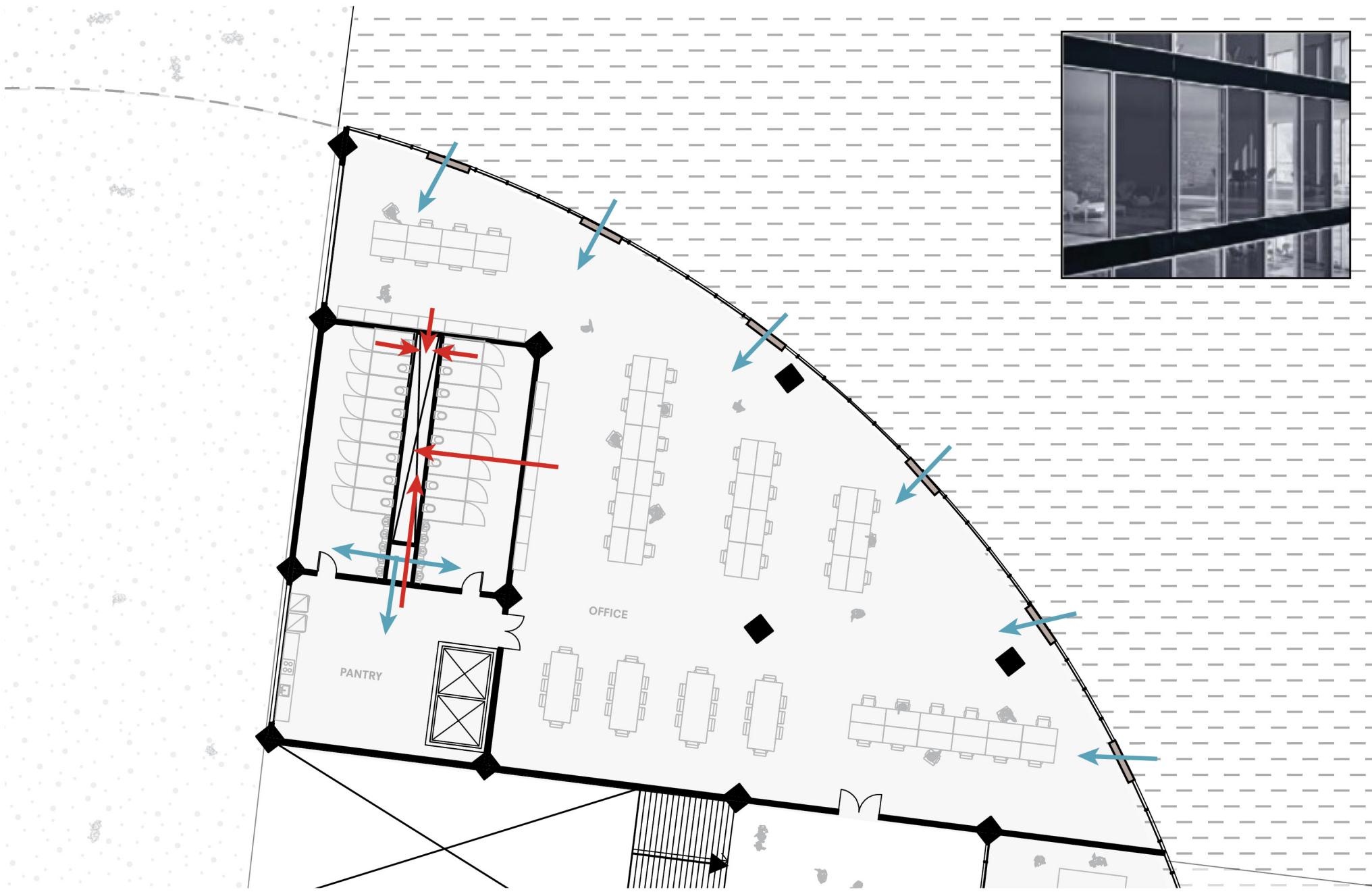
WINTER



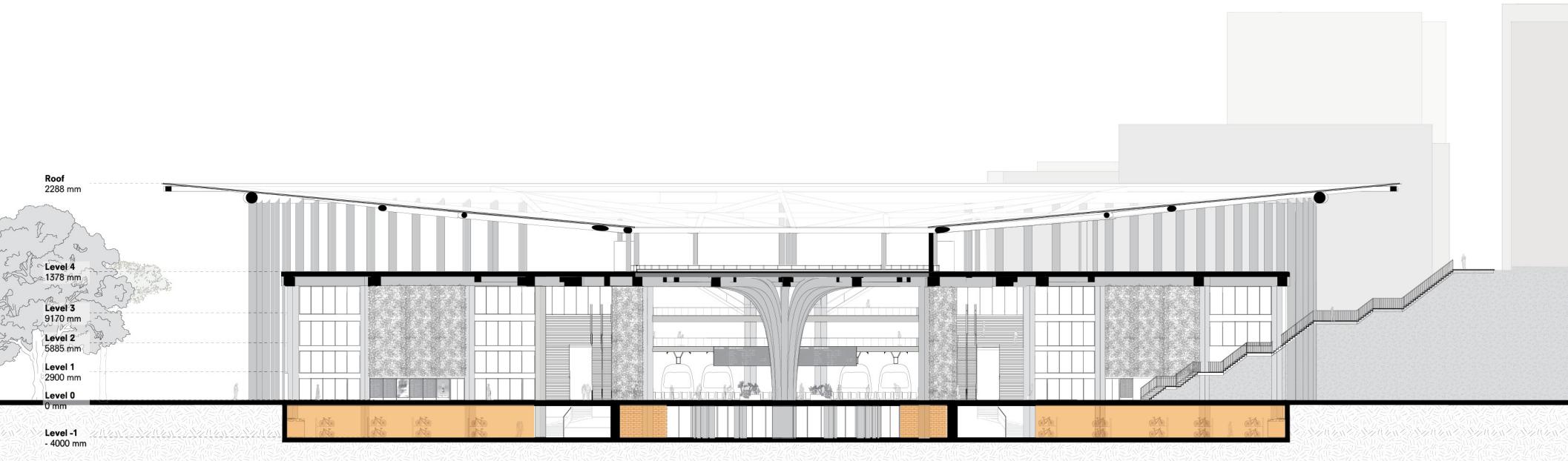
# NATURAL VENTILATION



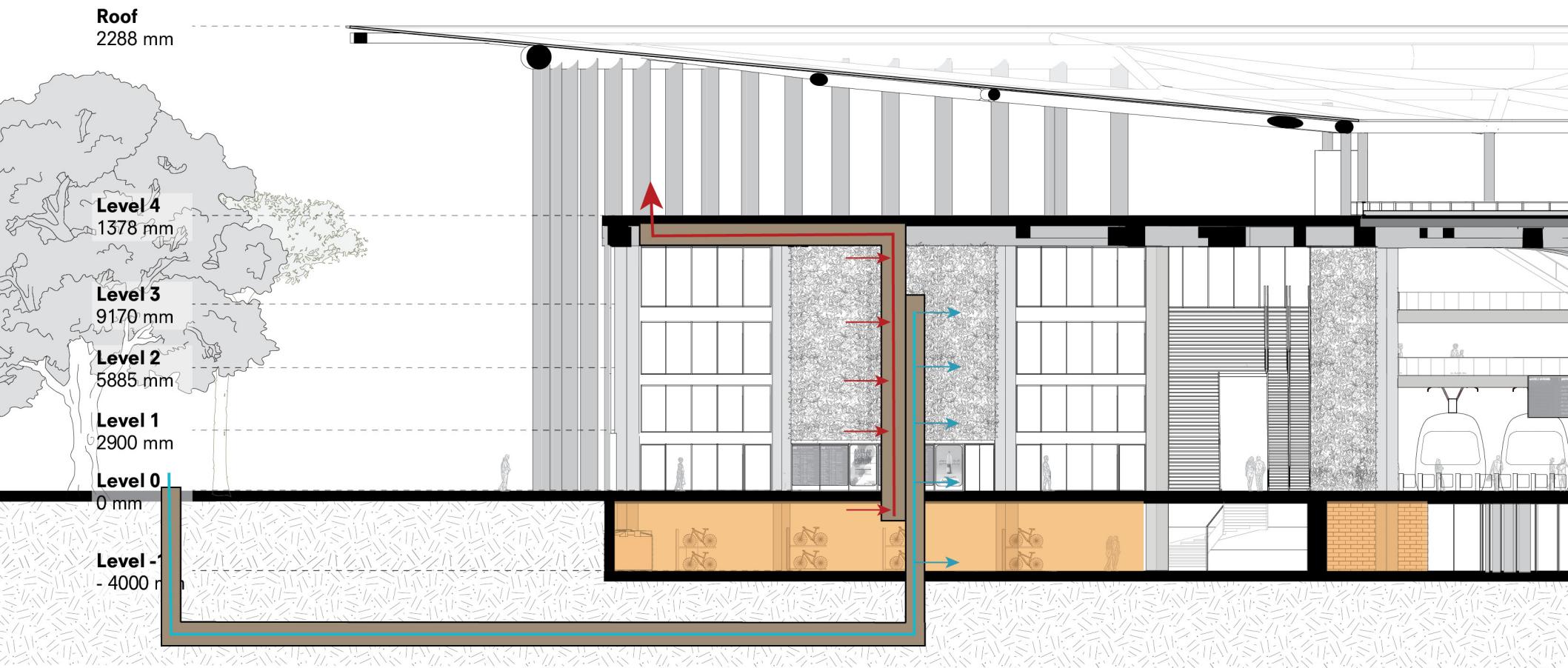
## HYBRID VENTILATION OFFICES



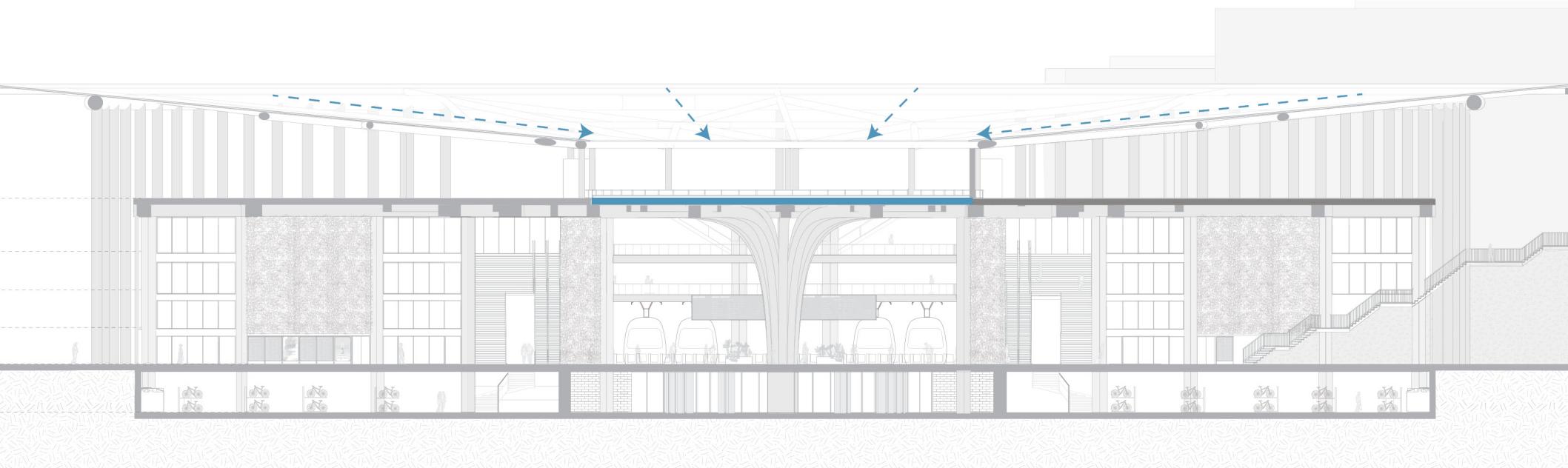
# TECHNICAL ROOMS



## CENTRALIZED VENTILATION SERVICE ROOMS



# WATER

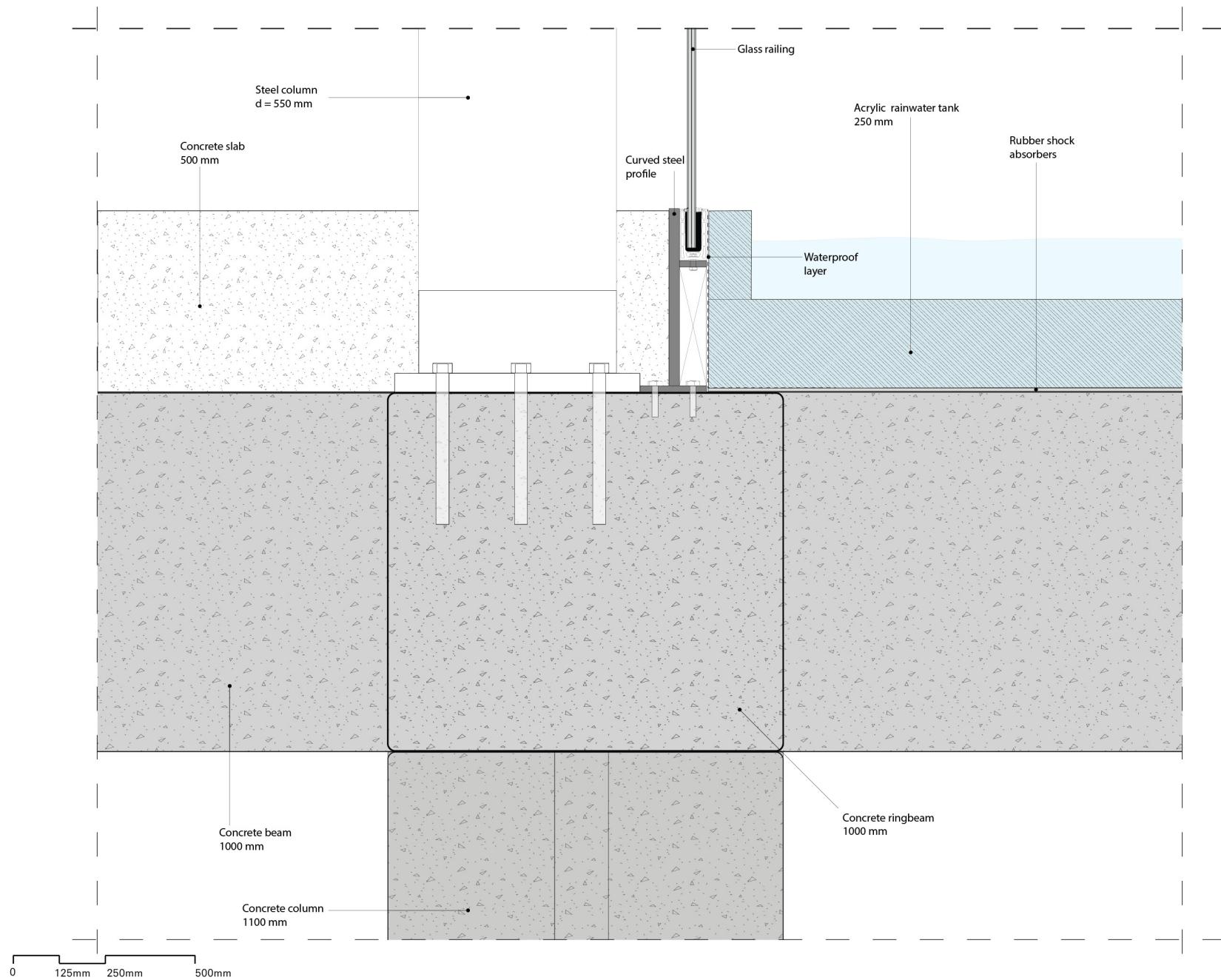


**8,600,000 LITRES WATER A YEAR**

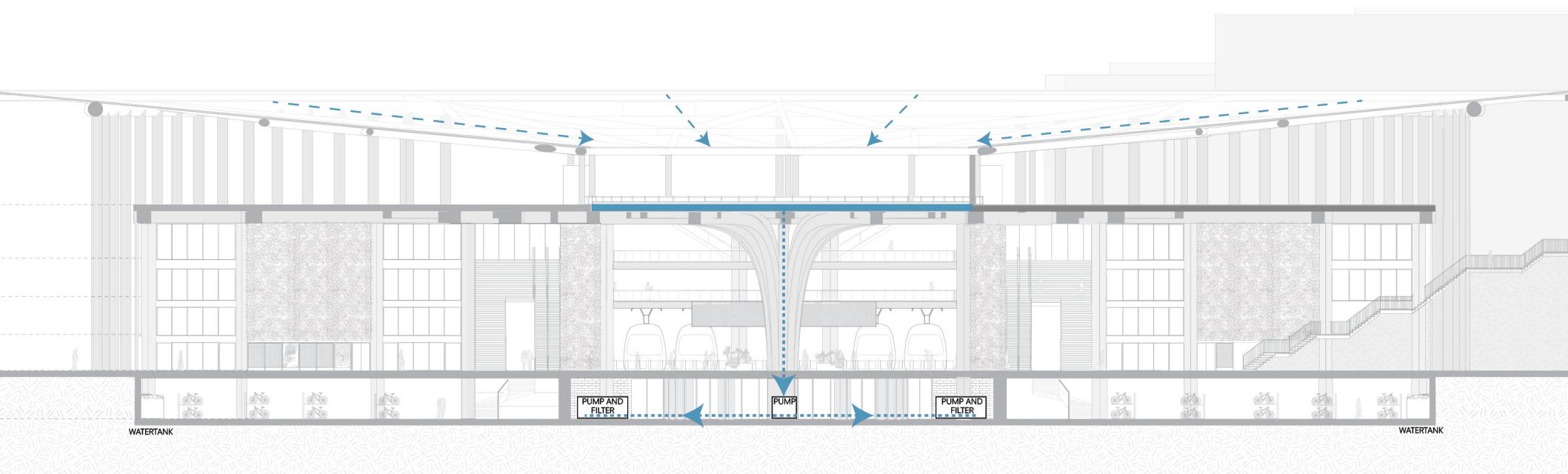


\* based on 600 people flushing 4 times a day

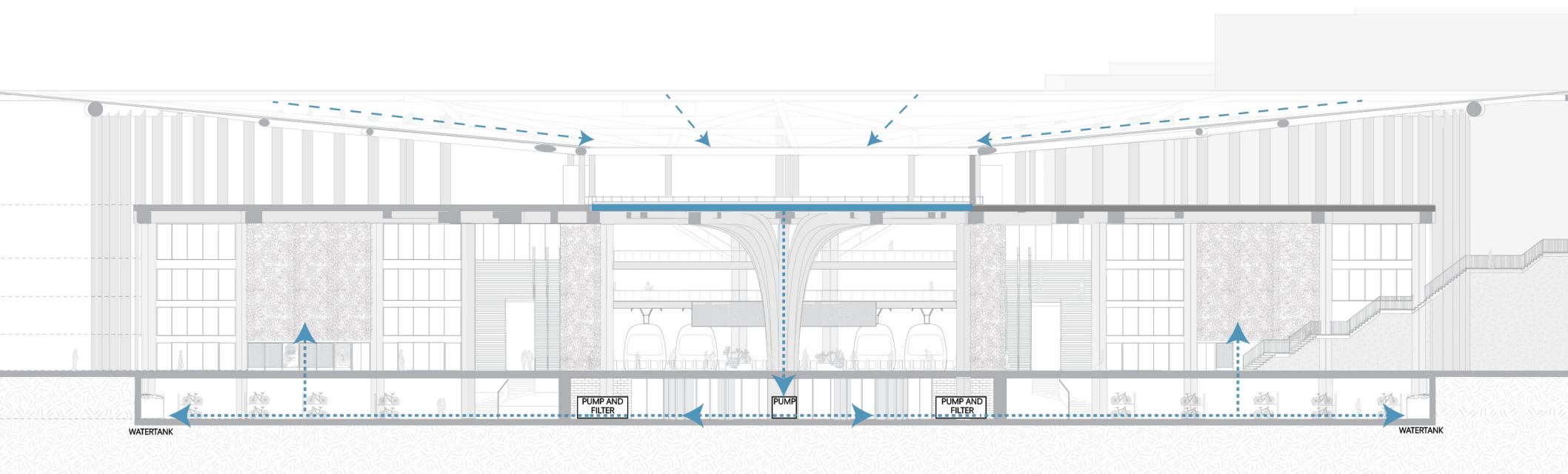
## DETAIL ROOF / ROAD 1:5



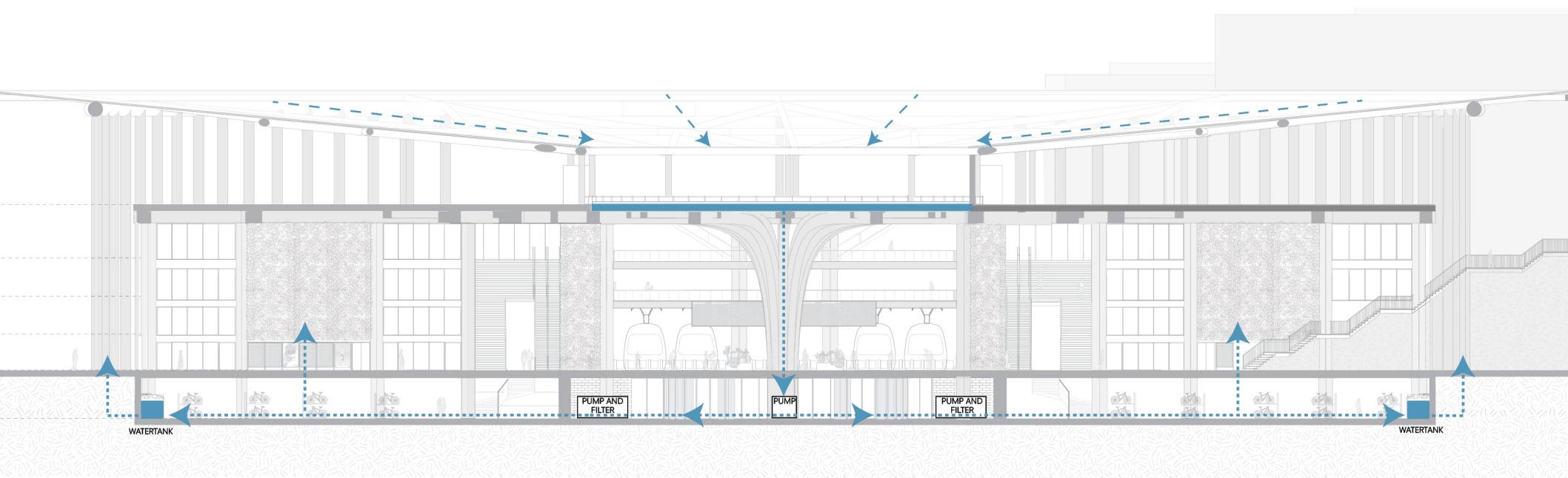
# WATER

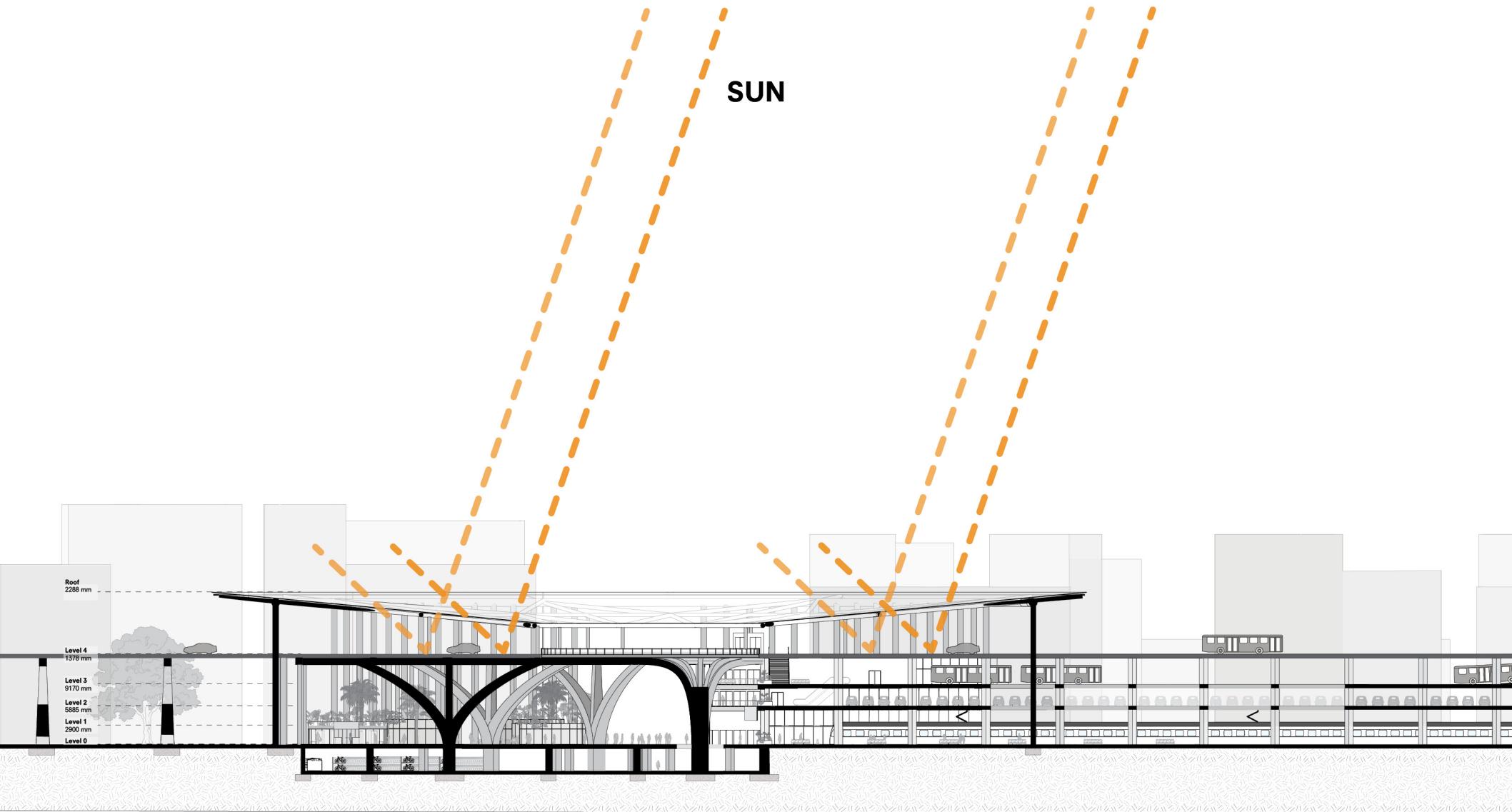


# WATER

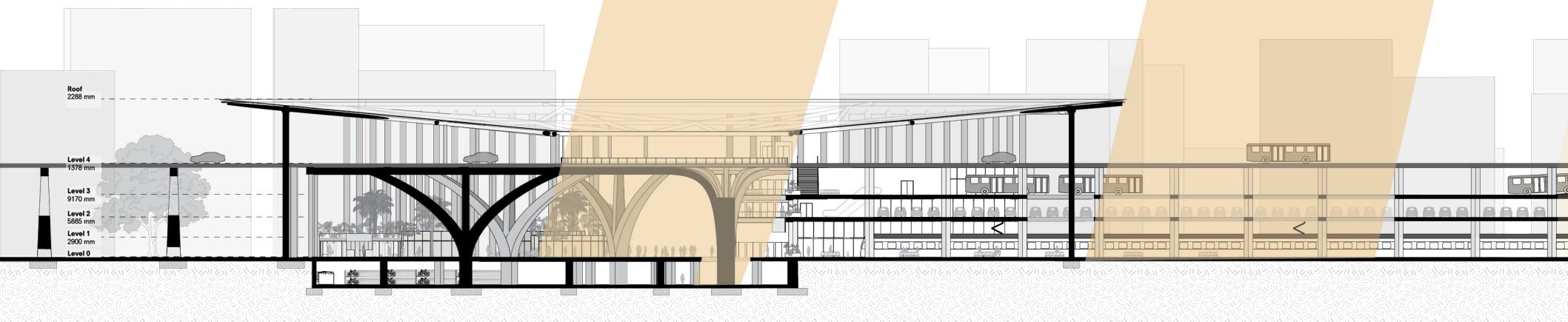


# WATER

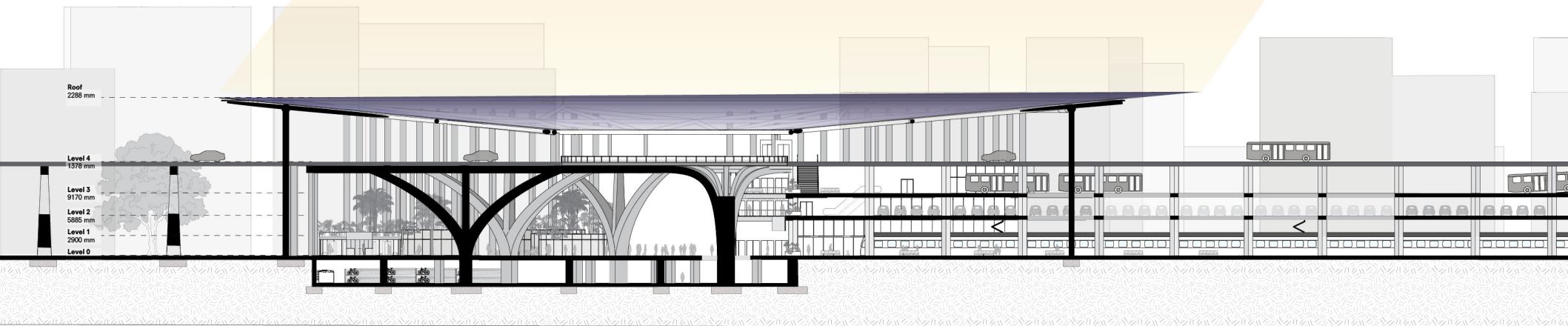




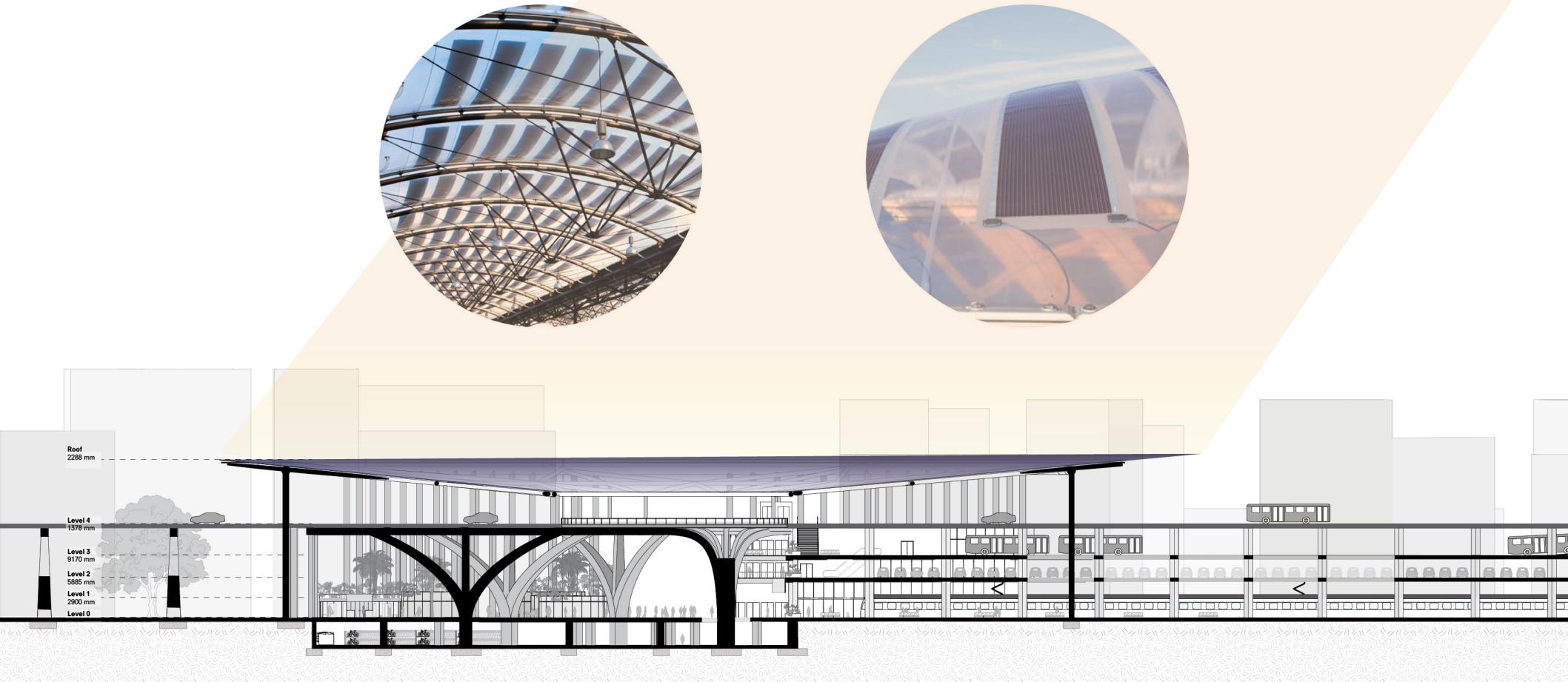
# SKYLIGHT



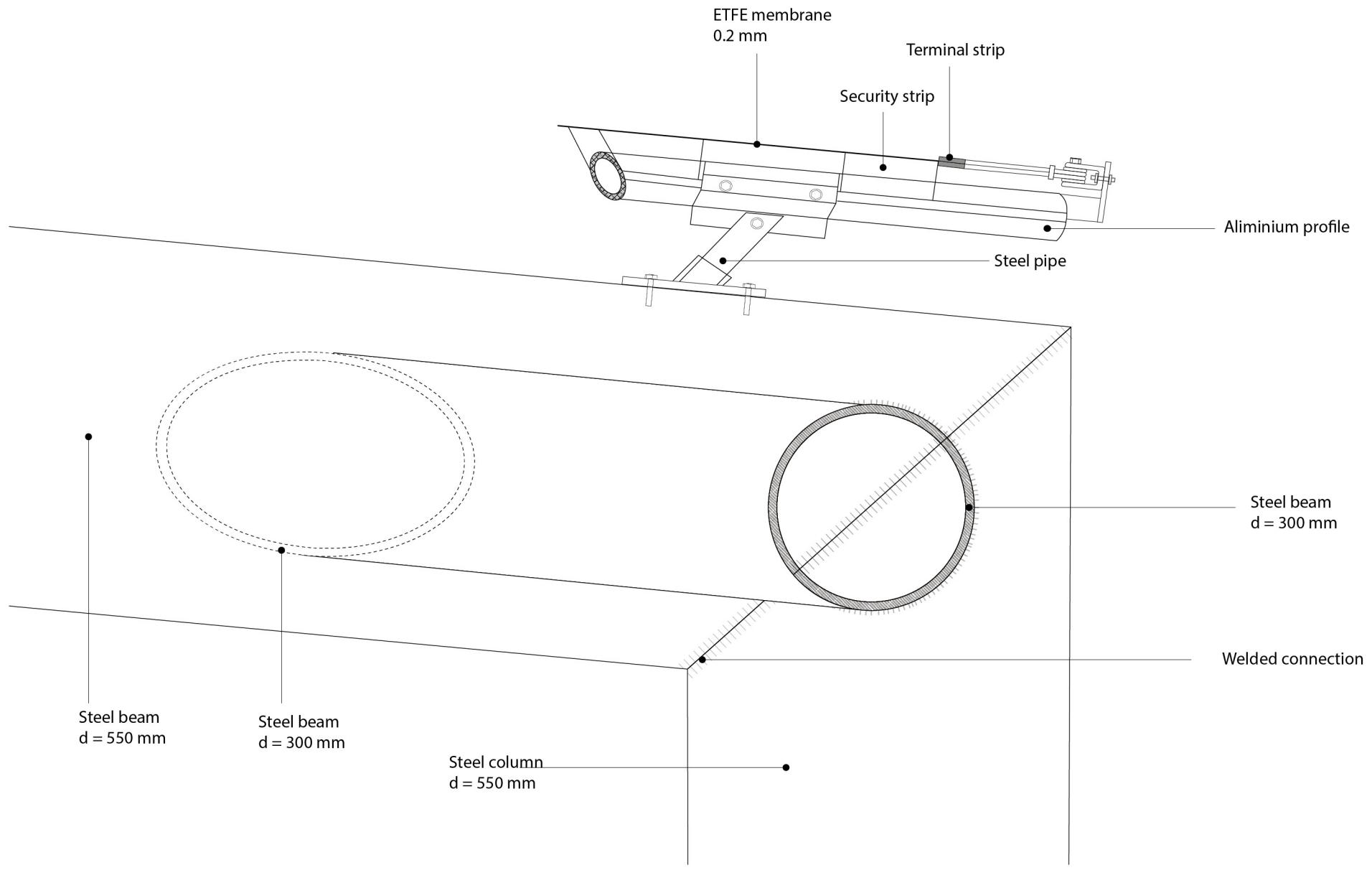
# RENEWABLE ENERGY



## RENEWABLE ENERGY

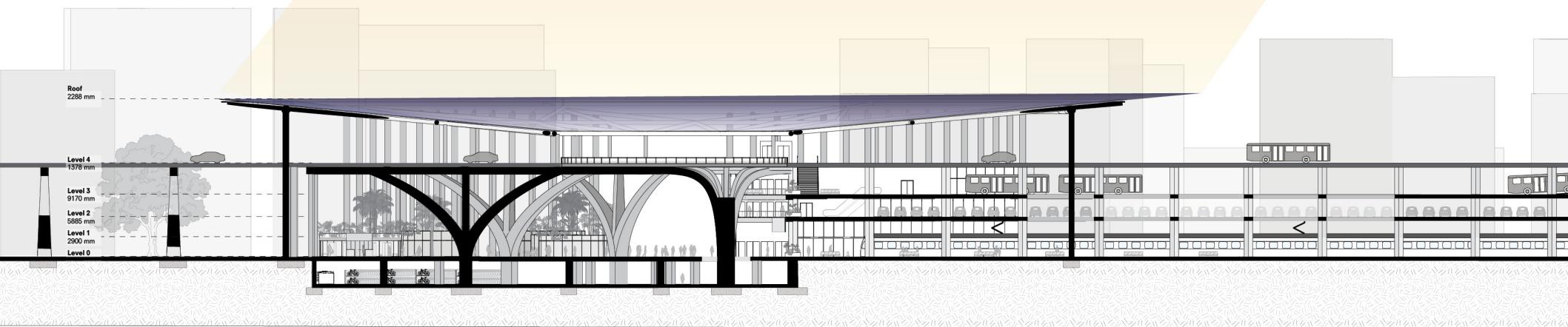


## DETAIL SECOND ROOF 1:5



0 125mm 250mm 500mm

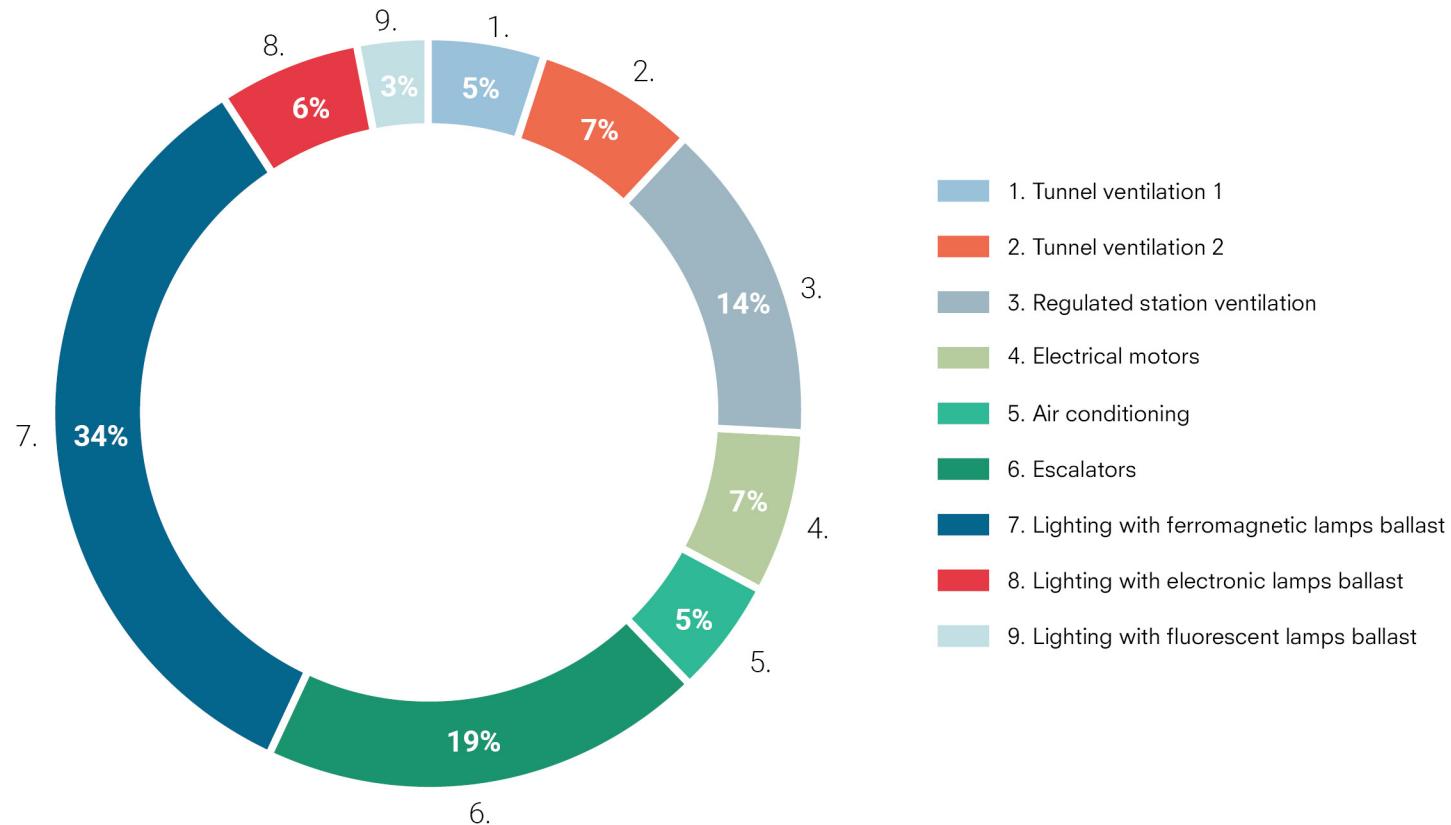
## RENEWABLE ENERGY



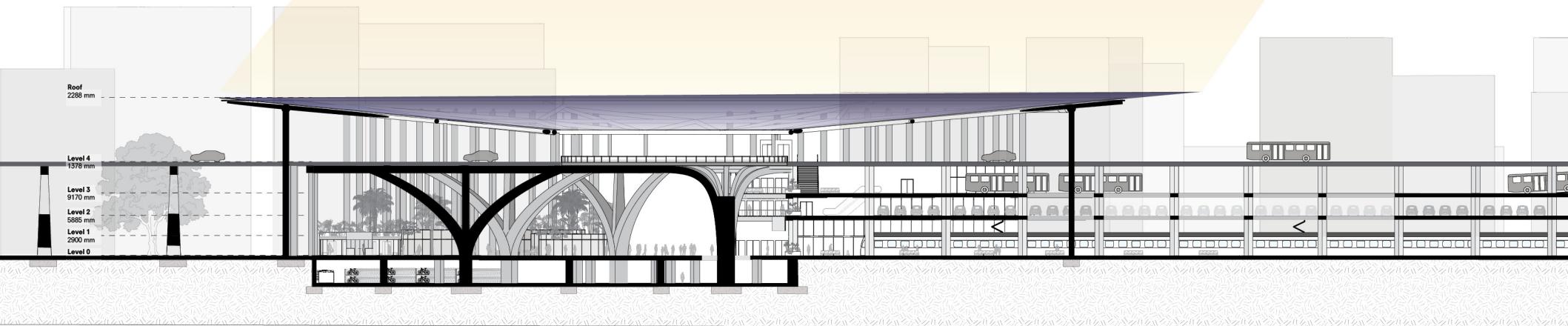
SOLAR ENERGY PRODUCTION PER YEAR: 700 MWH

# ENERGY USE STATIONS

Urban train station energy consumption



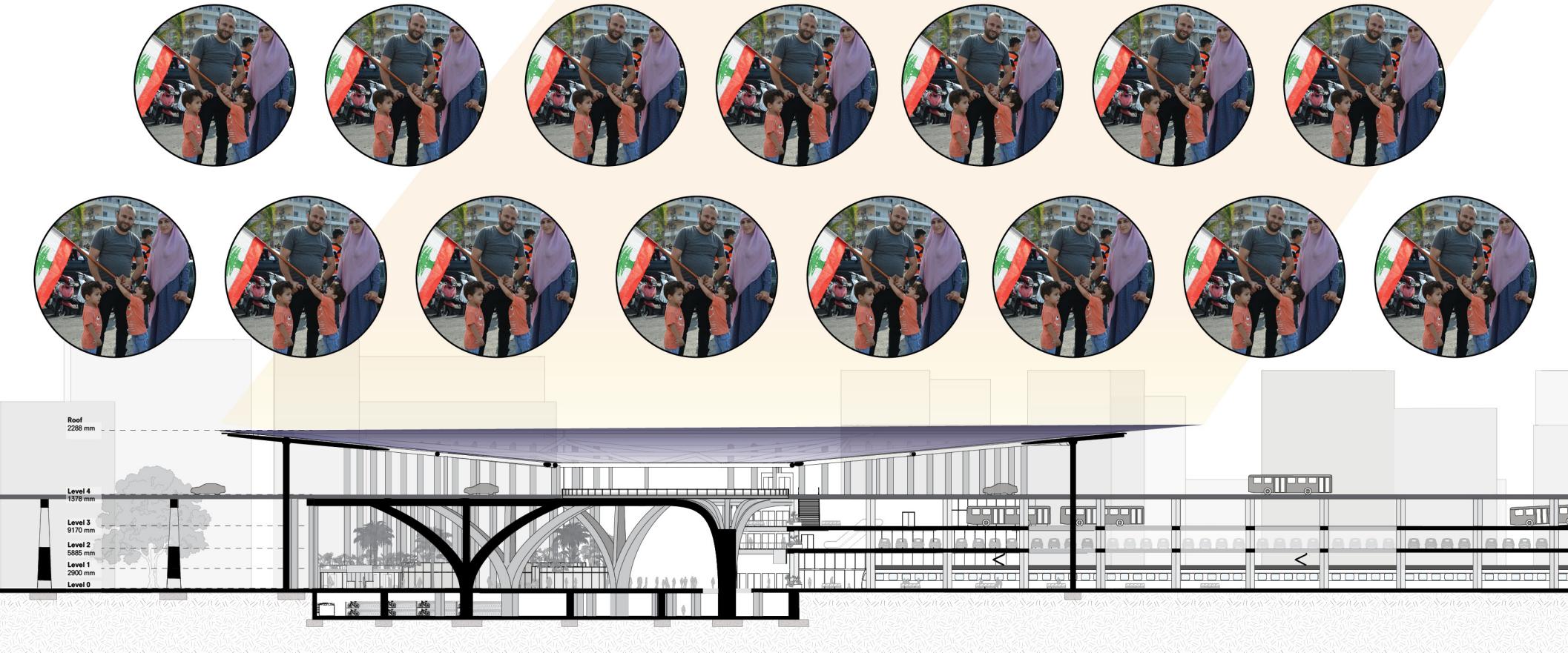
## RENEWABLE ENERGY



ESTIMATED ENERGY USE PER YEAR: 600 MWH \*  
ENERGY SURPLUS: 100 MWH \*\*

\* based on energy use of 3100 m<sup>2</sup> offices (400 mwh), escalators + elevators (150 mwh), lighting (50 mwh)  
\*\* which is equivalent to the yearly energy consumption of 15 Lebanese households.

## RENEWABLE ENERGY



ESTIMATED ENERGY USE PER YEAR: 600 MWH<sup>\*</sup>  
ENERGY SURPLUS: 100 MWH \*\*

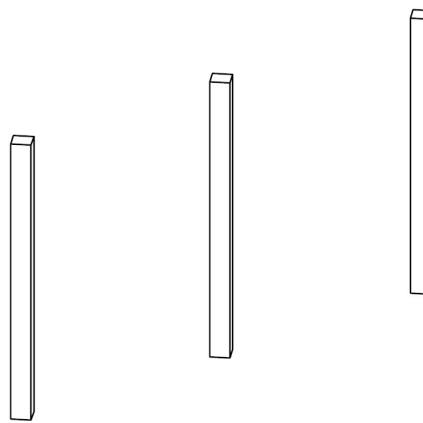
\* based on energy use of 3100 m<sup>2</sup> offices (400 mwh), escalators + elevators (150 mwh), lighting (50 mwh)  
\*\* which is equivalent to the yearly energy consumption of 15 Lebanese households.

# STRUCTURAL DESIGN

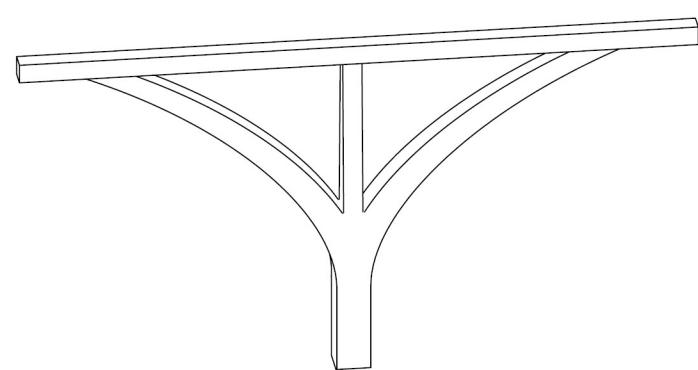


## STRUCTURE CONCEPT

ORTHOGONAL GRID WITH  
RECTANGULAR COLUMNS

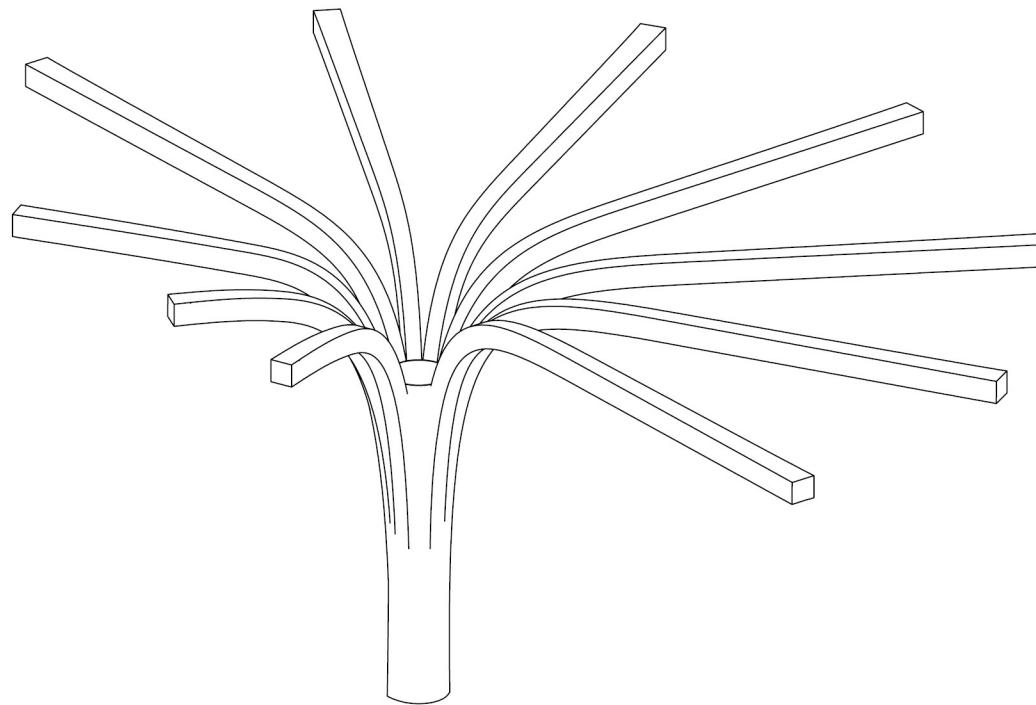


RADIALL PLACED ORGANIC  
CONCRETE COLUMNS



THE COLUMNS REPRESENT THE CHARACTER OF THE PART OF THE  
BUILDING THEY'RE SUPPORTING.

## STRUCTURE CONCEPT

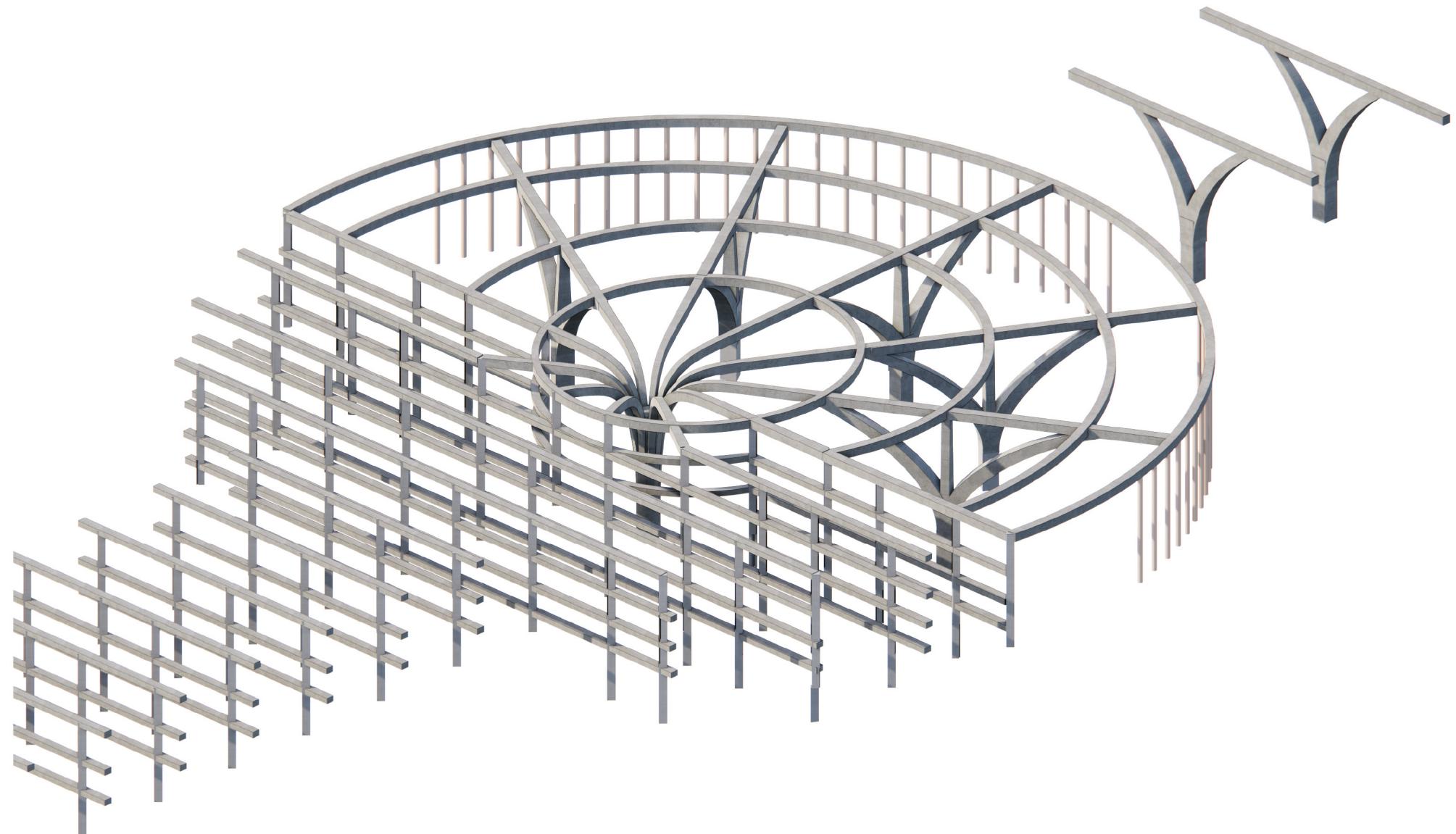


CENTRAL COLUMN UNIFYING BOTH SYSTEMS.

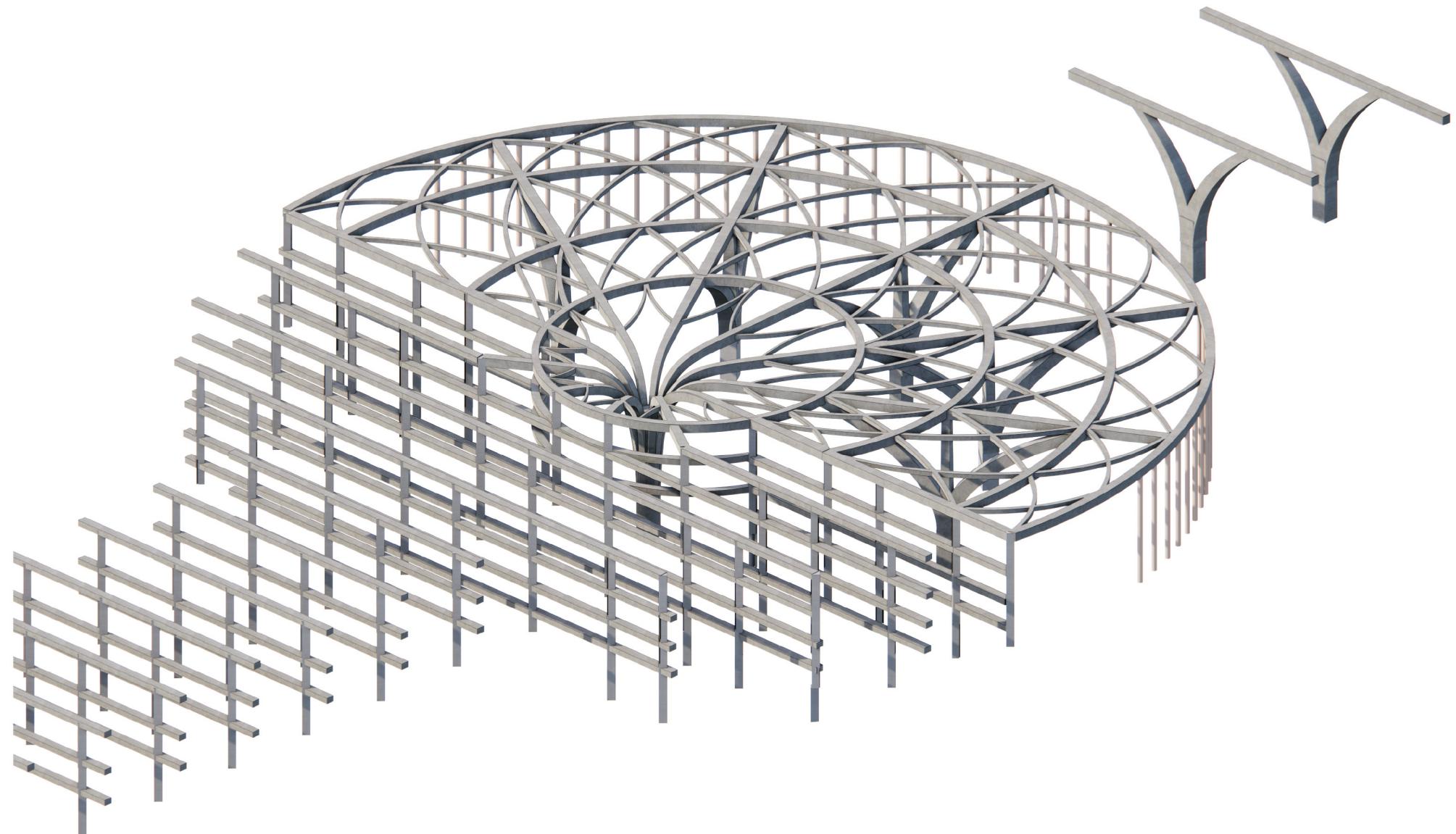
## CENTRAL COLUMN



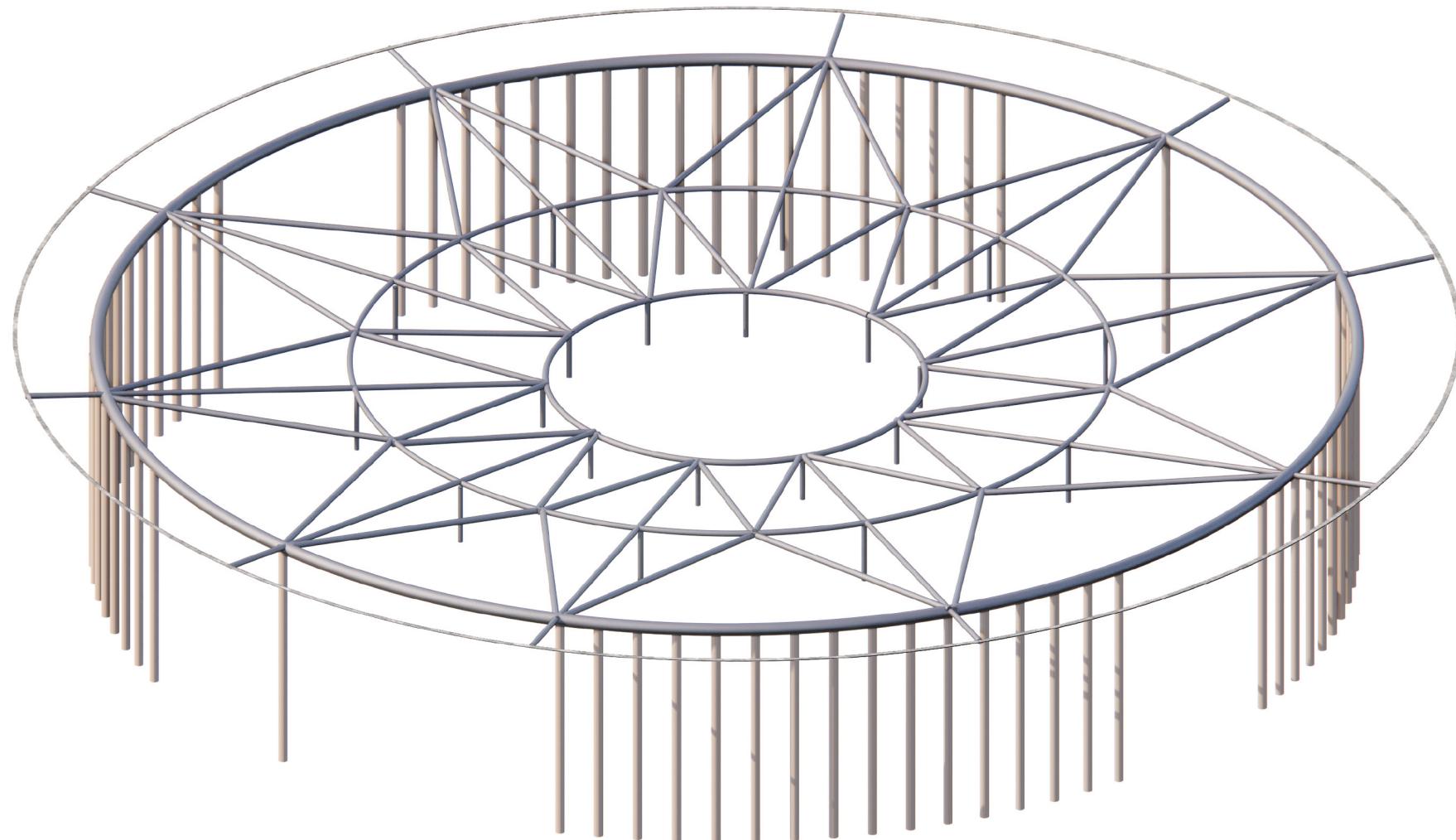
## PRIMARY STRUCTURE 3D



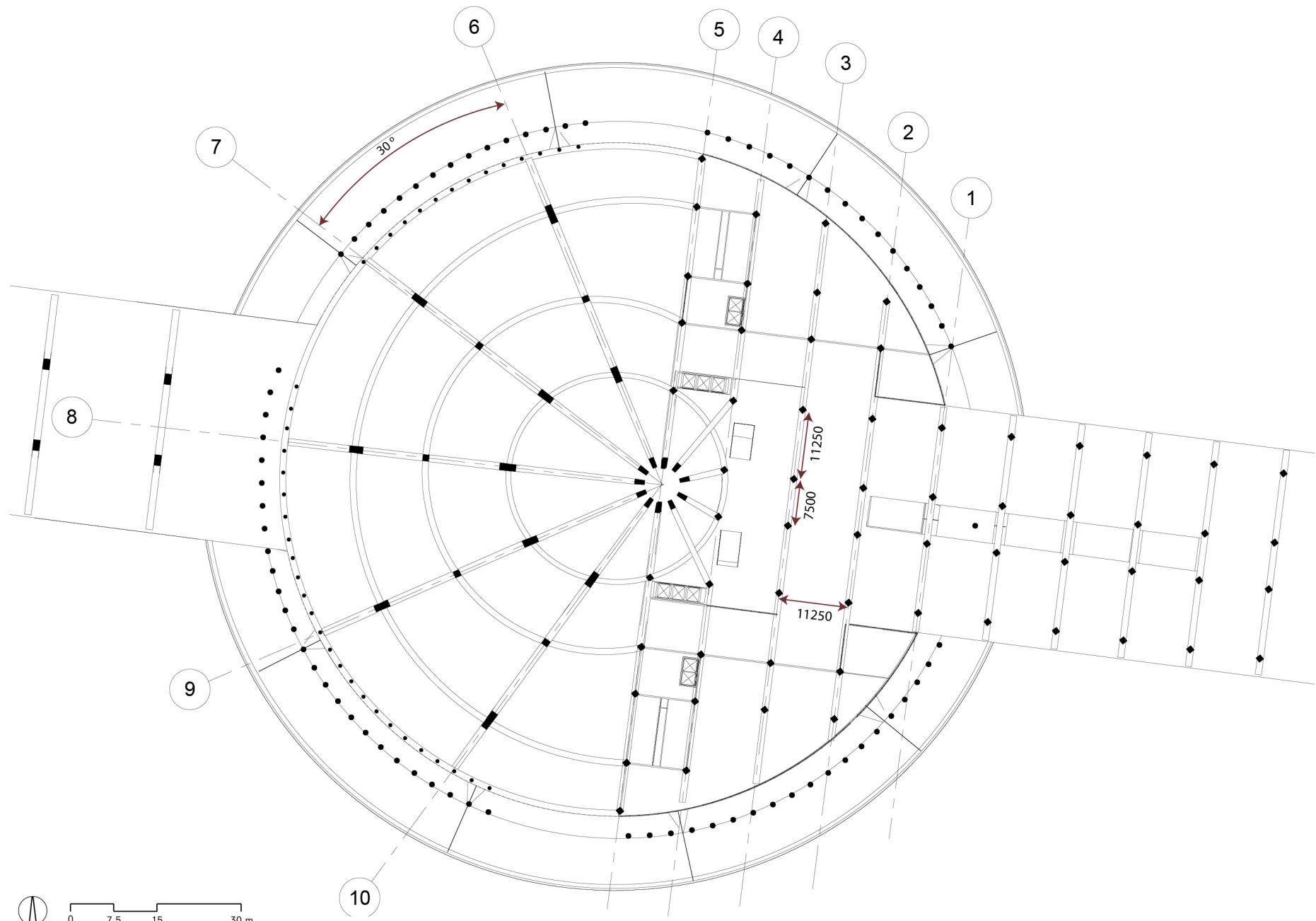
## SECONDARY STRUCTURE 3D



## ROOF STRUCTURE 3D

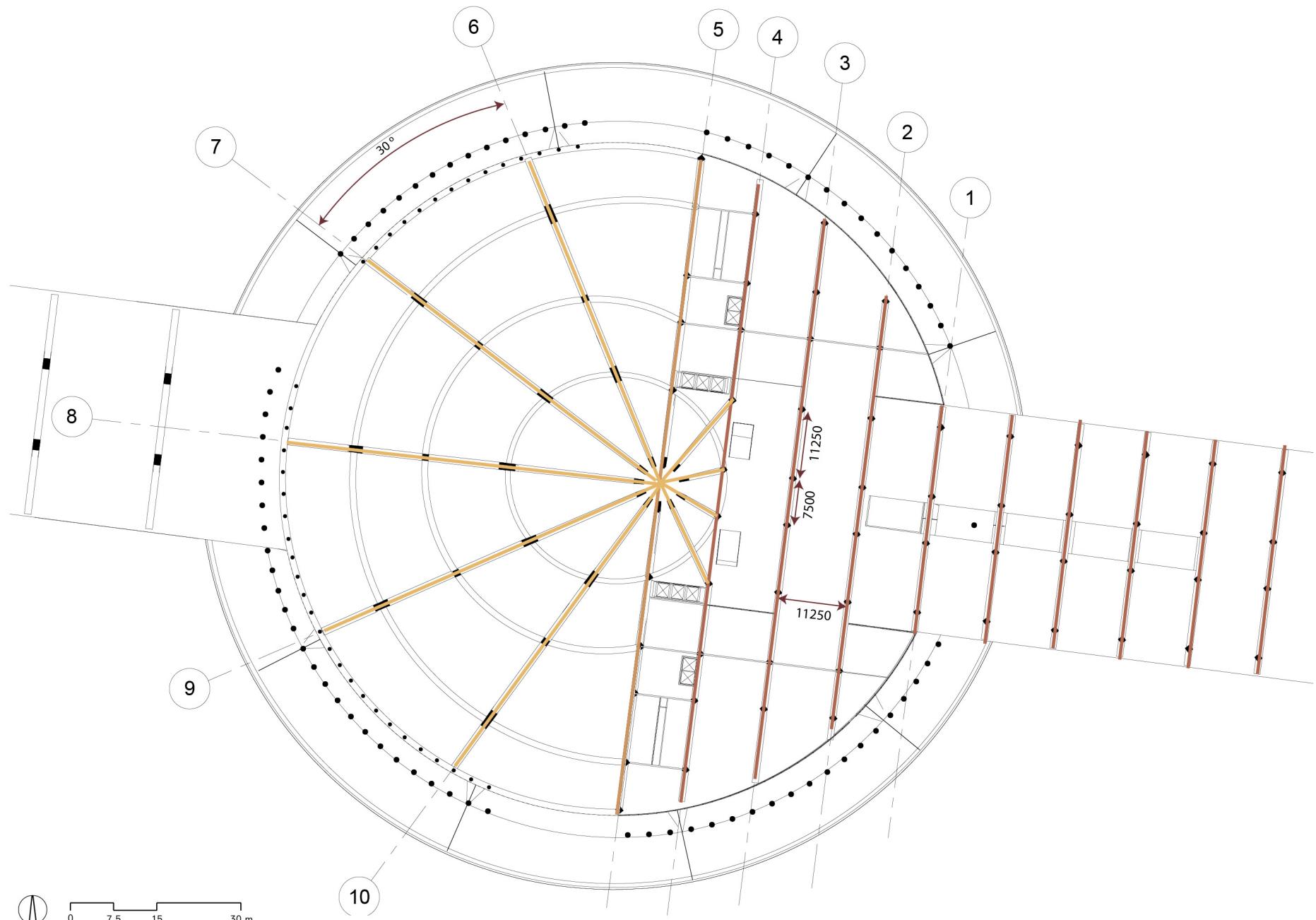


# PRIMARY STRUCTURAL PLAN



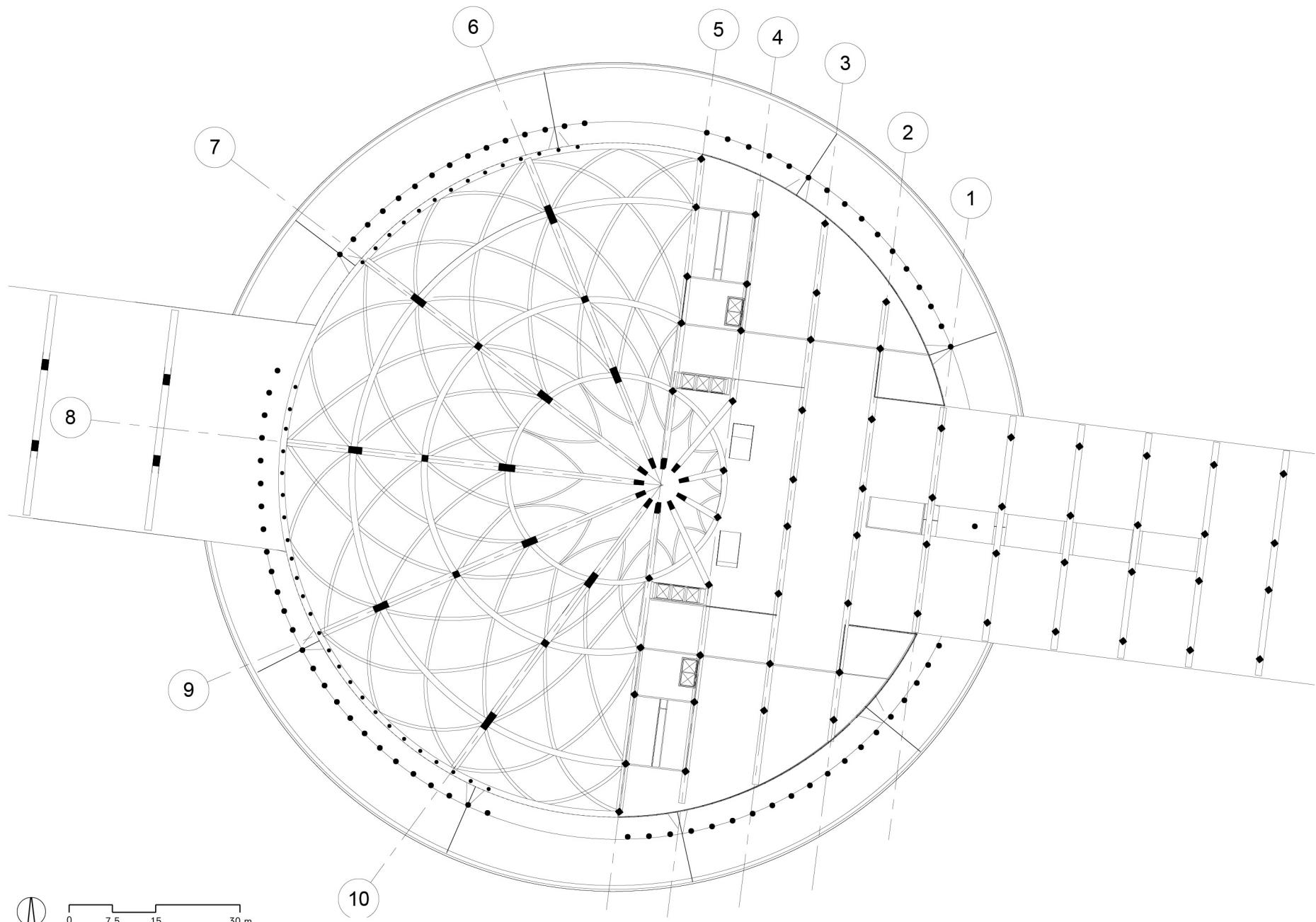
0 7.5 15 30 m

# PRIMARY STRUCTURAL PLAN



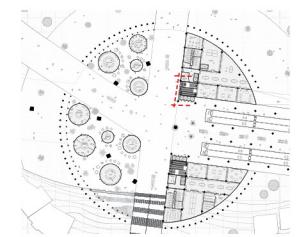
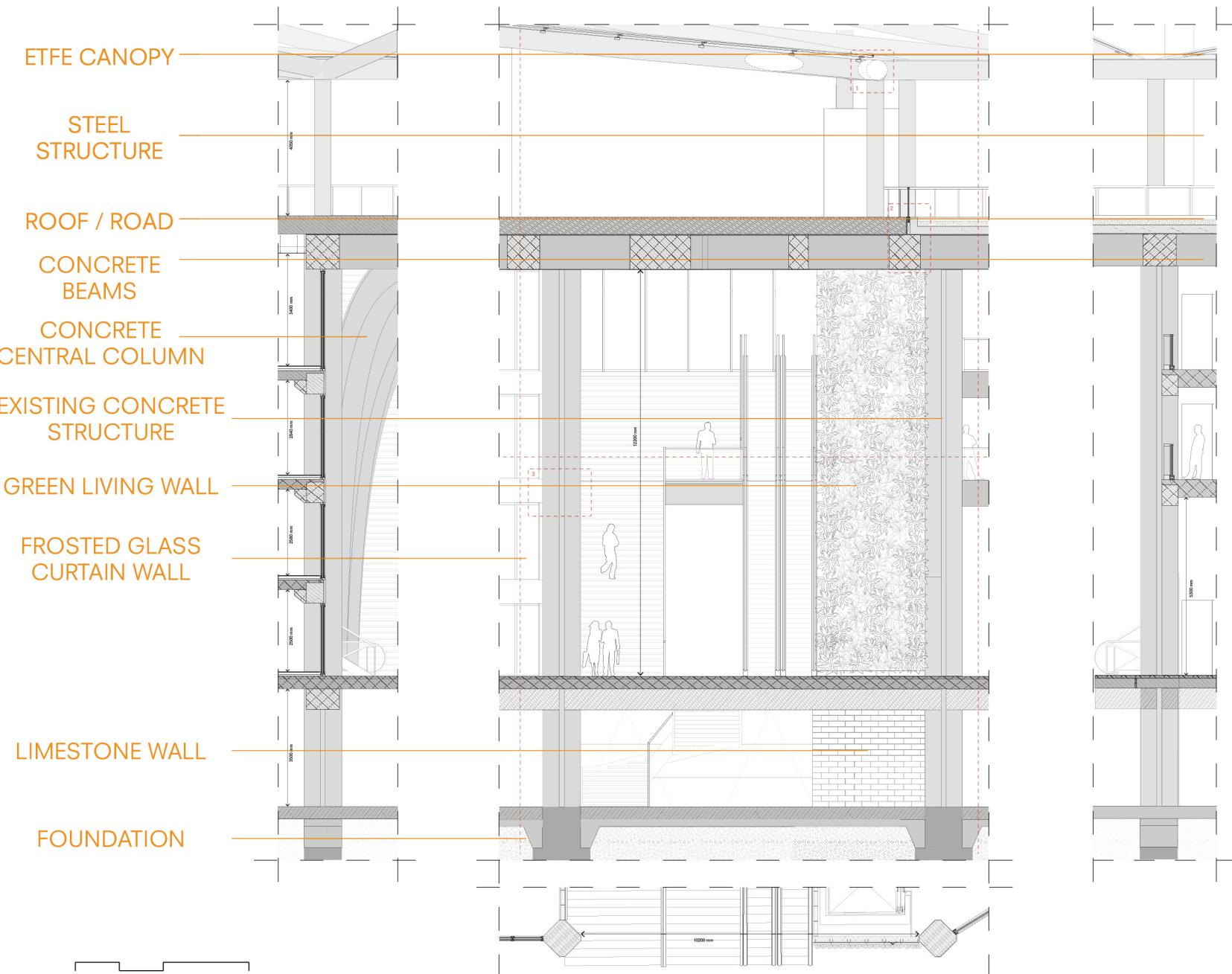
0 7.5 15 30 m

## SECONDARY STRUCTURAL PLAN



0 7.5 15 30 m

# 1:20 BUILDING FRAGMENT

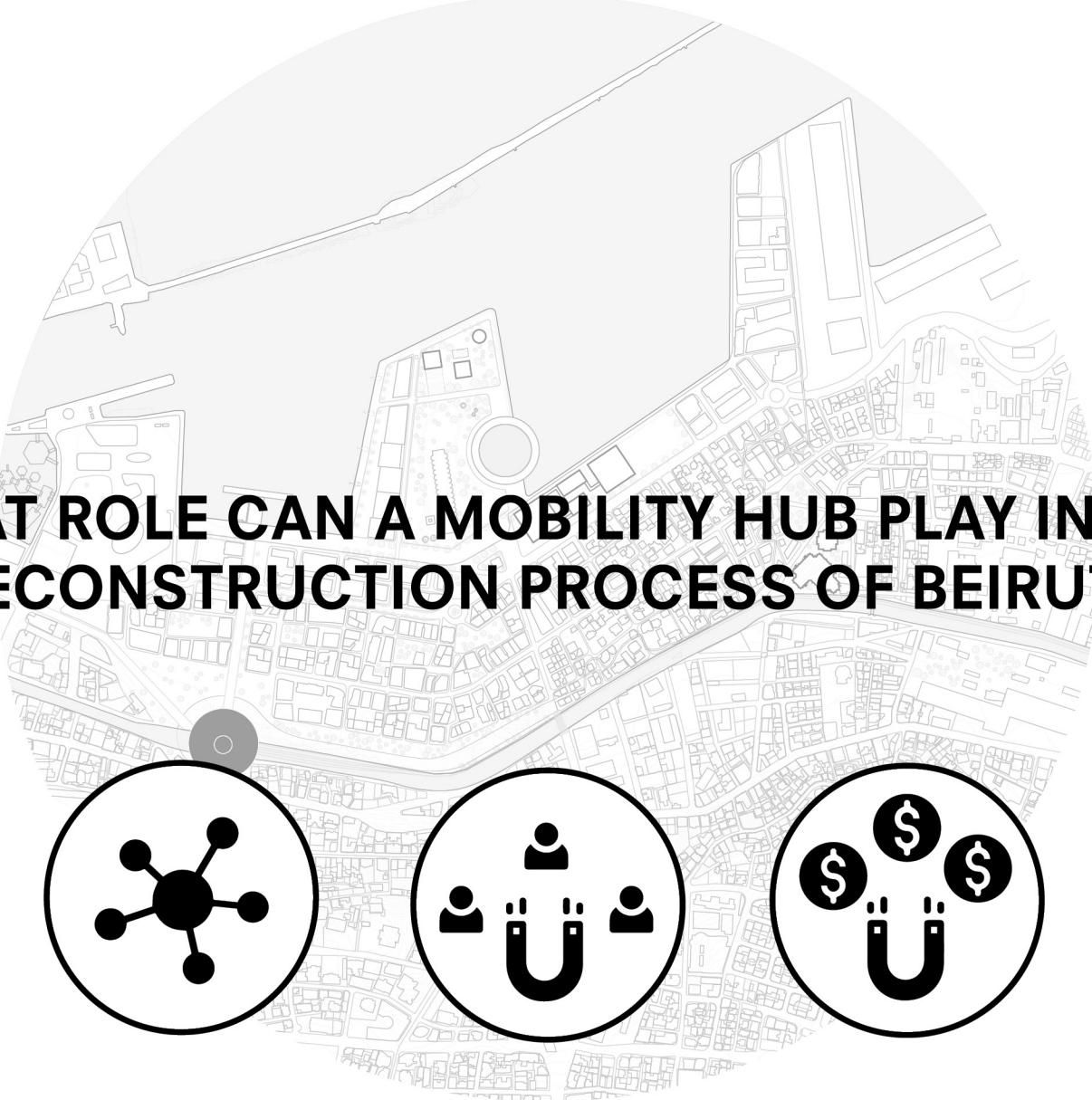


# CONCLUSION

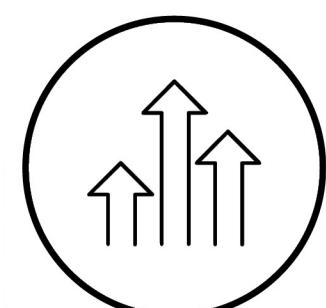
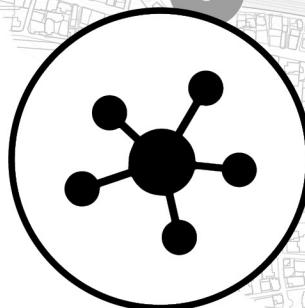




# **WHAT ROLE CAN A MOBILITY HUB PLAY IN THE RECONSTRUCTION PROCESS OF BEIRUT?**

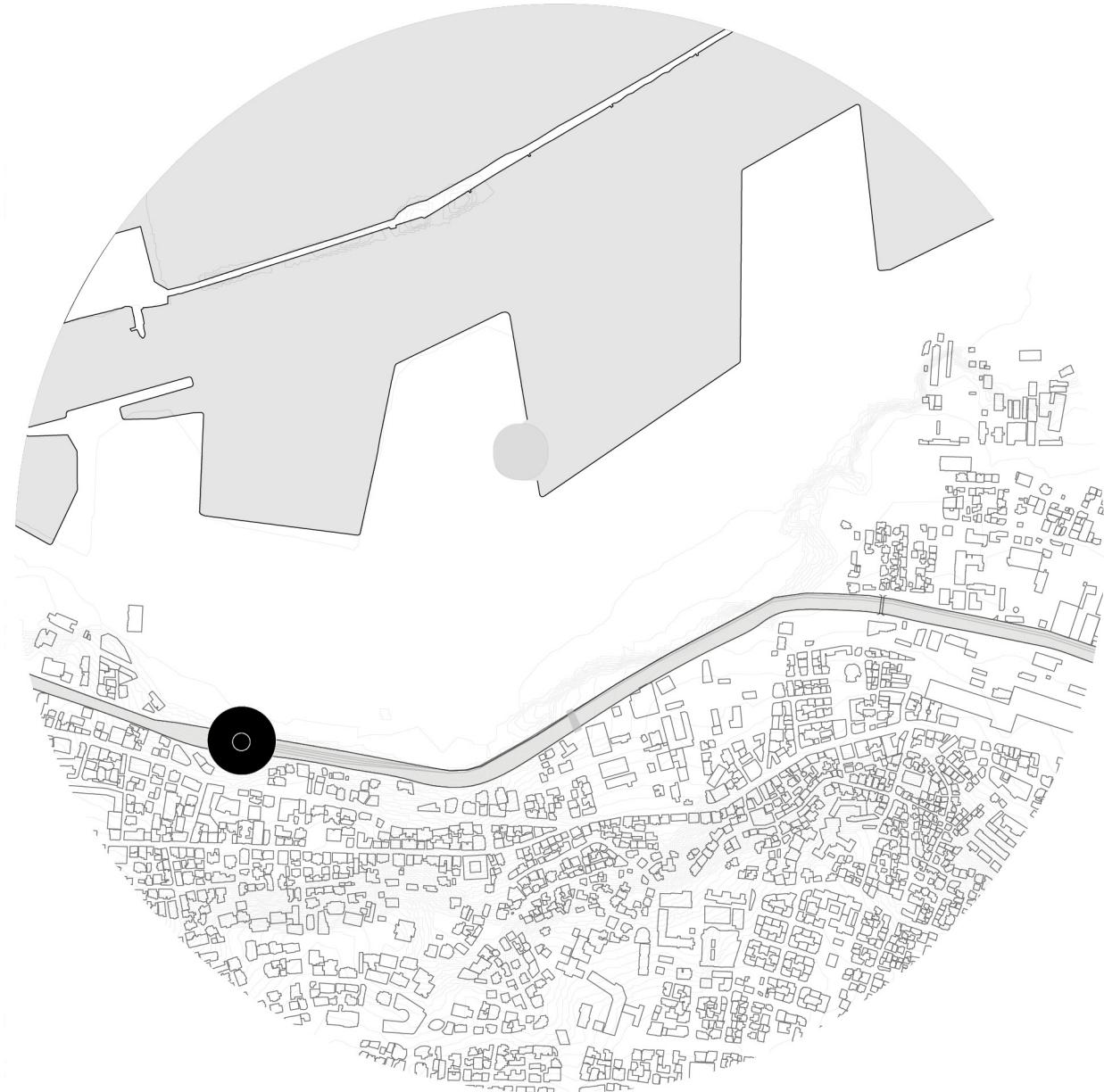


# WHAT ROLE CAN A MOBILITY HUB PLAY IN THE RECONSTRUCTION PROCESS OF BEIRUT?





## AREA DEVELOPMENTS



0 125 m 250 m 500 m

Beirut Terminus



Lüte Biesheuvel

## AREA DEVELOPMENTS



0 125 m 250 m 500 m

Beirut Terminus



Lüte Biesheuvel

## AREA DEVELOPMENTS



0 125 m 250 m 500 m

Beirut Terminus



Lüte Biesheuvel

# AREA DEVELOPMENTS



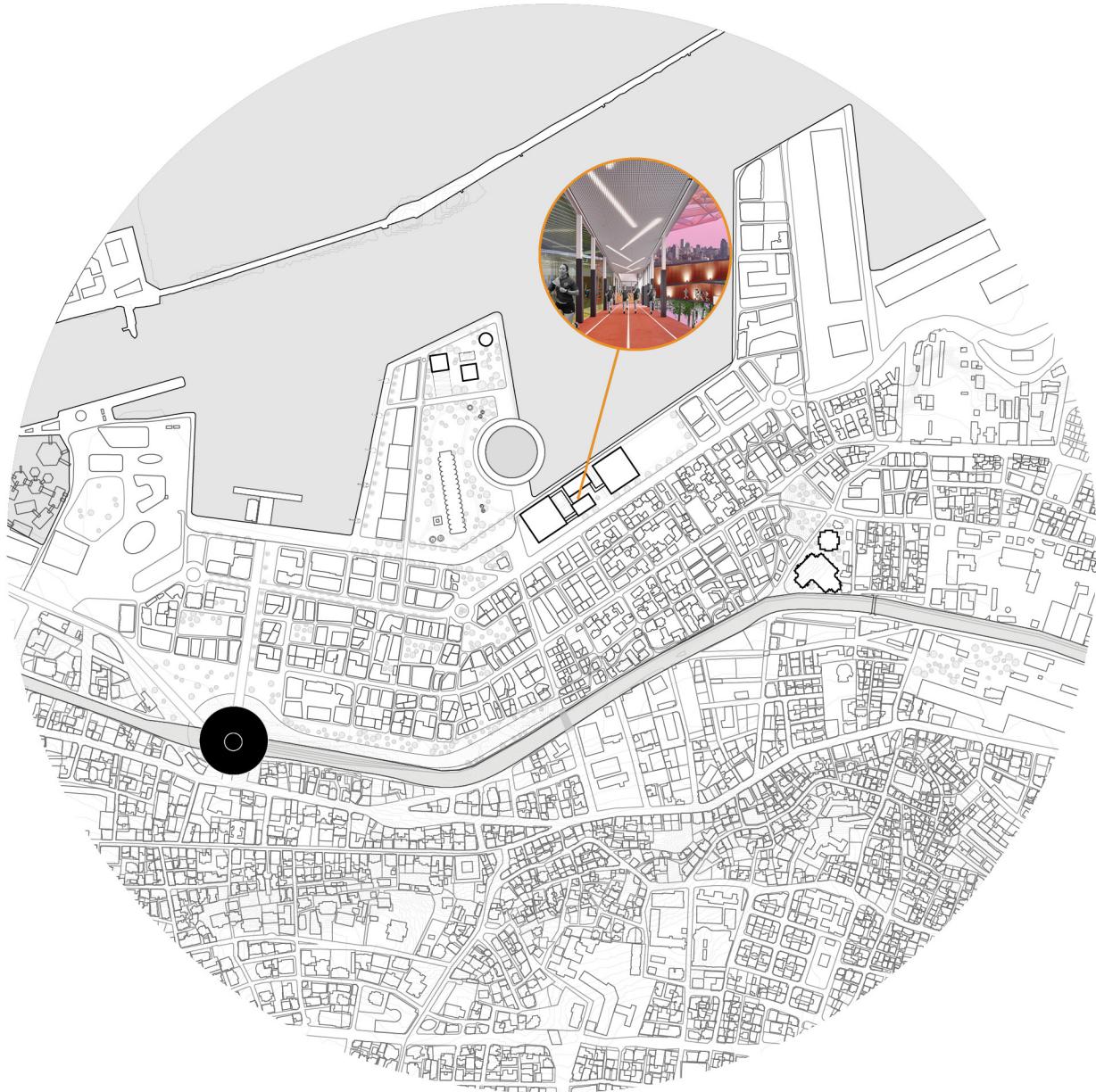
0 125 m 250 m 500 m

Beirut Terminus



Lüte Biesheuvel

## AREA DEVELOPMENTS



0 125 m 250 m 500 m

Beirut Terminus



Lüte Biesheuvel

## AREA DEVELOPMENTS



0 125 m 250 m 500 m

Beirut Terminus



Lüte Biesheuvel

2030



0 125 m 250 m 500 m

Beirut Terminus



Lüte Biesheuvel

# THANK YOU!



An aerial photograph of a dense urban landscape, likely Beirut, Lebanon. The scene is filled with numerous buildings of varying heights, from small residential houses to tall commercial skyscrapers. A prominent feature is a large, modern green space in the center-right, which includes a circular building with a glass roof and a surrounding walkway. A multi-lane highway or elevated train track cuts through the city, with several cars visible. The overall atmosphere is one of a bustling, modern metropolis.

**QUESTIONS?**