

# GARAGE

A CONCENTRATED PARKING INFRASTRUCTURE FOR THE PORT OF BEIRUT

P5 Presentation

06/21/2022

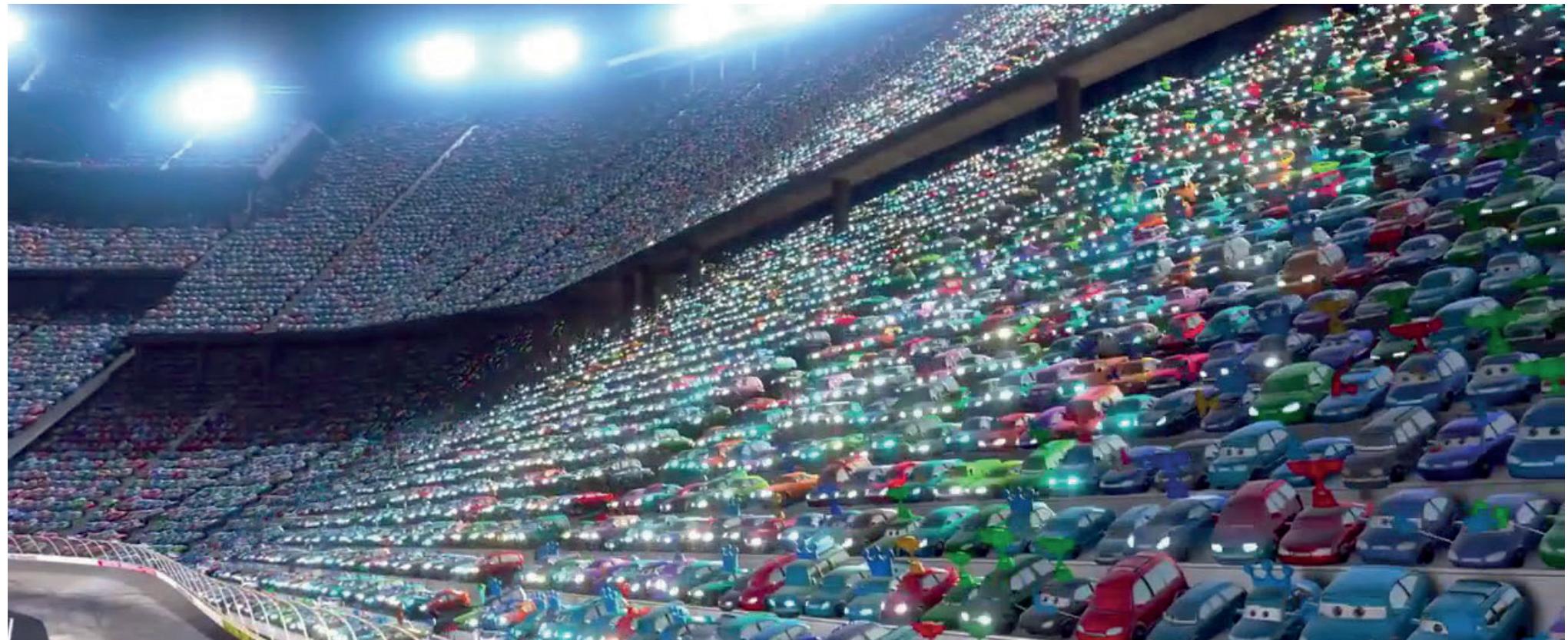
Dan Xie



Complex Projects

Introduction

# CARS



Introduction

# “CARCHITECTURE”

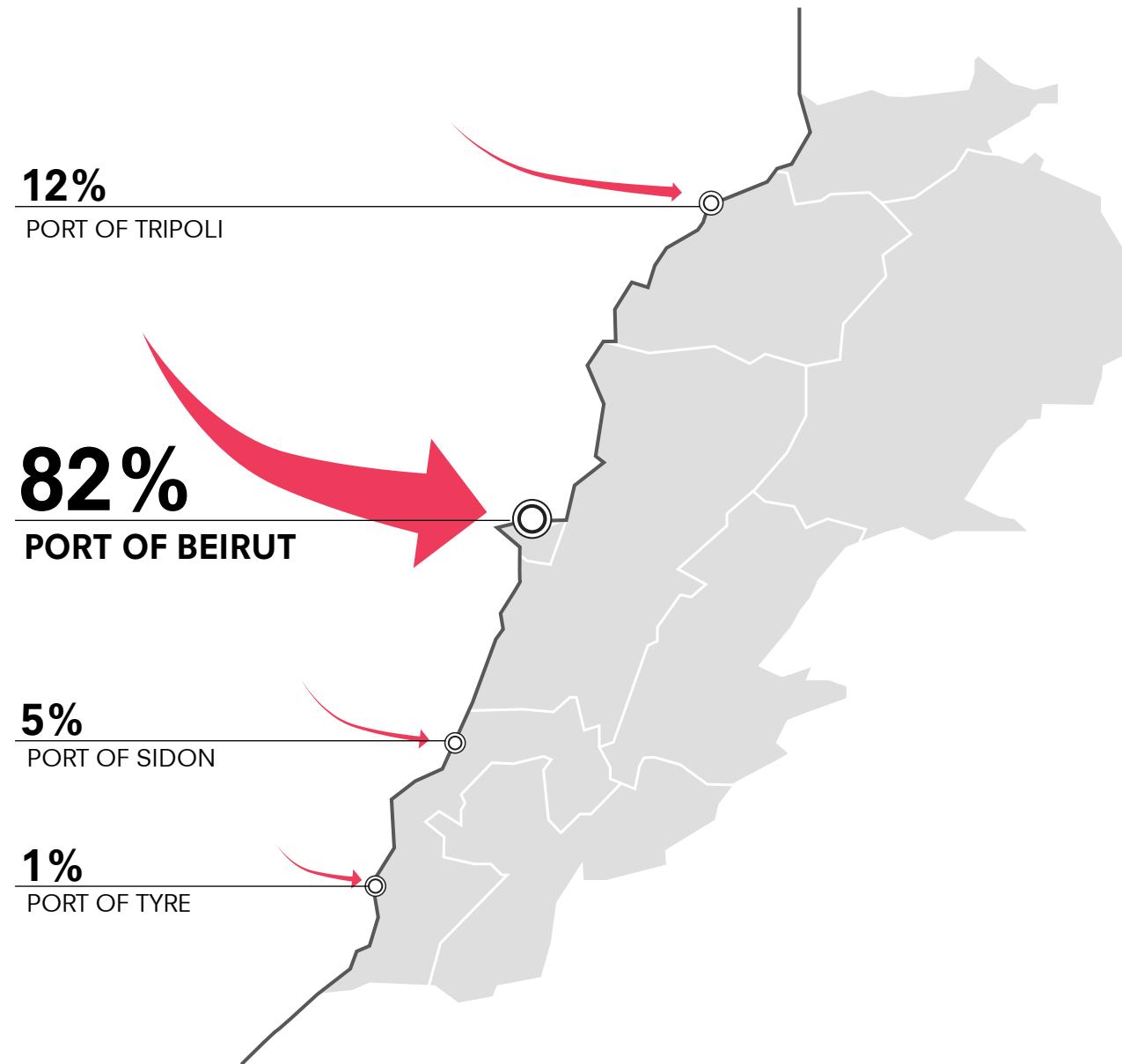


Introduction

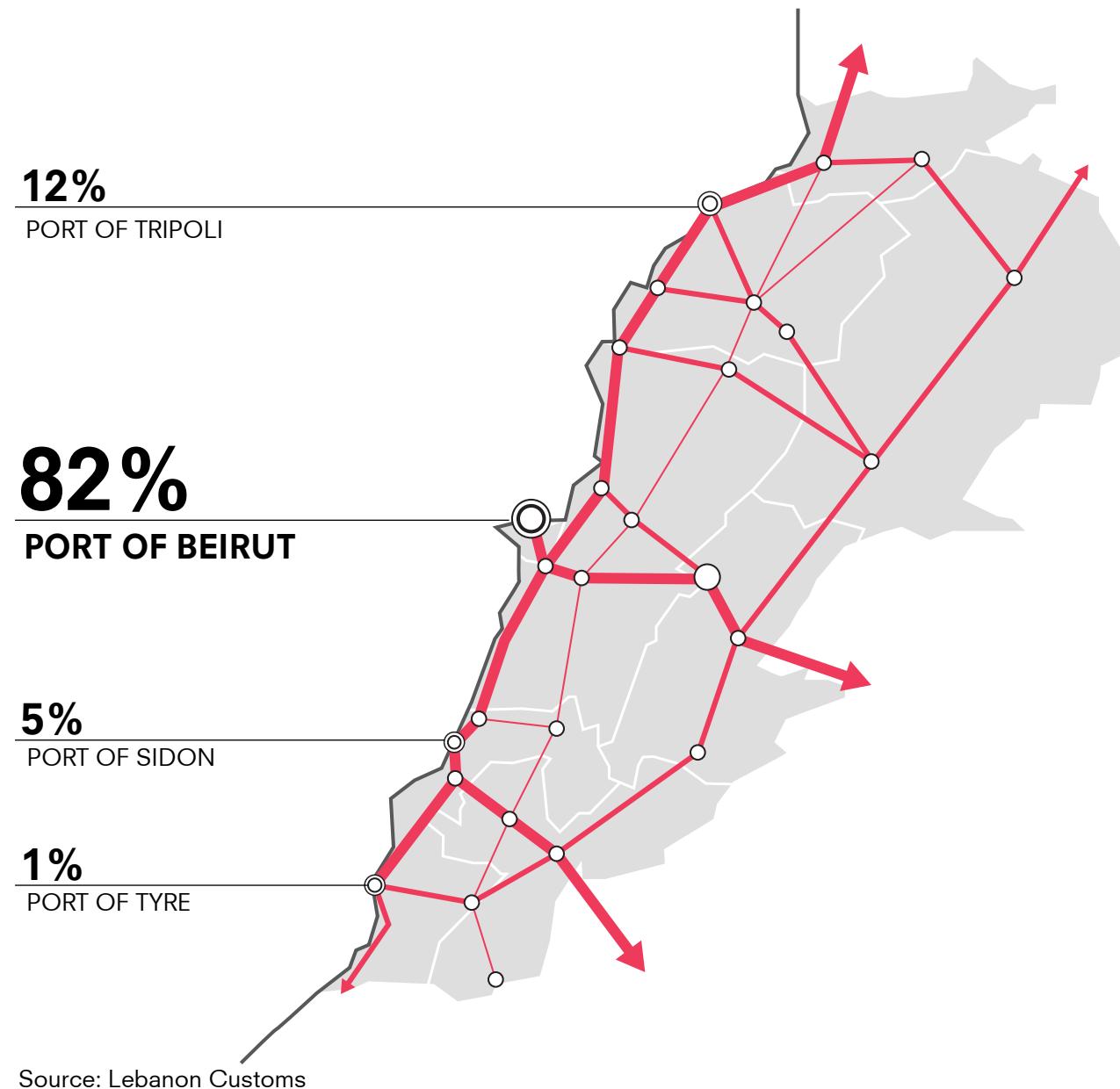
# “CARS” IN BEIRUT



Introduction  
**IMPORT**



# HINTERLAND TRANSPORT



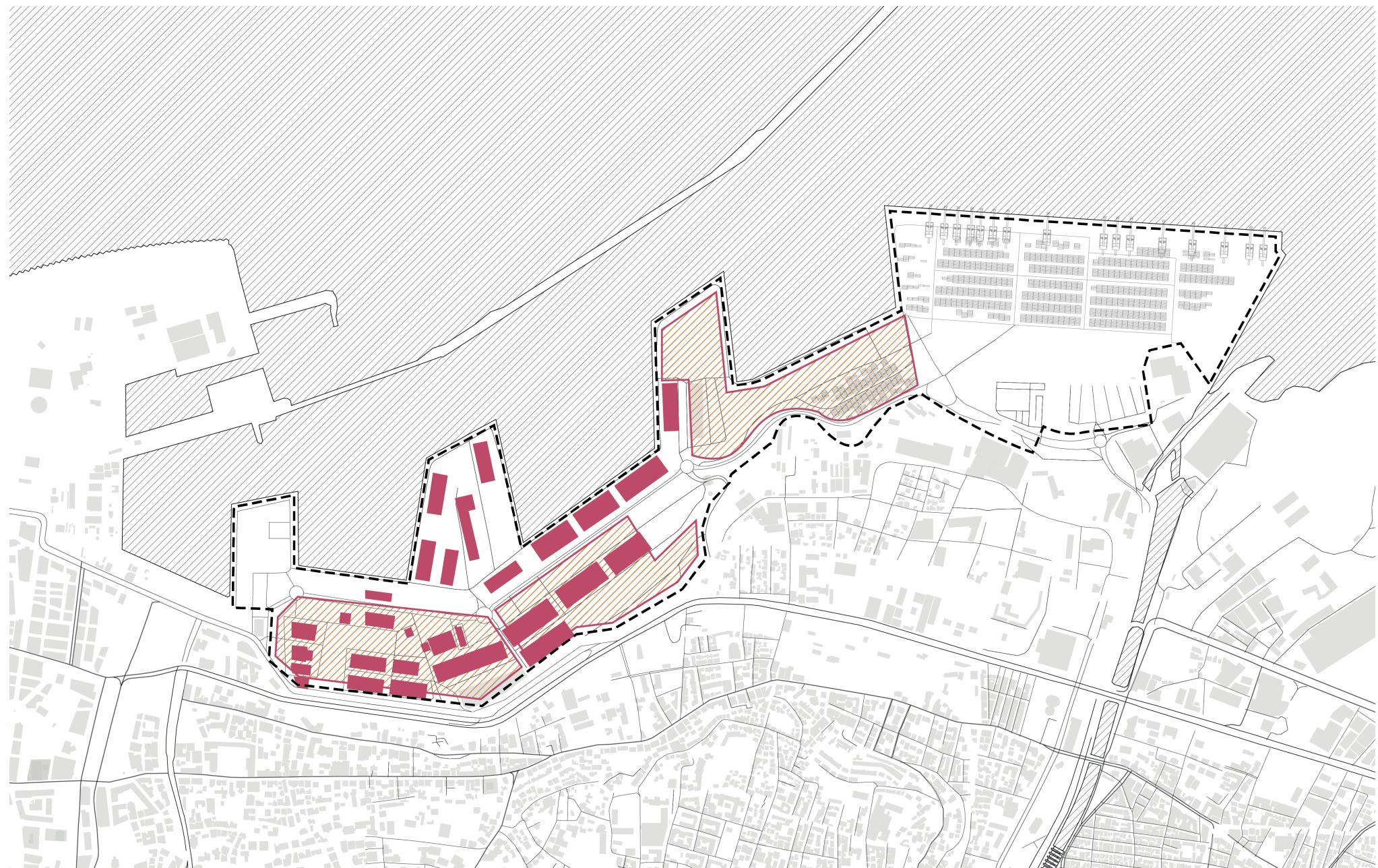






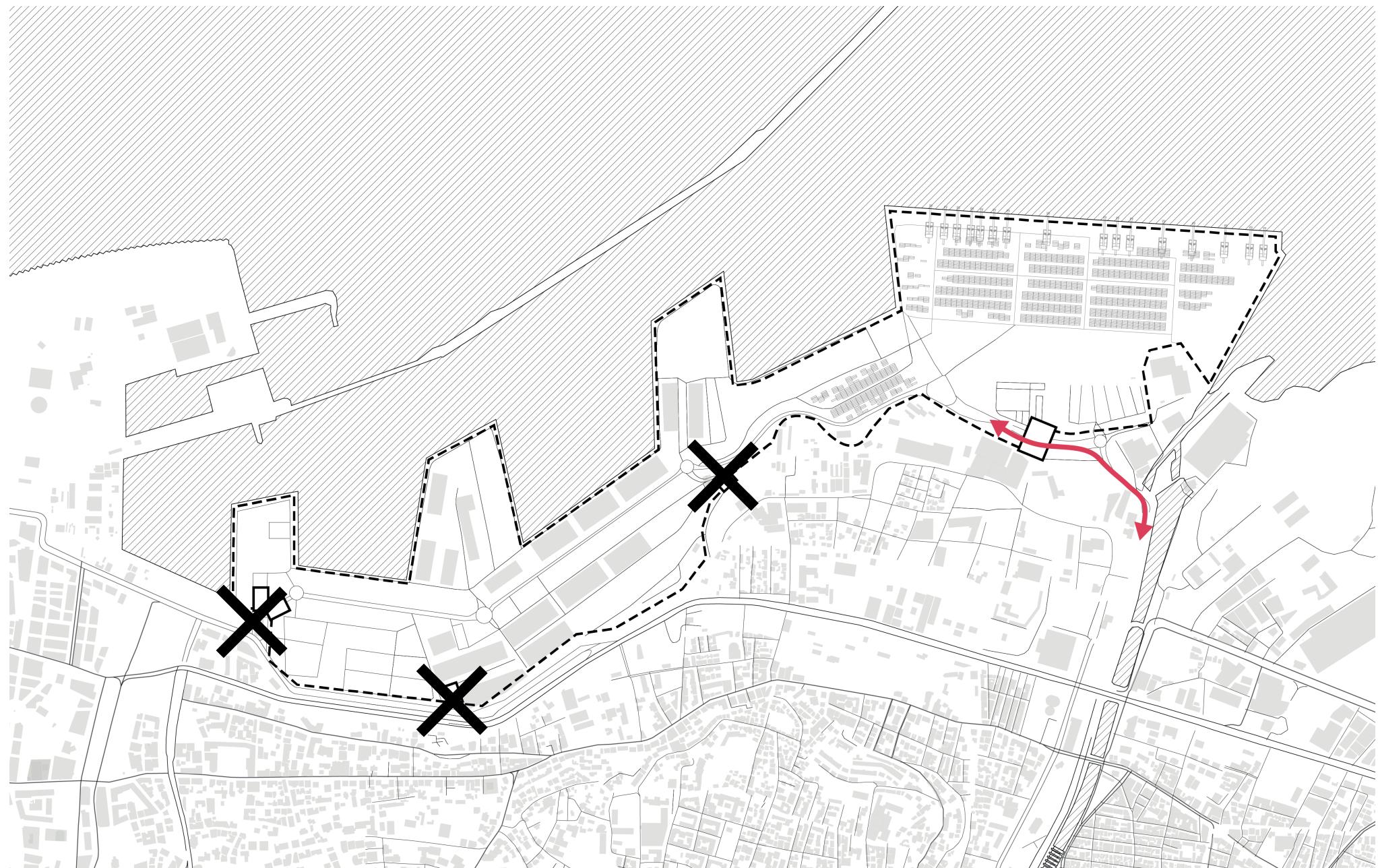
Introduction

# FUNCTION DAMAGE



Introduction

# ENTRANCE DAMAGE







Prin

MAT

SUZUKI

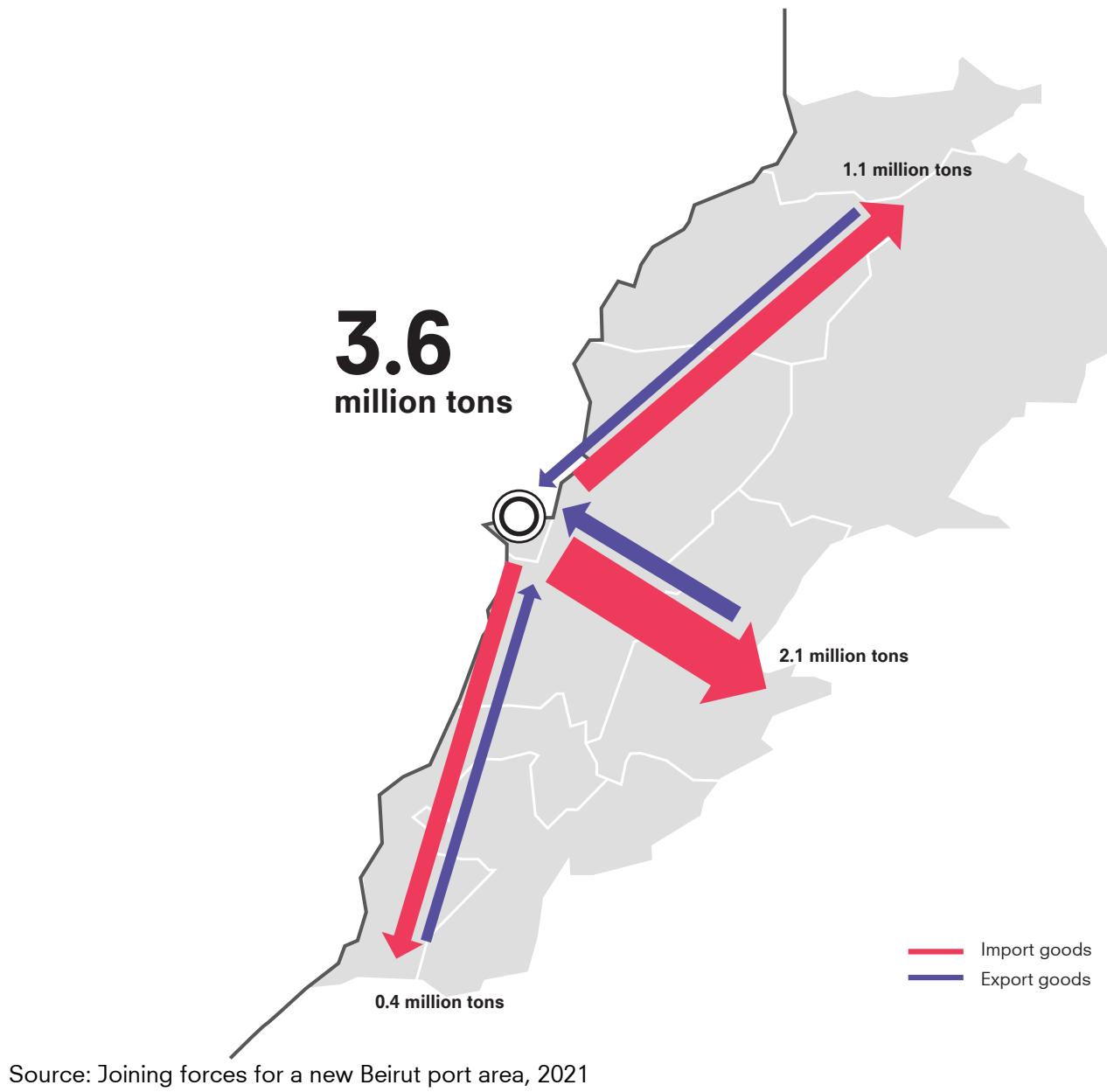
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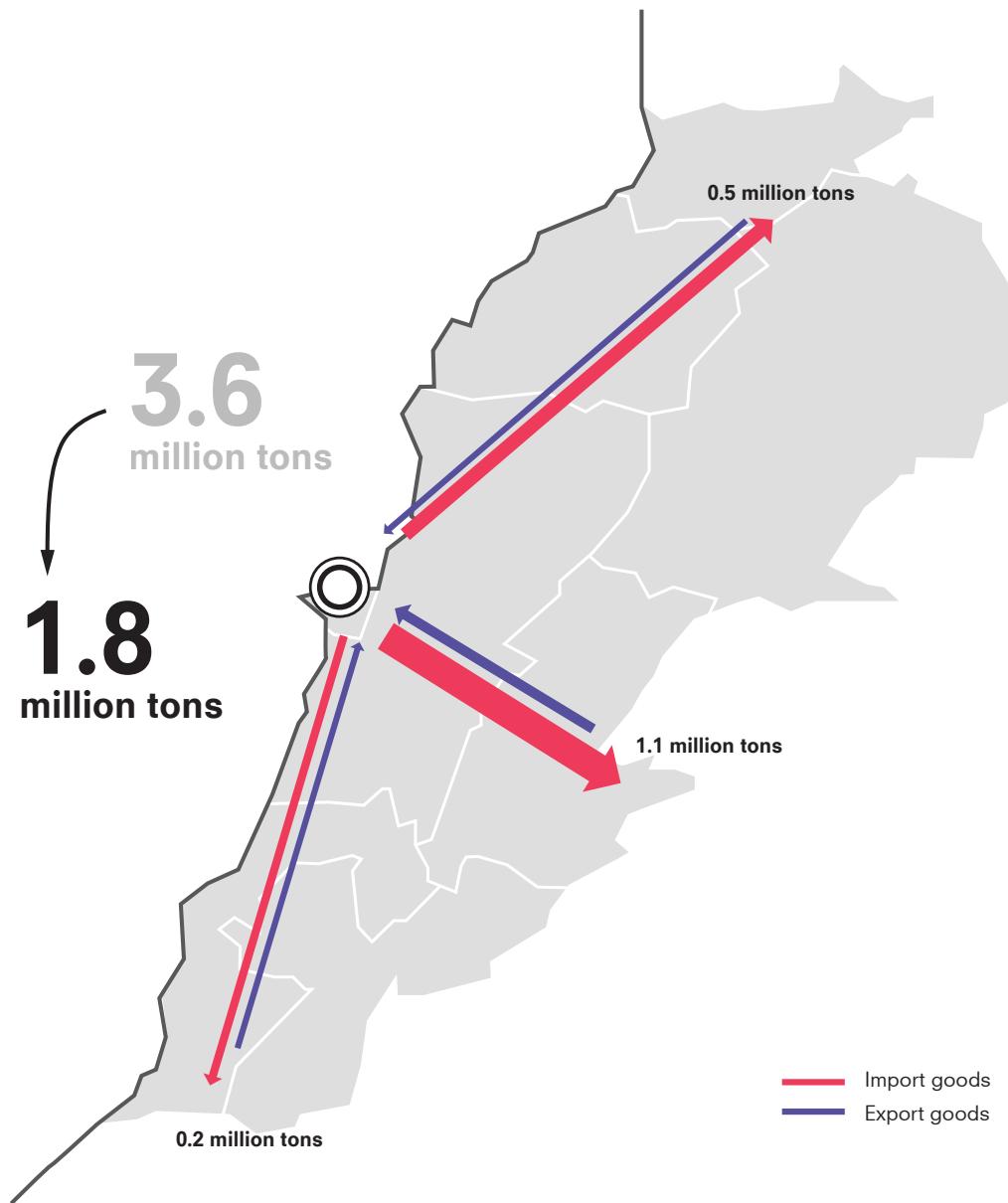




# HINTERLAND TRANSPORT VOLUME (2018)

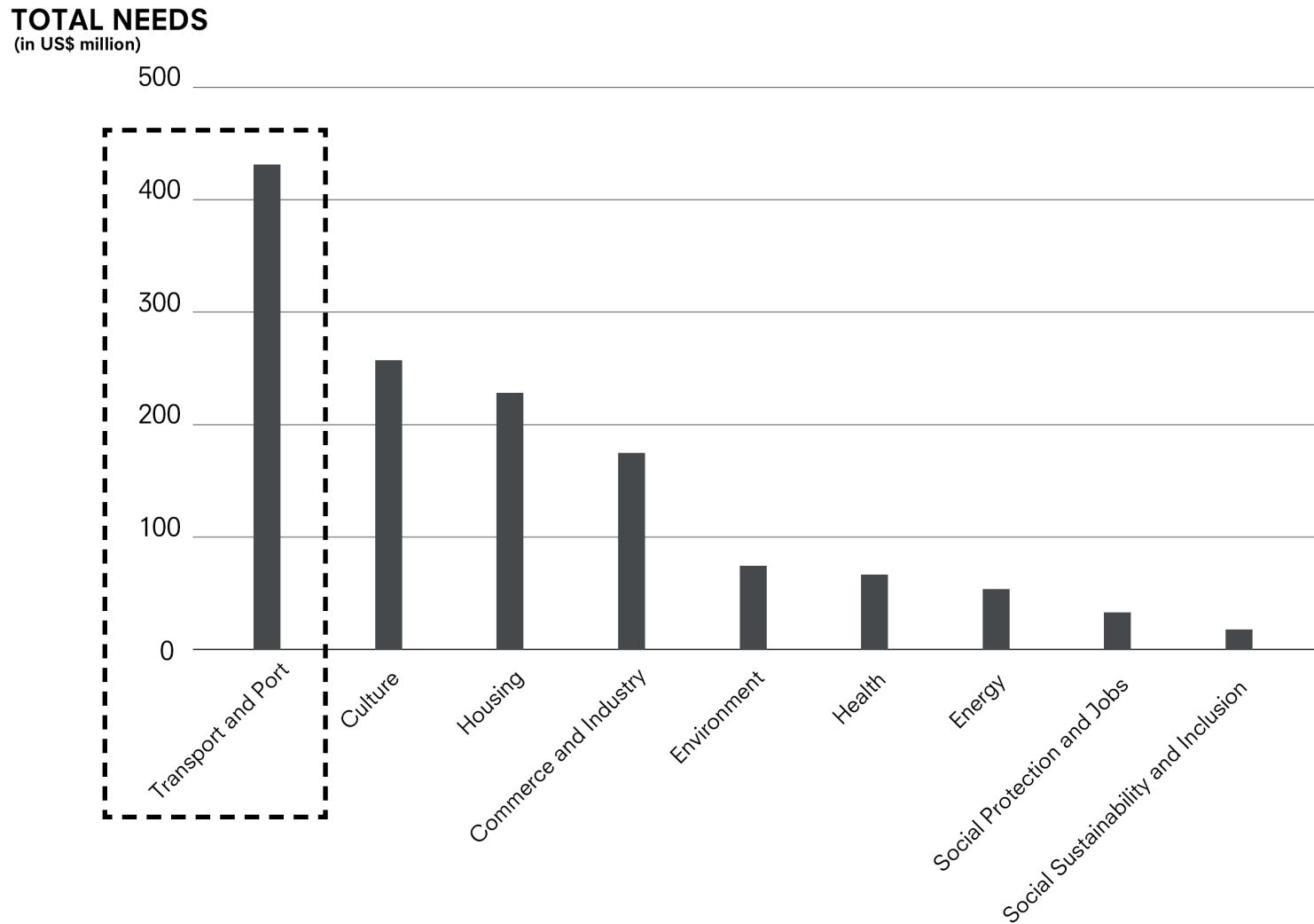


# HINTERLAND TRANSPORT VOLUME (2020)



Source: Joining forces for a new Beirut port area, 2021

# RECONSTRUCTION DEMAND



Source: Beirut Rapid Damage and Needs Assessment, World Bank Group, 2020



THE PORT URGENTLY NEED TO IMPROVE  
THE MOBILITY OF GOODS TRANSPORTED TO  
THE HINTERLAND

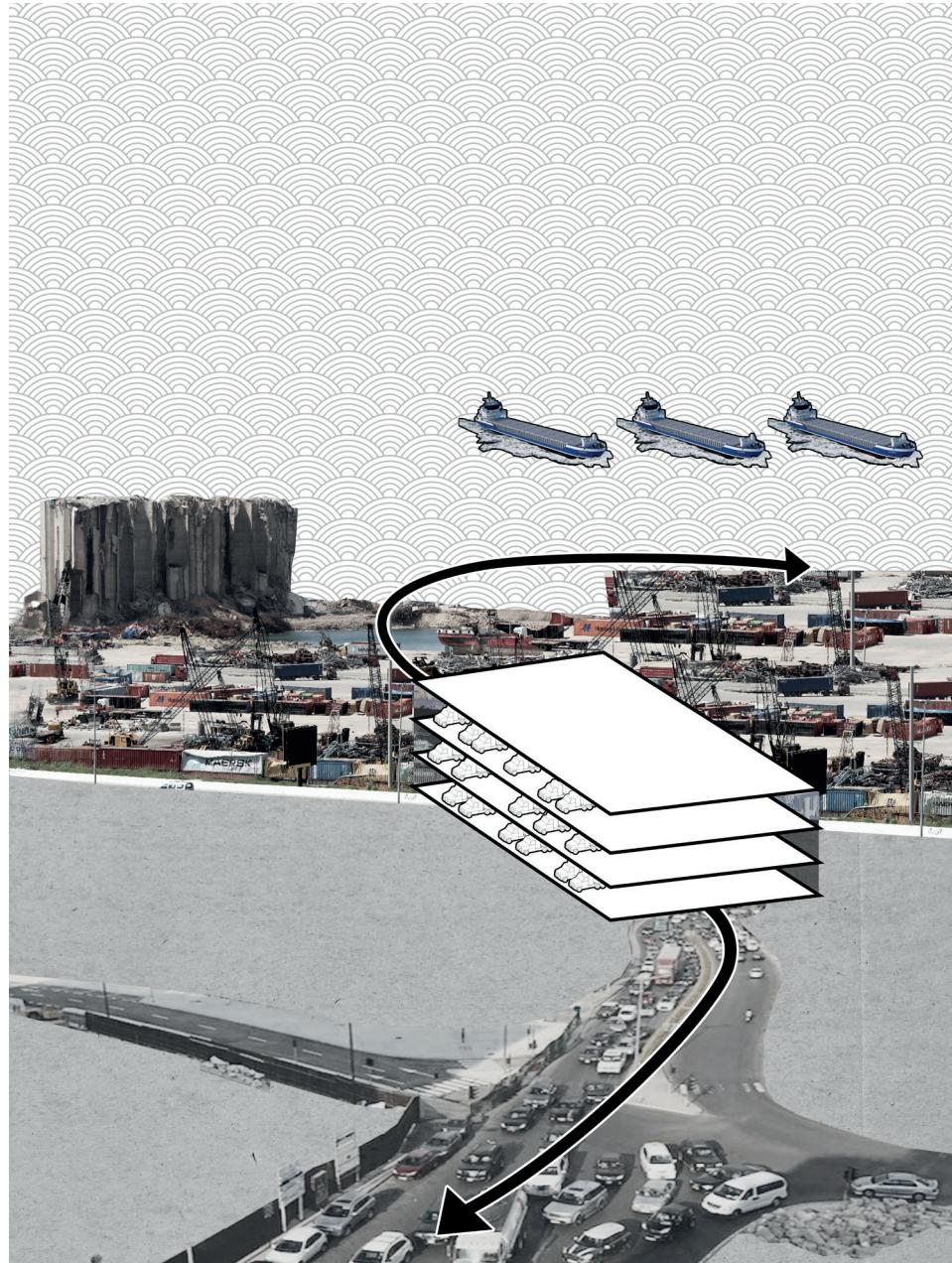
# PROJECT AMBITION

**How to solve the parking shortage at the port,  
and improve the goods transportation from the  
port to the hinterland?**

# TRUCK TRANSPORTATION



Introduction  
**GARAGE**



# PORT CONTEXT

port context

# SEA TRADE CONNECTION

mediterranean region



**PORT OF BEIRUT**

port context

# GROUND TRADE CONNECTION

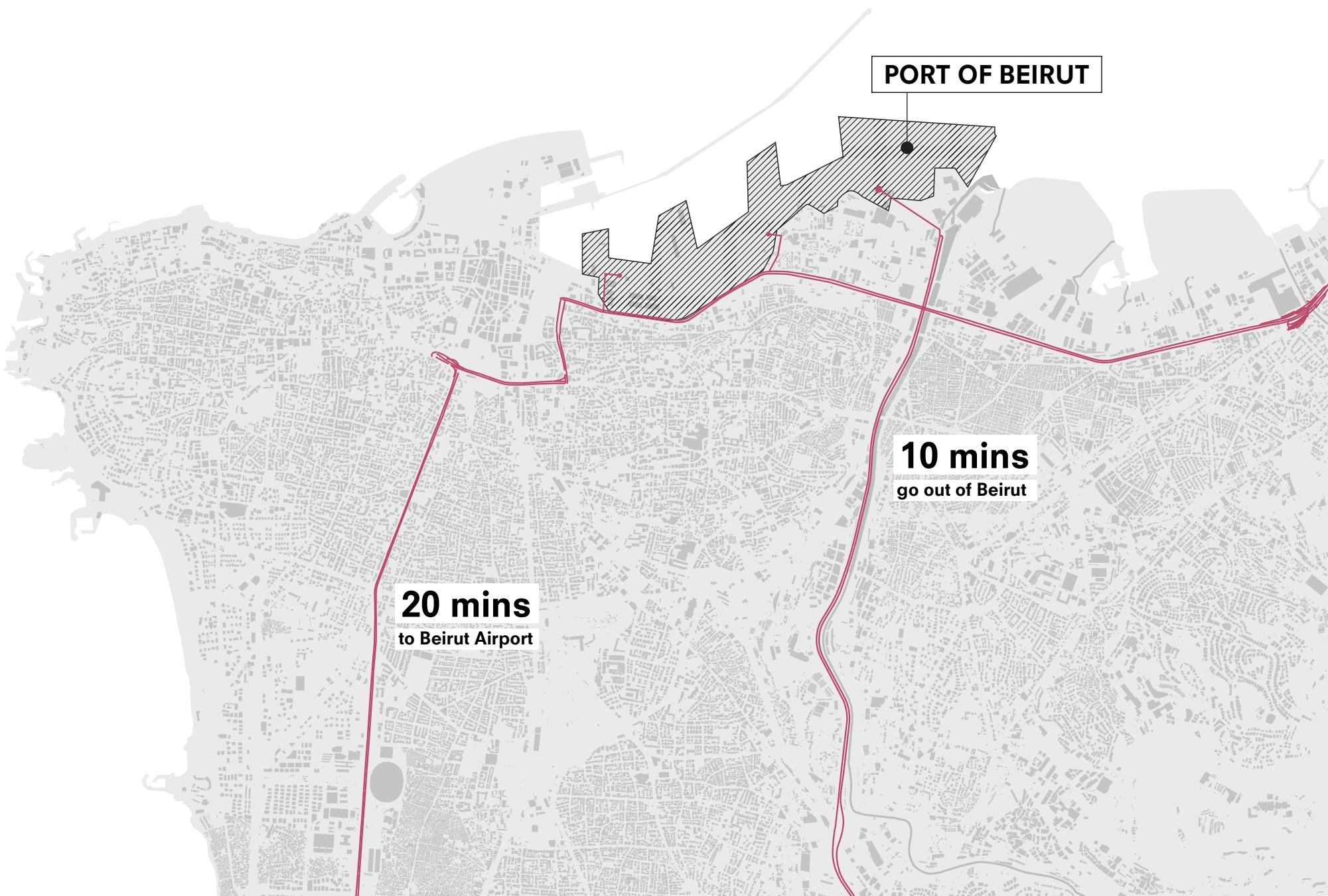
mediterranean region



port context

# CITY ROAD CONNECTION

Beirut city



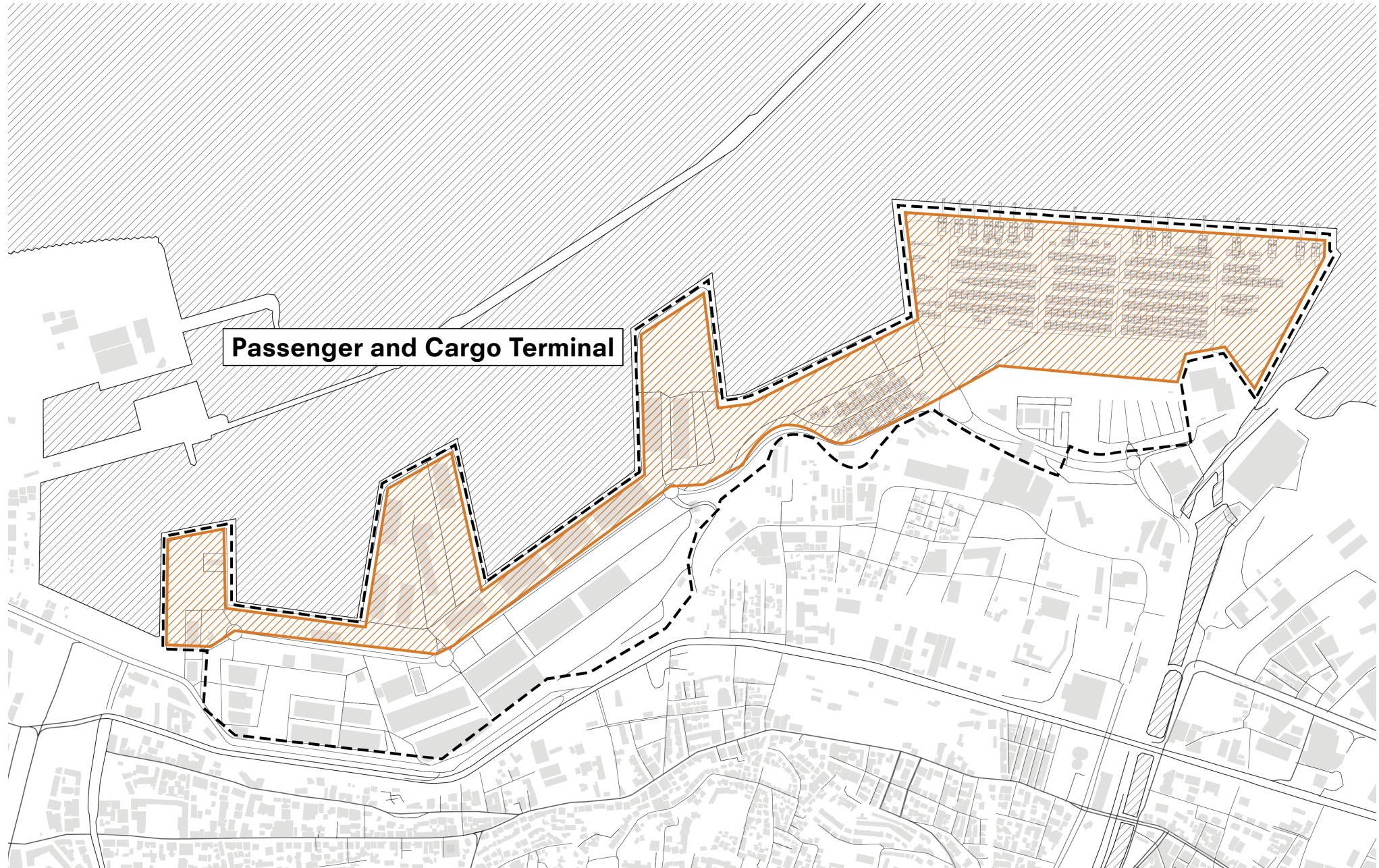
A wide-angle photograph of a busy port terminal. In the foreground, a large Gottwald crane is positioned on the left, its arm extending towards the top of the frame. The ground is filled with stacks of shipping containers in various colors, including red, blue, green, and white. Many of the containers have "MAERSK" printed on them. In the background, a dense urban area is built on a hillside, with buildings packed closely together. The sky is clear and blue.

**PORT OF BEIRUT IS A HUB PORT  
FOR THE EAST MEDITERRANEAN REGIONS**

**A HUB CONNECTING BETWEEN  
THE MARKETS OF ASIA, EUROPE AND AFRICA**

port context

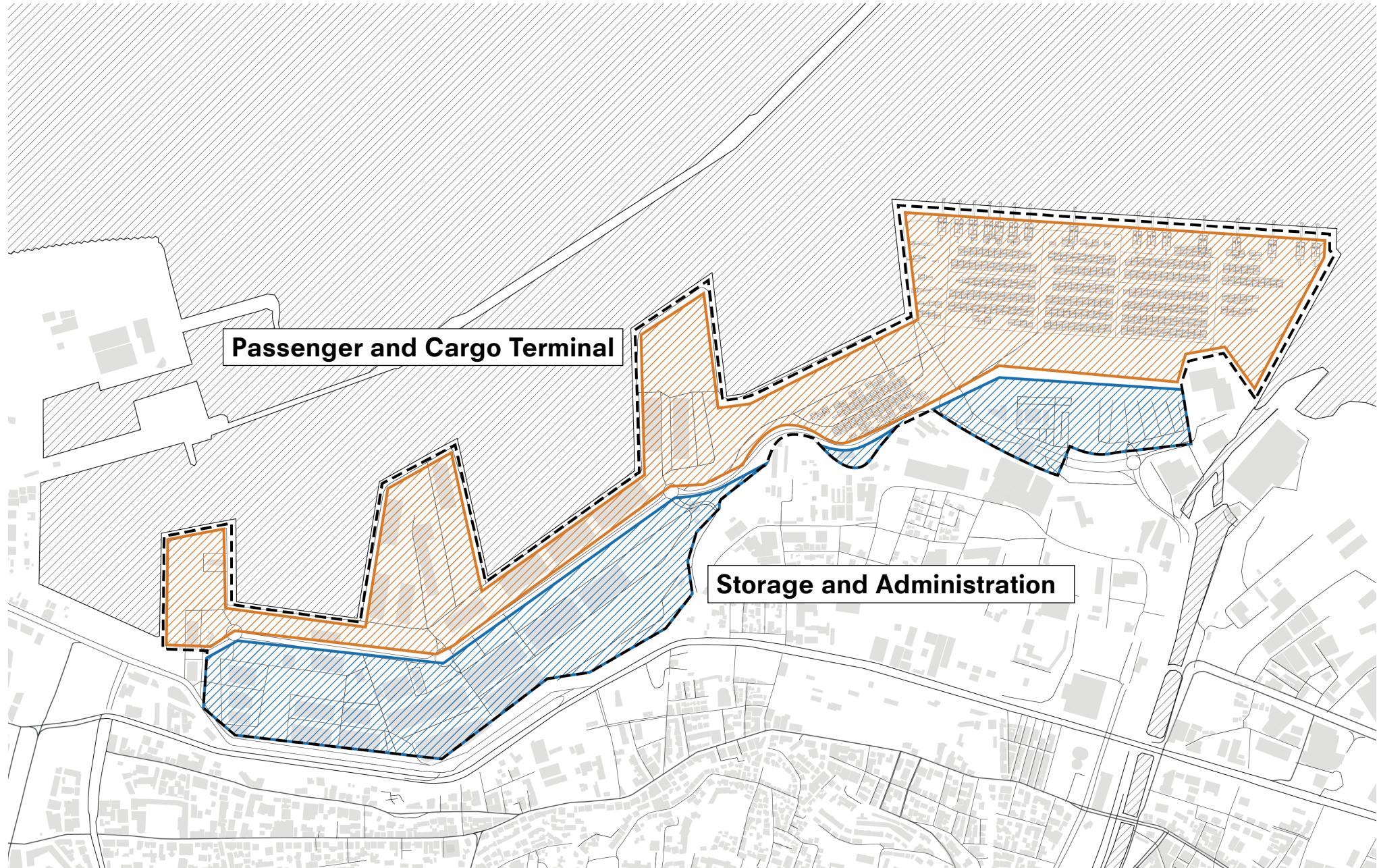
# FUNCTION DIVISION





port context

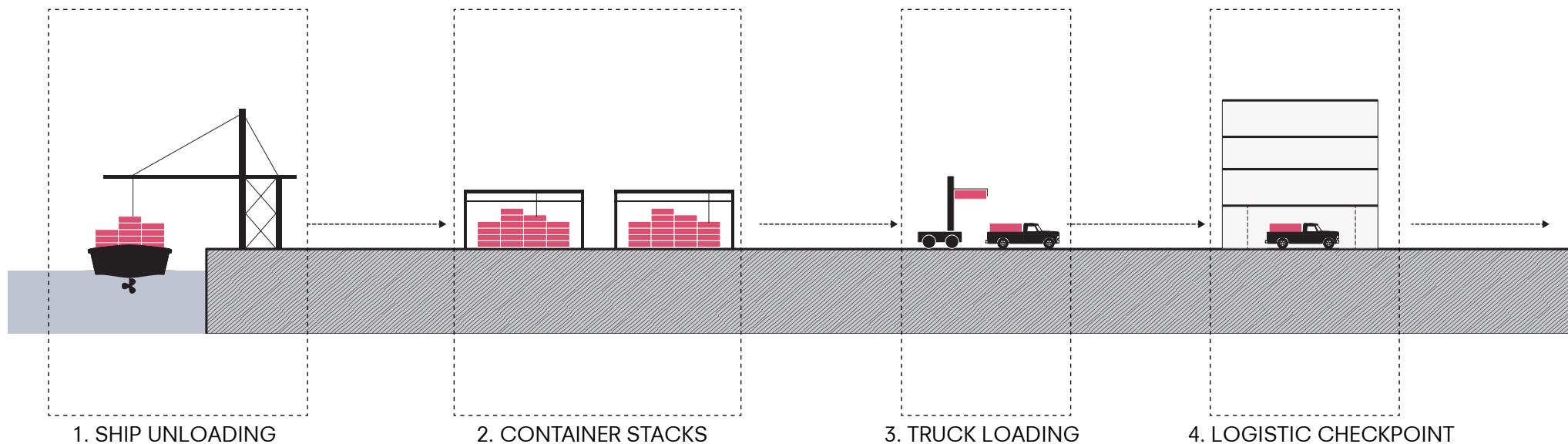
# FUNCTION DIVISION





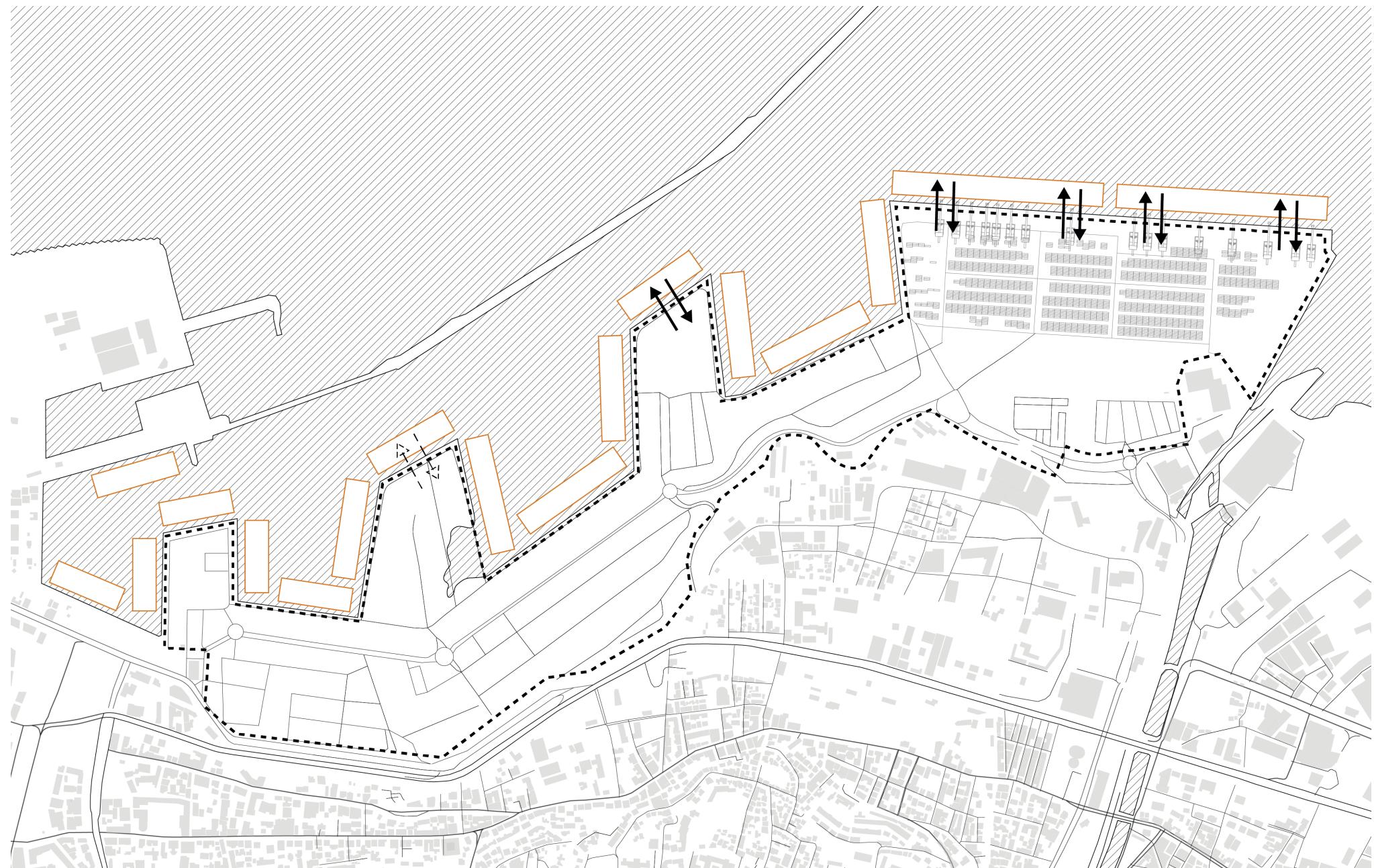
port context

# LOGISTIC PROGROCESS

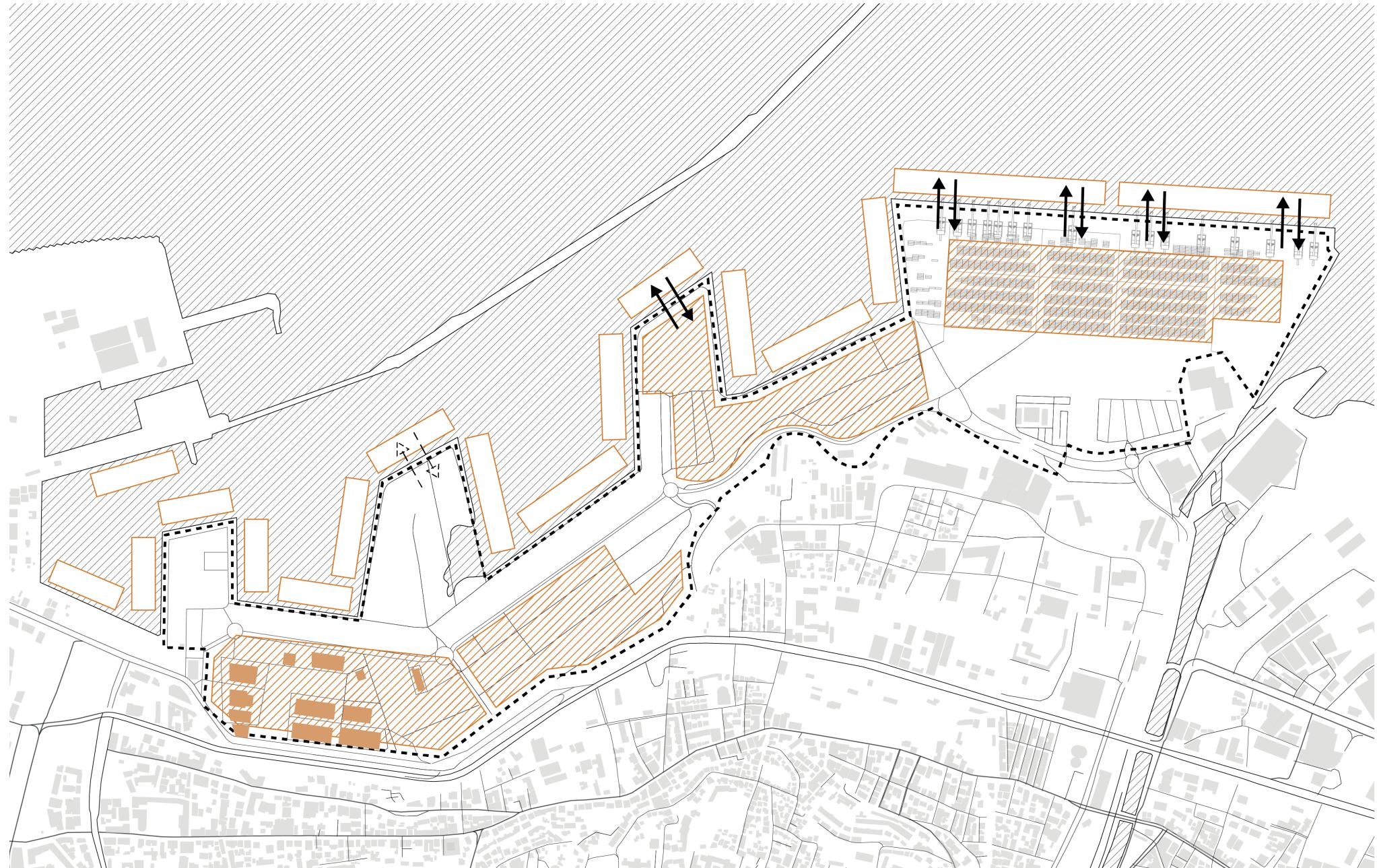


port context

# UNLOADING

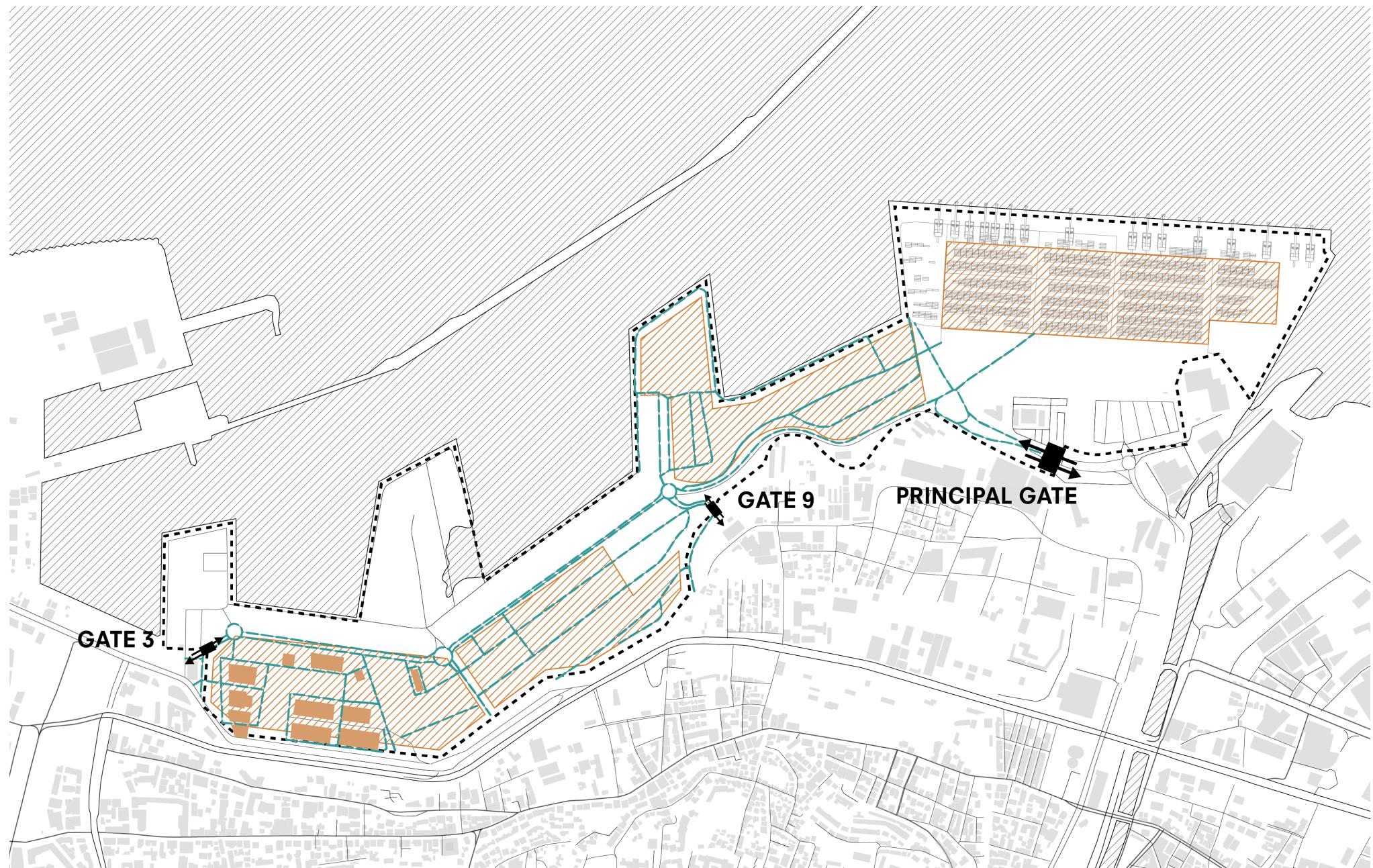


port context  
**STORAGE**



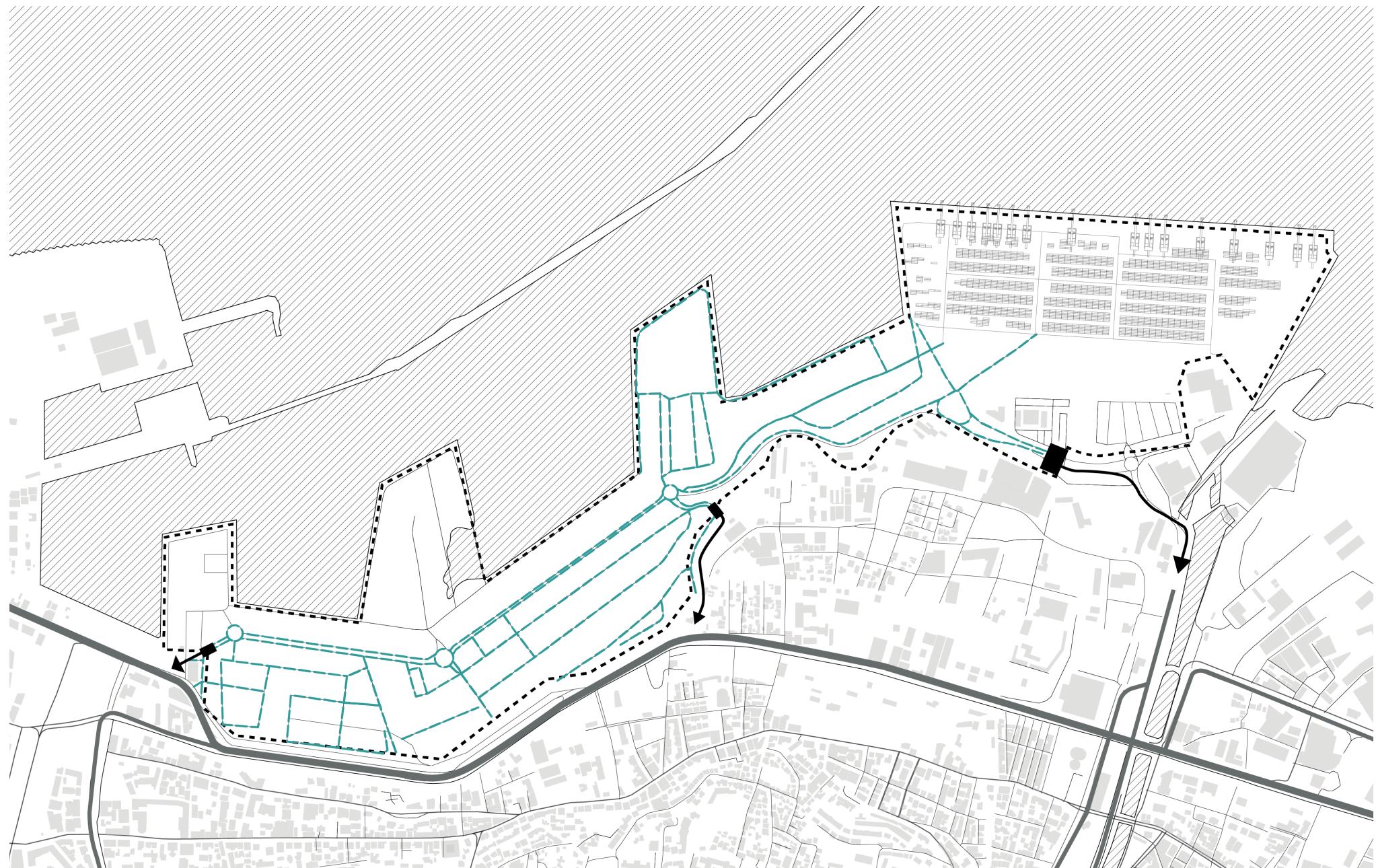
port context

# PASS THE CHECKPOINTS



port context

# HINTERLAND TRANSFER





# PORT TRANSFER

## Port of Tripoli: absorbing the crisis

The Lebanese Cabinet took a decision on Wednesday, August 5 to use ports in Tripoli in the north and the smaller ports of Sidon and Tyre to the south. Tripoli, as the second-largest logistics hub in

[Home](#) > [Middle East](#) > [Lebanon's Tripoli To Serve As Main Port After Beirut Blast](#)

Wed 5 Aug 2020

## Lebanon's Tripoli to serve as main port after Beirut blast

The government is assessing

[Home](#) > [Middle East](#) > [Lebanon's Tripoli Port Readies To Fill In For Blast-Hit Beirut](#)

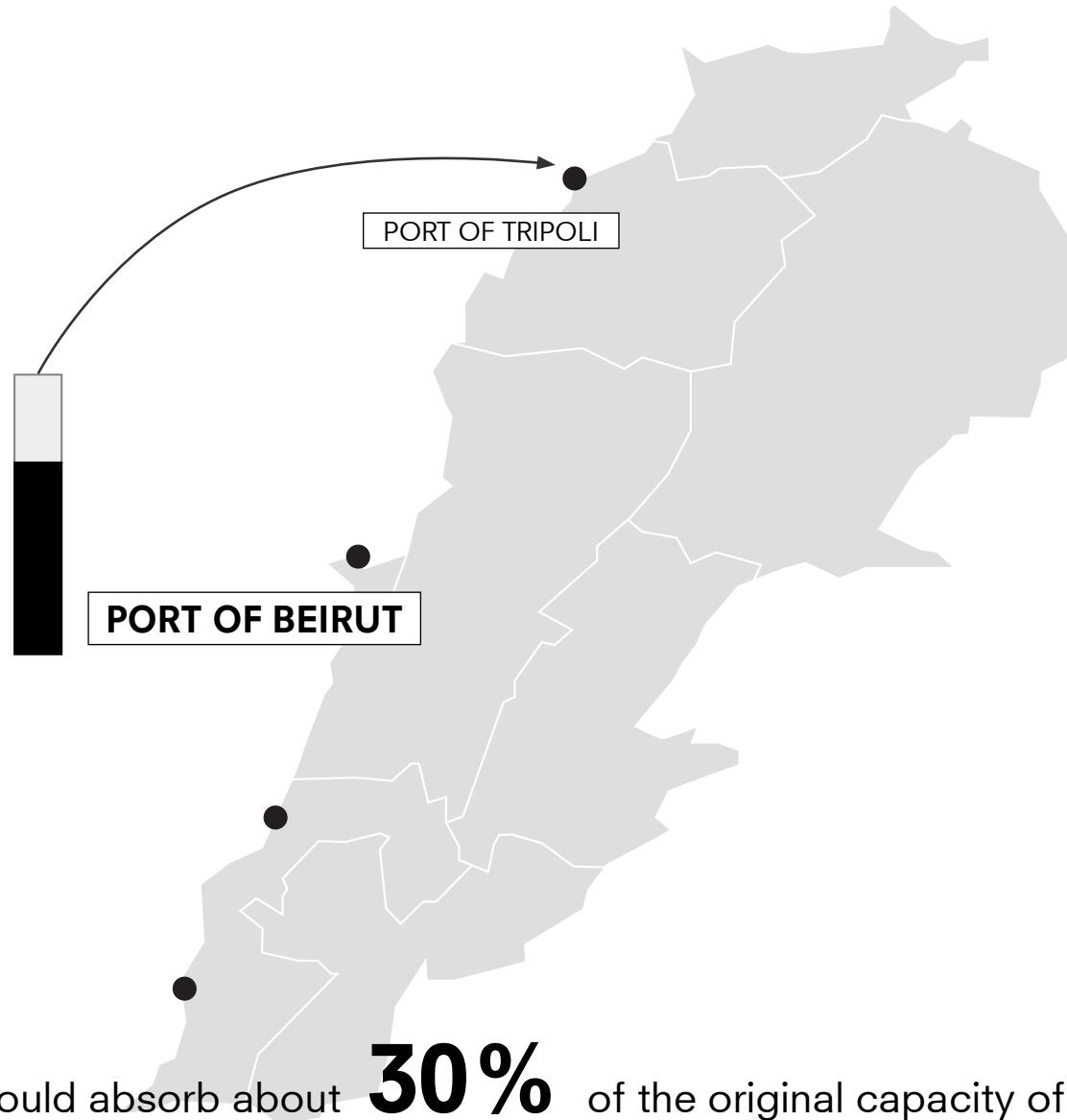
Thu 13 Aug 2020

## Lebanon's Tripoli port readies to fill in for blast-hit Beirut

Tripoli port's capacity is smaller than Beirut's, through which the vast majority of Lebanon's food and other imports used to transit

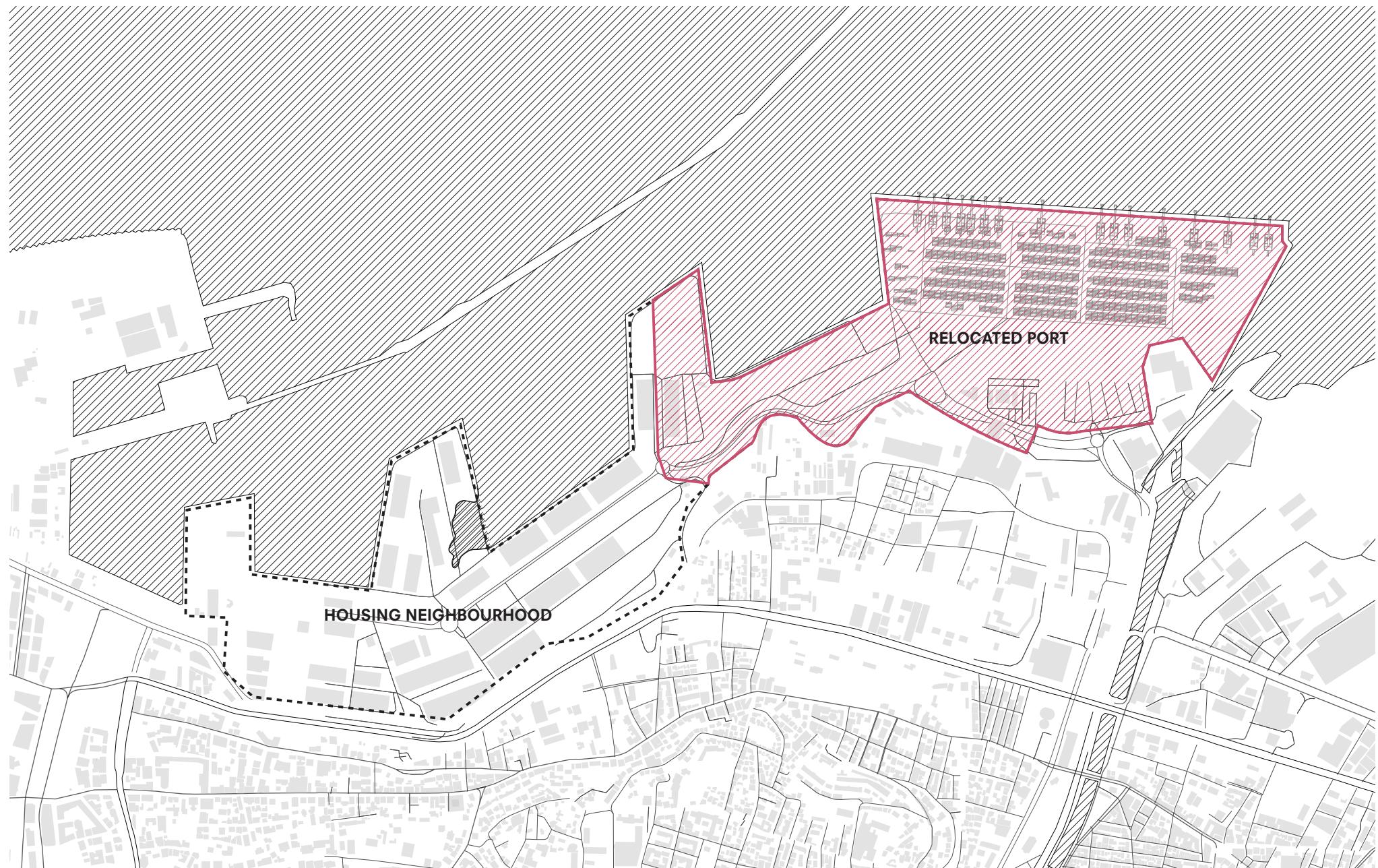
port context

# PORT TRANSFER



port context

# CONDENSED NEW PORT

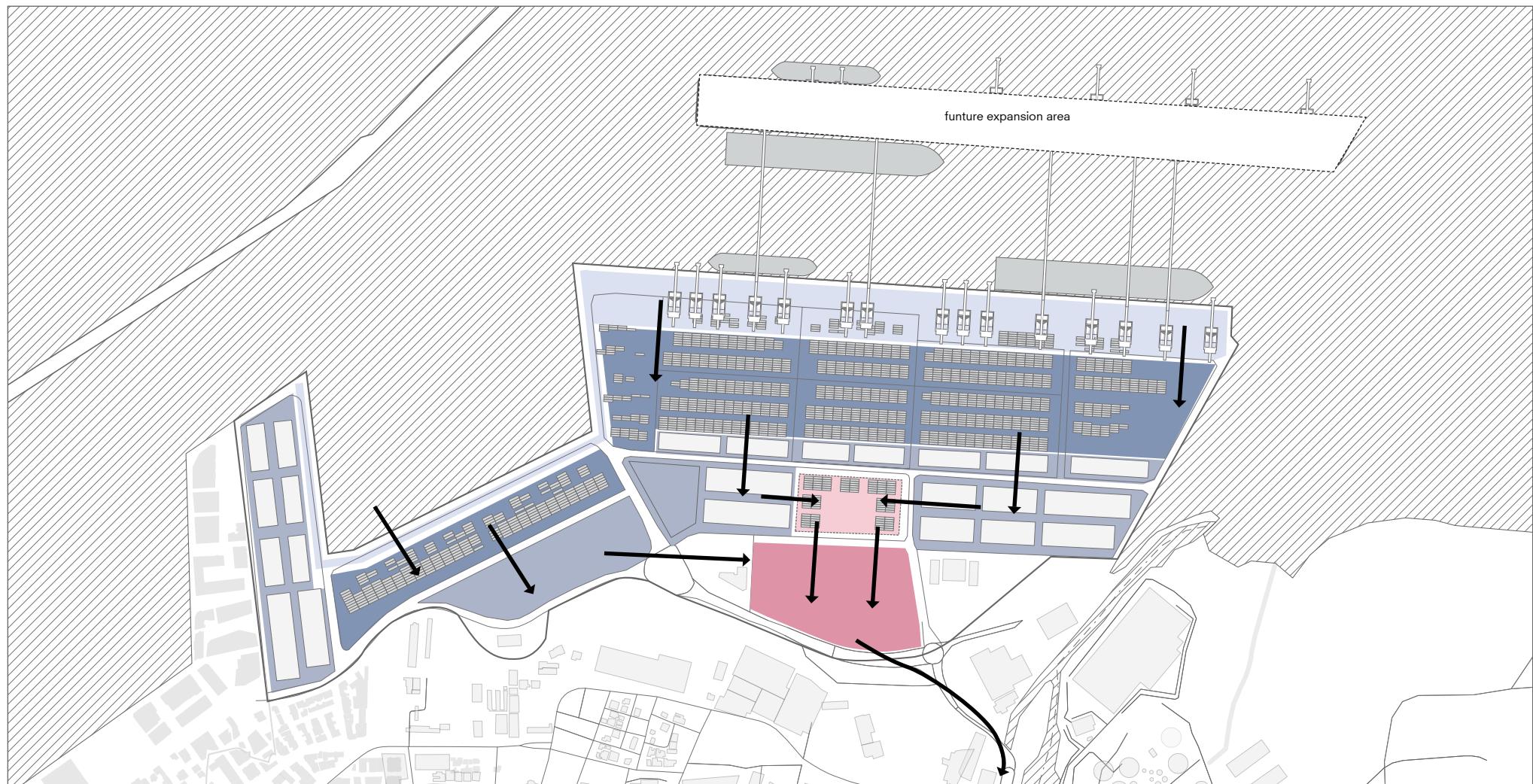


# SITE RESEARCH

site research

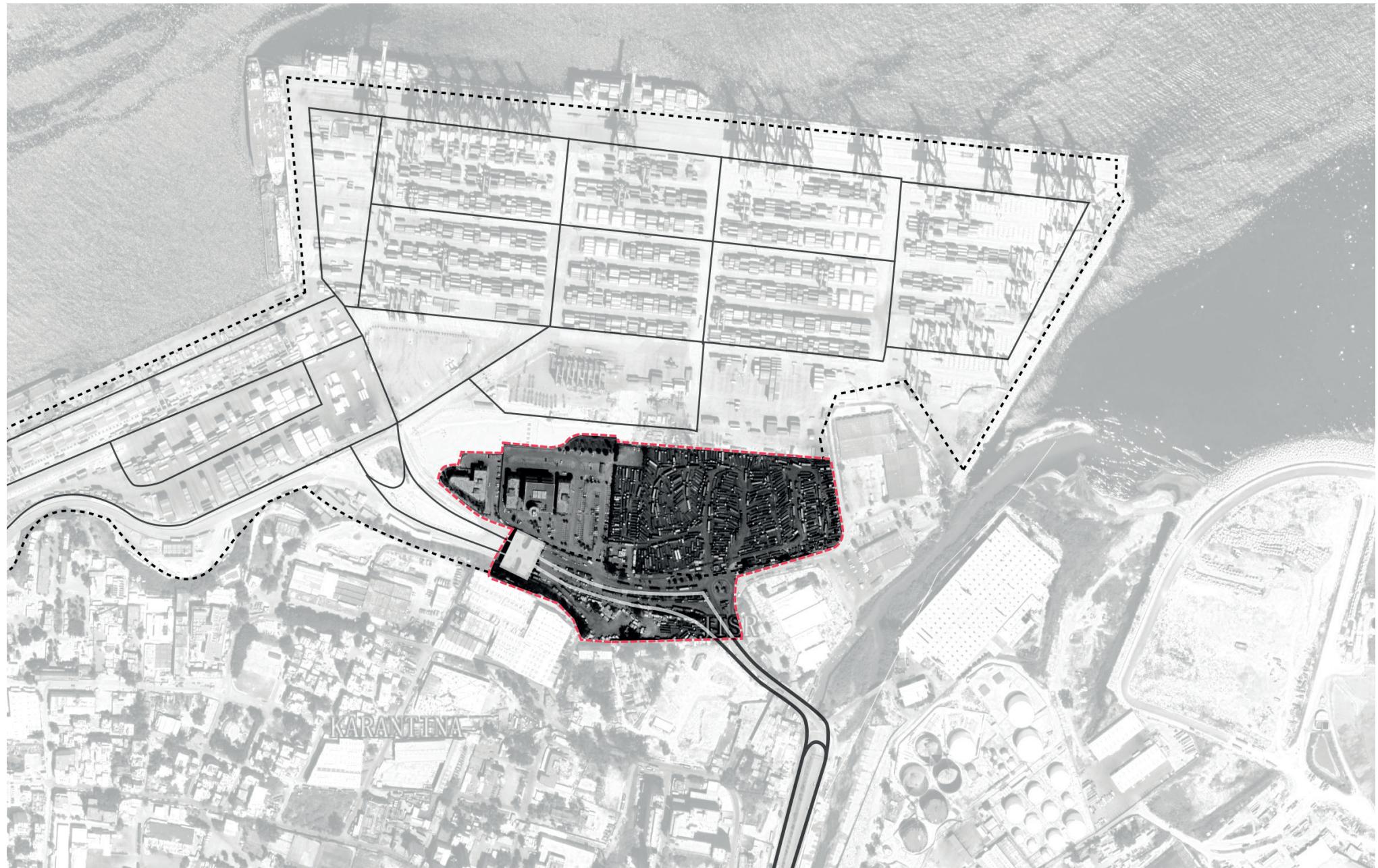
# LOGISTIC PROCESS

SHIP UNLOADING → CONTAINER STACKS STORAGE AREA → TRUCK LOADING → LOGISTIC CHECKPOINT → CITY HIGHWAY NETWORK



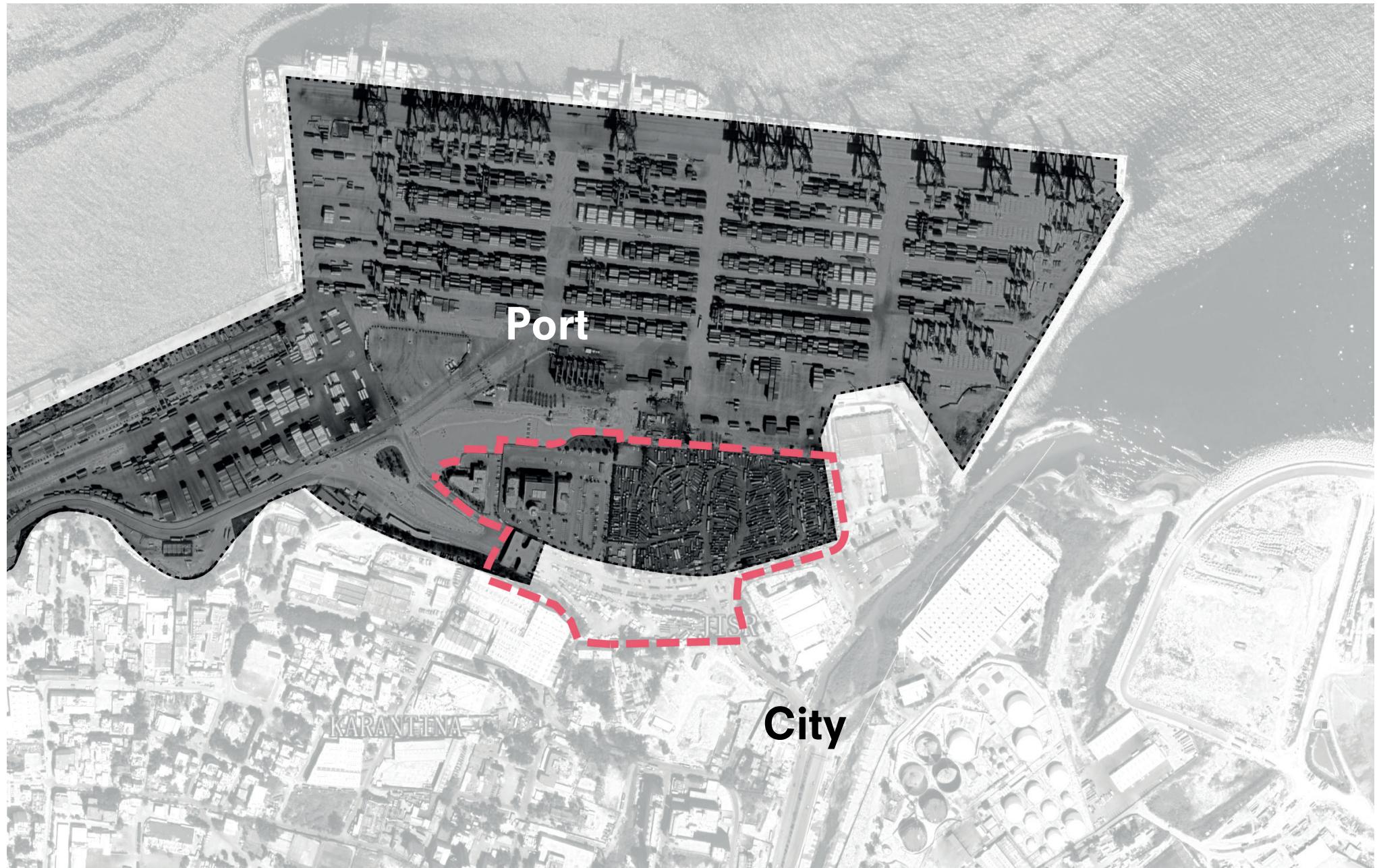
site research

# PORT ENTRANCE AREA

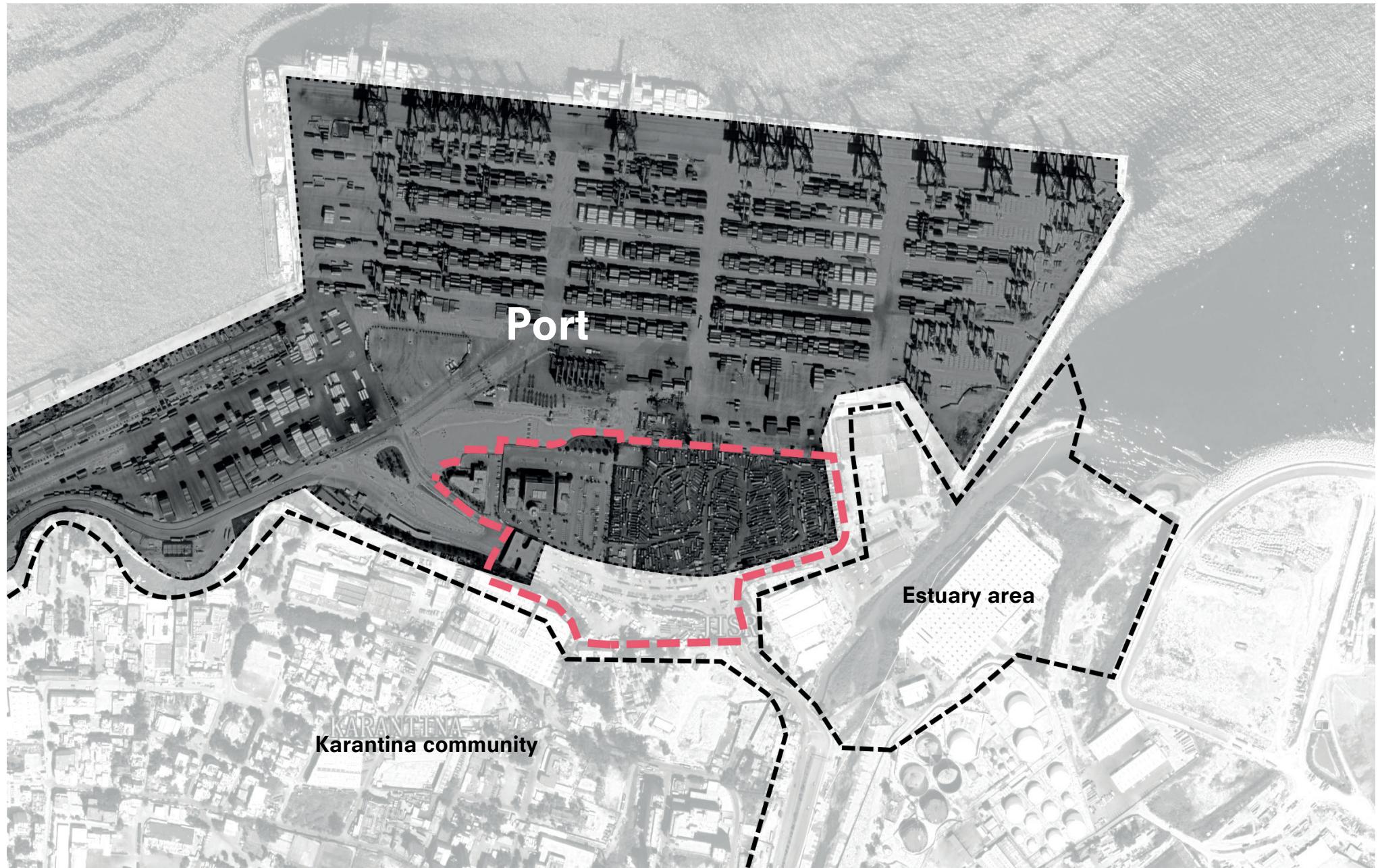


site research

# BORDER

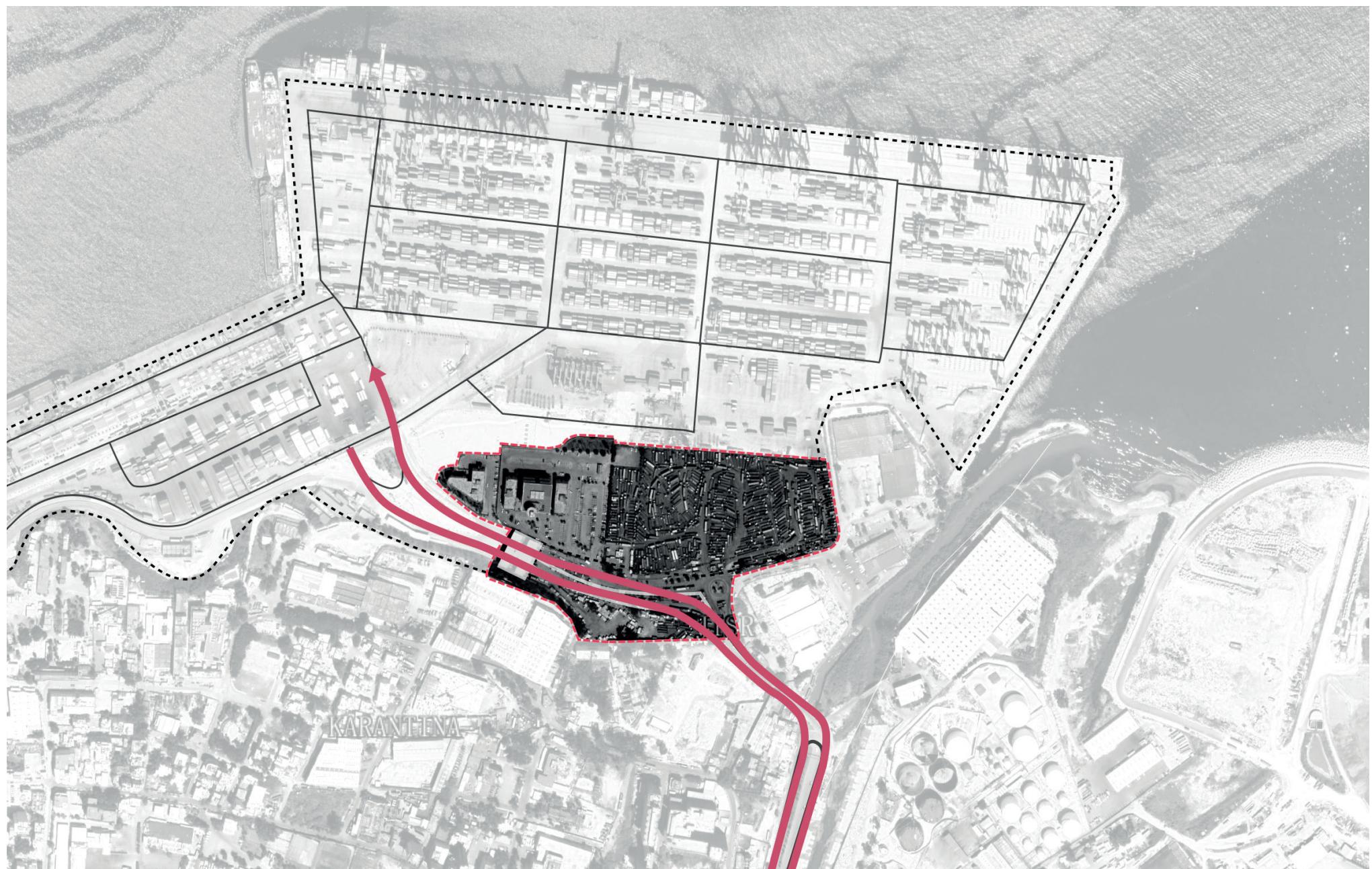


# SURROUNDING

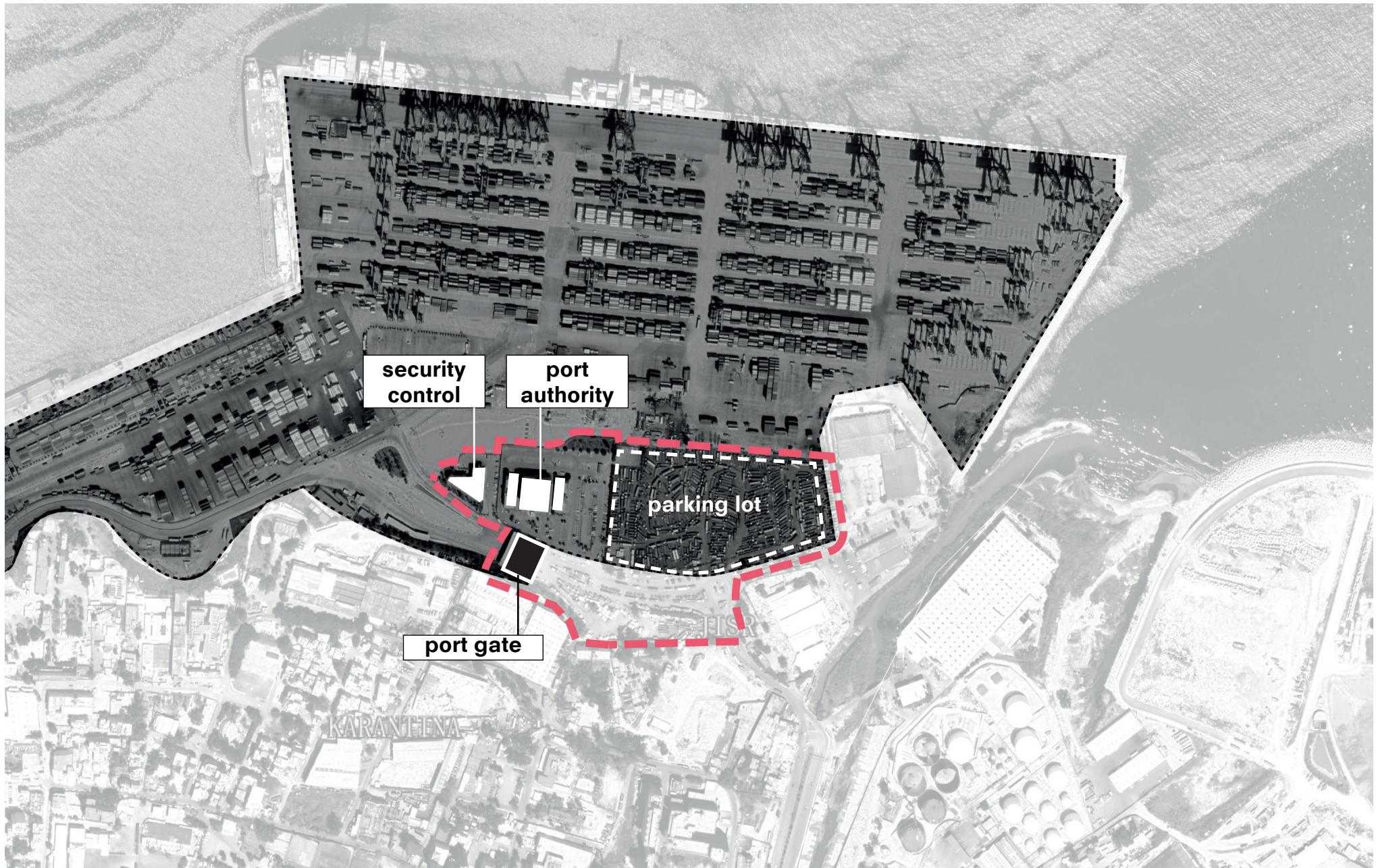


site research

# FLOW



# EXISTING FUNCTION

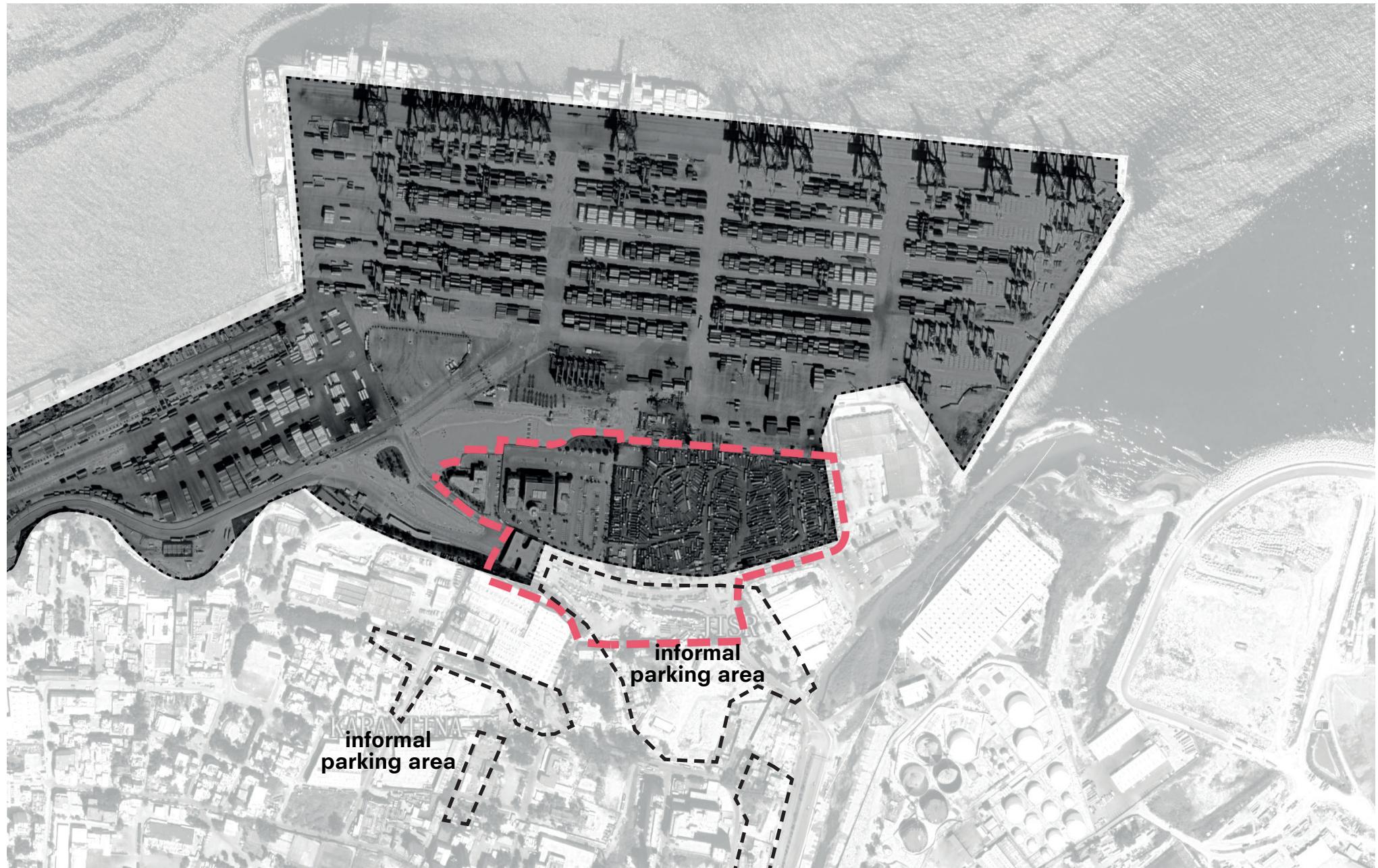


site research

# CONGESTED ENTRANCE

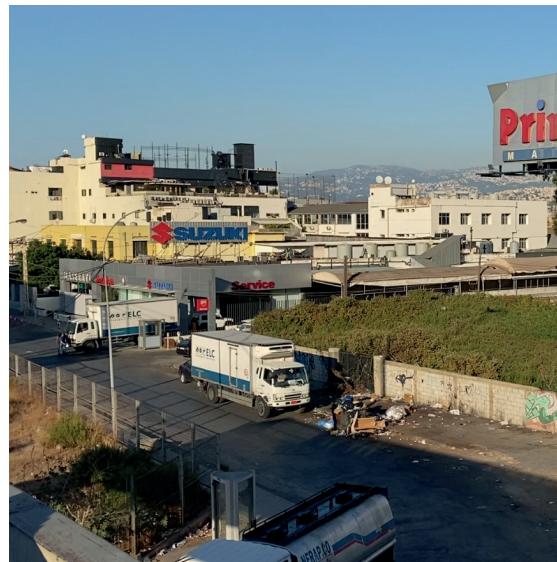


# INFORMAL PARKING

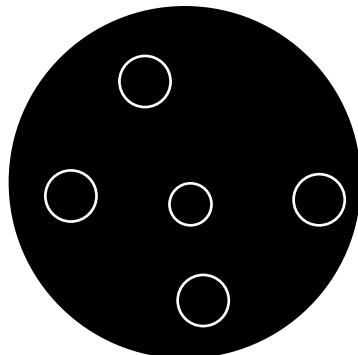


site research

# INFORMAL PARKING

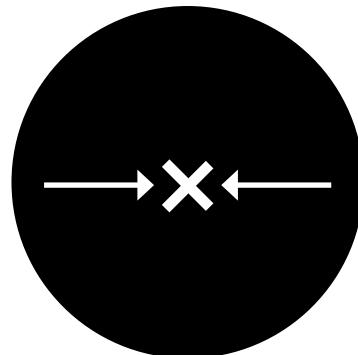


# KEY ISSUE



## Scattered elements

Vehicle workshops, parking, checkpoints, rest cabins... ... All the related function scattered on the field.



## Unorganized Traffic System

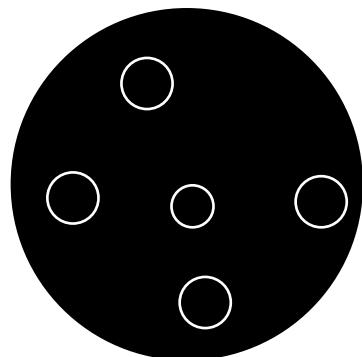
Unorganized traffic system and congested trucks lead to poor connectivity between cities and ports



## Interference between Different Activities

Interweaving of Different users activities: goods, people, trucks

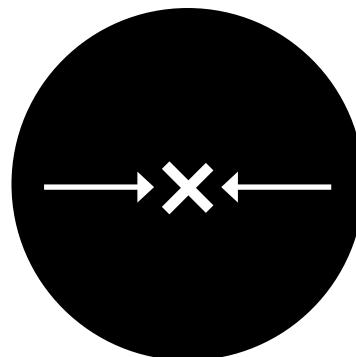
site research  
**RESPONSE**



**Scattered elements**



**Condense**



**Unorganized Traffic System**



**Supervision**

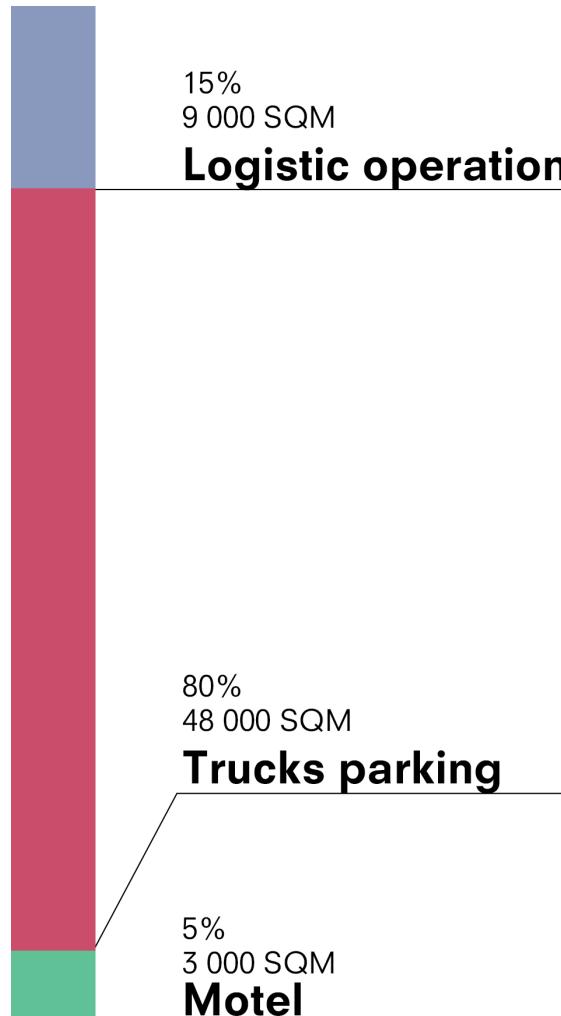


**Interference between  
Different Activities**

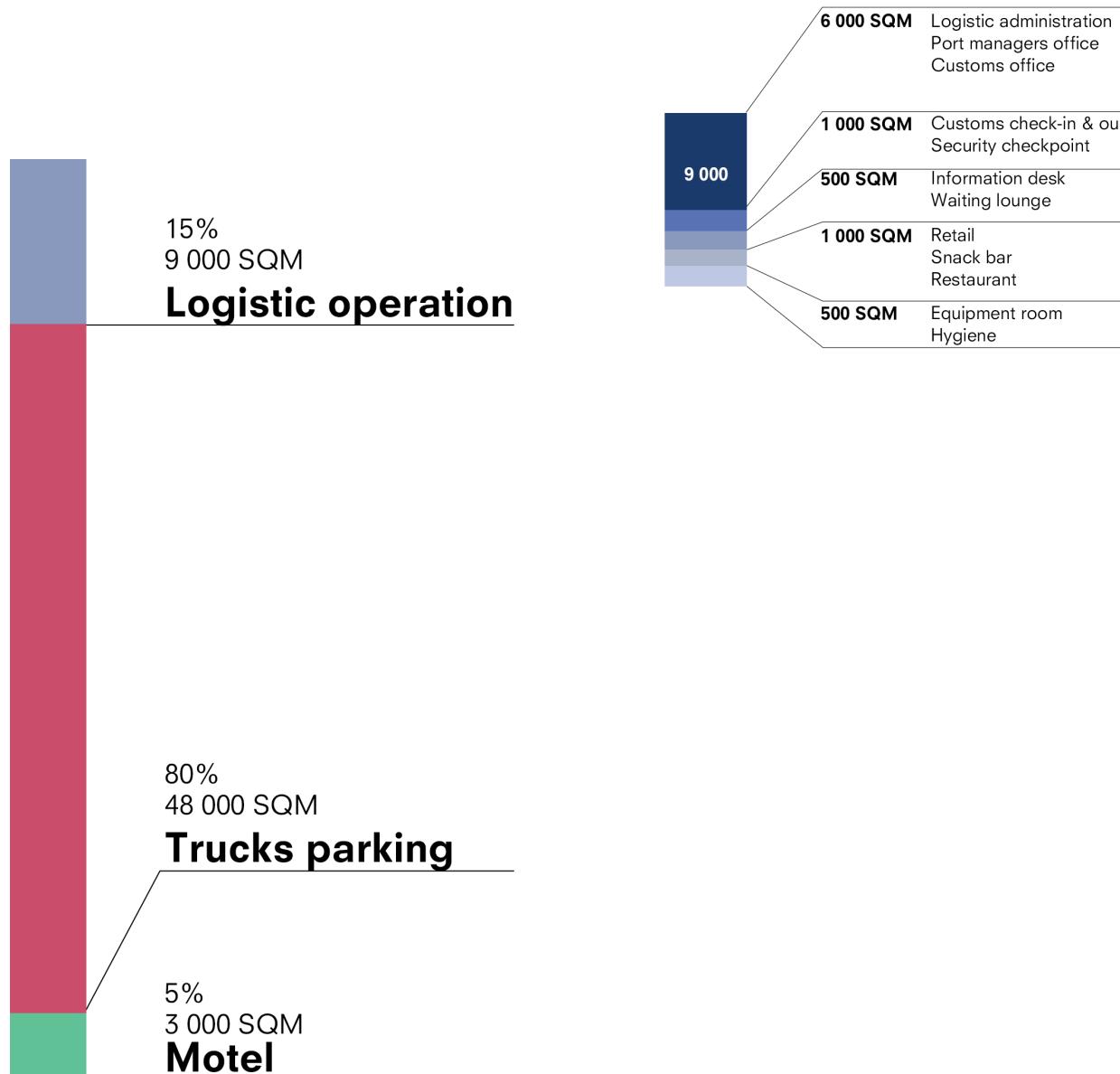


**Divide**

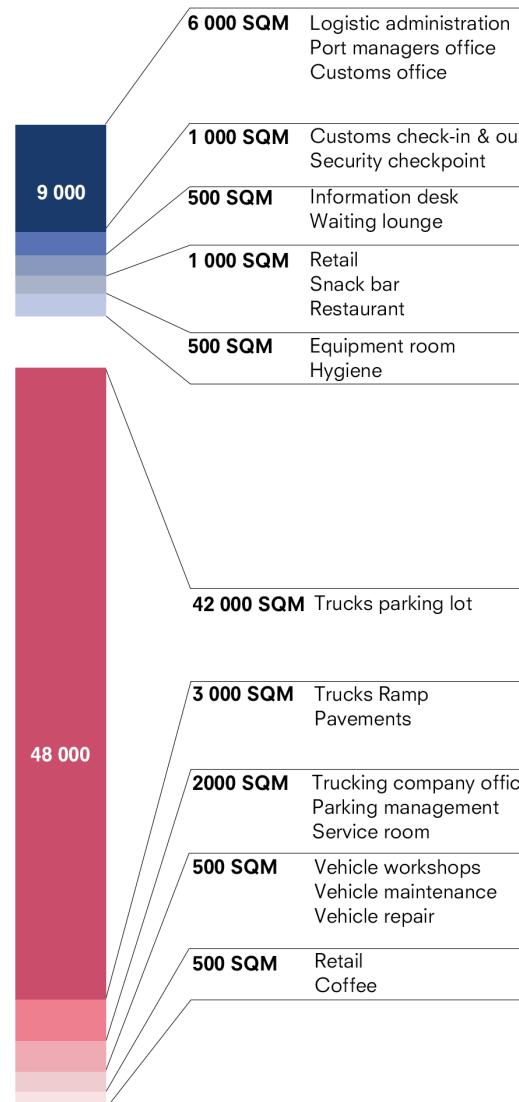
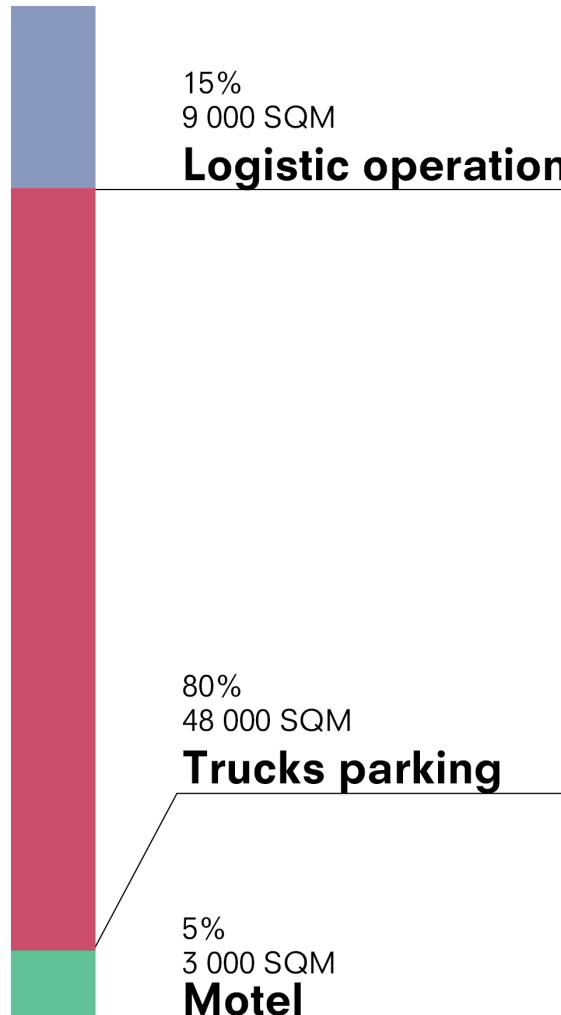
# PROGRAM



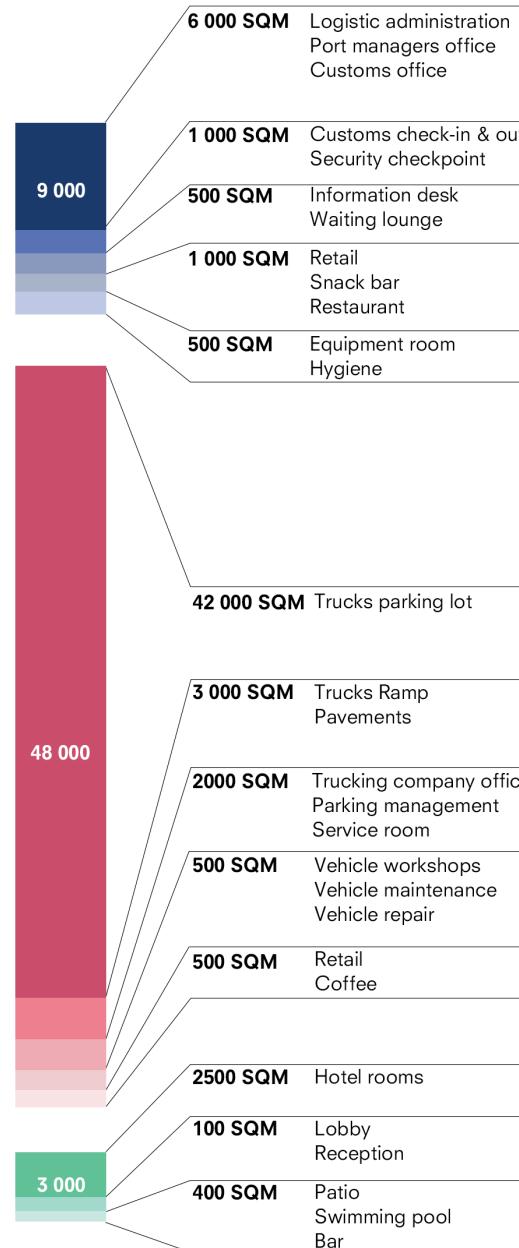
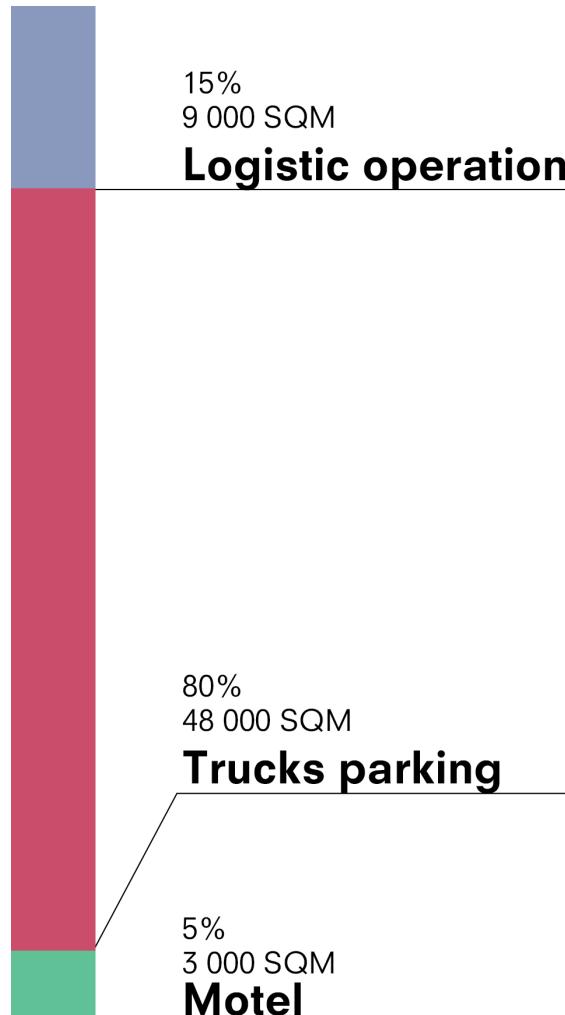
# PROGRAM



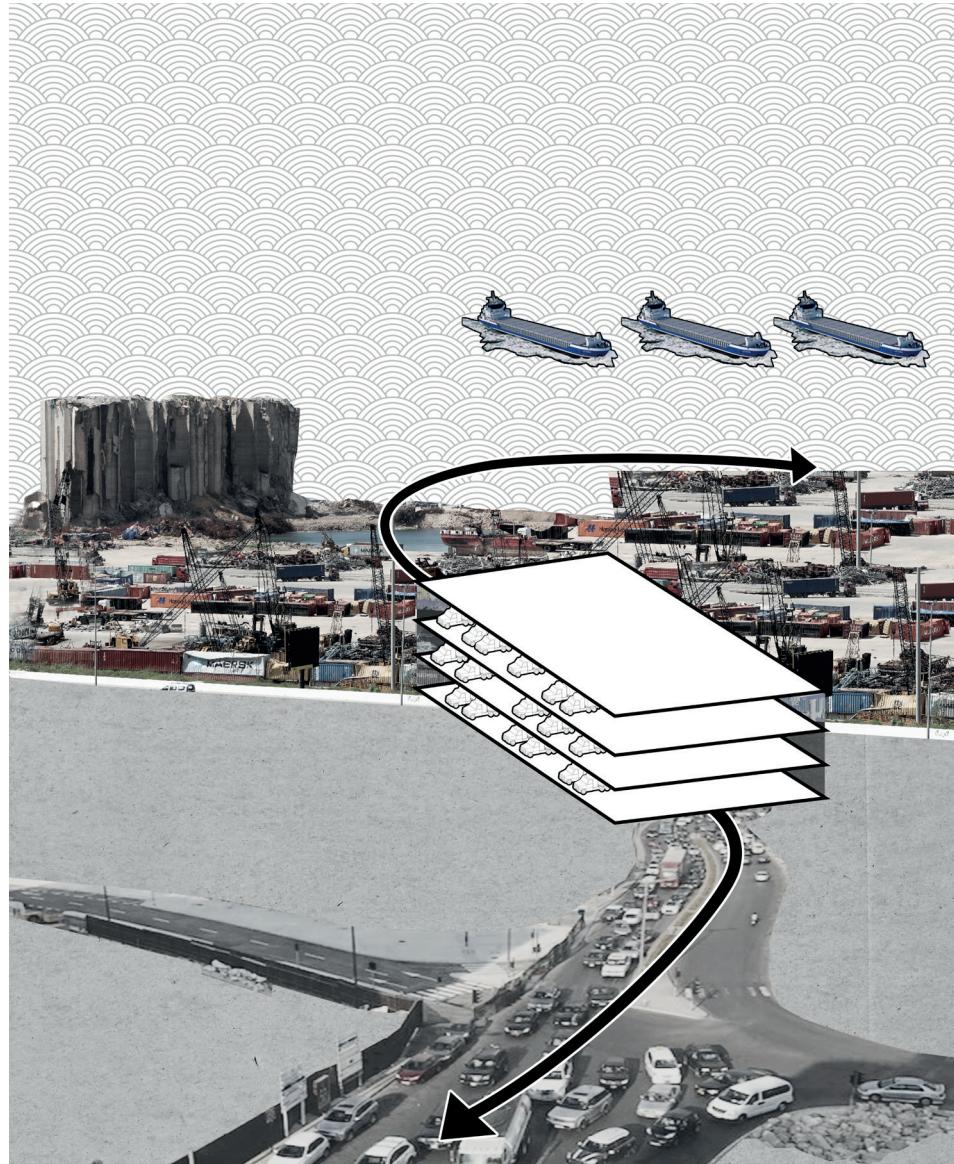
# PROGRAM



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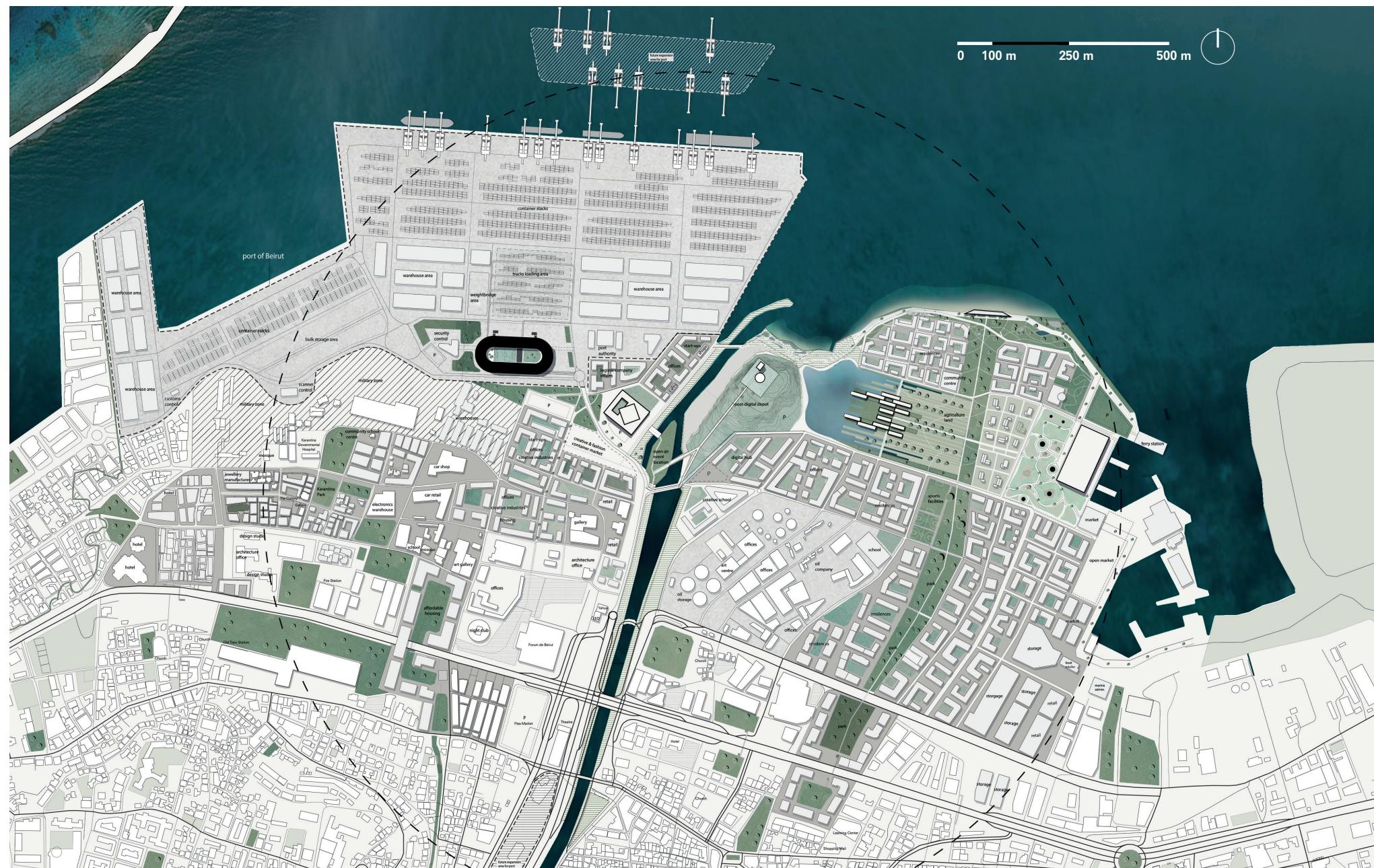
# GARAGE



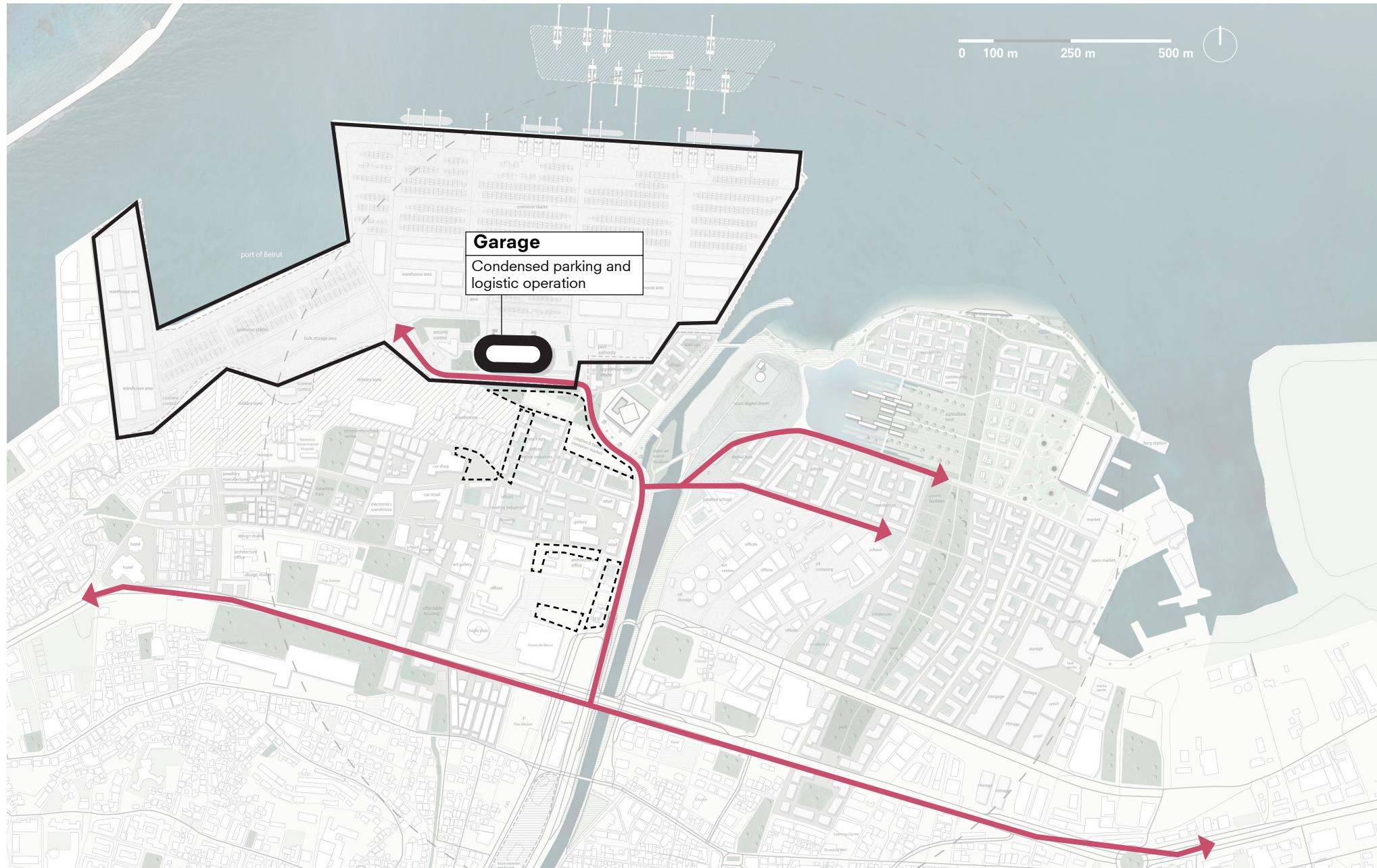
- A parking building for trucks
- A complex serves for drivers and port logistic operation

# site research

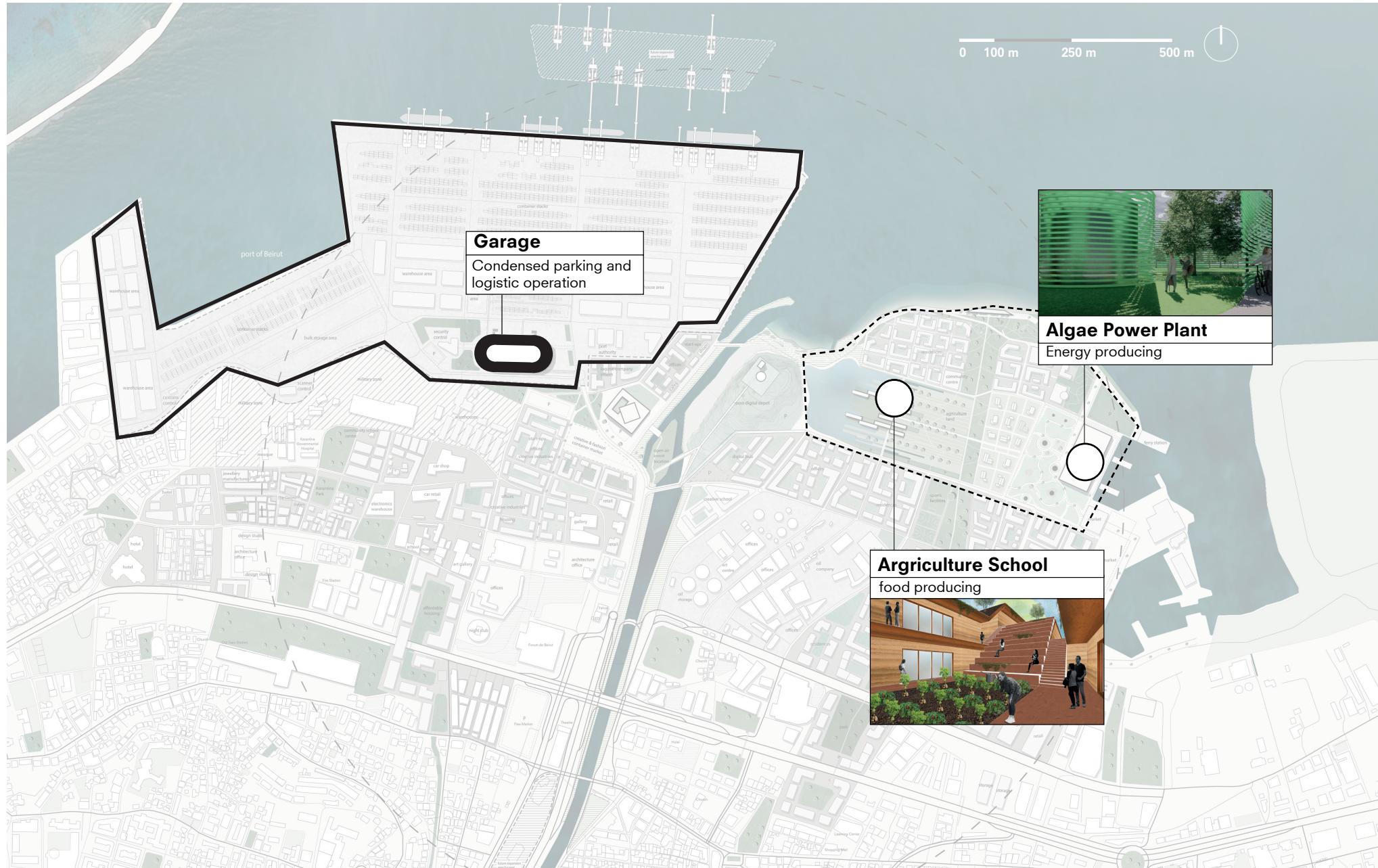
# URBAN PROPOSAL



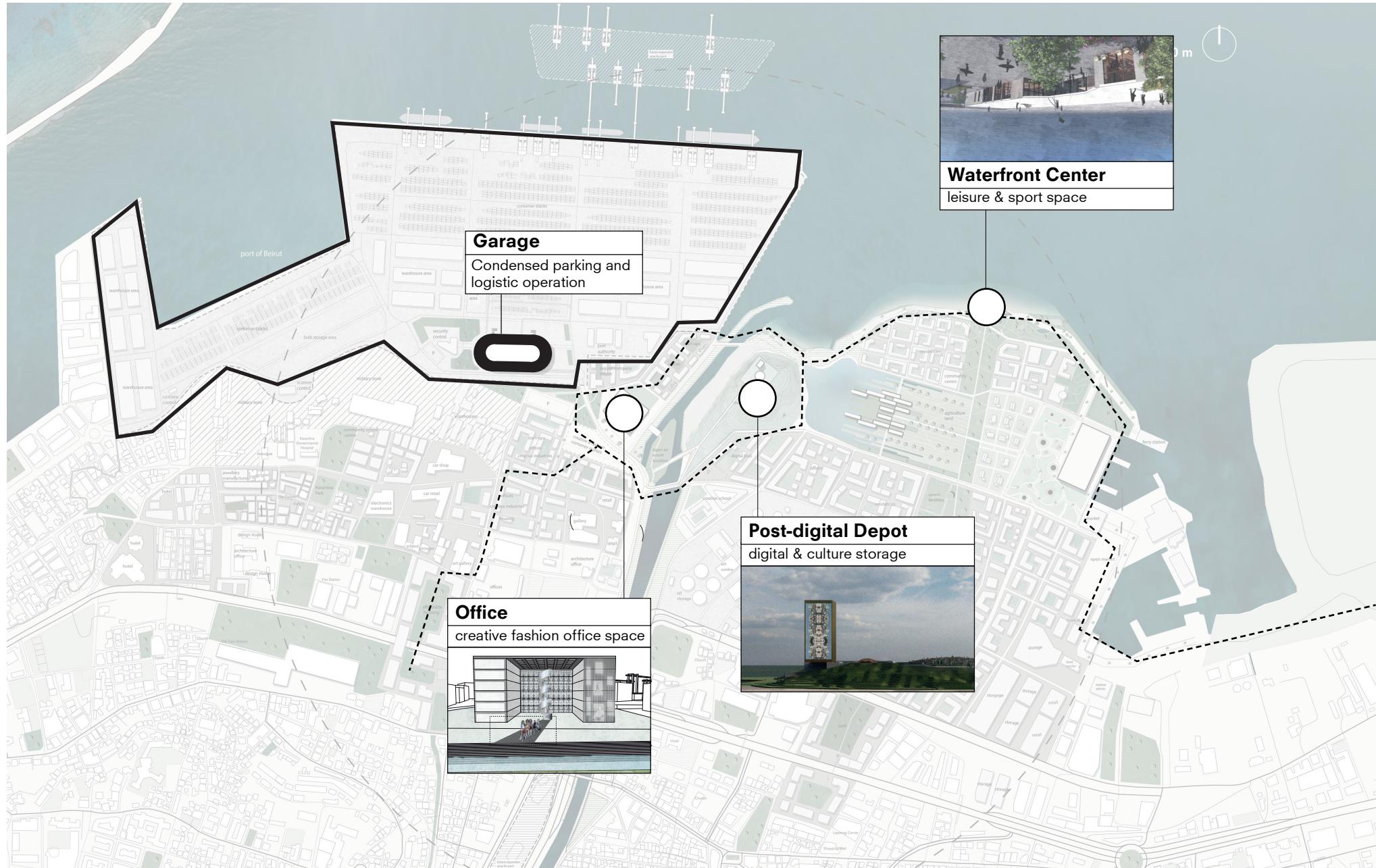
# STRENGTHEN CONNECTION



site research  
**COLLABORATION**



# WATERFRONT

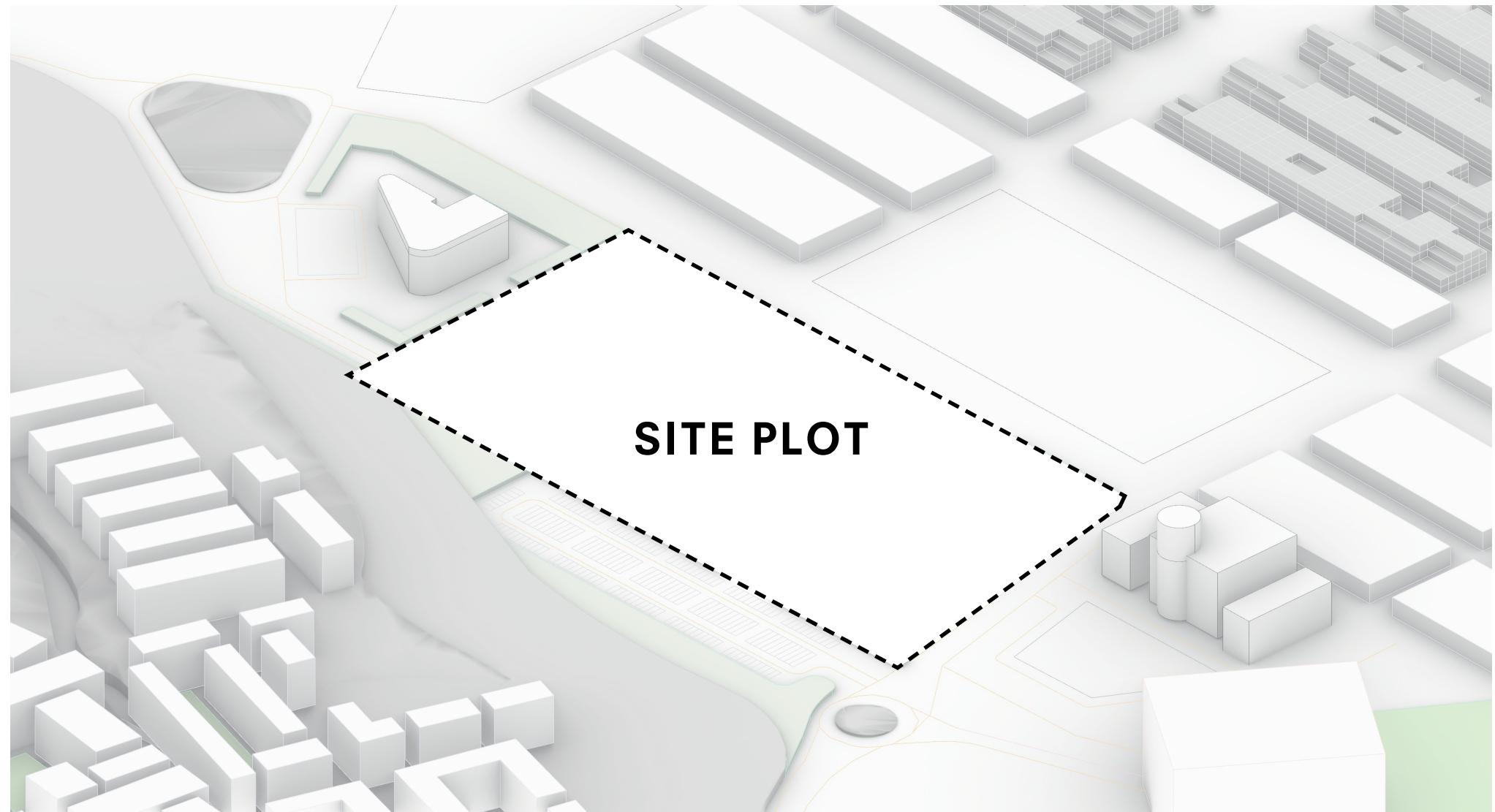


site research  
**URBAN PROPOSAL**

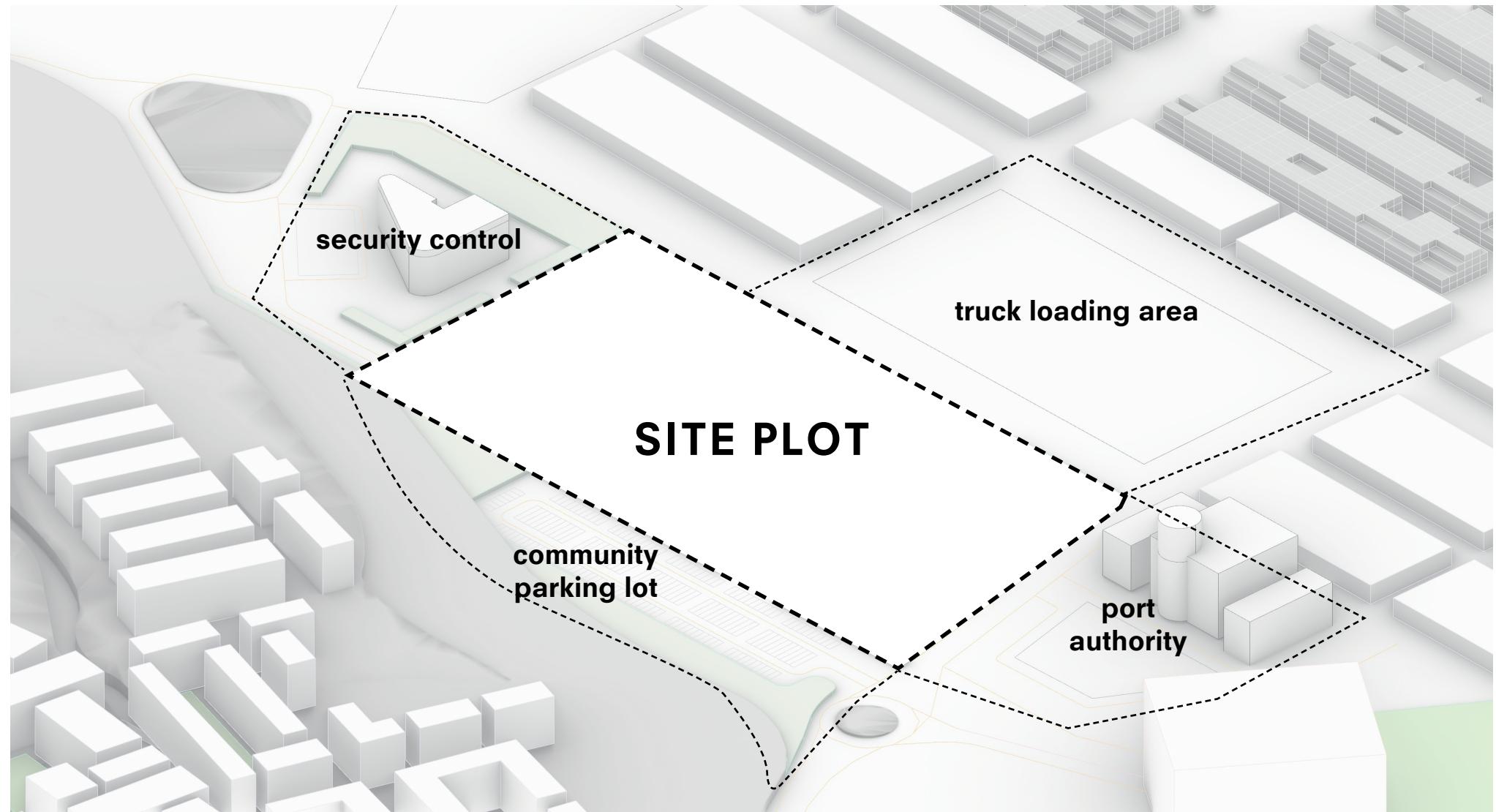


# INTERVENTION

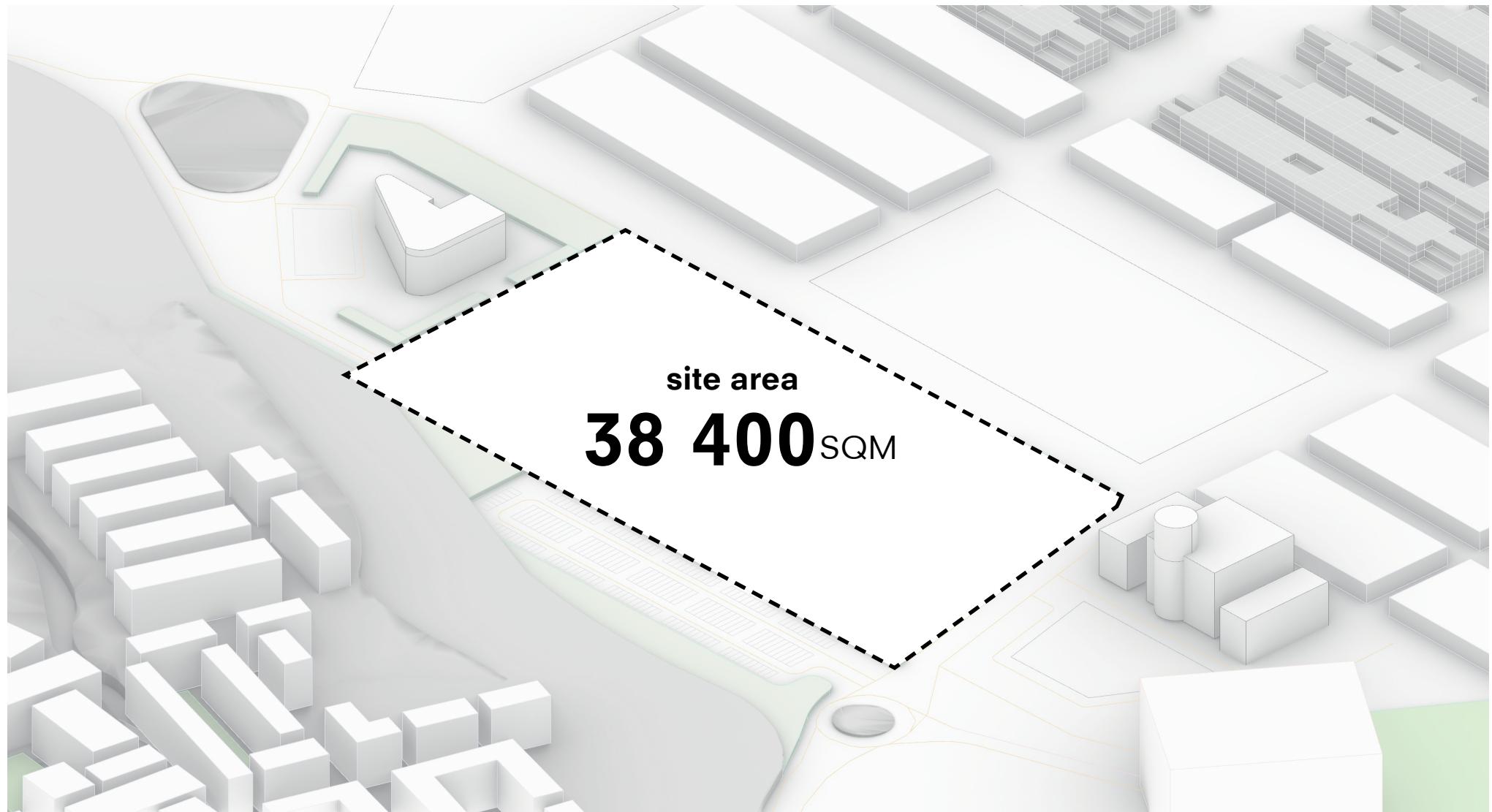
intervention  
**SITE PLOT**



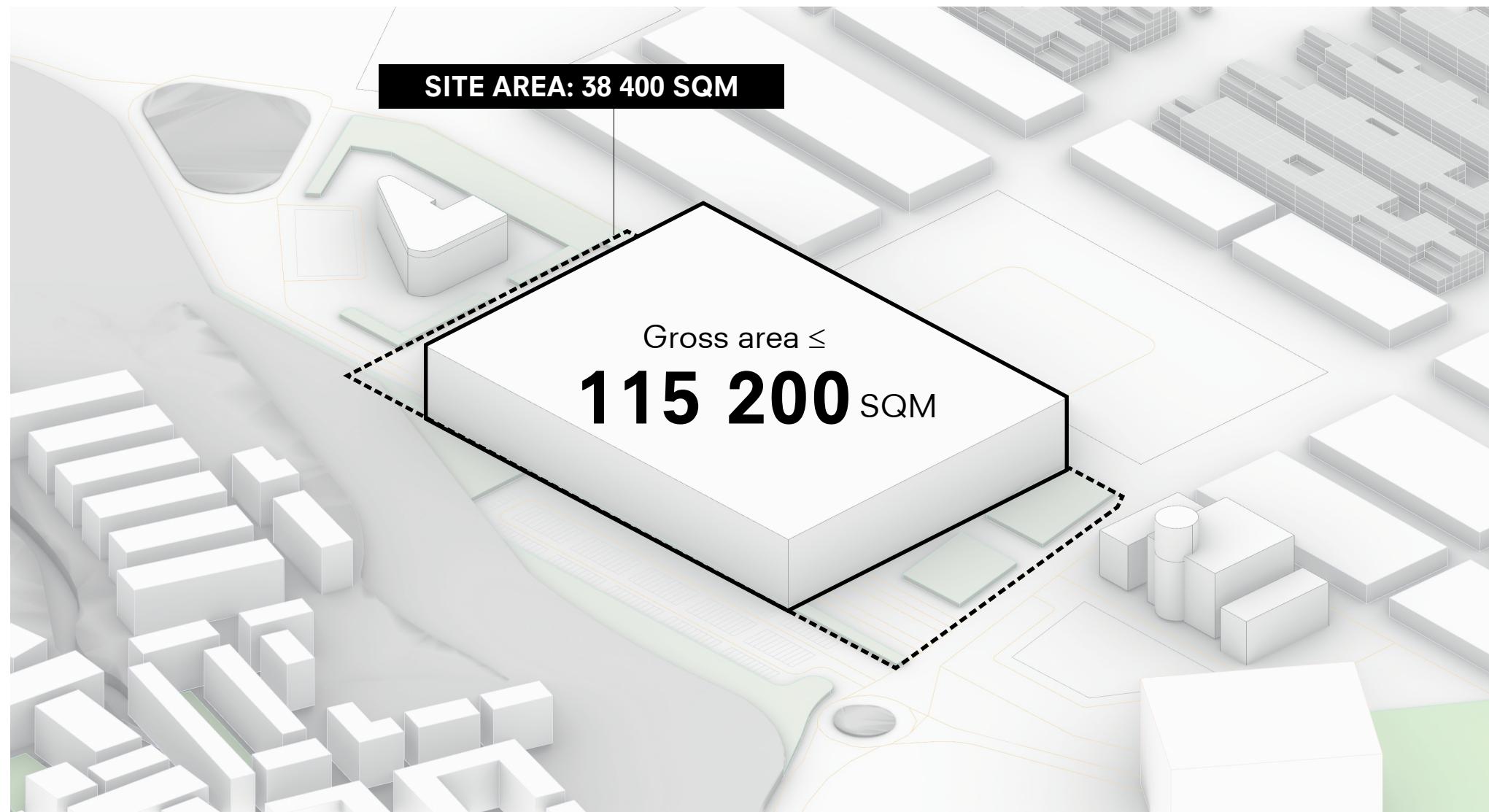
intervention  
**SITE PLOT**



intervention  
**SITE PLOT**



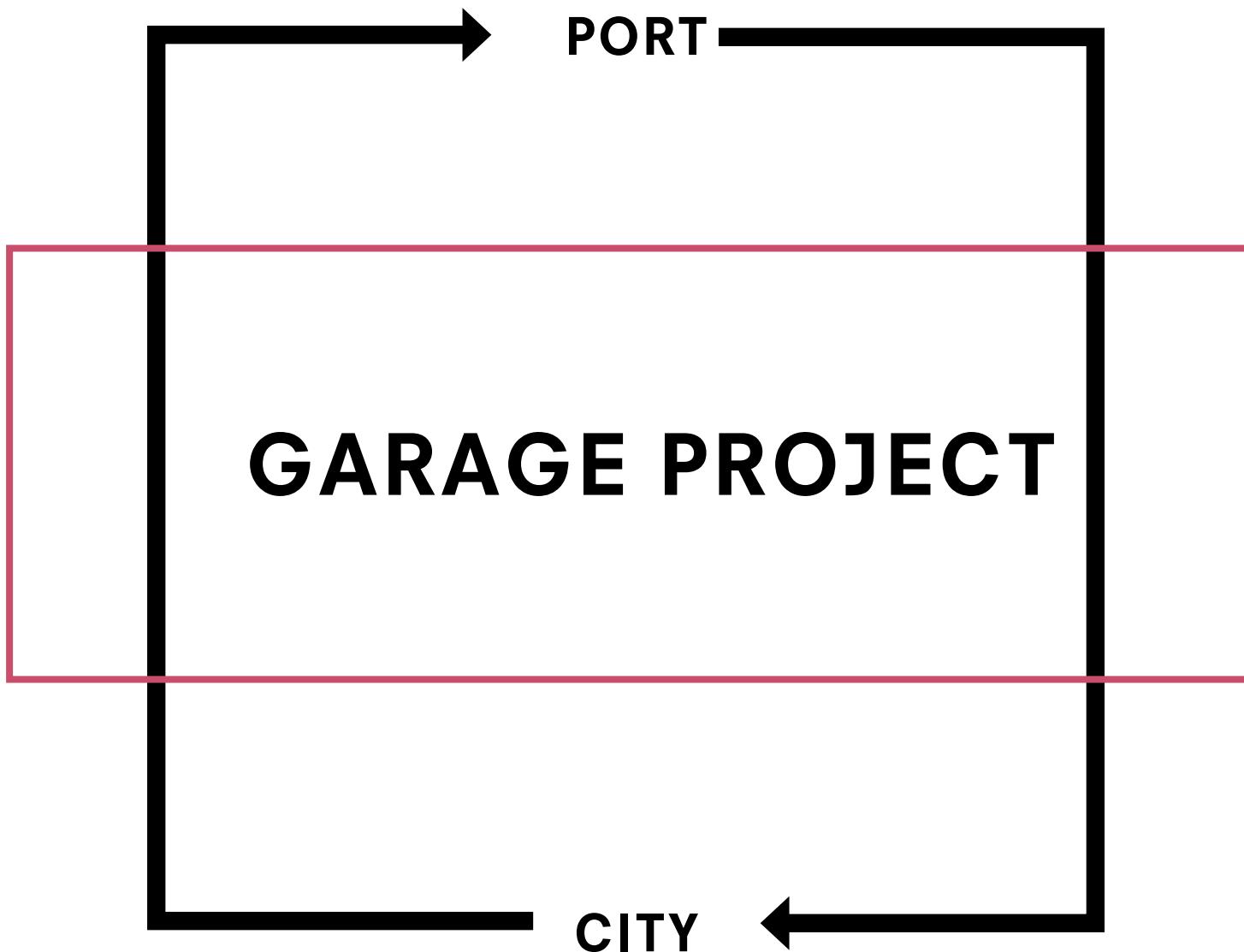
intervention  
**URBAN LIMIT**



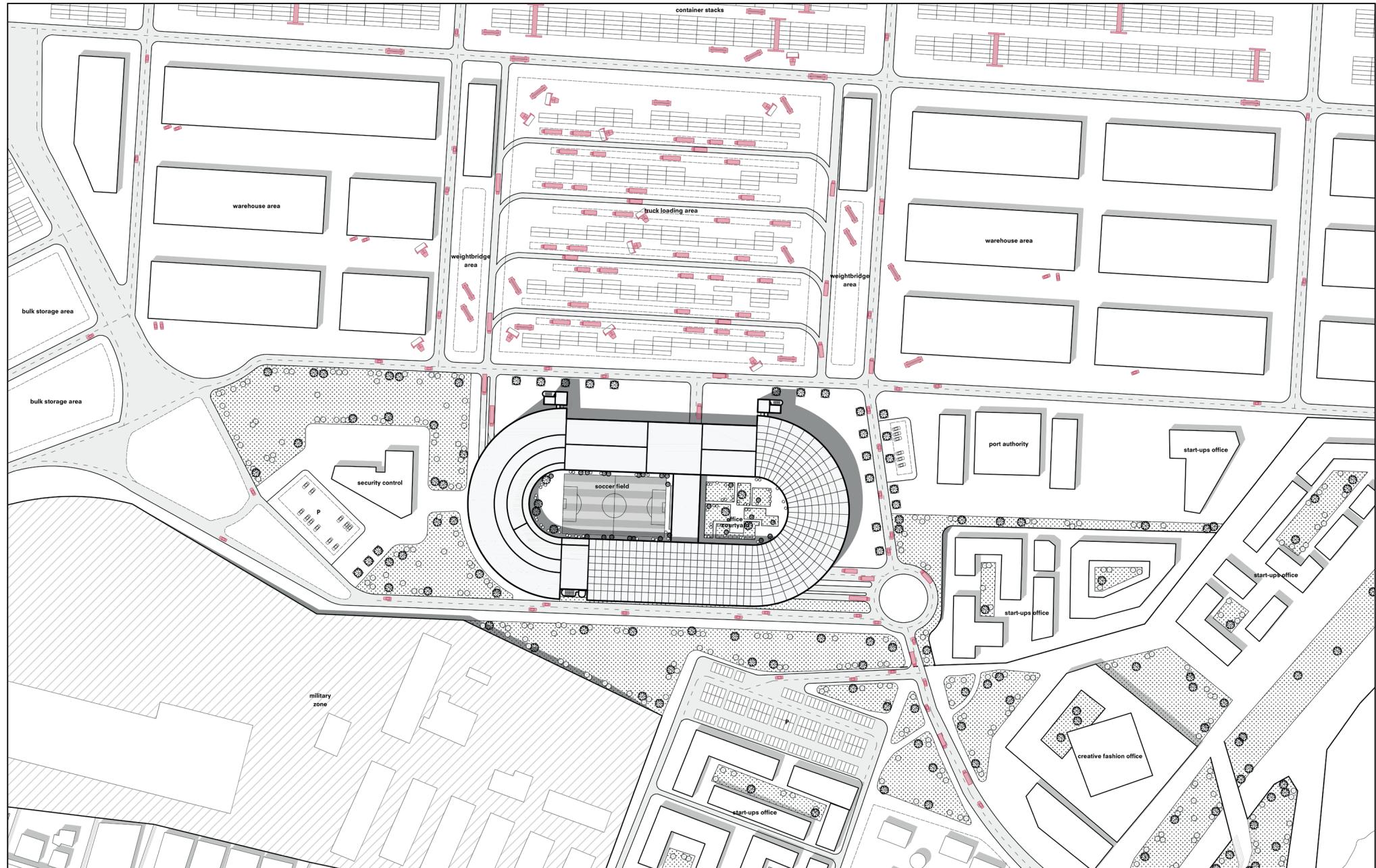
**FAR no more than 3  
Coverage ratio no more than 70%**

intervention

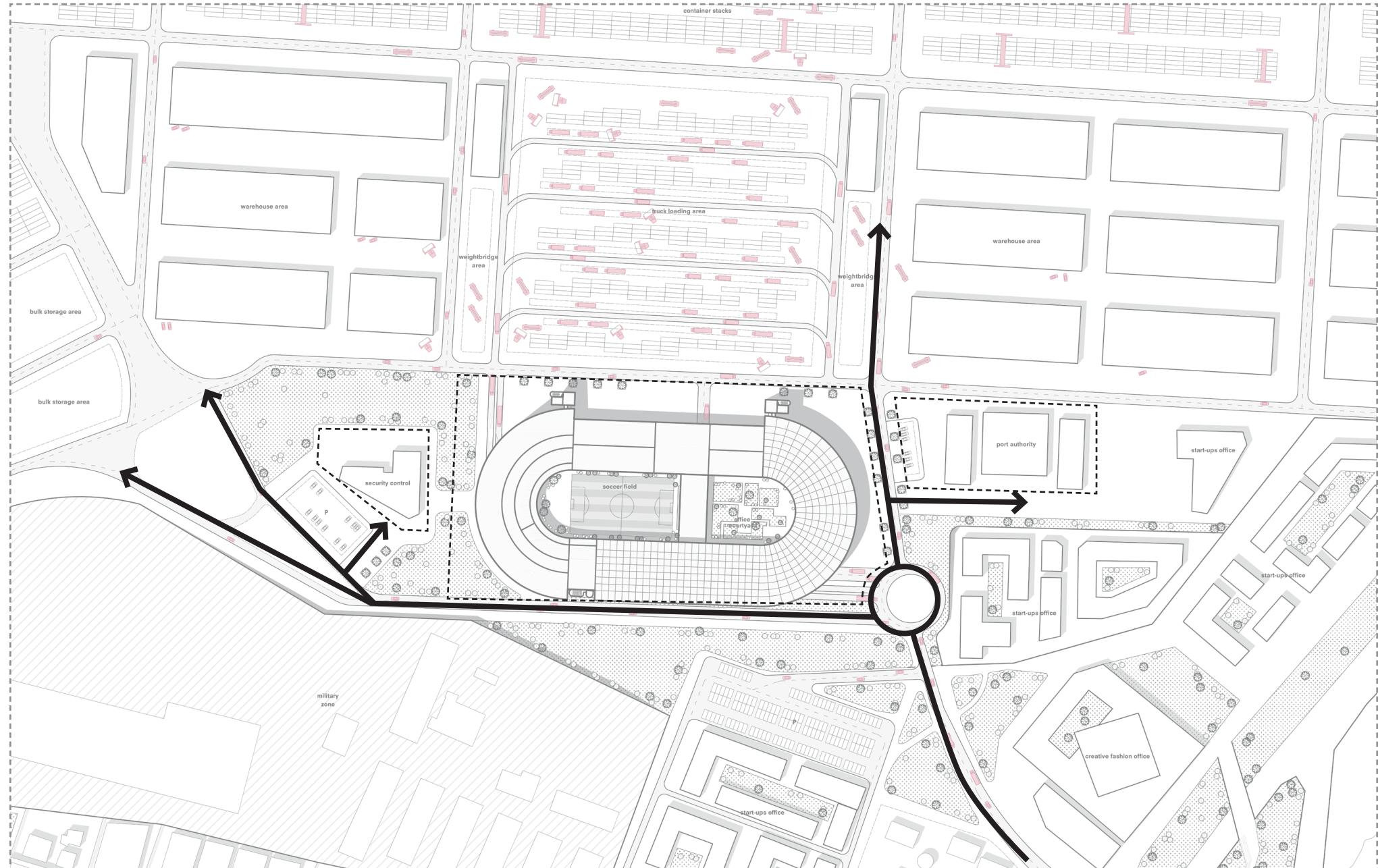
# CIRCULATION



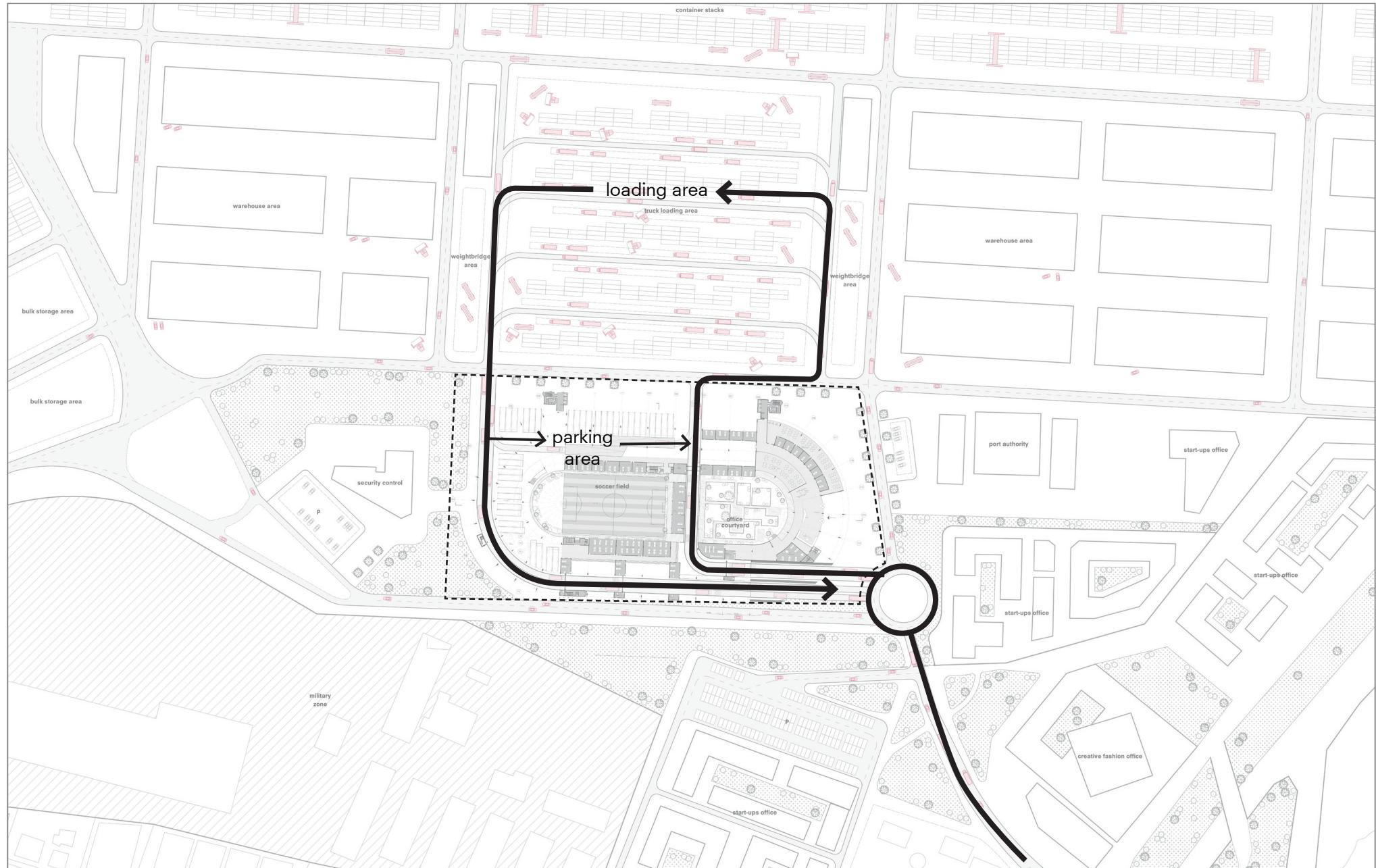
intervention  
**SITE PLAN**



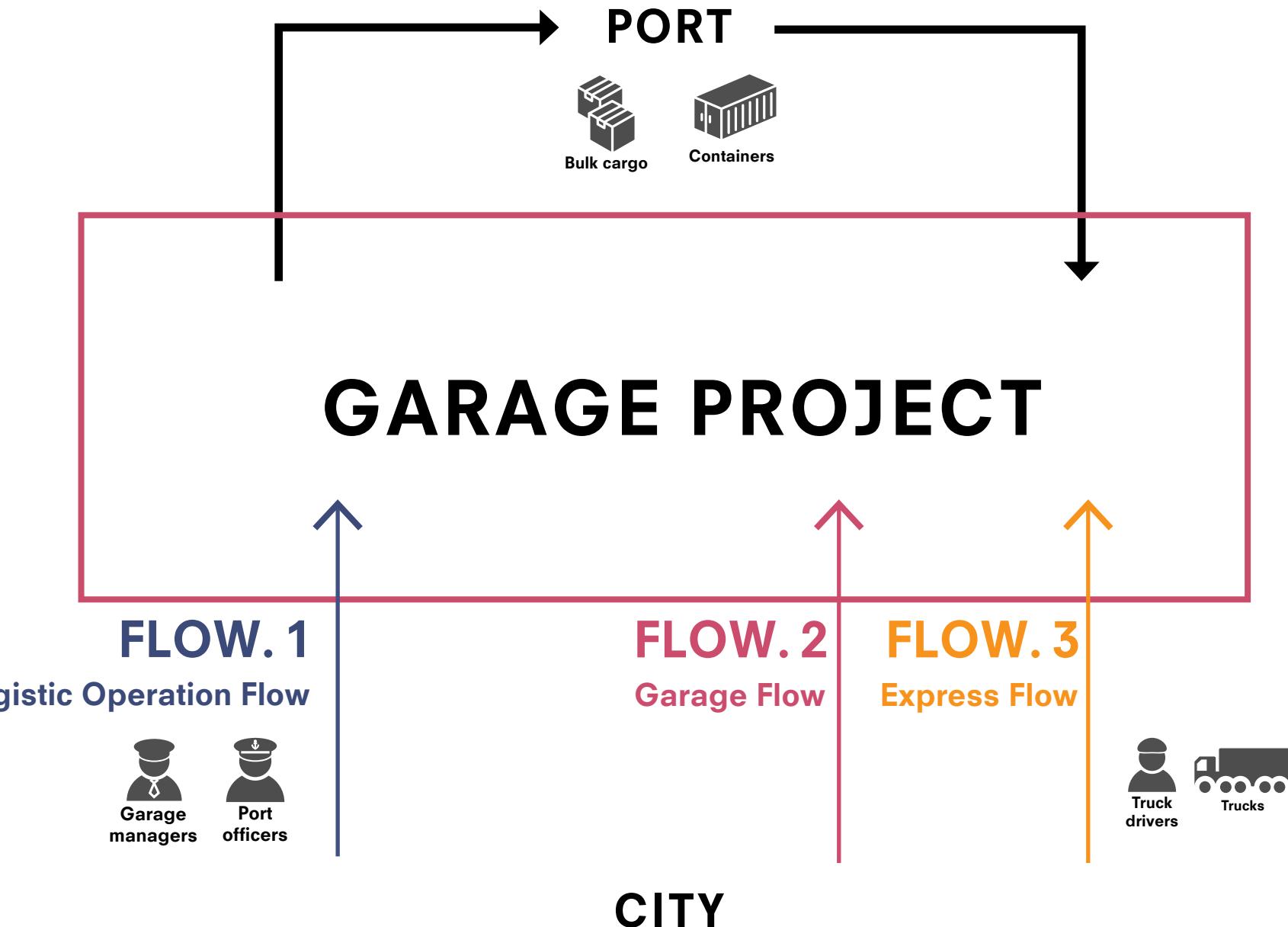
intervention  
**PORT MANAGER FLOW**



intervention  
**TRUCK FLOW**

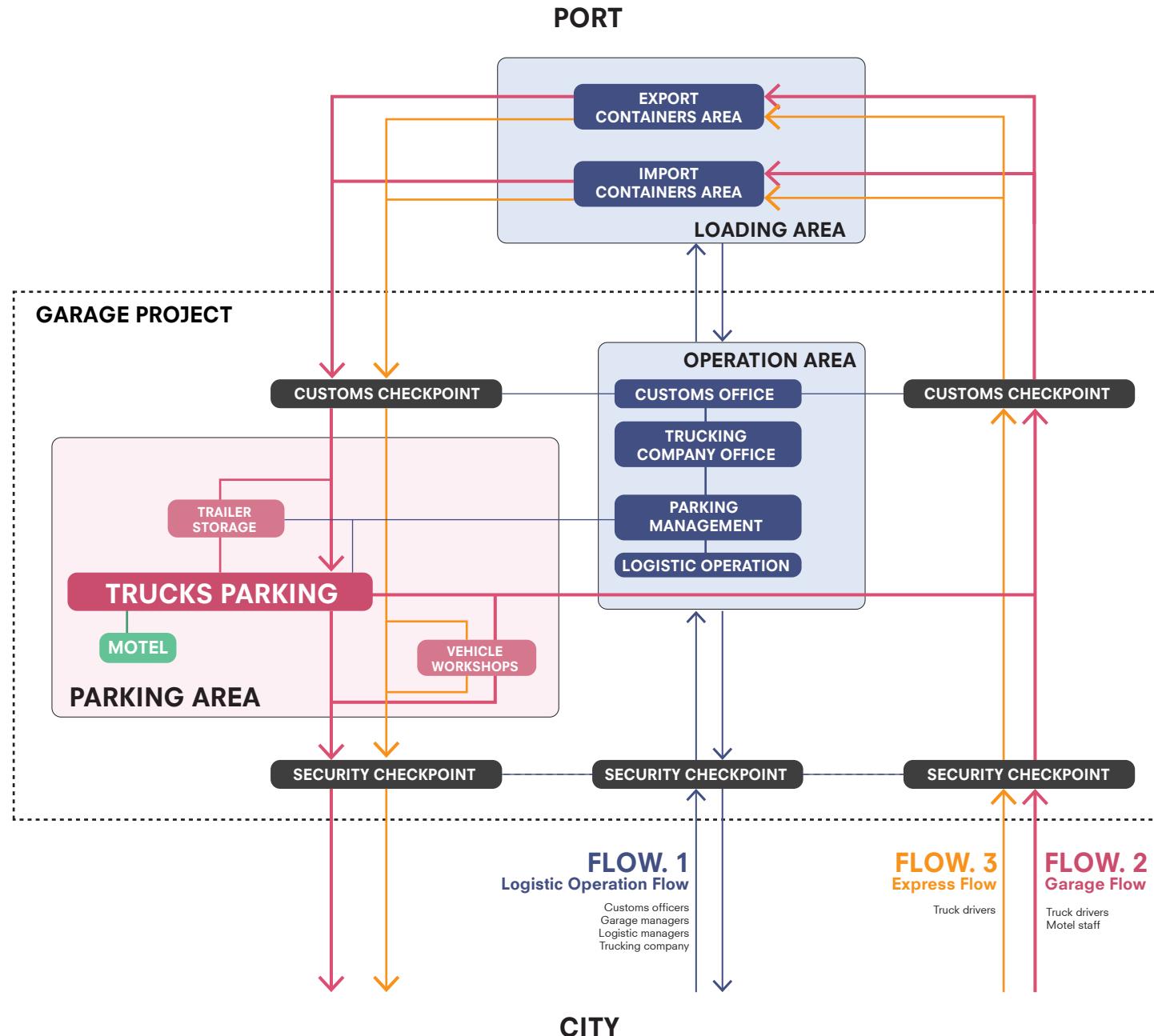


intervention  
**CIRCULATION**



intervention

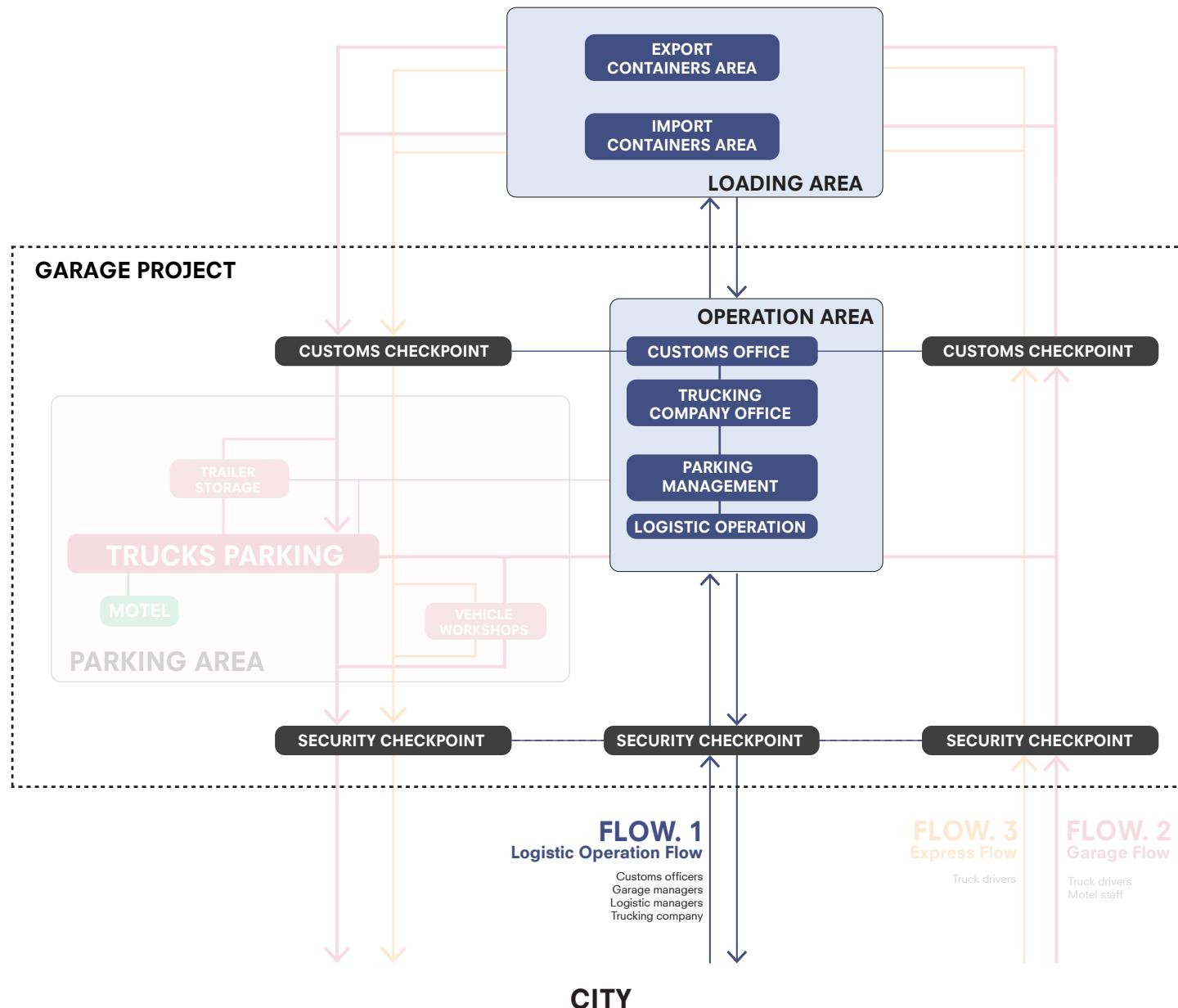
# CIRCULATION SYSTEM



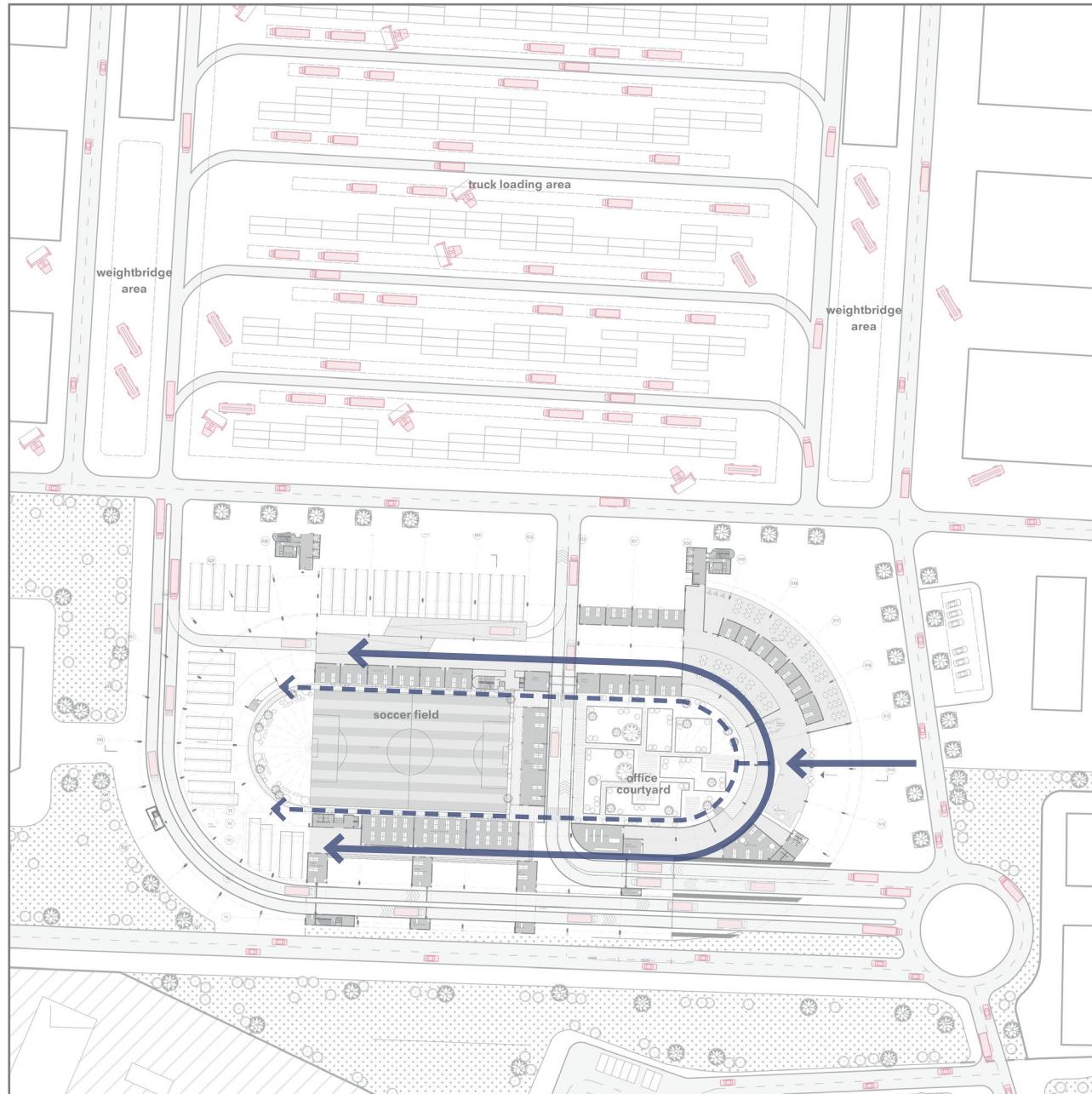
intervention

# CIRCULATION SYSTEM

PORT

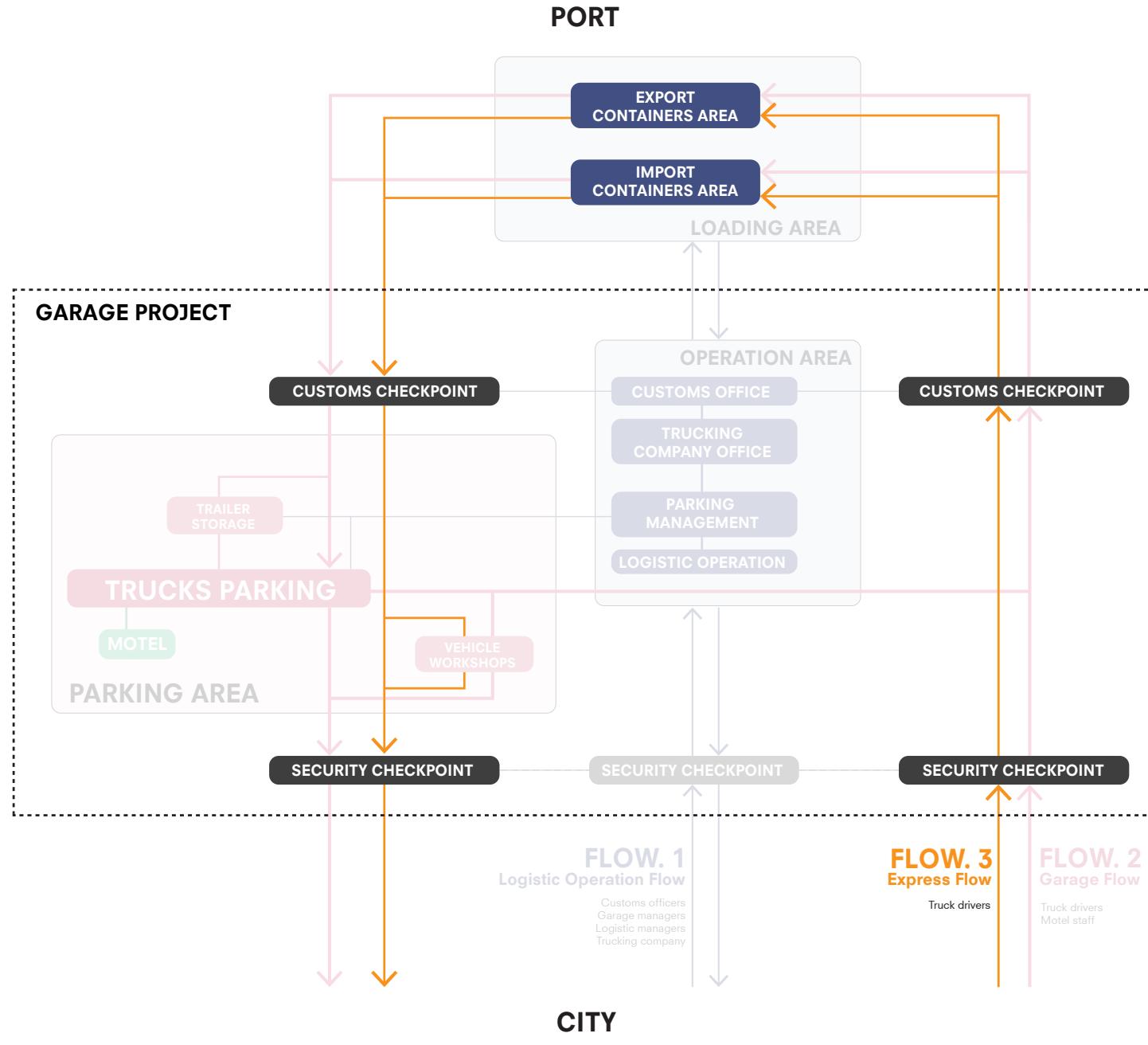


intervention  
**OFFICE FLOW**

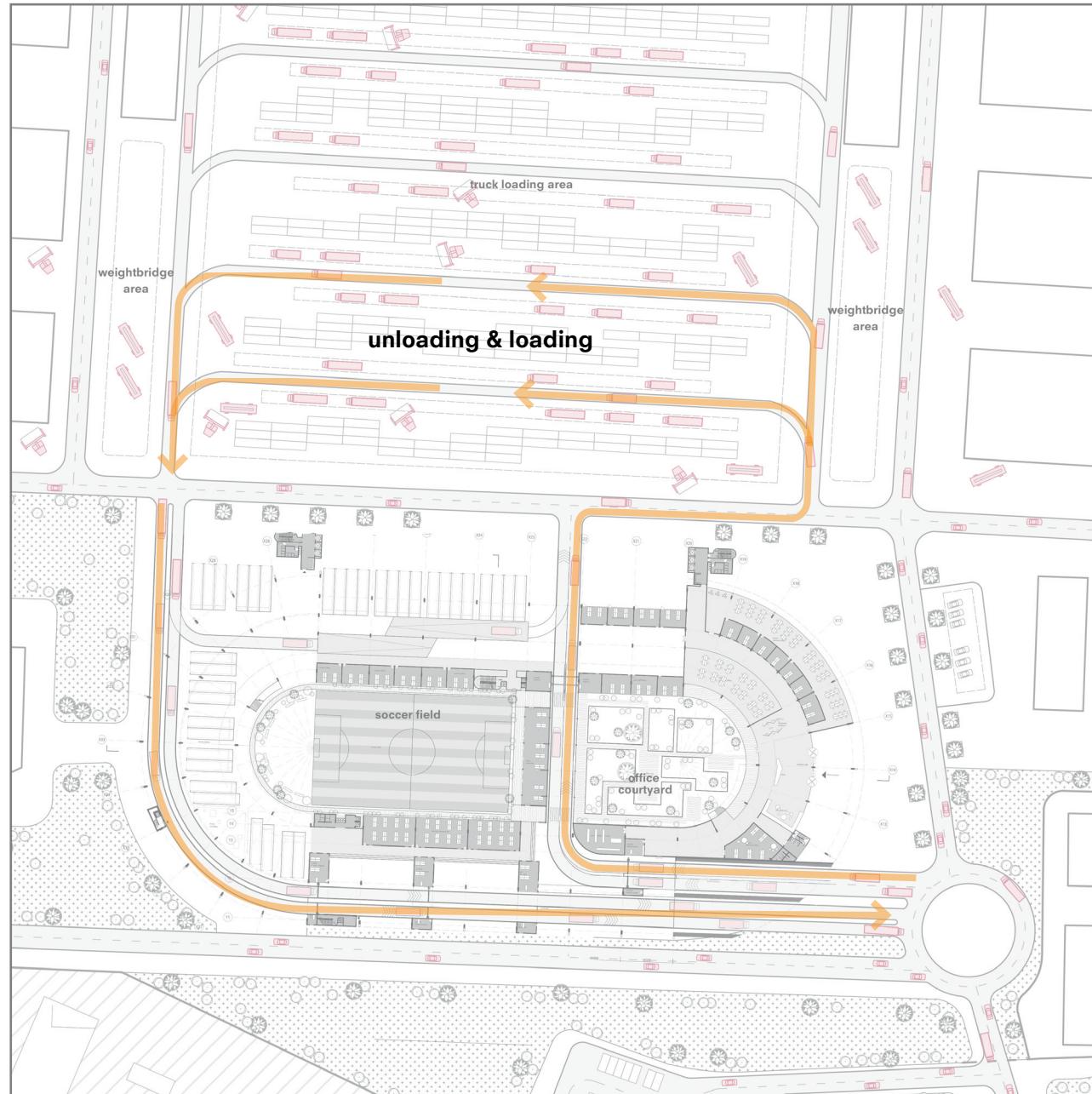


intervention

# CIRCULATION SYSTEM

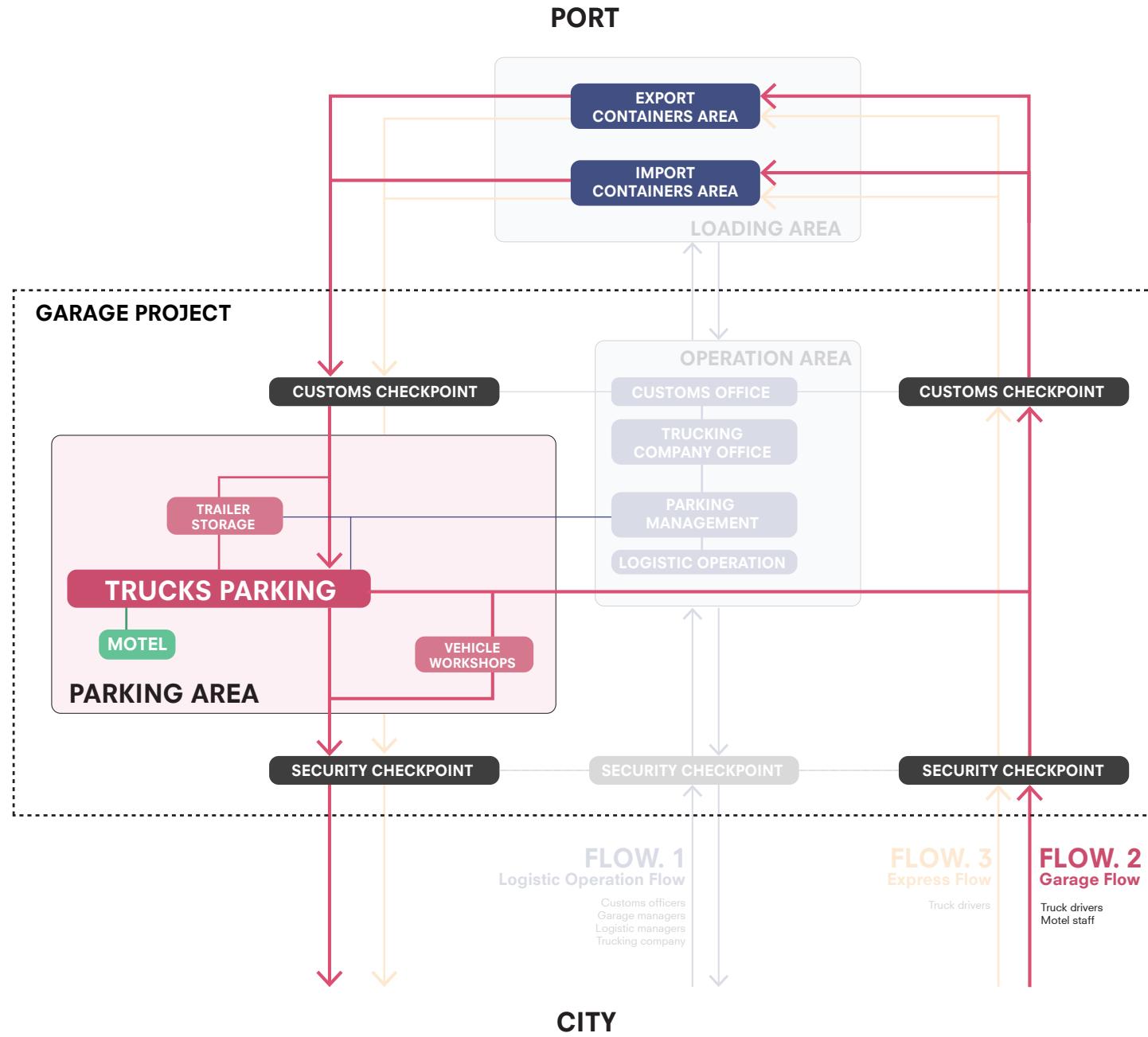


intervention  
**EXPRESS FLOW**

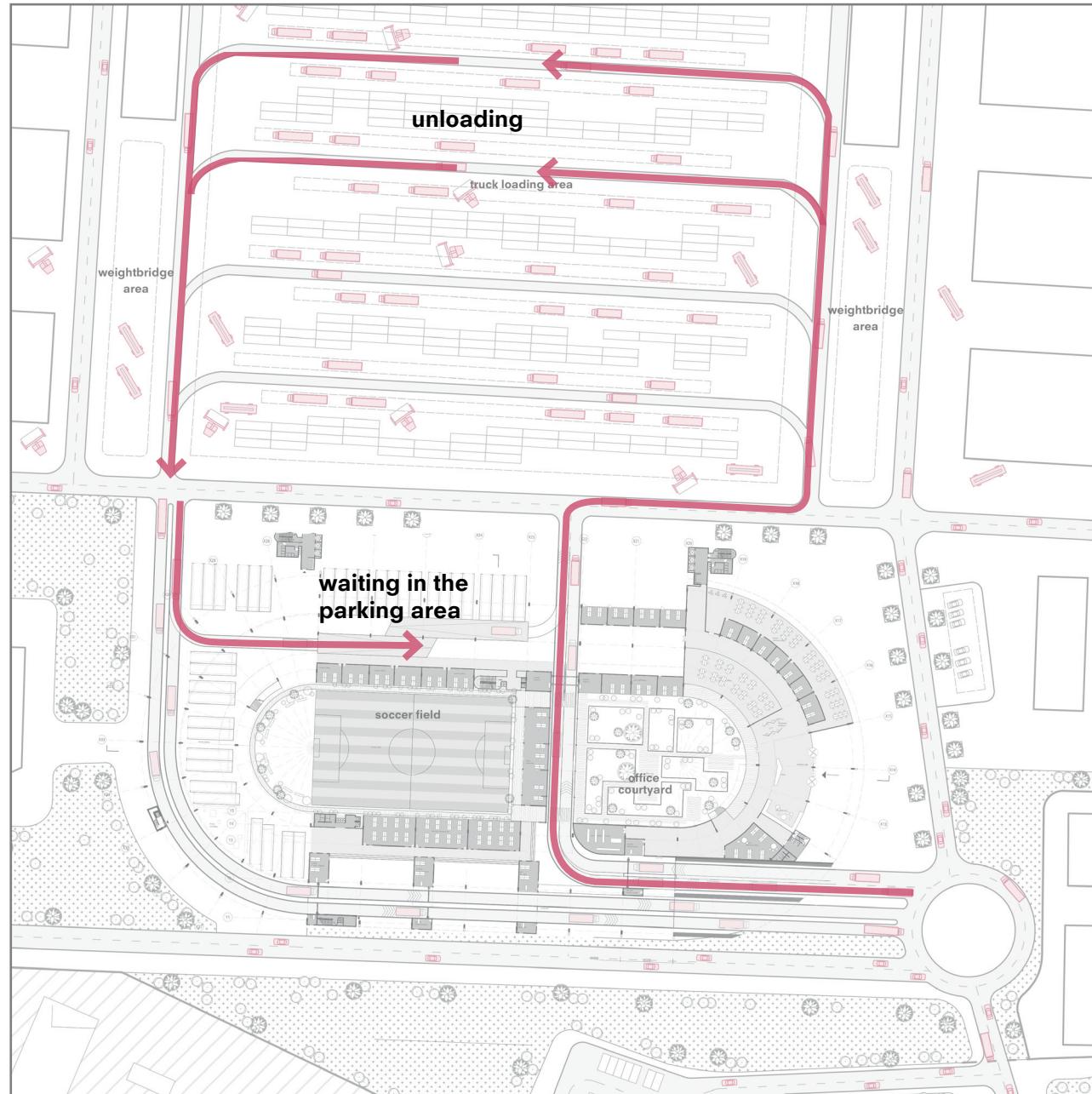


intervention

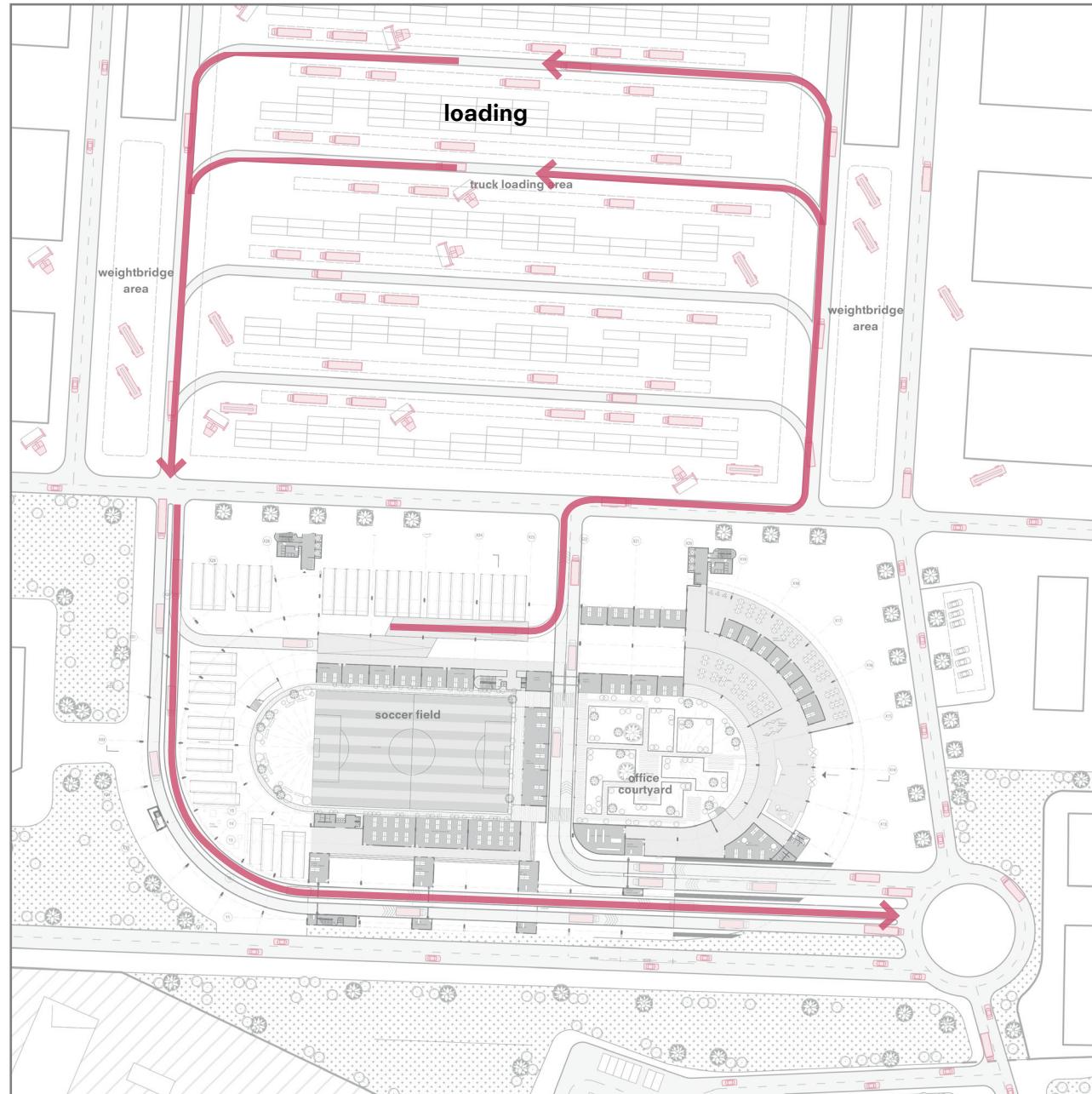
# CIRCULATION SYSTEM

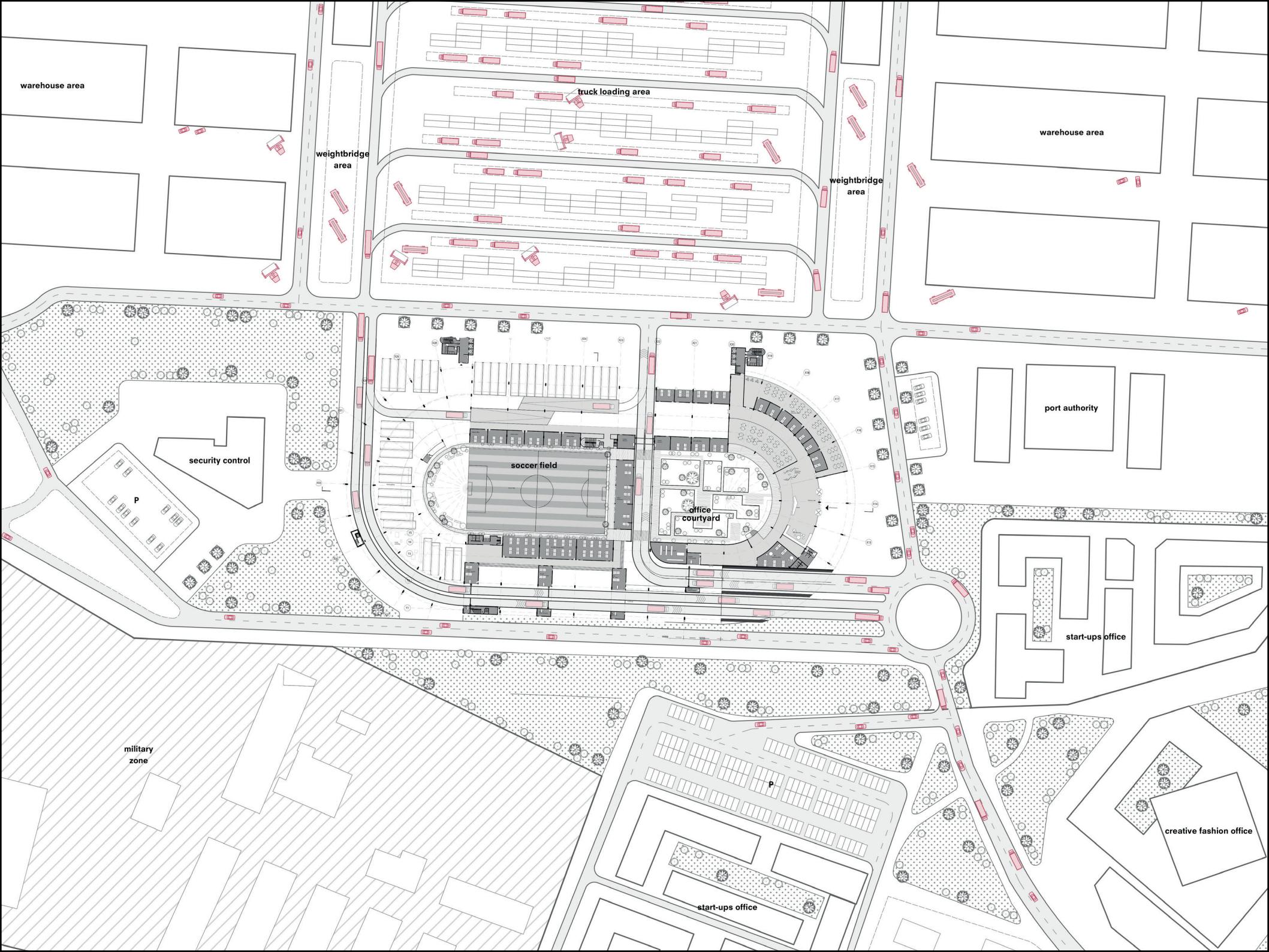


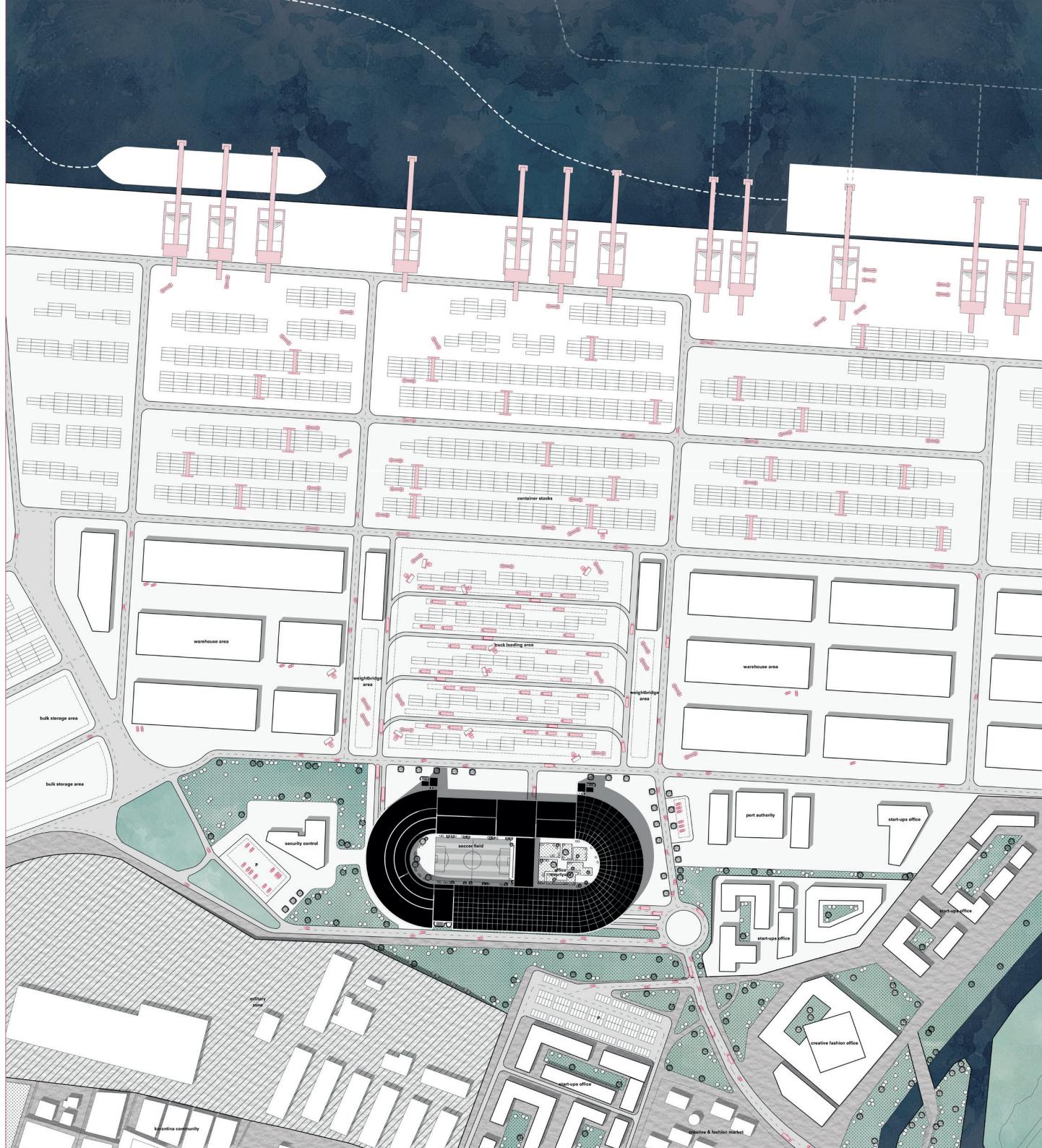
intervention  
**GARAGE FLOW**



intervention  
**GARAGE FLOW**



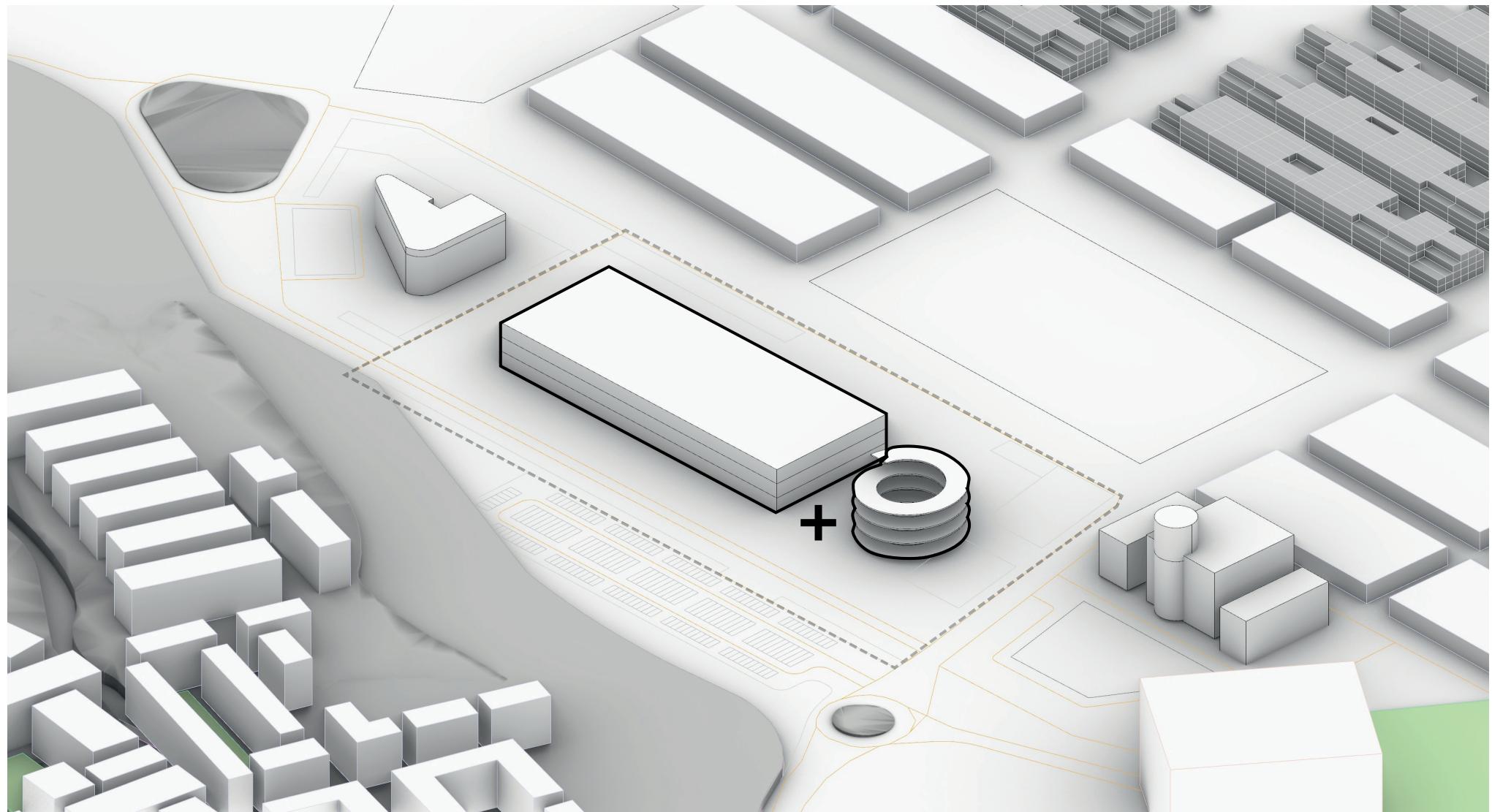




# DESIGN RESEARCH

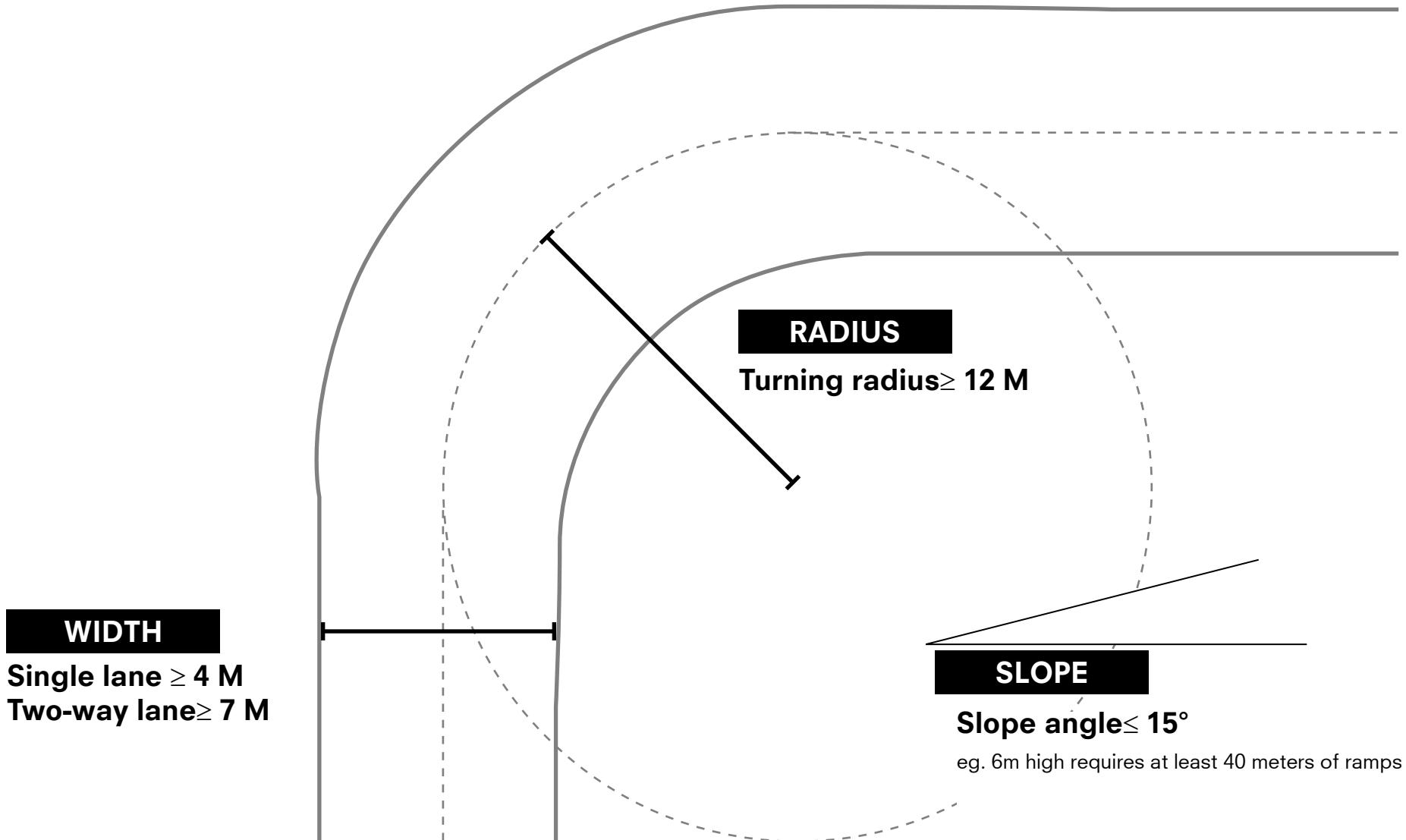
design research

# RAMP + PARKING SPACE





# RAMP DESIGN



# RAMP LAYOUT

**Swirling Car Park for RAI**  
/Amsterdam



**Parking space: 1000 cars**  
Area: 28 200 SQM  
Length: 75 m

**Parking and Intermodal Station/ Bouguenais**



**Parking space: 782 cars**  
Area: 25 000 SQM  
Length: 150 m

**IMEC/KUL Parking Building**  
/Leuven



**Parking space: 740 cars**  
Area: 23 600 SQM  
Length: 140 m

**Preston Bus Station**  
/Lancashire, England



**Parking space: 1100 cars and 80 buses**  
Area: 32 300 SQM  
Length: 170 m

**Veranda Car Park**  
/Rotterdam



**Parking space: 630 cars**  
Area: 20 000 SQM  
Length: 50 m

**1111 Lincoln Road**  
/Miami



**Parking space: 300 cars**  
Area: 22 500 SQM  
Length: 80 m

# RAMP LAYOUT

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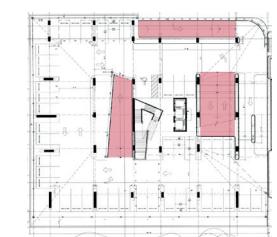
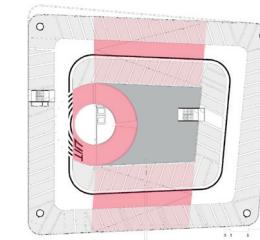
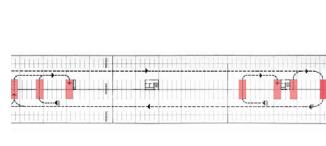
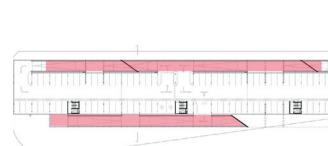
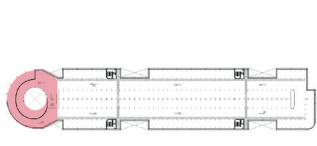
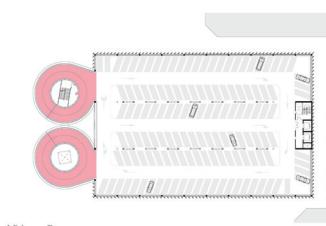


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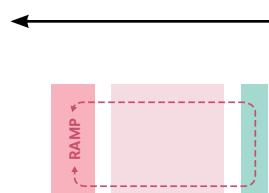
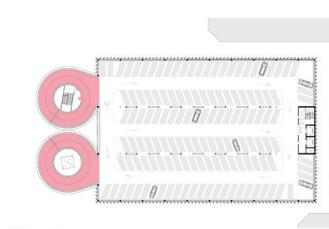


# TYPES

**Swirling Car Park for RAI**  
/Amsterdam



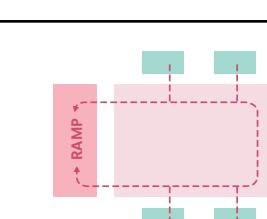
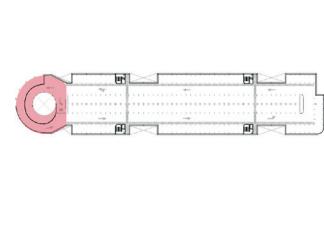
**Parking space:** 1000 cars  
Area: 28 200 SQM  
Length: 75 m



**Parking and Intermodal Station**  
/Bouguenais



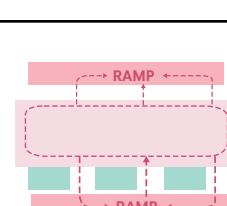
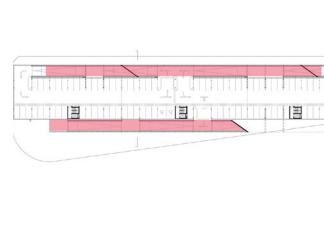
**Parking space:** 782 cars  
Area: 25 000 SQM  
Length: 150 m



**IMEC/KUL Parking Building**  
/Leuven



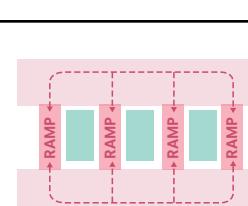
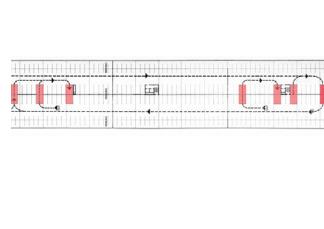
**Parking space:** 740 cars  
Area: 23 600 SQM  
Length: 140 m



**Preston Bus Station**  
/Lancashire, England



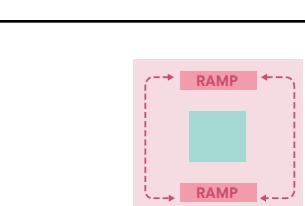
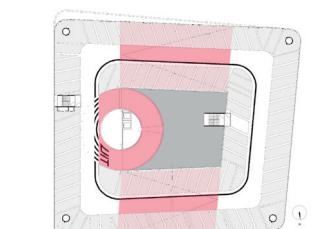
**Parking space:**  
**1100 cars and 80 buses**  
Area: 32 300 SQM  
Length: 170 m



**Veranda Car Park**  
/Rotterdam



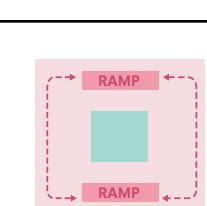
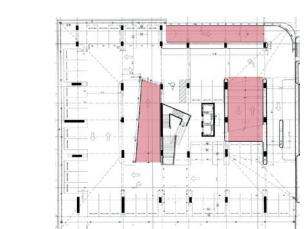
**Parking space:** 630 cars  
Area: 20 000 SQM  
Length: 50 m



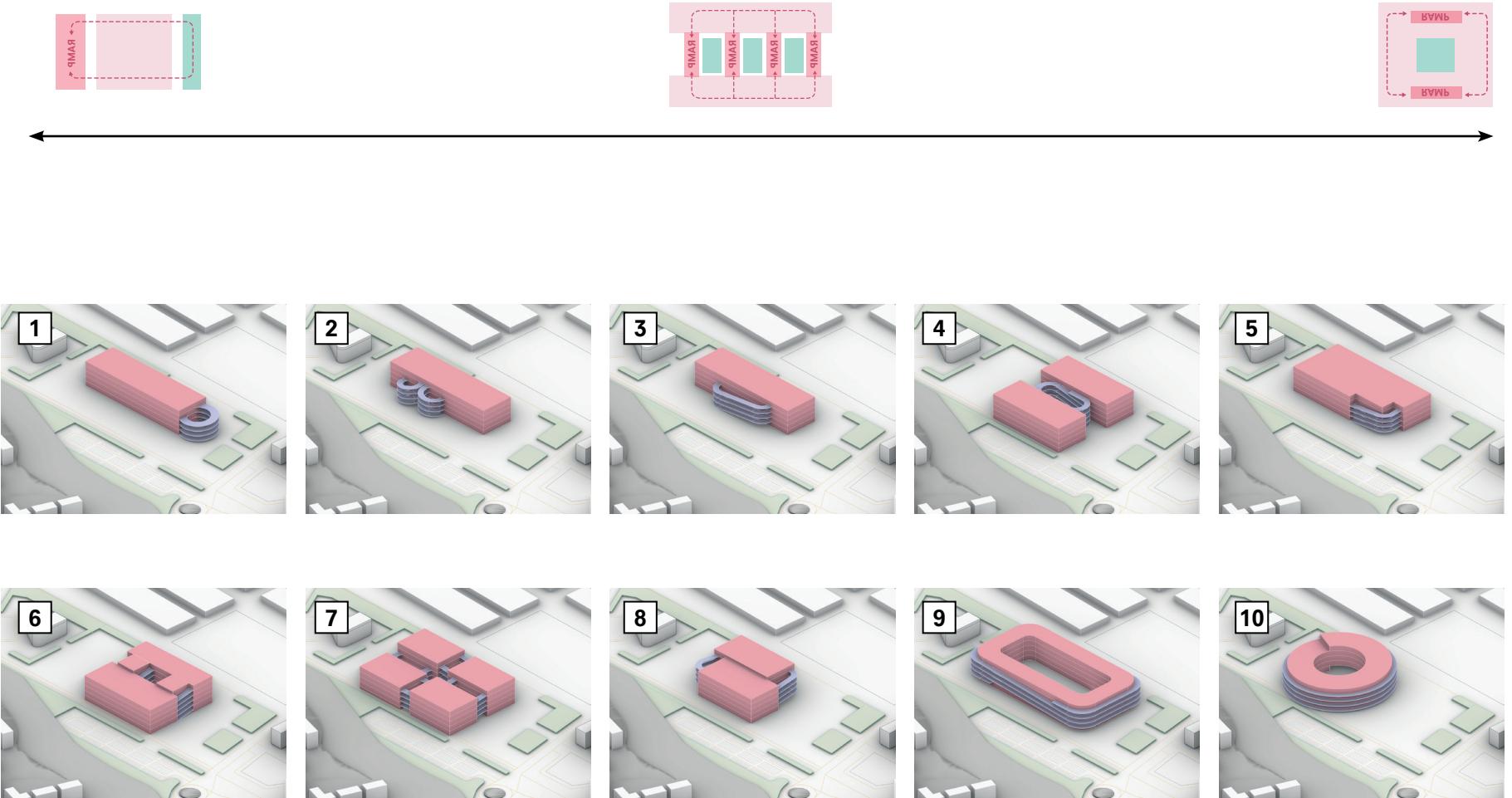
**1111 Lincoln Road**  
/Miami



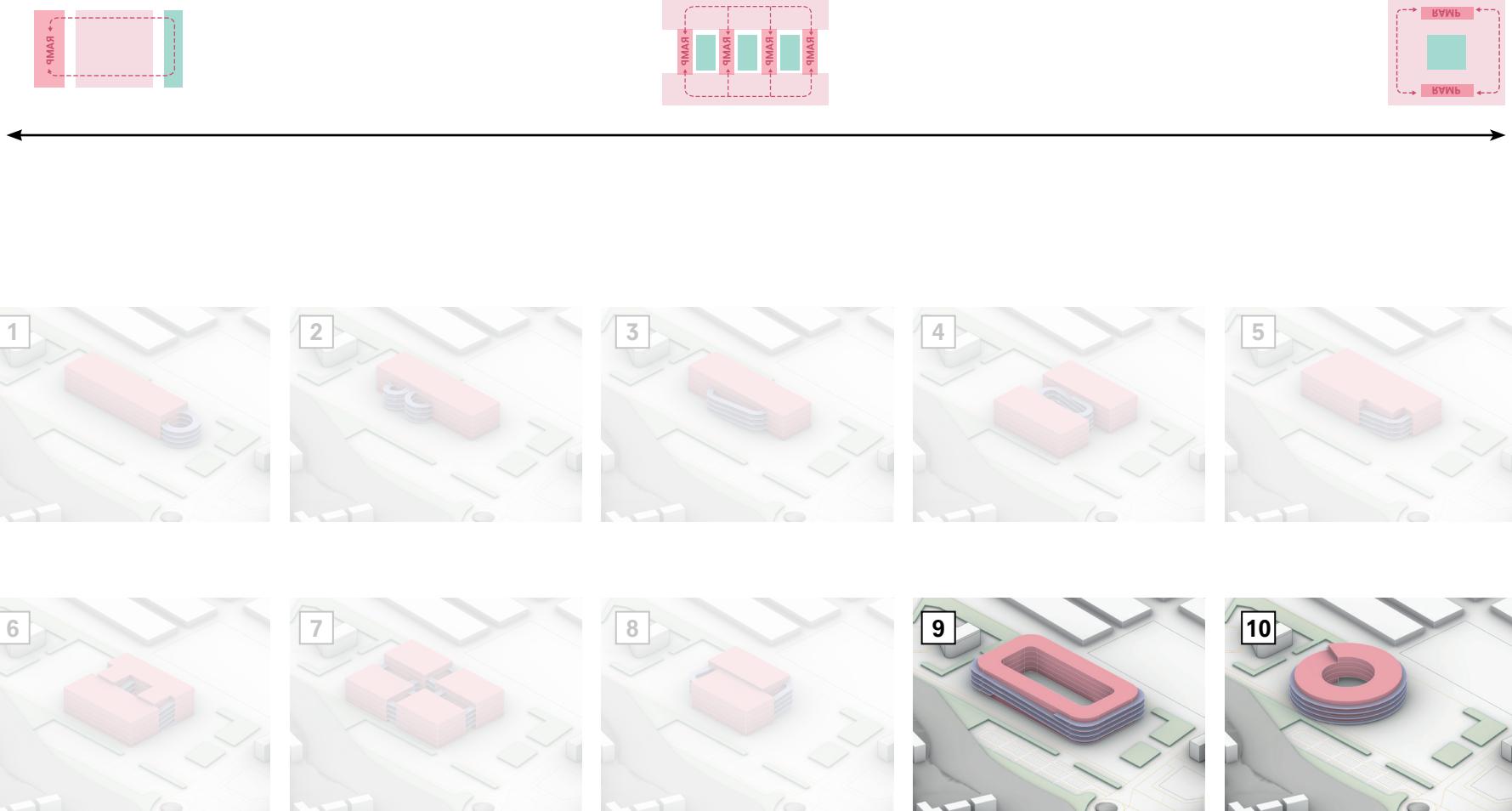
**Parking space:** 300 cars  
Area: 22 500 SQM  
Length: 80 m



design research  
**COMPARISON**



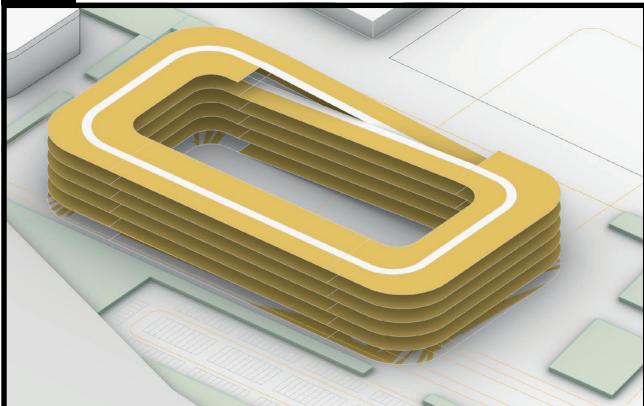
design research  
**COMPARISON**



design research

# MASSING RESEARCH

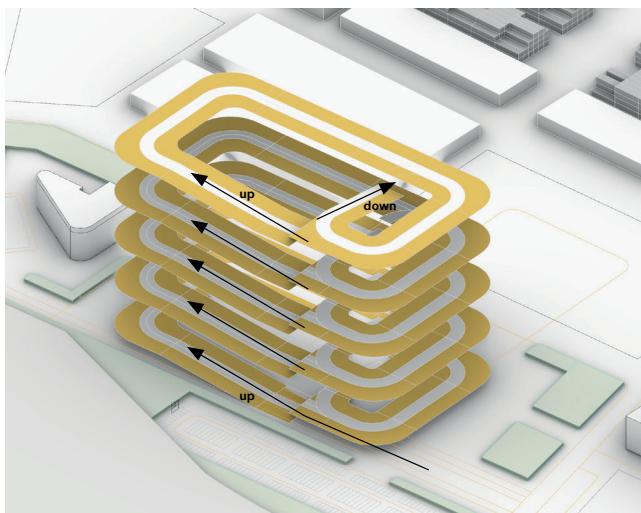
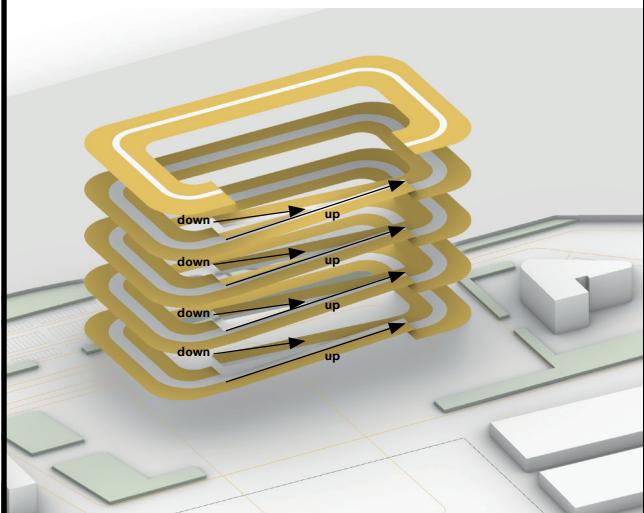
01

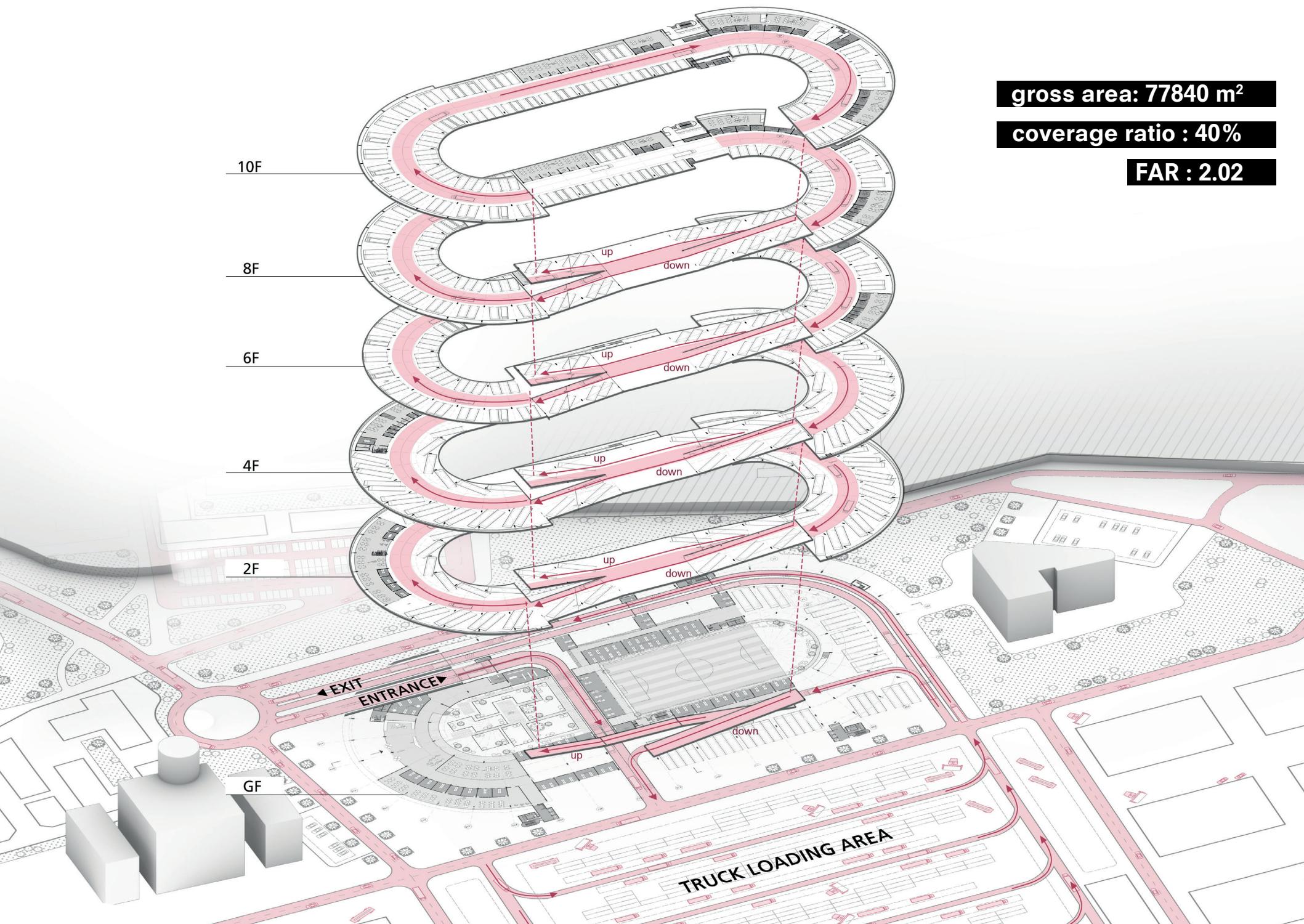


02

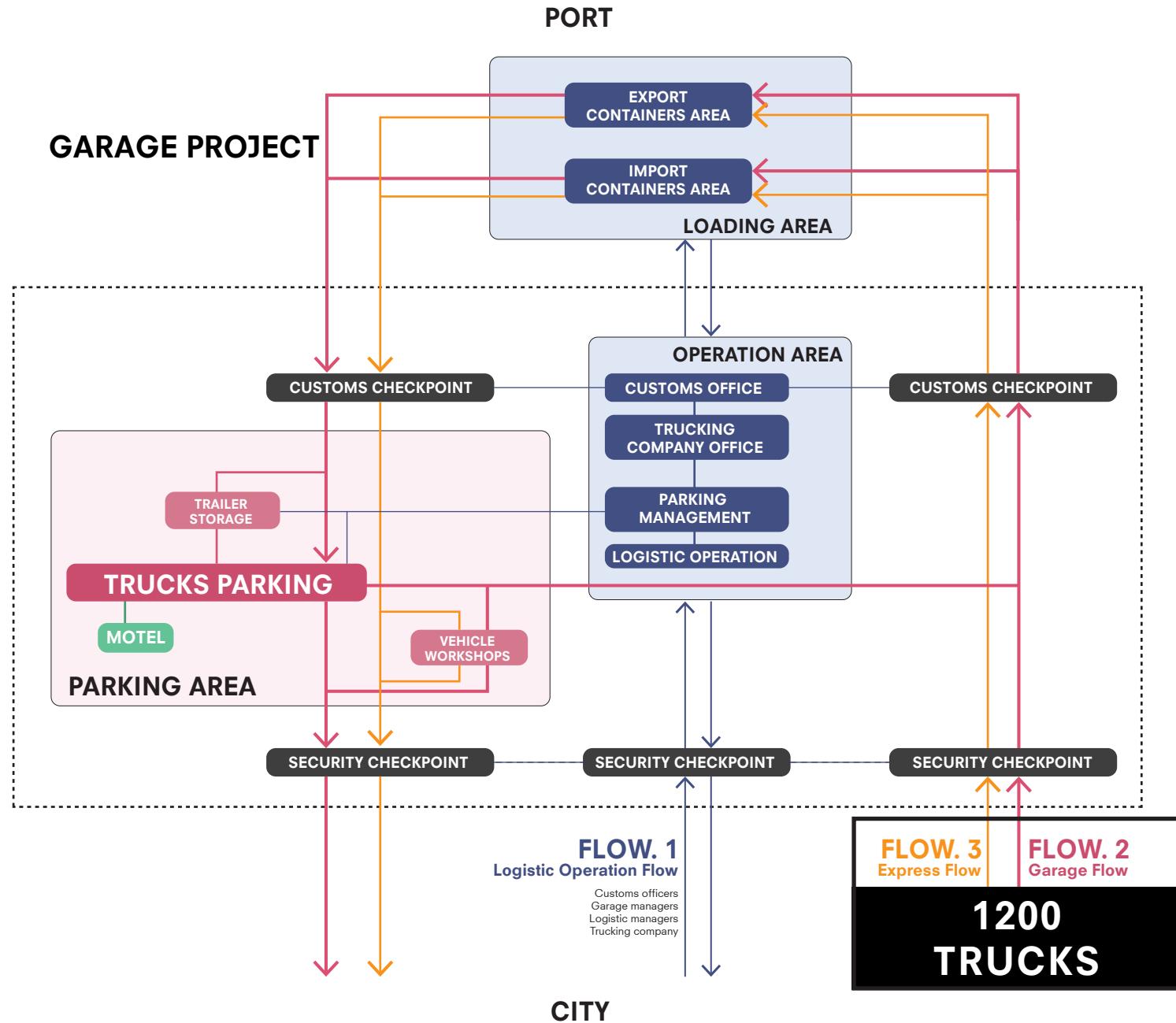


03





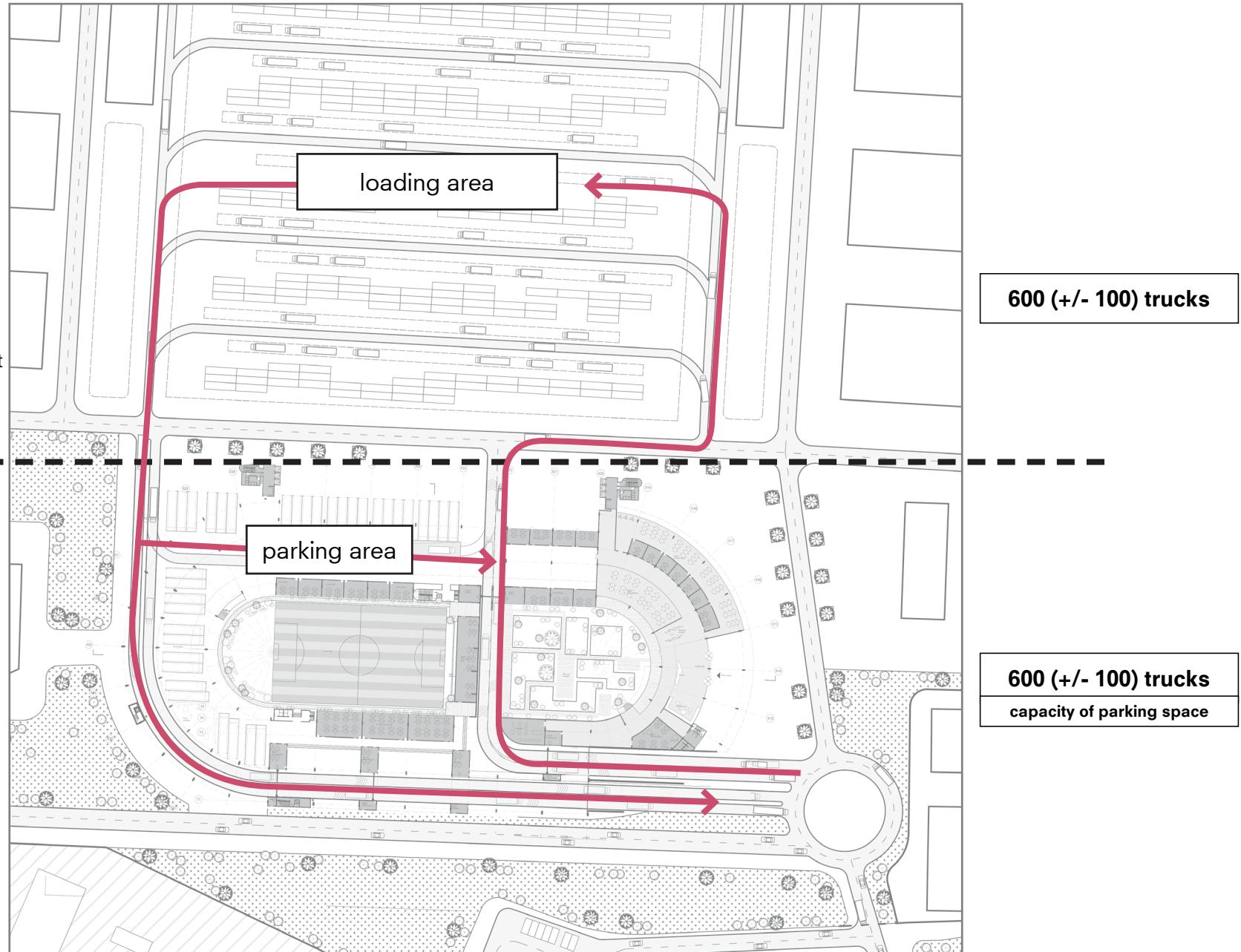
# CAPACITY



# WEEKLY VOLUME

**80**  
trucks loading space

**600**  
trucks can directly pick up  
the goods and leave the port

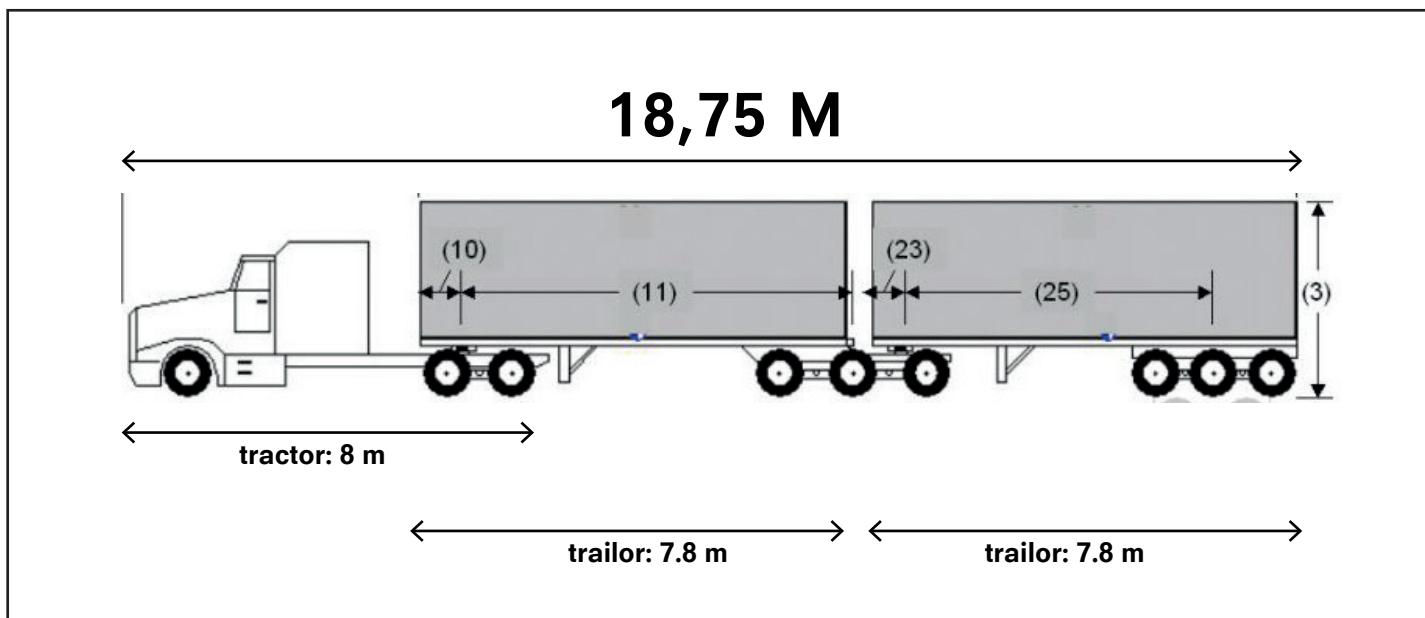


**600 (+/- 100) trucks**

**600 (+/- 100) trucks**  
capacity of parking space

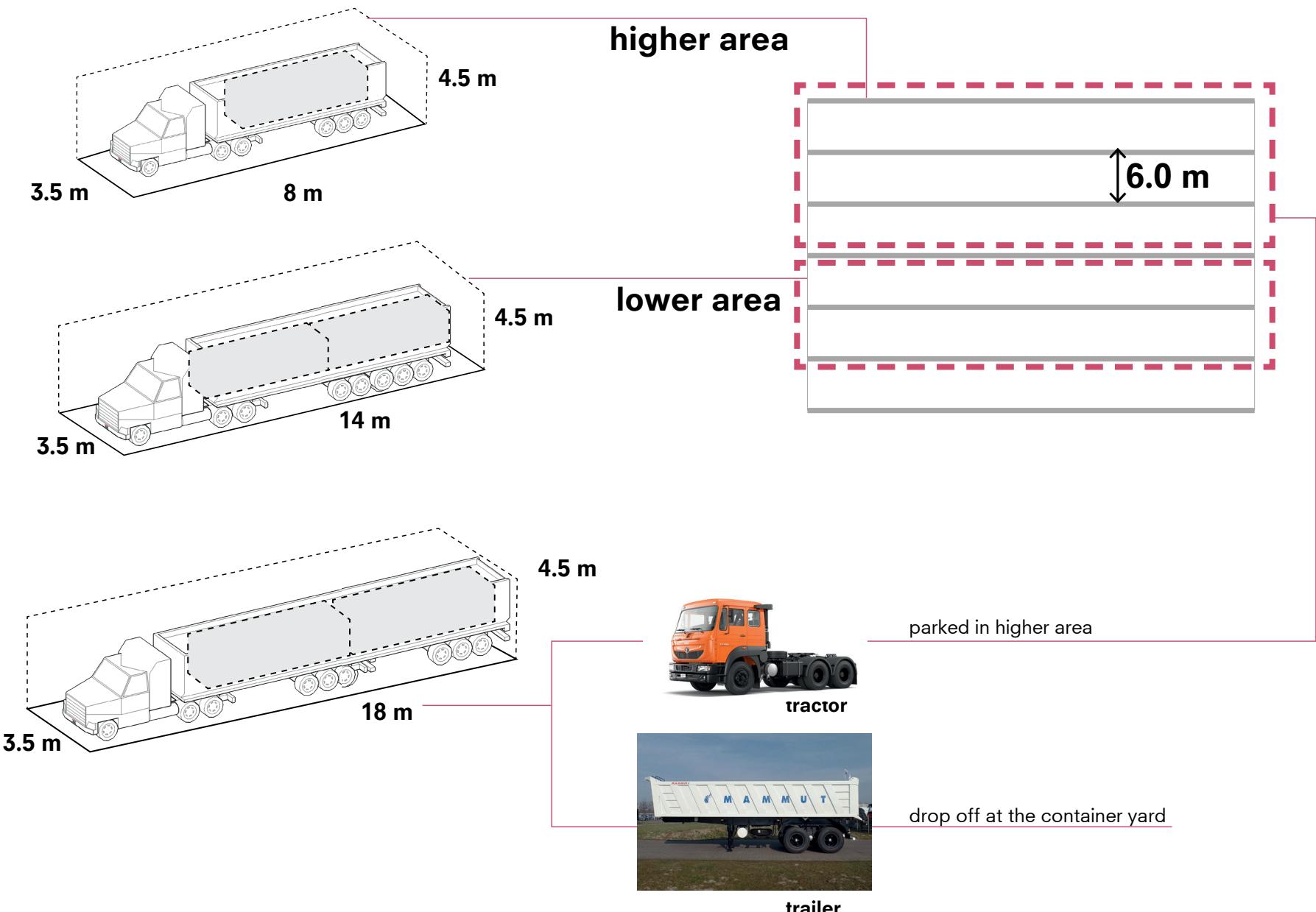
# PARKING LIMIT

Lebanese government limits truck tonnage within **45 tons**

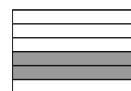
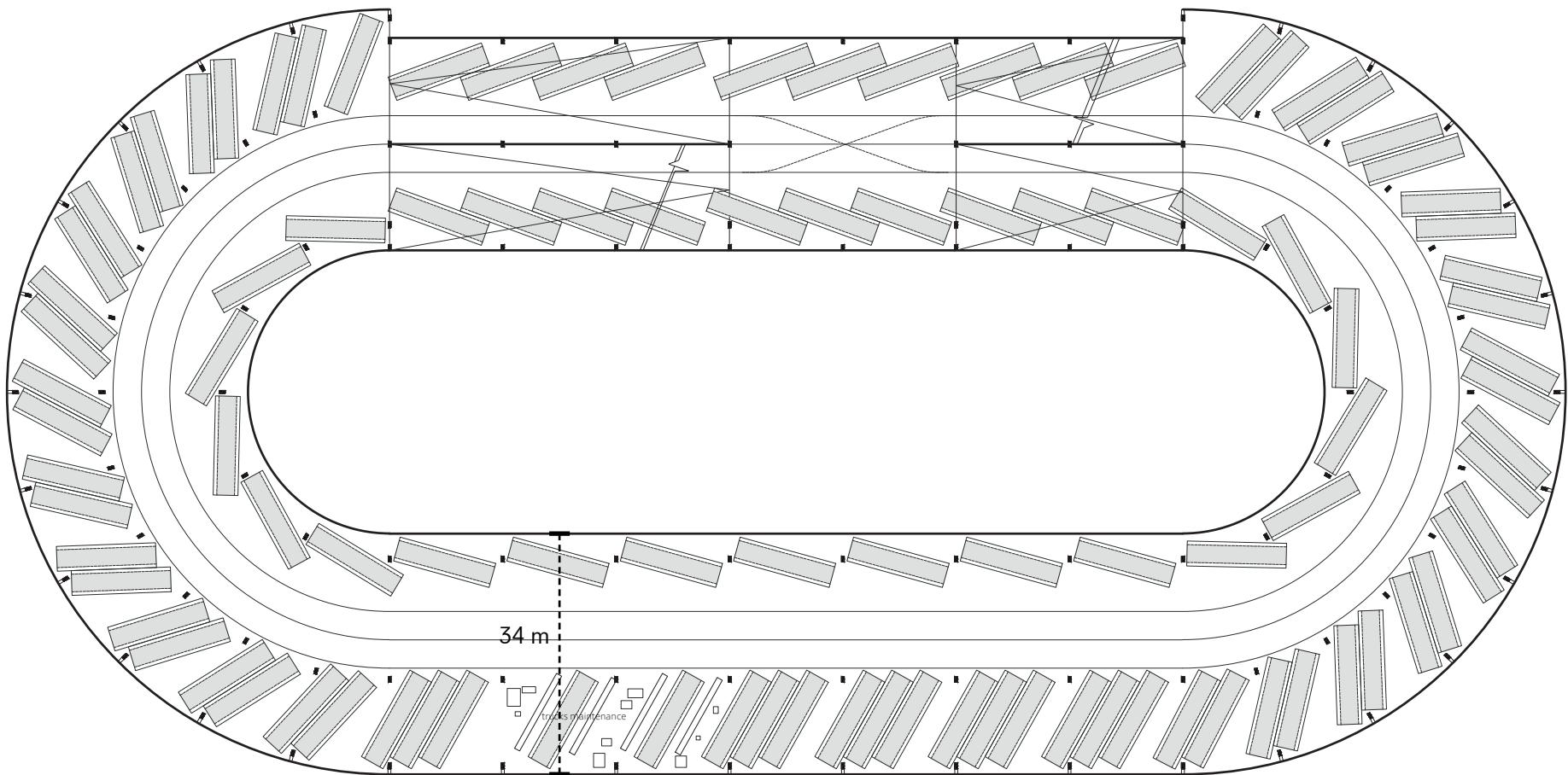


**local regulation**

# PARKING MANEUVERING

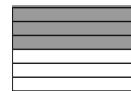
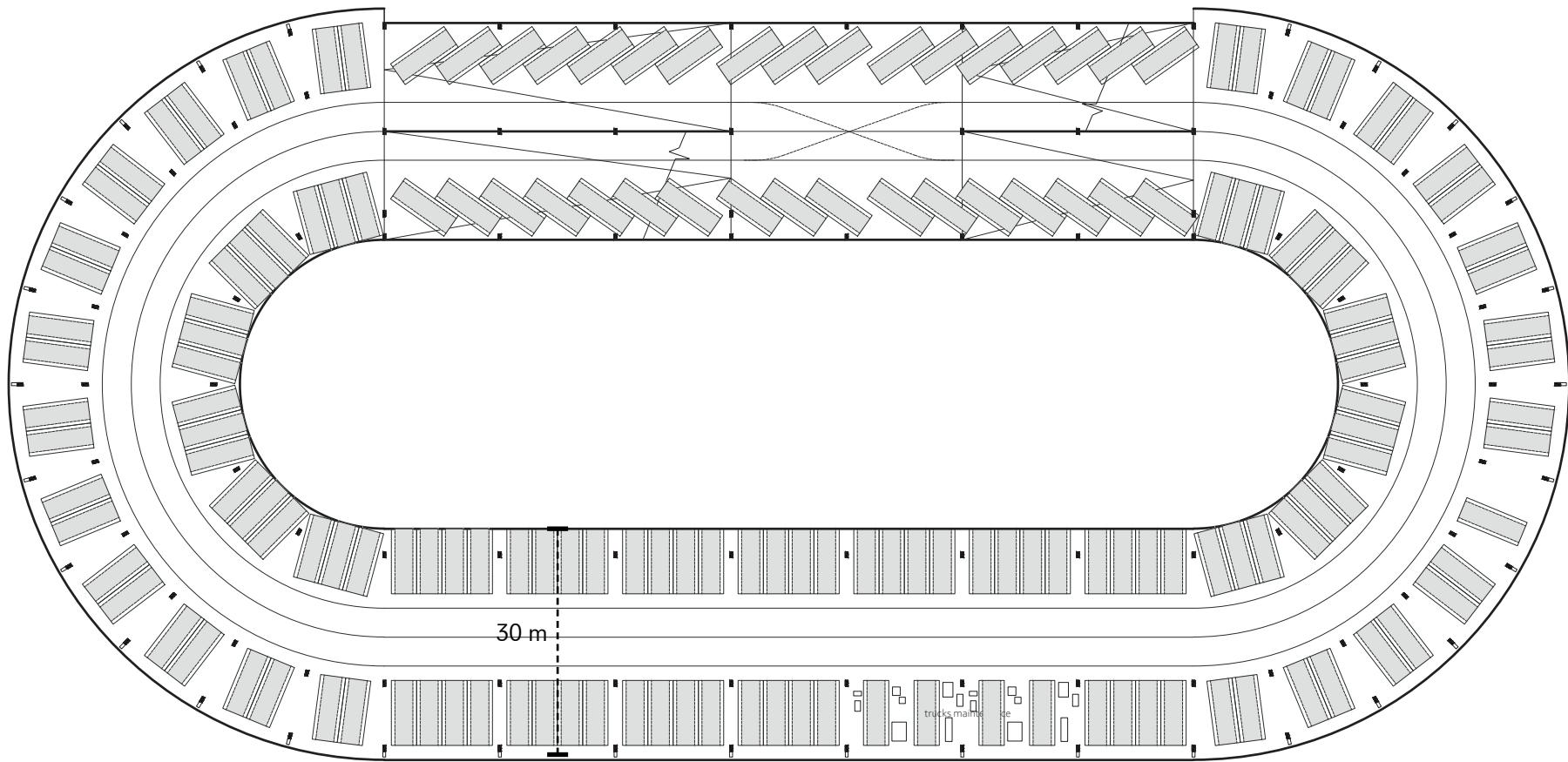


# PARKING MANEUVERING



**Prototype for 2/4 floor**   
parking space: 100  
big trucks, angled parking

# PARKING MANEUVERING

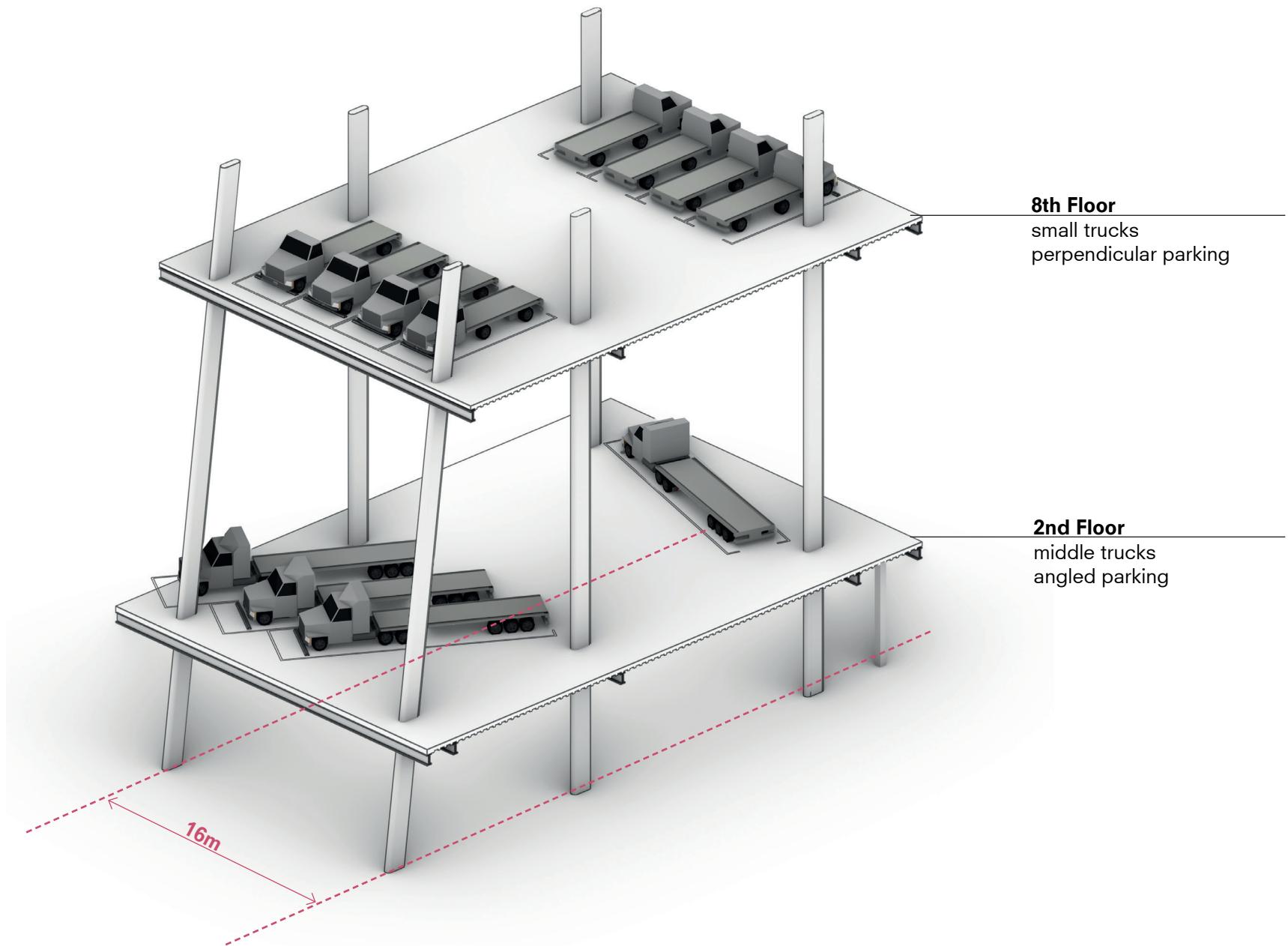


**Prototype for 6/8/10 floor**

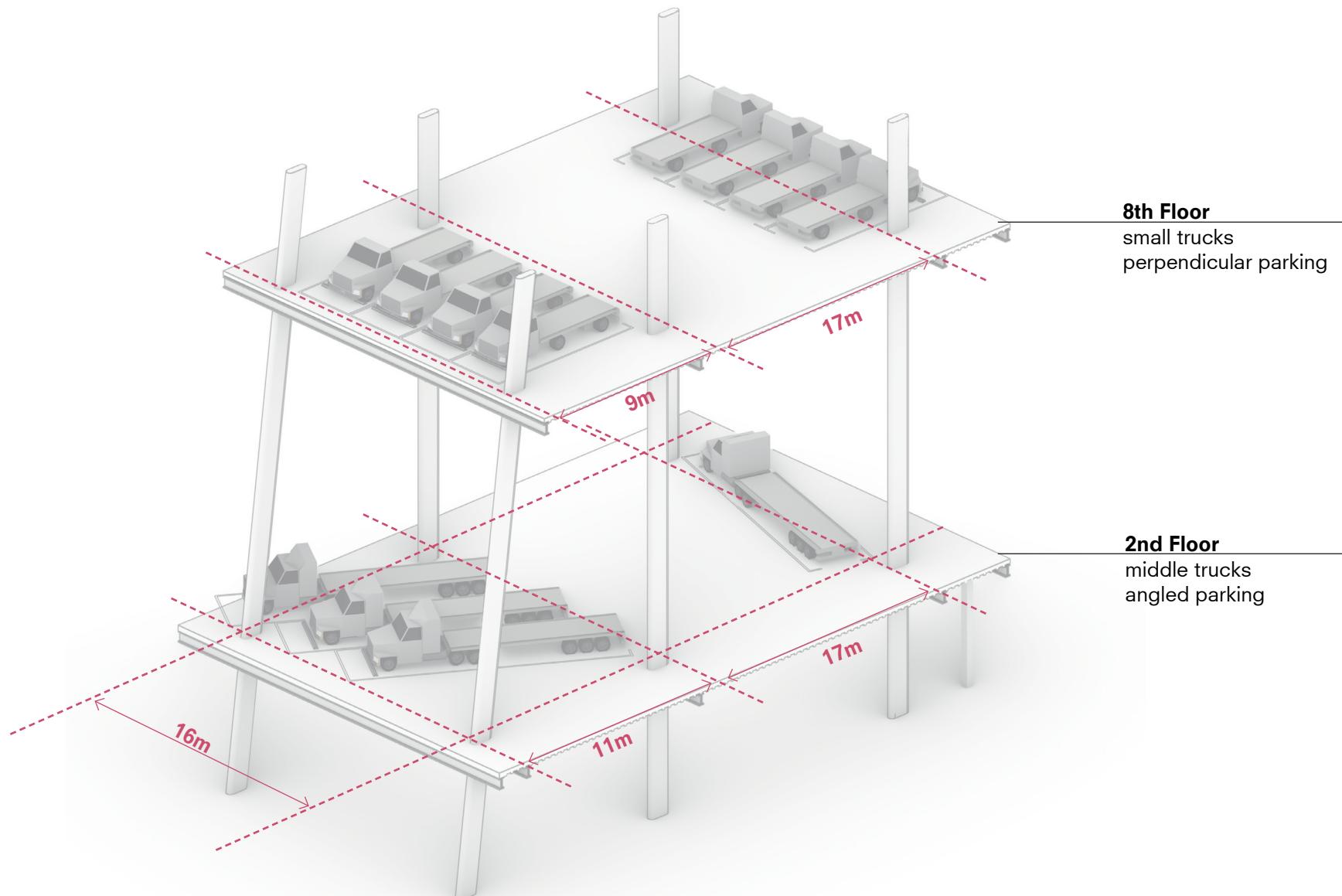
parking space: 160  
small trucks, perpendicular parking



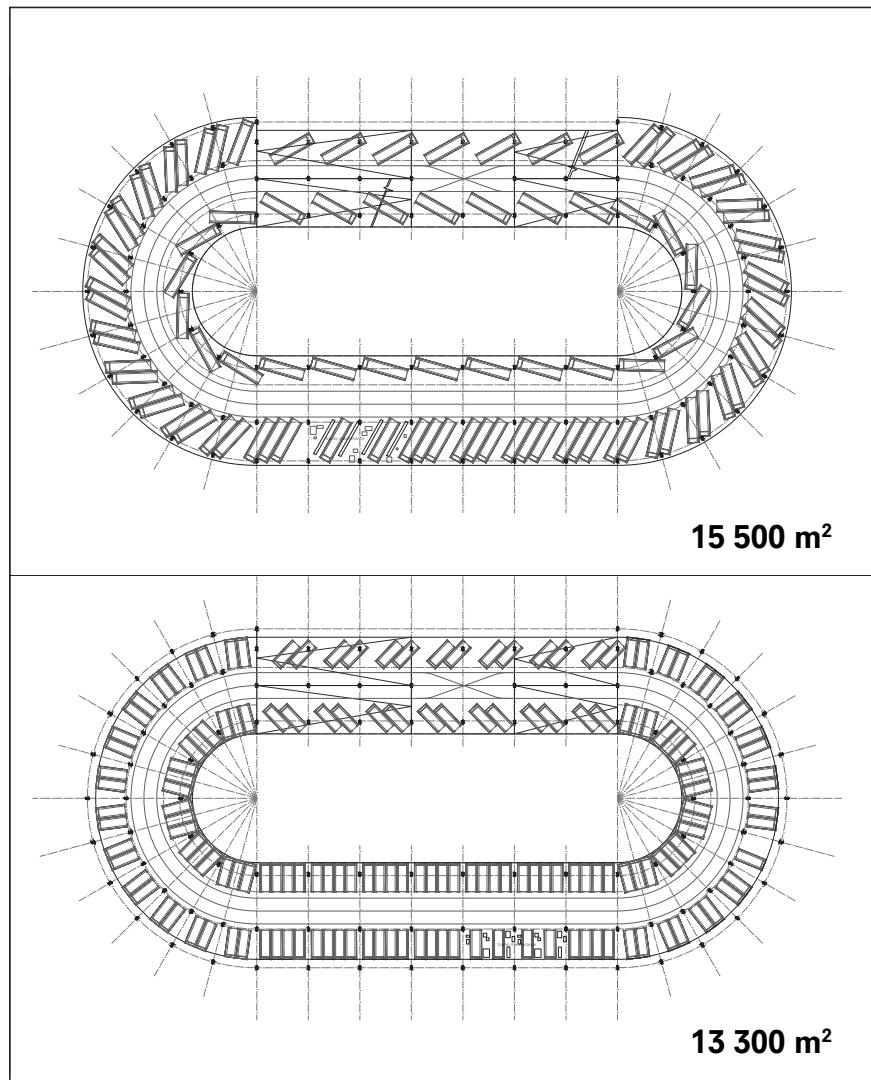
# PARKING UNIT



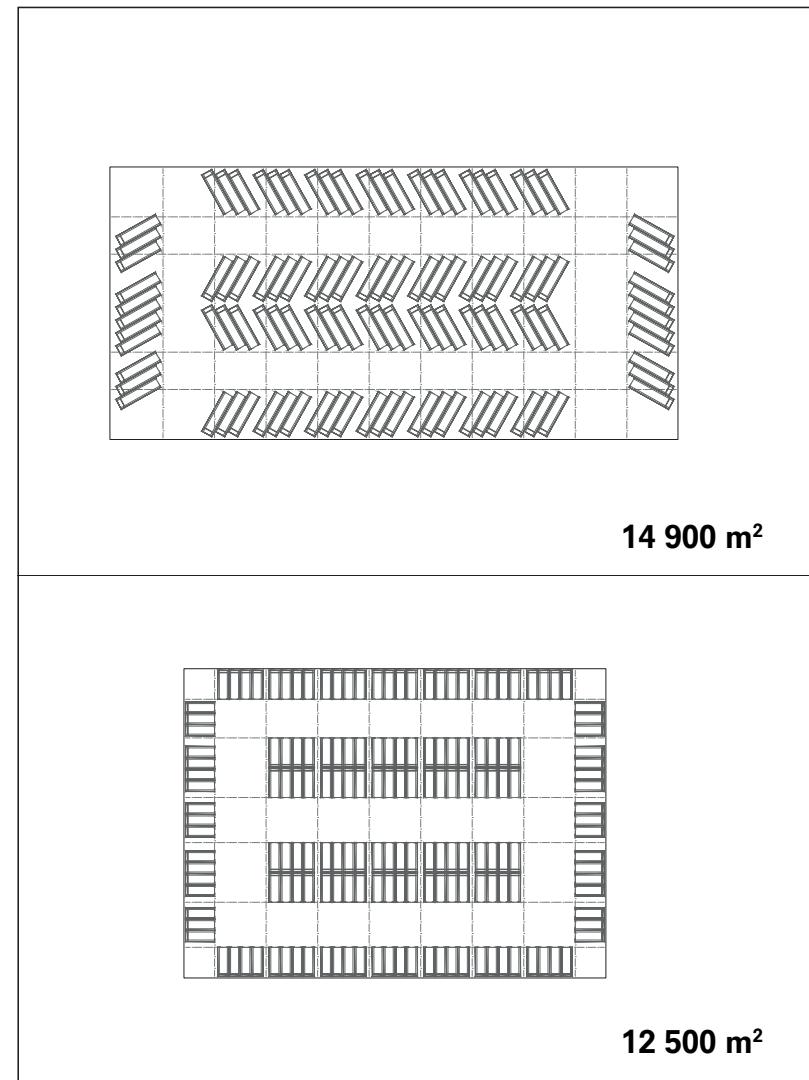
# PARKING UNIT



# MANEUVERING COMPARISON



project pattern

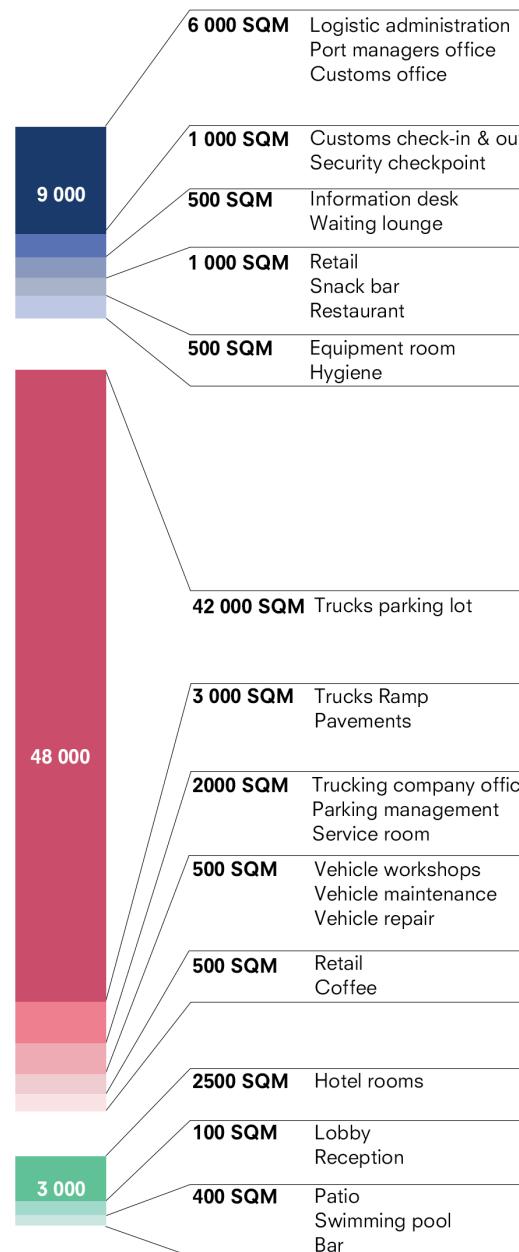
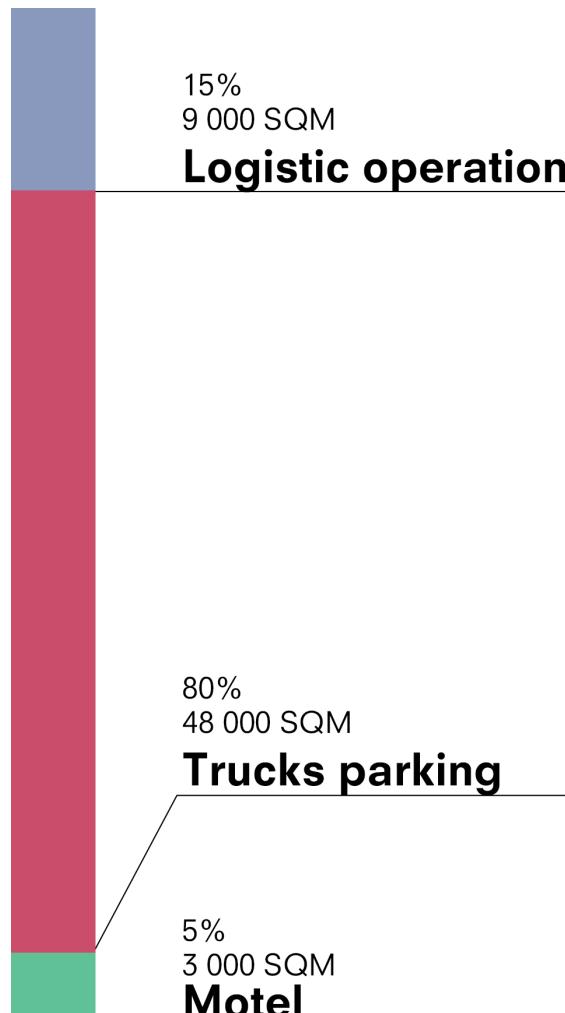


normal pattern

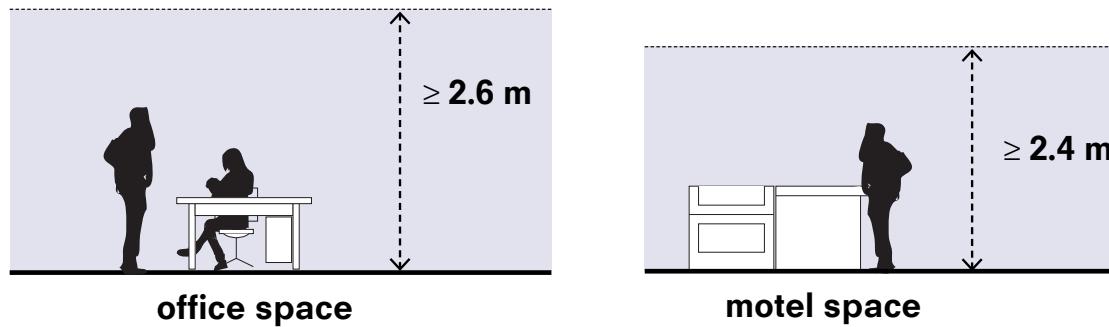
# ORGANIZATION

organization

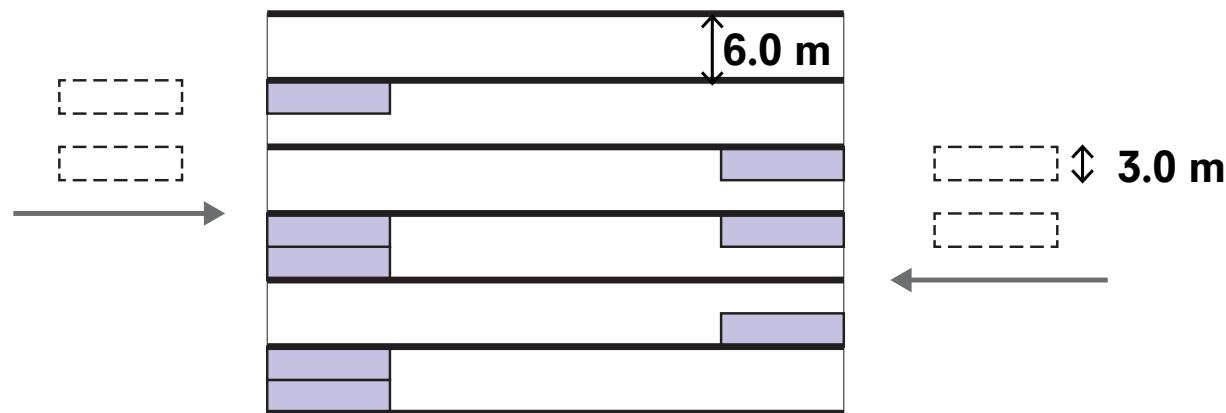
# PROGRAM



organization  
**SPACE COMBINE**

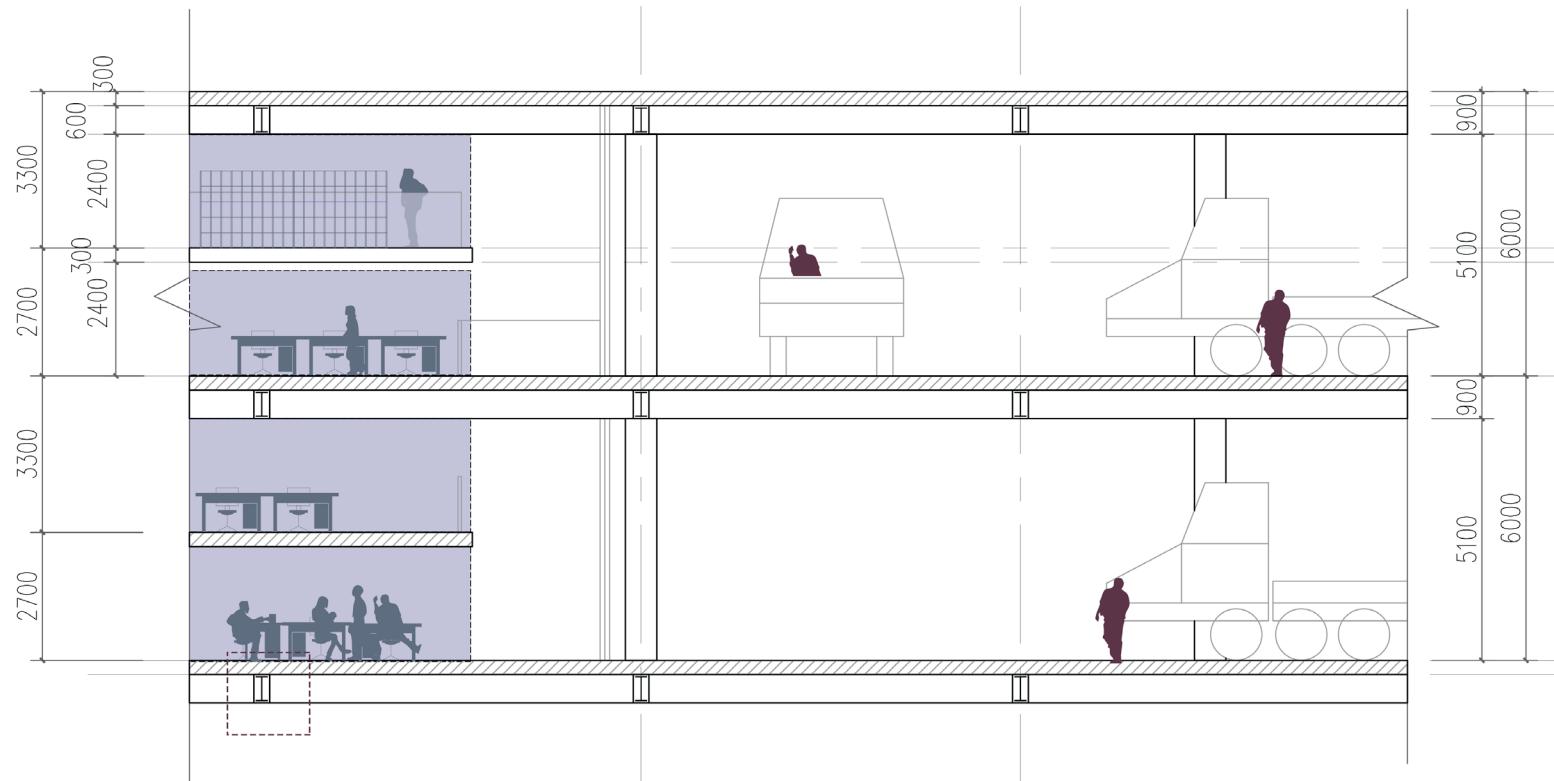


**FLOOR HEIGHT : 3 M**



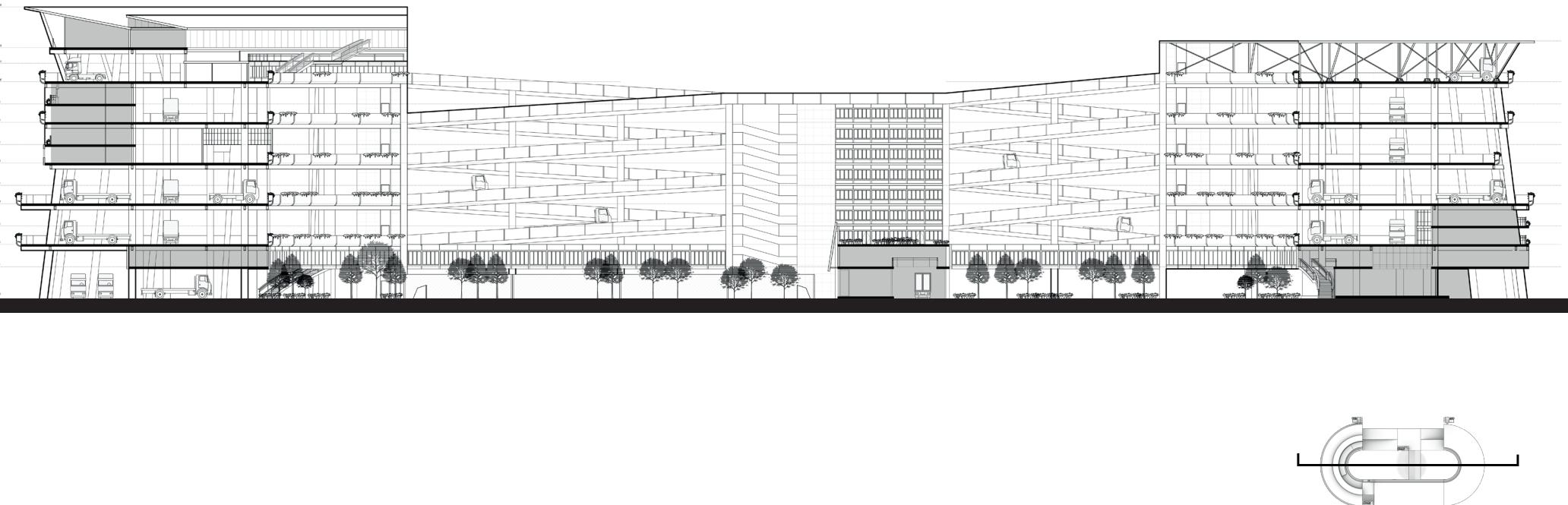
# organization

## **SECTION UNIT**



organization

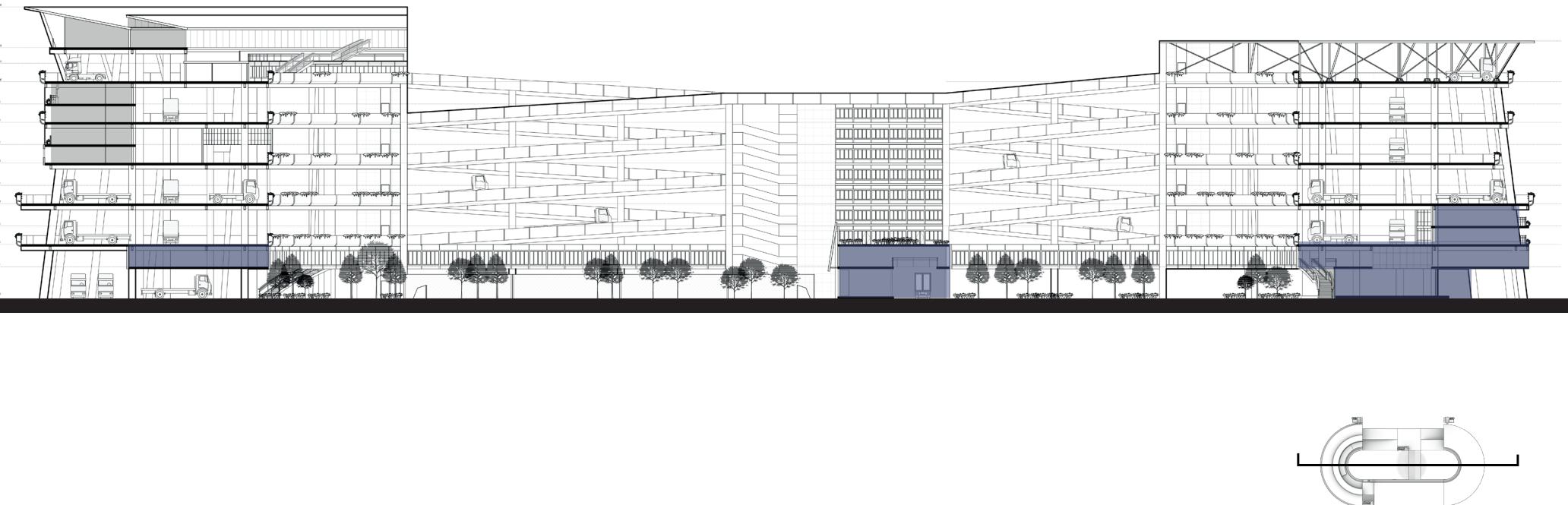
# FUNCTION LAYOUT



- trucks parking
- parking management
- logistic operation
- motel

organization

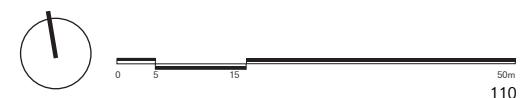
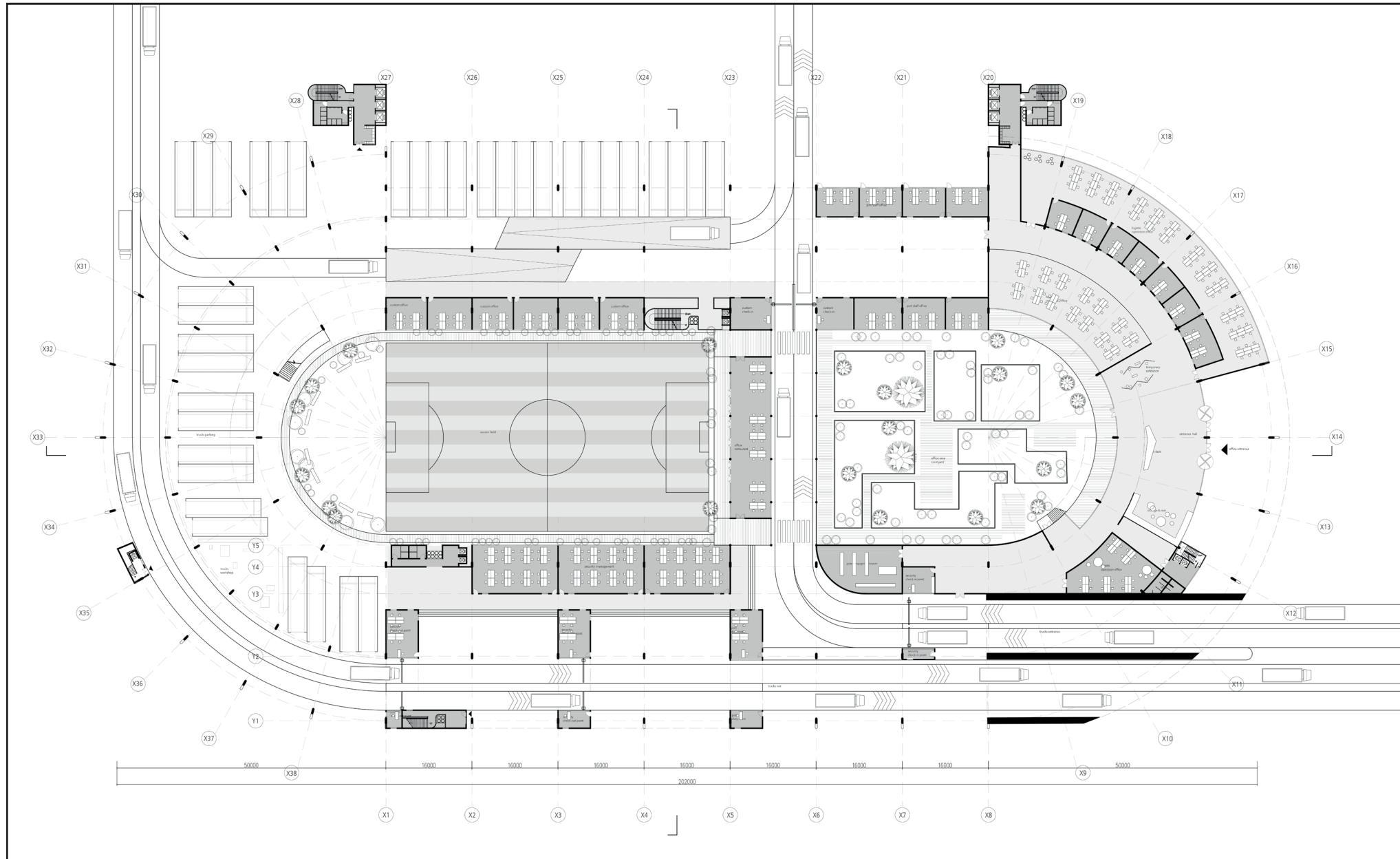
# LOGISTIC OPERATION



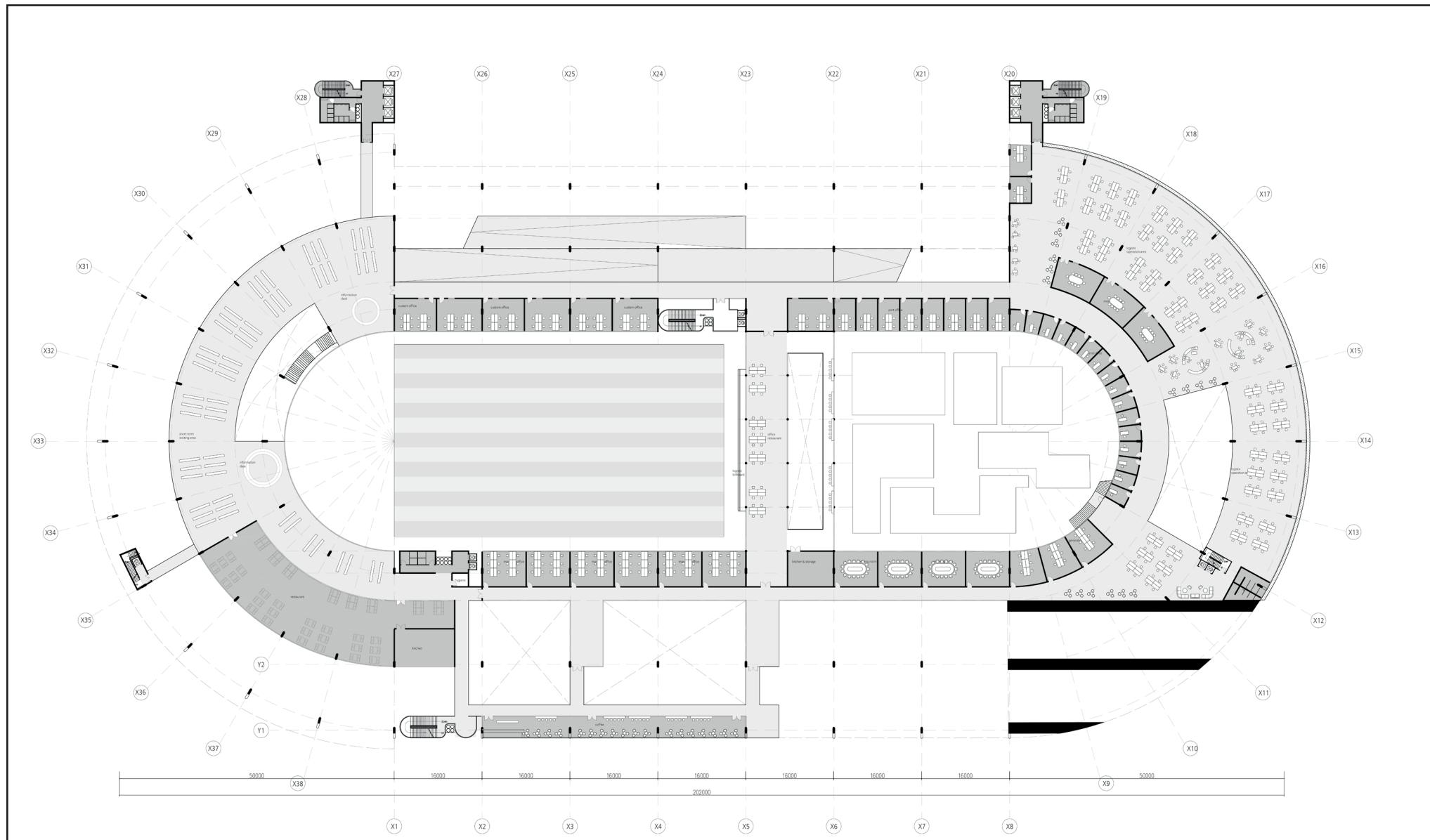
- trucks parking
- parking management
- logistic operation
- motel

# organization

# **GROUND FLOOR PLAN**

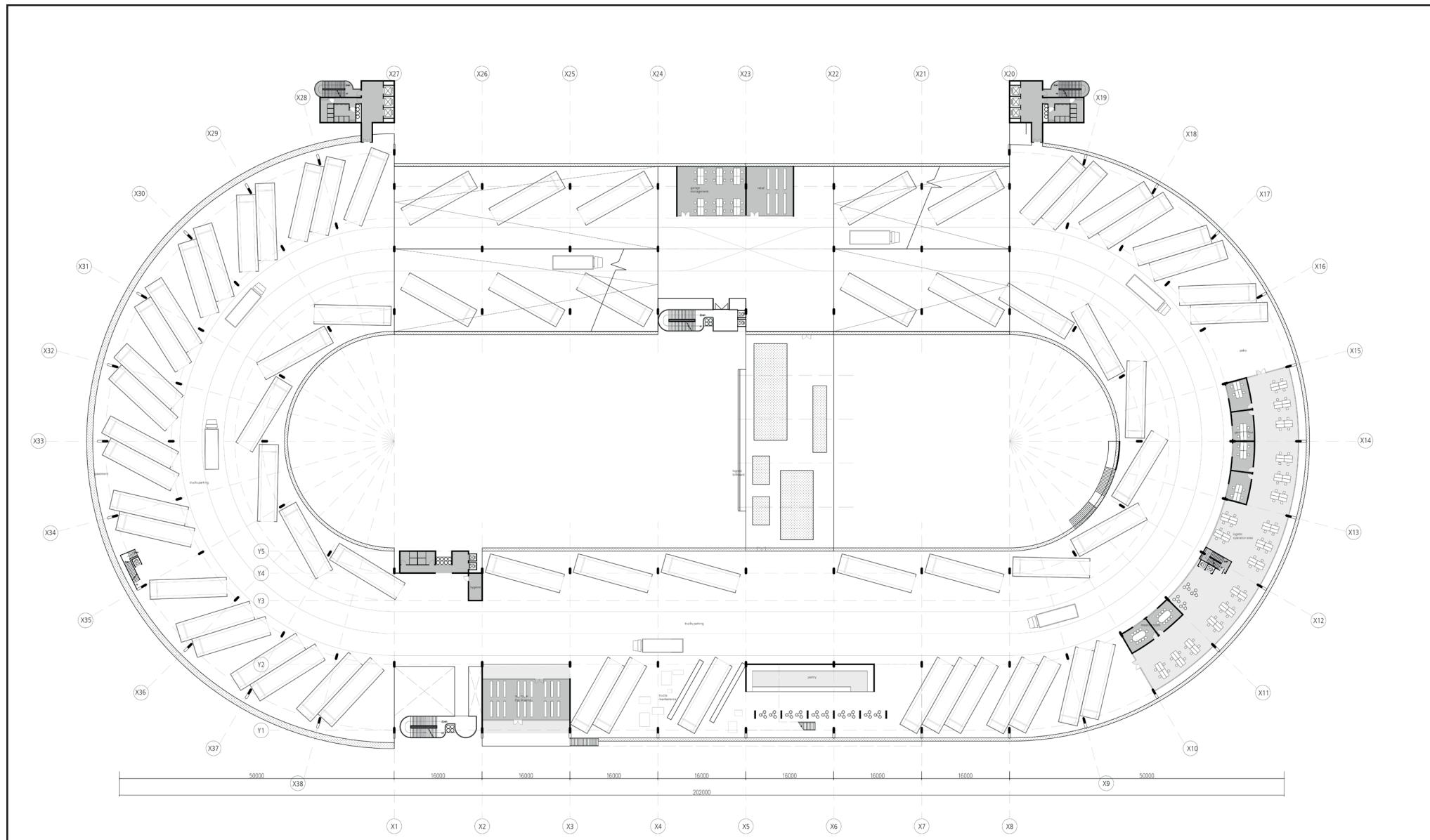


organization  
**1ST FLOOR PLAN**

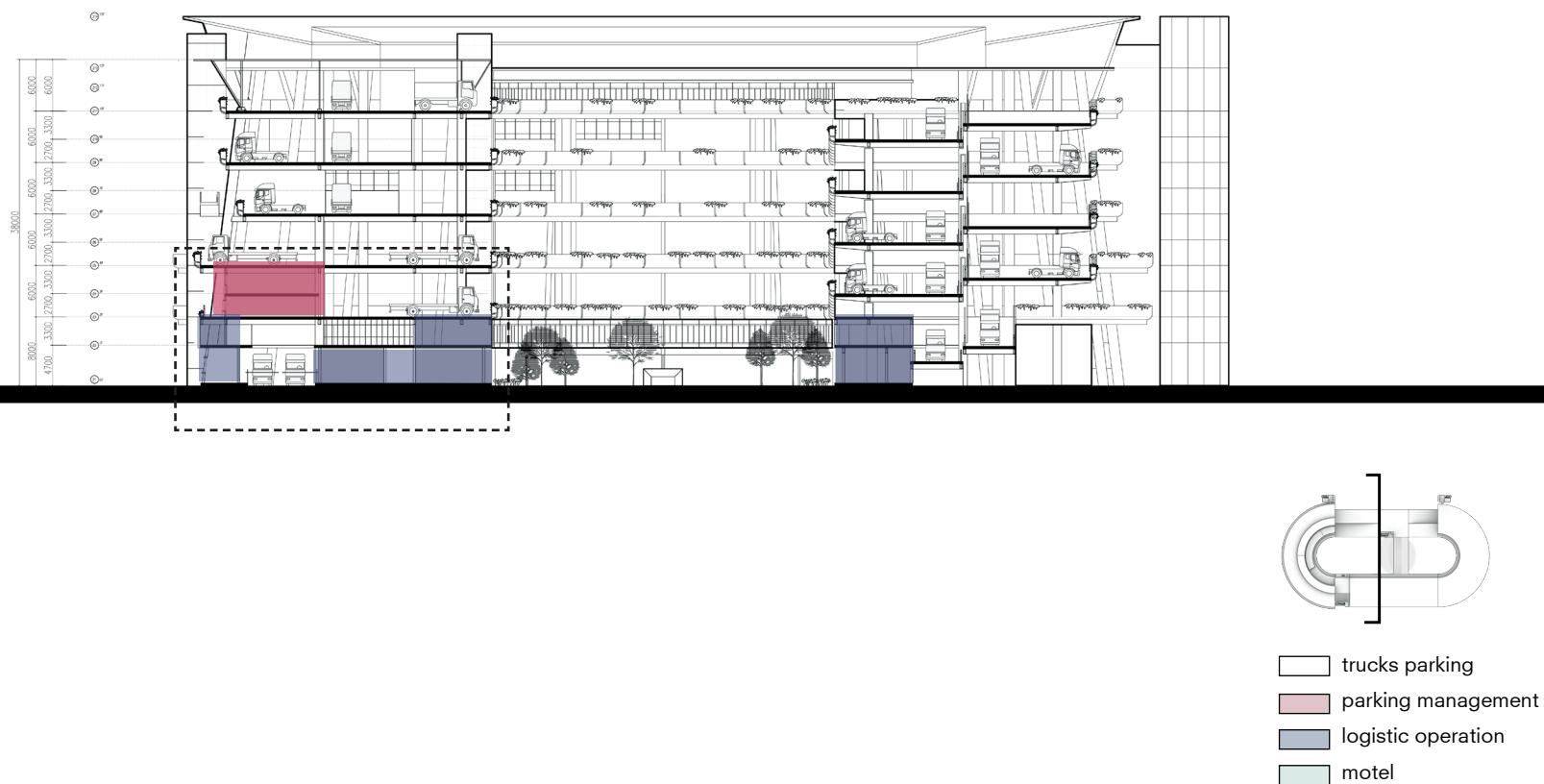


## organization

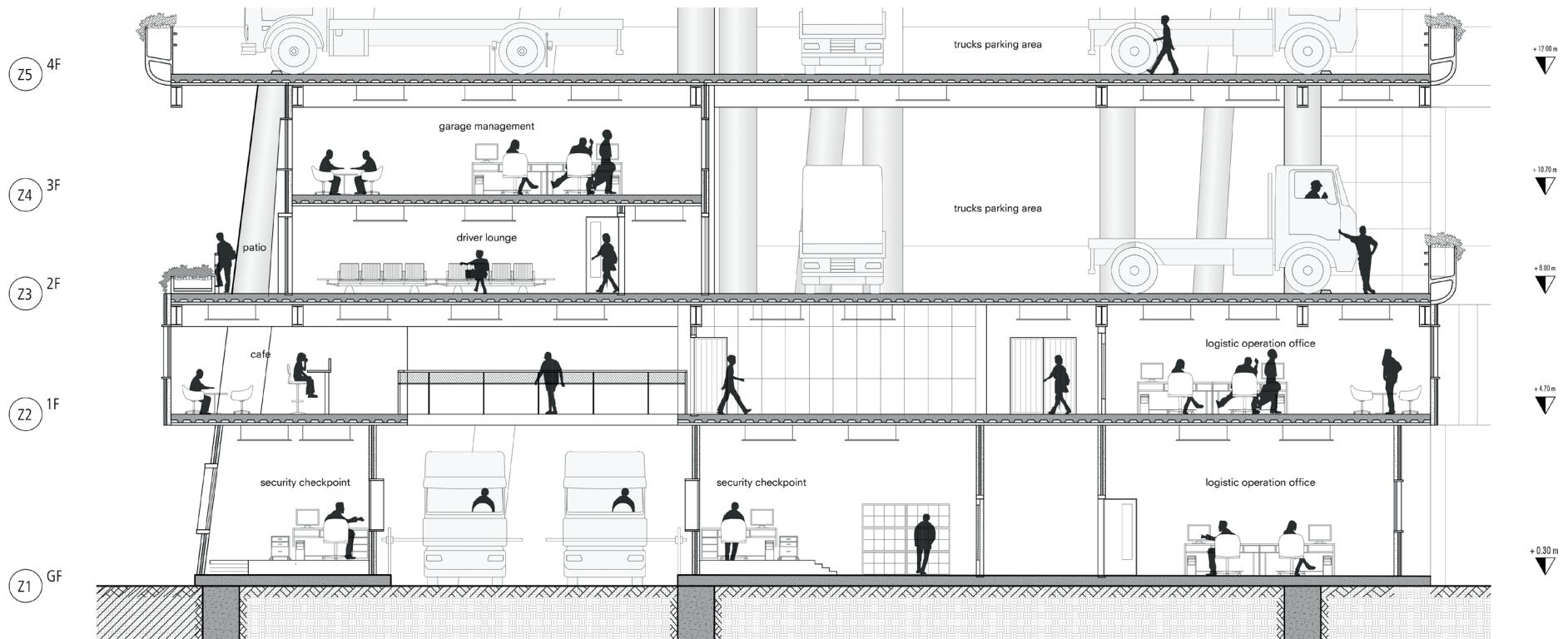
# 2ND FLOOR PLAN



organization  
**CROSS SECTION**



organization  
**INTERIOR FRAGMENT**



Y1

Y2

Y3

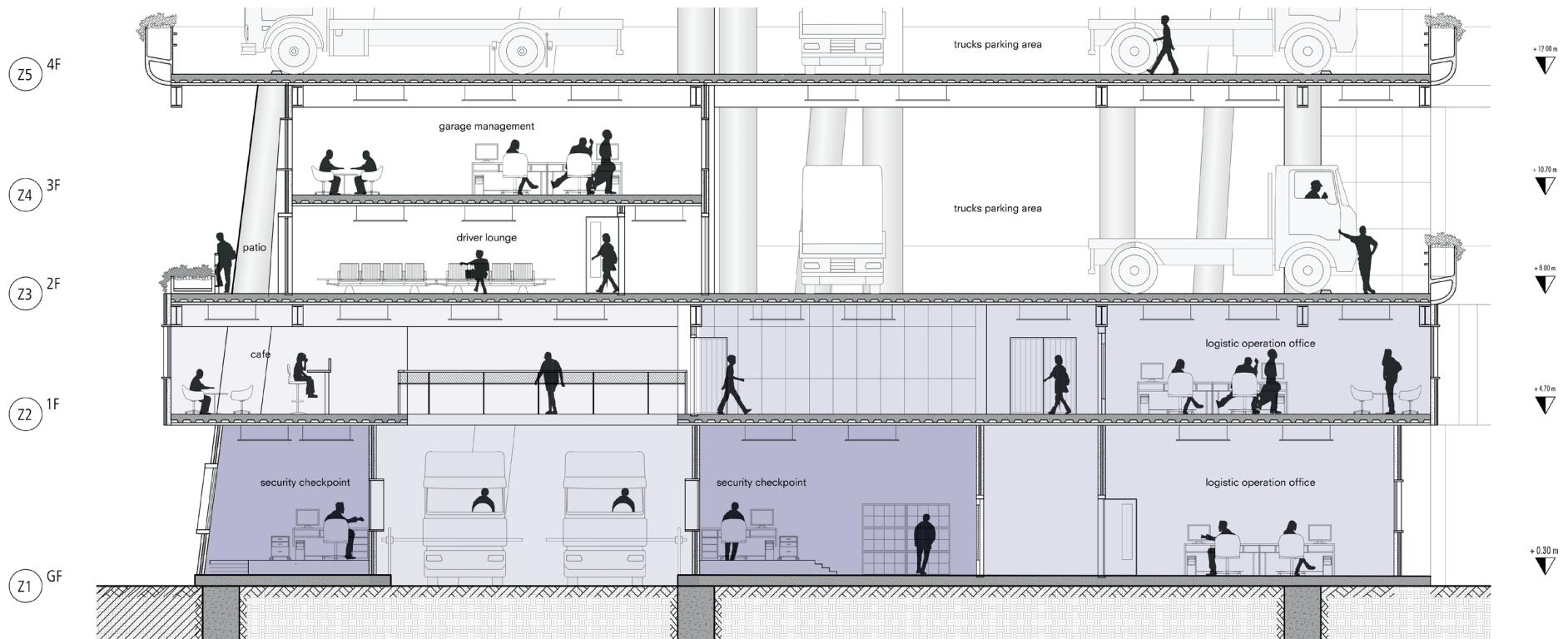
Y4

Y5

- trucks parking
- parking management
- logistic operation

0 5 10m

organization  
**INTERIOR FRAGMENT**



- trucks parking
- parking management
- logistic operation



organization  
**INTERIOR FRAGMENT**



Y1

Y2

Y3

Y4

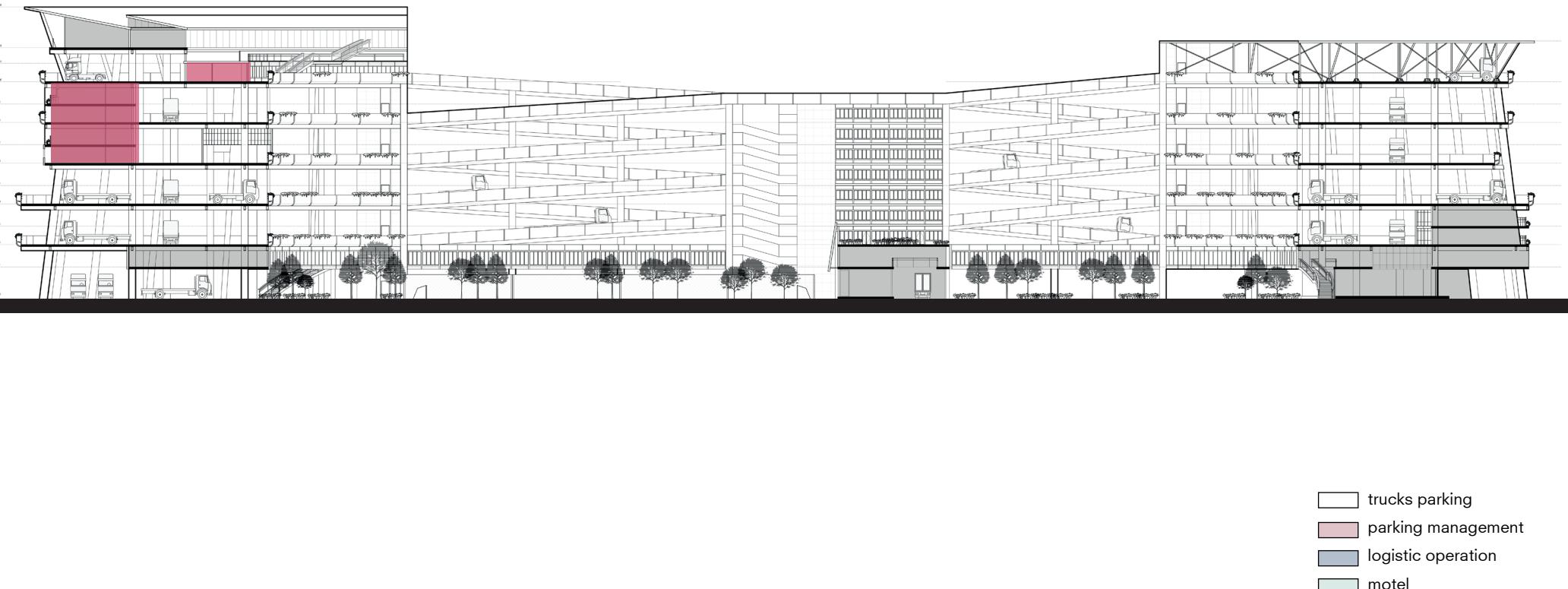
Y5

- trucks parking
- parking management
- logistic operation

0 5 10m

organization

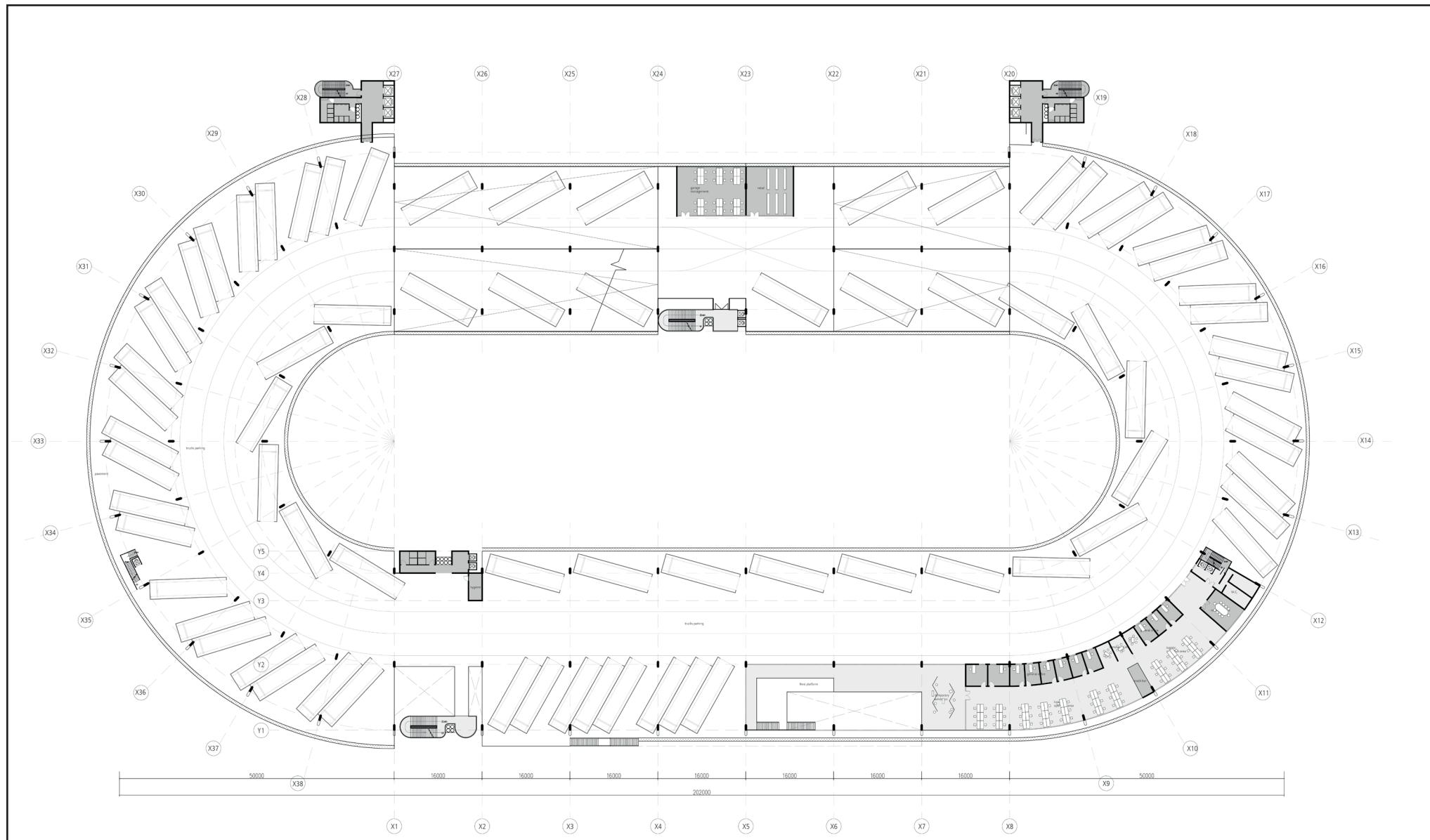
# PARKING MANAGEMENT



- trucks parking
- parking management
- logistic operation
- motel

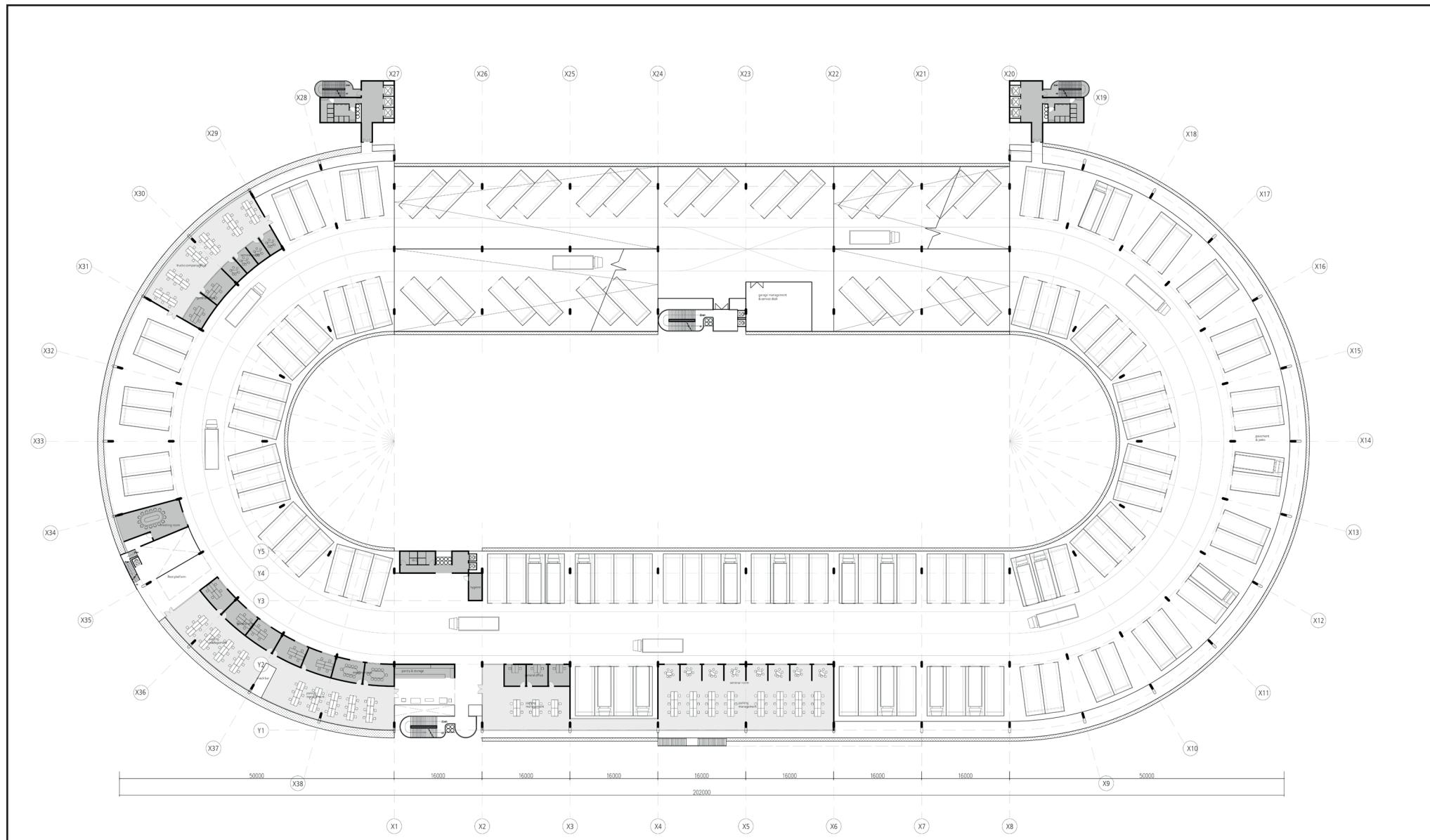
# organization

# 4TH FLOOR PLAN



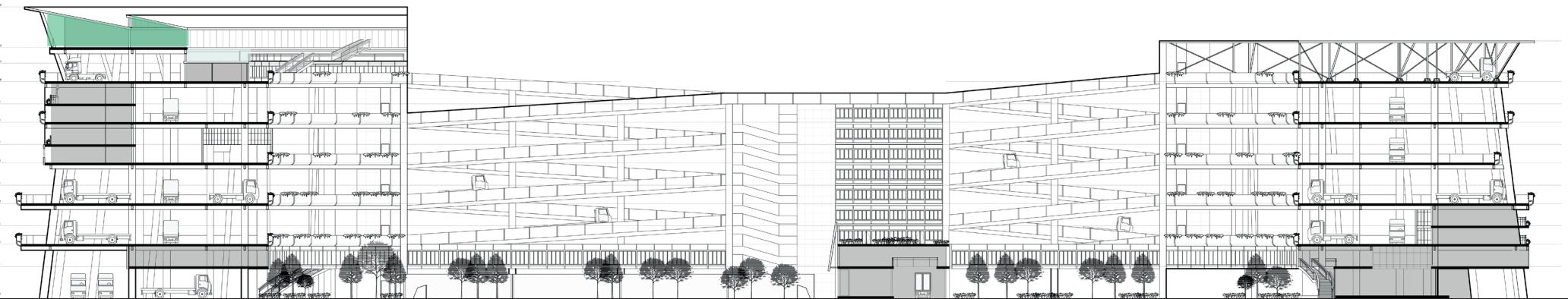
# organization

# 6TH FLOOR PLAN



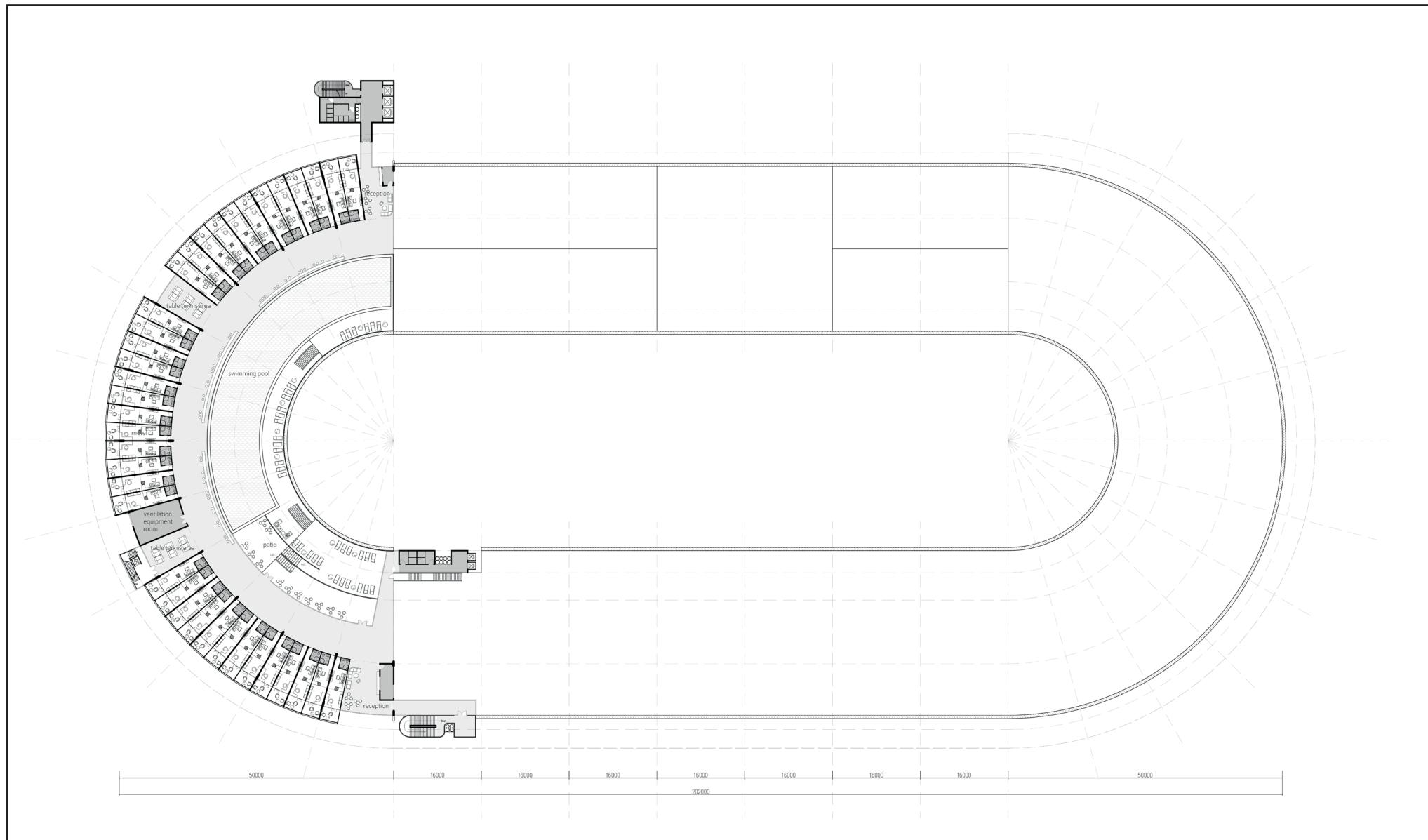
organization

# MOTEL

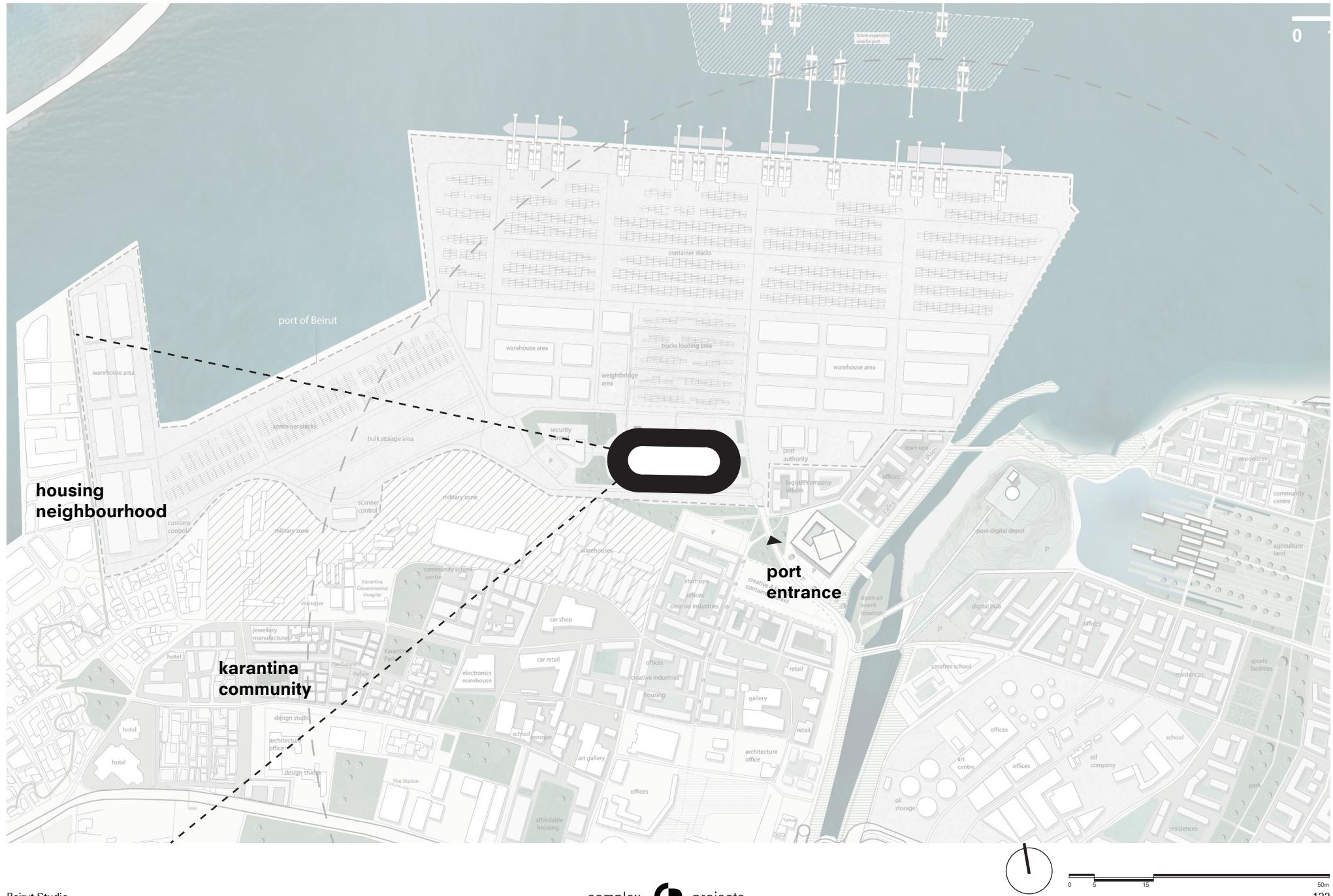


- trucks parking
- parking management
- logistic operation
- motel

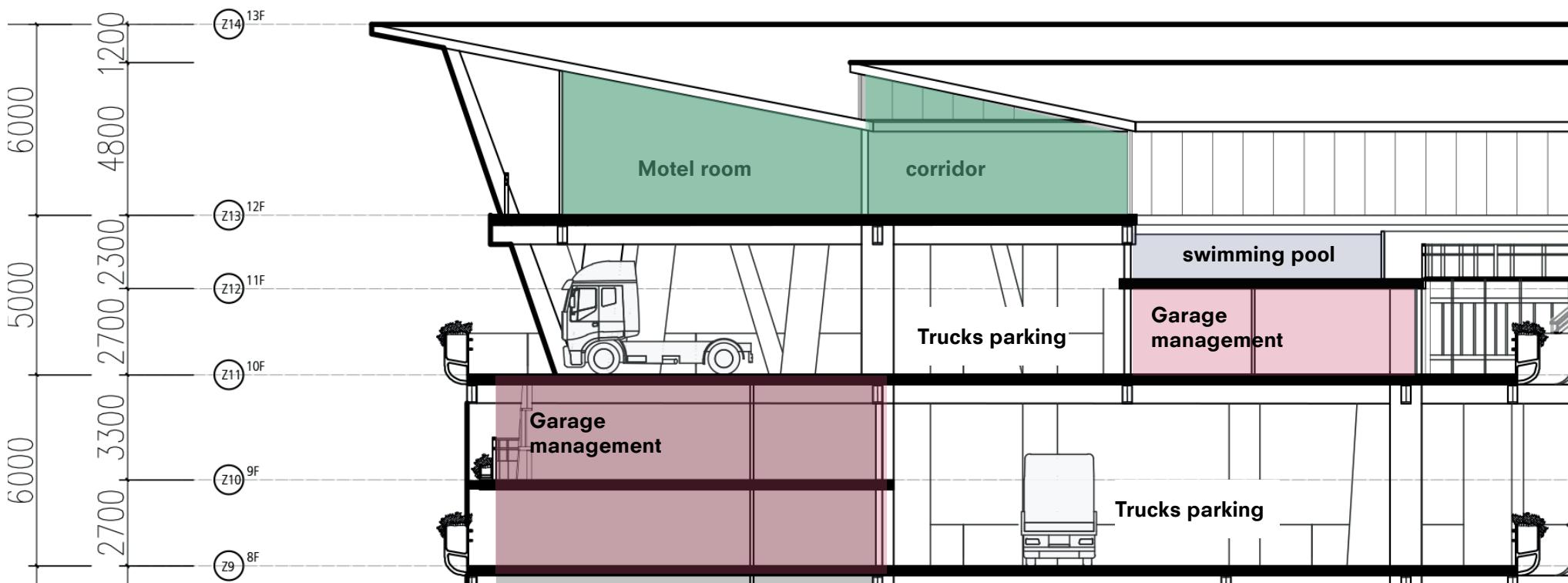
organization  
**11TH FLOOR PLAN**



organization  
**ORIENTATION**



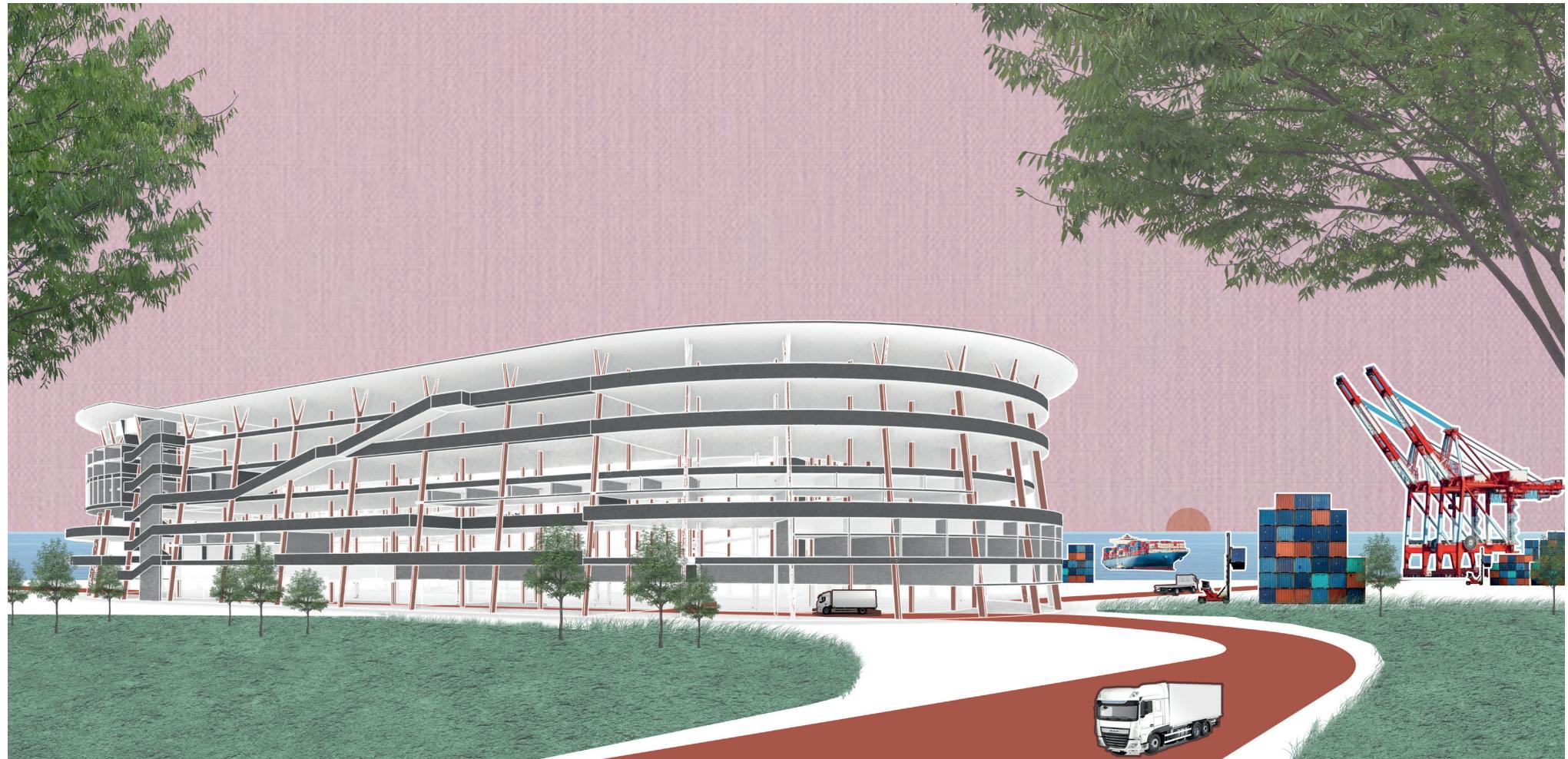
organization  
**MOTEL SPACE**



# FACADE DESIGN

facade design

# VISION

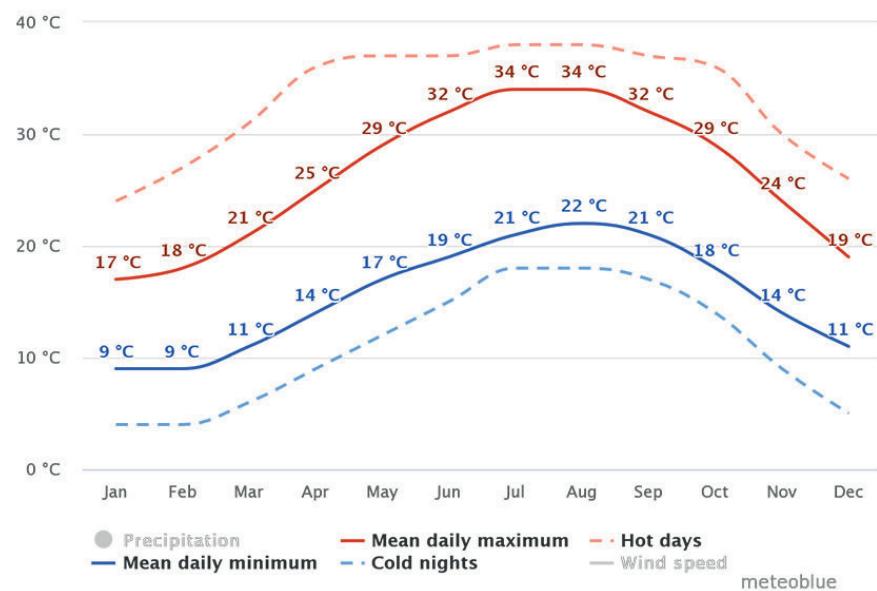


facade design  
**FACTORS**

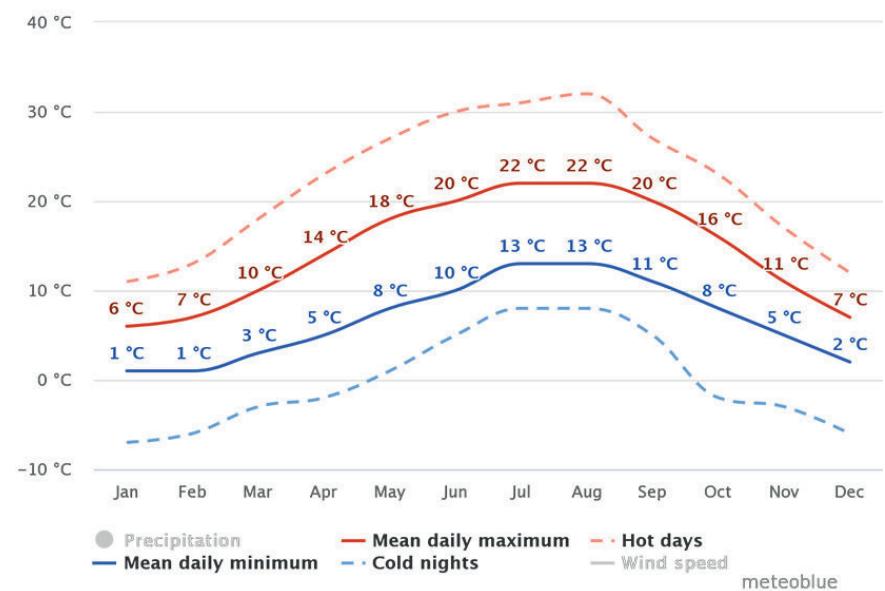


climate response

# TEMPERATURE



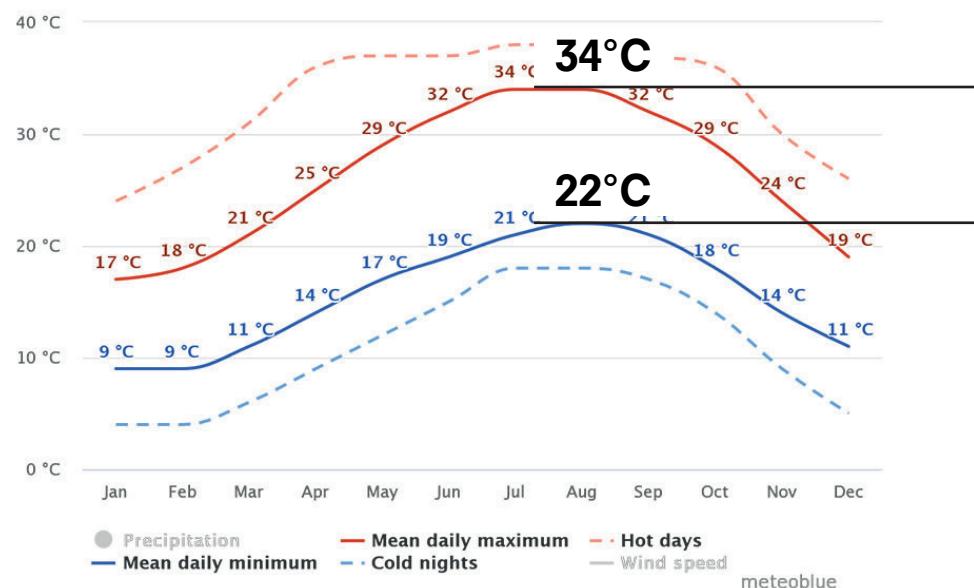
BEIRUT



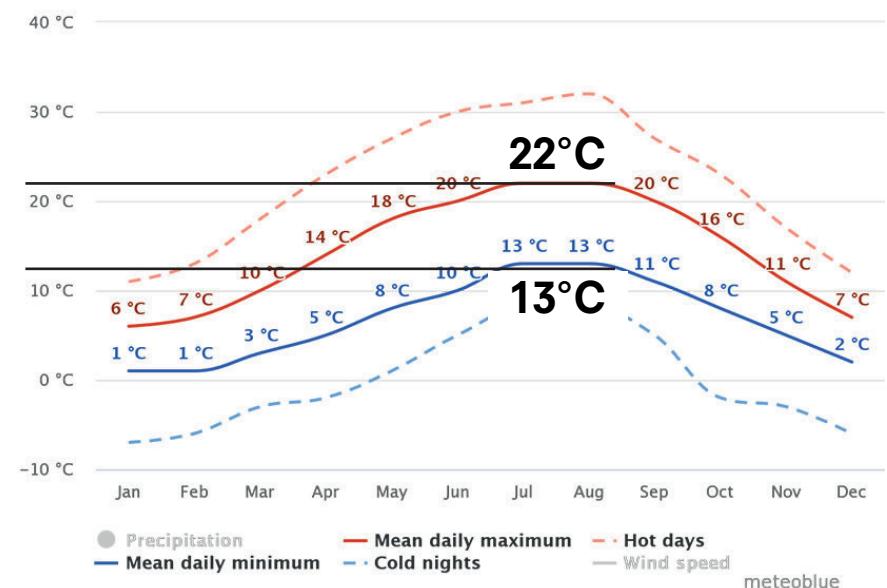
DELFT

climate response

# TEMPERATURE

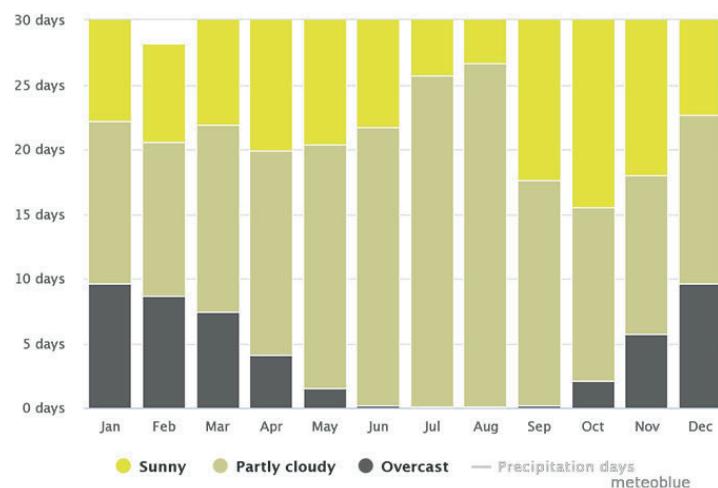


BEIRUT

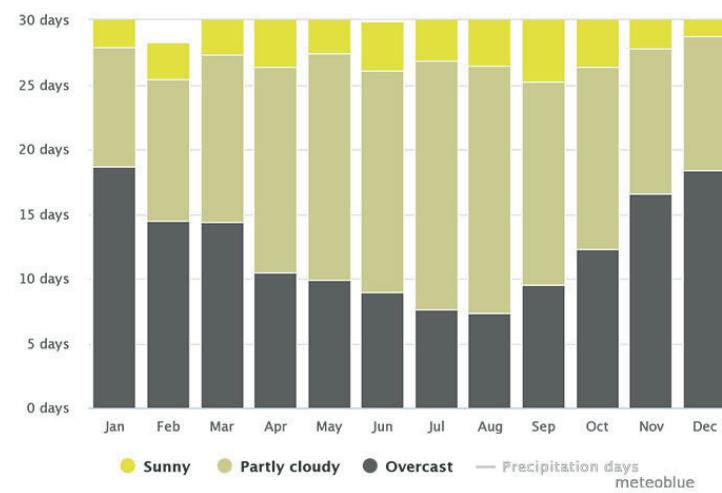


DELFT

climate response  
**WEATHER**

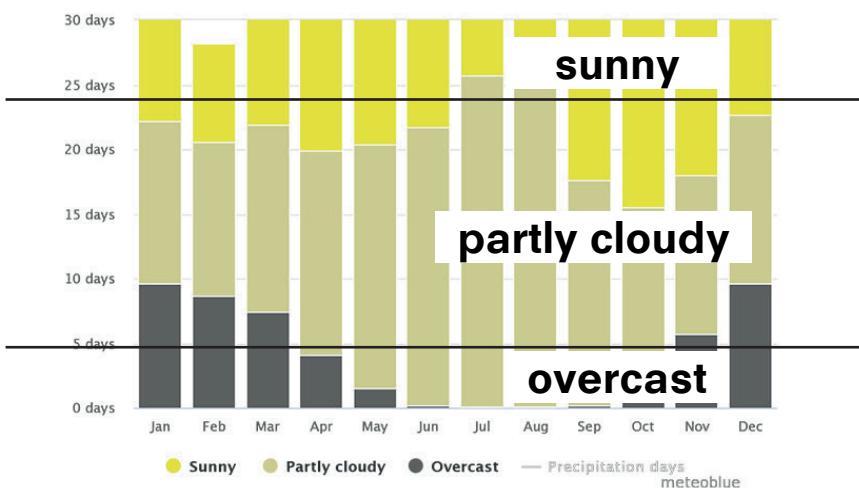


BEIRUT

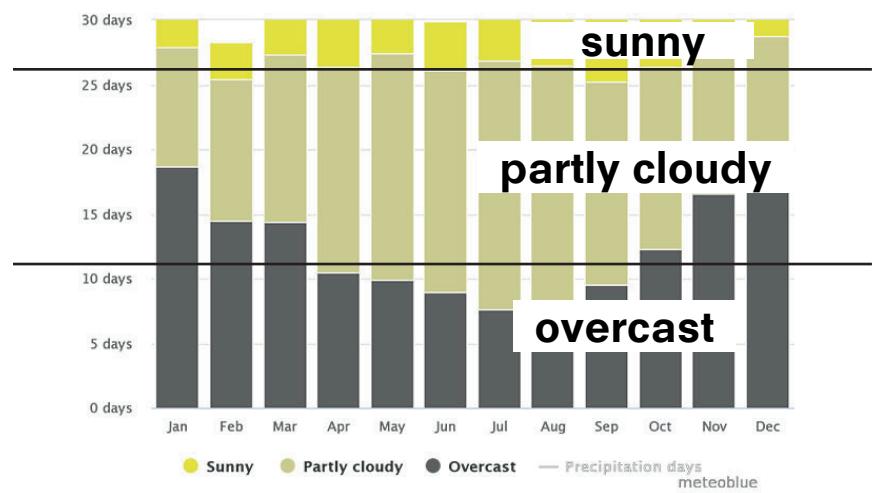


DELFT

climate response  
**WEATHER**



BEIRUT



DELFT

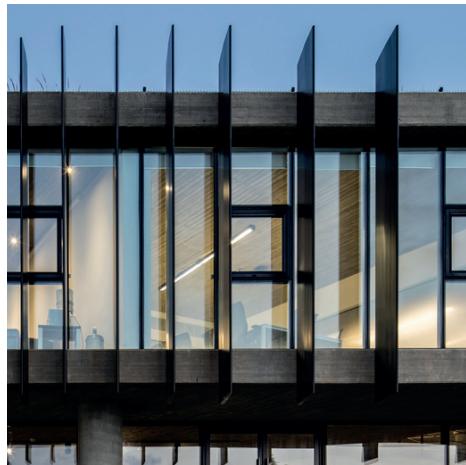
context response

# LOCAL PROJECTS

**Arabic Studies Centre  
KOURA, LEBANON**



**CMA-CGM Headquarters  
BEIRUT, LEBANON**



vertical shading



vertical + horizontal shading

# CLIMATE REQUIREMENT

**1. Ensure ventilation**

**2. Heat insulation and facade shading:**

hot in summer;  
partly block the direct sunlight

context response

# PORT CHARACTERISTIC



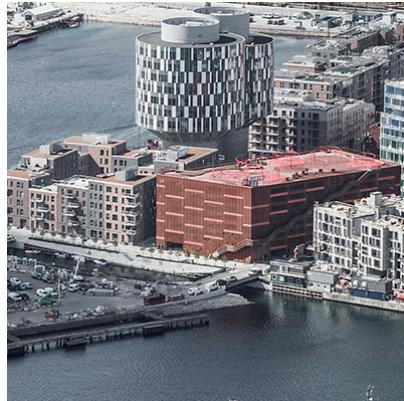
context response

# PORT PROJECTS

**COBE**  
The Silo



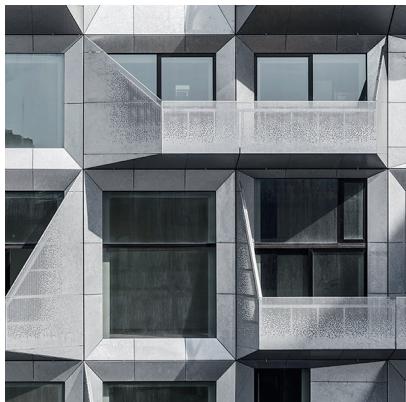
**JAJA Architect**  
Parl n'Play



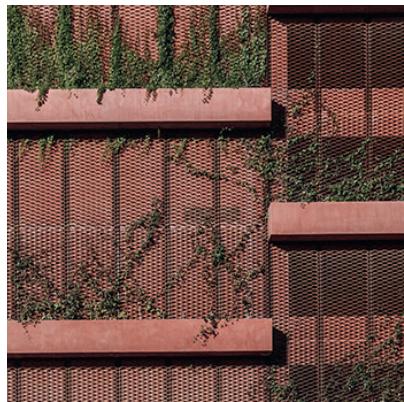
**atelier d'architecture King Kong**  
Dock G6 Hotel



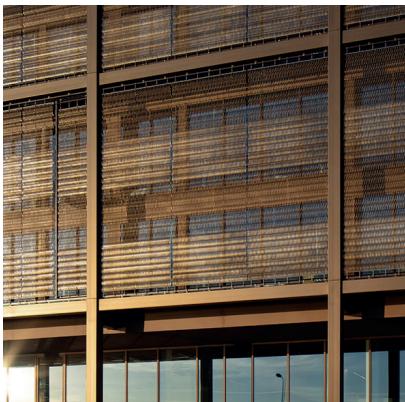
**C.F. Møller Architects**  
Copenhagen International School



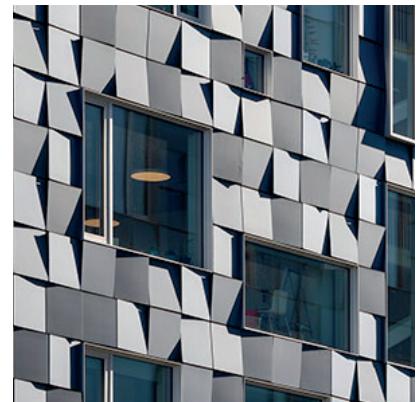
galvanized steel



corroded steel plate



metal mesh



solar panels

context response

# TRUCK WAREHOUSE



context response

# PARKING BUILDING

Keith Ingham; Charles Wilson  
Preston Bus Station



Stéphane Beel Architects  
Parking Building IMEC / KUL



Herzog & de Meuron  
1111 Lincoln Road



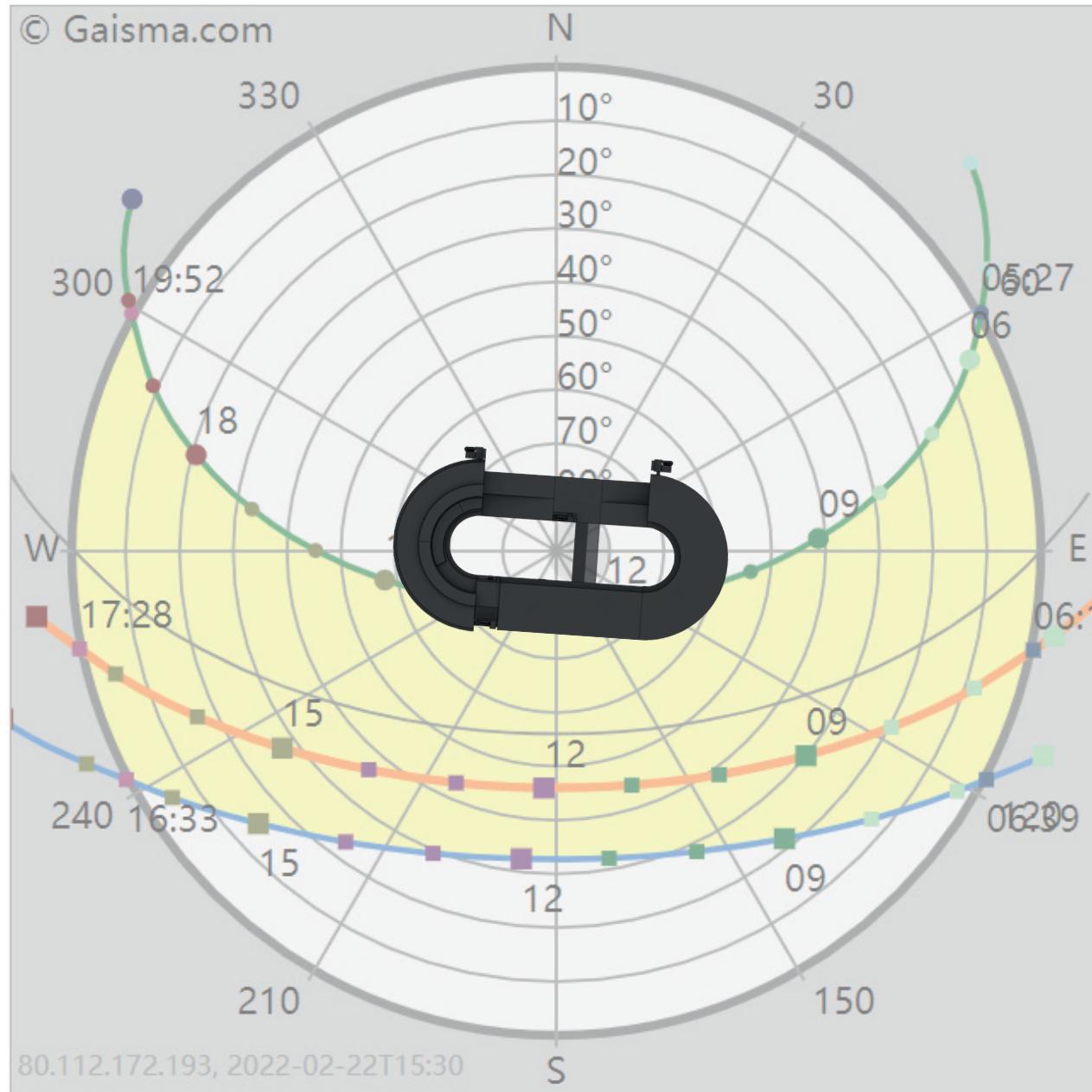
Paul de Ruiter architects  
Veranda Car Park



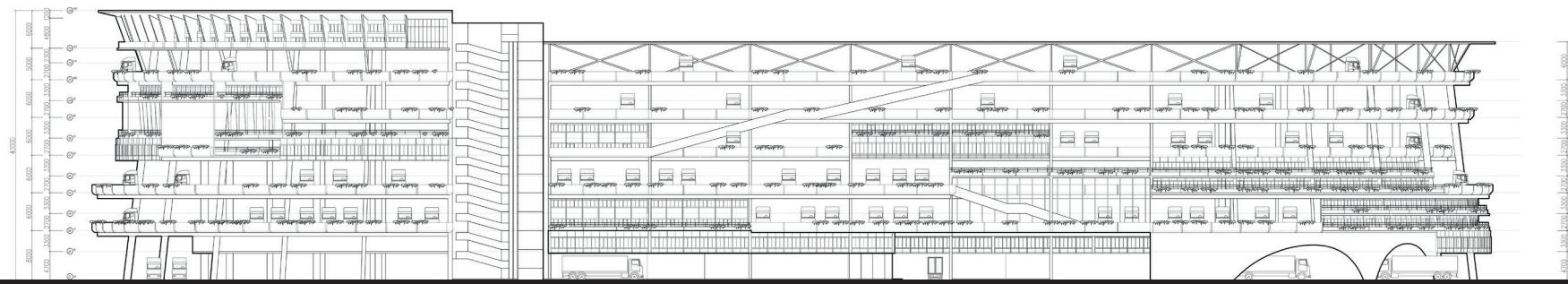
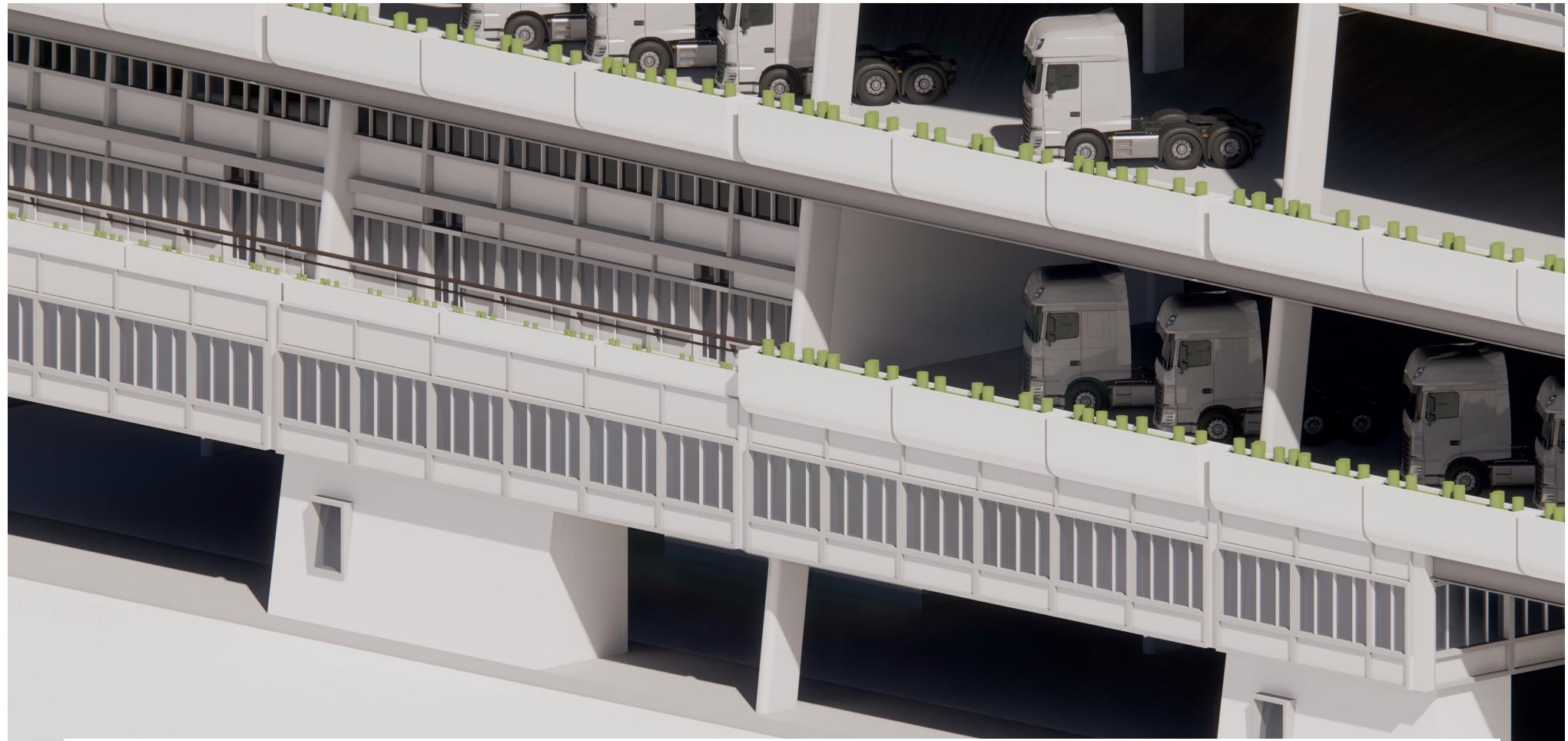


facade design

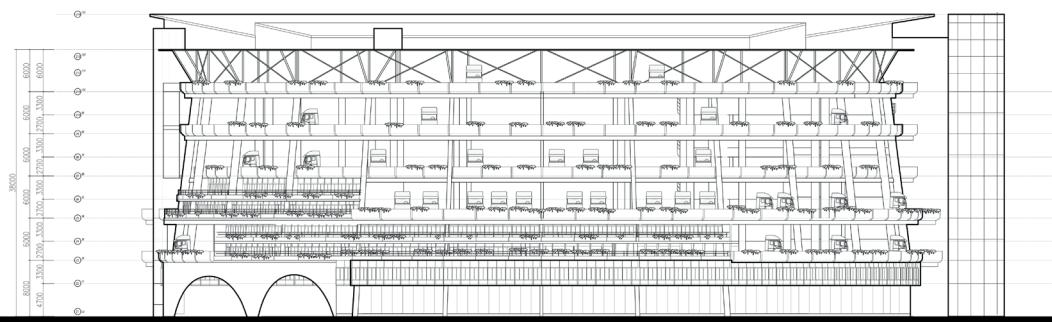
# SUN PATH DIAGRAM



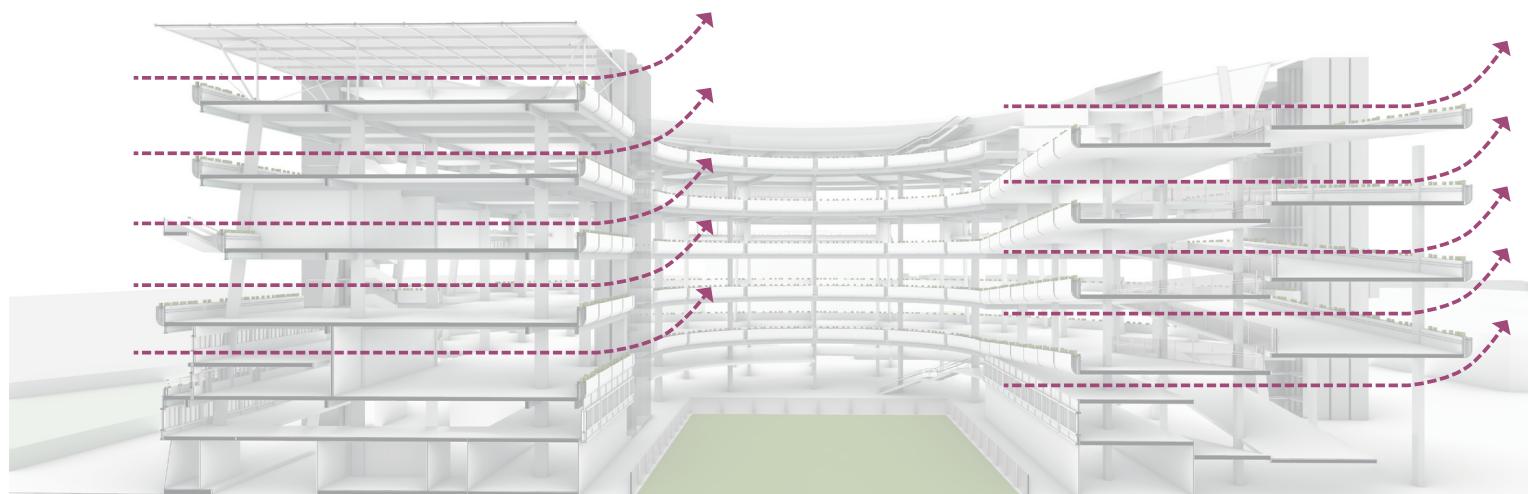
facade design  
**SOUTH FACADE**



facade design  
**WEST/EAST FACADE**



facade design  
**VENTILATION**



READY TO PICK:

No. FIELD.  
00144 zone A

WAITING LIST

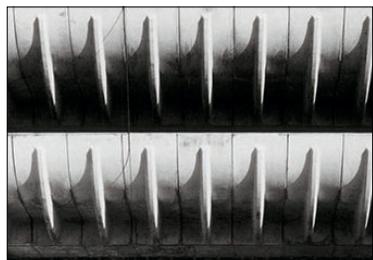
No.	TIME
00145	2 HOURS
00146	2 HOURS
00147	2 HOURS
00148	3 HOURS
00149	3 HOURS
00150	3 HOURS



facade design  
**FRAGMENT**



**solar panel roof**



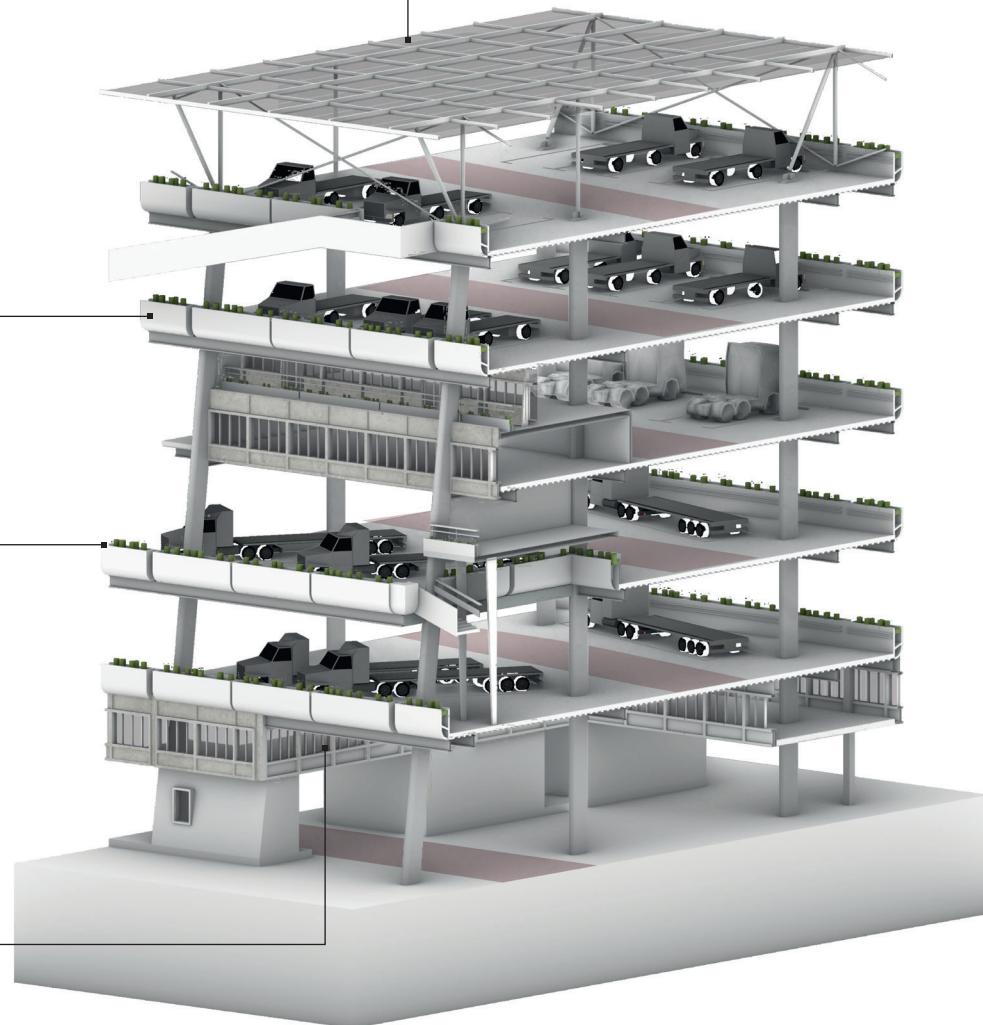
**curved concrete guardrail**



**anti-pollution plant**

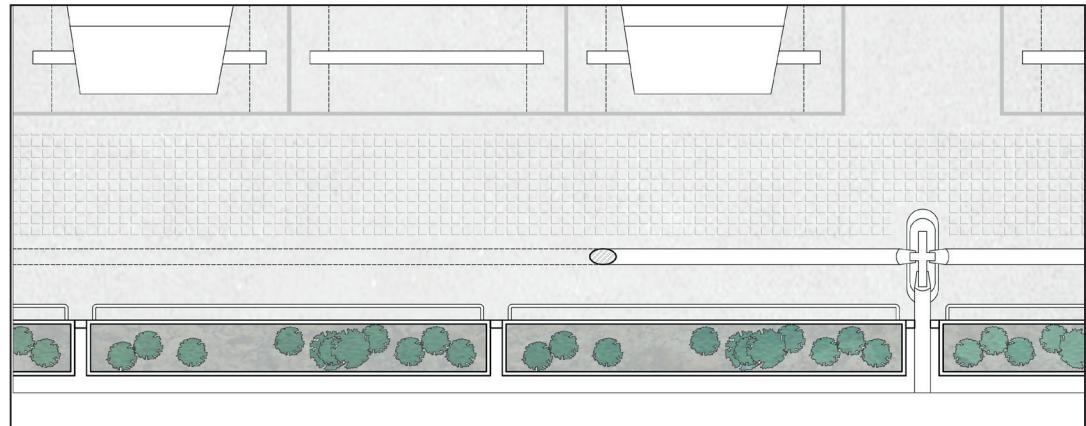
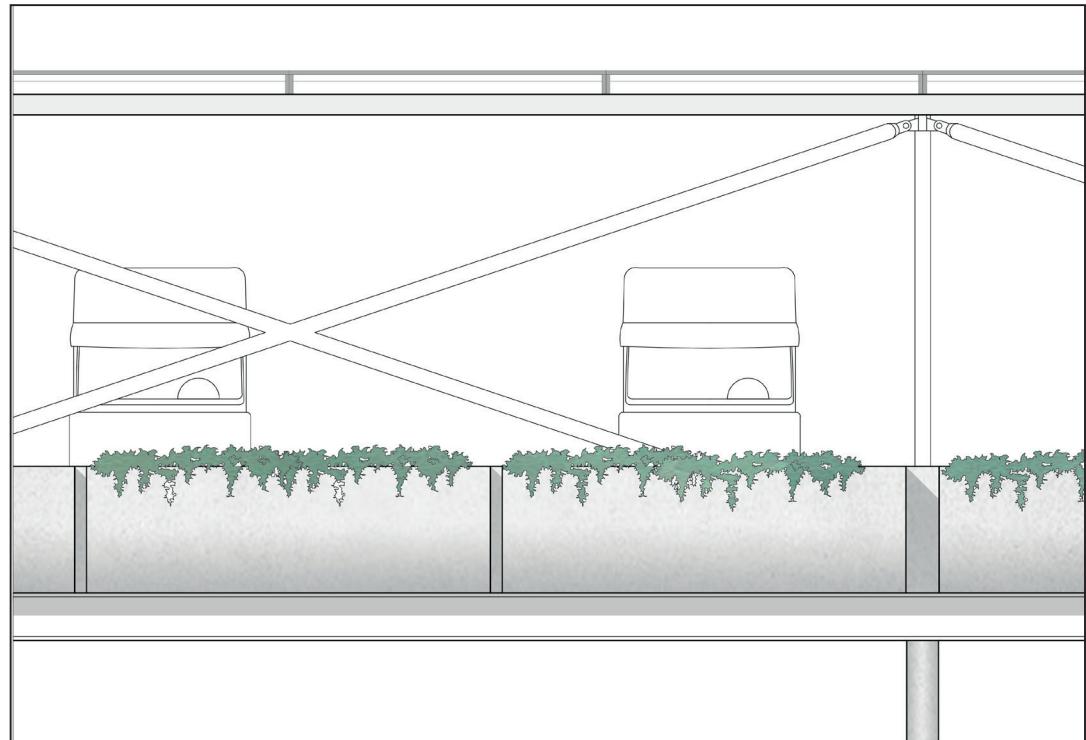
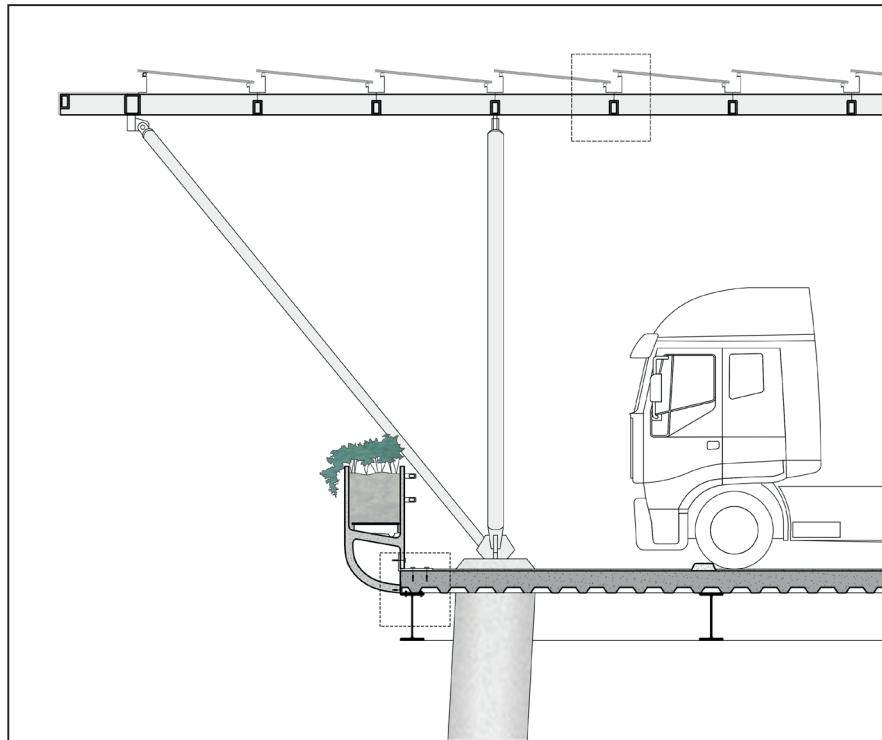


**prefabricated concrete panel**



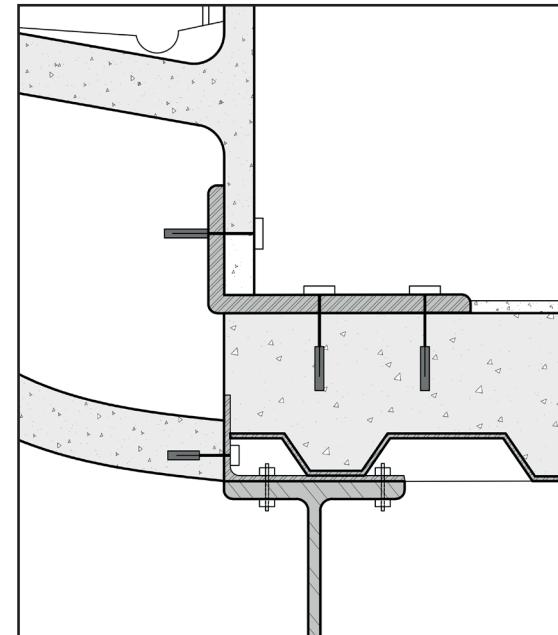
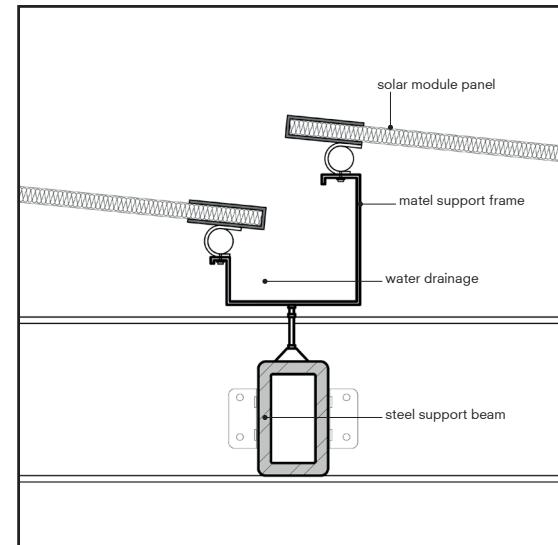
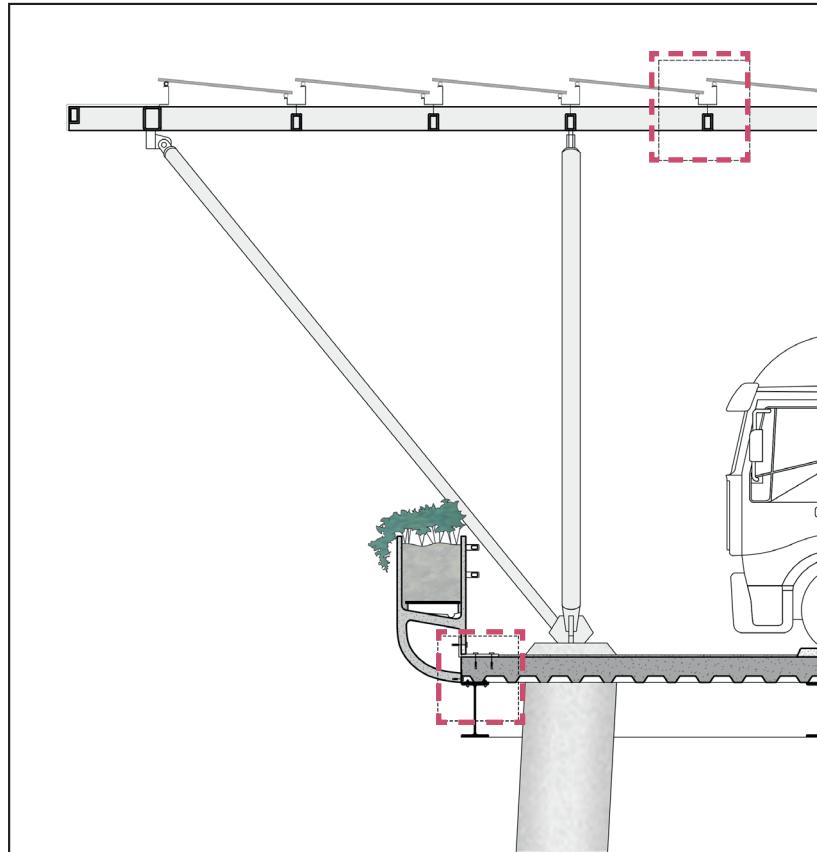
facade design

# ROOF TOP DETAIL



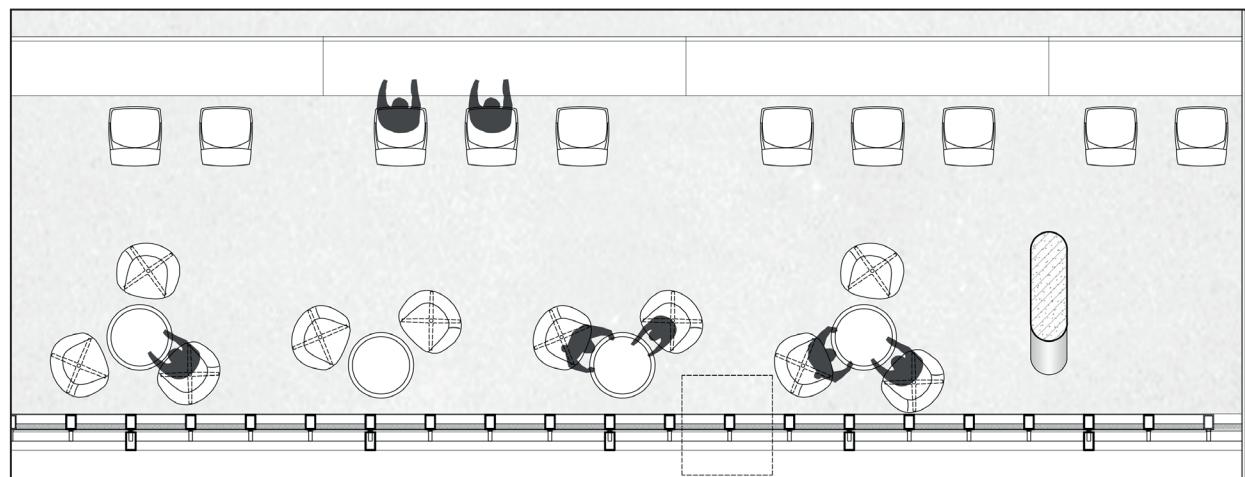
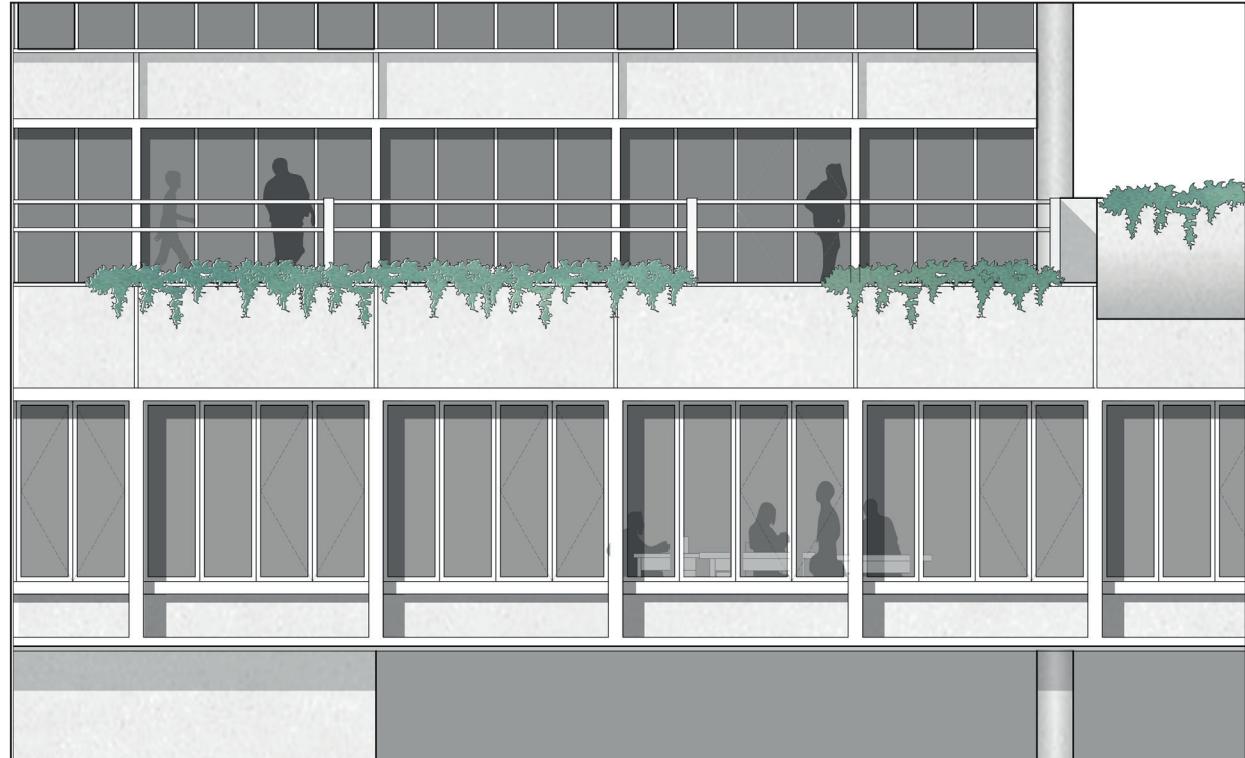
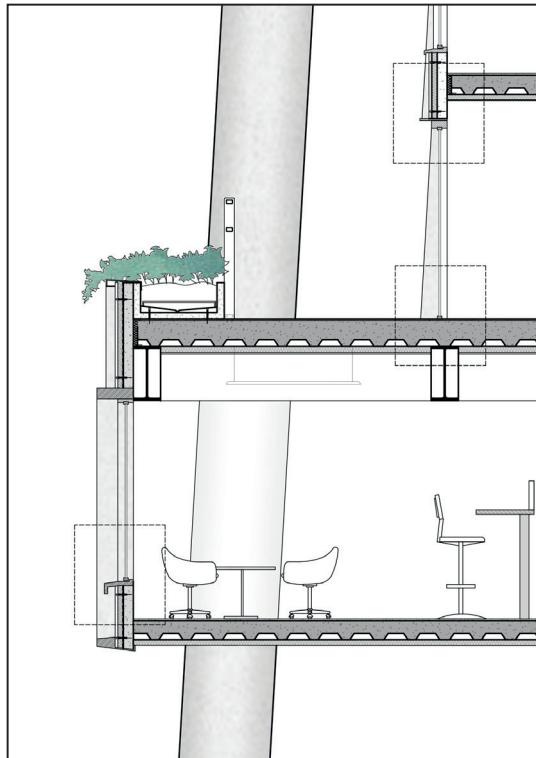
facade design

# ROOF TOP DETAIL



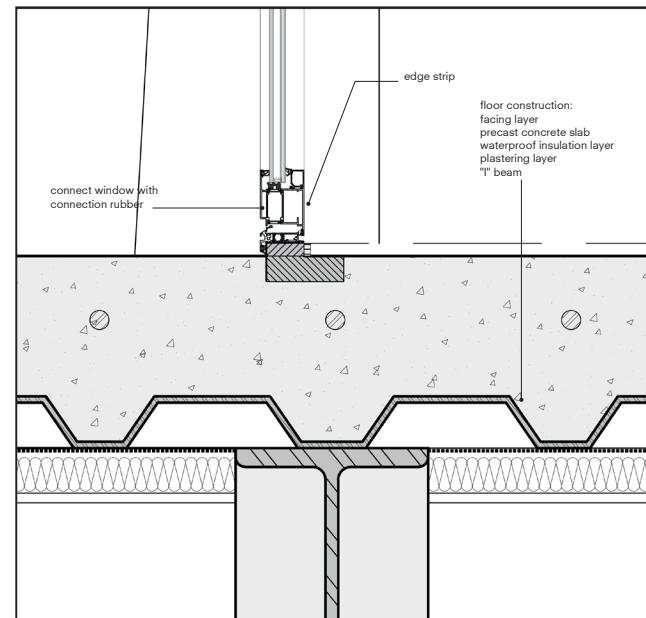
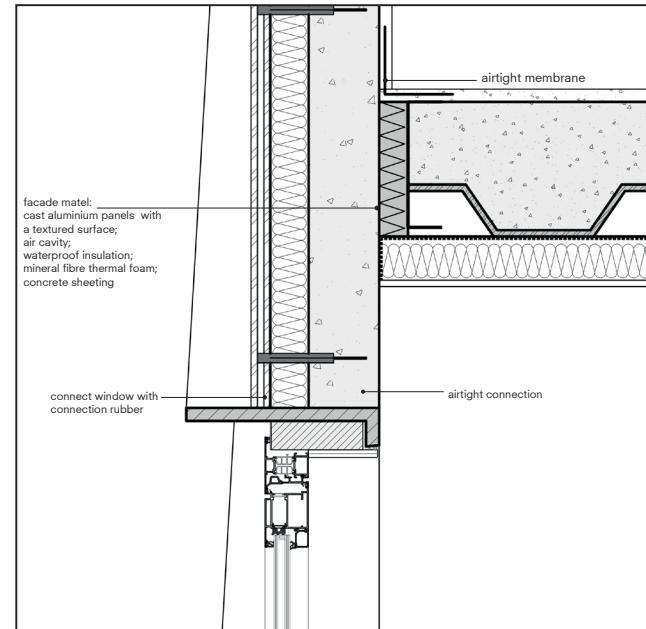
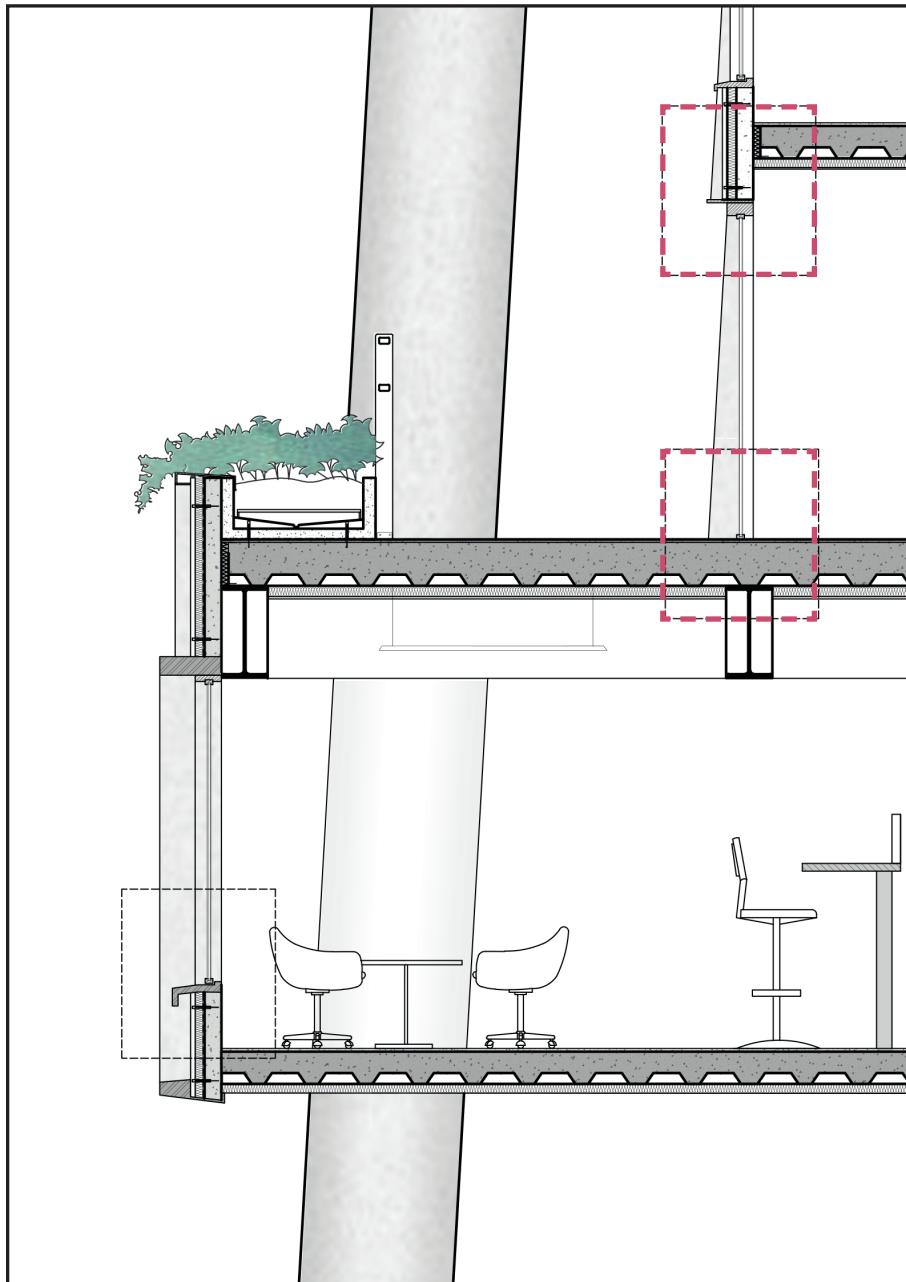
facade design

# OFFICE FACADE DETAIL



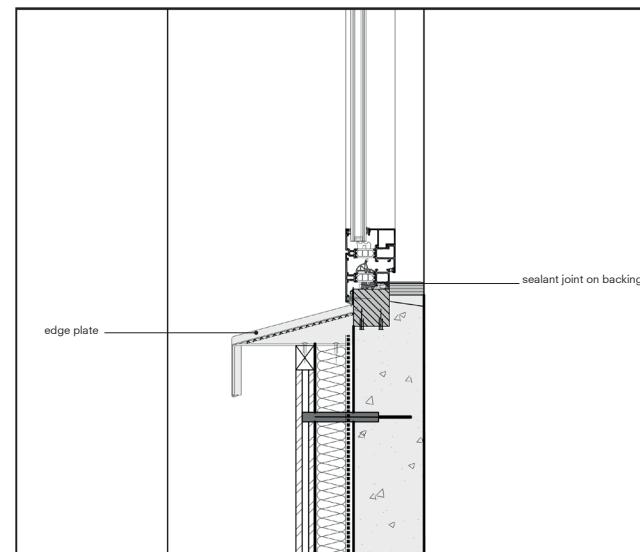
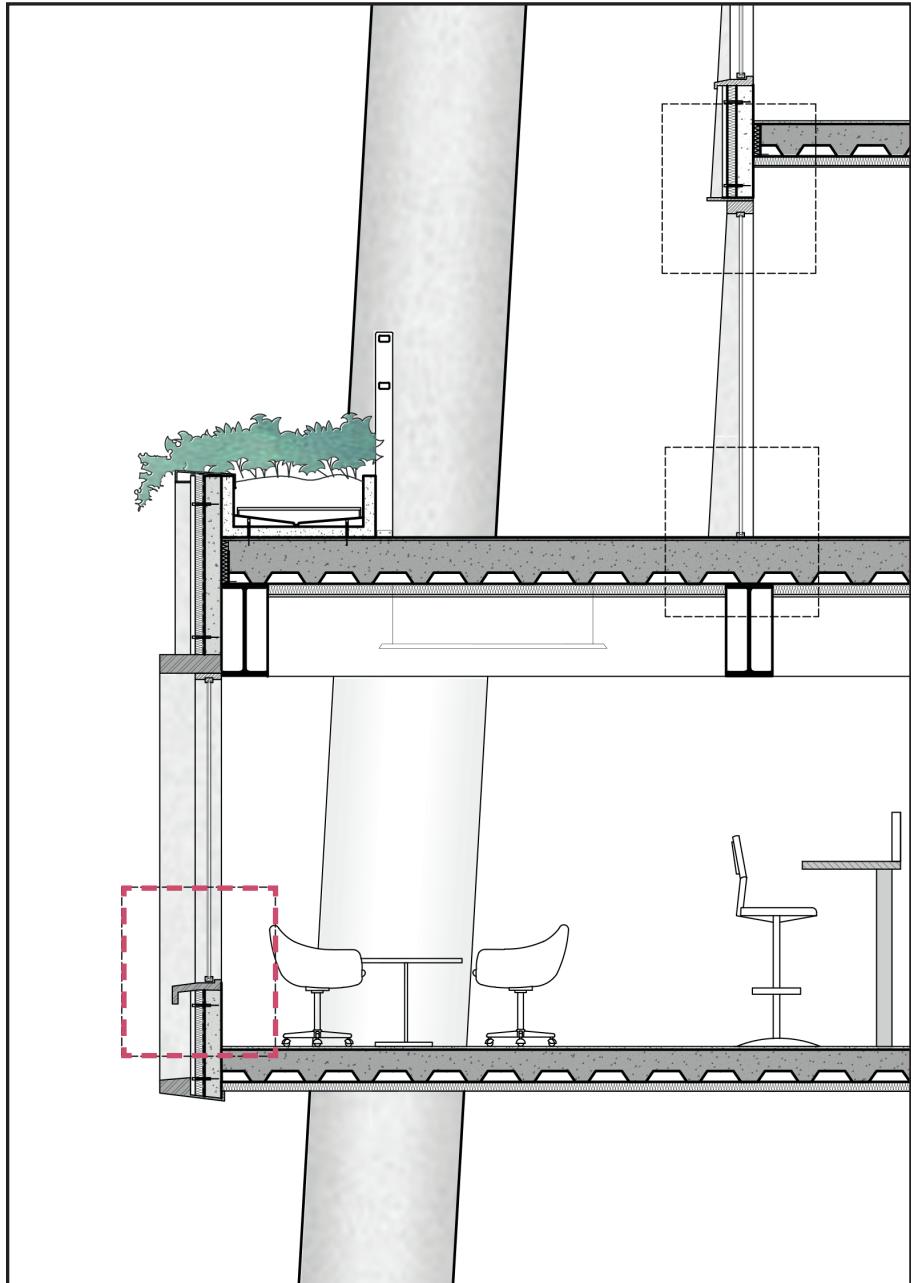
facade design

# OFFICE FACADE DETAIL



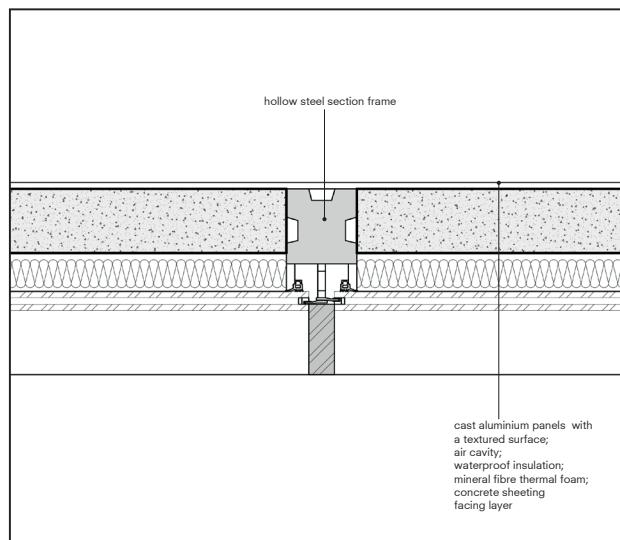
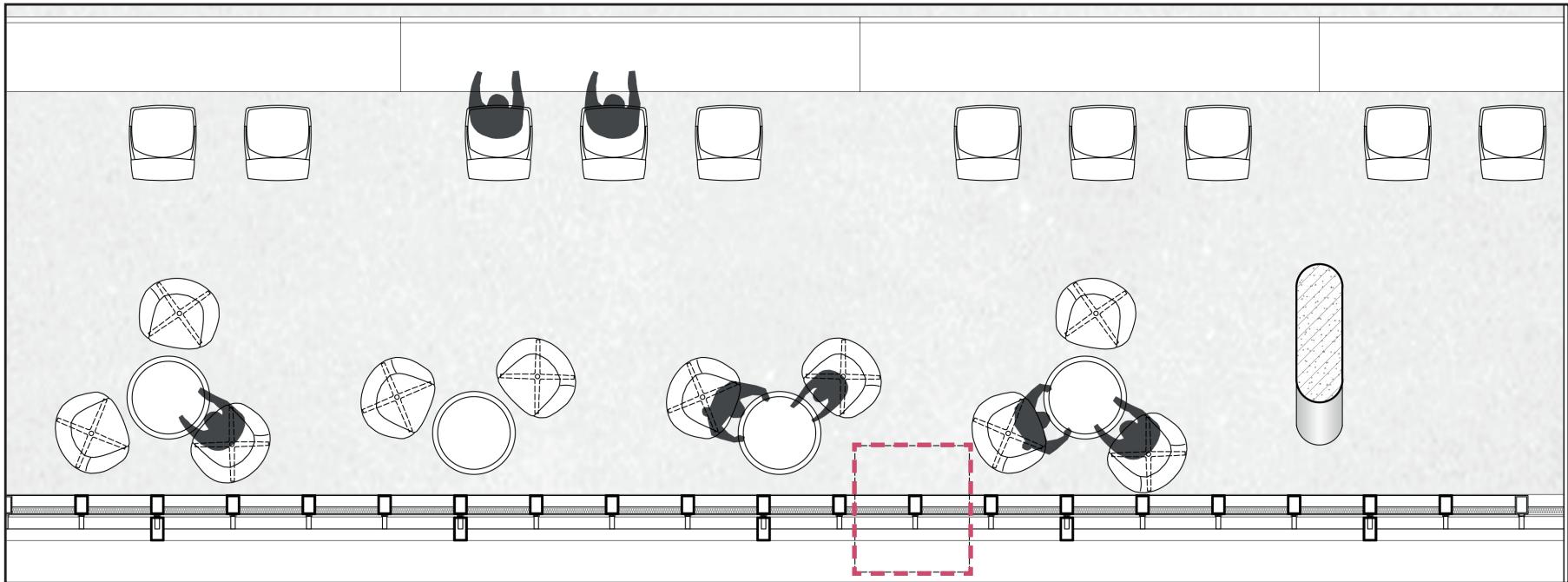
facade design

# OFFICE FACADE DETAIL



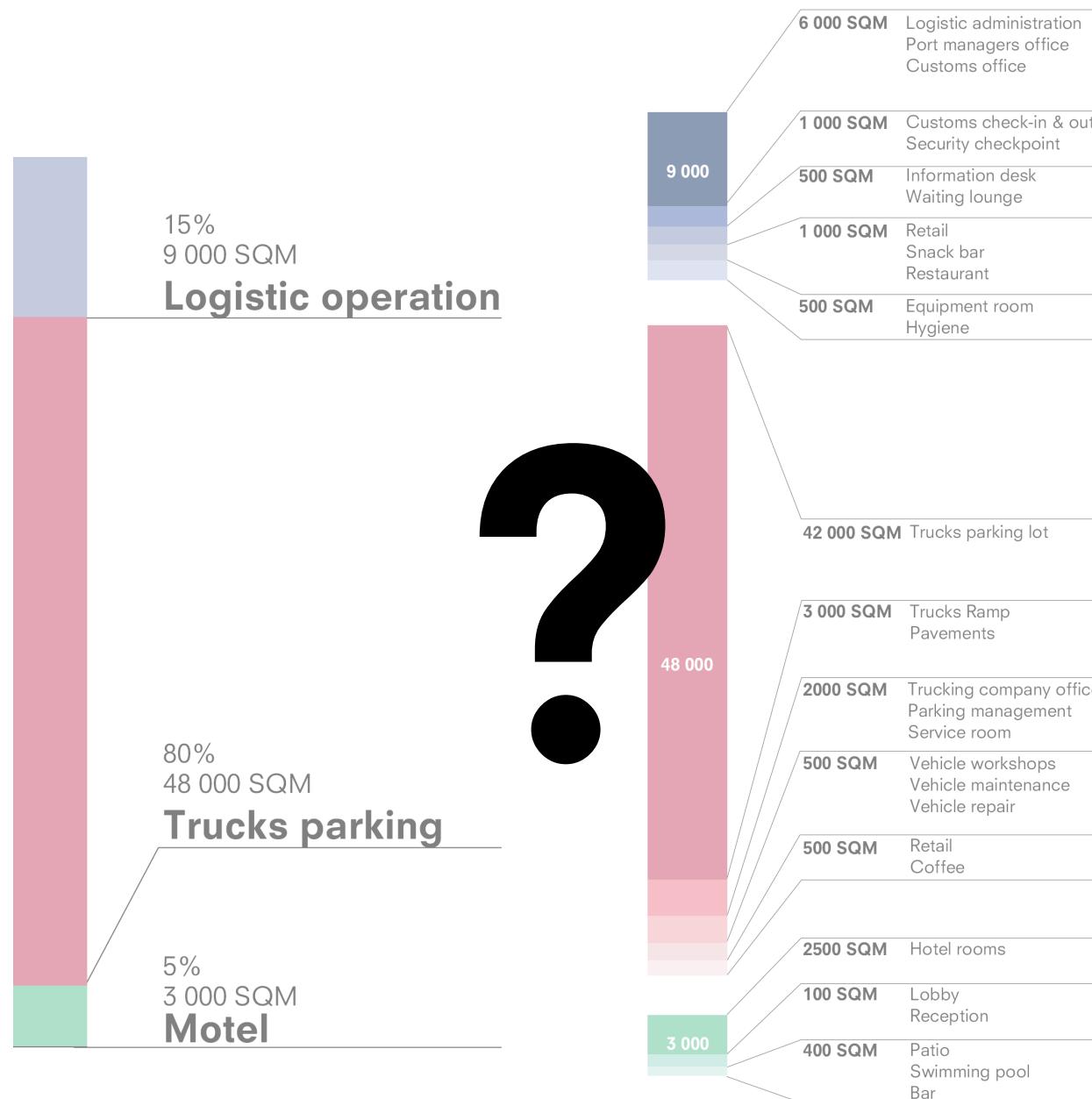
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# OFFICE FACADE DETAIL



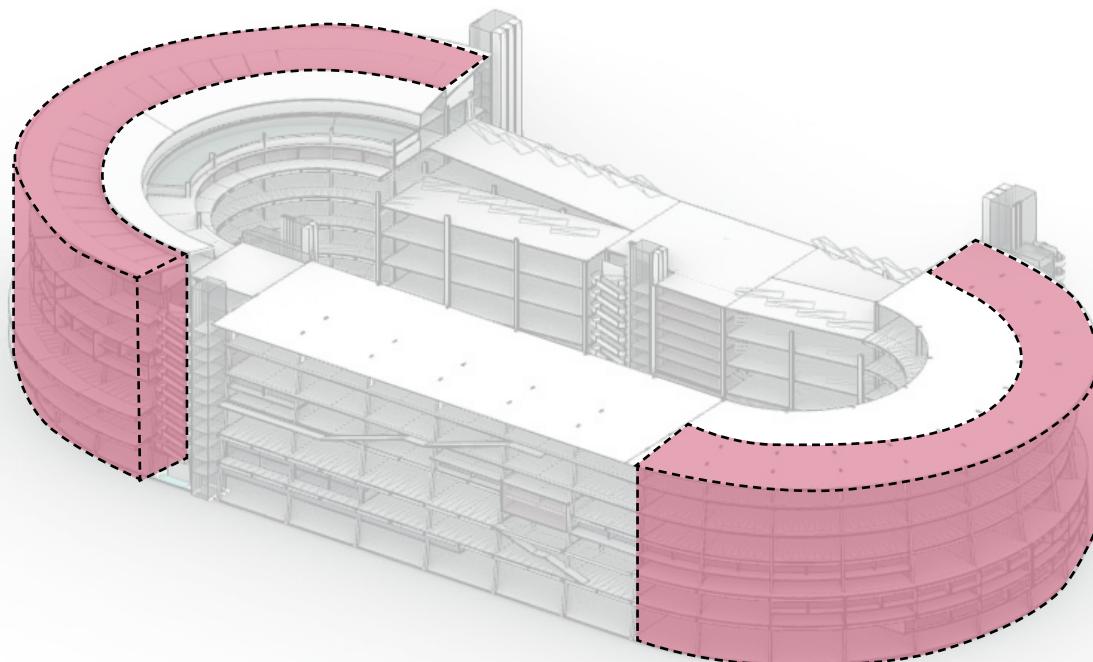
# CHANGABLE USE

# CHANGES?



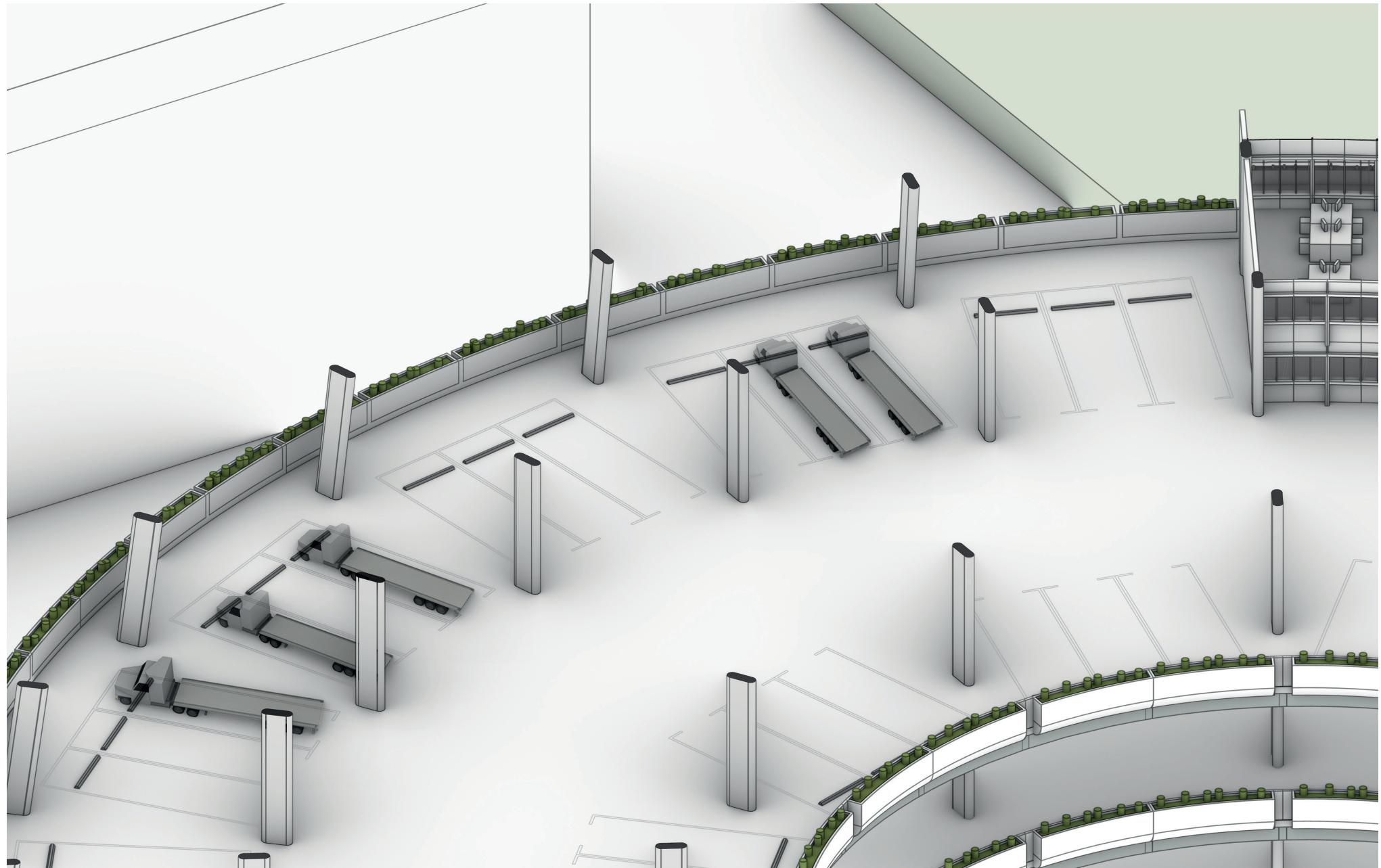
changable use

# CHANGEABLE USE ZONE



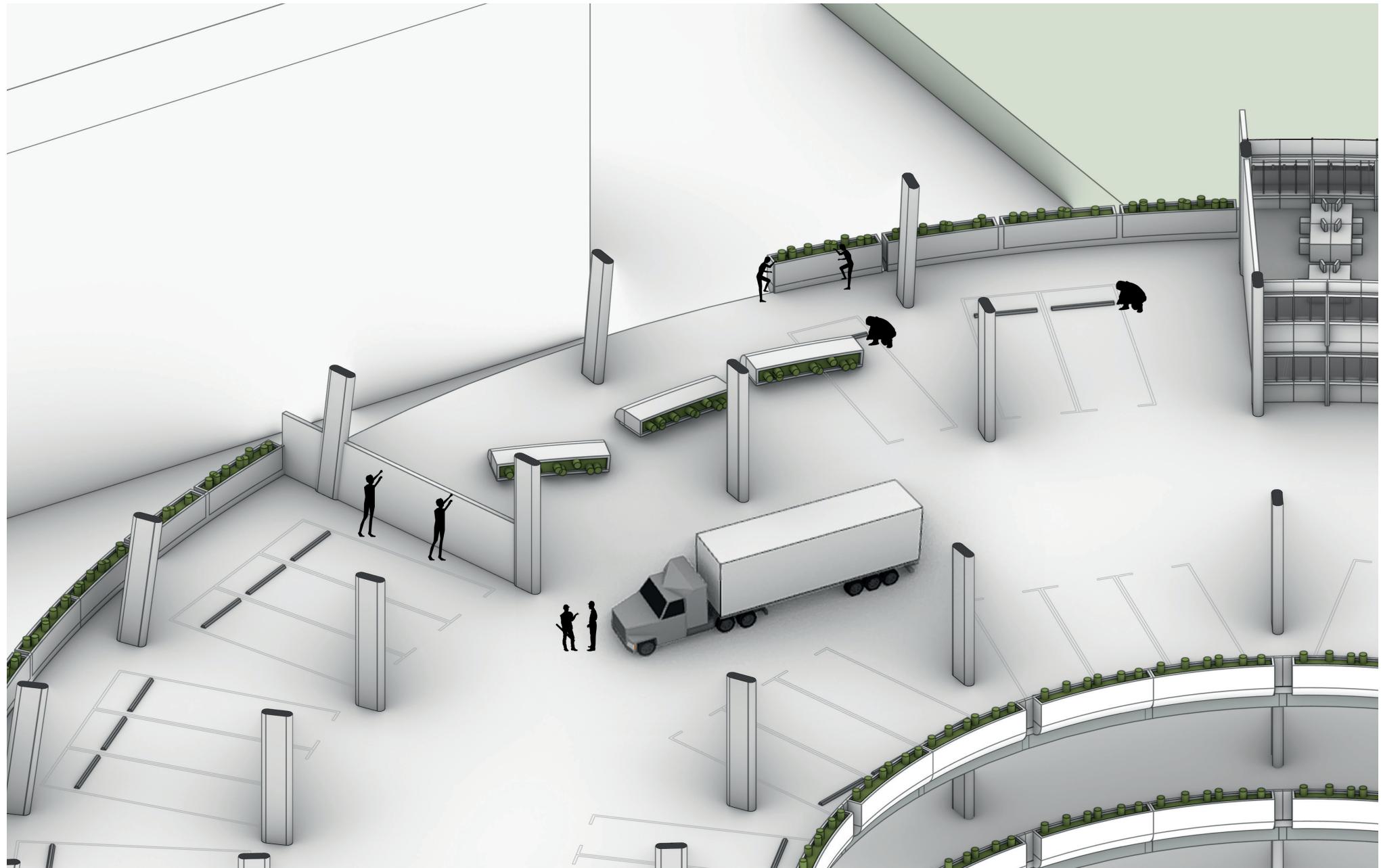
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# CURRENT FUNCTION



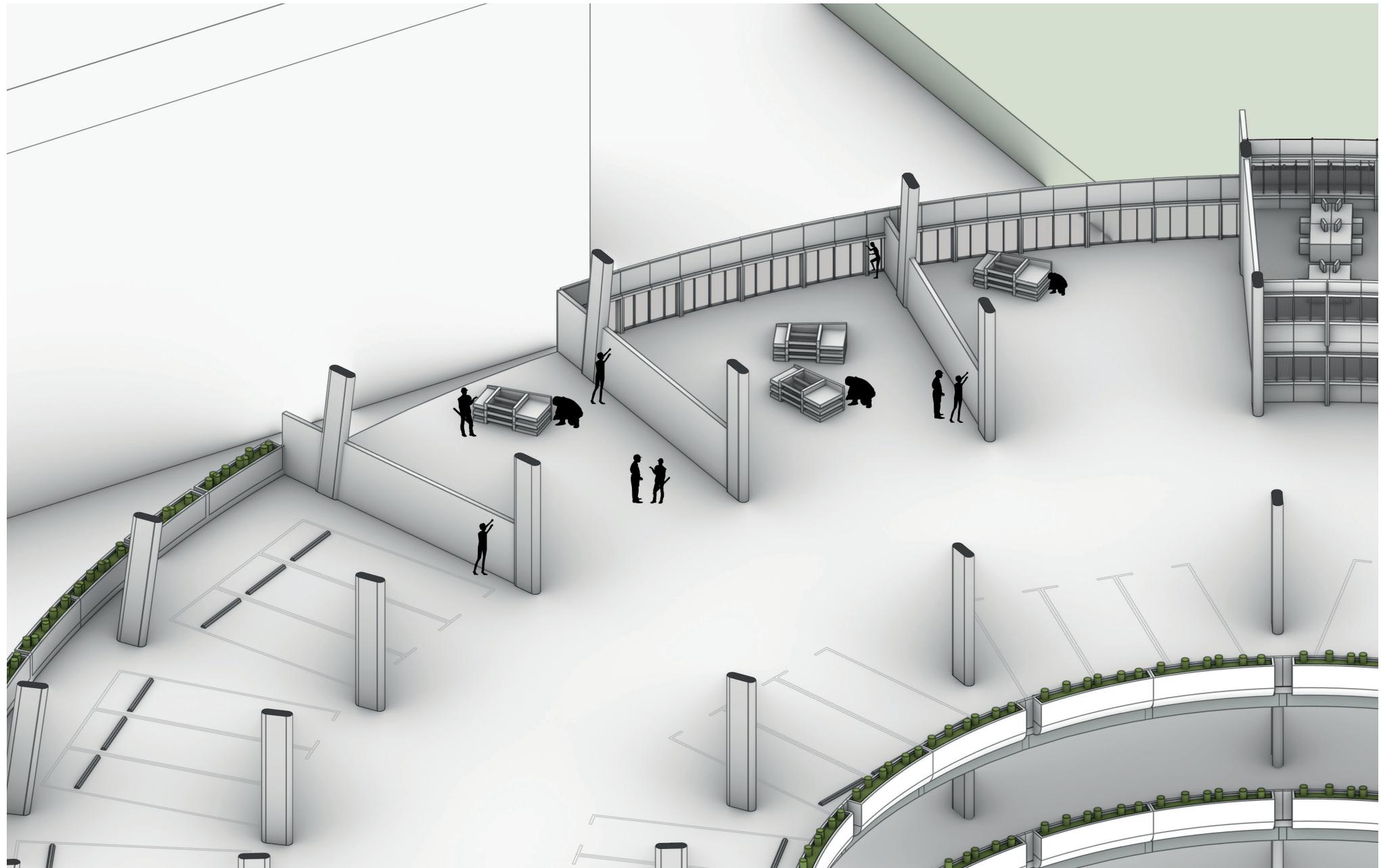
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# PARTLY DEMOLITION



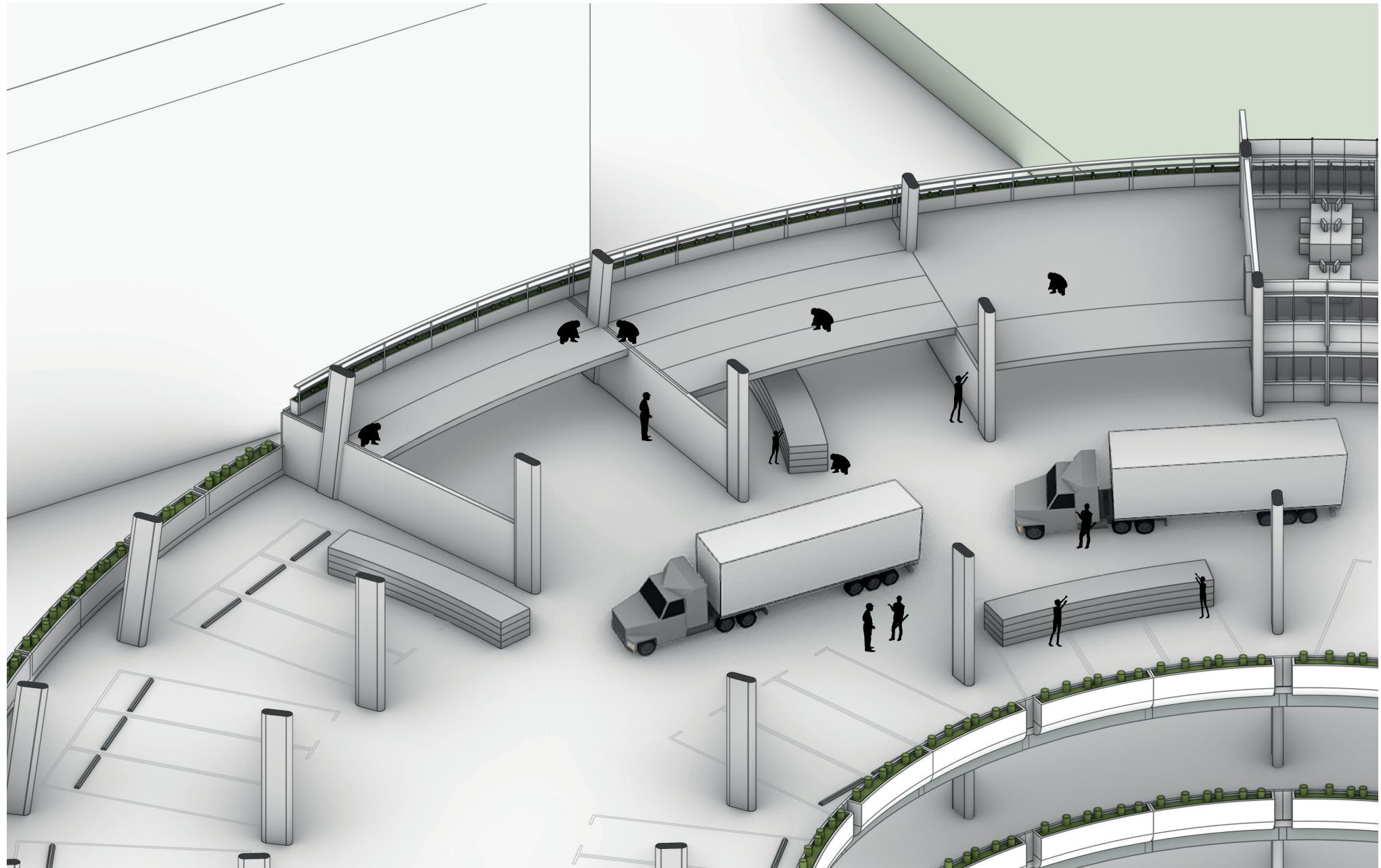
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# WALL CONSTRUCTION

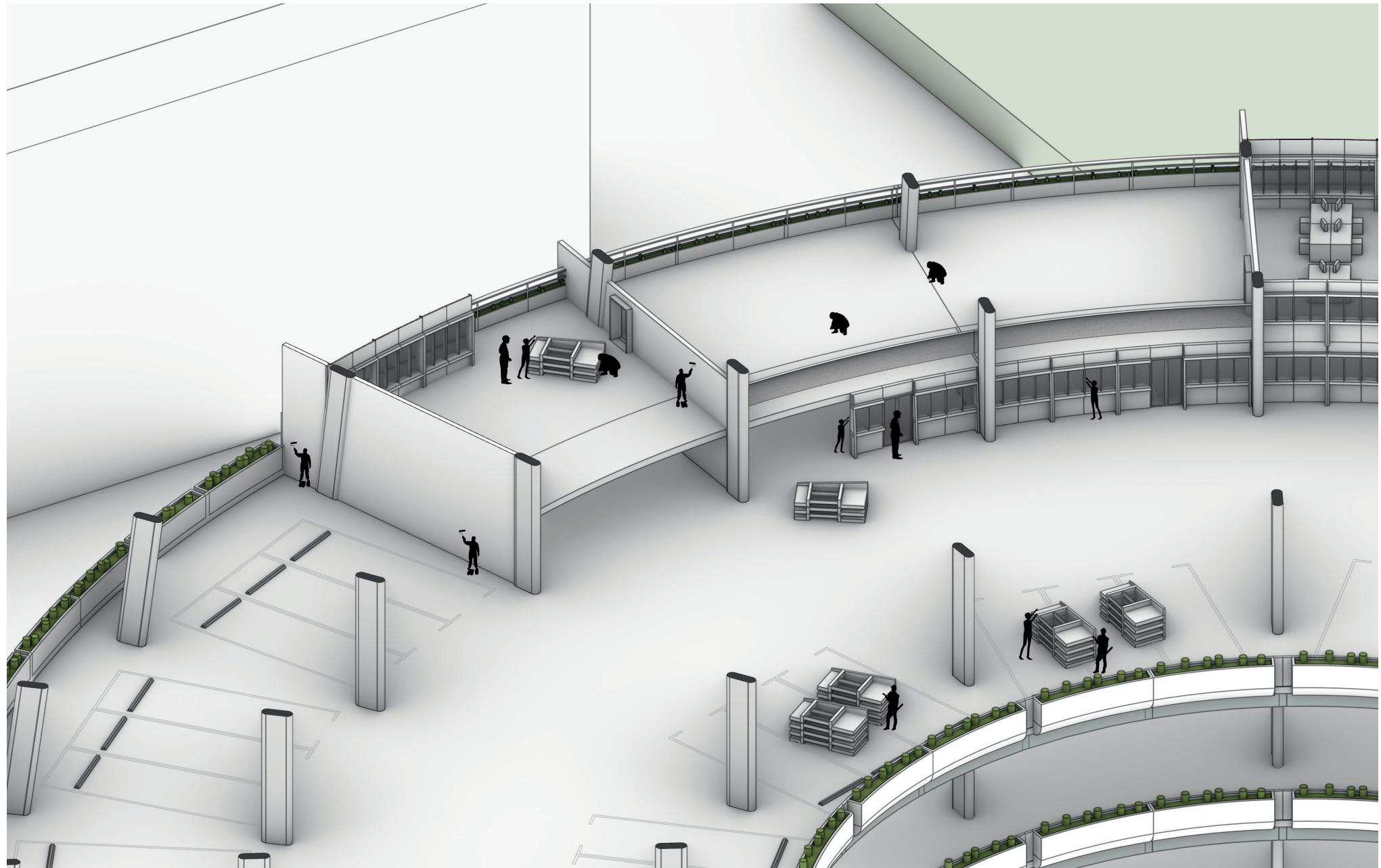


changable use

# FLOOR CONSTRUCTION

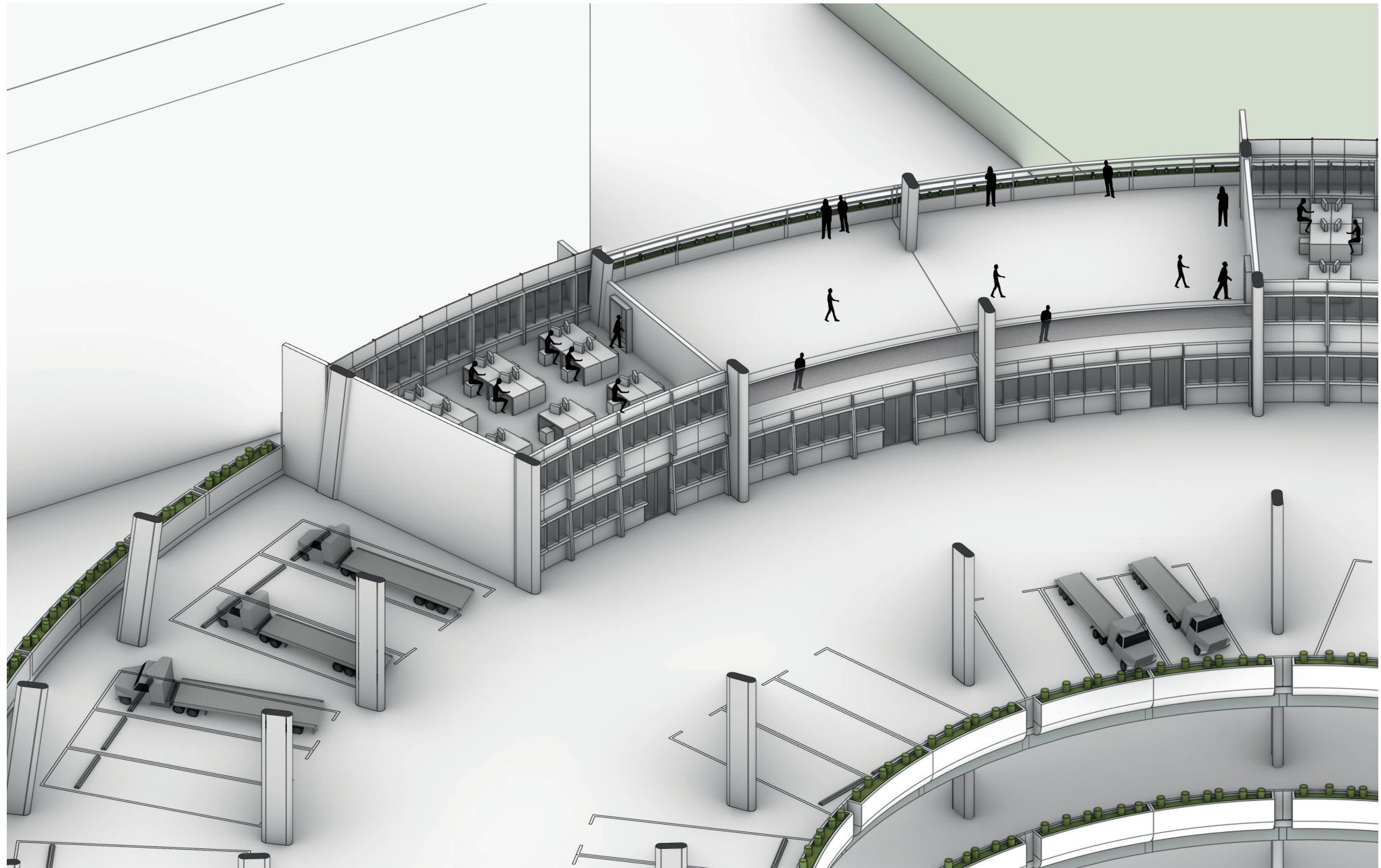


changable use  
**INTERIOR FACADE**

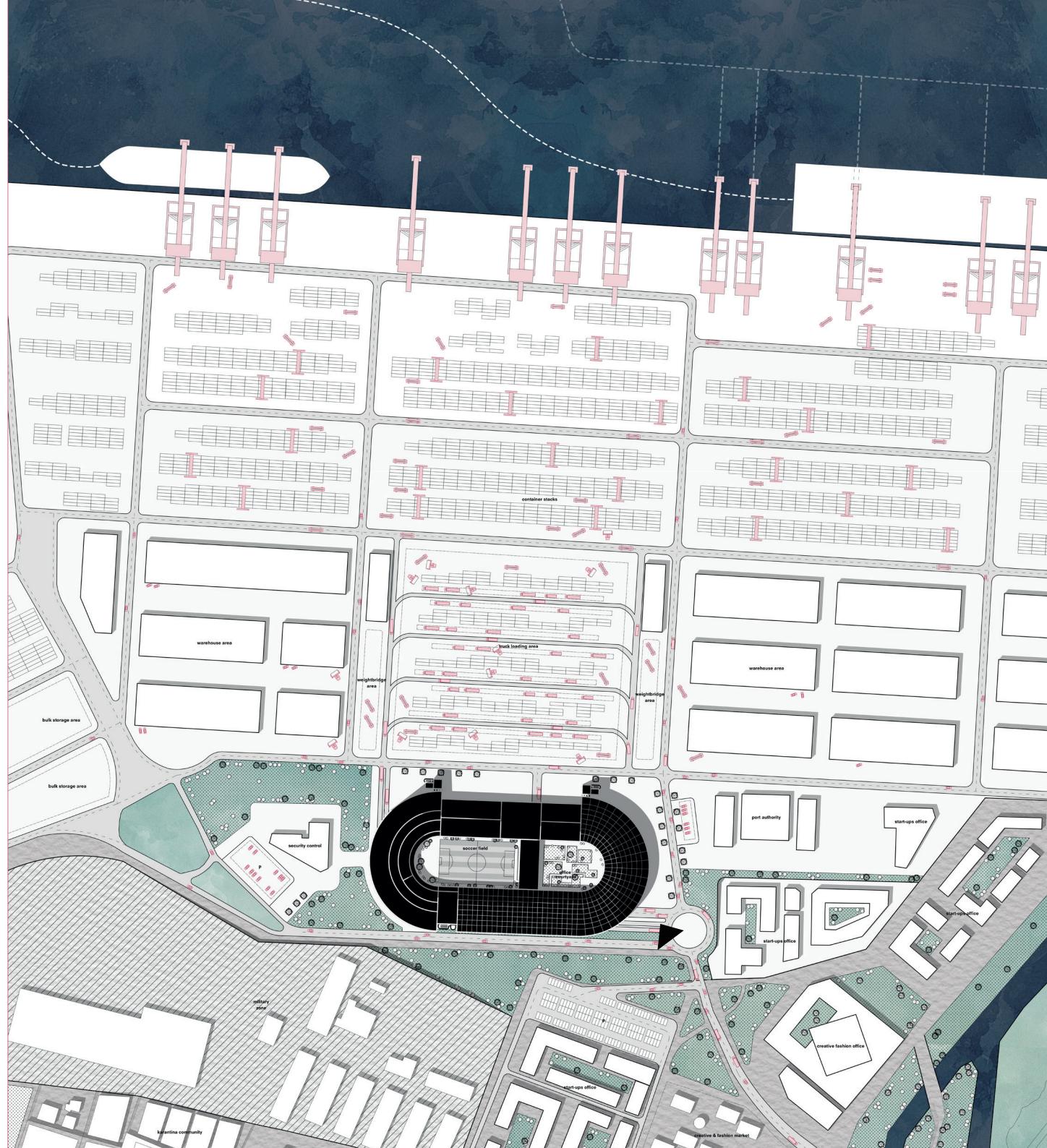


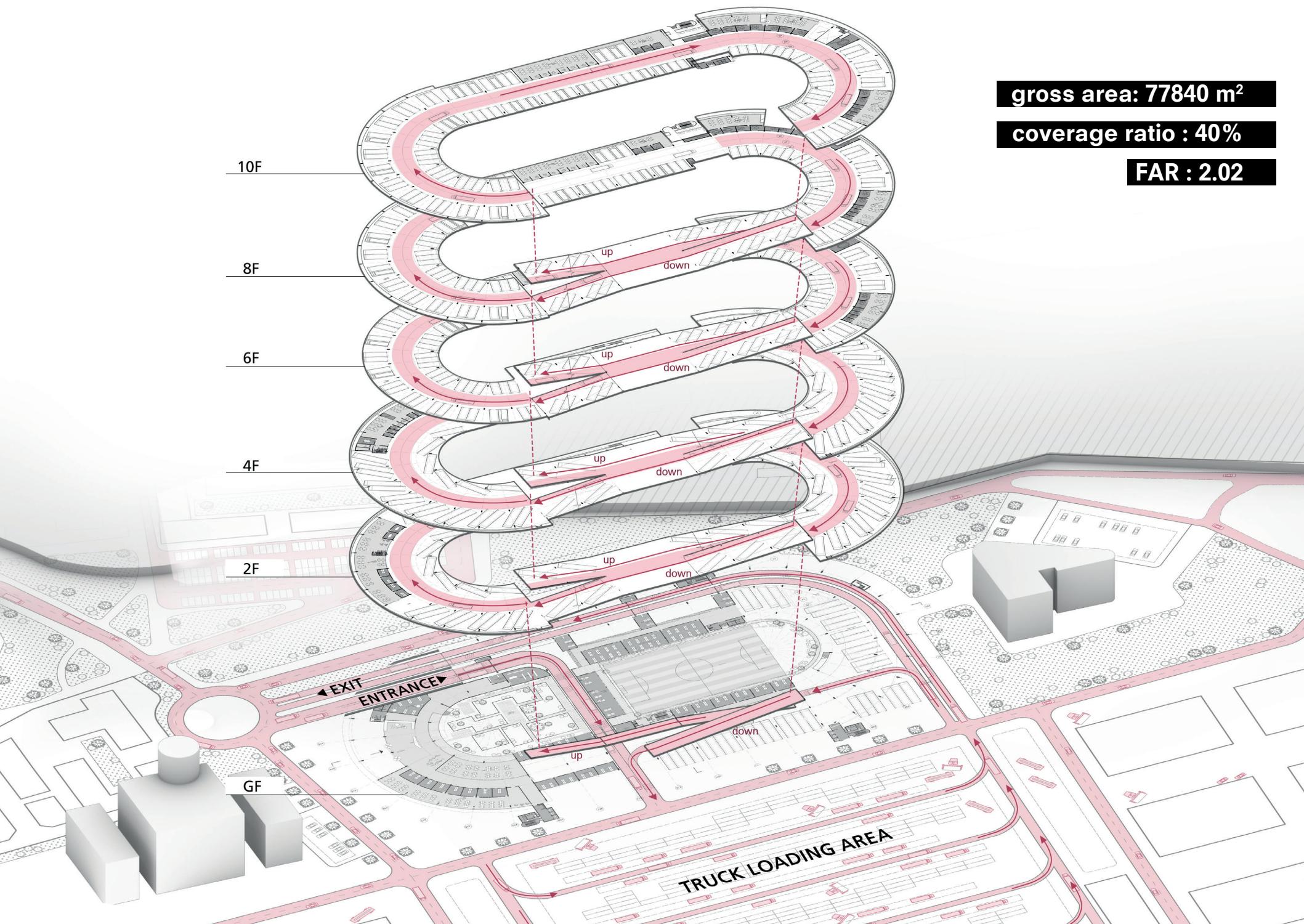
changable use

**COMPLETED**

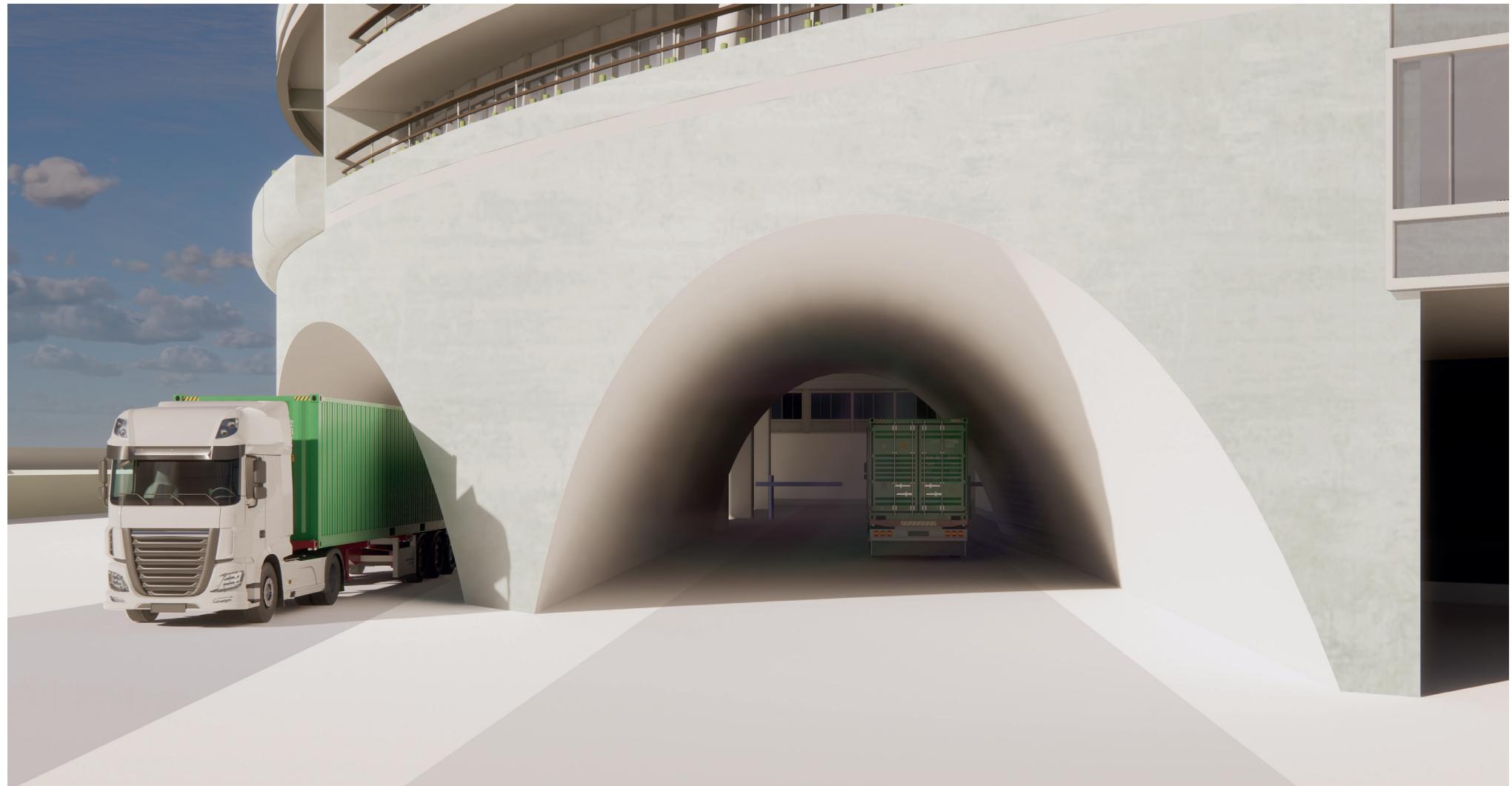


# PROJECT TOUR

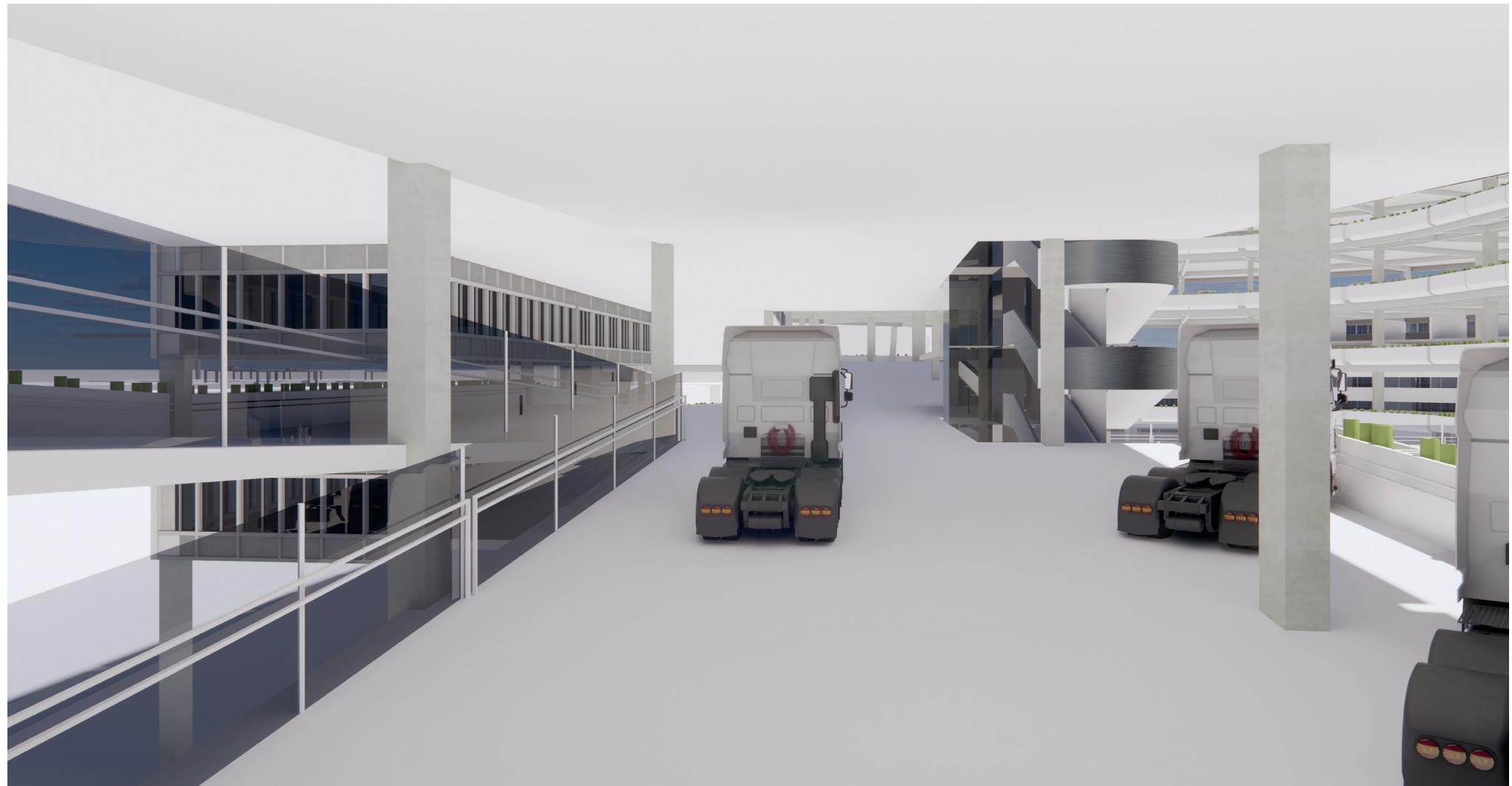




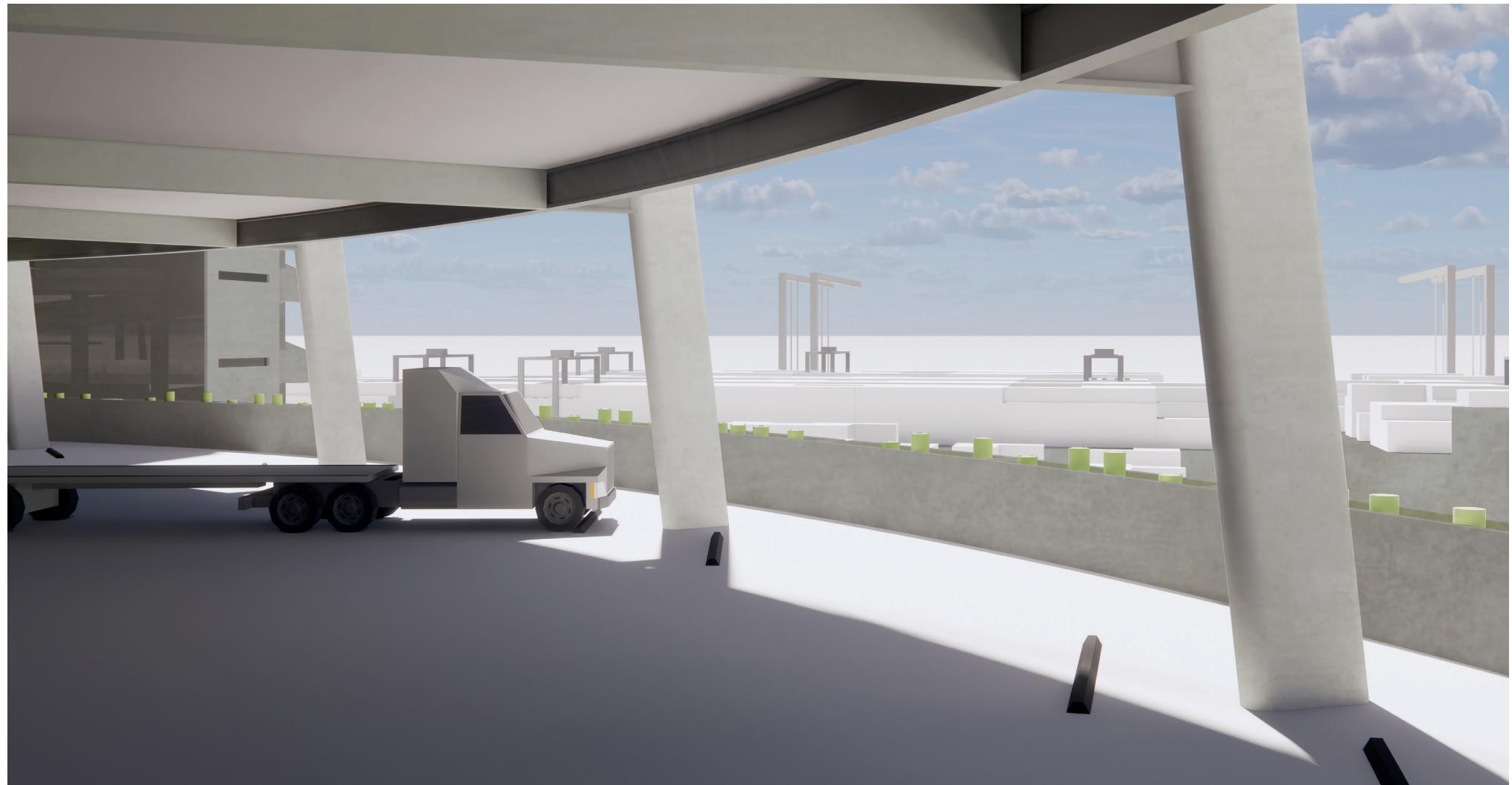
project tour  
**TRUCK ENTRANCE**



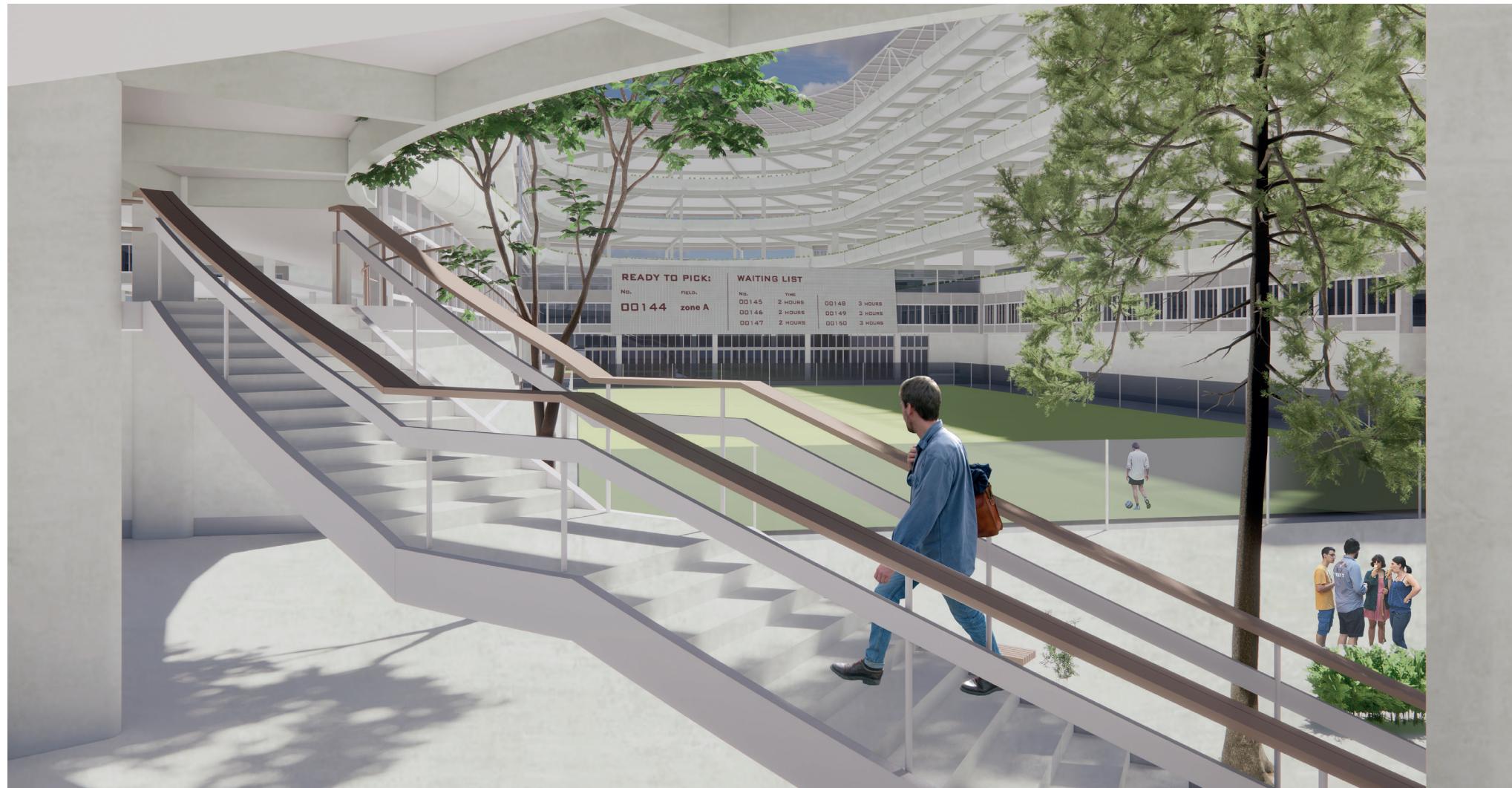
project tour  
**RAMP SPACE**



project tour  
**PARKING SPACE**



project tour  
**COURTYARD**



project tour  
**REST LOUNGE**



project tour  
**MOTEL**



project tour

**EXIT**



READY TO PICK:

No. FIELD.  
00144 zone A

WAITING LIST

No.	TIME
00145	2 HOURS
00146	2 HOURS
00147	2 HOURS
00148	3 HOURS
00149	3 HOURS
00150	3 HOURS







**THANK YOU!**