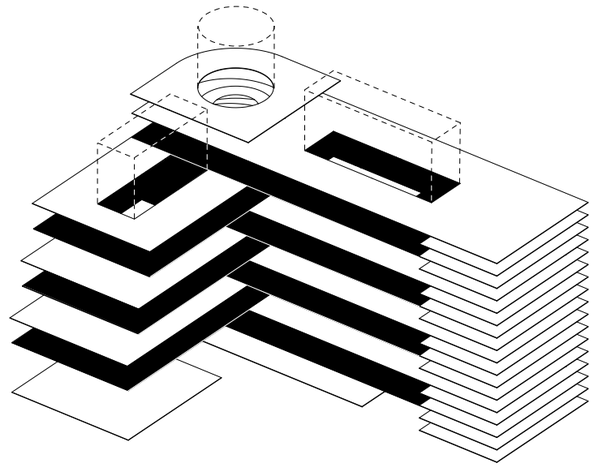
MANHATTAN FUTURE GATEWAY

NEW PORT AUTHORITY BUS TERMINAL



HAOCHEN YANG | P5 | 27/08/2020
Complex Projects Graduation Studio | New York Midtown

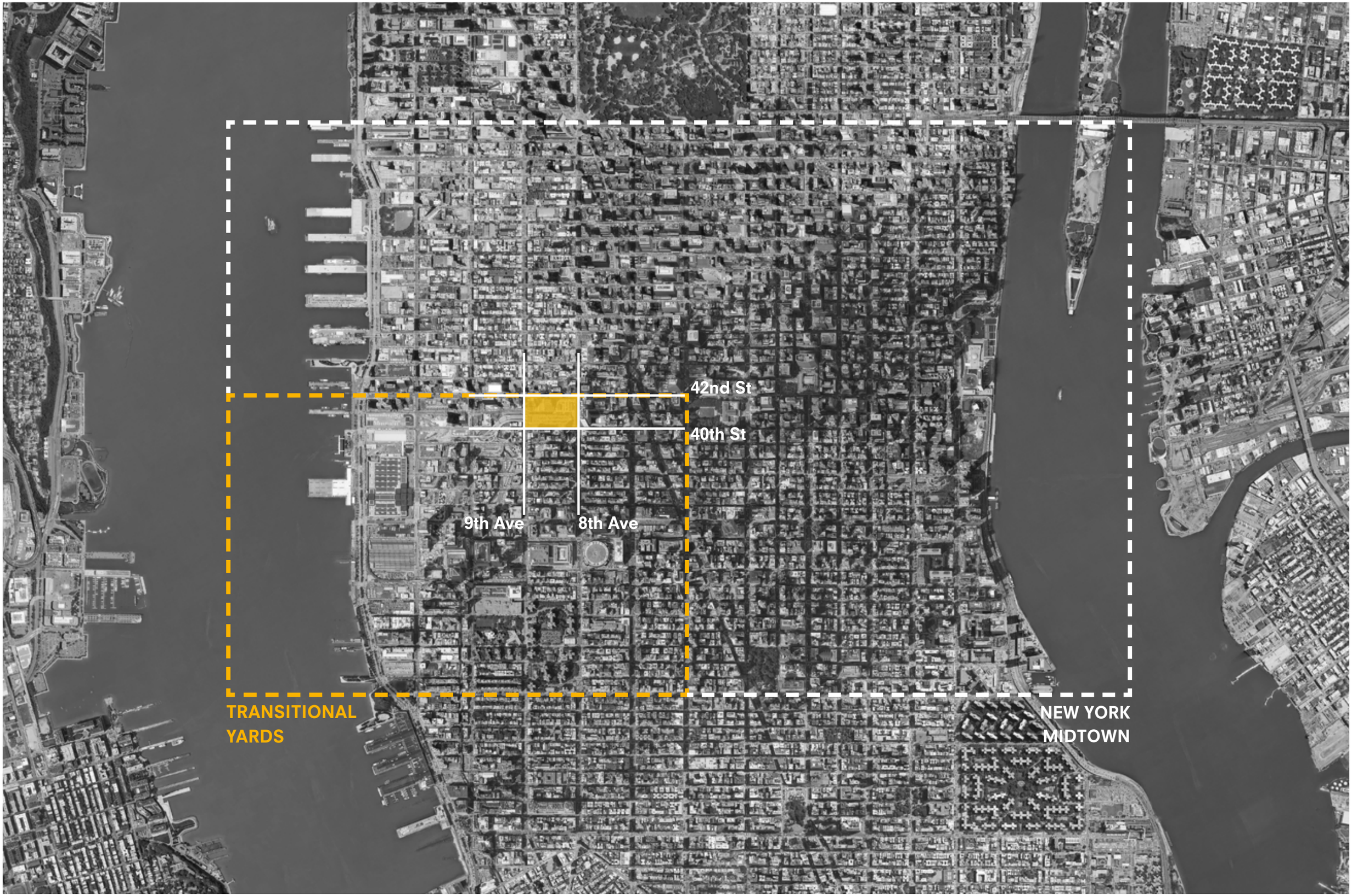
CP

TU Delft
BK Bouwkunde

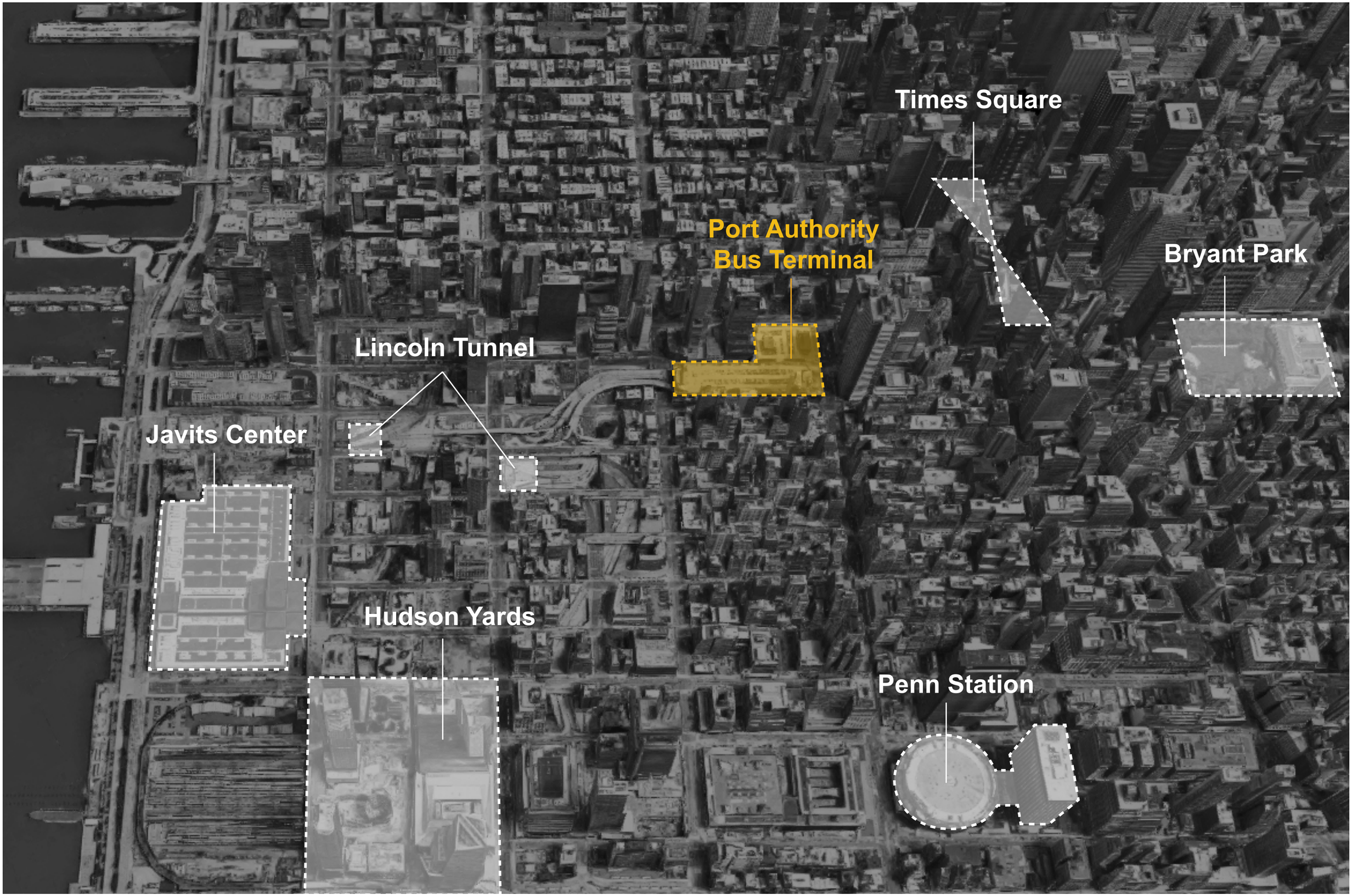
INTRODUCTION

PORT AUTHORITY BUS TERMINAL

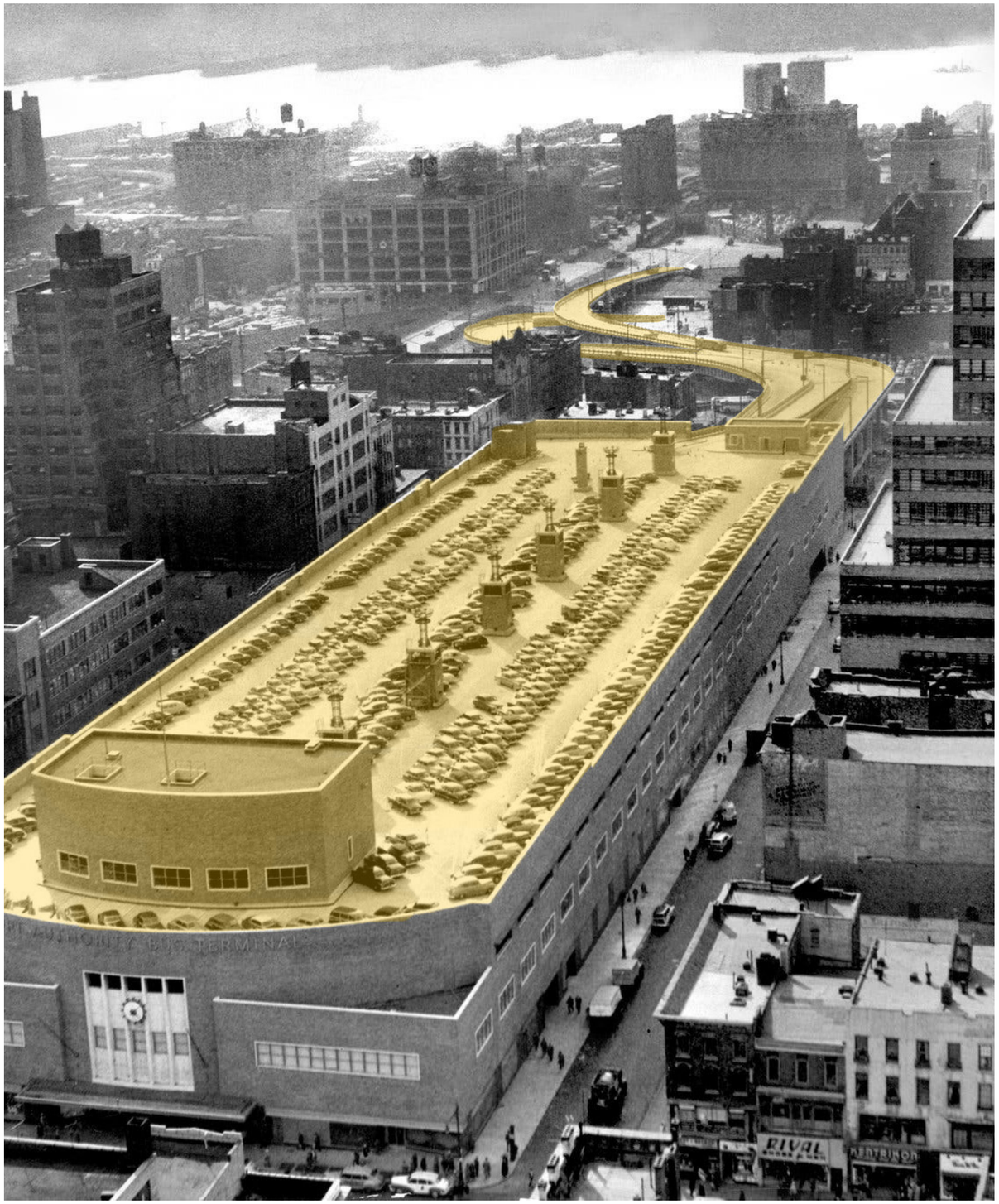
Location


42nd St
40th St
9th Ave
8th Ave
TRANSITIONAL YARDS
NEW YORK MIDTOWN

Location


Times Square
Port Authority
Bus Terminal
Bryant Park
Lincoln Tunnel
Javits Center
Hudson Yards
Penn Station

Opened in 1950



Source: The New York Times

Source: The Port of New York Authority

Renovated in 1979

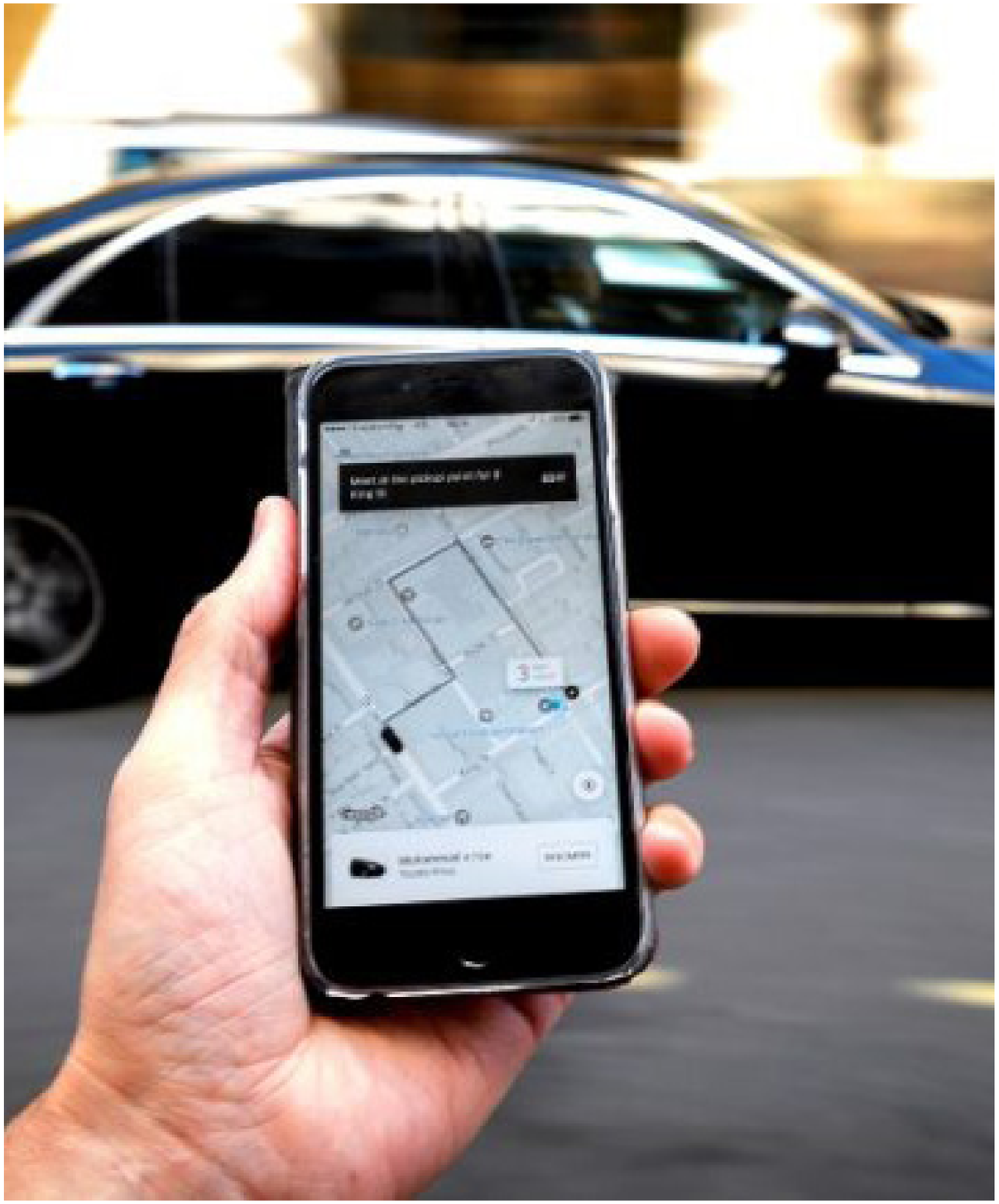
Source: Jack Manning/The New York Times

8,000 BUS TRIPS
225,000 PASSENGERS
PER DAY

"It's a mid-20th century bus terminal trying to meet mid-21st century needs."

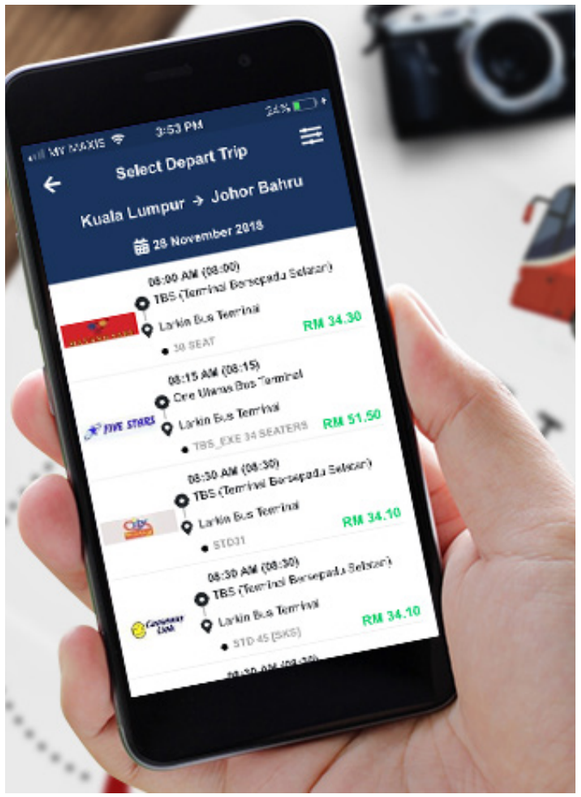
Source:Frank G. Runyeon, Will the Port Authority Bus Terminal ever get replaced? November 29, 2018

New Mobility Trends Cannot be Facilitated

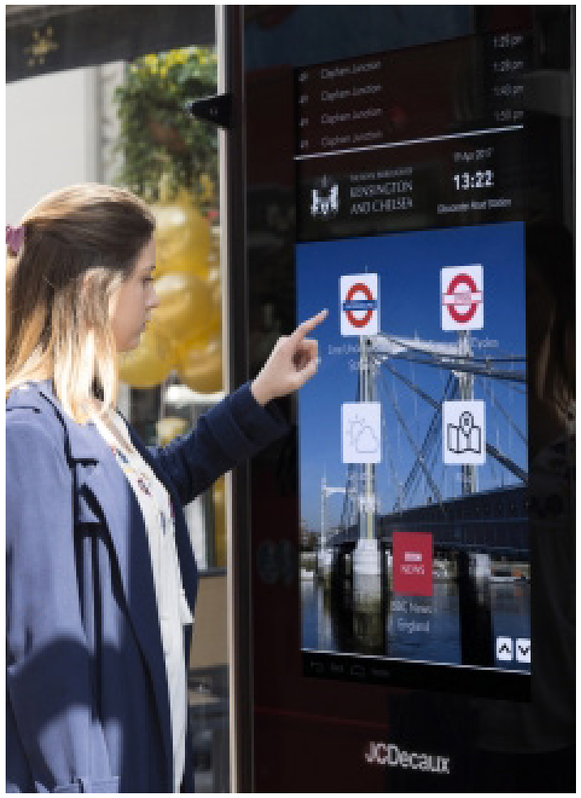


New Mobility Trends Cannot be Facilitated

Technological Development Cannot be Implemented

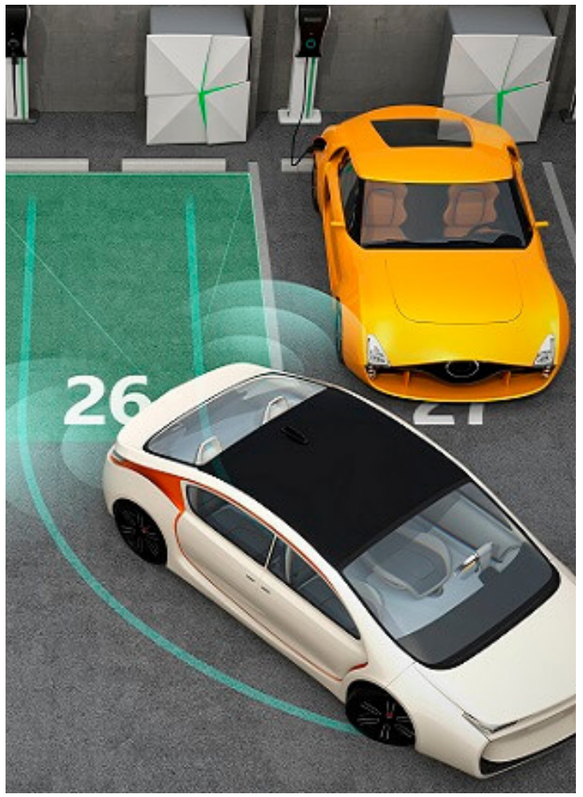


Online Tickets



Real-time Information

Turnstile



Smart Parking

THE BUS TERMINAL CHALLENGES

1. Operating beyond capacity

2. New mobility trends cannot be facilitated

3. Technological development cannot be implemented

RESEARCH QUESTION

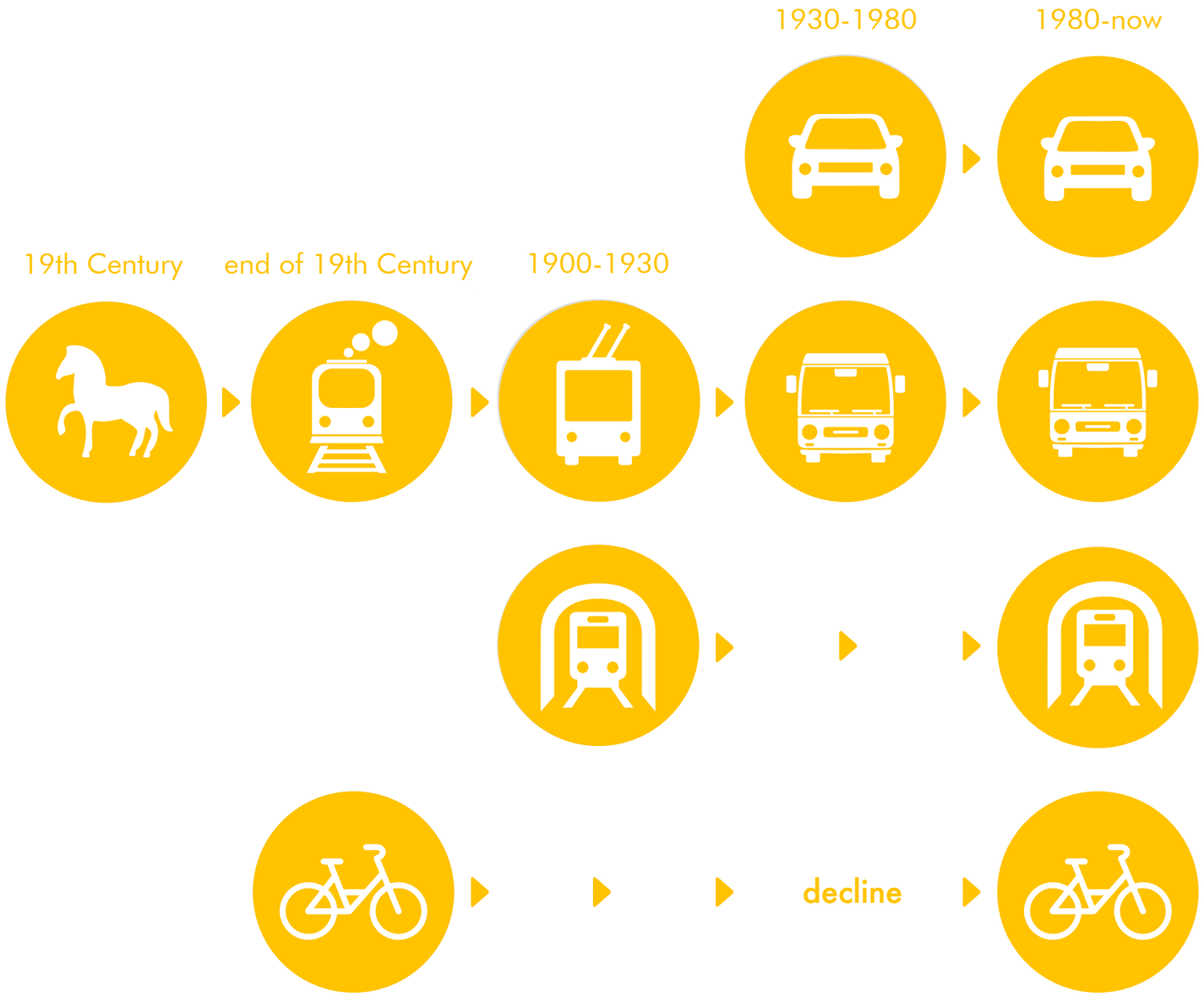
How can bus terminal meet the existing need in the dense NY Midtown urban context and adapt to changes of new mobilities that may arise in the future?

FUTURE AMBITION

Improve the transport efficiency by reorganizing the terminal and parking spaces and cater for future development of new mobilities.

RESEARCH

History of Mobility in NYC

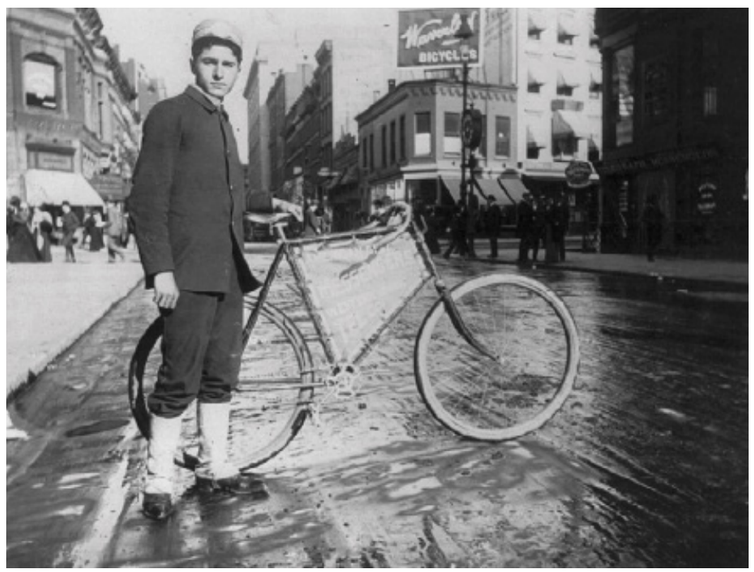


NYC's Mobility in History

Horse-drawn carriages, 1892

Trolley, 1909

Old NYC buses



Bicycle, 1896

Private automobiles boom, 1930

NYC subway, 1963

Different Terminals in History

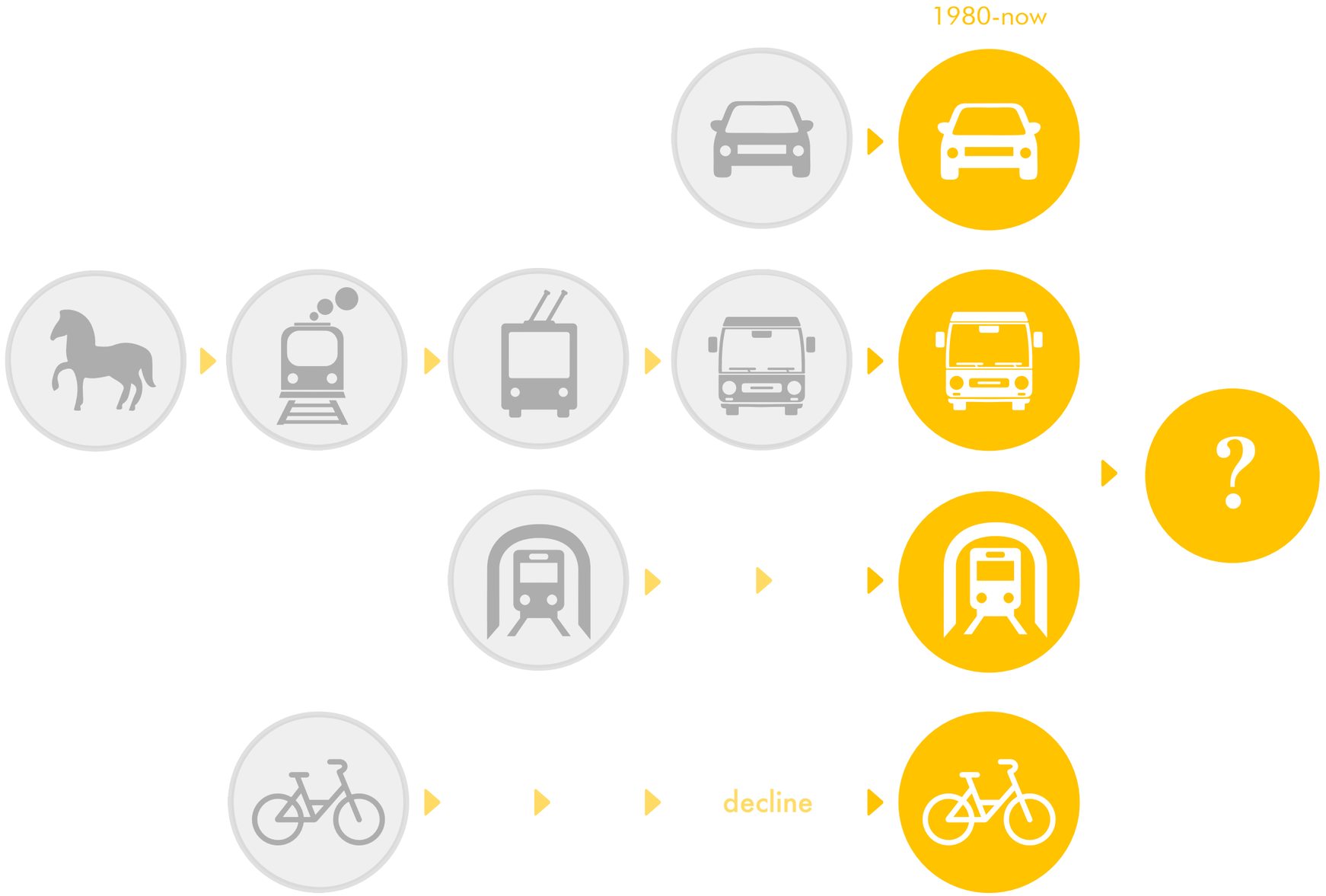
Streets of Manhattan in 19th Century

Williamsburg Bridge Terminal, c. 1919

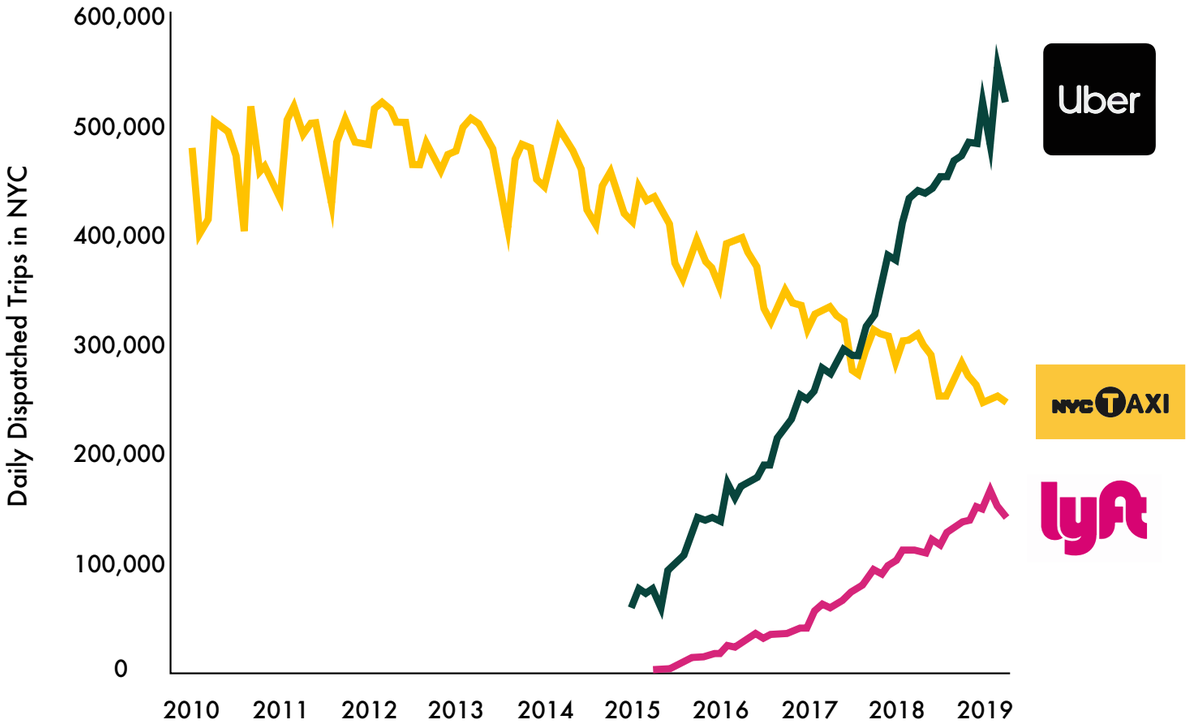
Pennsylvania Greyhound Terminal, 1929

Port Authority Bus Terminal, 1950

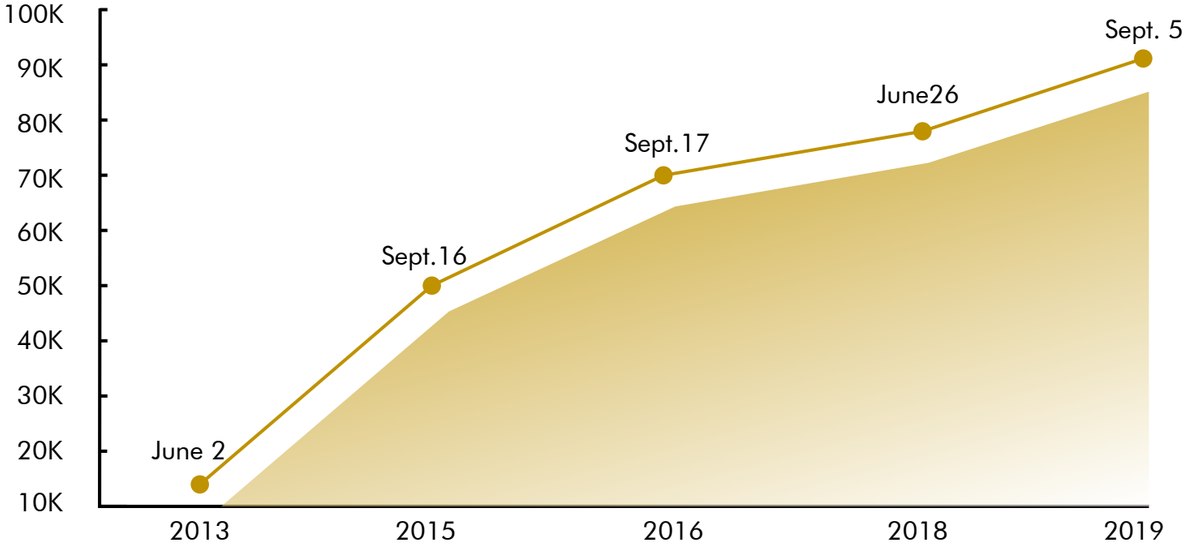
History of Mobility in NYC



New Mobility Trend in NYC



Taxis & FHV (for-hire vehicles) change from 2010-2019



CitiBike (NYC) Daily Ridership Record, 2019

Source: FHV Base Aggregate Report & NYC Taxi & Limousine Commission, https://nycdotbikeshare.info/news-and-events/new-daily-ridersip-record-91529)


In Manhattan, FHV’s now make up nearly 30% of all traffic.

Port Authority Bus Terminal

Port Authority Bus Terminal, 1950

Port Authority Bus Terminal, 2019

?

Port Authority Bus Terminal

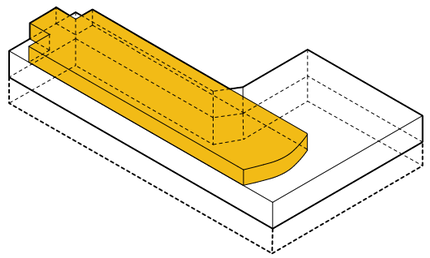
Port Authority Bus Terminal, 1950

Port Authority Bus Terminal, 2019

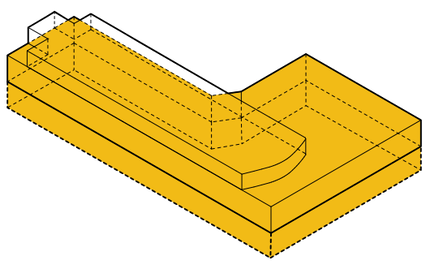
?

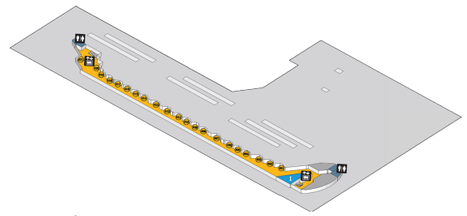
Port Authority Bus Terminal

Parking - 5F/6F/7F

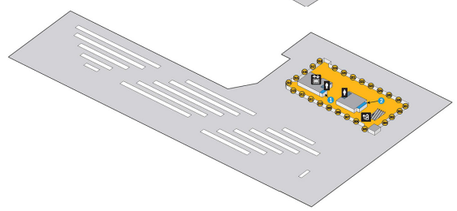


Bus Terminal

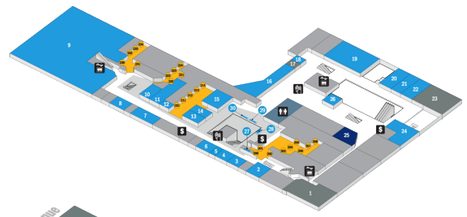




4F

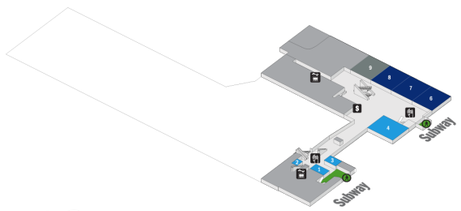


3F

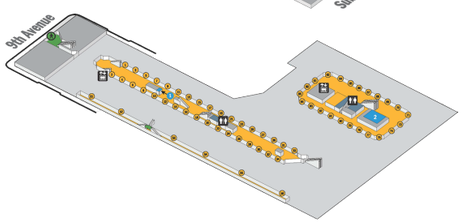


2F

1F (Groundfloor)



-1F

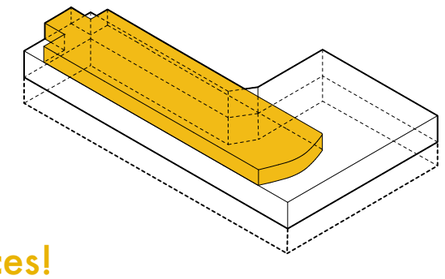


-2F

Source: Terminal Maps, https://www.panynj.gov/bus-terminals/en/port-authority.html

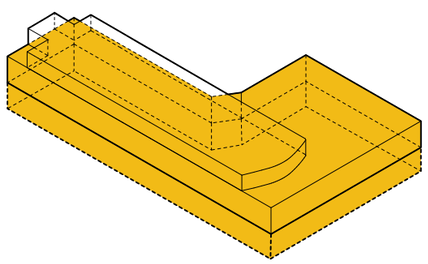
Port Authority Bus Terminal

Parking - 5F/6F/7F

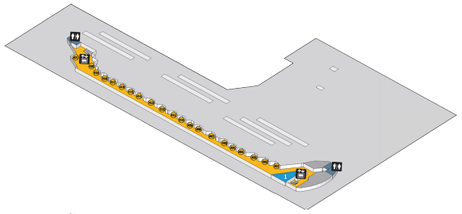


1250 Parking Spaces!

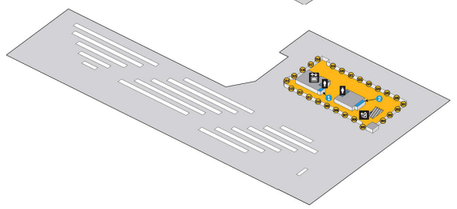
Bus Terminal



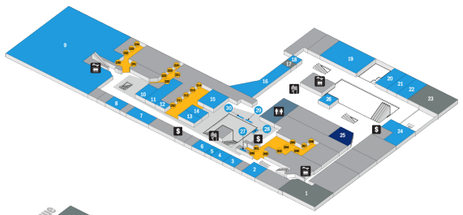
148 Gates!



4F good

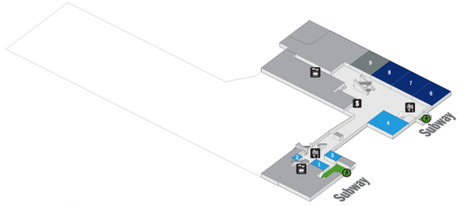


3F newest, good

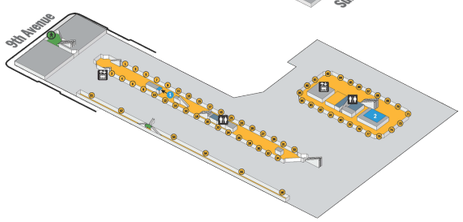


2F worst, individual elevator, narrow and crowded

1F (Groundfloor)



-1F



-2F gates on two sides, dark

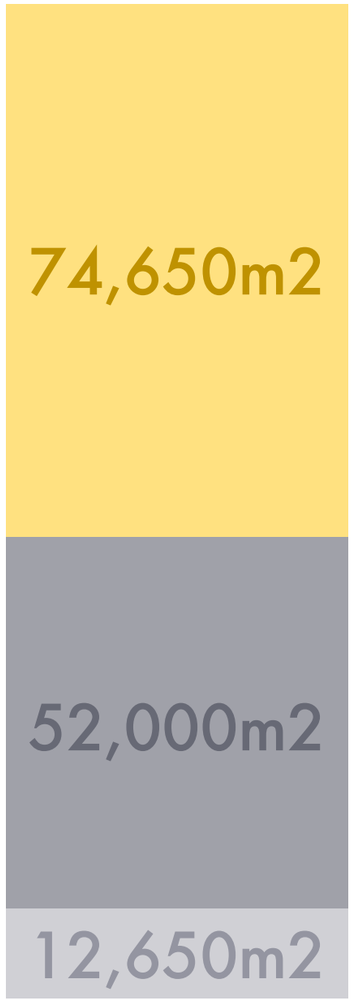
Source: Terminal Maps, https://www.panynj.gov/bus-terminals/en/port-authority.html

Functional Distribution

1. Bus Terminal

2. Parking

3. Support Functions



BUS TERMINAL CHALLENGES

- Different type of gates on different layers of north/south wings

- Congestion

- Inappropriate functional distribution

- Interior space gathers criminals and homeless people

Different Types of Gates

Congestion / Technological Development Cannot be Implemented

Corridor of Crime and Homeless

Source: Bob Glass/The New York Times

Source: The Port of New York Authority

DESIGN OF NPABT

- Simple, clear and unified boarding way

- Larger area of circulation and public space

- New functional distribution

PARKING CHALLENGES

- High demand even with expensive parking fee

- Long ramp system

- No parking area for buses

- Private vehicle drivers have no separate flow

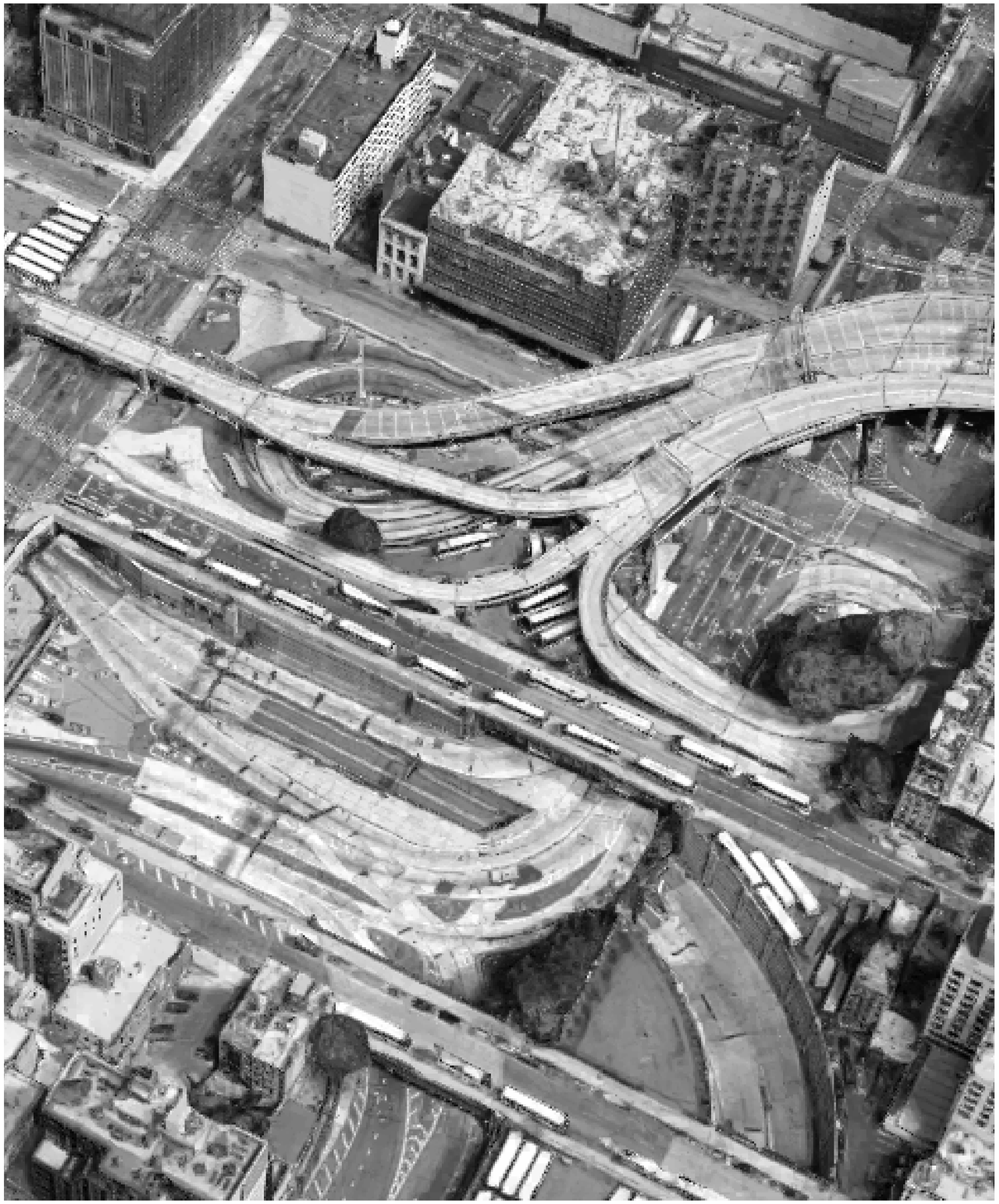
Huge Parking Demand

Parking

Parking

High demand,
Scattered,
Waste of public space

Long Ramp System



No parking area for buses

DESIGN OF NPABT

- Keep enough parking lots

- Add bus storage area

- Reorganize the ramp system

- Divide the flow of passengers and car drivers

SUPPORT FUNCTIONS CHALLENGES

- Public spaces are not in good use

- Did not make use of the good view

- Without consideration of white-collar workers

Public Spaces in PABT

Views on the Rooftop of PABT

DESIGN OF NPABT

- Improve public space

- Add viewing platform

- Add entertainment place for workers

DESIGN BRIEF


Site

Property

THE PORT AUTHORITY
OF NY & NJ

Property

PABT

GALVIN

DYER

Districts

CLINTON

THEATER DISTRICT

JAVITS

DYER CORR-IDOR

GARMENT DISTRICT

HUDSON YARDS

PENN STATION

CHELSEA

New Site

New Site


NEW SITE ?
Lot Area: 23,690 m2
Max FAR: 10 - residential
15 - commercial
15 - facilities
Lot Area: 10,000 m2
Max FAR: 6.02 - residential
2 - commercial
6.5 - facilities
Lot Area: 30,000 m2
Max FAR: 10 - residential
2 - commercial
10 - facilities

New Site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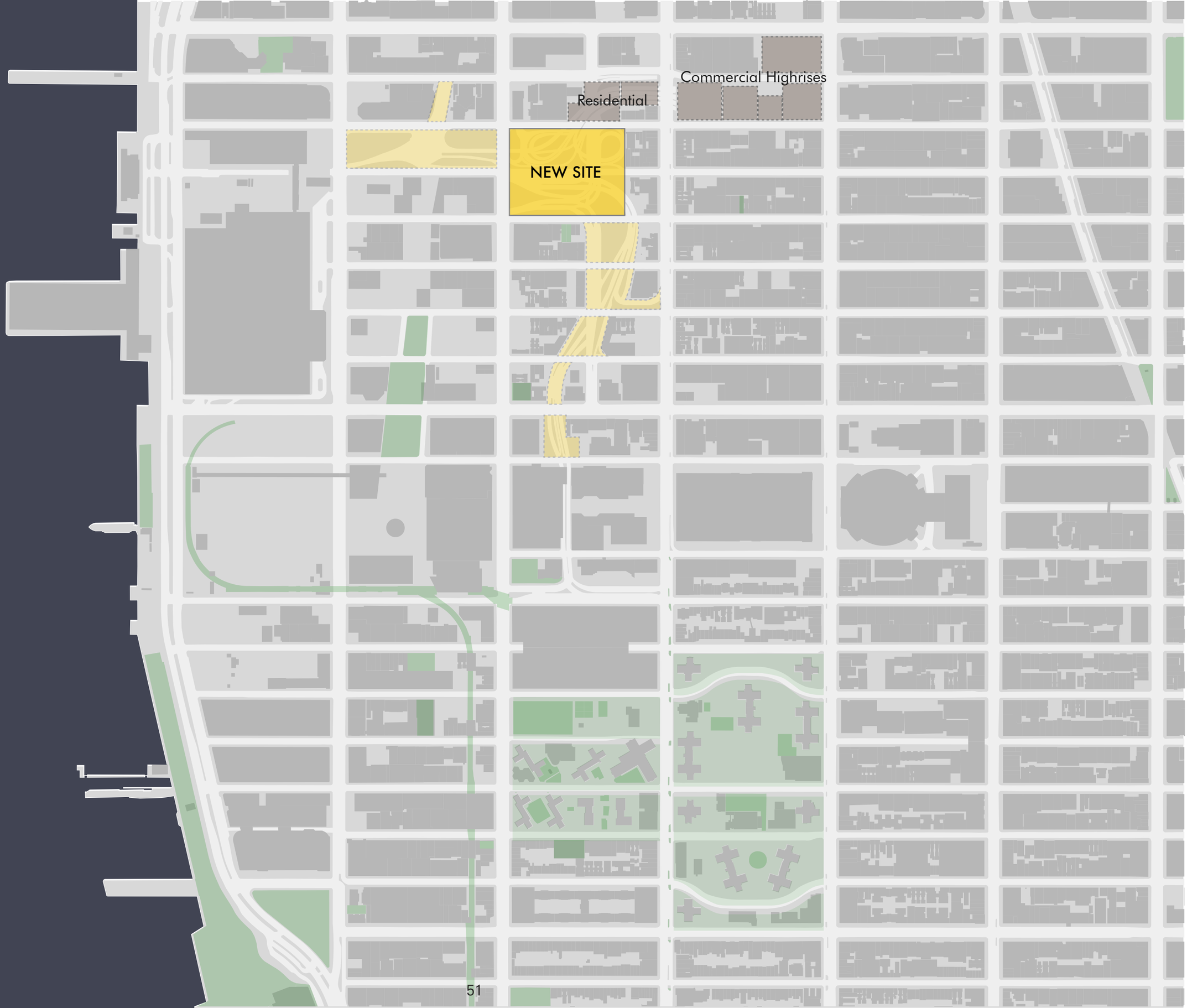
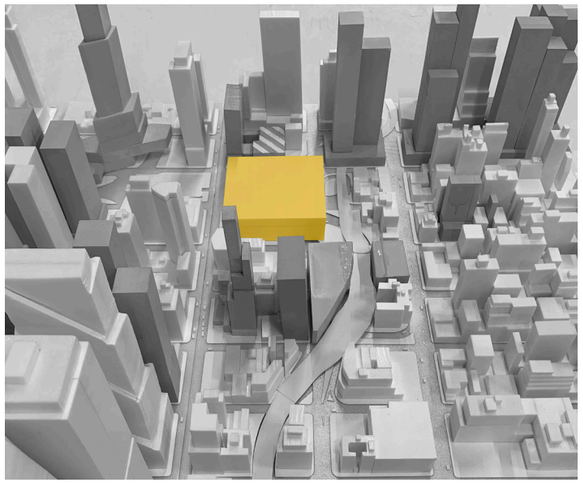
New Site

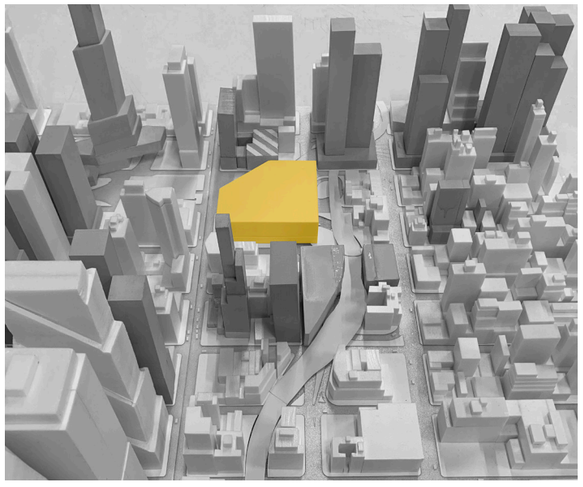


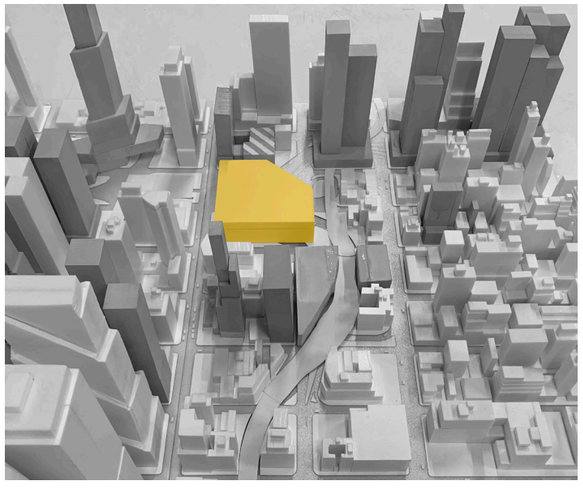

Times Square
Hudson Yards
Penn Station & Herald Square

Massing Study

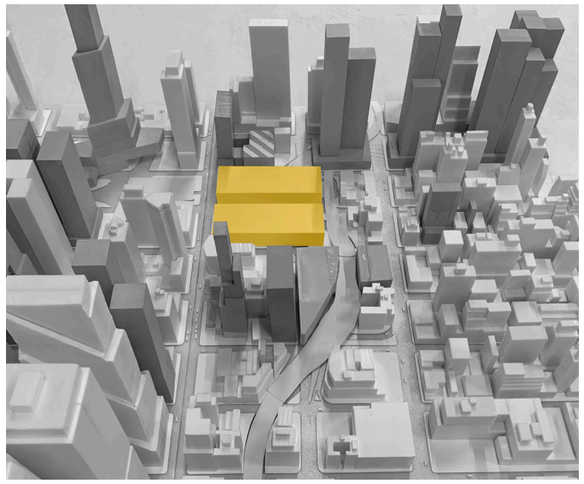
cube

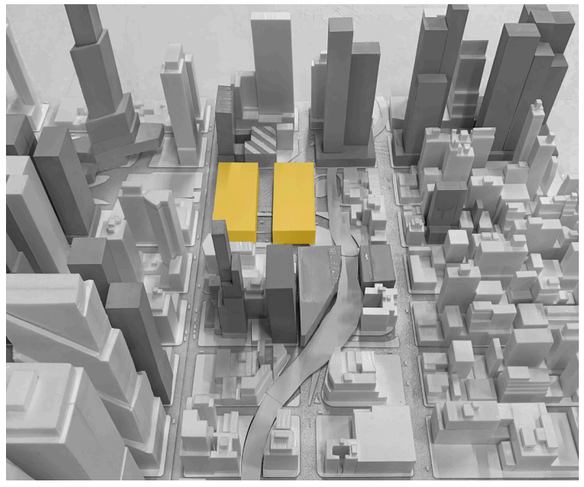


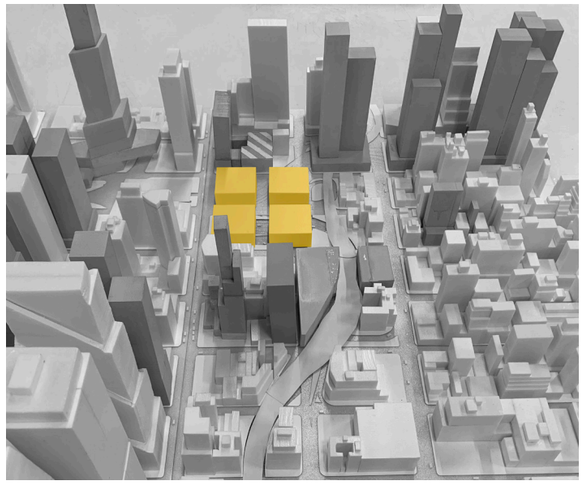




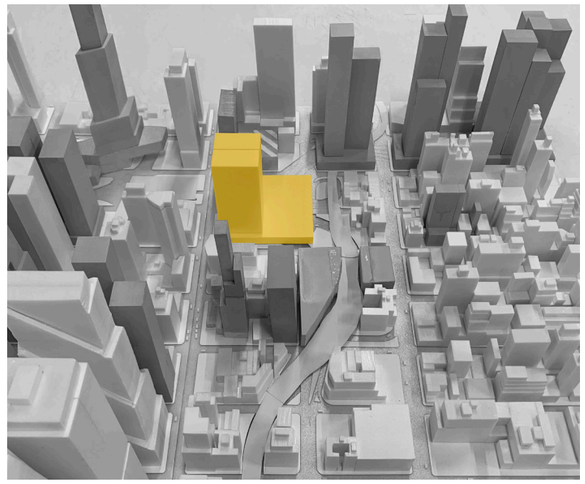
scattered bulk

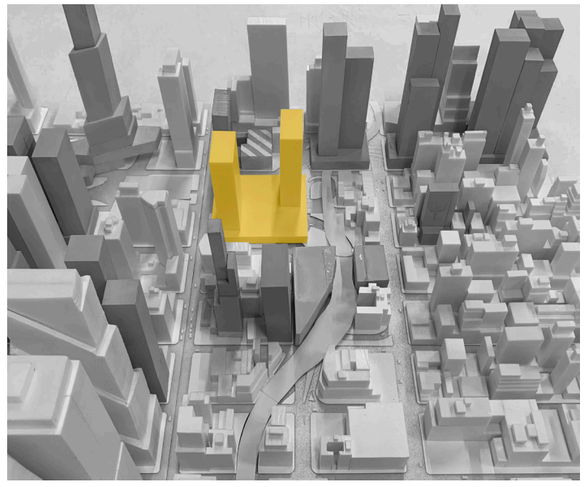


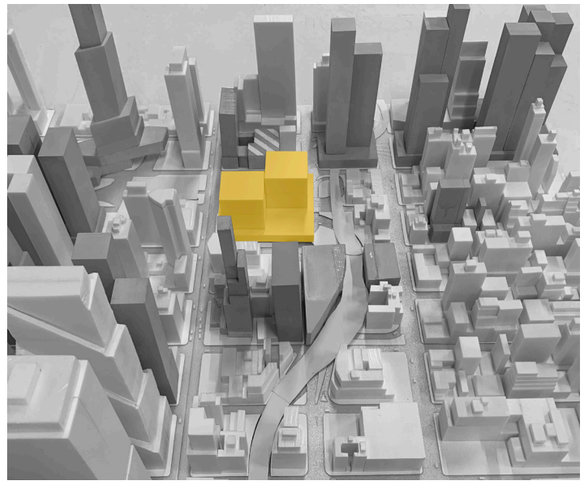




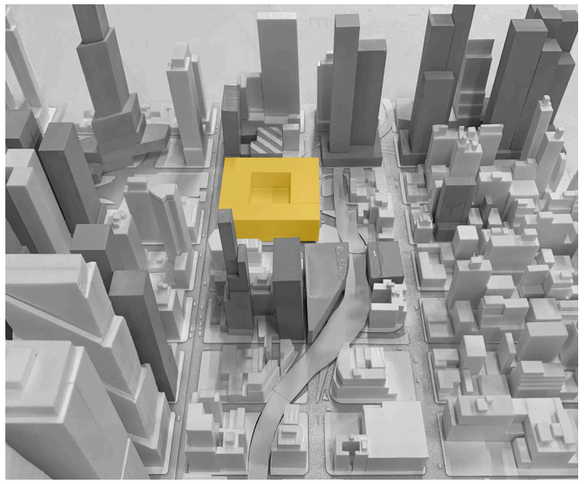
building(s) with base

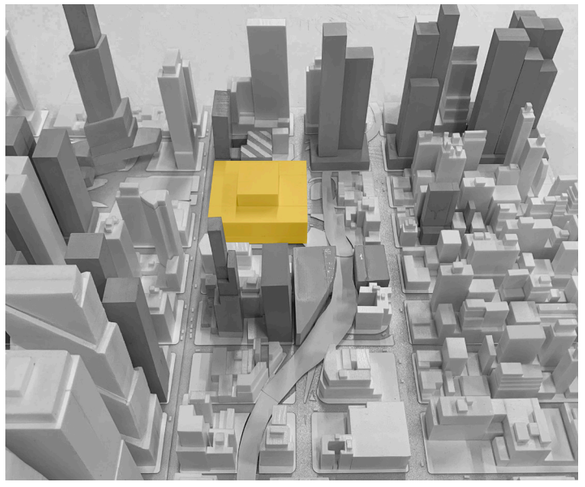


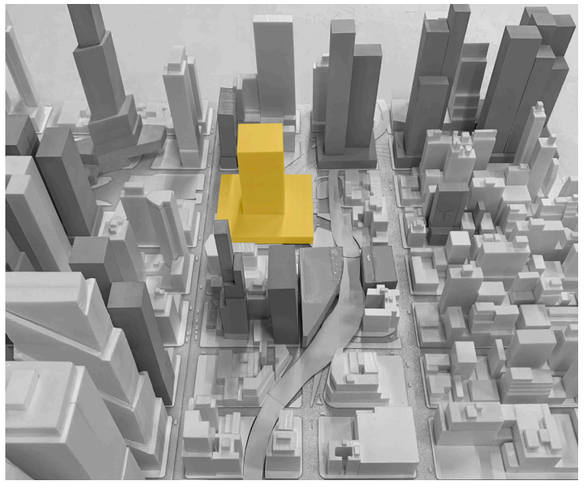




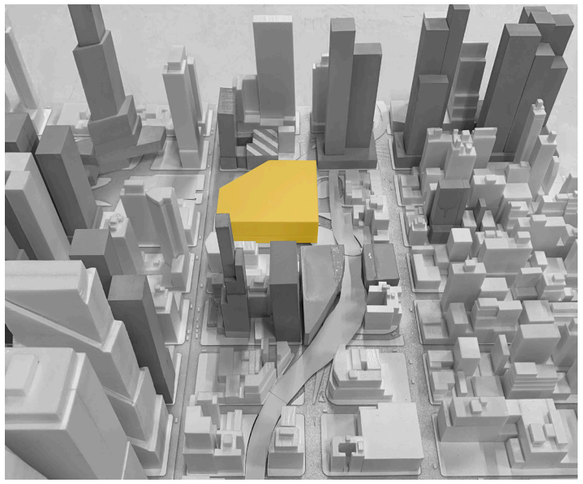
centrally concentrated



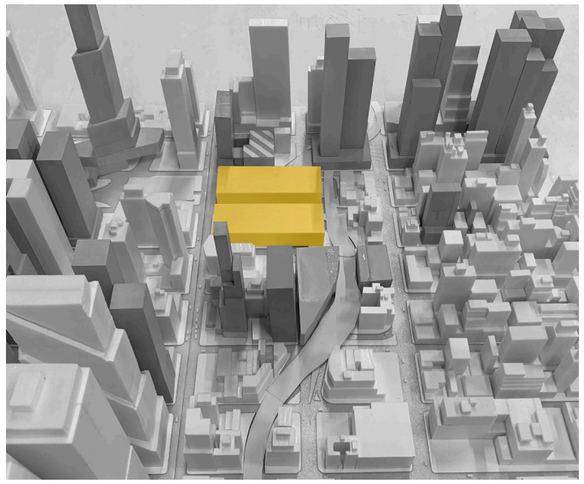




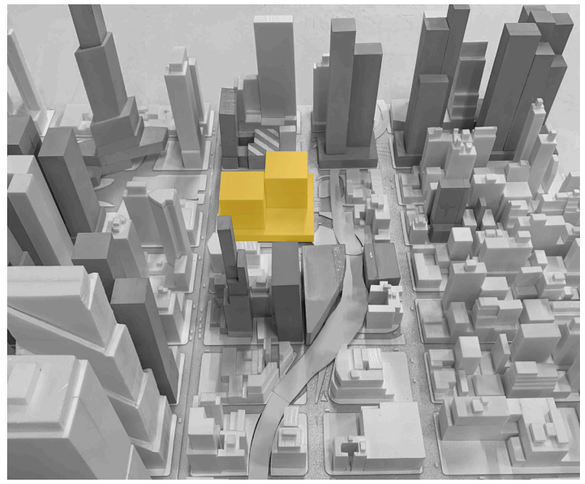
Urban Restrictions



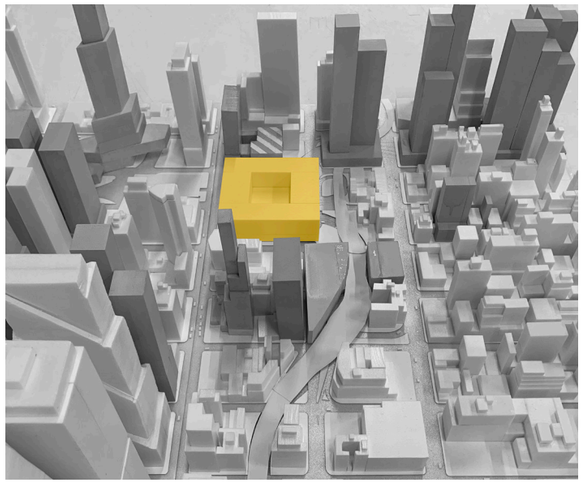
1. react to the public spaces in the surroundings



2. make the city road in the middle passable



3. consider Lincoln Tunnel exit and traffic condition



4. centrally concentrated with courtyards

Program of New PABT

BUS TERMINAL

50,000m2

PARKING

30,000m2

SUPPORT FUNCTIONS

13,000m2

BUS BAY	15,000m2
GATES	7,500m2
OFFICE	3,000m2
TICKETING	1,000m2
FOYER	500m2
RAMP SYSTEM	10,000m2
BUS STORAGE	10,000m2
SHARING CAR	2,500m2
E-BIKE	500m2
PRIVATE VEHICLE	30,000m2
RETAIL	7,500m2
ENTERTAINMENT	2,500m2
WC	1,000m2
ROOF GARDEN	2,000m2

New added functions comparing to current PABT

modern
light
green
passable

spacious, visible, organized

open
lively
good view
pedestrian accessible

MANHATTAN FUTURE GATEWAY

NEW PORT AUTHORITY BUS TERMINAL

URBAN STRATEGY

MAIN CHALLENGES

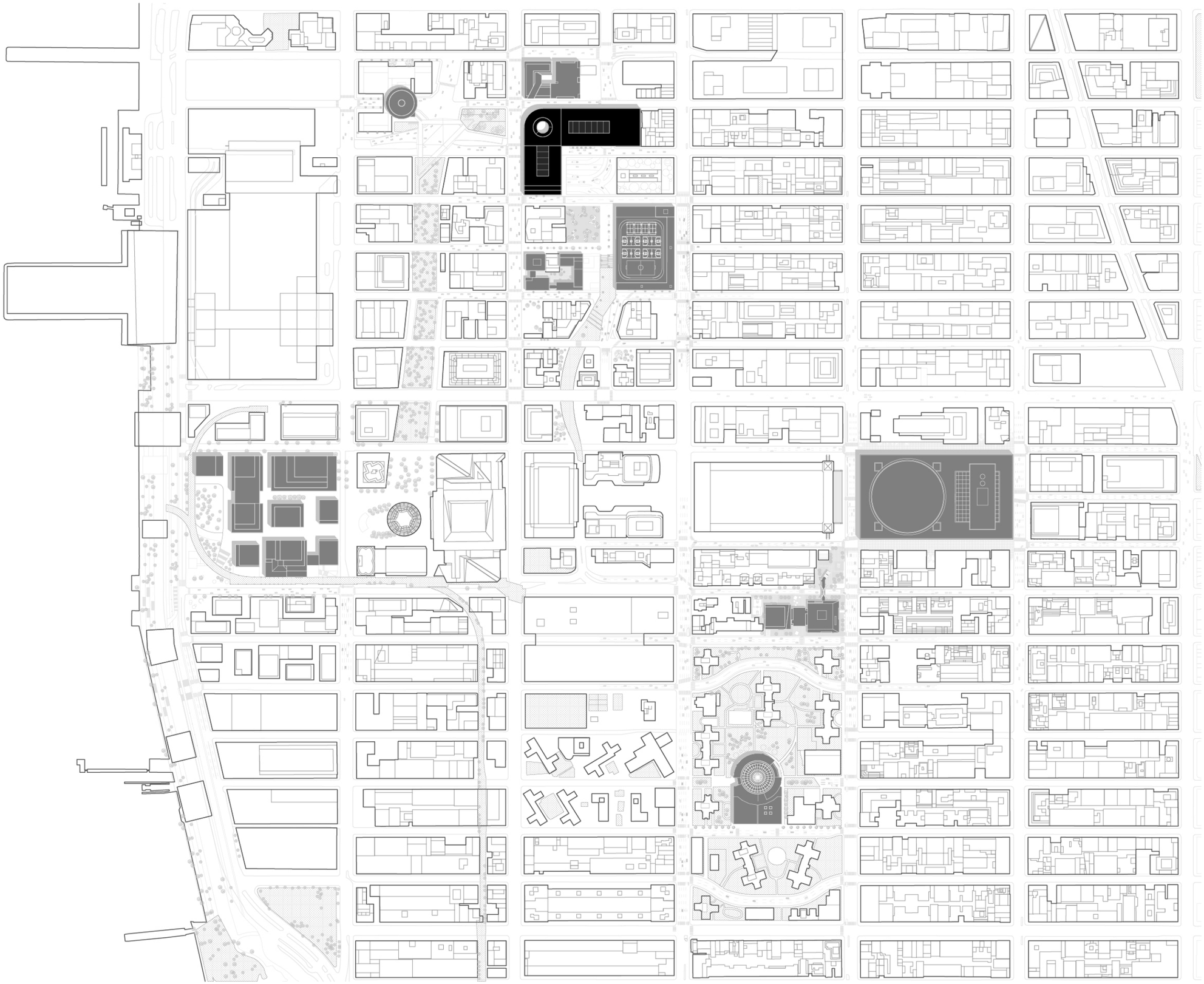
1. Lincoln Tunnel connection & vehicles' routes

2. Relationship with the surrounded buildings and parks

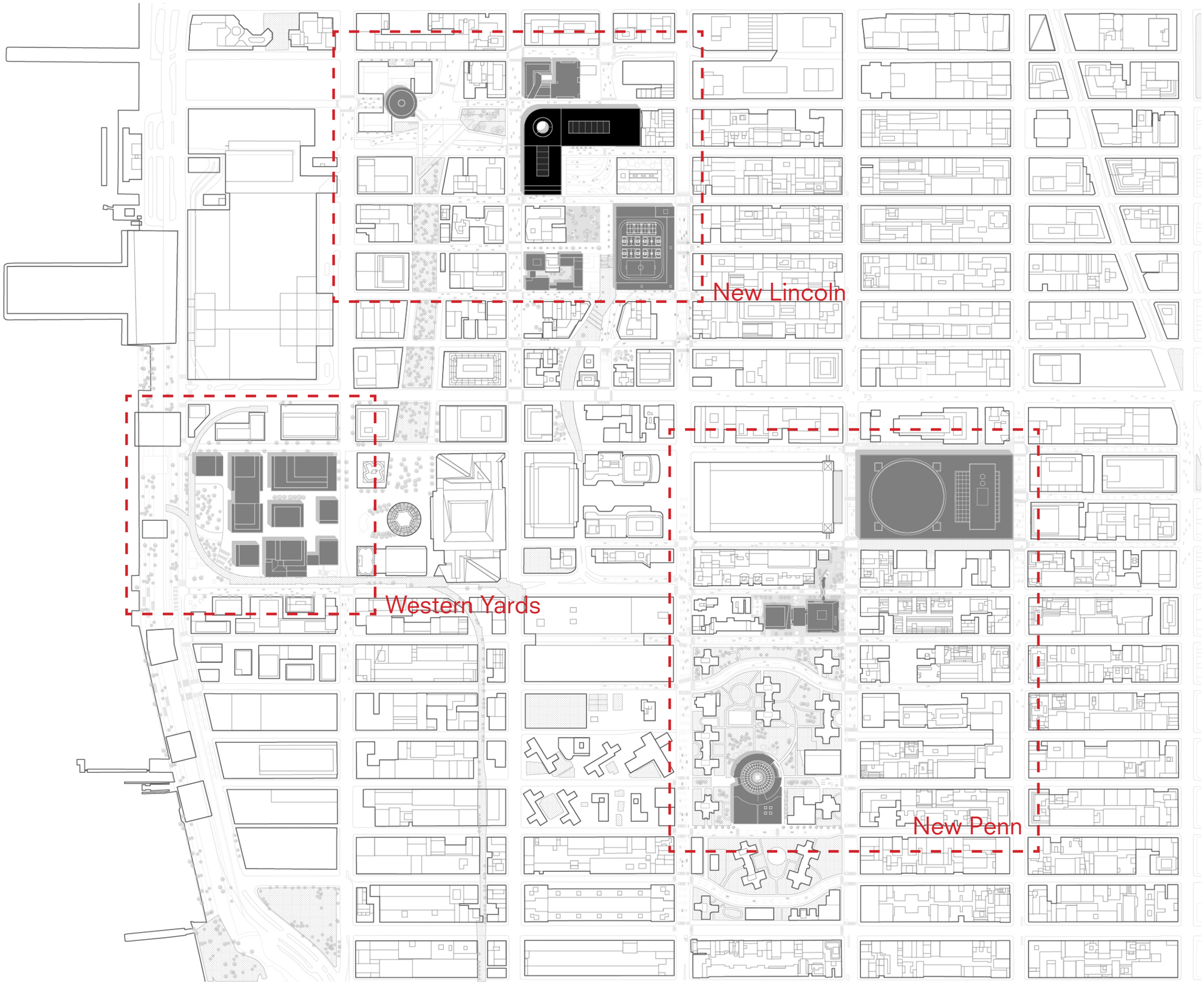
3.Commuters & tourists' circulation

Group Model 1:1000 - Transitional Yards

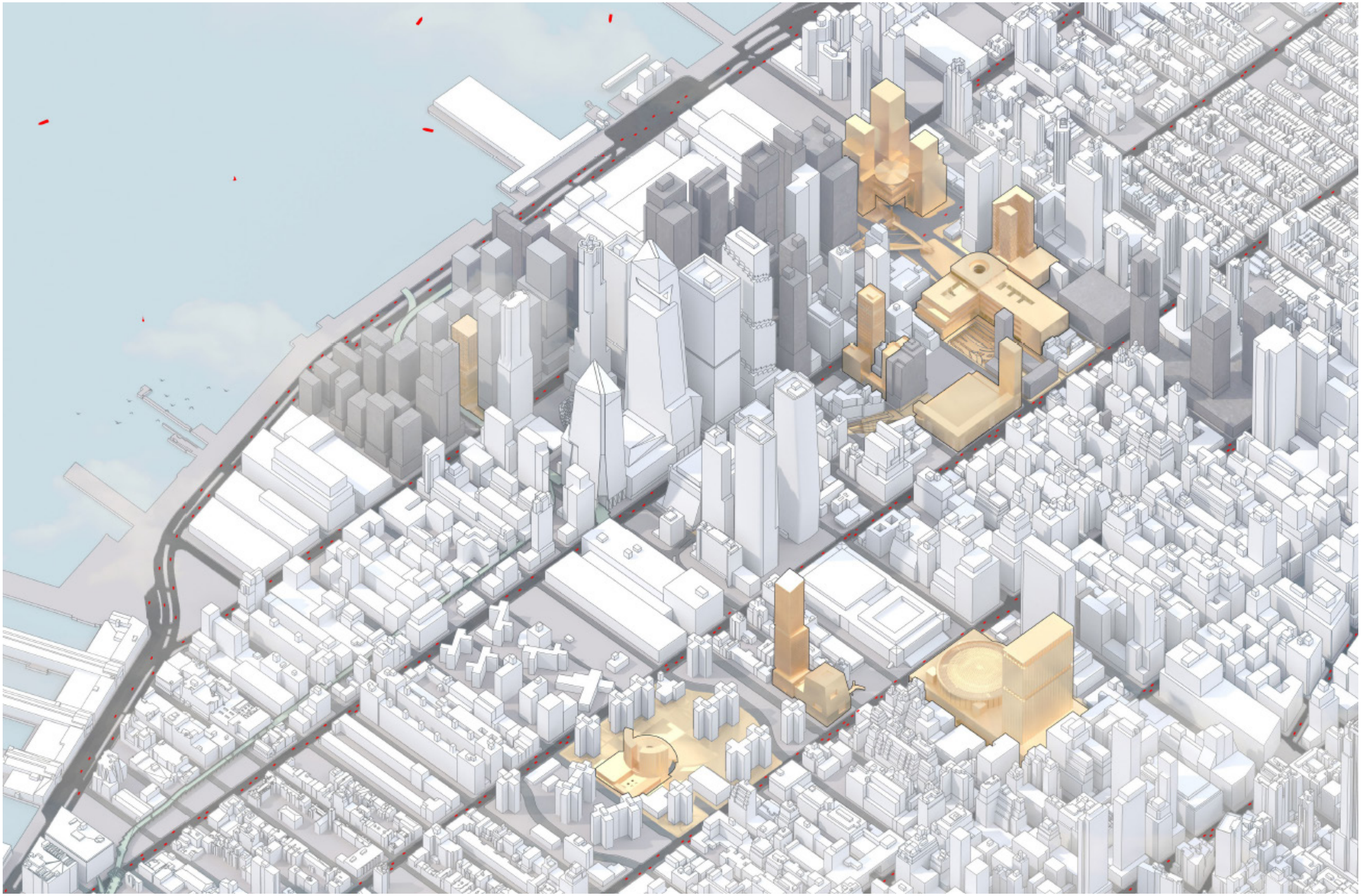
Group Site Plan - Transitional Yards



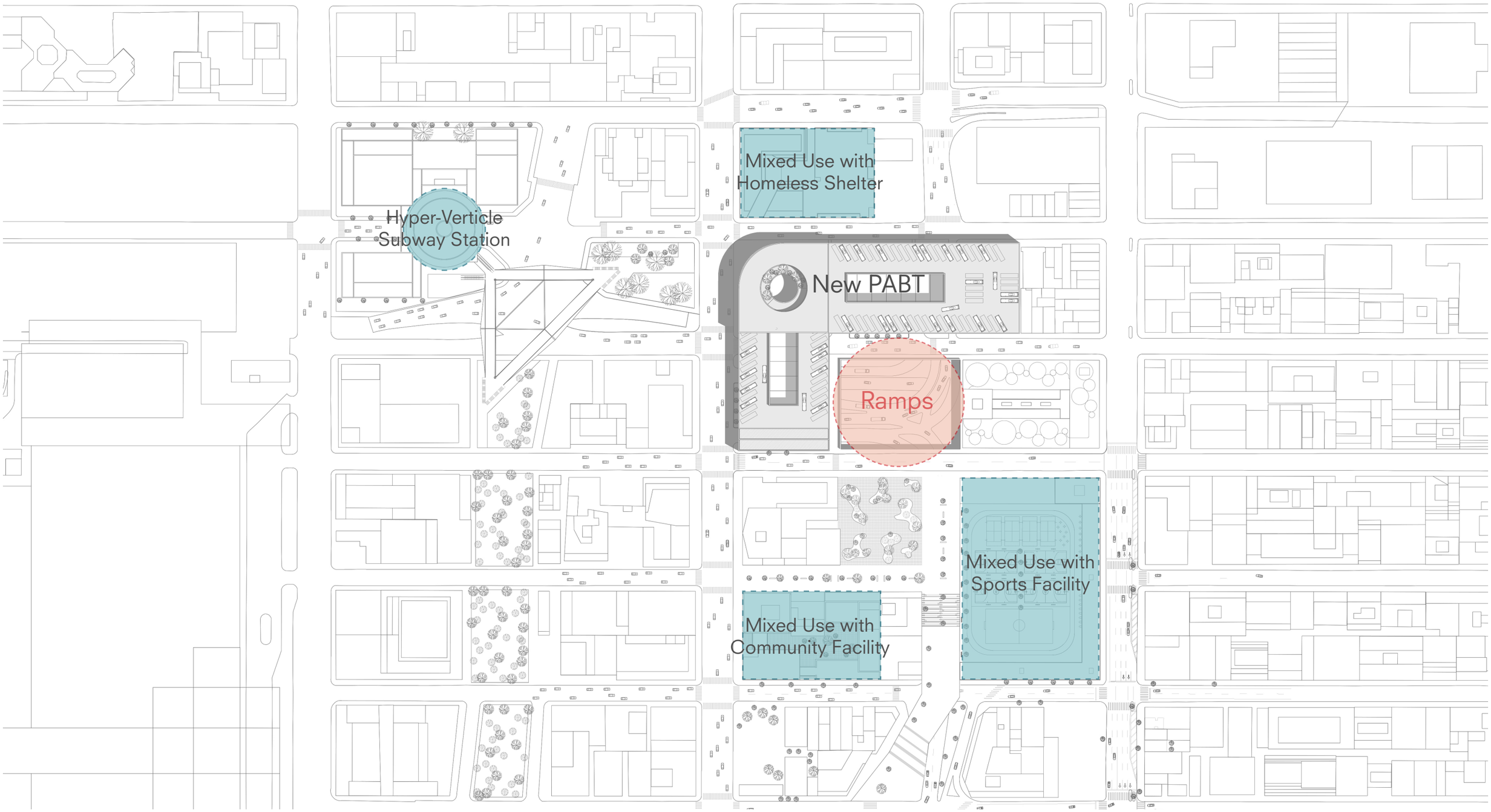
Group Site Plan - Transitional Yards



Axon of Transitional Yards



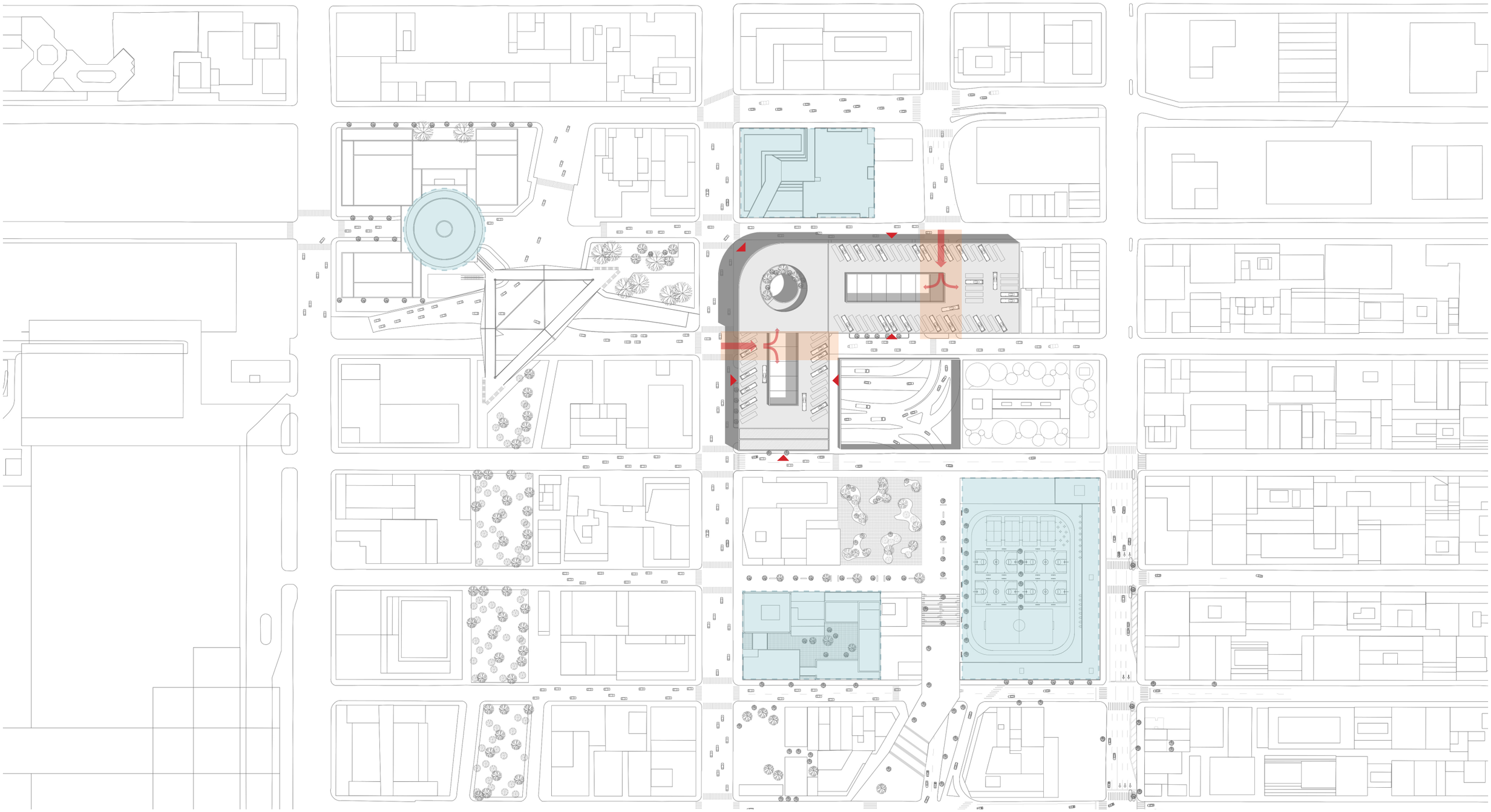
Group Site Plan - New Lincoln



Relationship with the surroundings

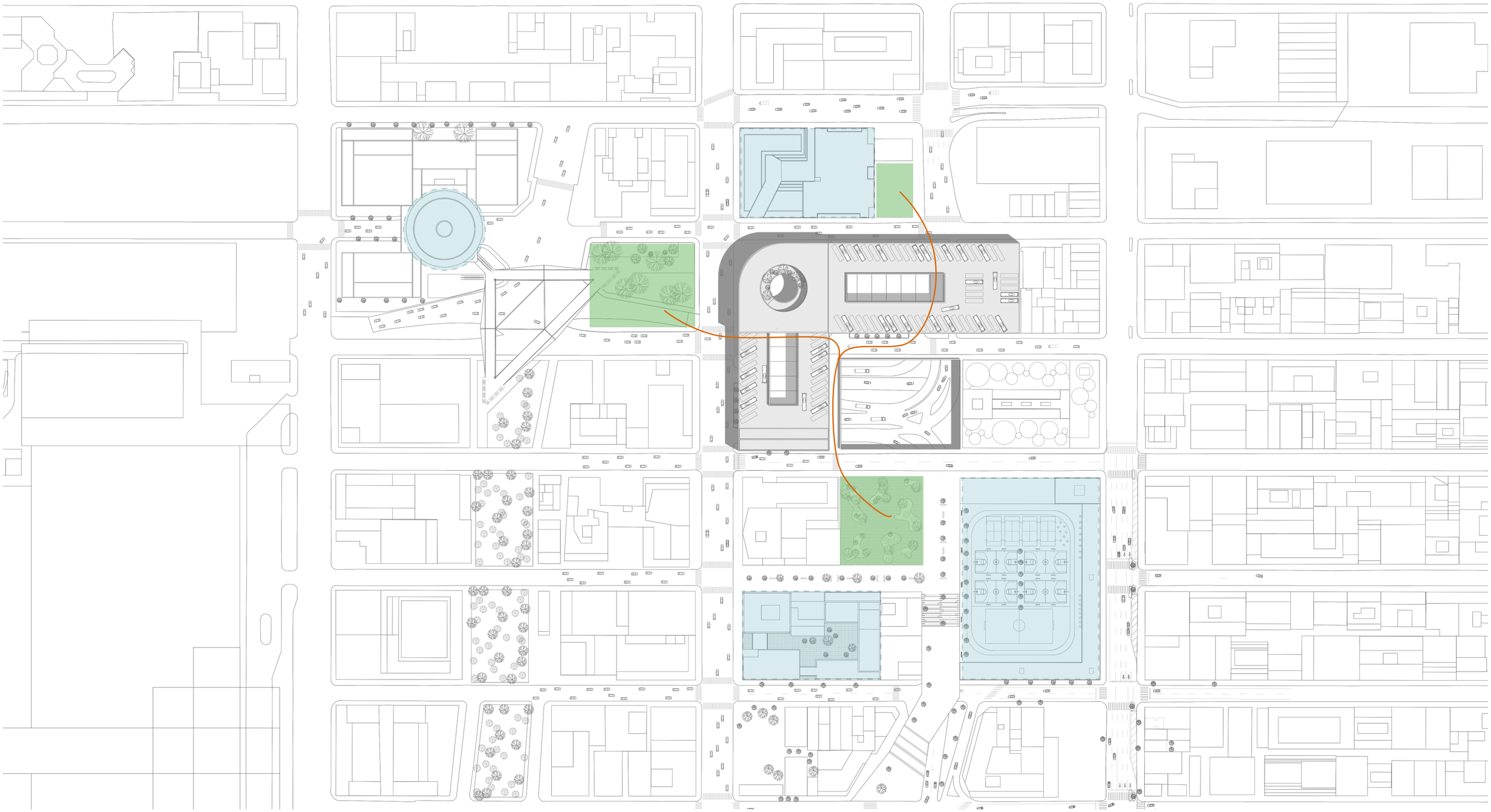
Keep the exit of LT open

Urban Strategy



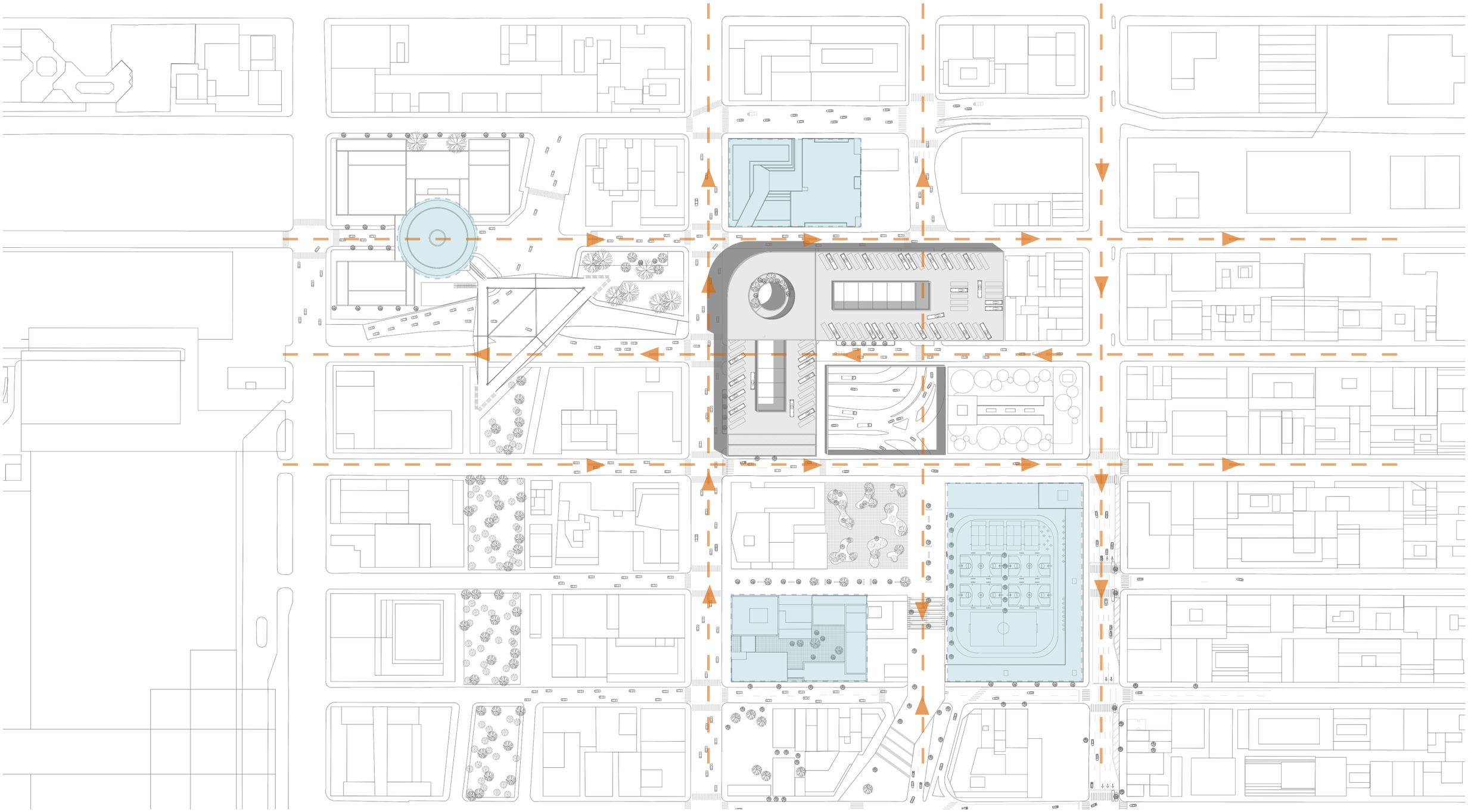
Passenger's entrance

Urban Strategy



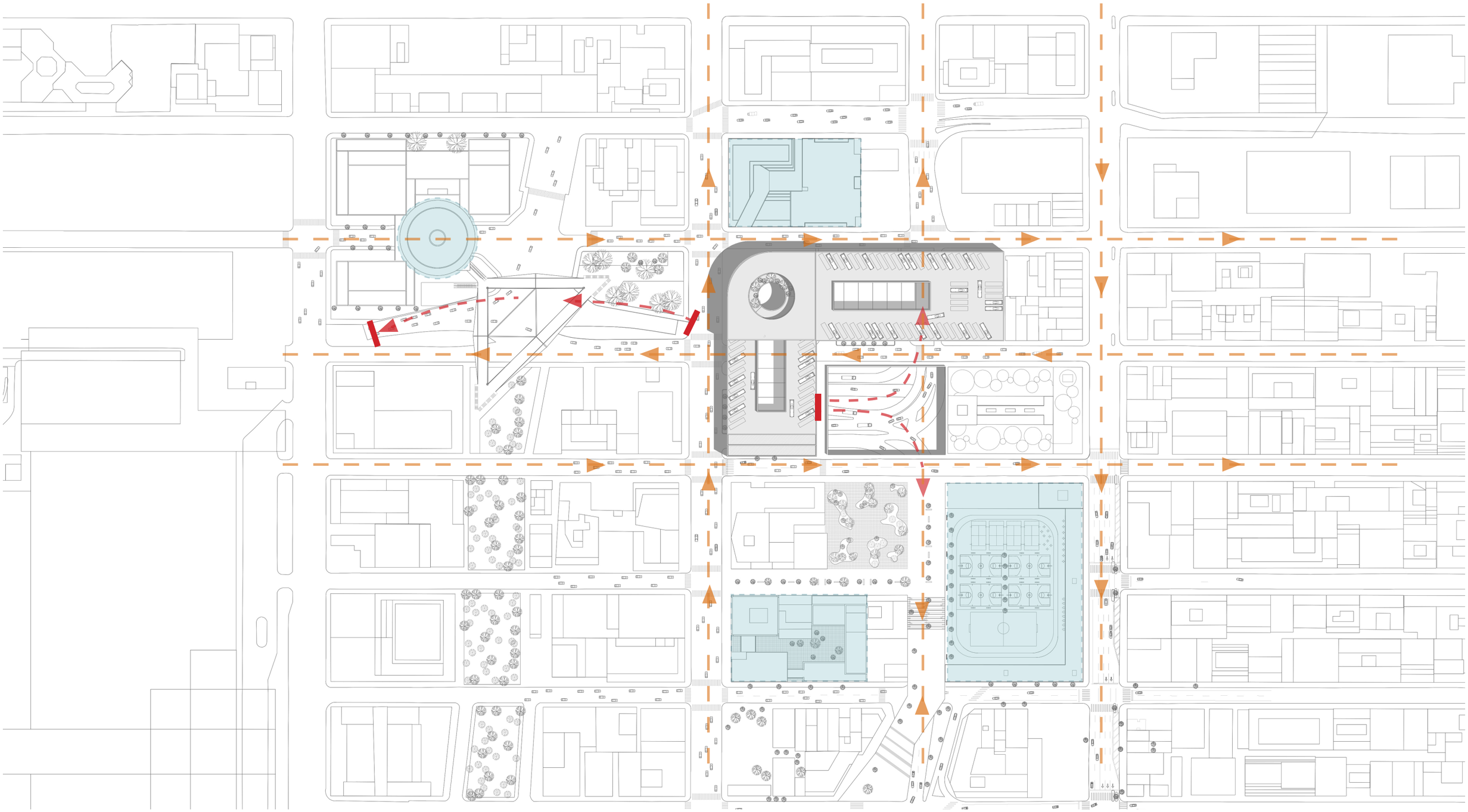
Passenger's way
Connect parks / public space

Urban Strategy



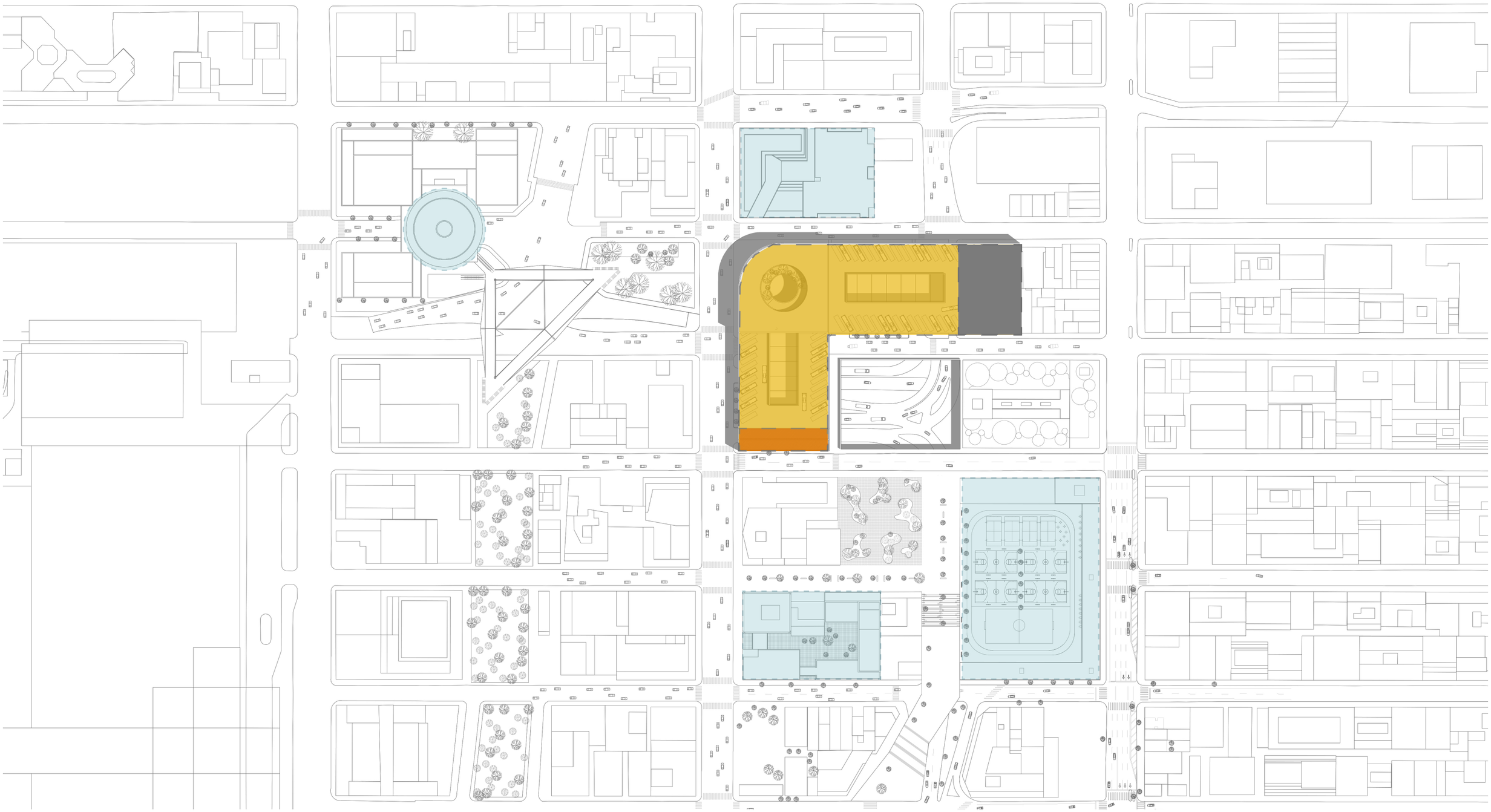
Vehicle's way
Ground road

Urban Strategy

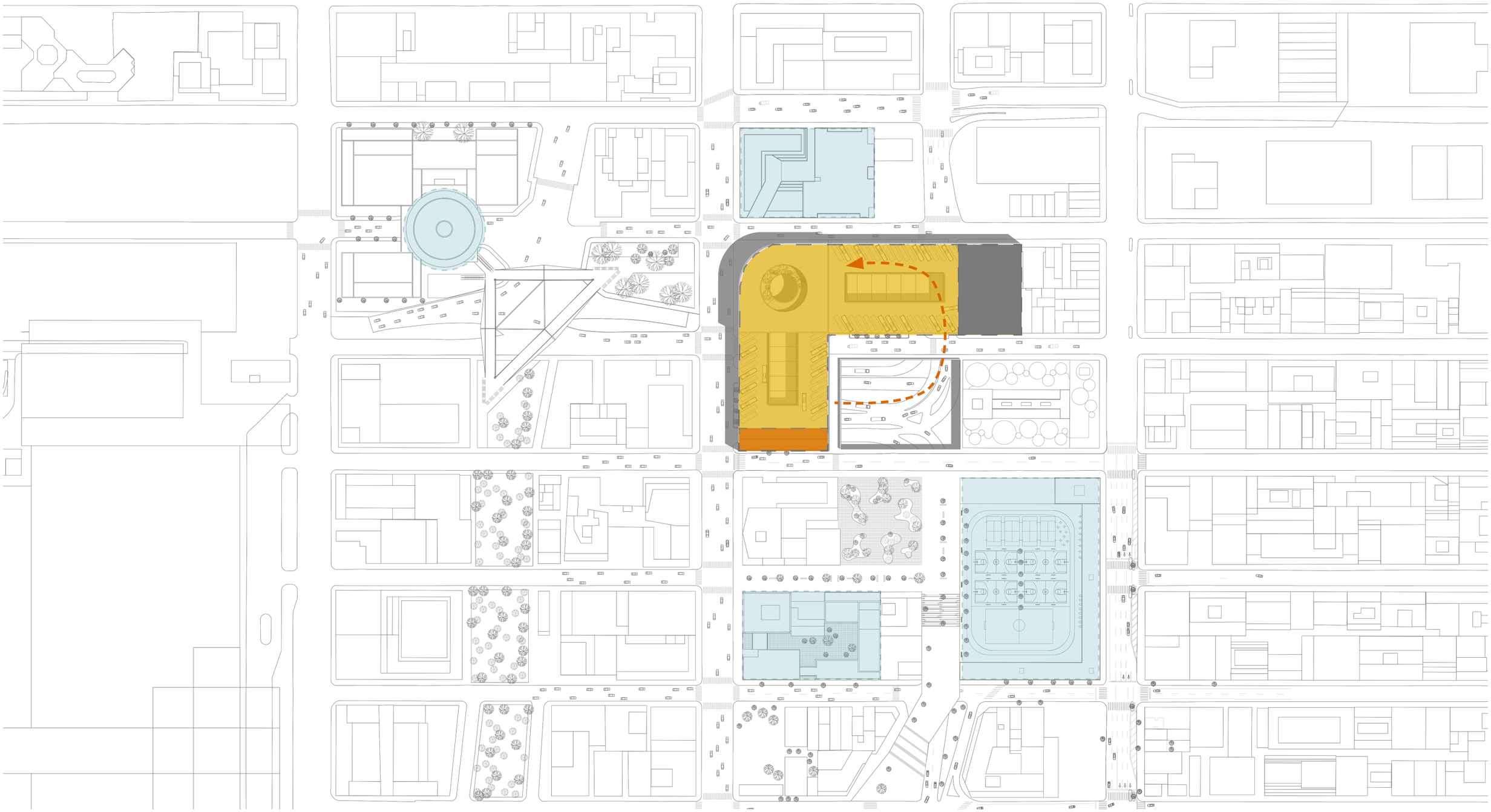


Vehicle's way
Ground road
Tunnel road

Urban Strategy

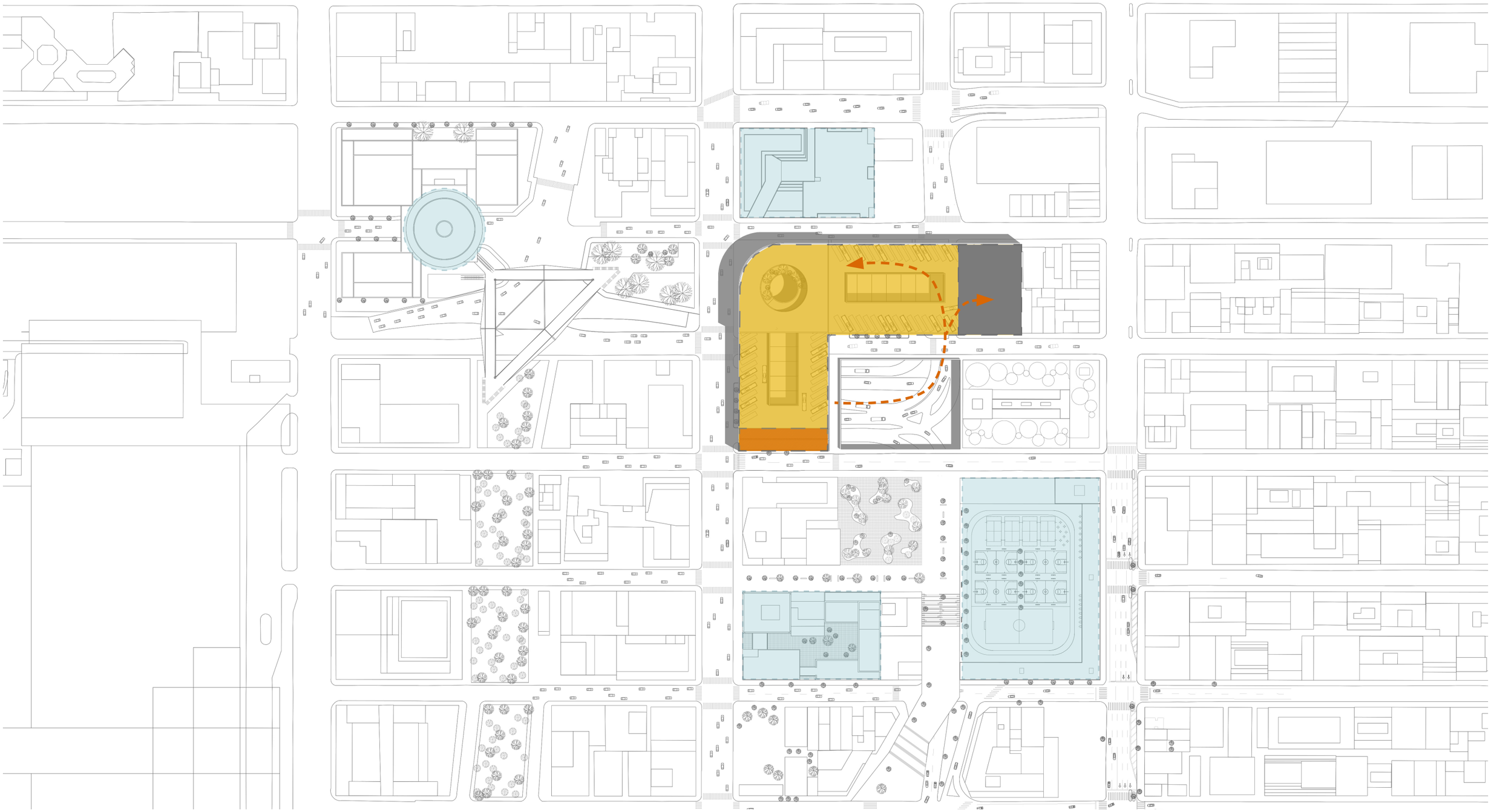


Urban Strategy



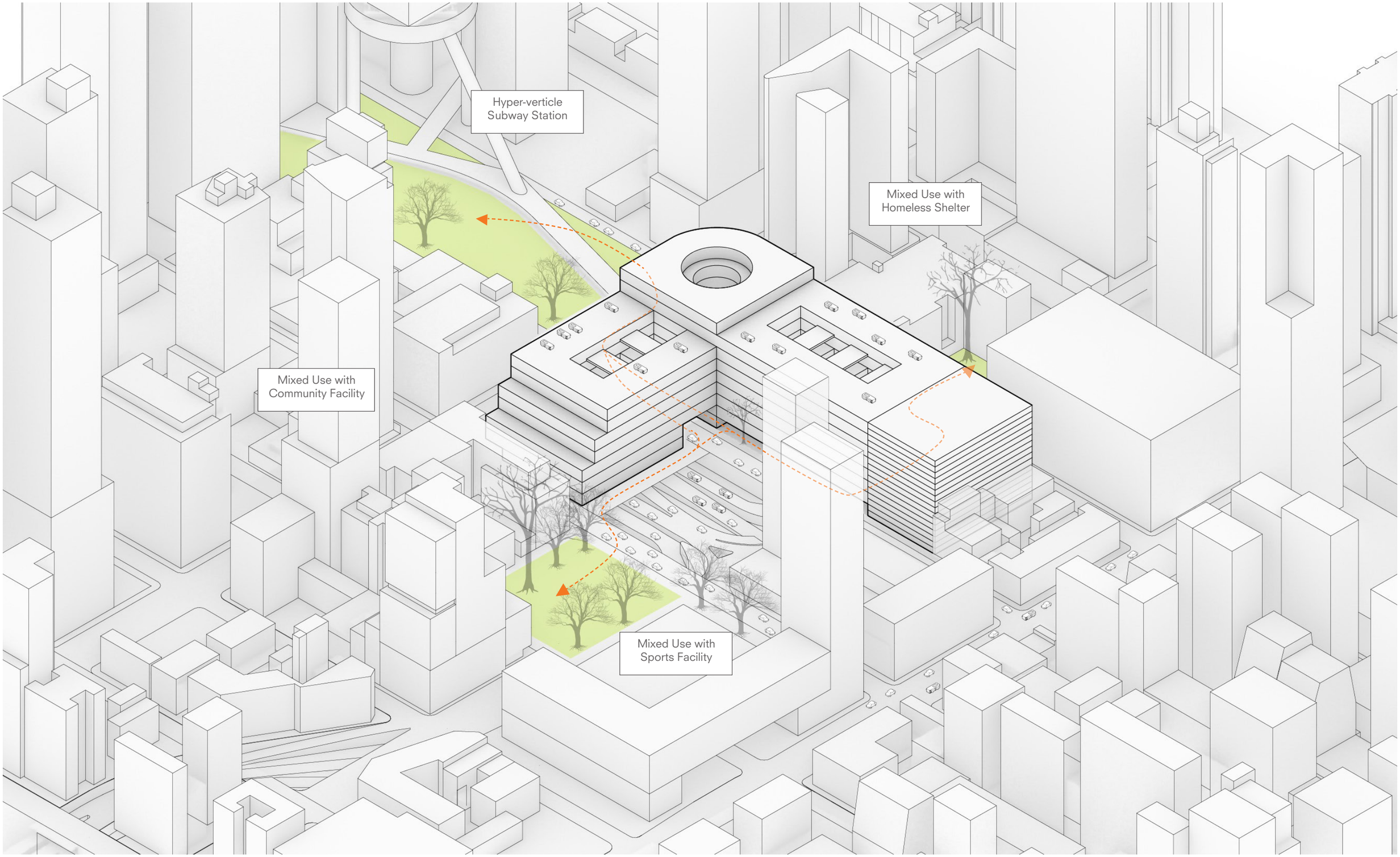
Vehicle's way
Buses out from the tunnel

Urban Strategy



Vehicle's way
Buses out from the tunnel
Cars out from the tunnel

Axon of the New PABT



SPACE & FUNCTION

MAIN CHALLENGES

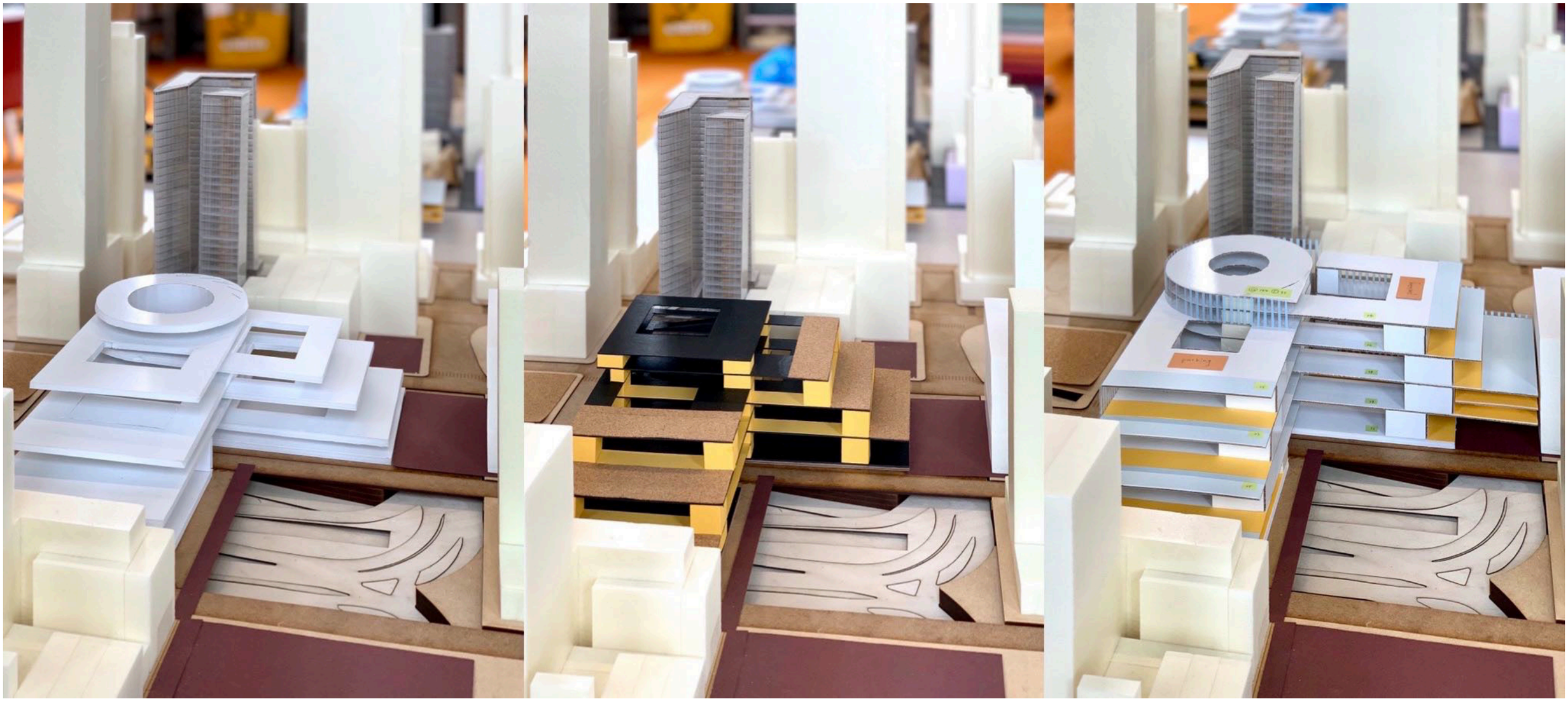
1. Space efficiency: use less area but same amount of gates

2. Buses' & Communiters' circulation

3. Convenience and comfort of space

4. New mobility services should be implemented

Development

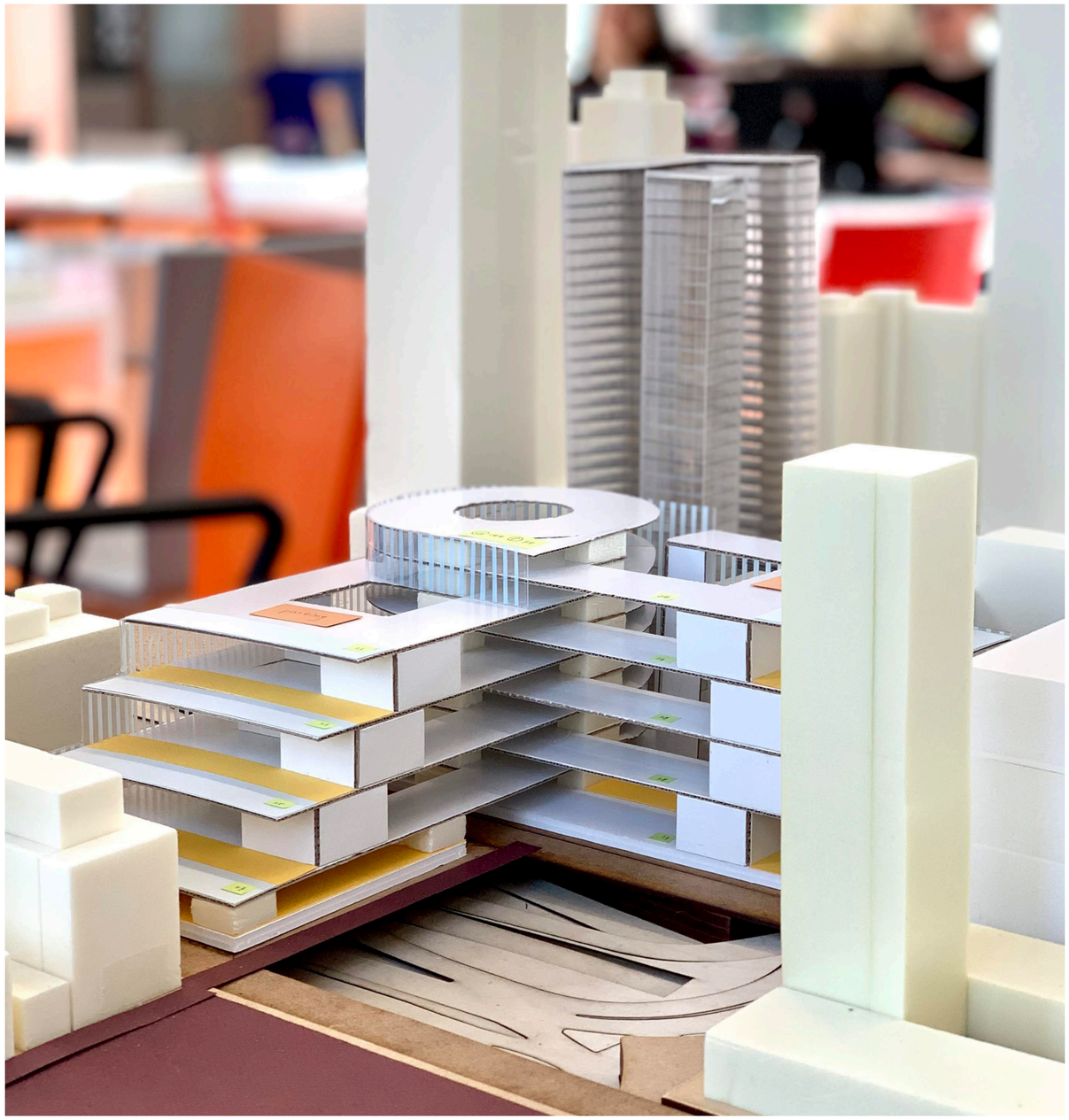


Development

P2.5 Model 1:500

P2.5 Model 1:500

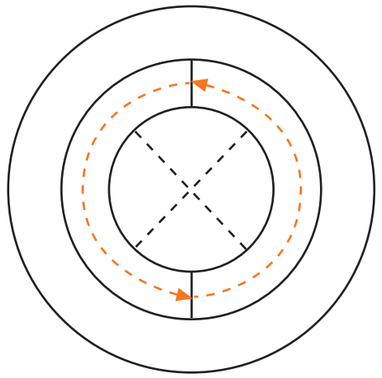
Concept

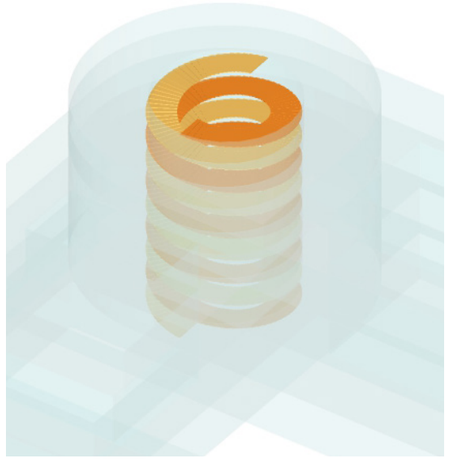


1. Round volume for ramps with atrium
2. Two wings with atriums
3. Viewing Platforms
4. Interlace layers

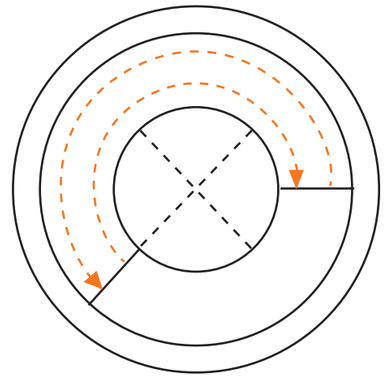
Ramp for Buses

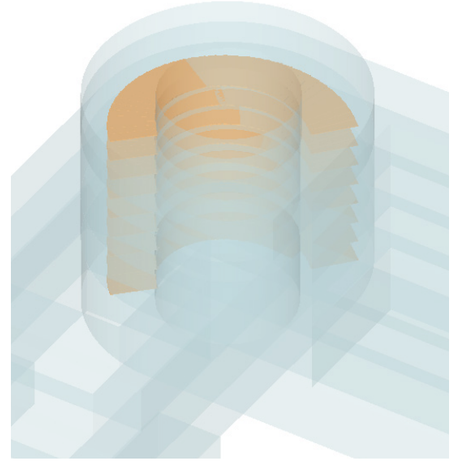
2 spirals, one-way ramp





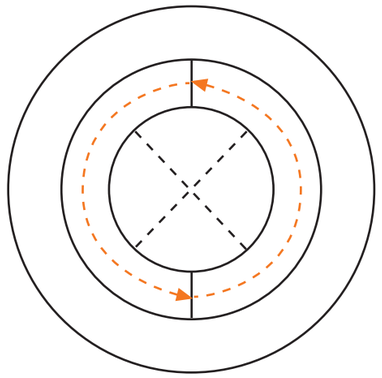
1 spiral, two-way ramp

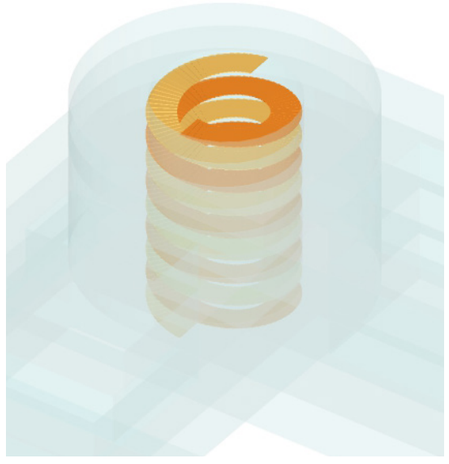




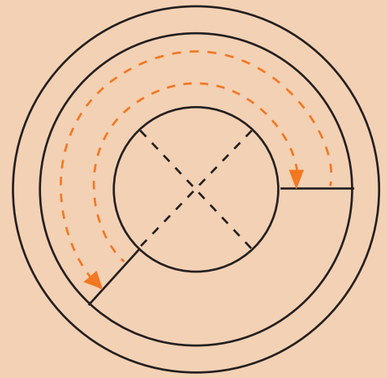
Ramp for Buses

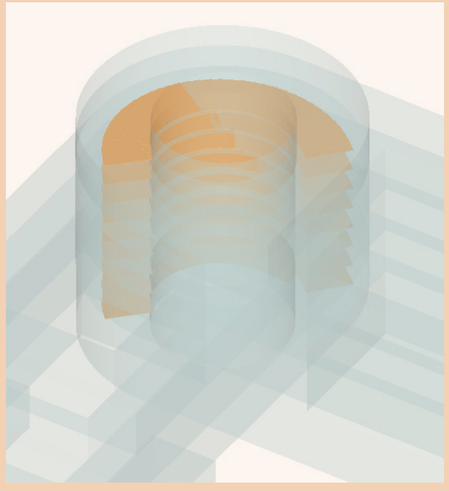
2 spirals, one-way ramp





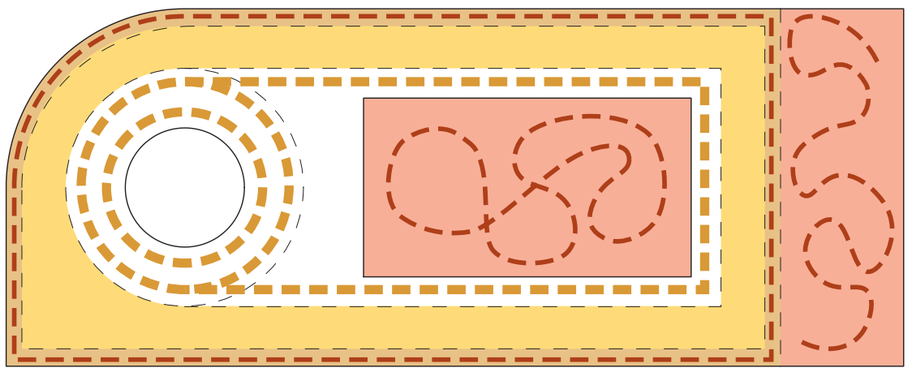
1 spiral, two-way ramp





Route for Buses

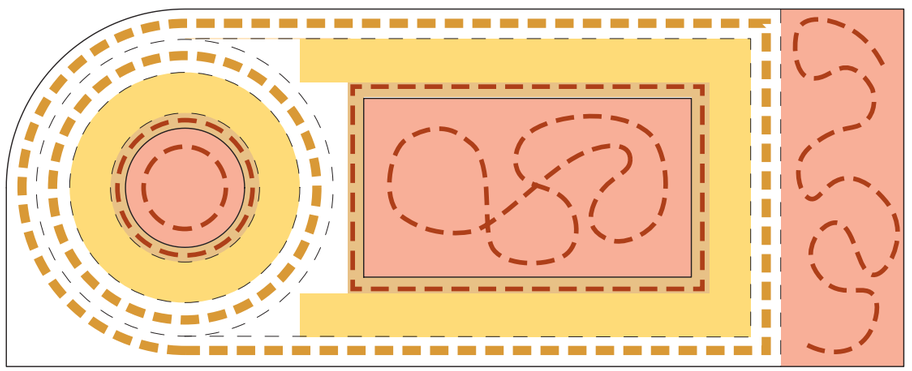
Inner side



+: Better view for pedestrians
More bus gates

-: Longer pedestrian circulation
Shorter bus circulation
Connect the atrium and platforms

Outer side



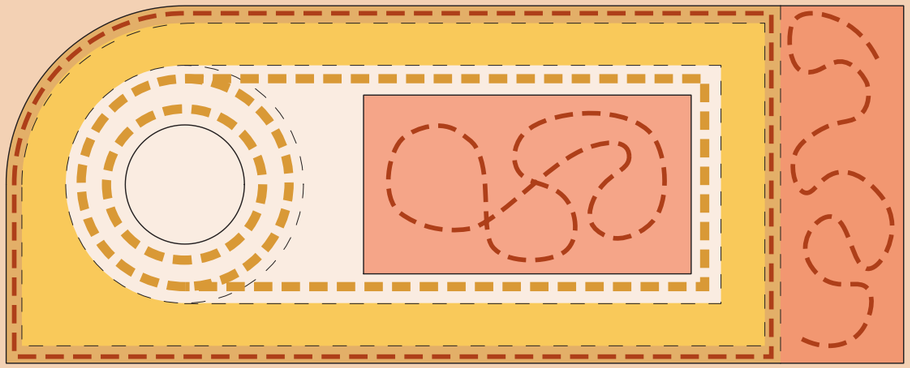
+: Shorter Pedestrian circulation
Longer bus circulation

-: No outside view for waiting area
Less bus gates
Connect the atriums and platforms

Public Functions
Bus Boarding Bay
Pedestrian Circulation
Bus Circulation

Route for Buses

Inner side



+: Better view for pedestrians
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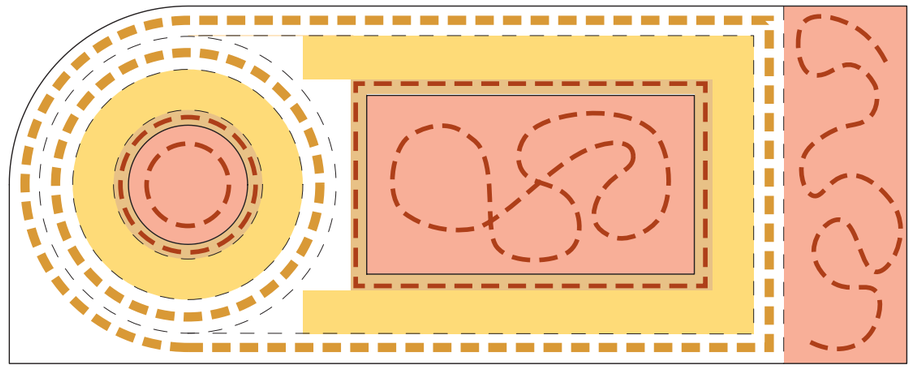
Outer side

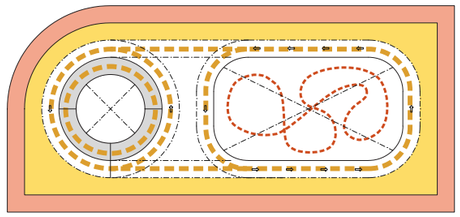


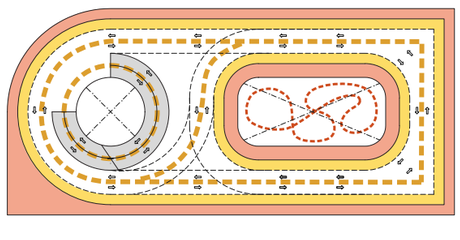
+: Shorter Pedestrian circulation
Longer bus circulation

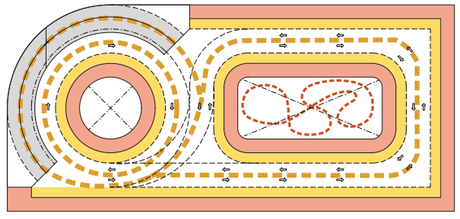
-: No outside view for waiting area
Less bus gates
Connect the atriums and platforms

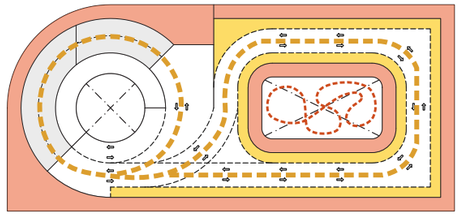
Pedestrian Area
Bus Boarding Bay
Pedestrian Circulation
Bus Circulation

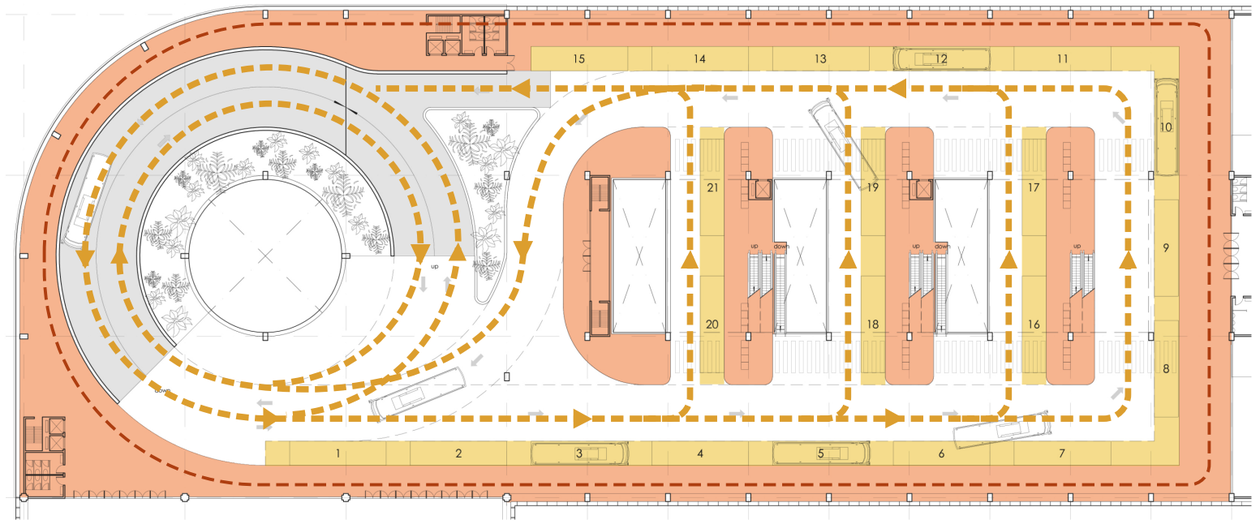
Program Scheme











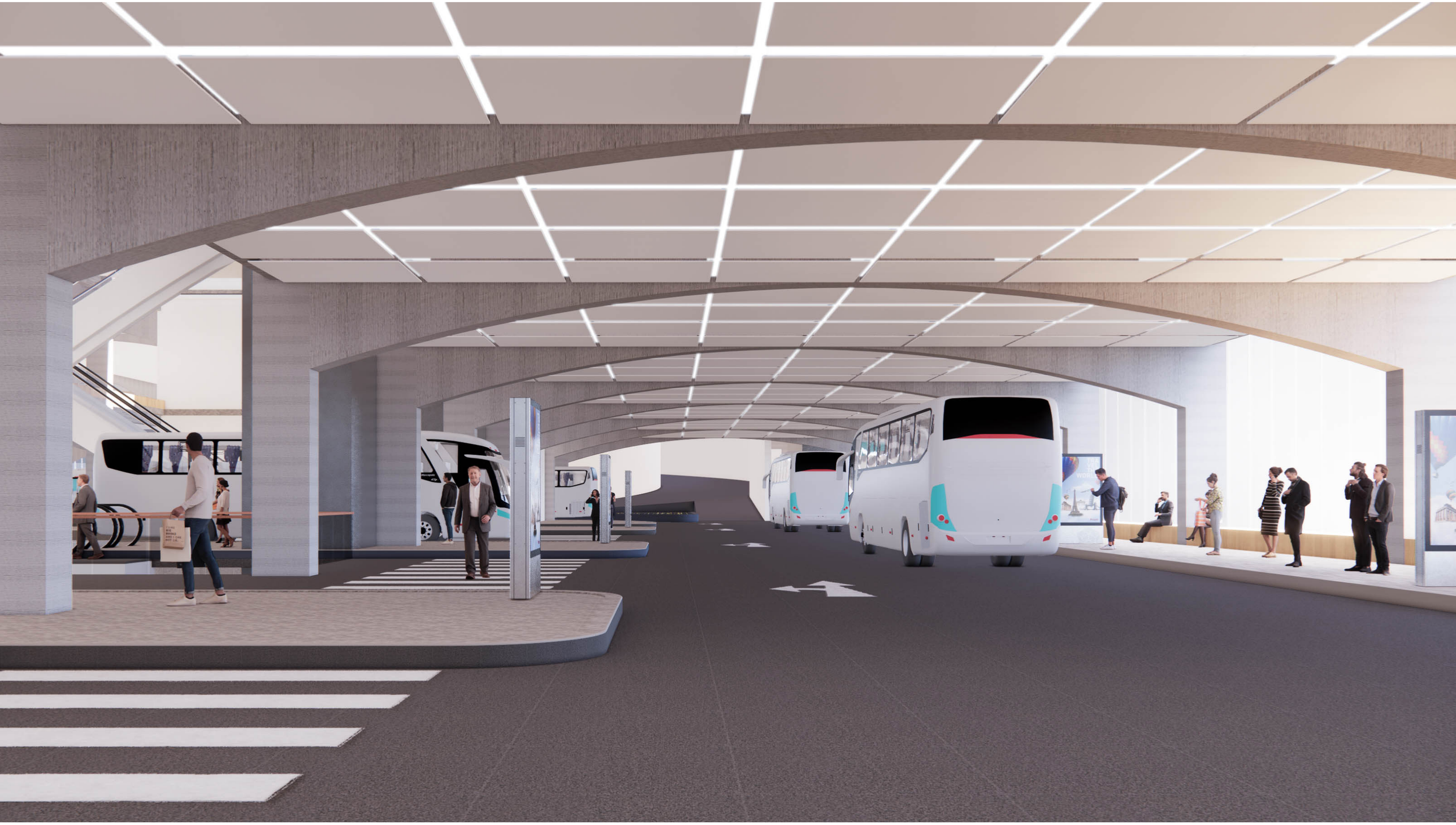
Pedestrian Area

Bus Boarding Bay

Pedestrian Circulation

Bus Circulation

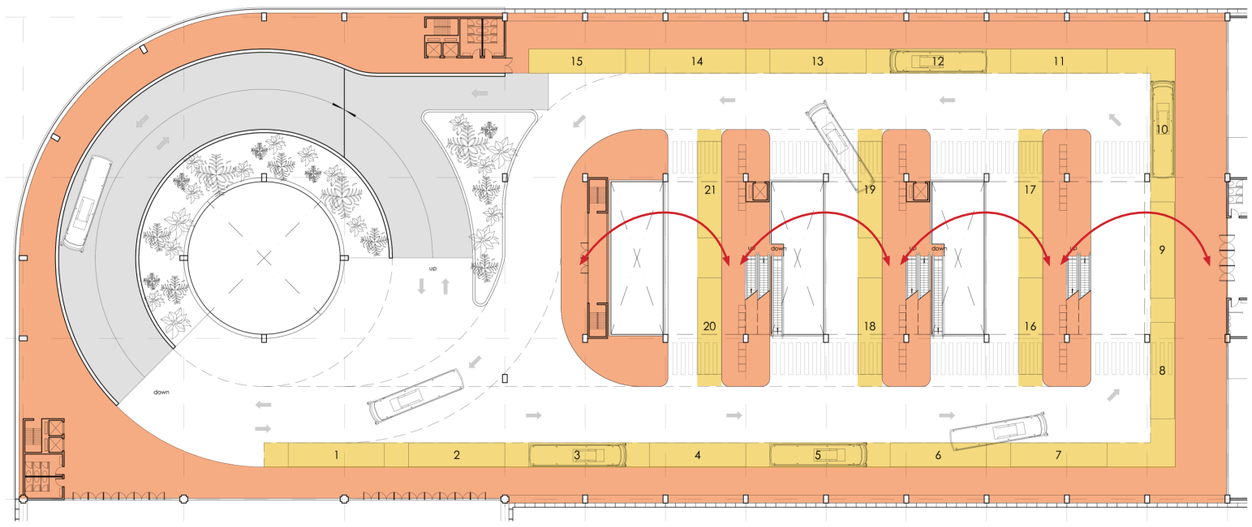
Bus Lane



Outer Boarding Area

Inner Boarding Area

Program Scheme



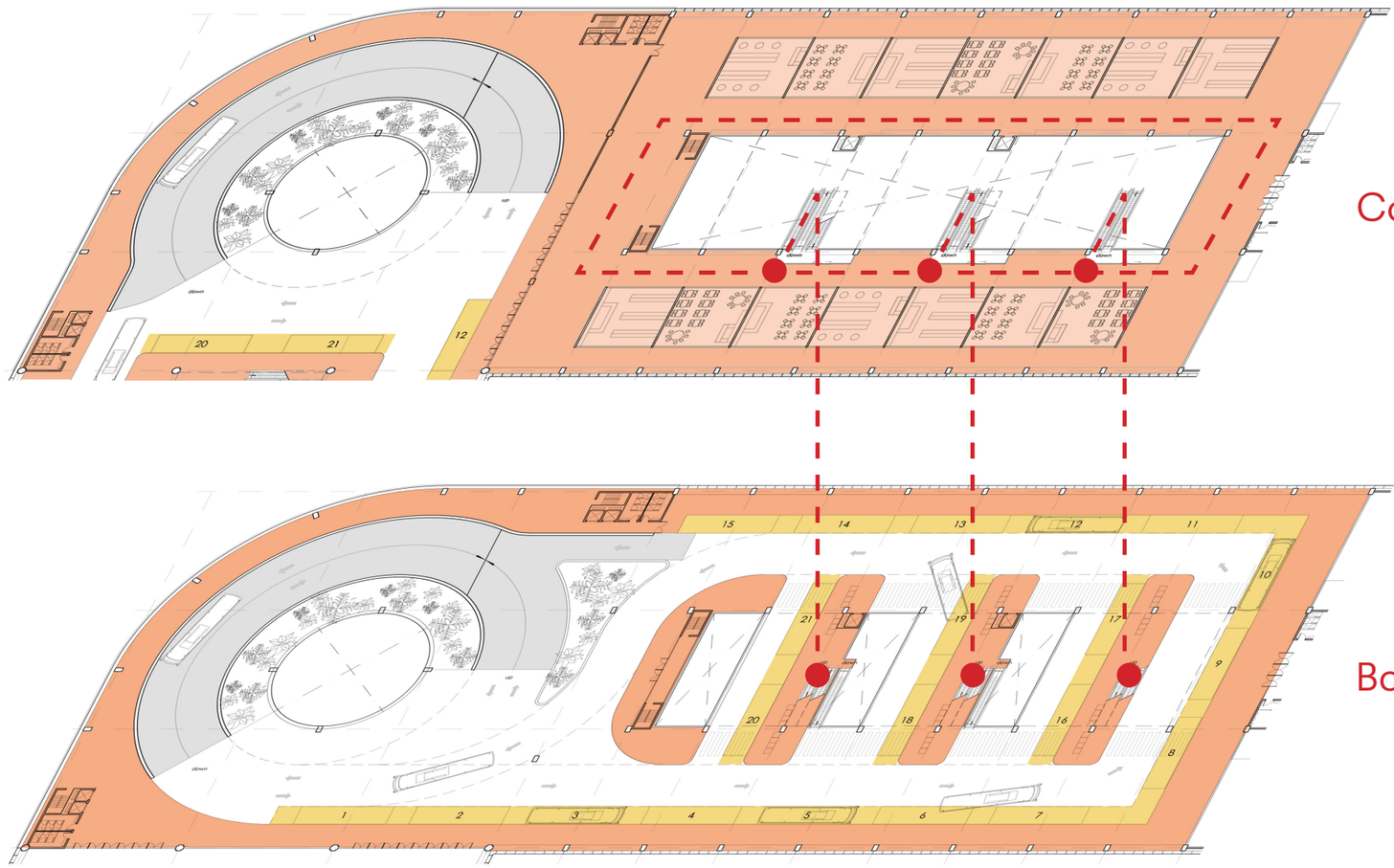
Connection?

Pedestrian Area

Bus Boarding Bay

Ramp

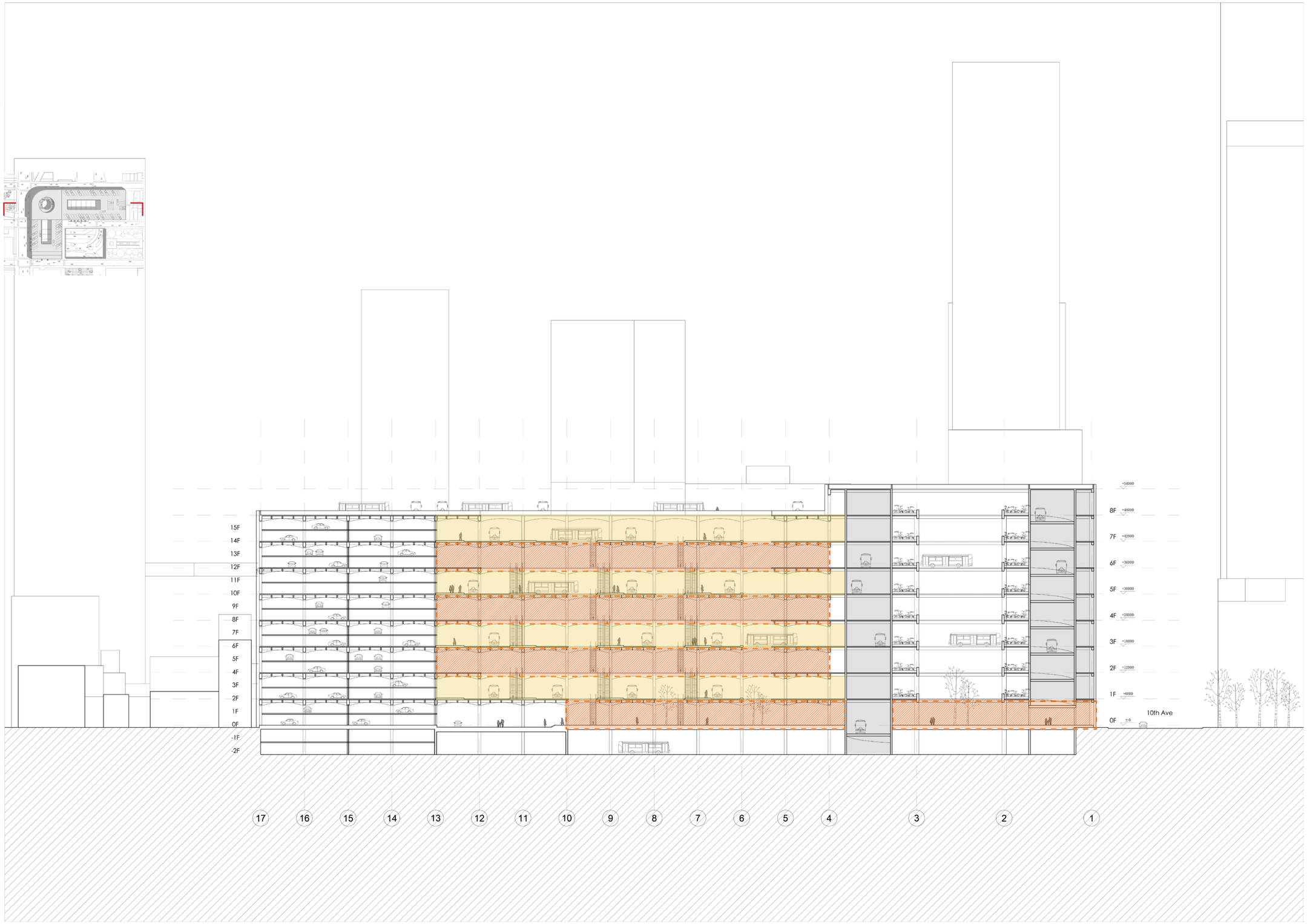
Program Scheme



Commercial Layer

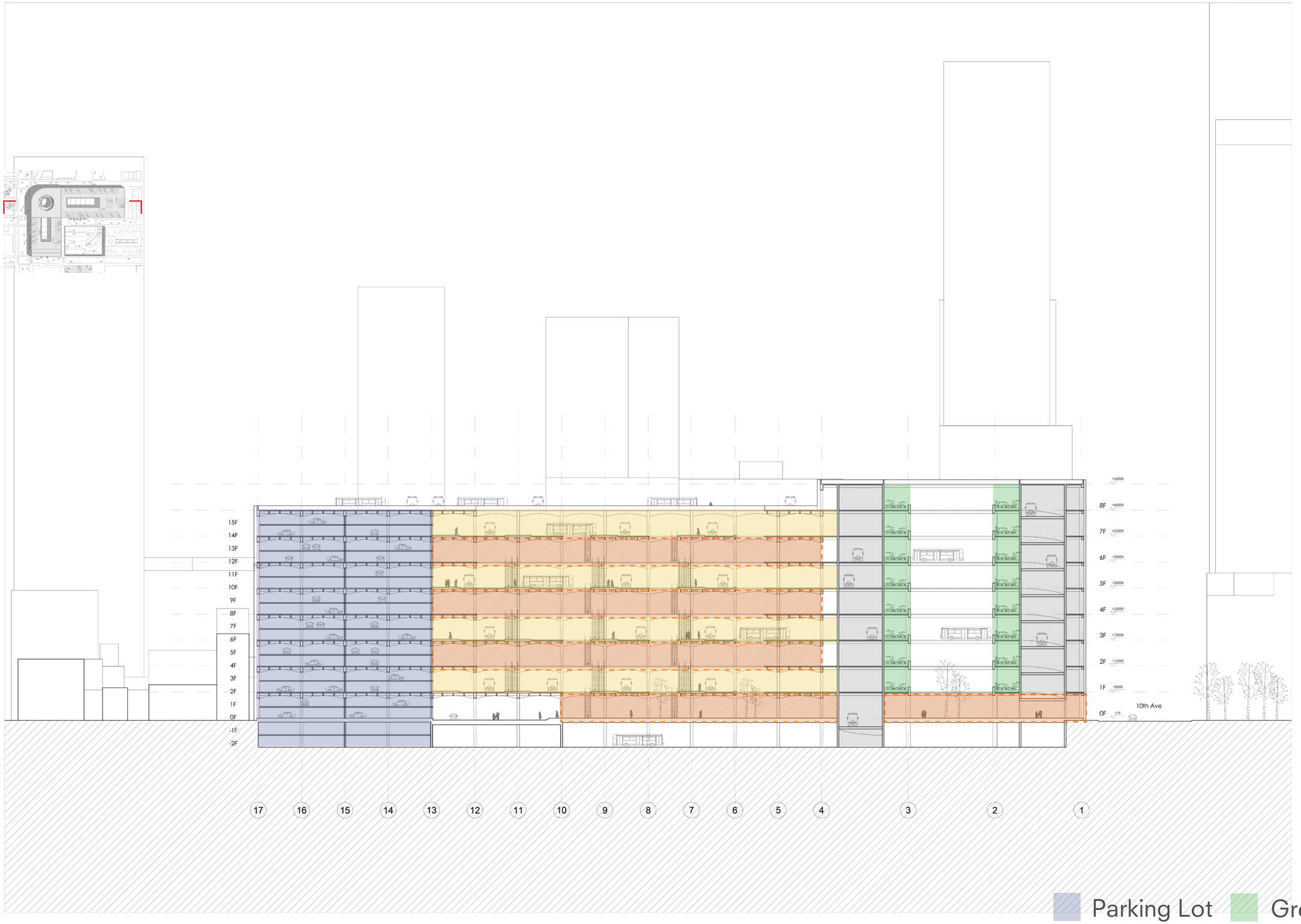
Commercial Layer

A-A Section



Support Functions Layers Bus Boarding Layers Ramp

A-A Section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0F
10th Ave
17
16
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10
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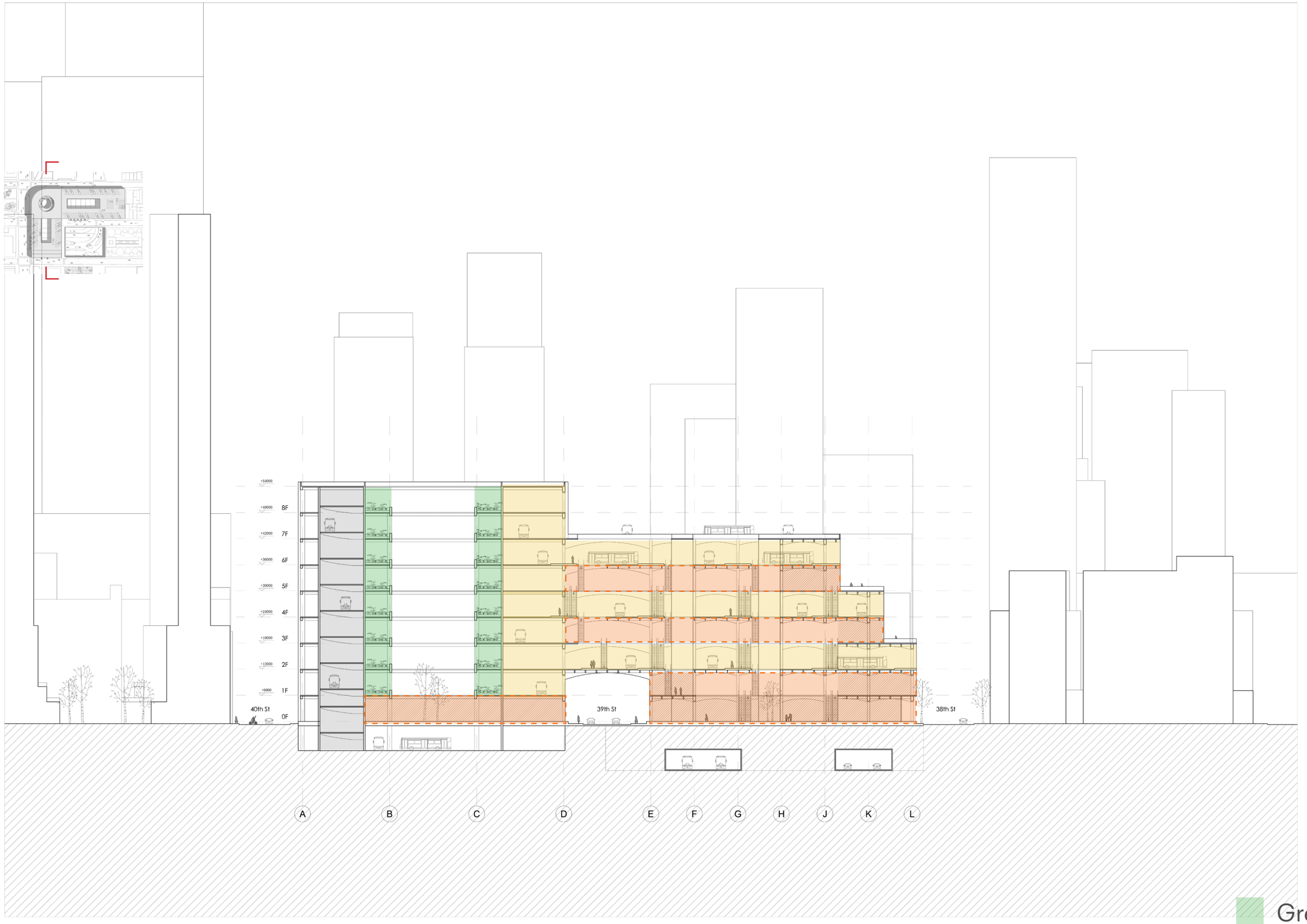
2
1
Parking Lot
Greenery
Support Functions Layers
Bus Boarding Layers
Ramp

B-B Section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1F
0F
40th St
39th St
38th St
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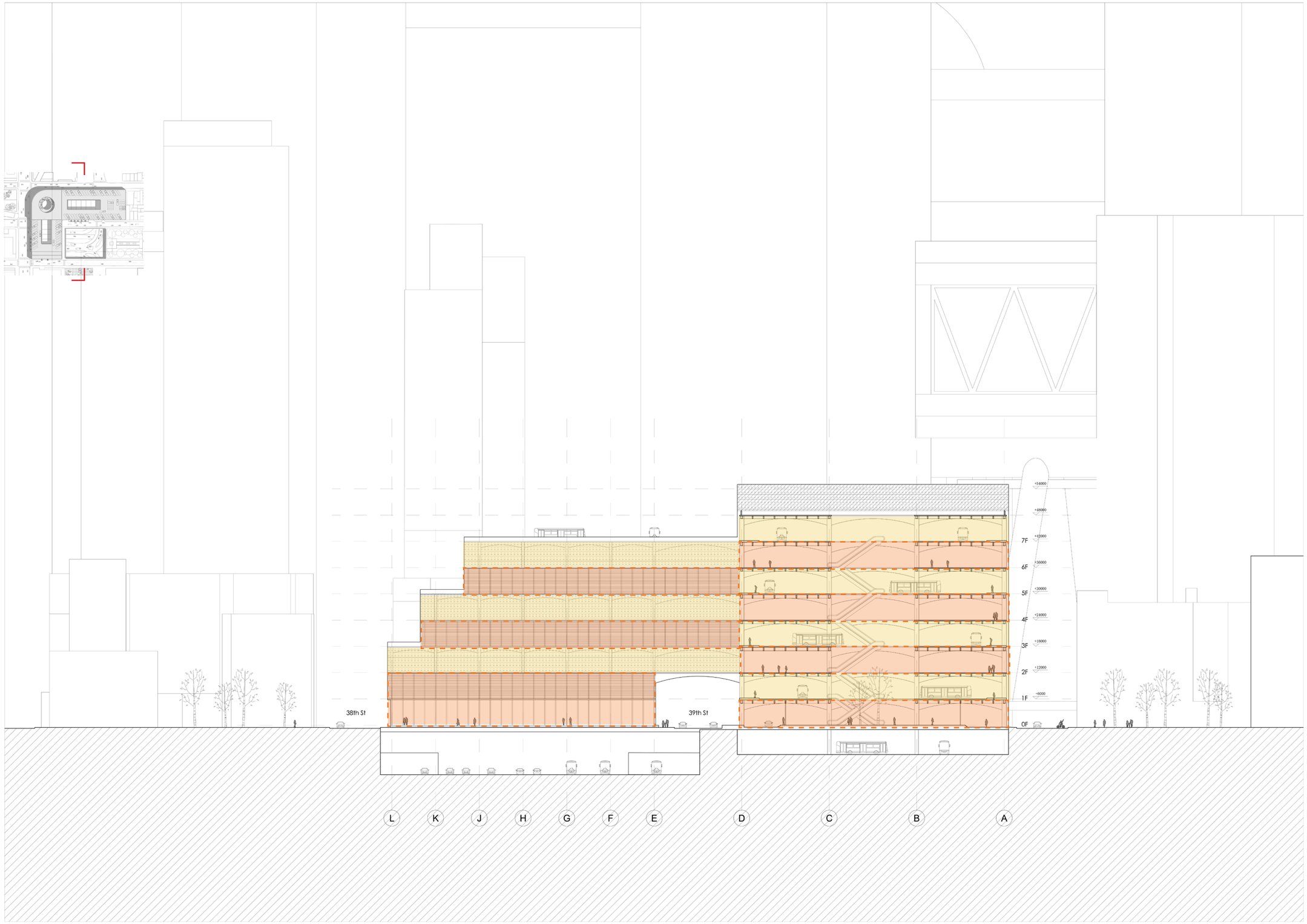
J
K
L
Greenery
Support Functions Layers
Bus Boarding Layers
Ramp

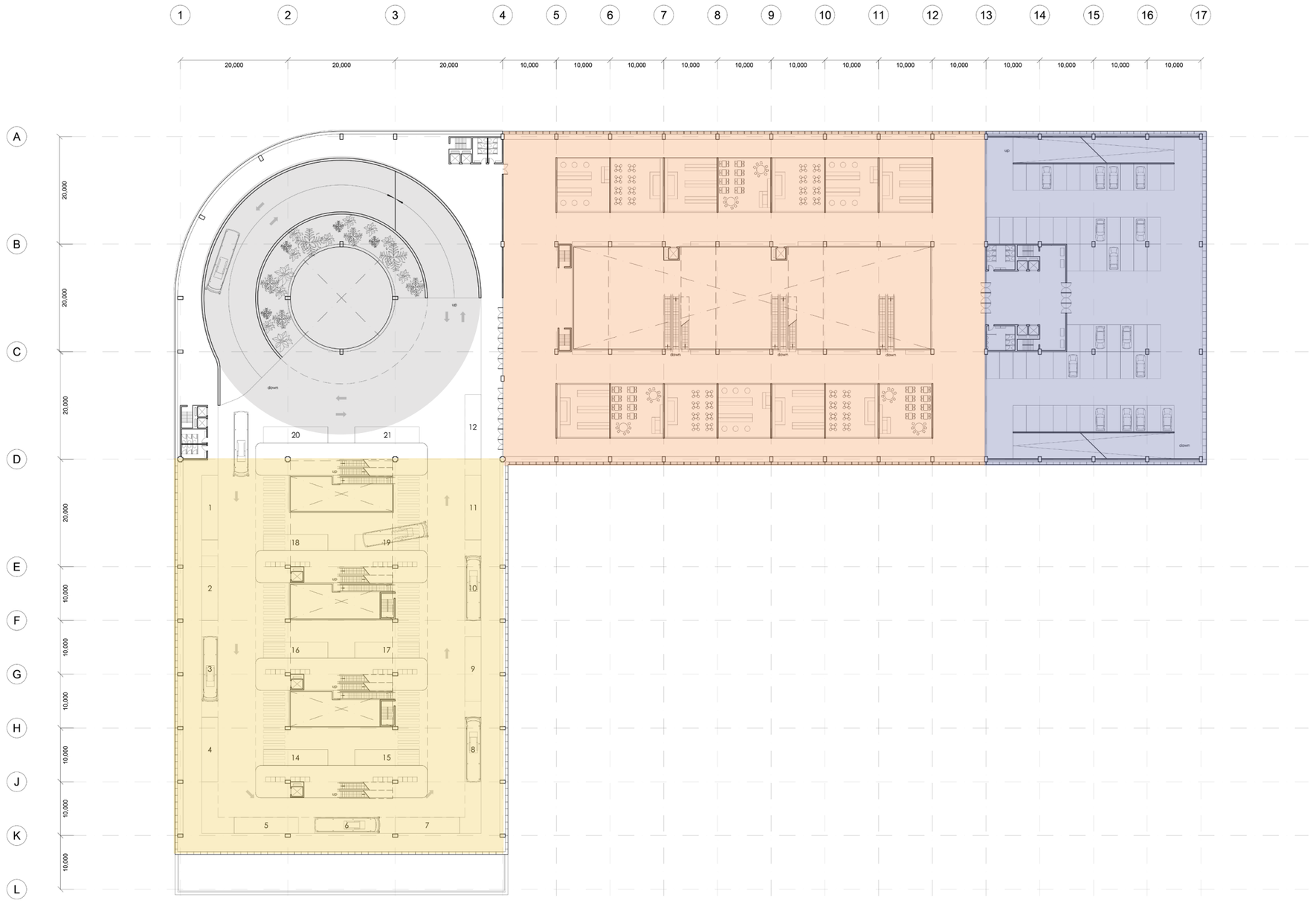
C-C Section



Support Functions Layers

Bus Boarding Layers

Typical Plan



Parking Lot

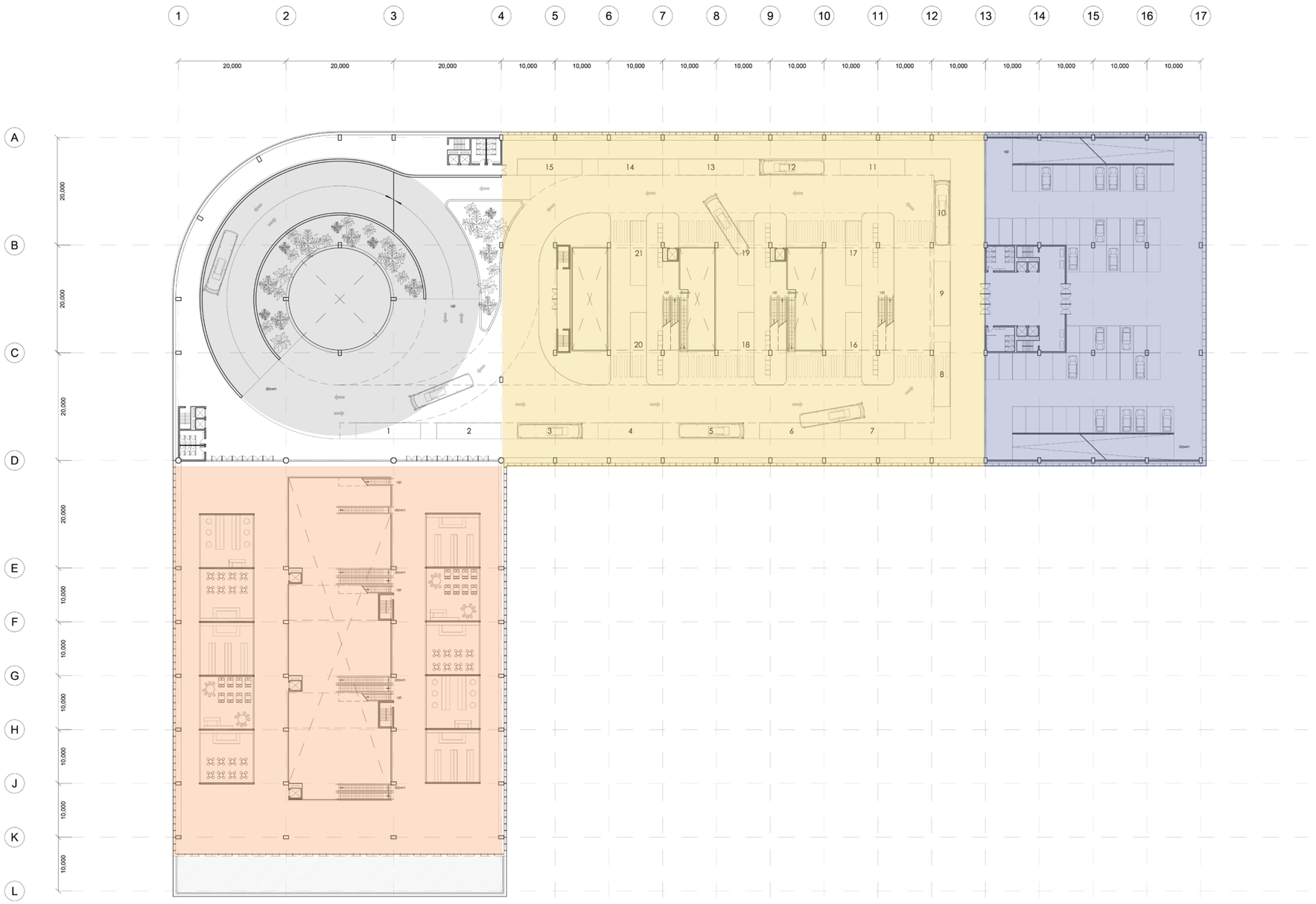
Ramp

Support Functions Layers

Bus Boarding Layers

4th Floor Plan

Typical Plan



Parking Lot

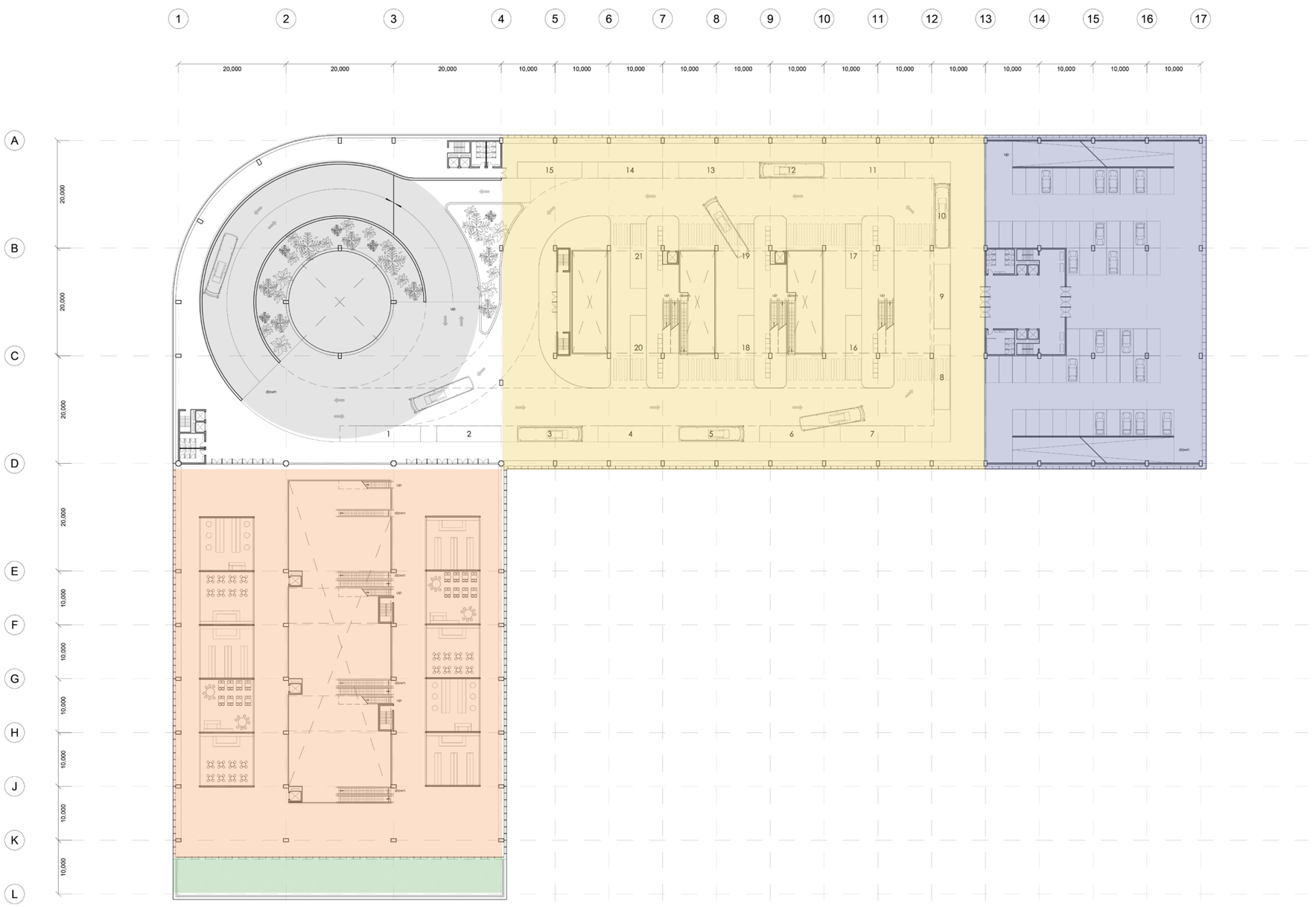
Ramp

3rd Floor Plan

Support Functions Layers

Bus Boarding Layers

Typical Plan



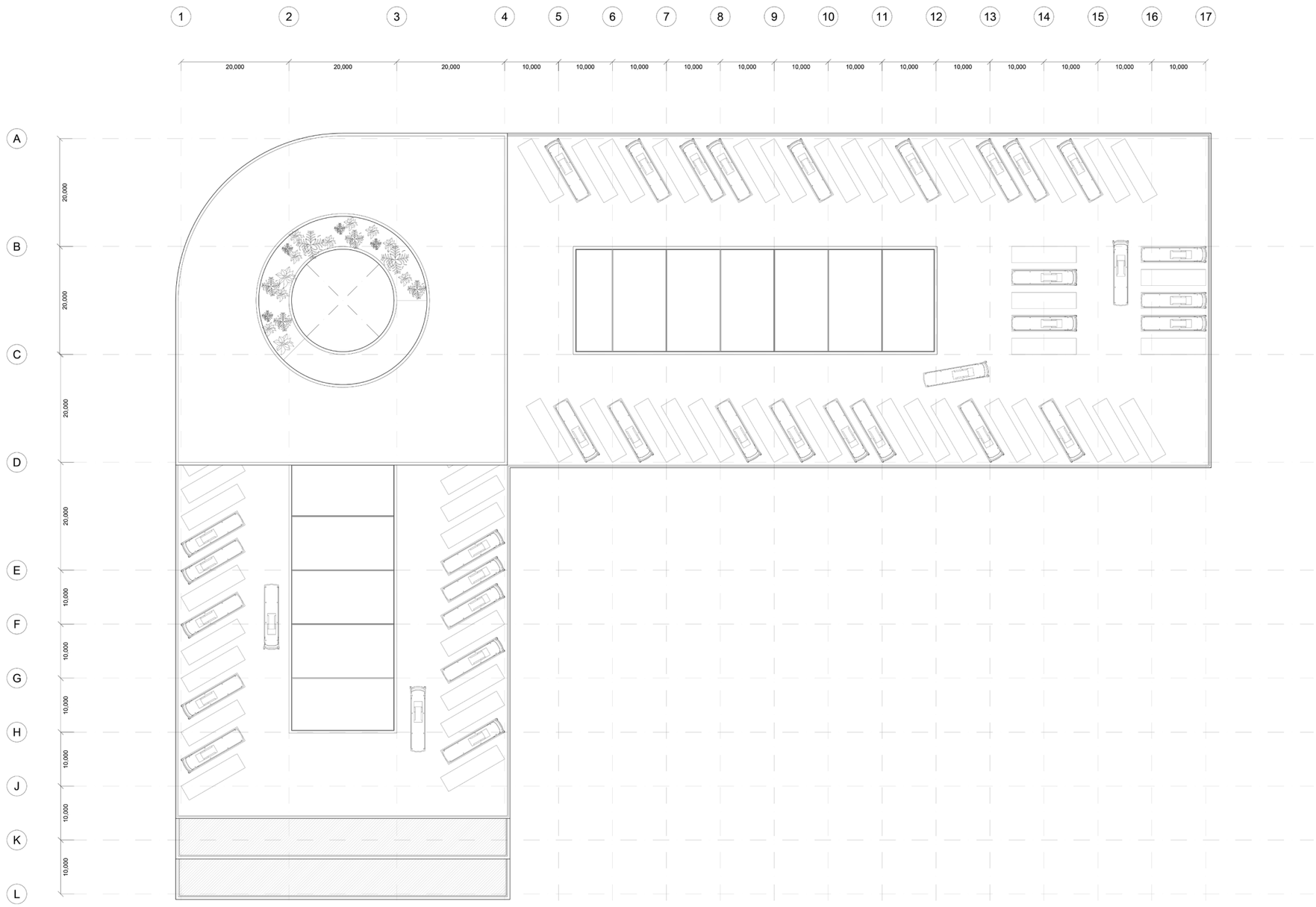
3rd Floor Plan

100

Commercial Layer and the Balcony

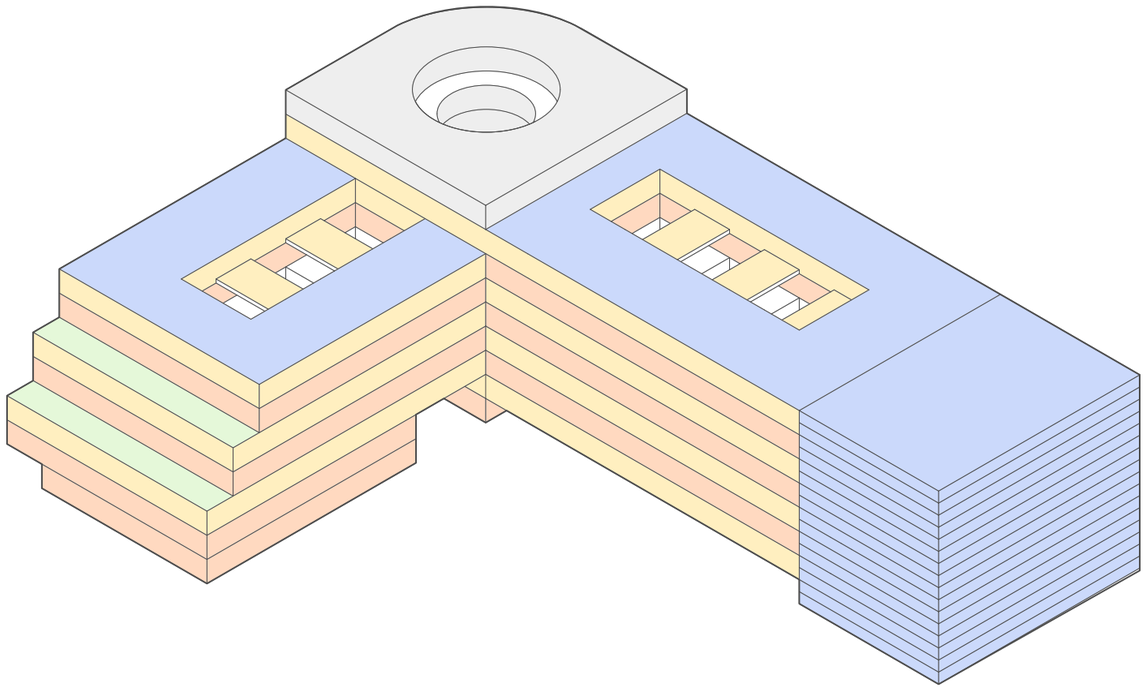
Commercial Layer and the Balcony

Typical Plan



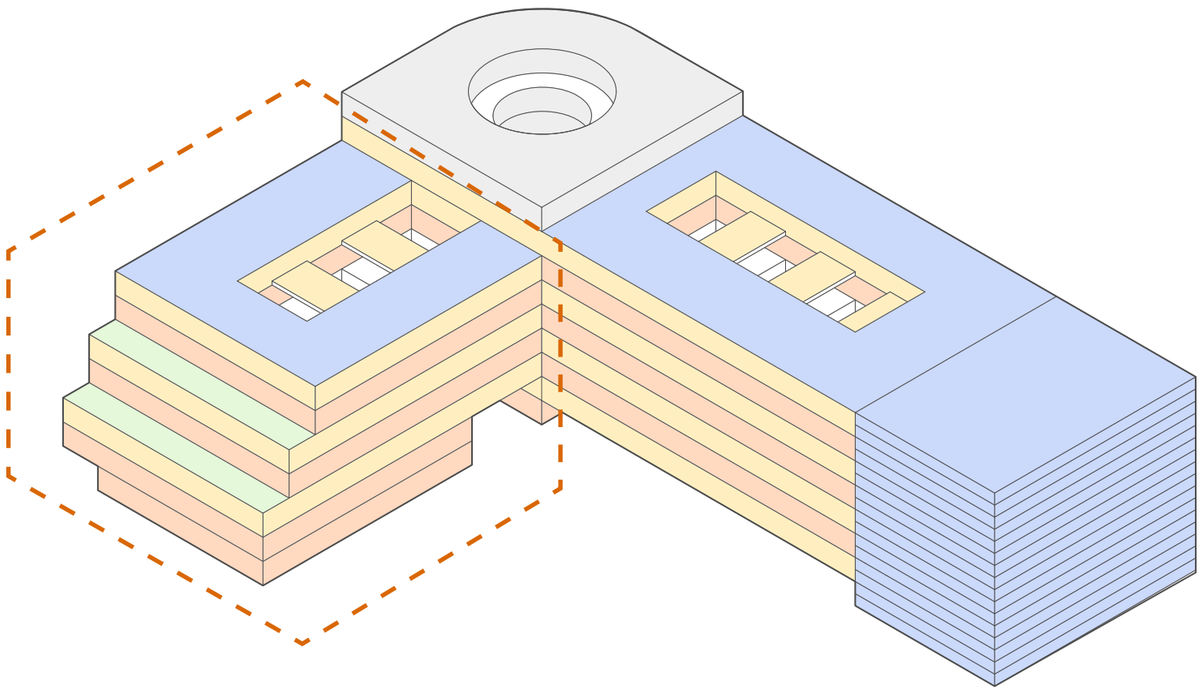
Rooftop Plan

Program Scheme



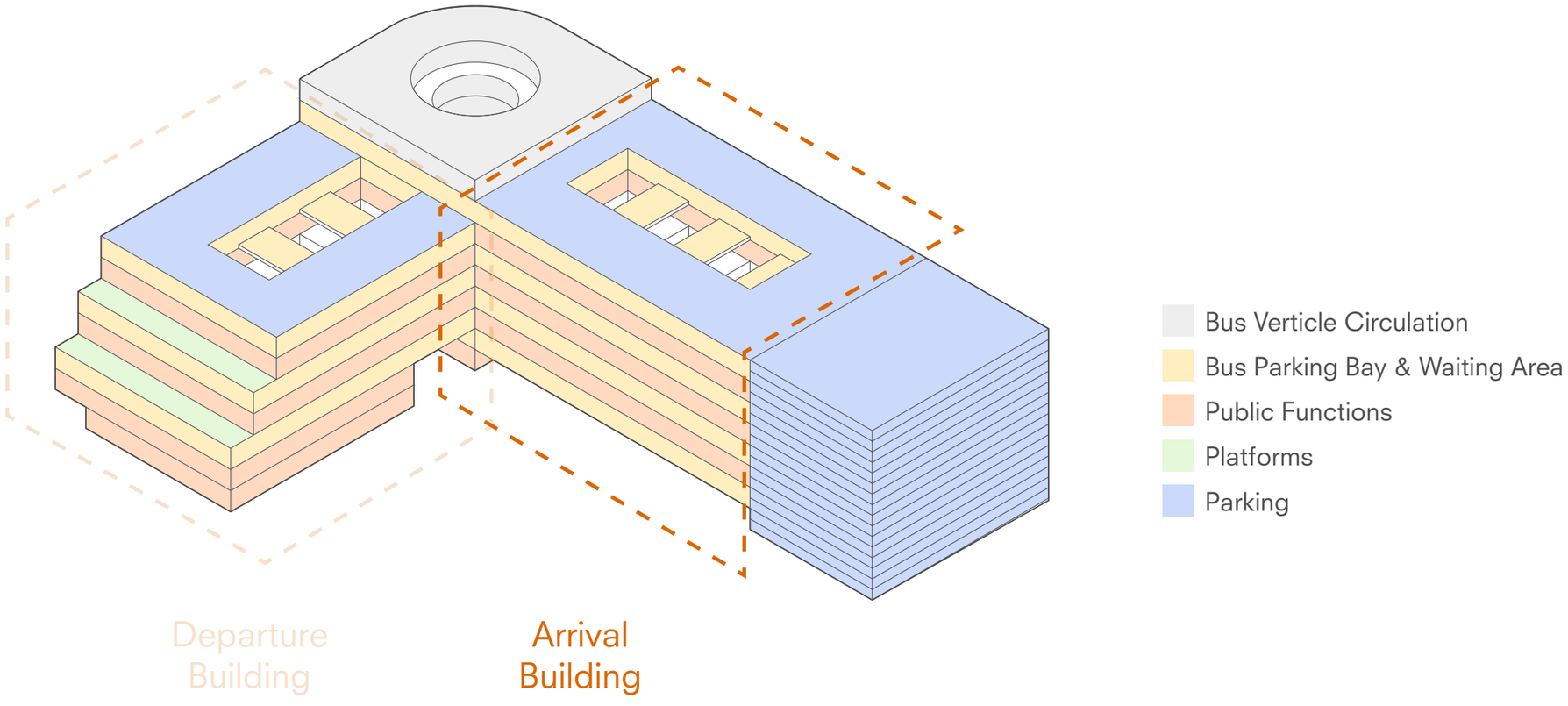
Bus Verticle Circulation
Bus Parking Bay & Waiting Area
Public Functions
Platforms
Parking

Program Scheme

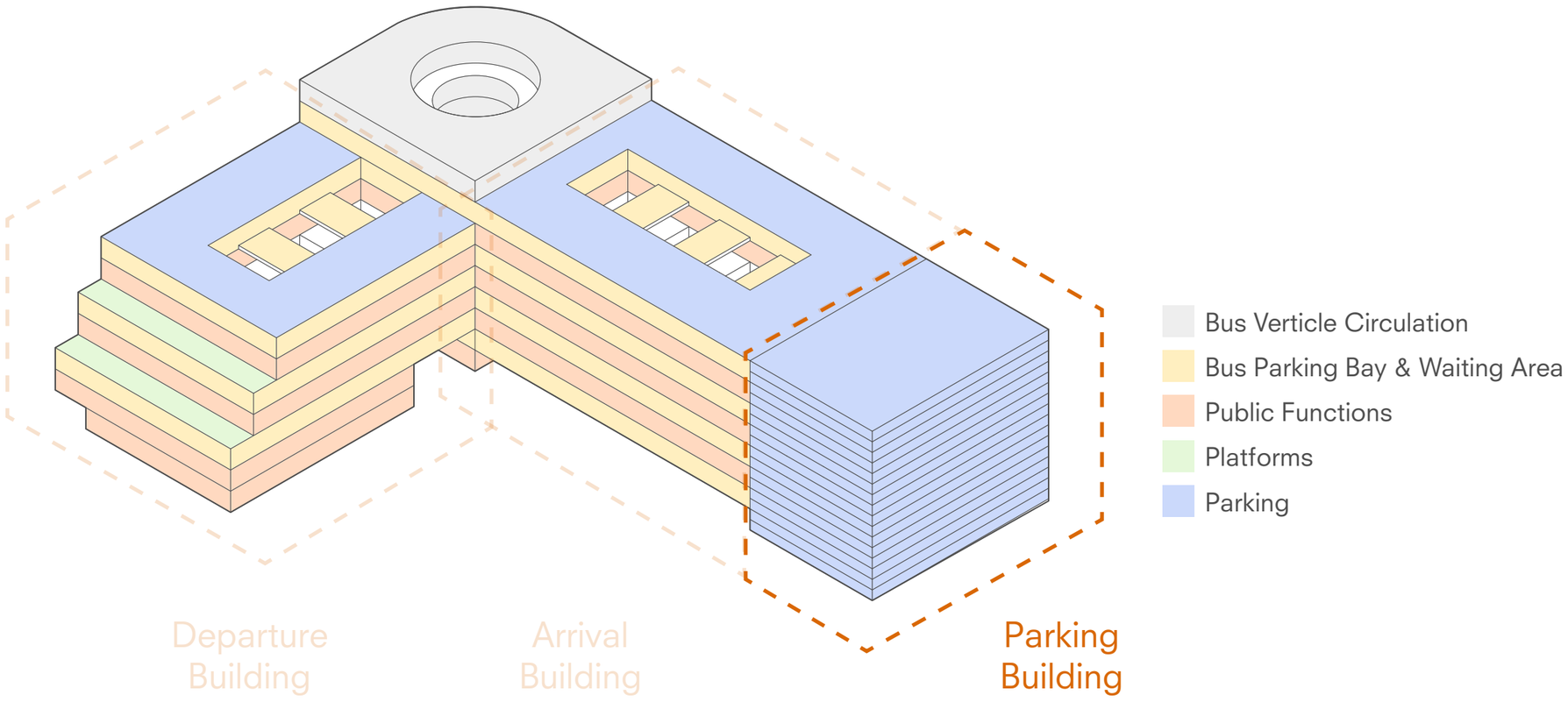


- Bus Verticle Circulation
- Bus Parking Bay & Waiting Area
- Public Functions
- Platforms
- Parking

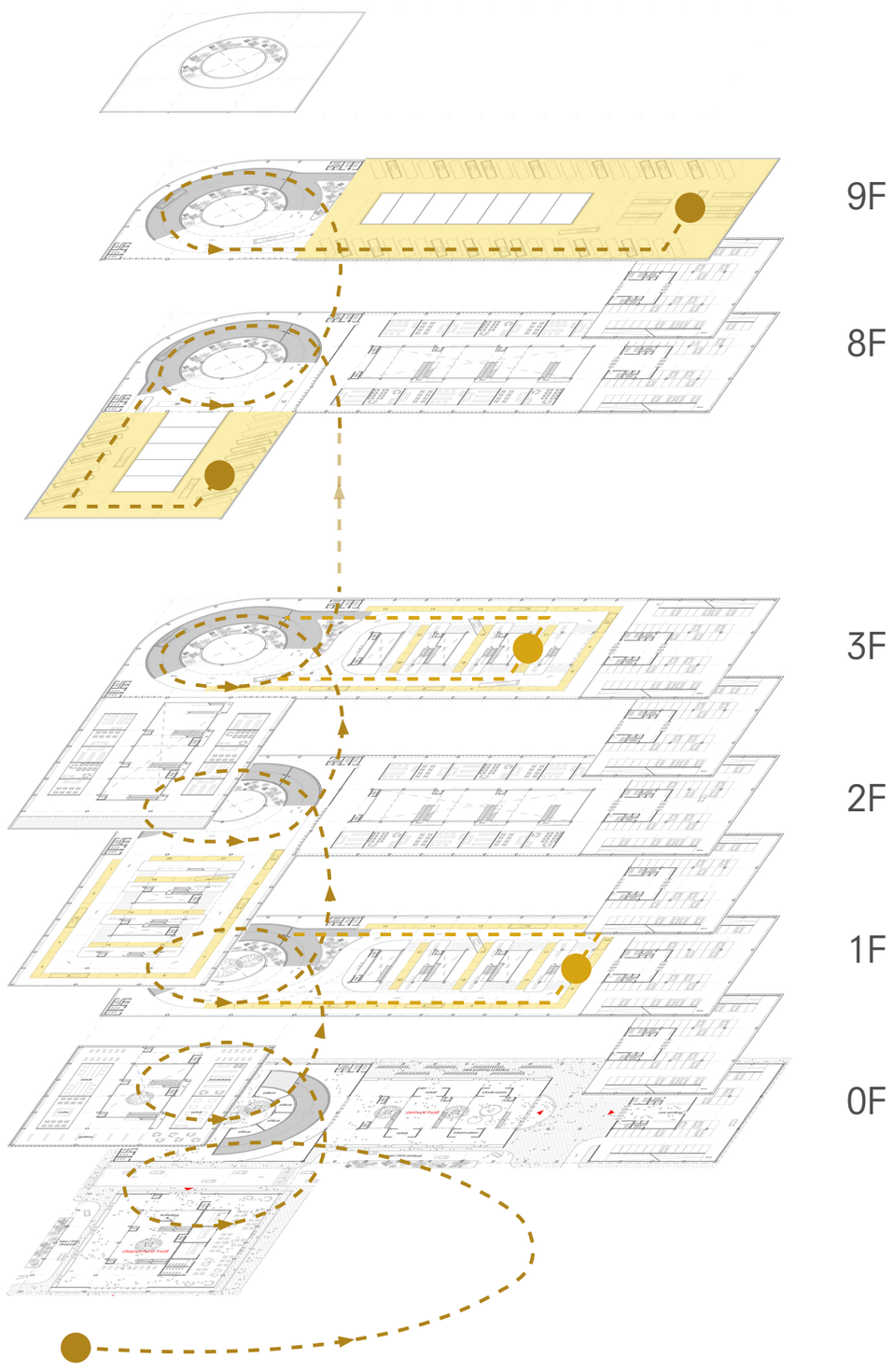
Program Scheme



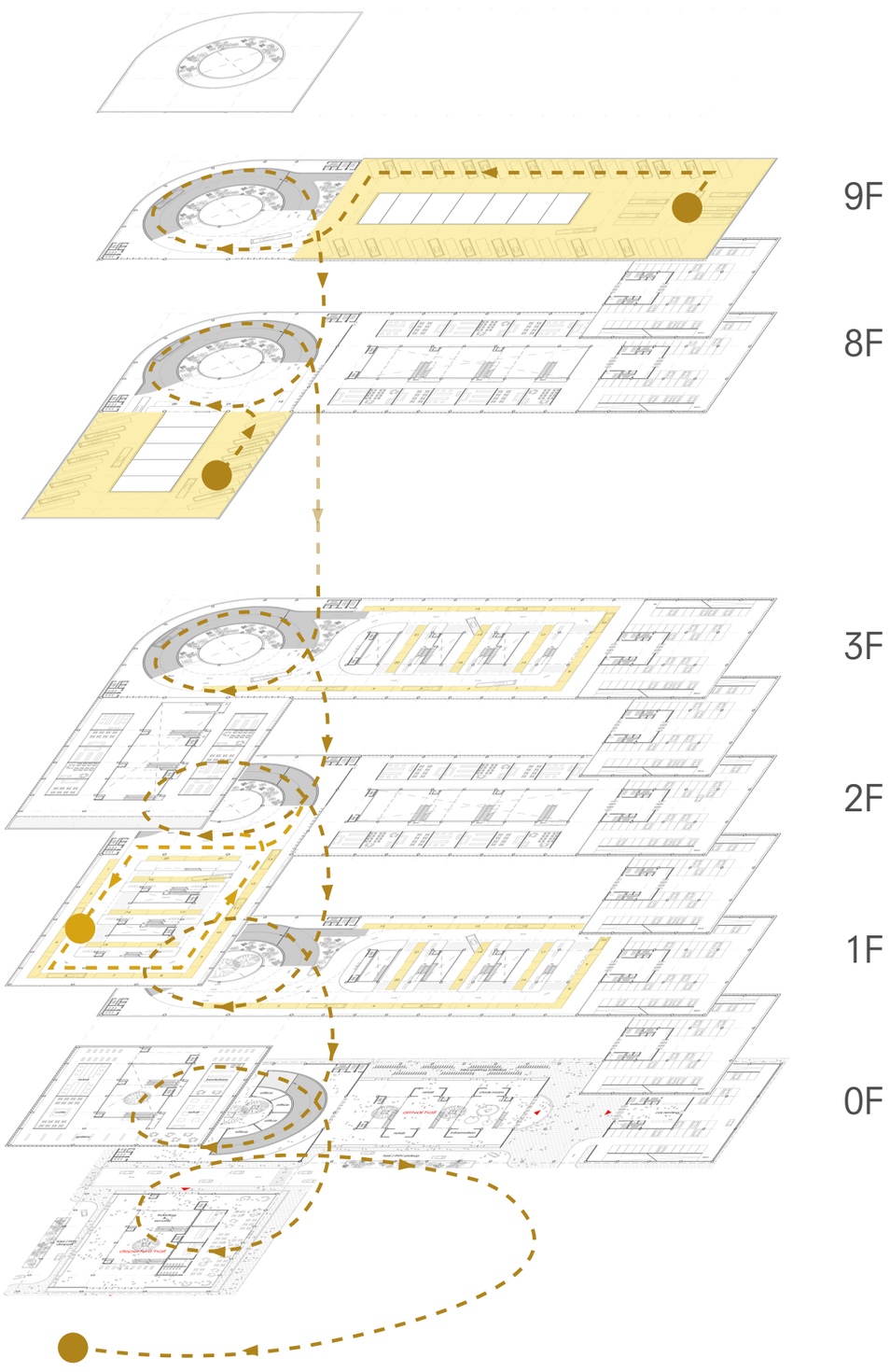
Program Scheme



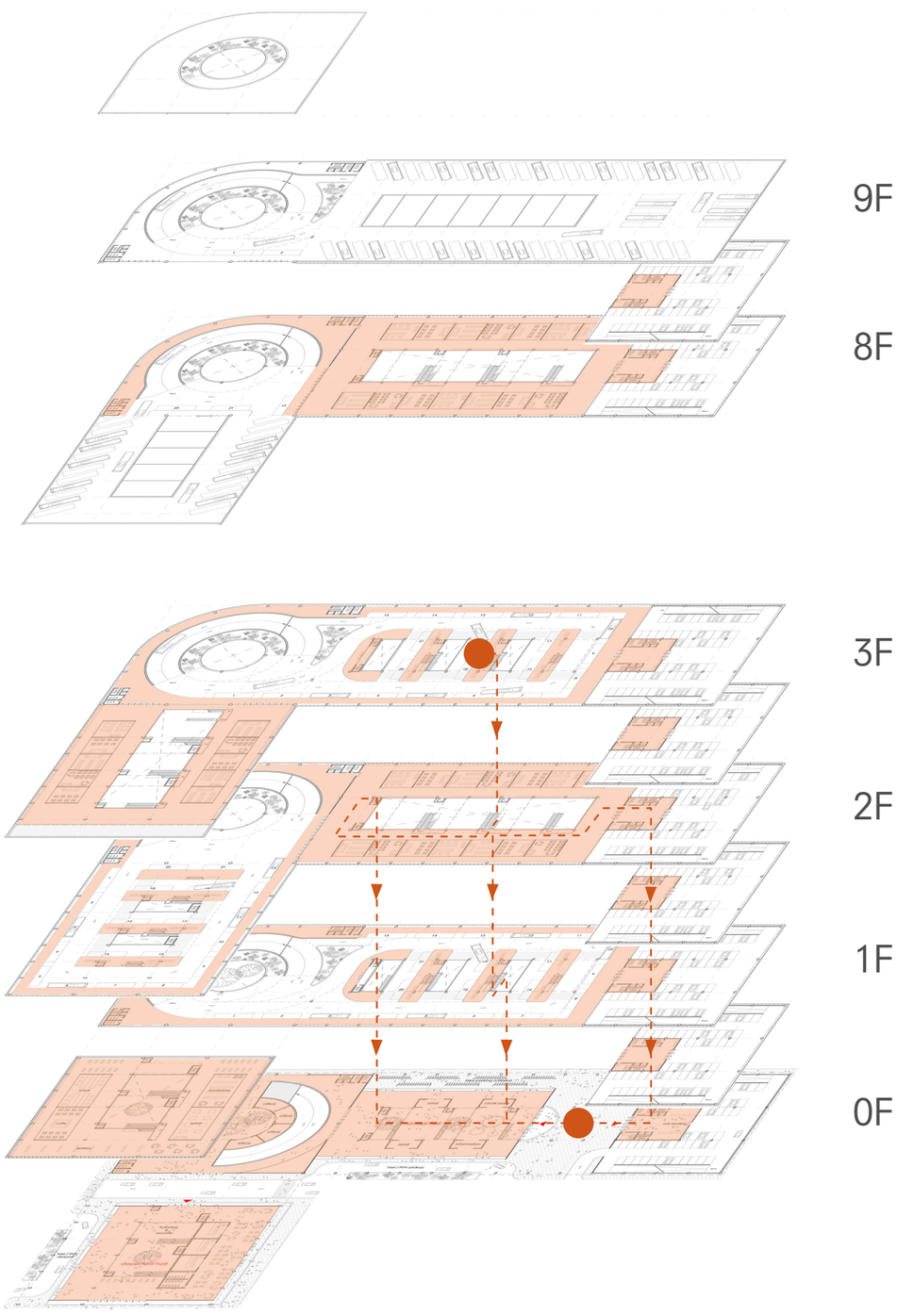
Bus Circulation (Arrive)



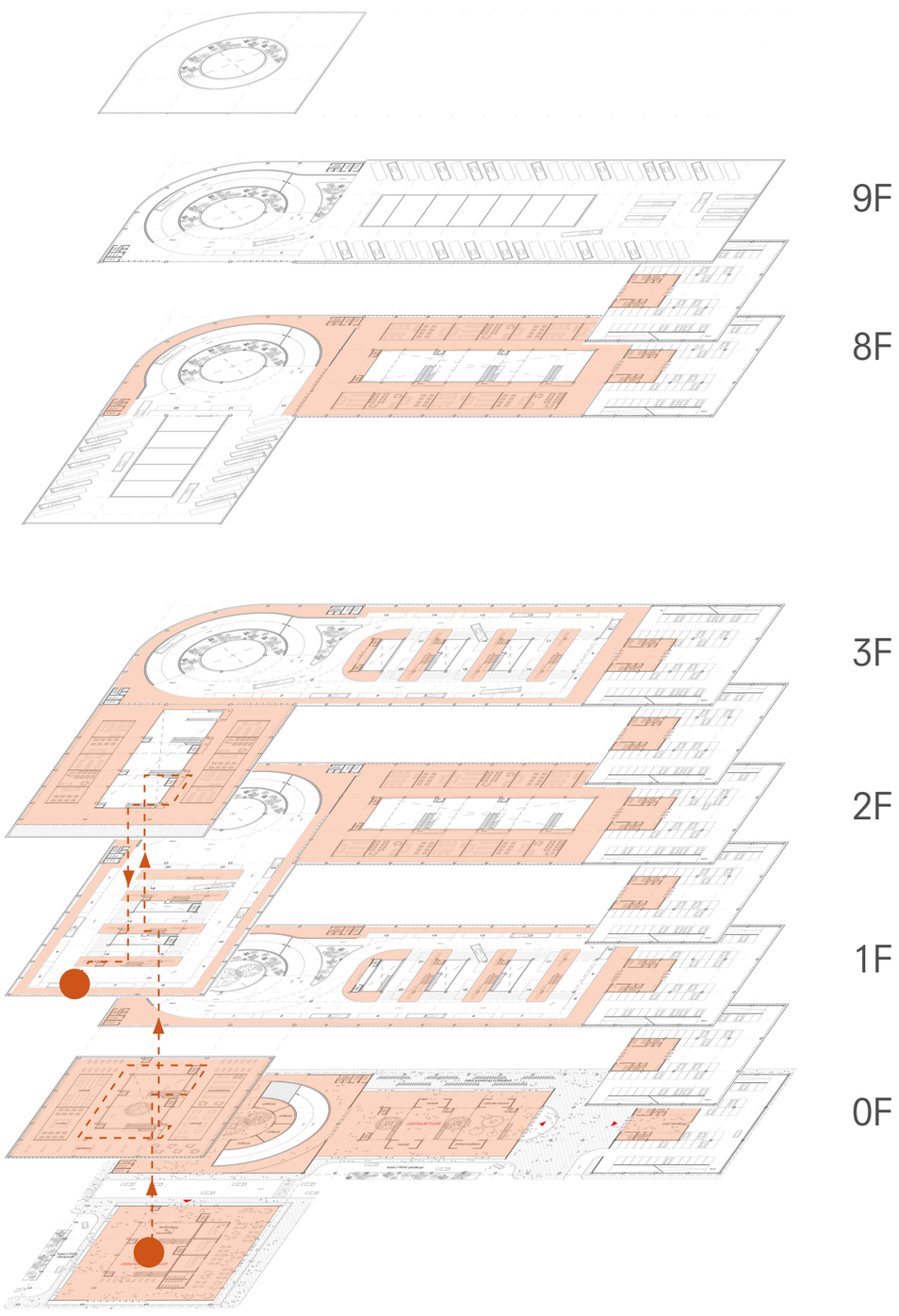
Bus Circulation on (Departure)



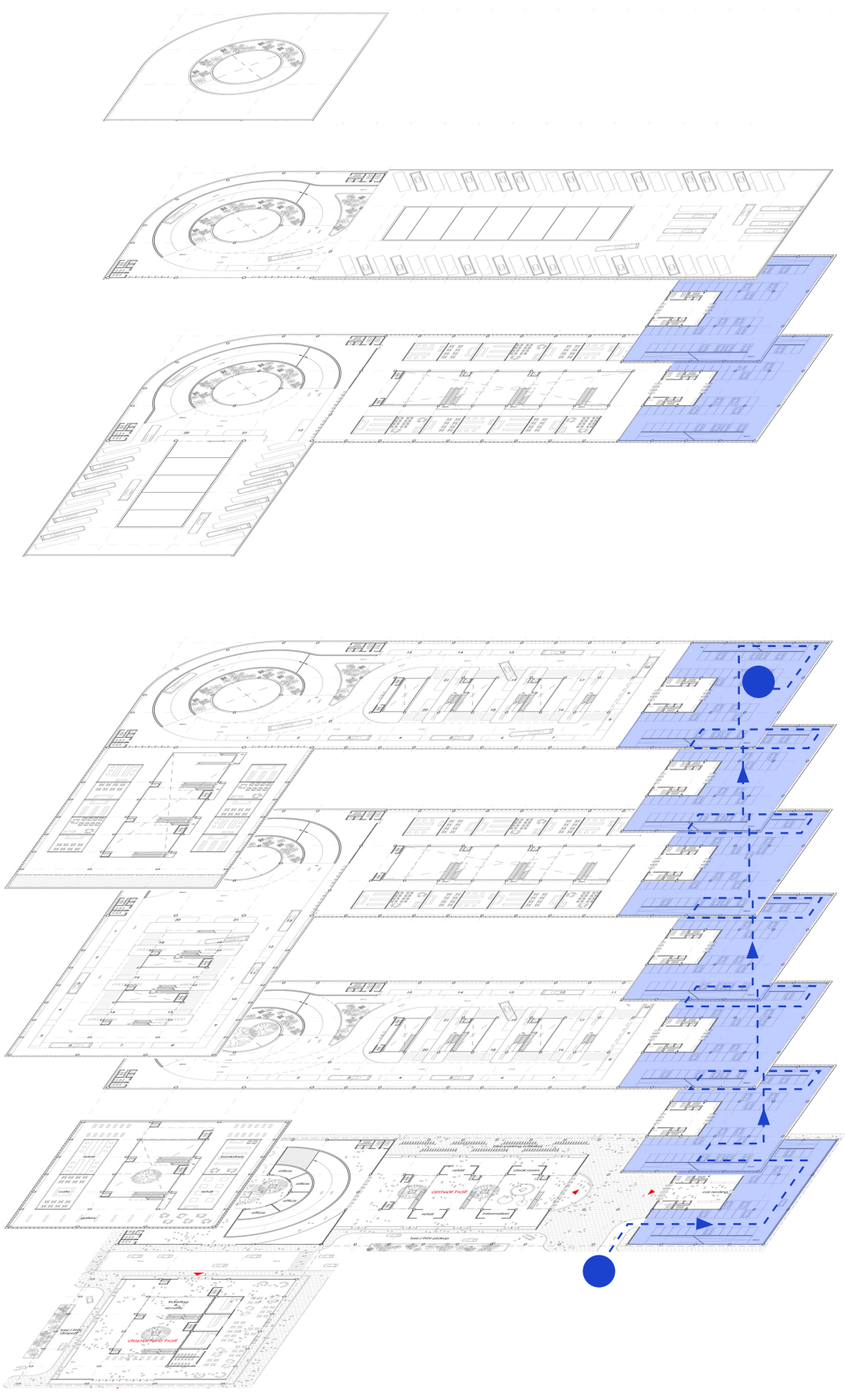
Pedestrian Circulation (Arrive)



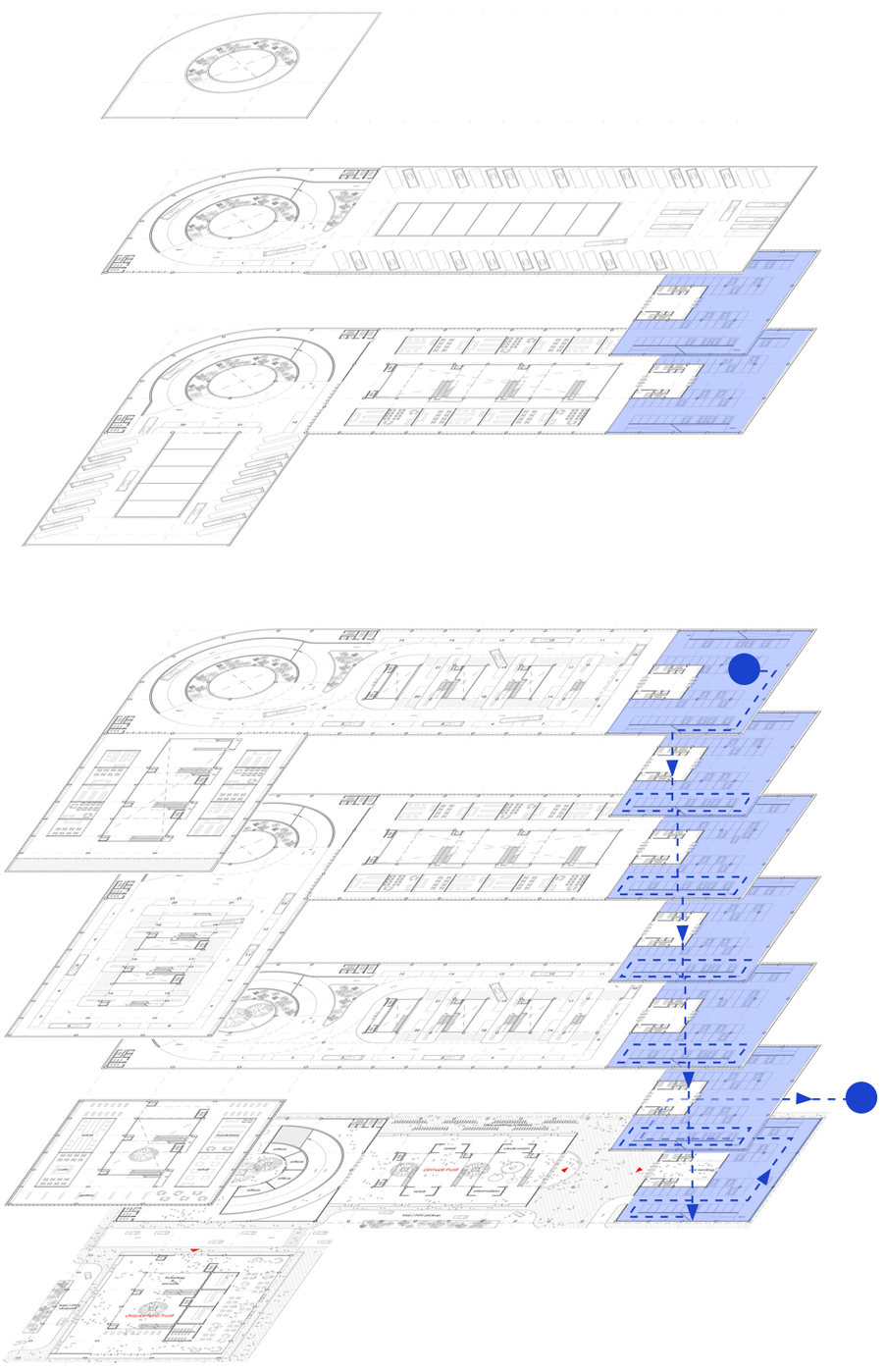
Pedestrian Circulation (Departure)



Car Circulation (Arrive)



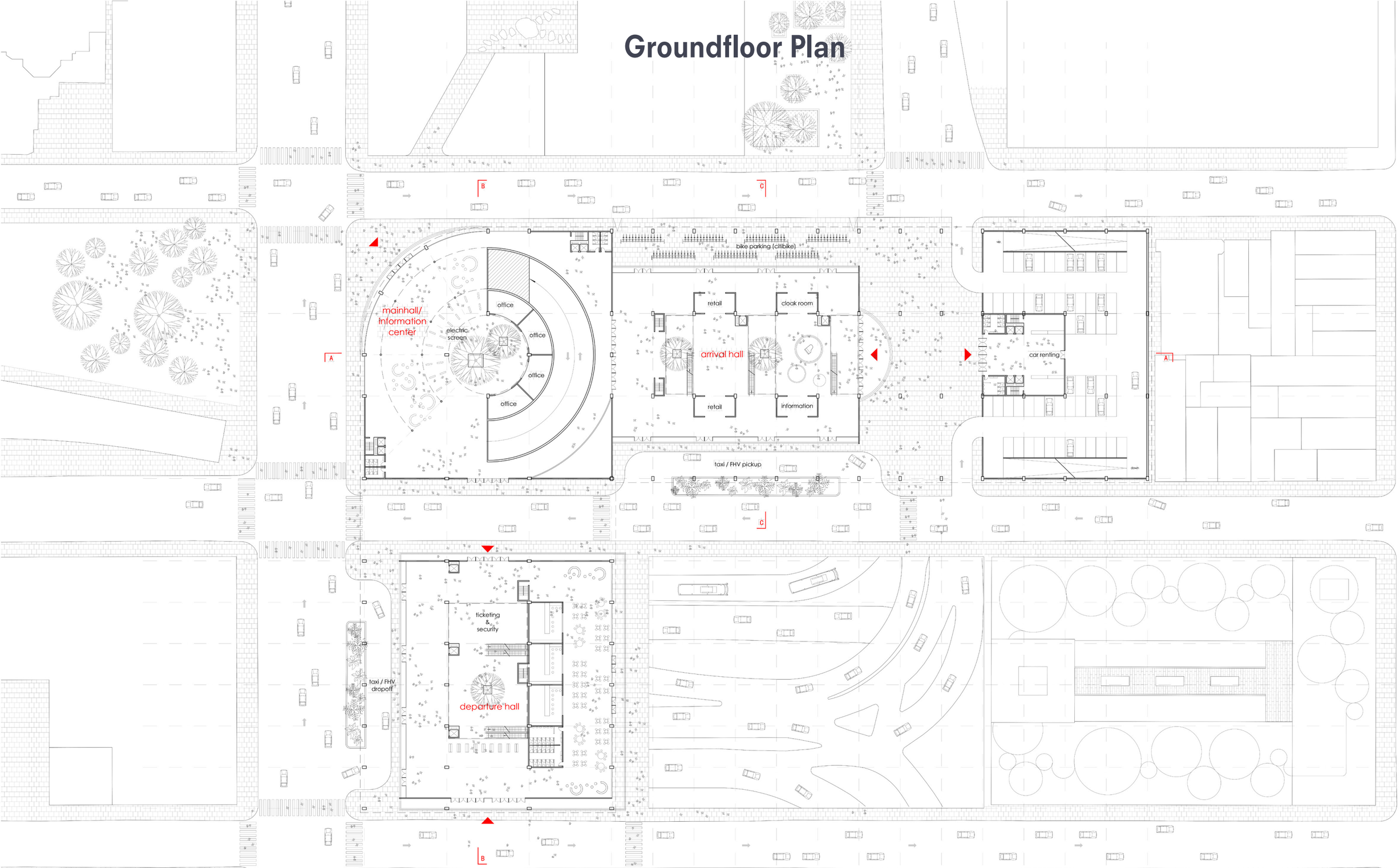
Car Circulation (Departure)



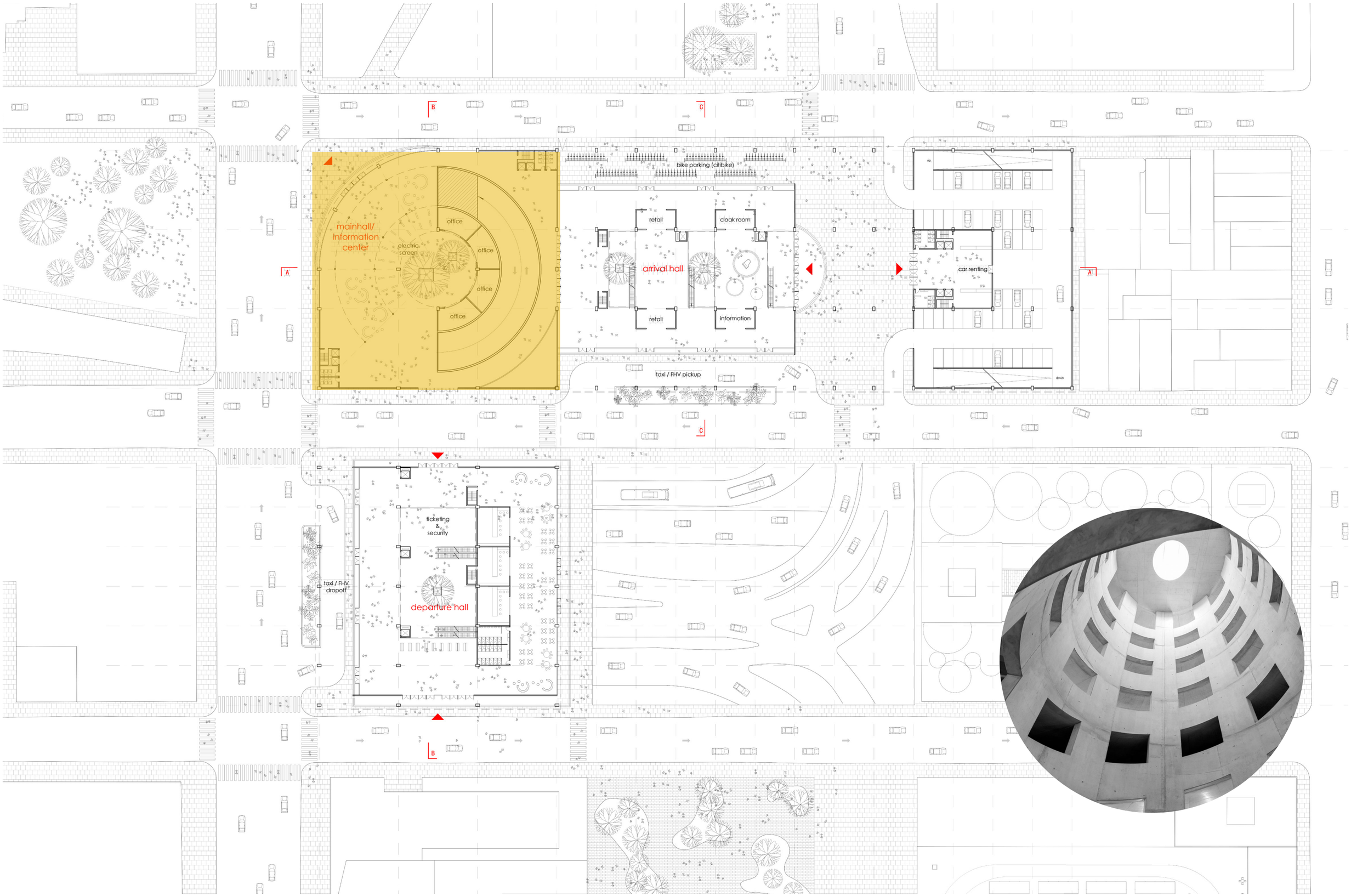
Cars Circulation

Parking Lots

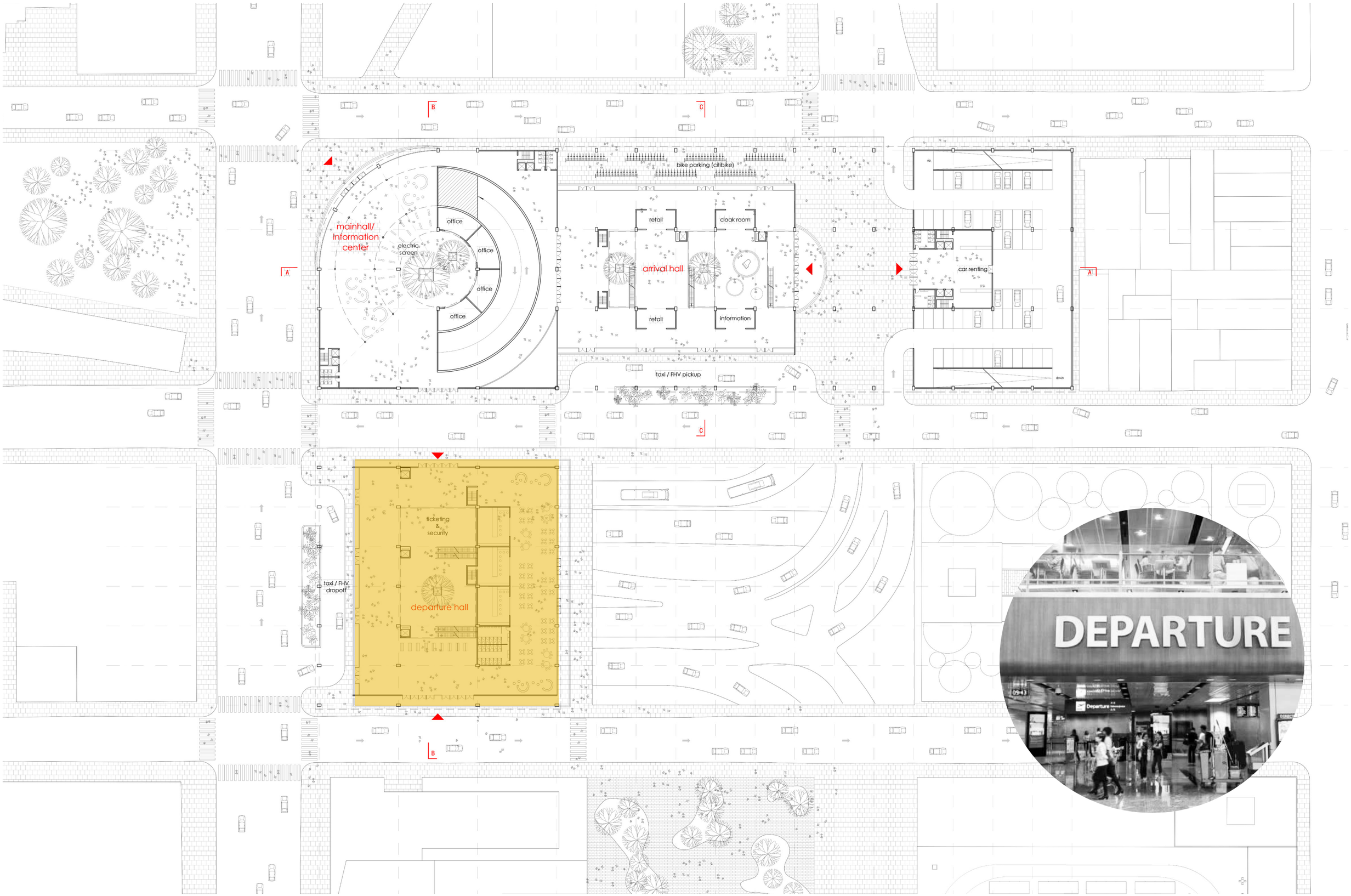
Groundfloor Plan



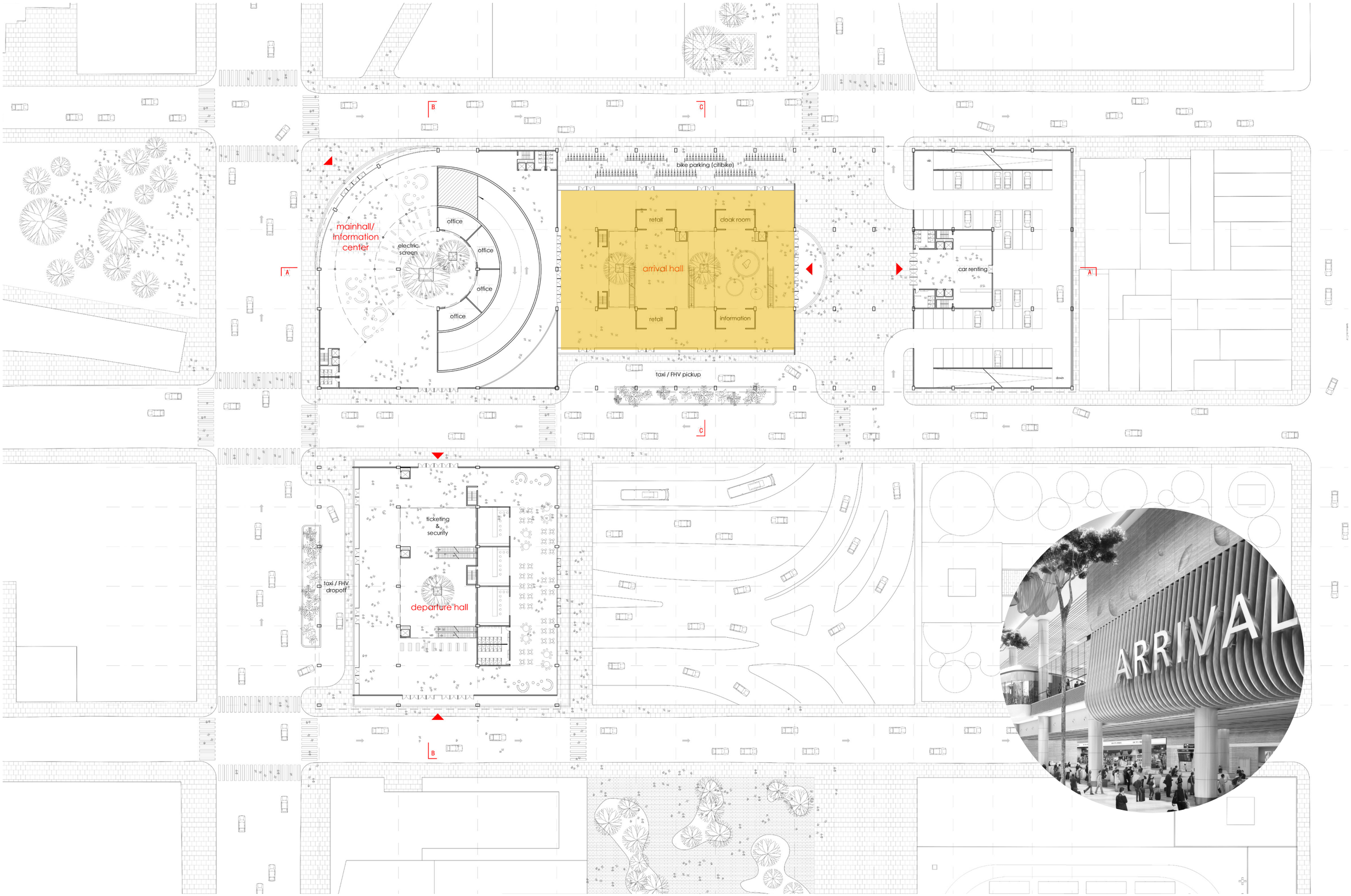
Meeting Hall



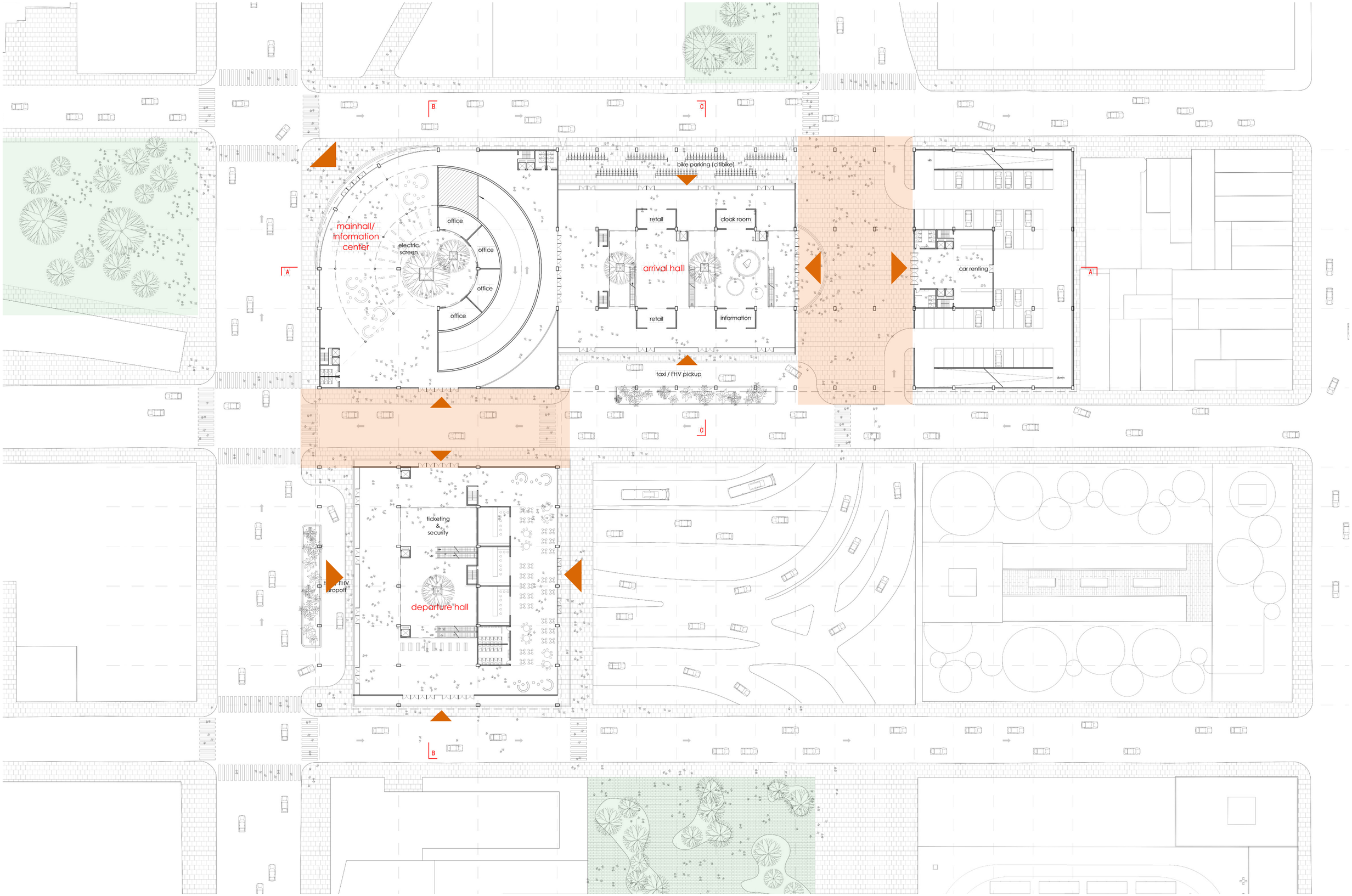
Departure Hall



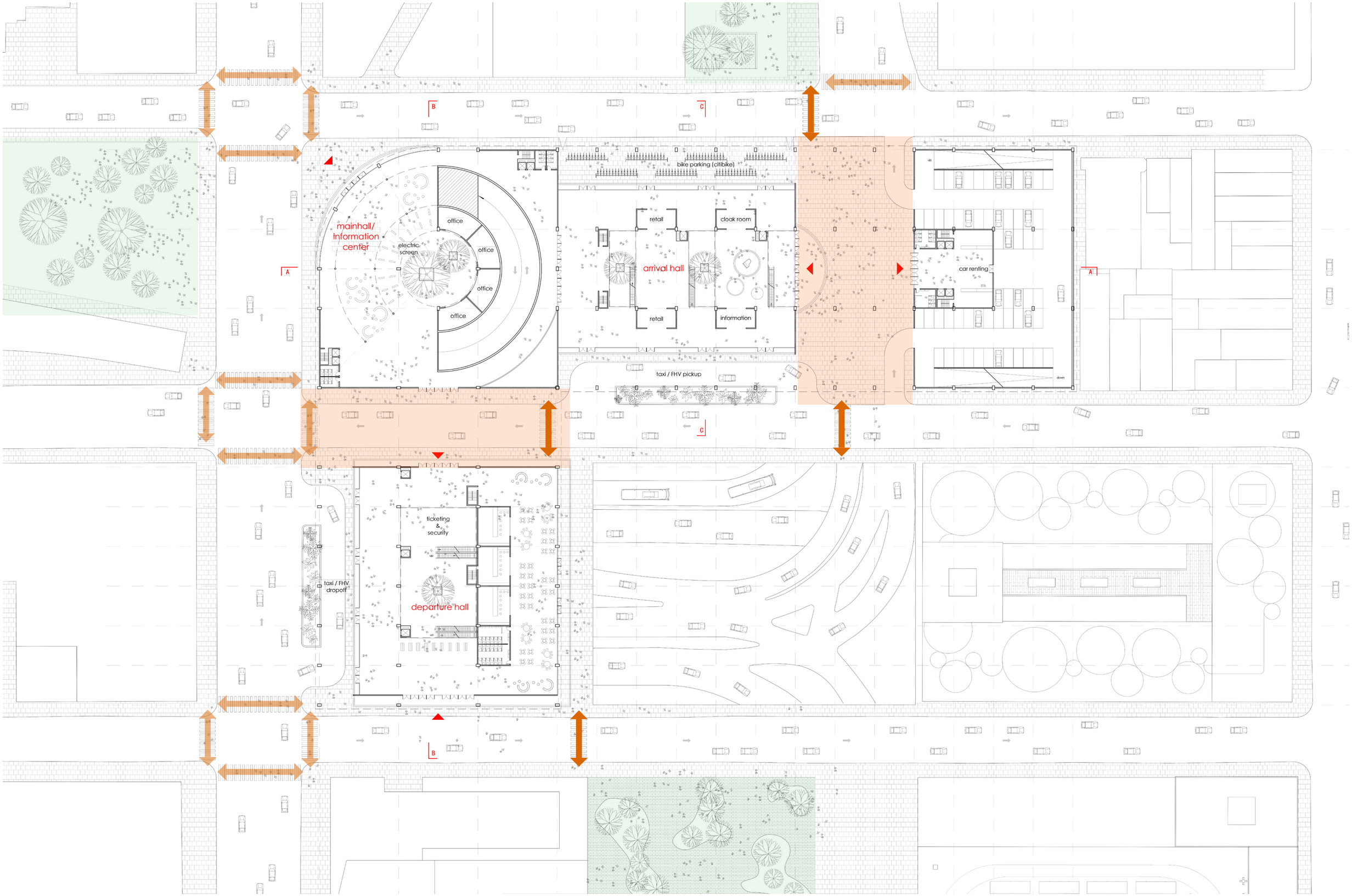
Arrival Hall



Pedestrian Entrance



Crosswalks


mainhall/
information
center
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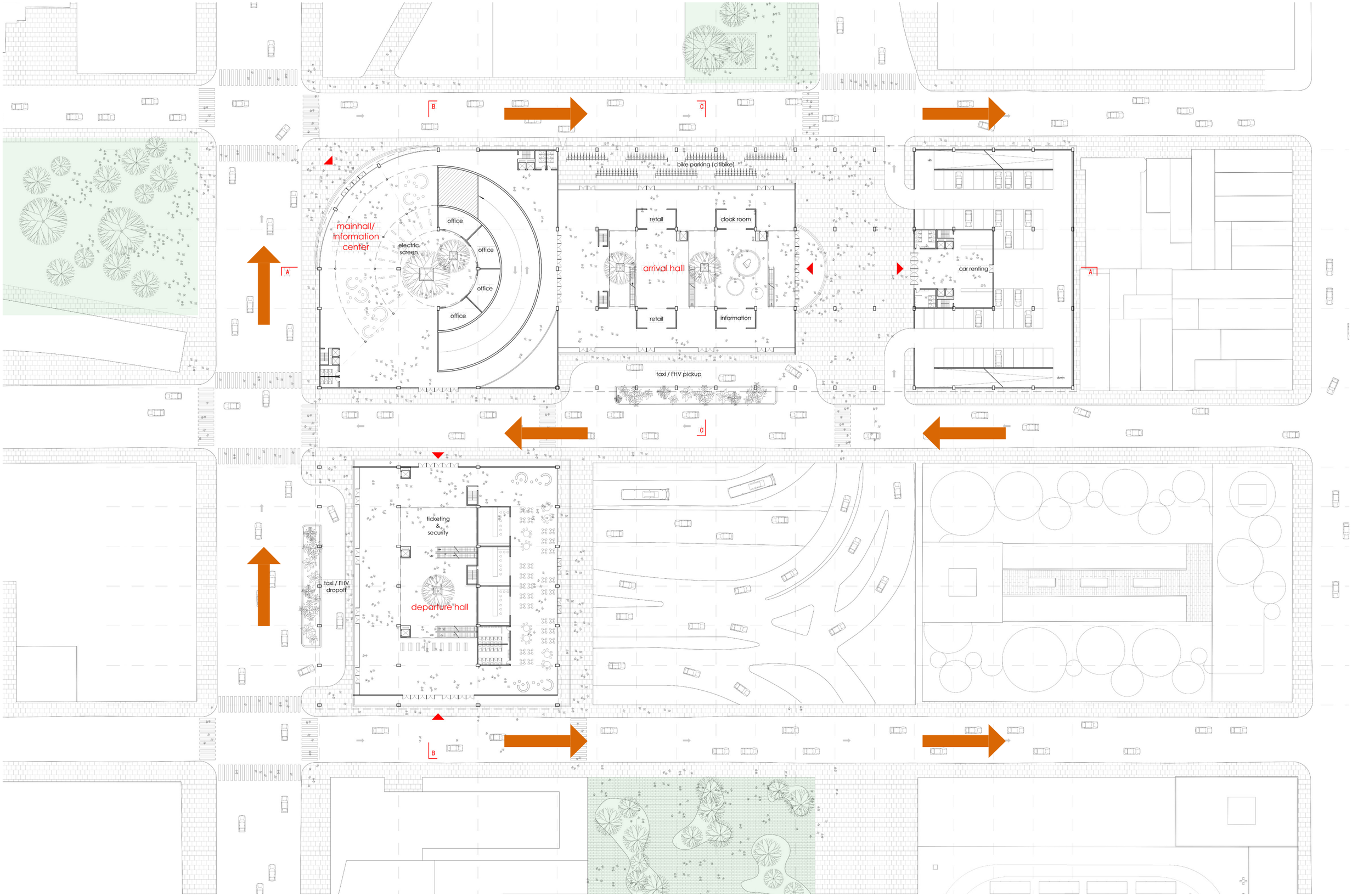
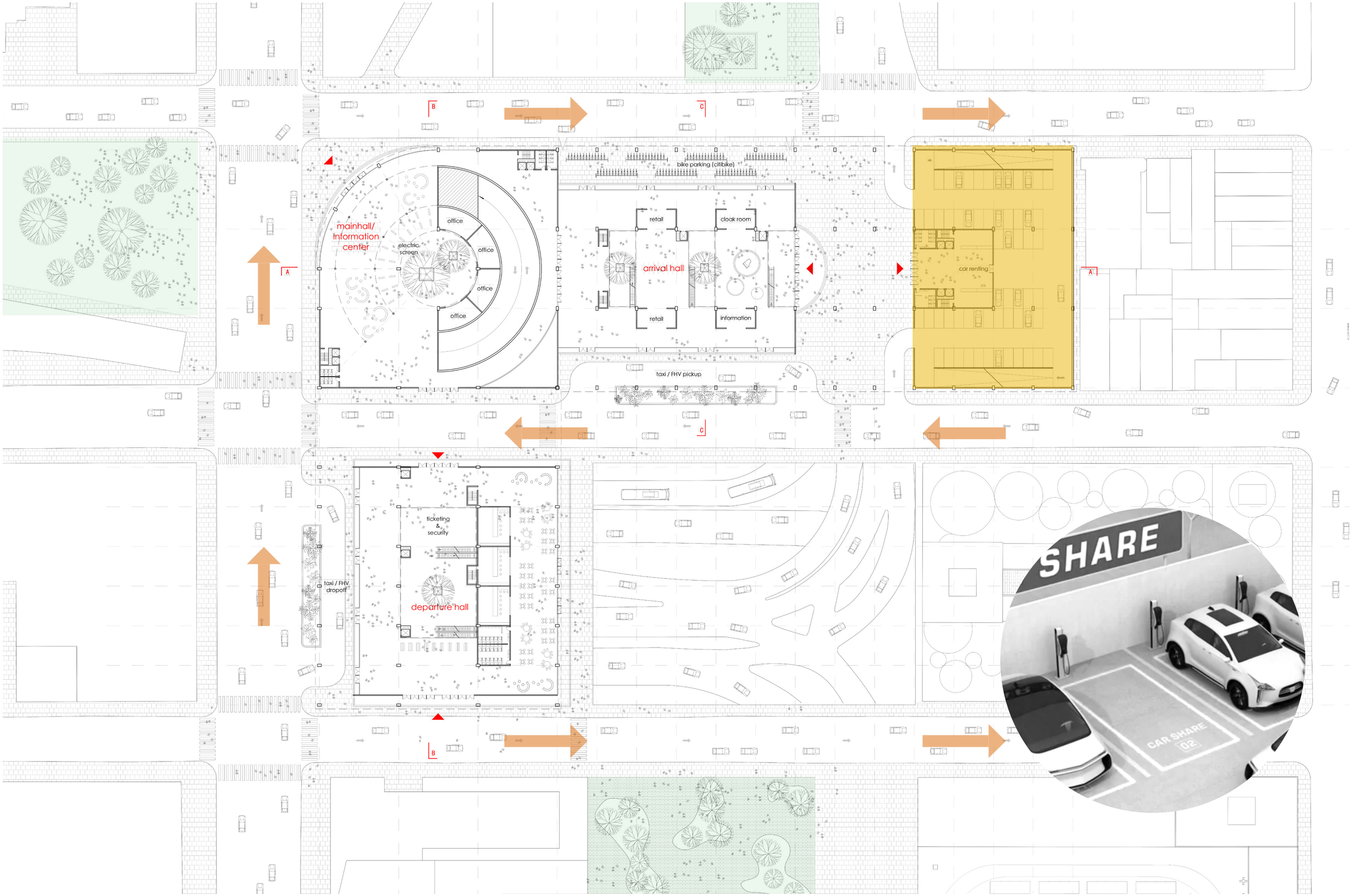
office
office
electric
screen
bike parking (citibike)
retail
cloak room
arrival hall
retail
information
taxi / FHV pickup
car renting
up
down
A
B
C
ticketing
&
security
taxi / FHV
dropoff
departure hall

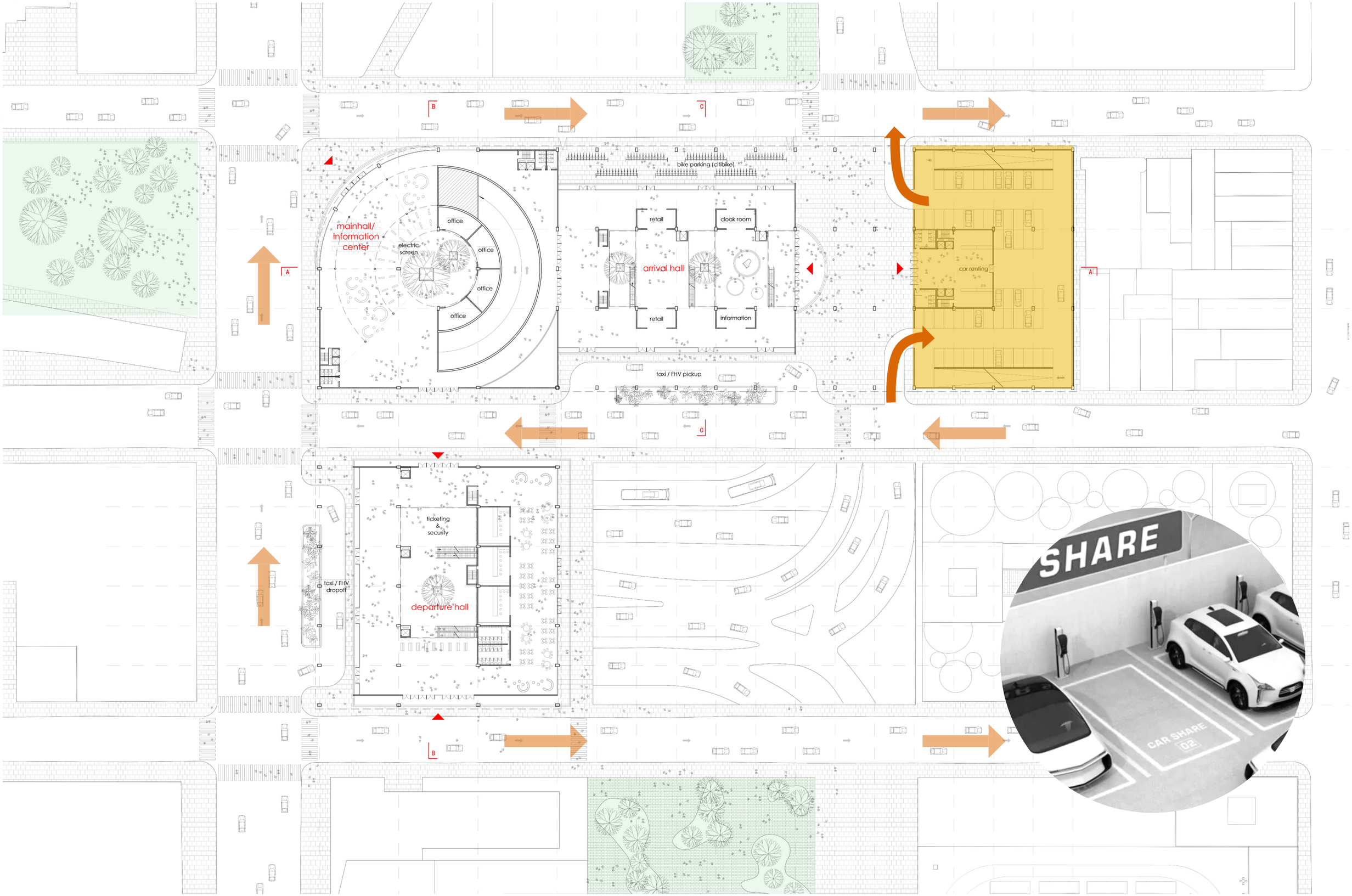
Vehicle's Way



Private Car Parking / Car Sharing

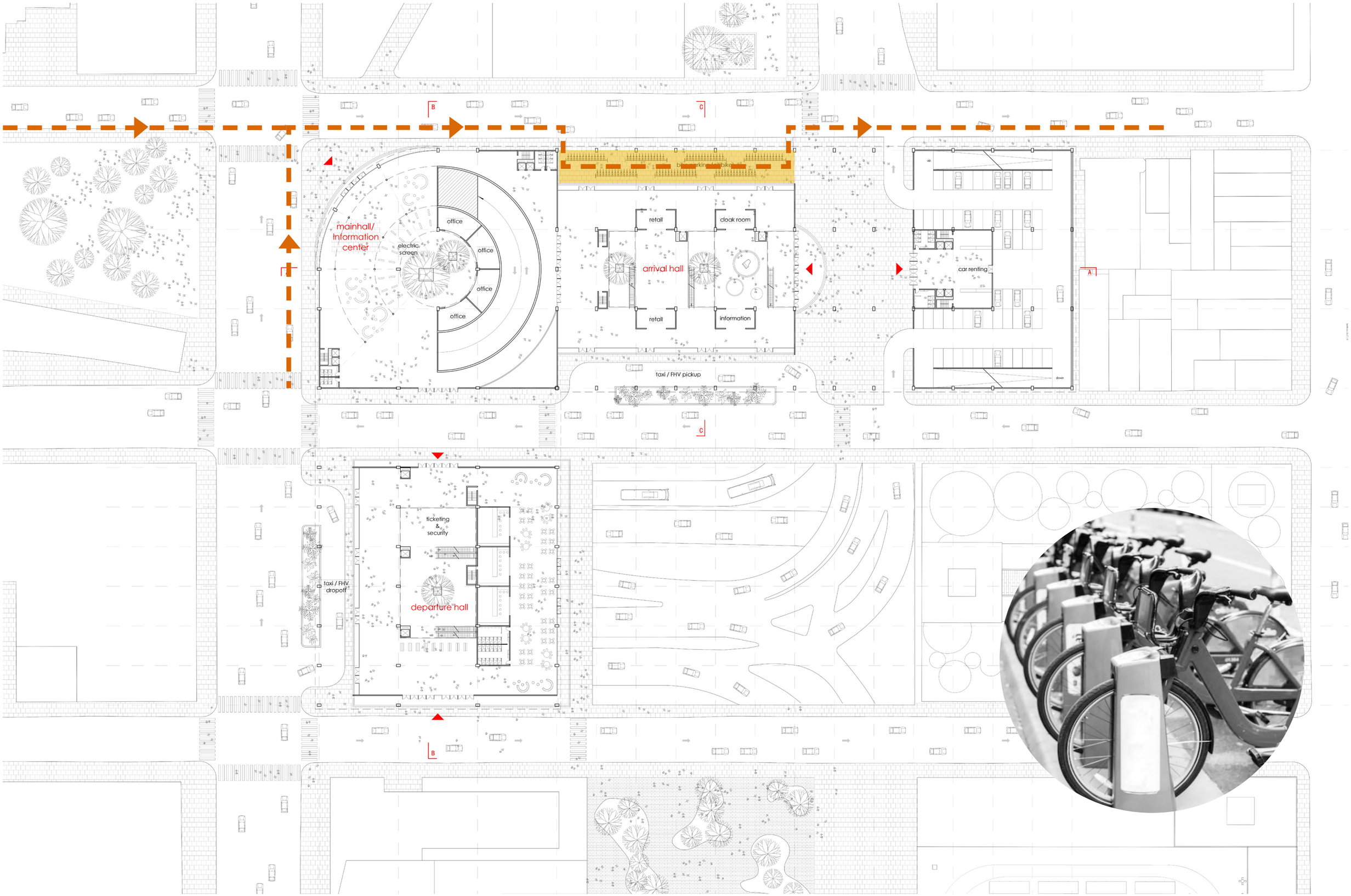


Private Car Parking / Car Sharing



Exterior from the 39th Street

CitiBike


B
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mainhall/
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center
electric
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office
bike parking + citibike
retail
cloak room
arrival hall
retail
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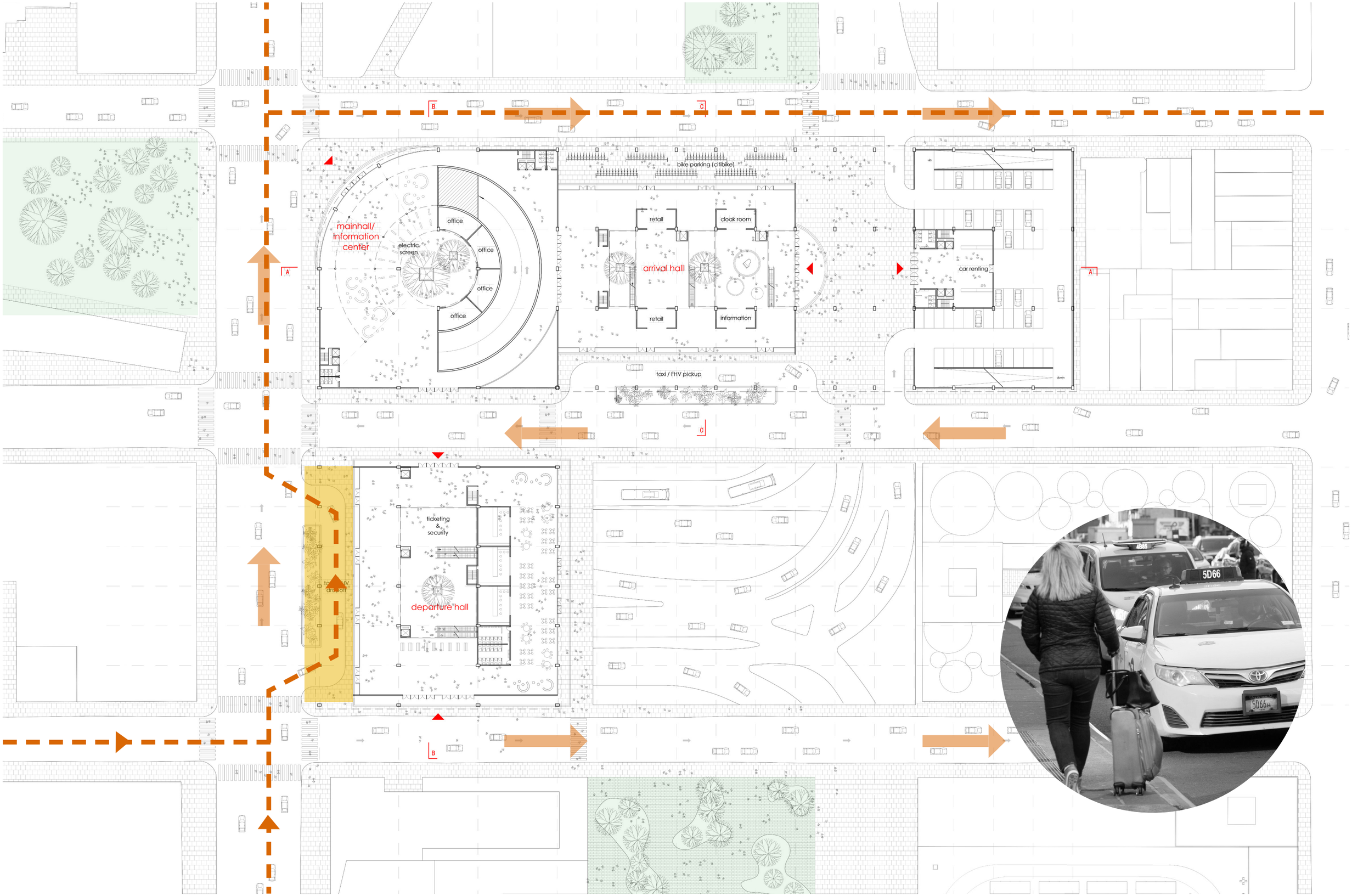
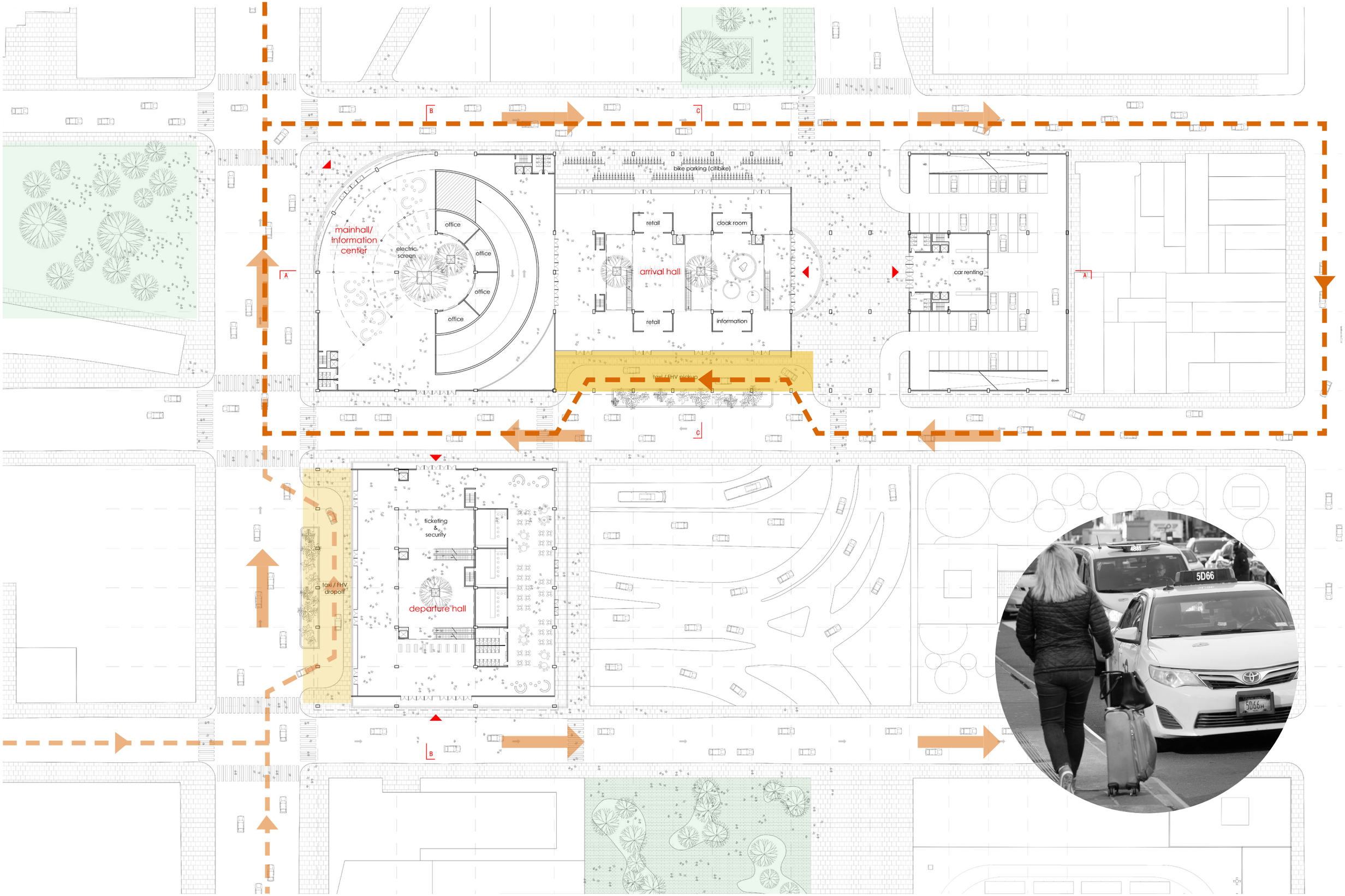
taxi / FHV pickup
car renting
up
down
A
ticketing
&
security
taxi / FHV
dropoff
departure hall
B

FHV Drop-off Point

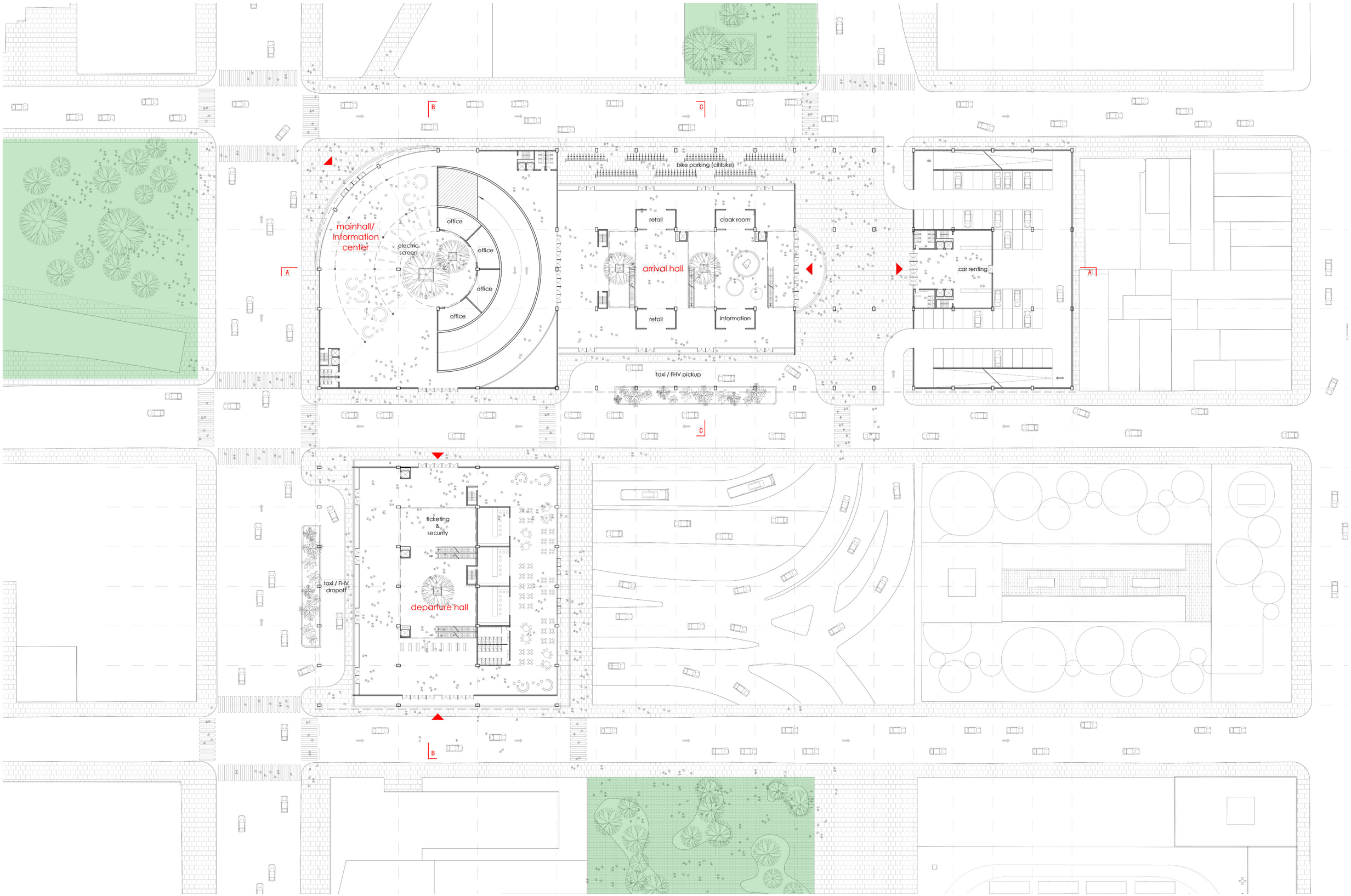


FHV Pick-up Point



FHV Waiting Area

Parks


mainhall/
information
center
electric
screen
office
office
office
office
bike parking (citibike)
retail
cloak room
arrival hall
retail
information
taxi / FHV pickup
car renting
up
down
ticketing
&
security
taxi / FHV
dropoff
departure hall
A
B
C

Exterior from the South Park

Exterior from the West Plaza

STRUCTURE

MAIN CHALLENGES

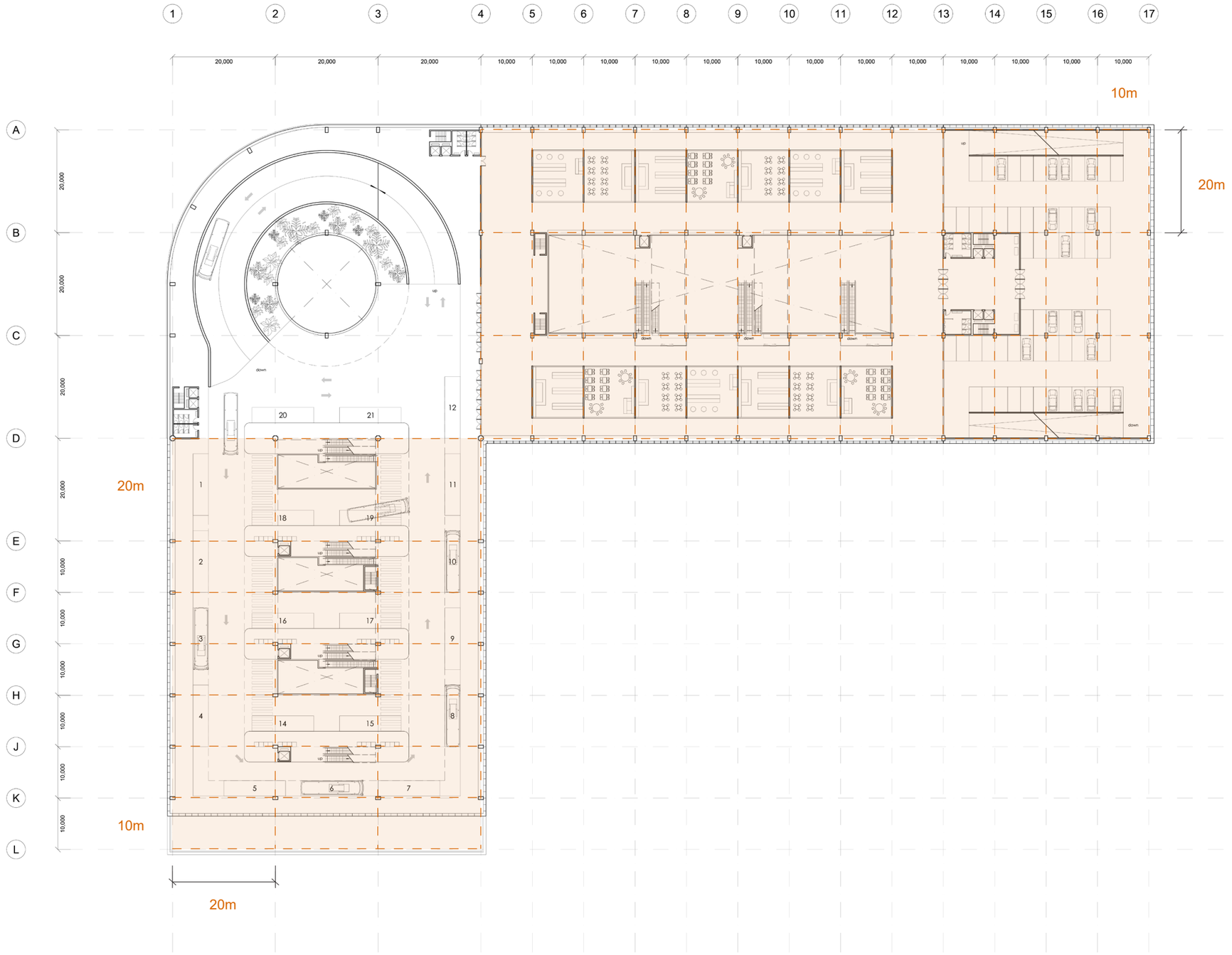
1. Long span structure

2. Round volume

Material

Concrete

Structure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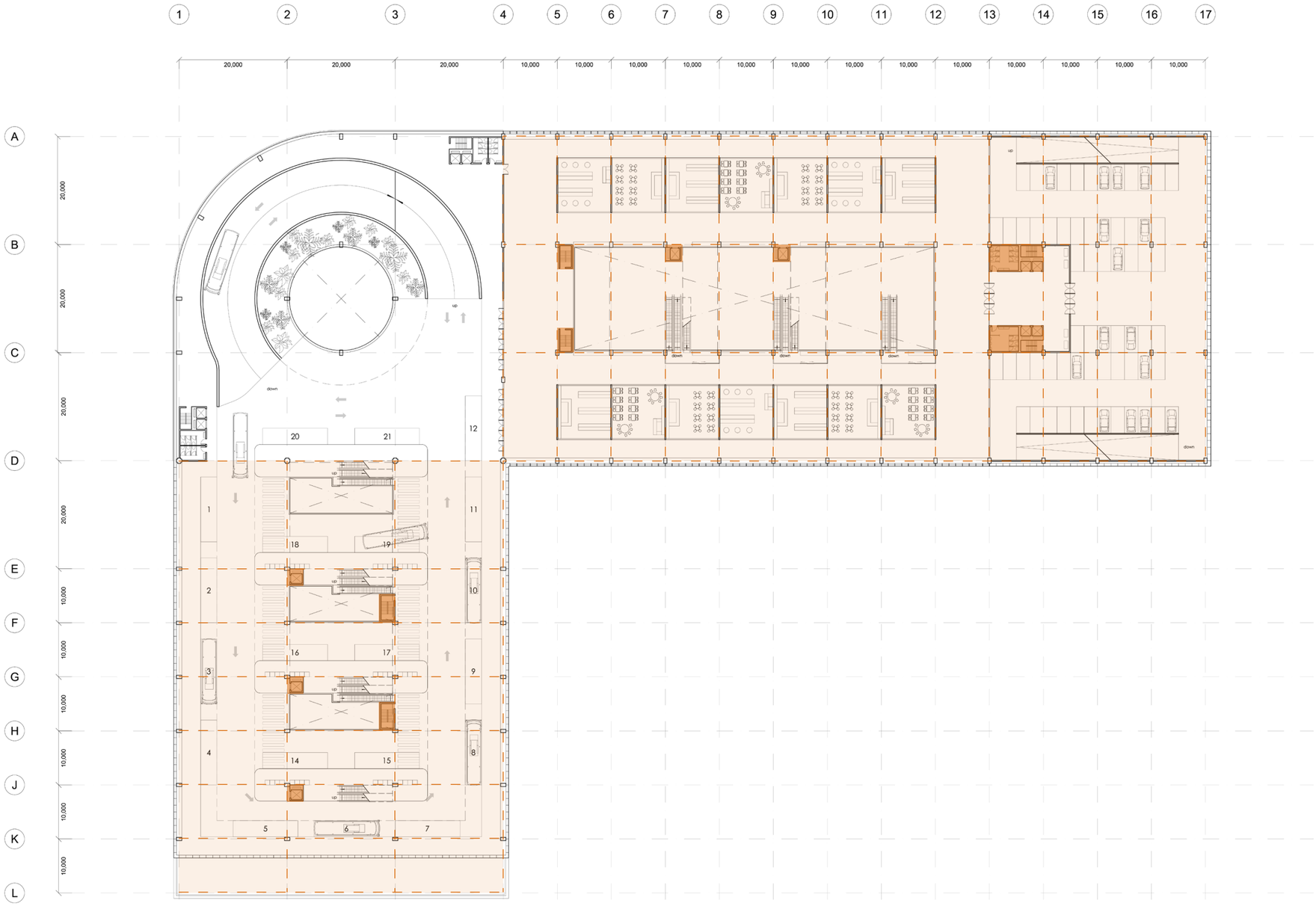
Structure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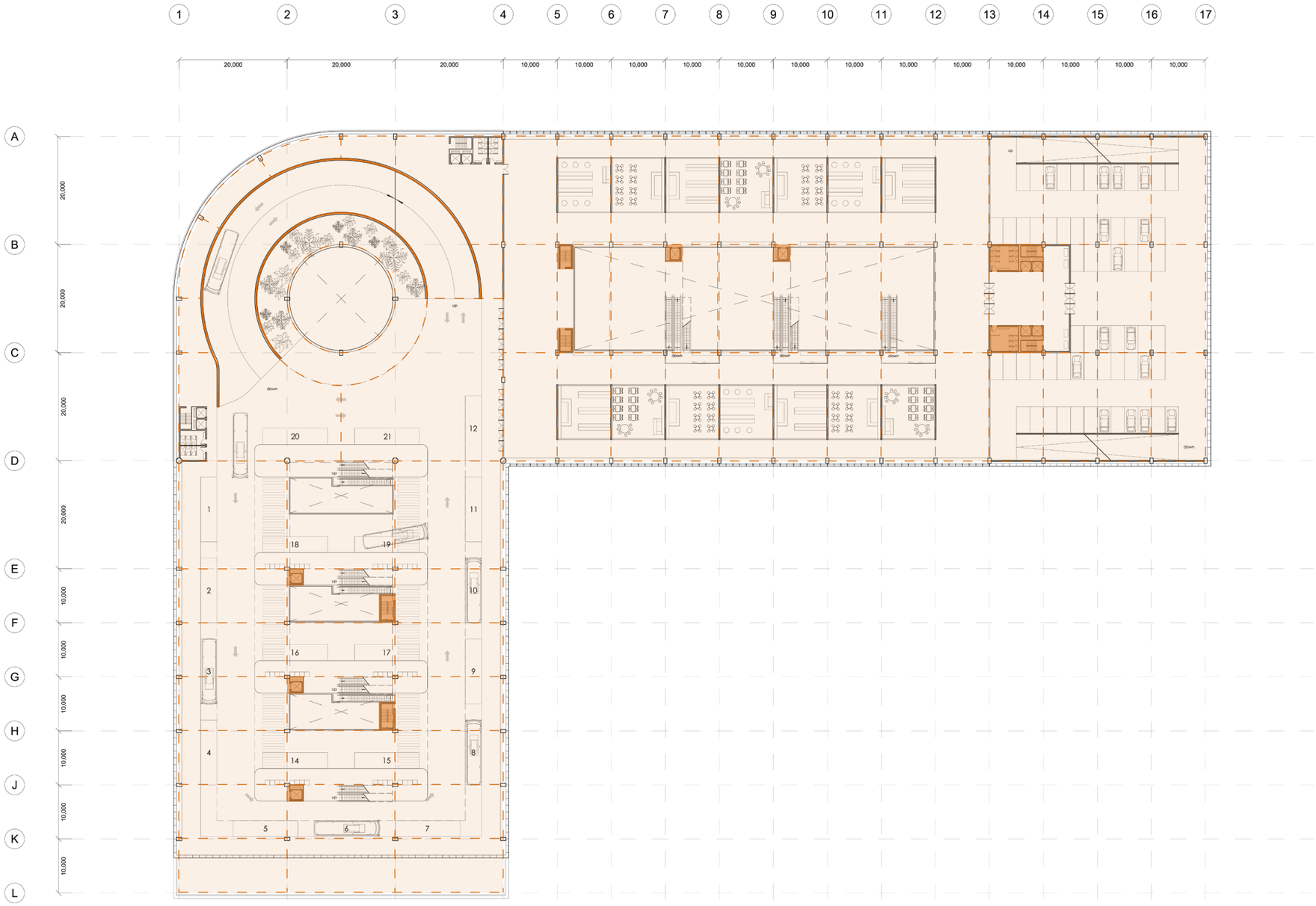
Structure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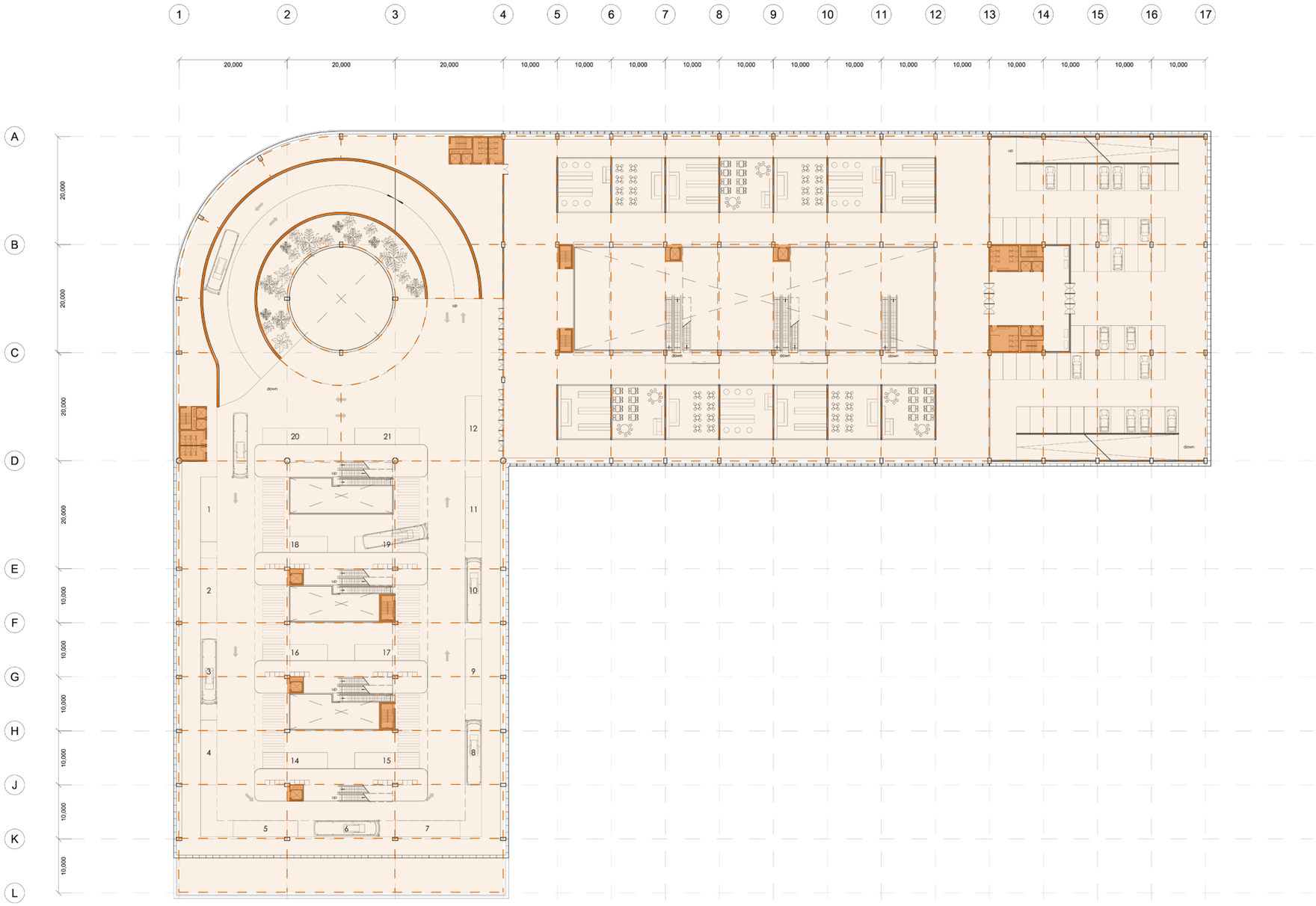
Structure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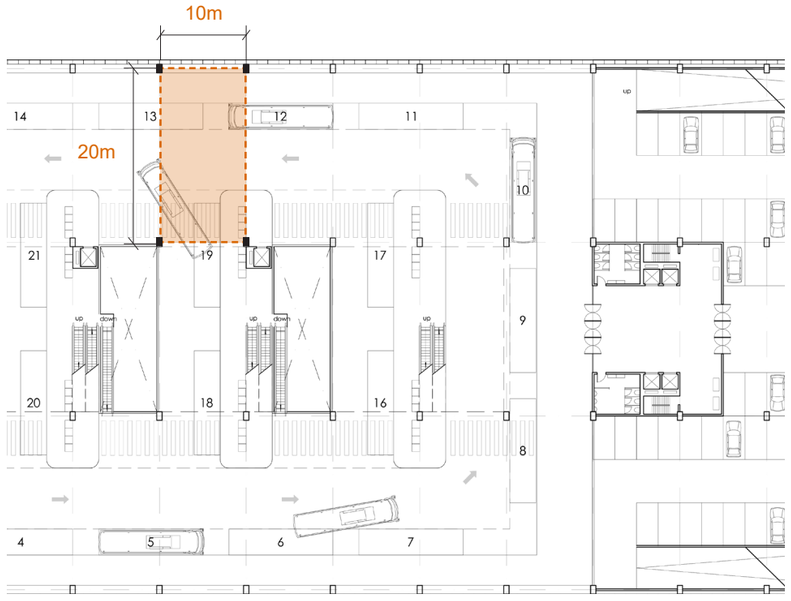
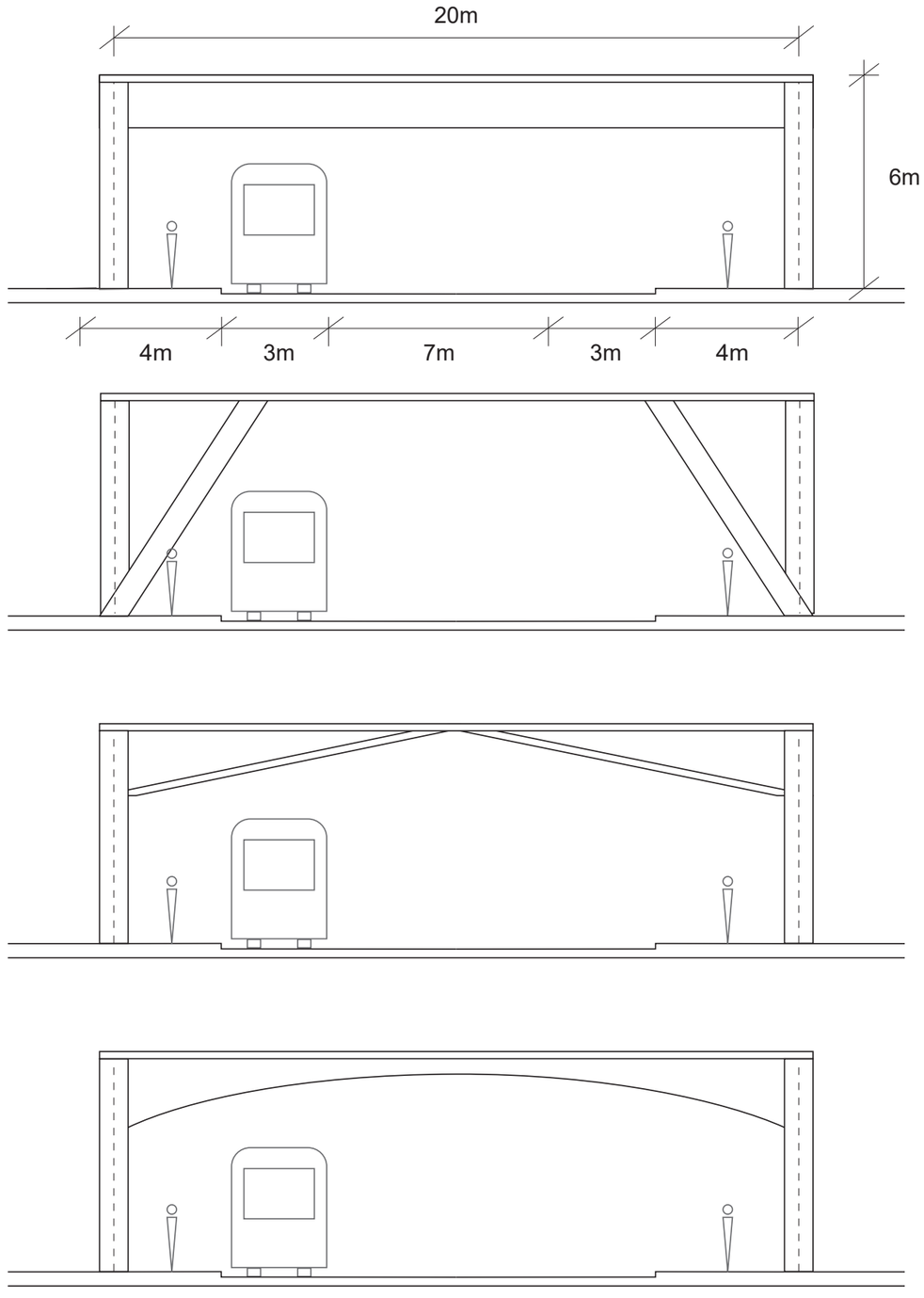
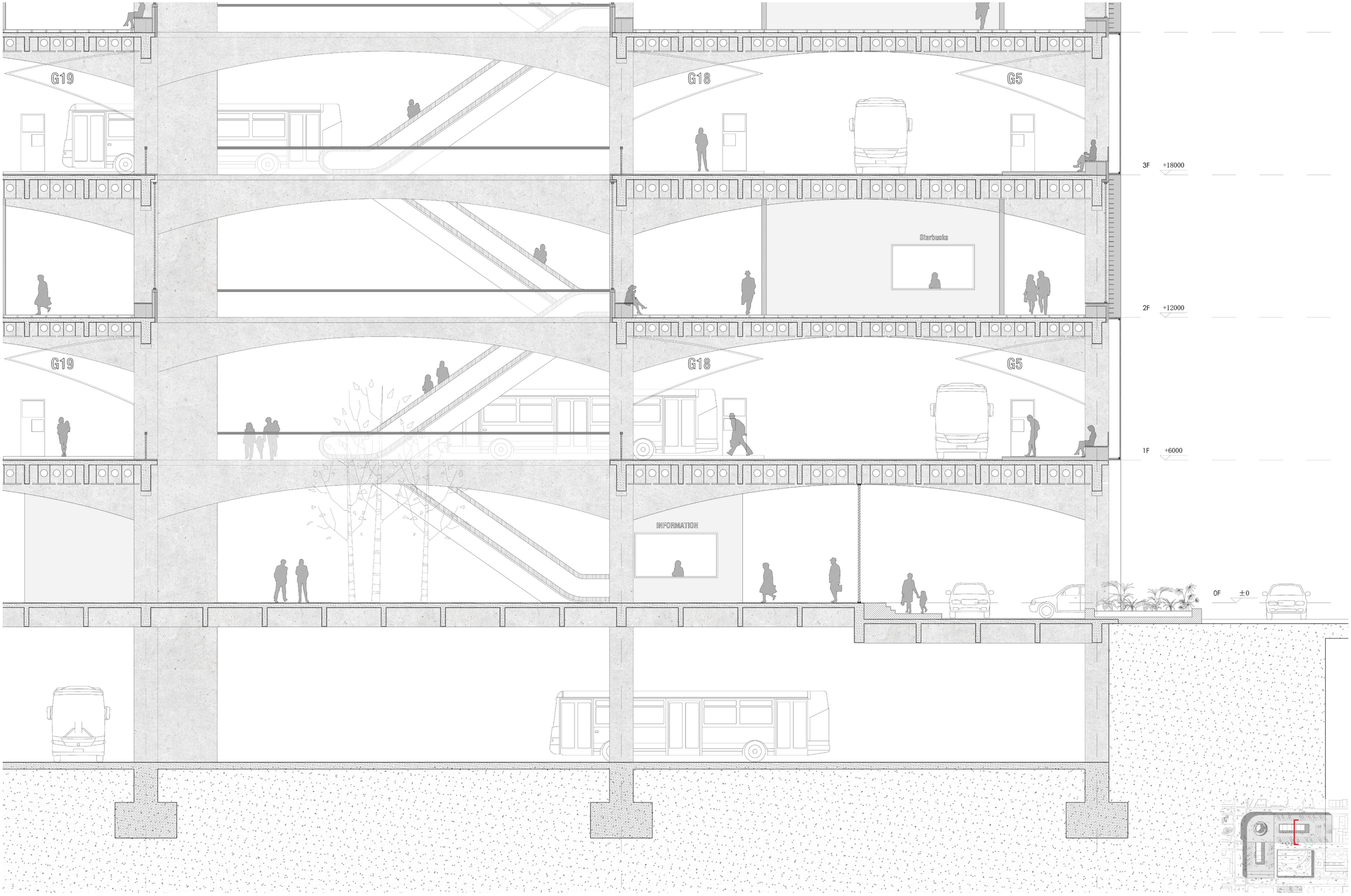
Beam



Long Span Structure



Fragment Section



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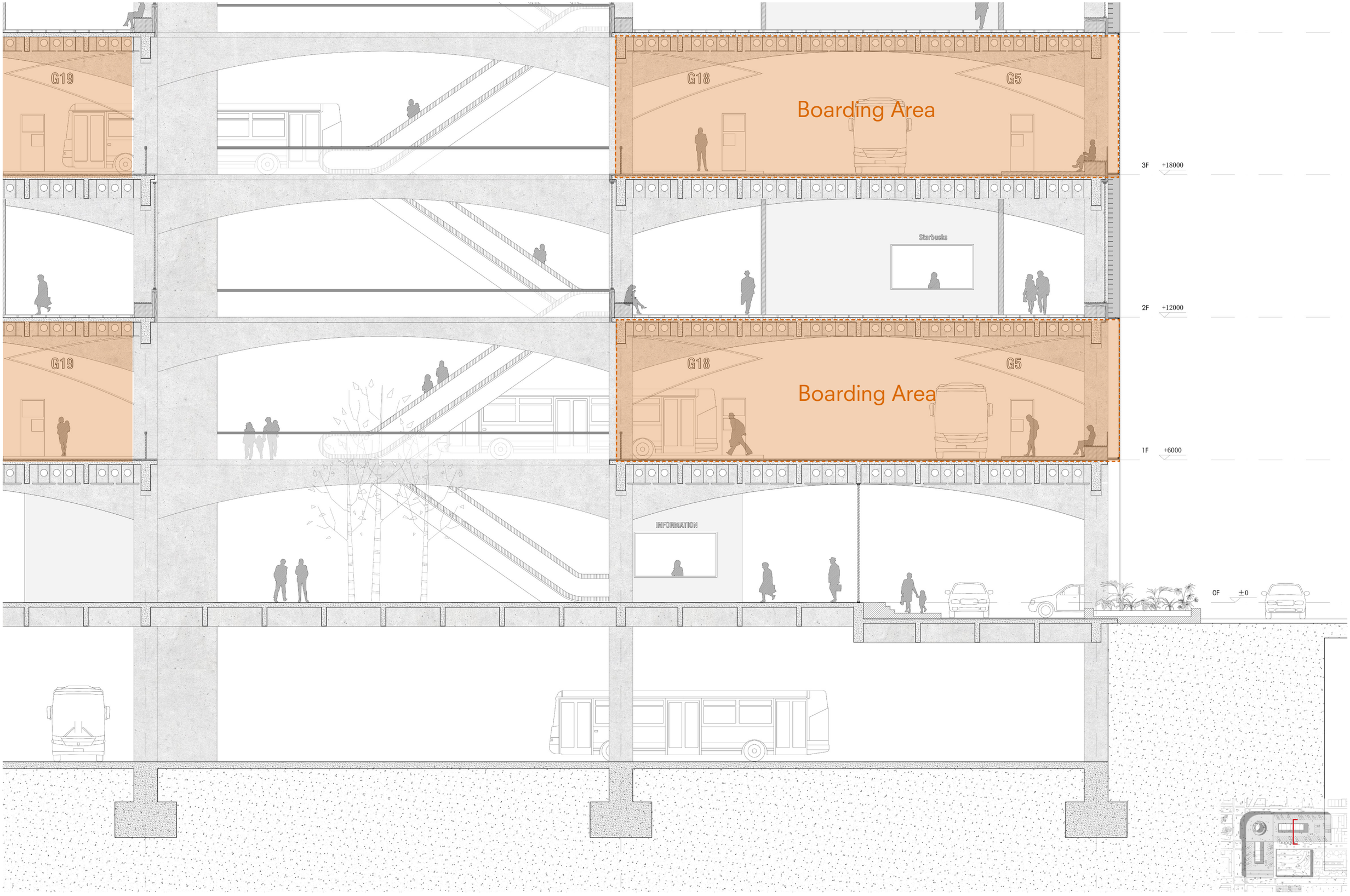
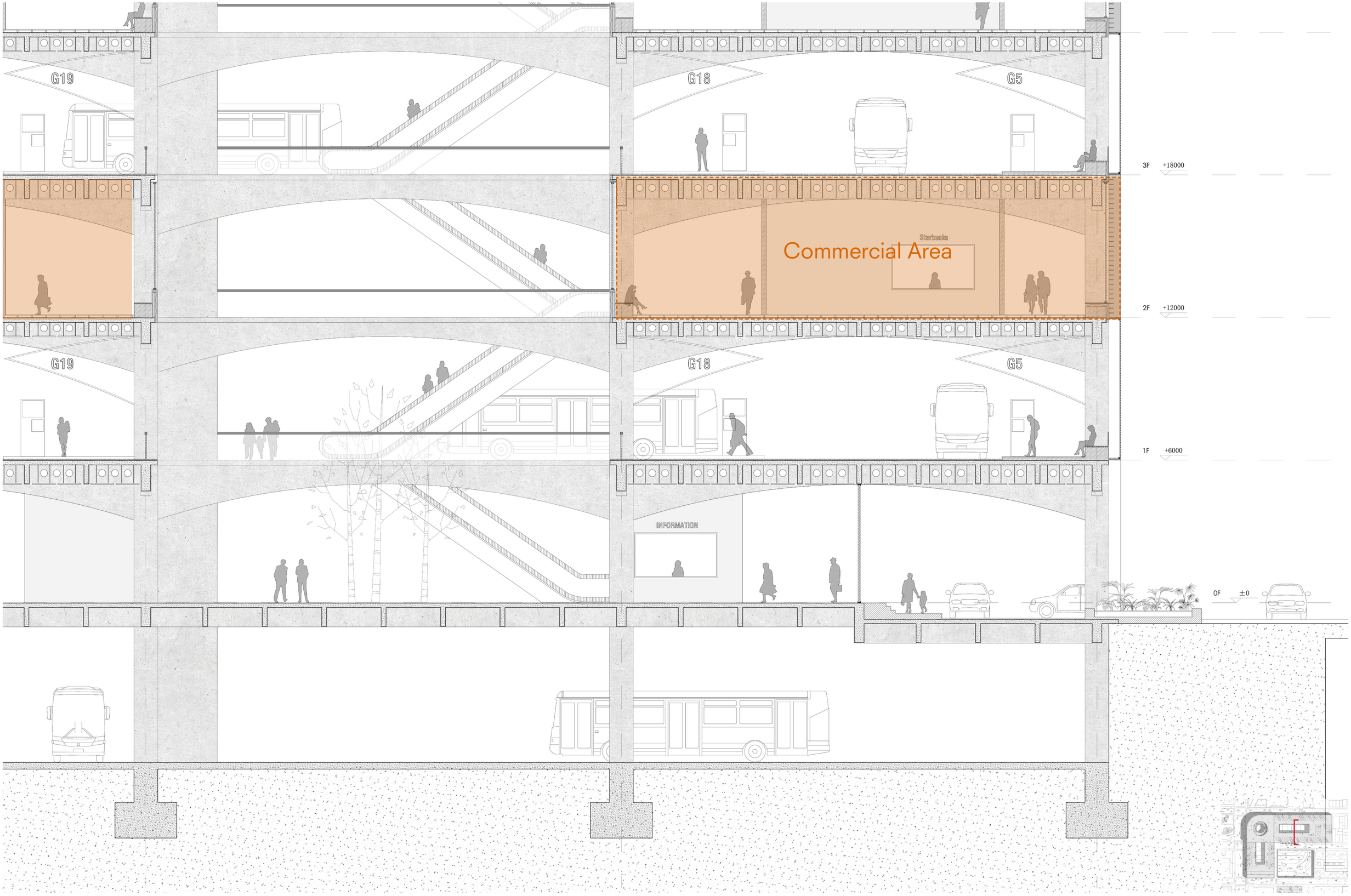


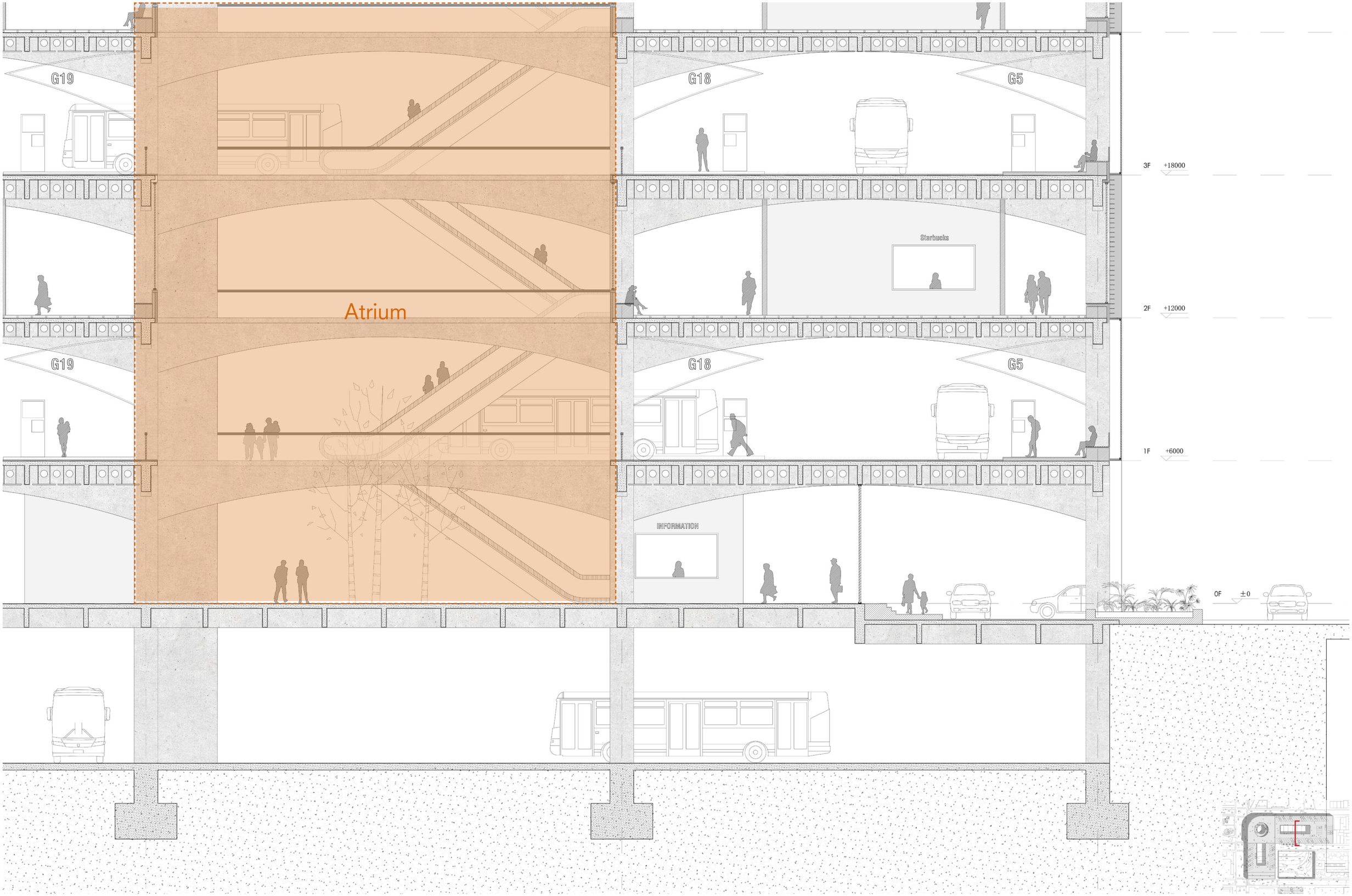
Boarding Area

Fragment Section



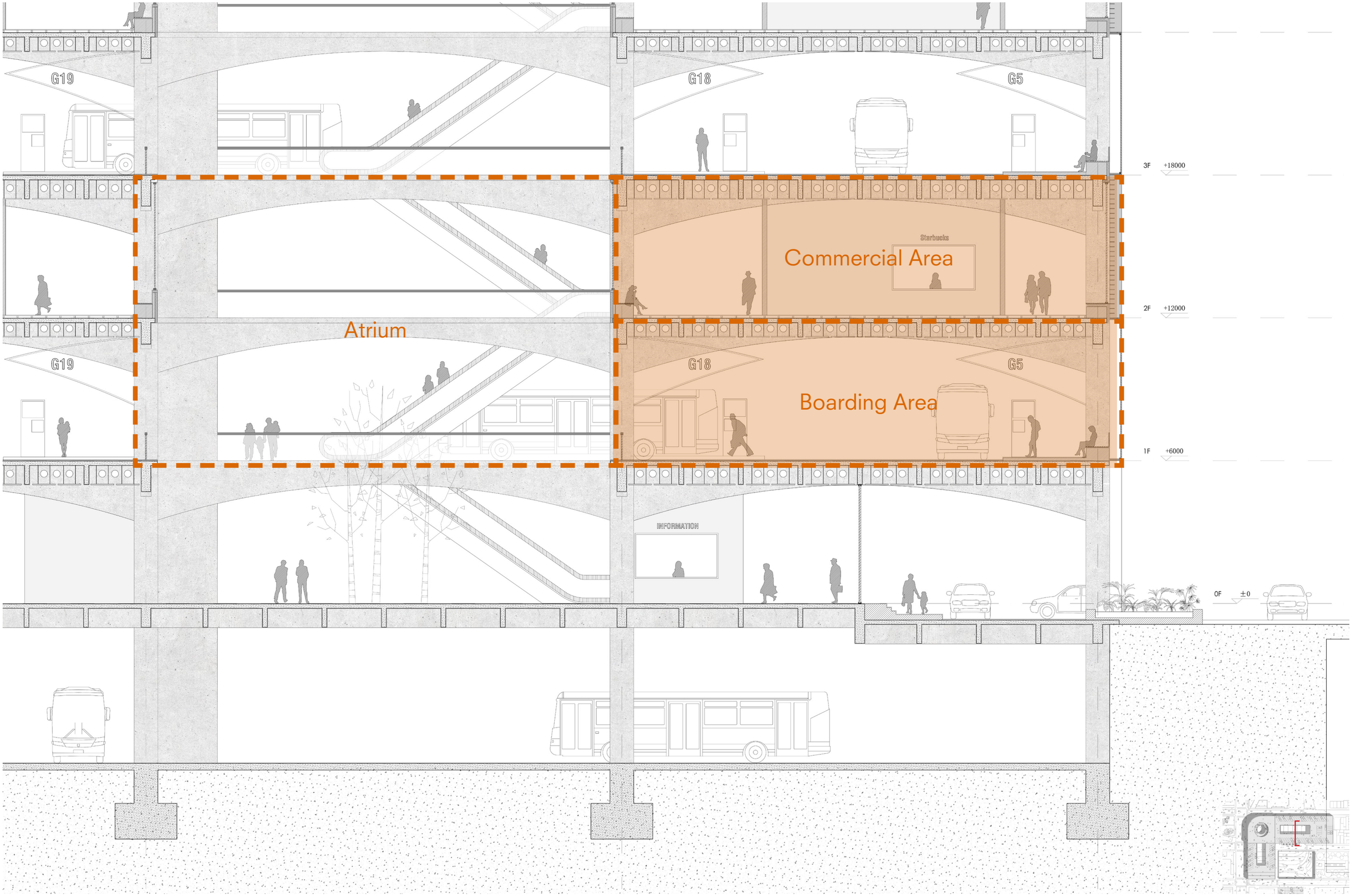
Commercial Area

Fragment Section



Atrium

Fragment Section



Two Floors as a Unit

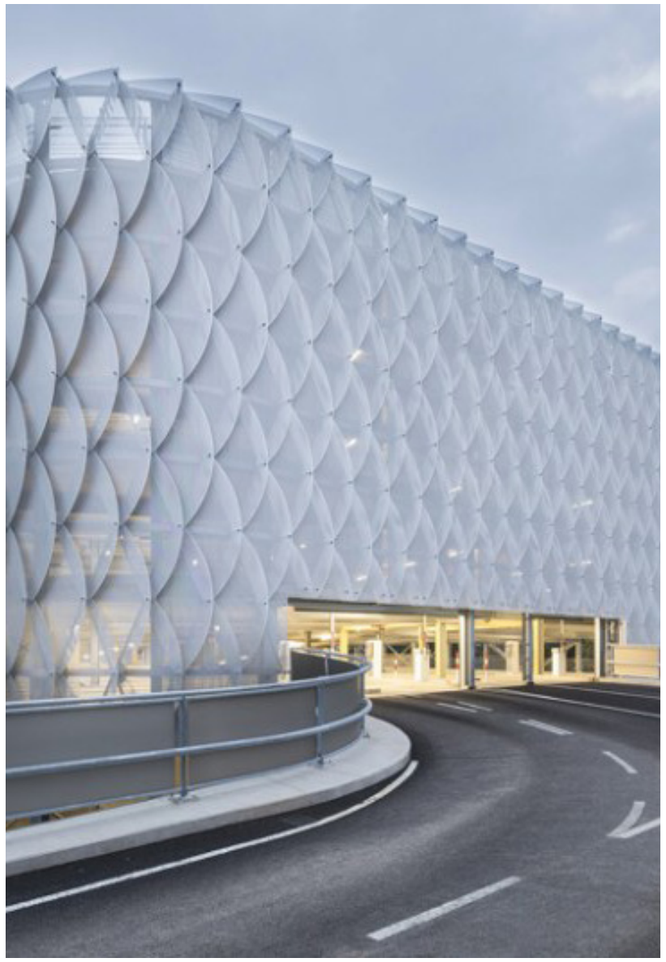
FACADE

MAIN CHALLENGES

1. Huge volume and long elevation

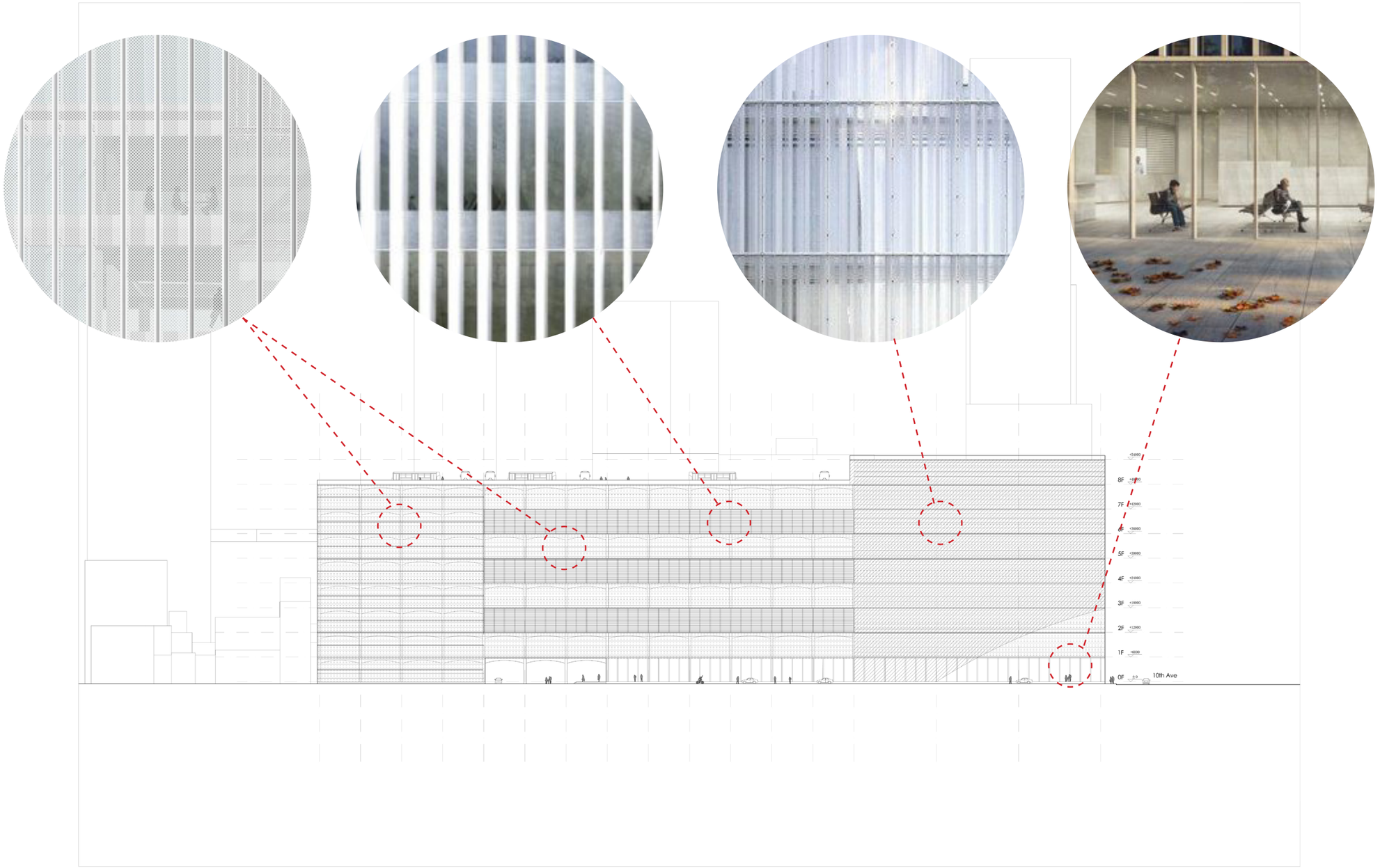
2. Different demand of different functions

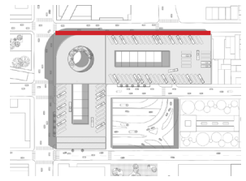
Facade



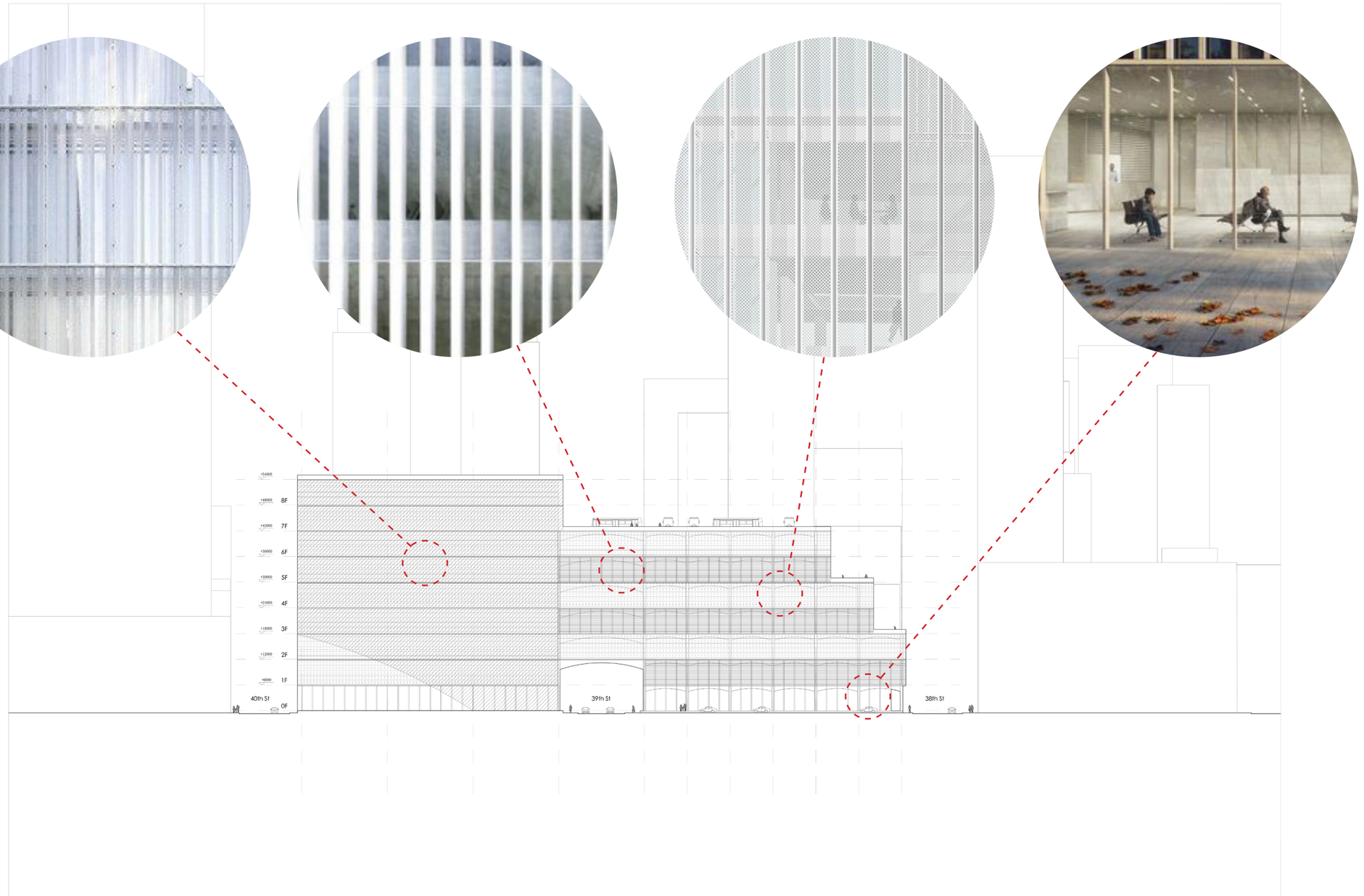
Light color
Translucence
Penetration

Elevation





Elevation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39th St
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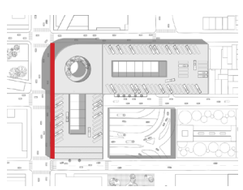

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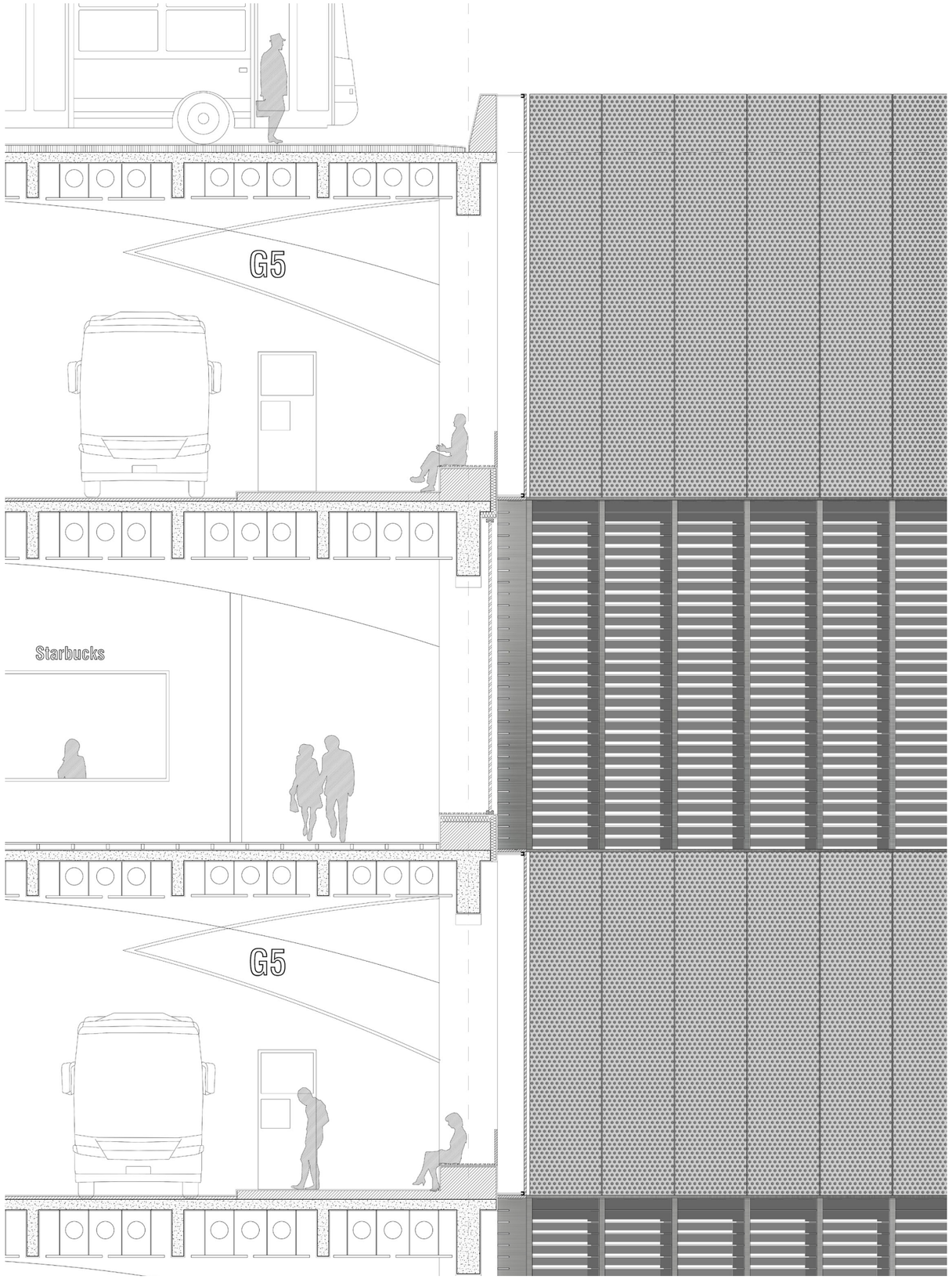

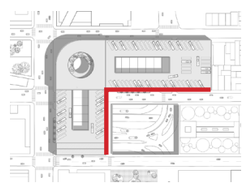

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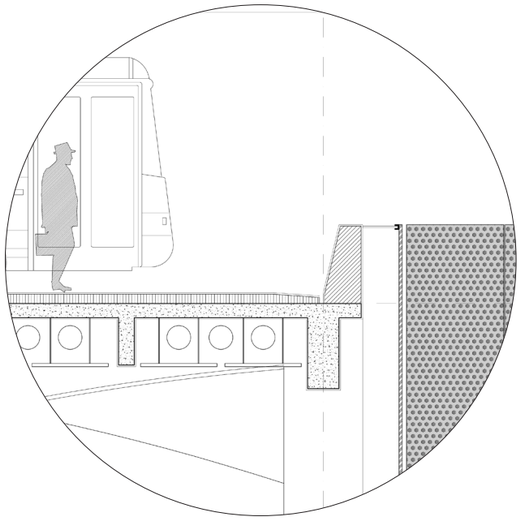

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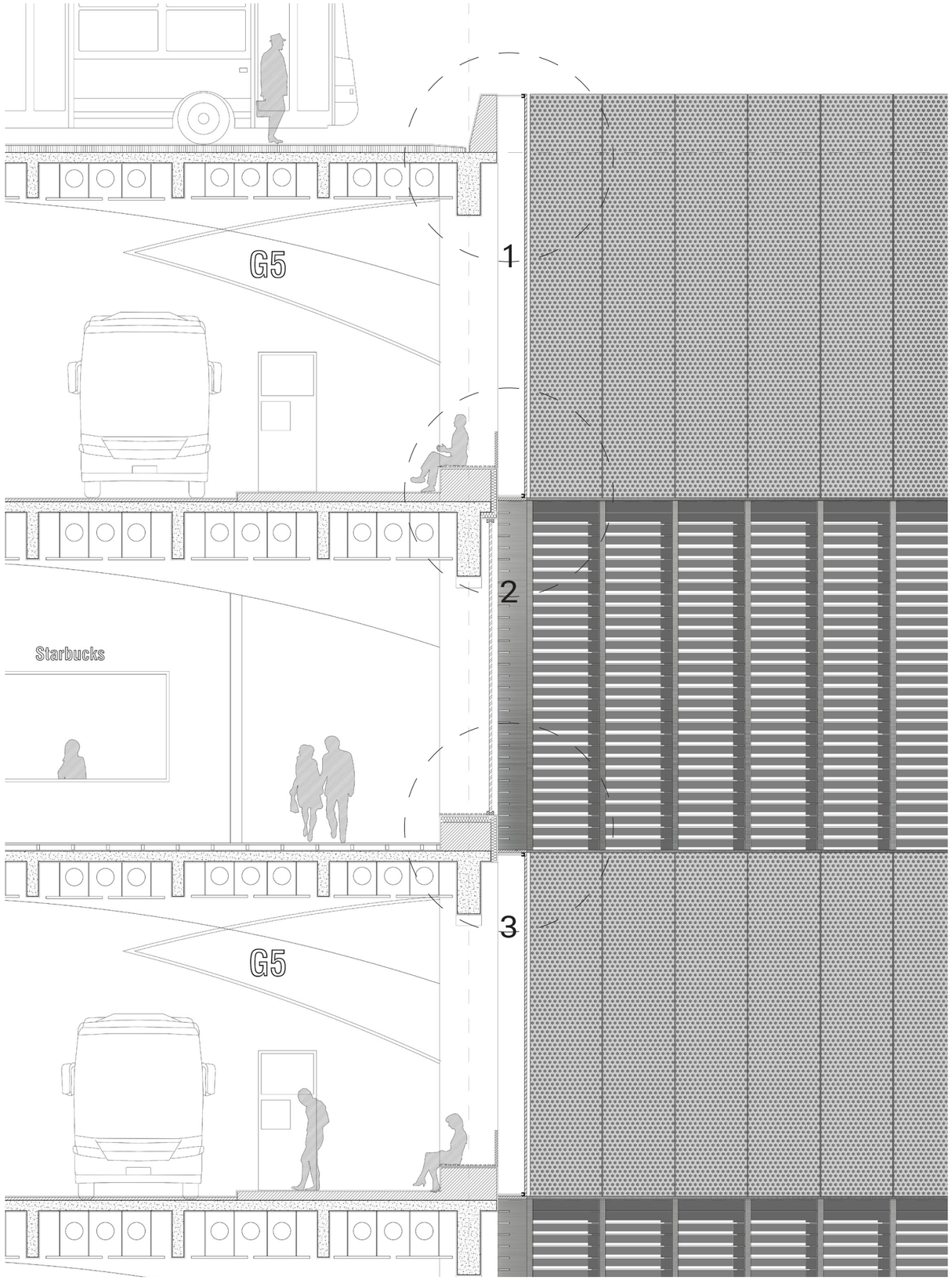

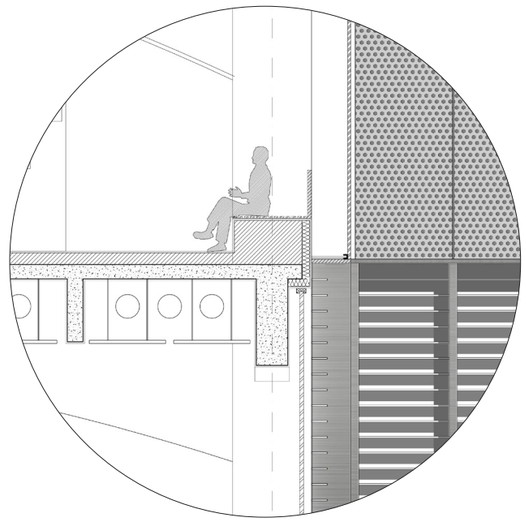

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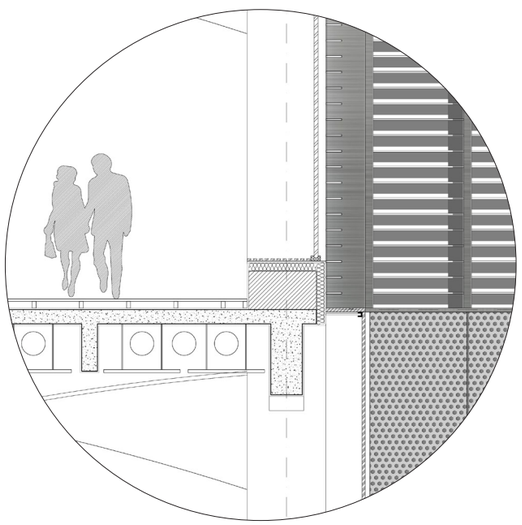

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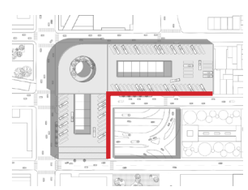


Exterior from the South

Exterior from the West

CLIMATE

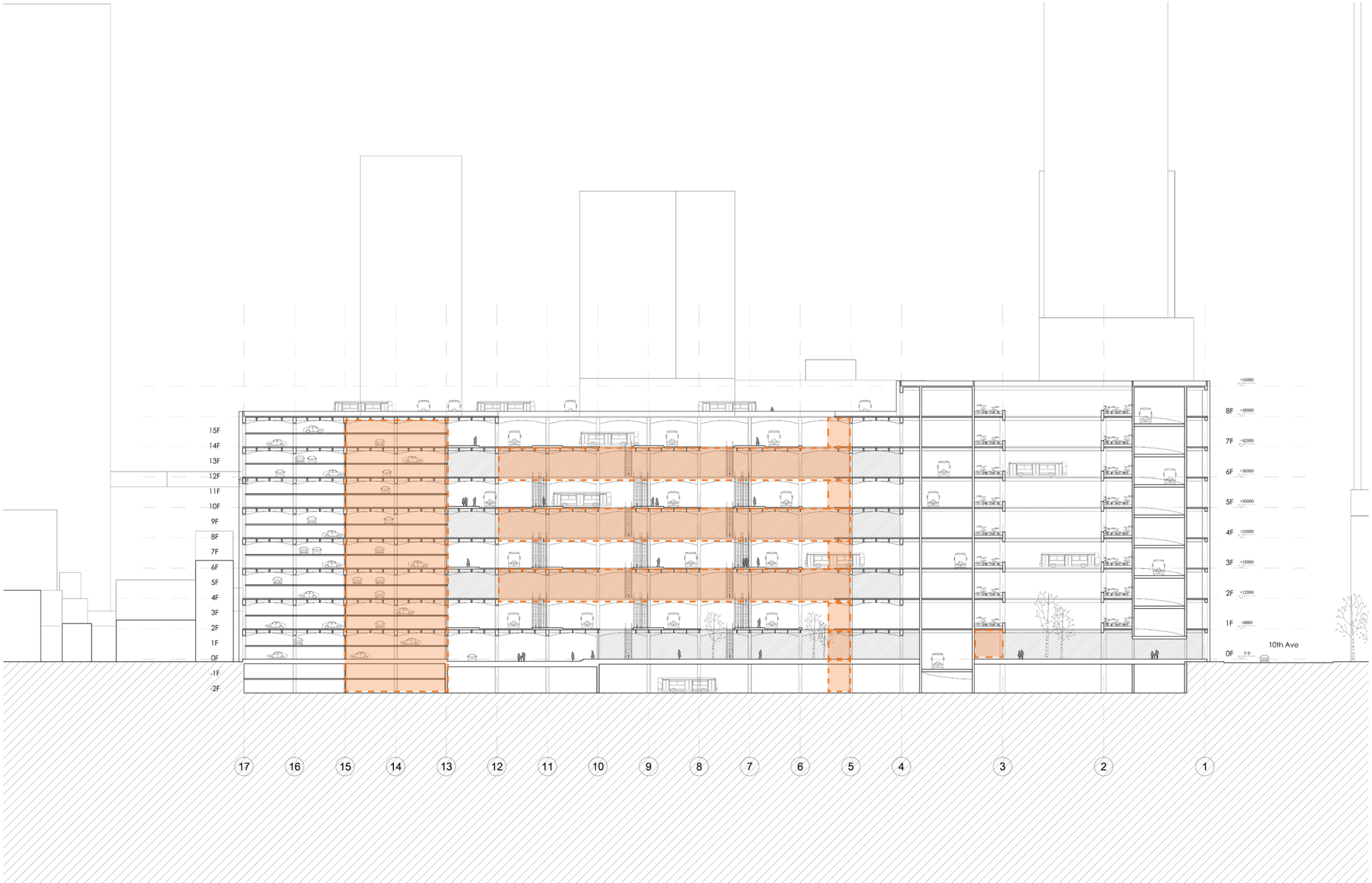
MAIN CHALLENGES

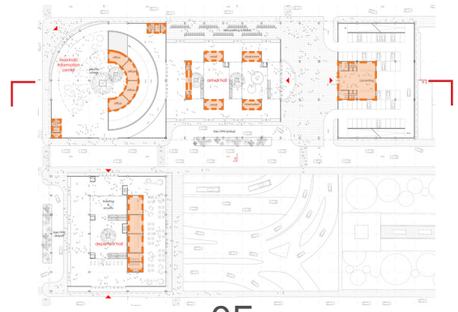
1. Natural systems of lighting and ventilation (atrium)

2. Shading system

3. Acoustic

Climate Border





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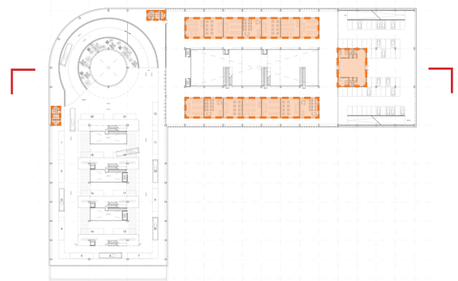
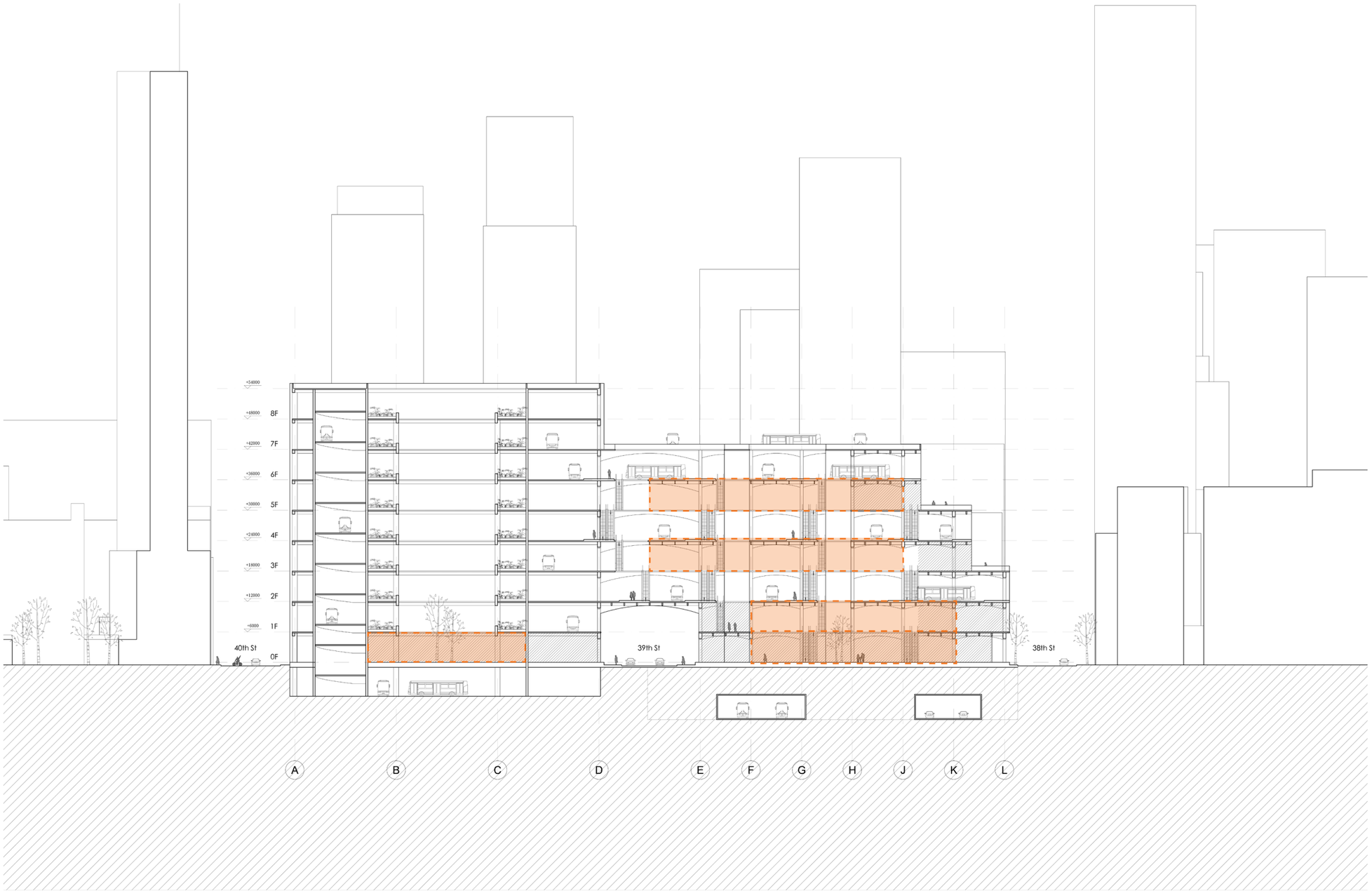
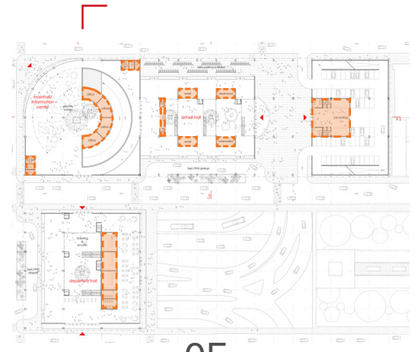


2/4/6F

Climate Border





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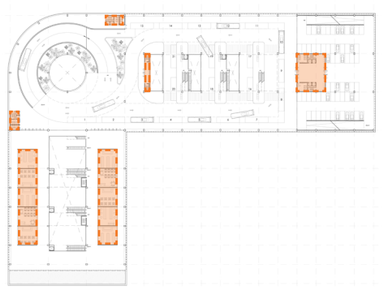
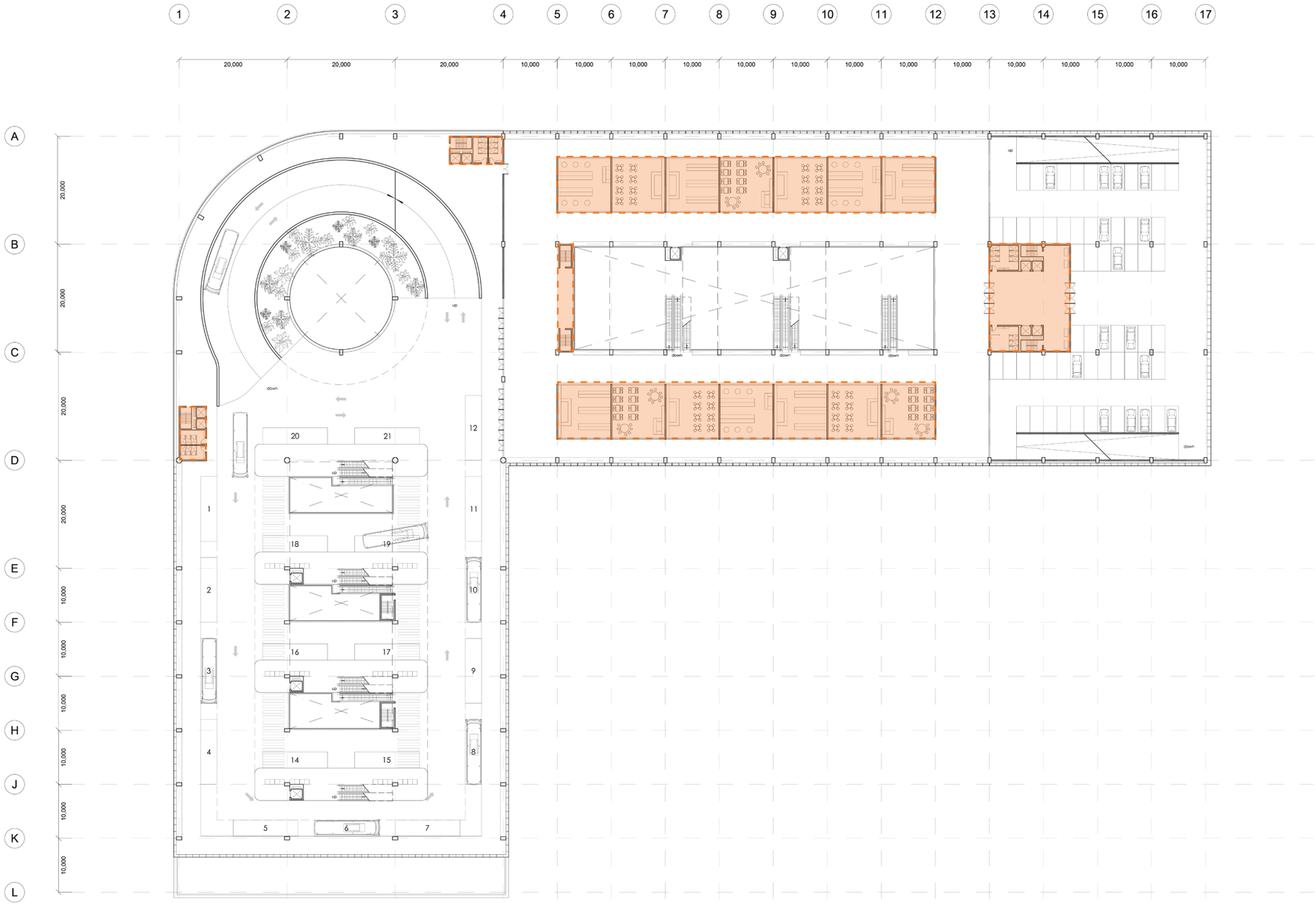
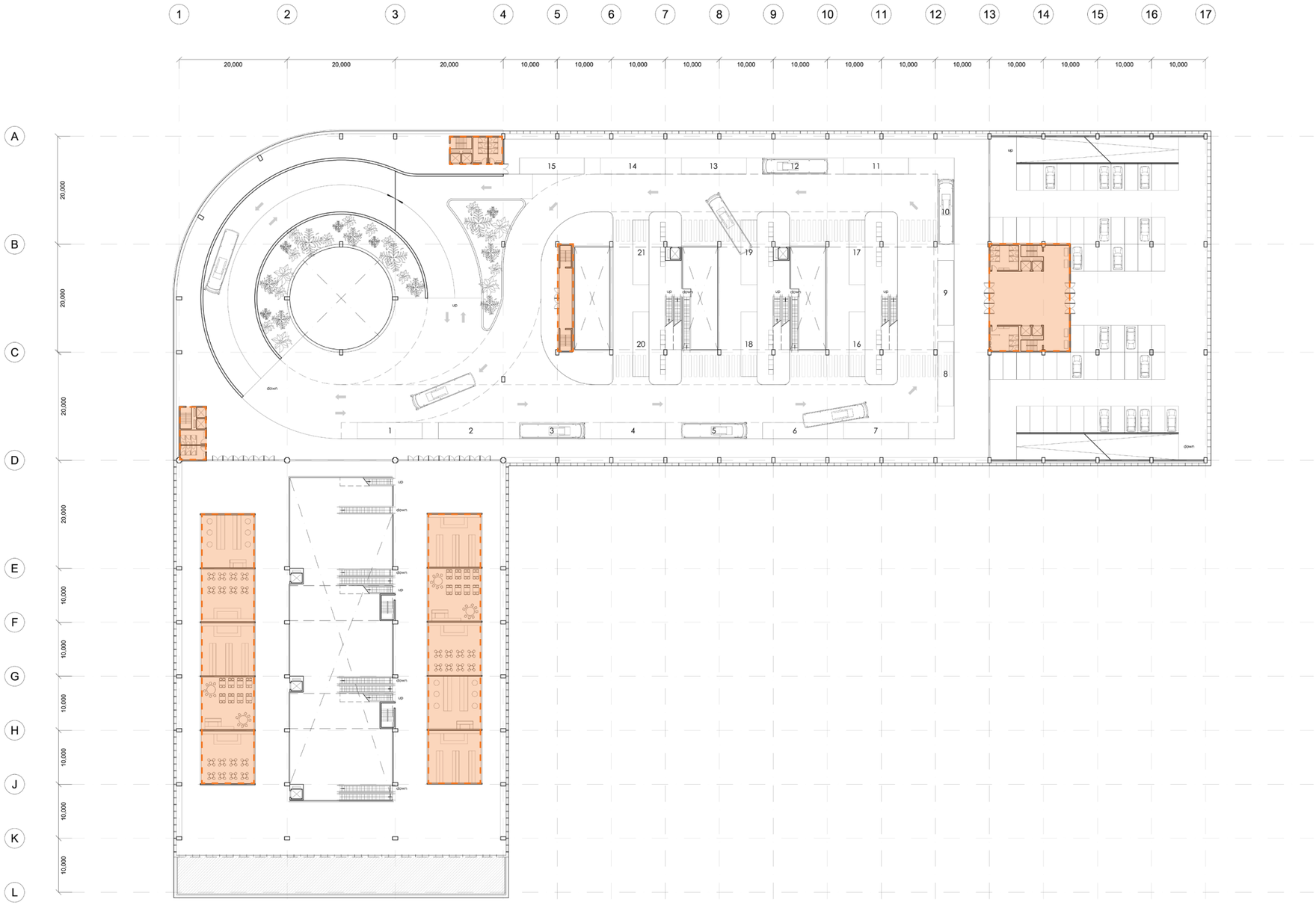


3/5F

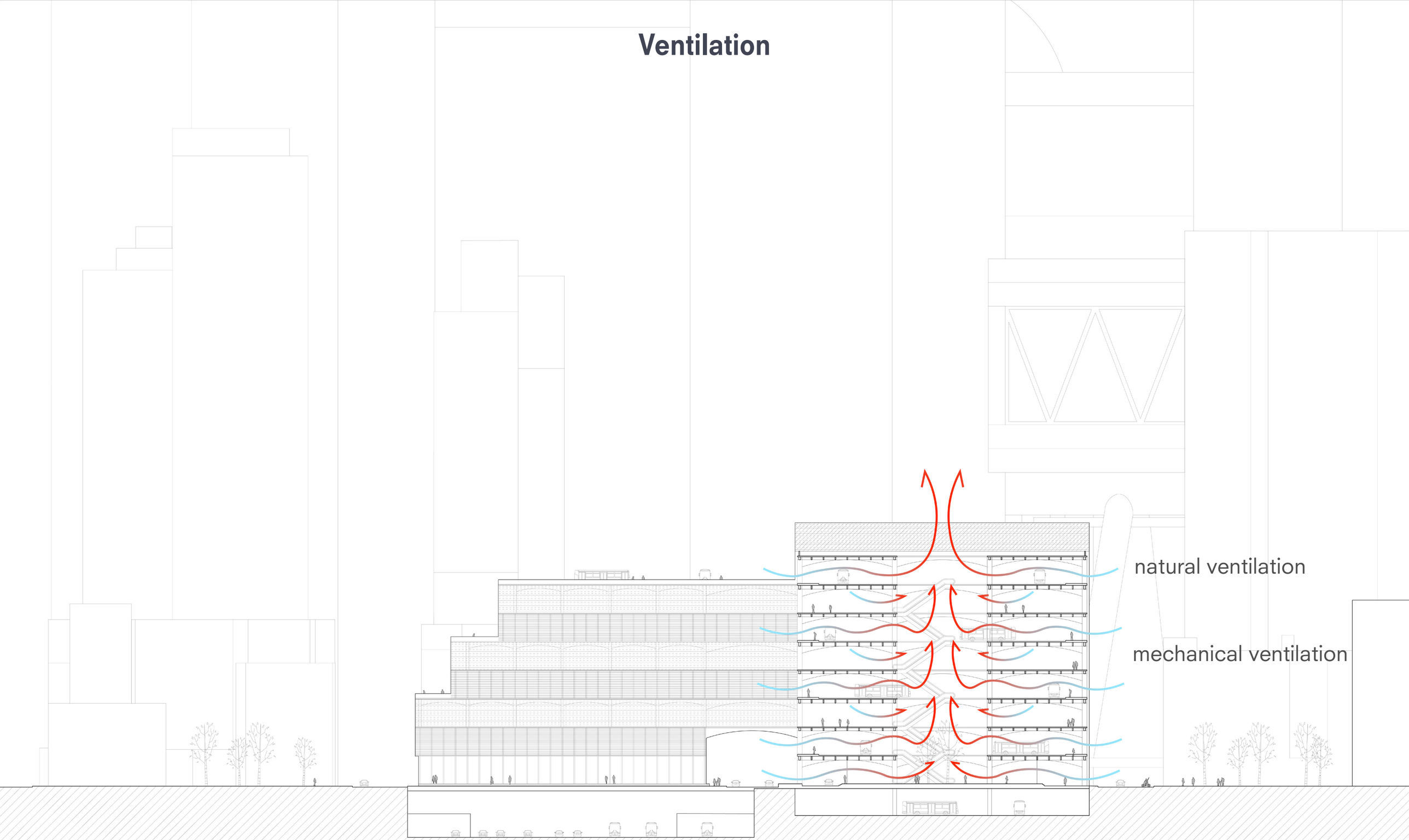
Climate Border



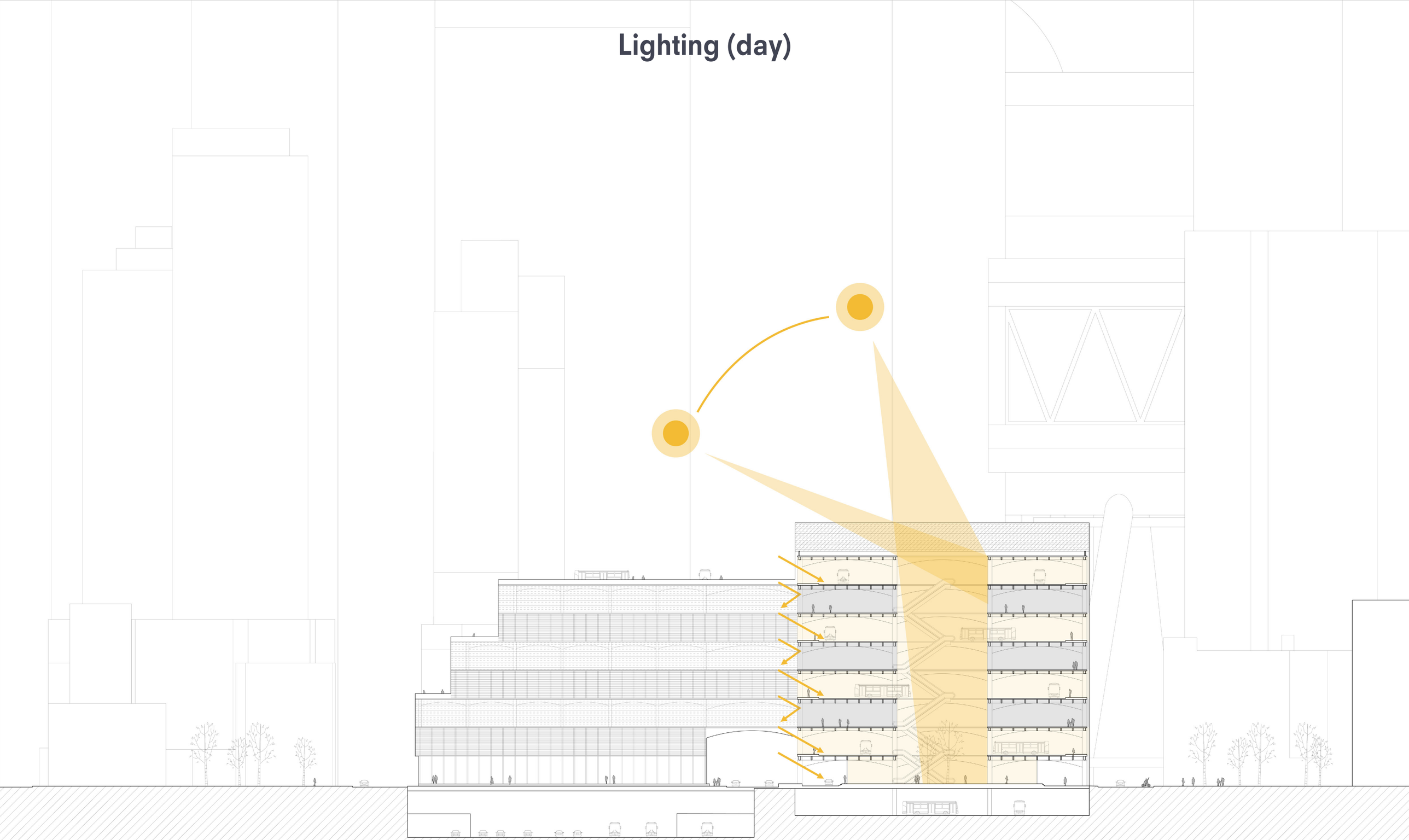
Climate Border



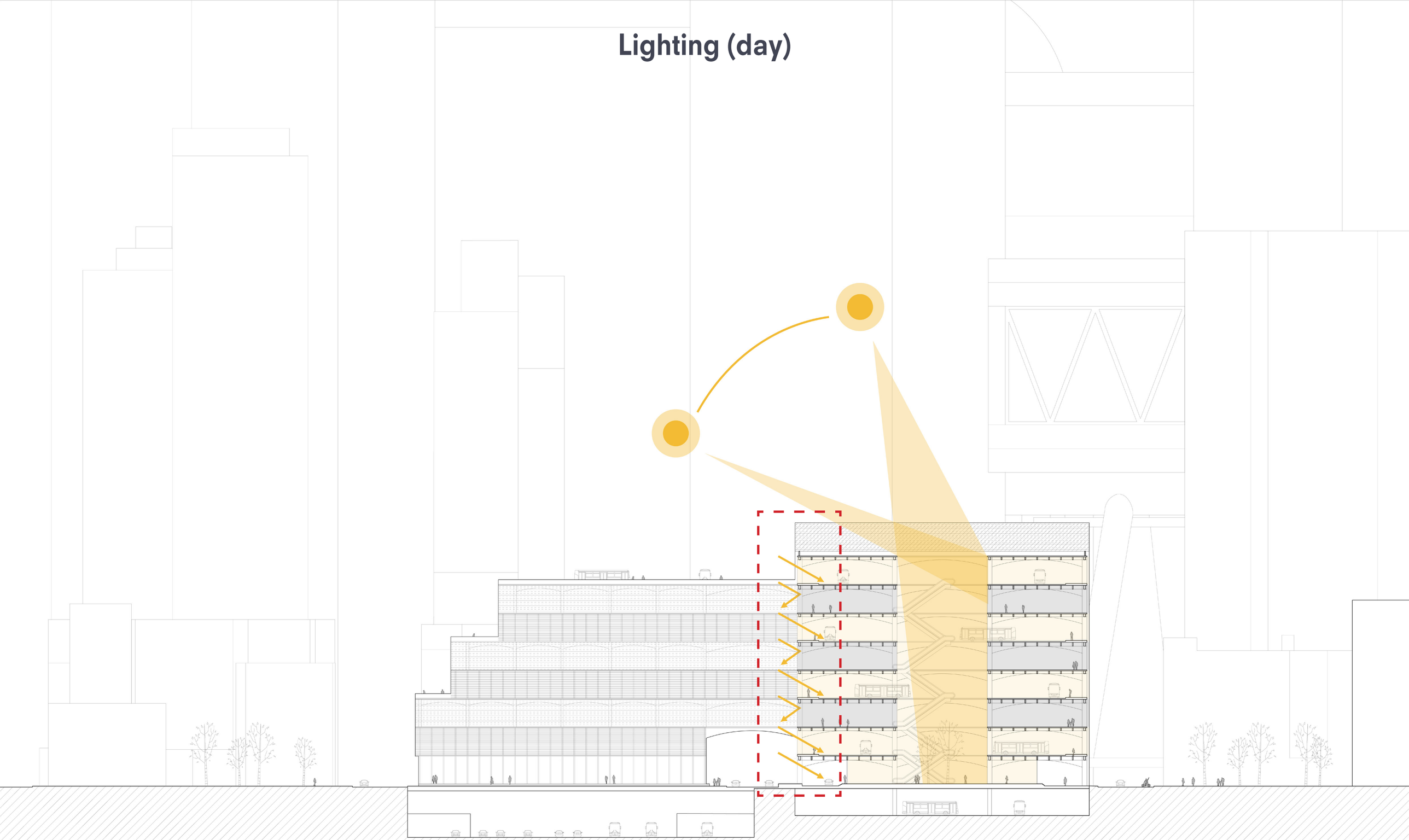
Ventilation



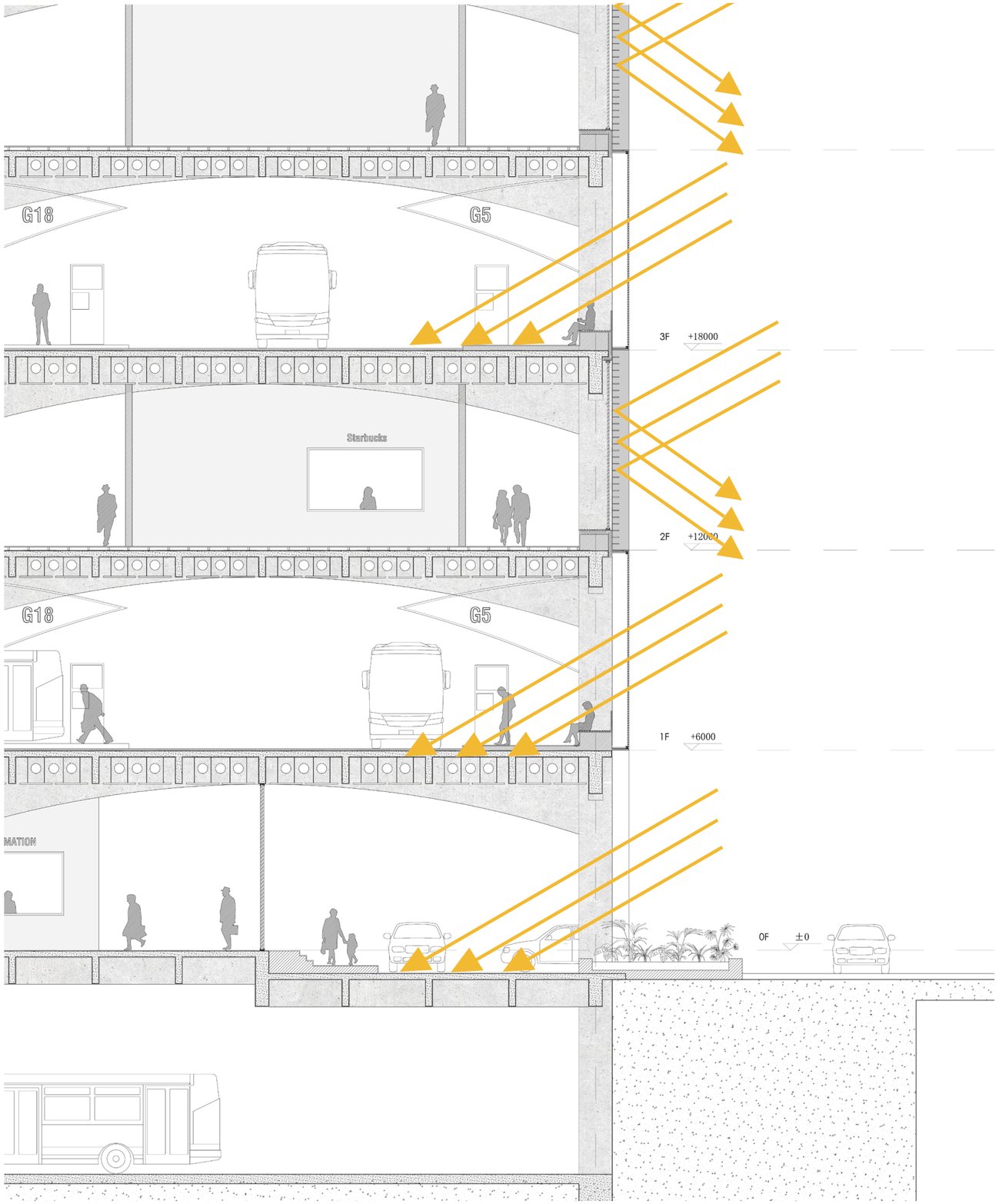
Lighting (day)

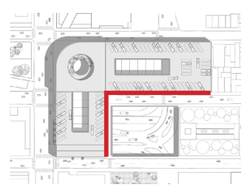


Lighting (day)

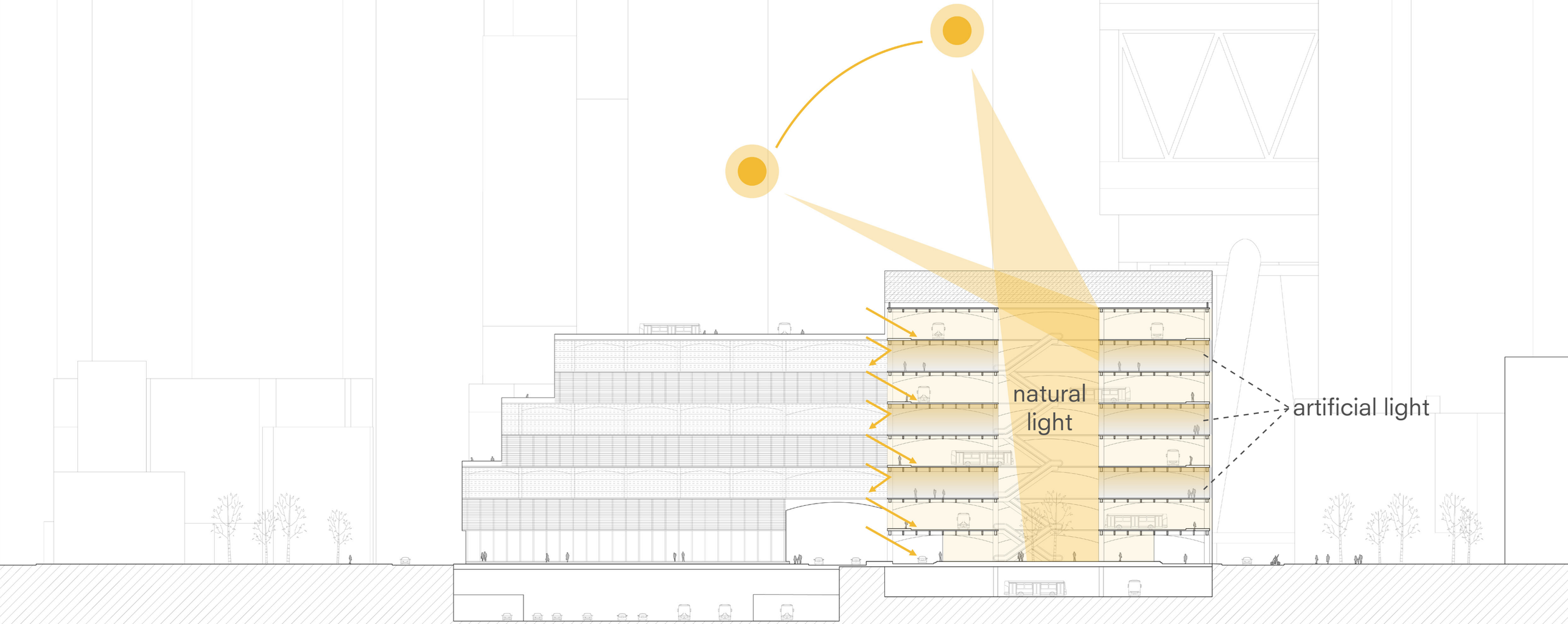


Shading system (south)

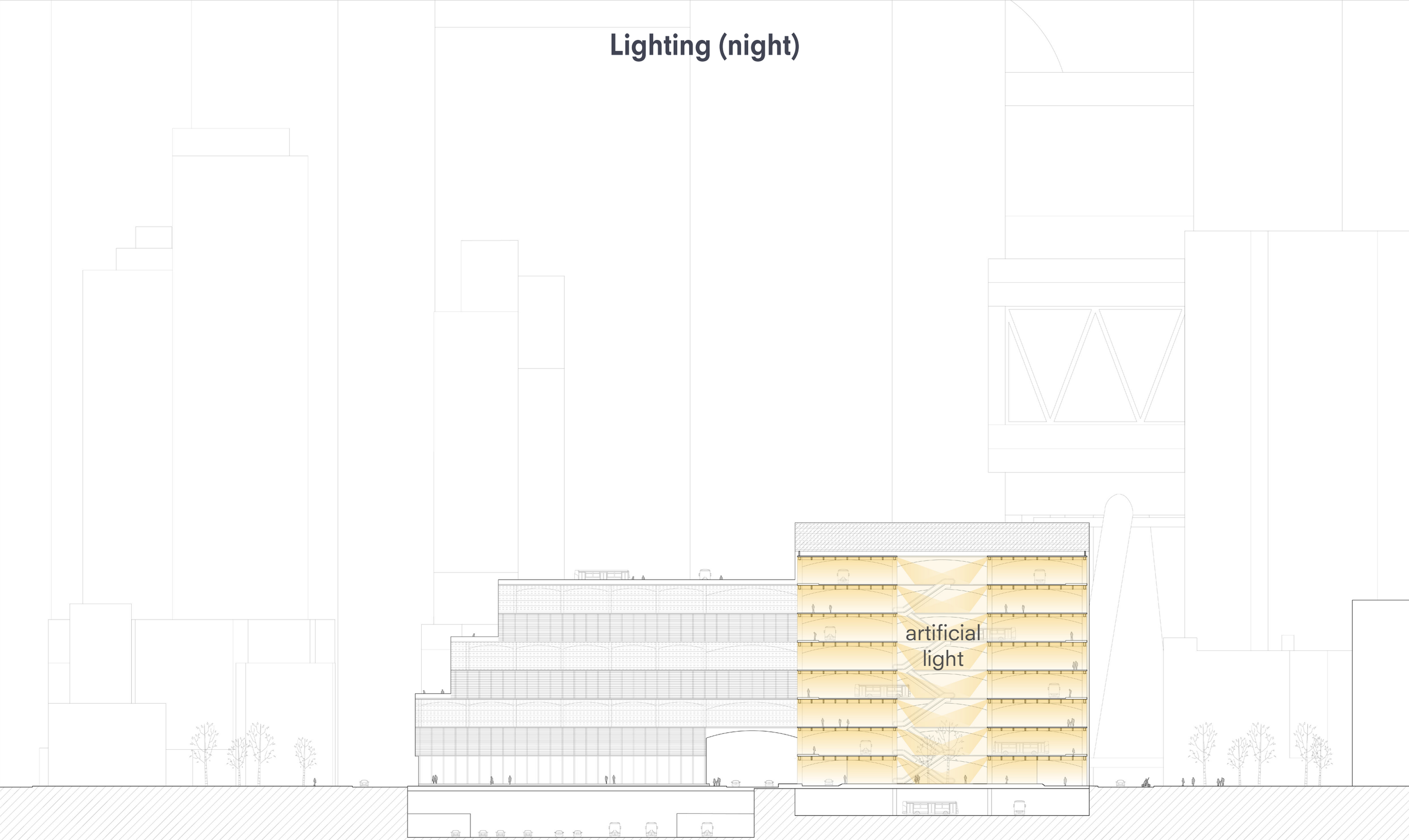




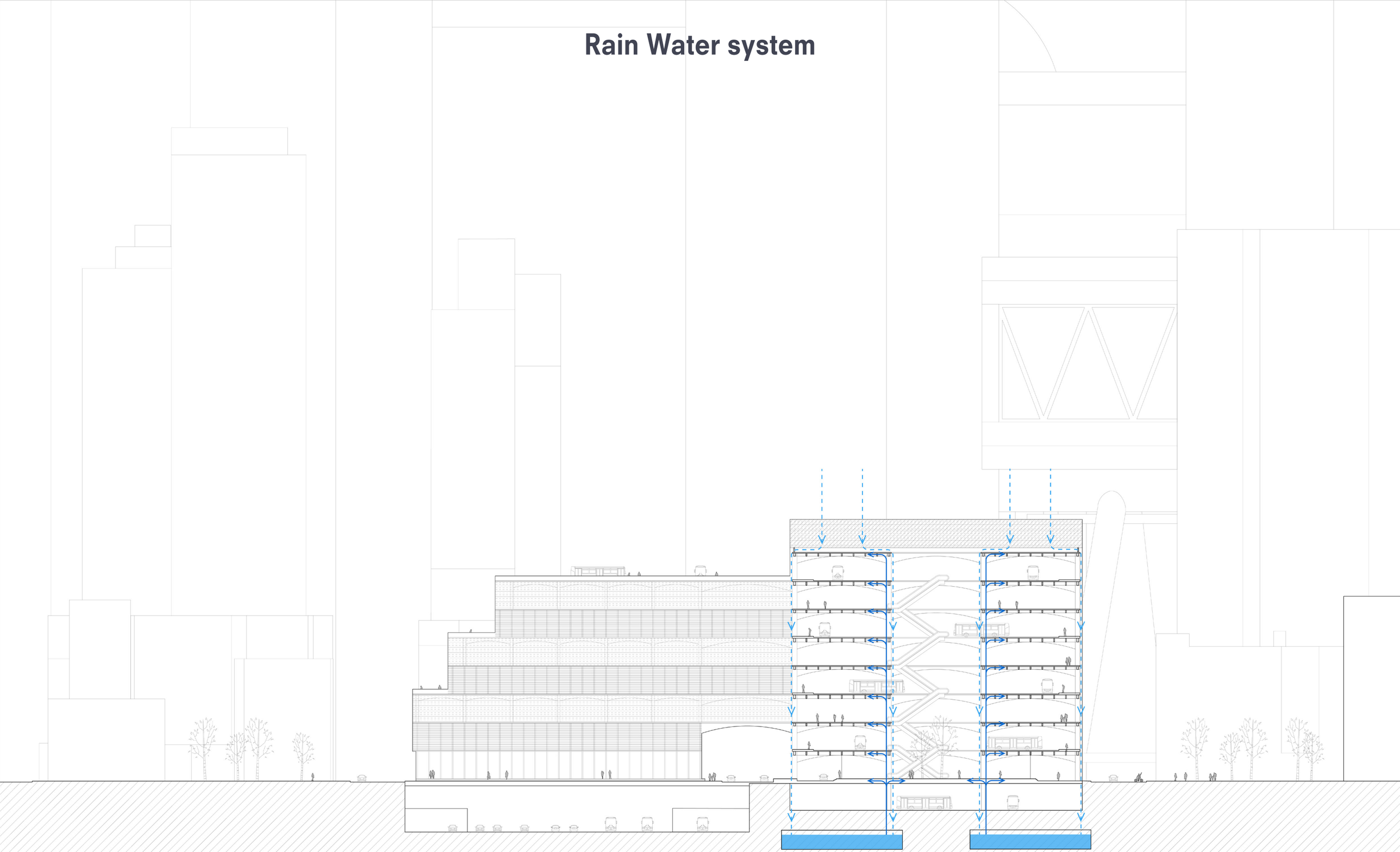
Lighting (day)



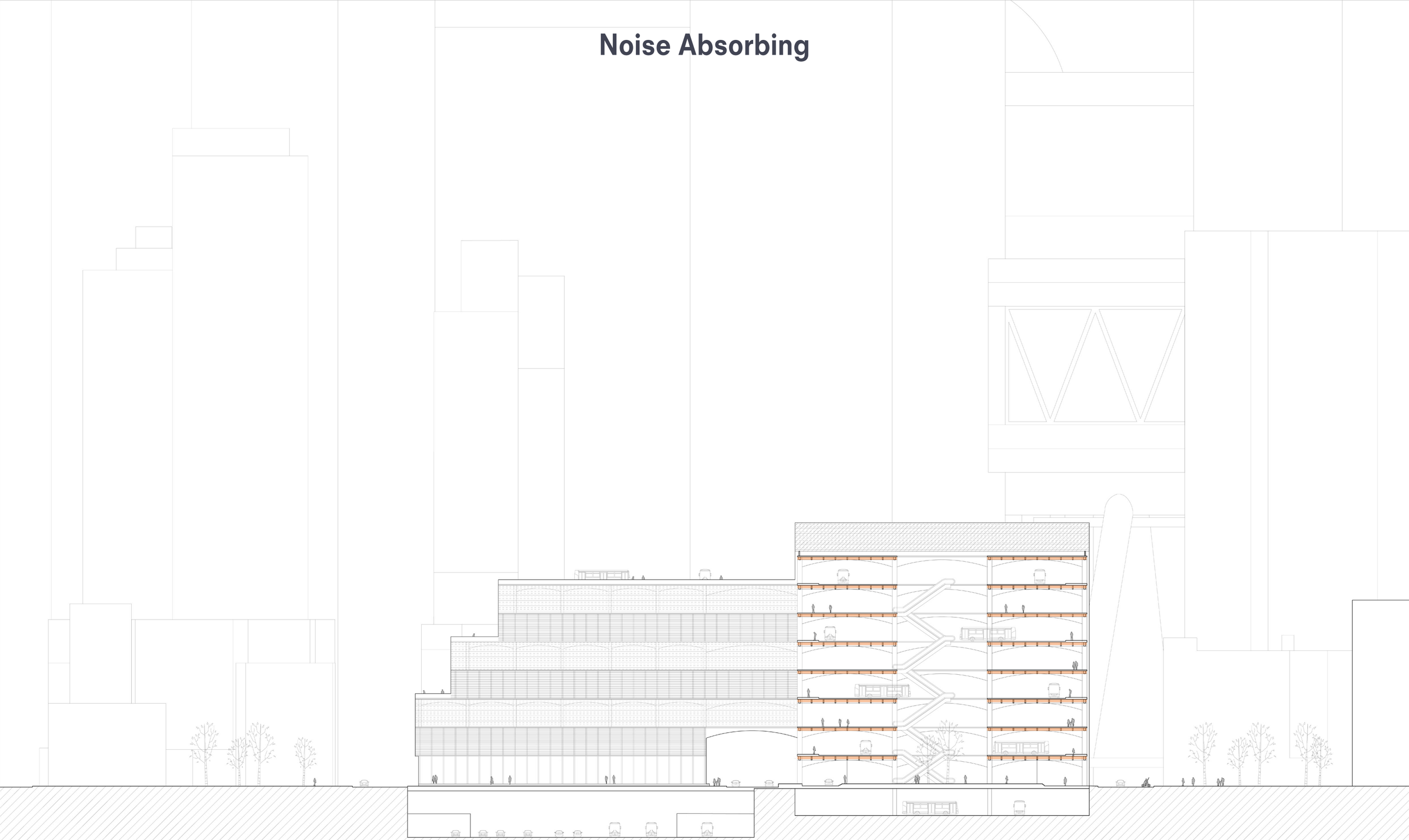
Lighting (night)



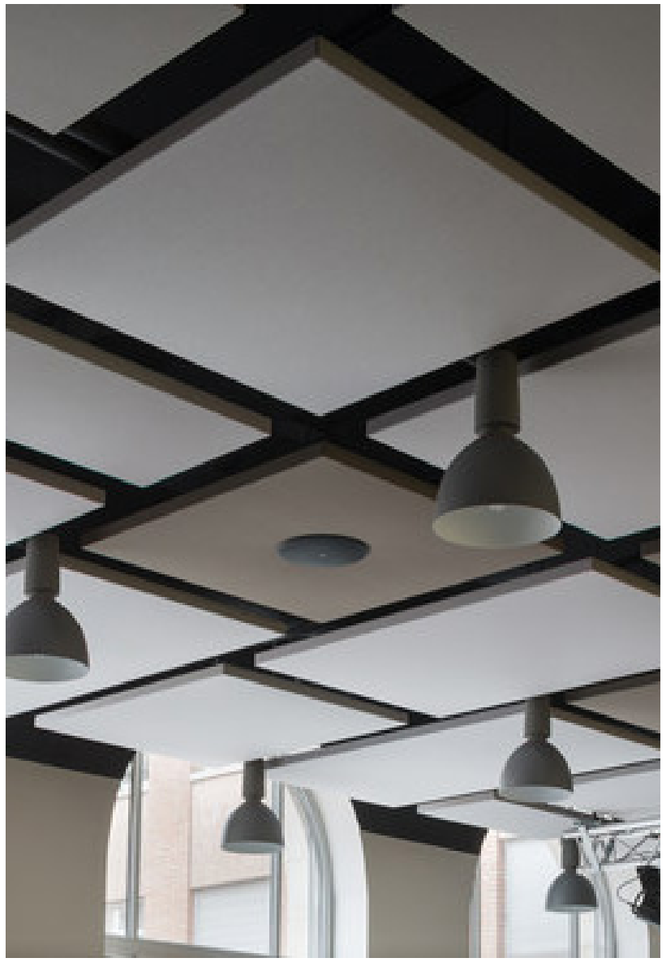
Rain Water system

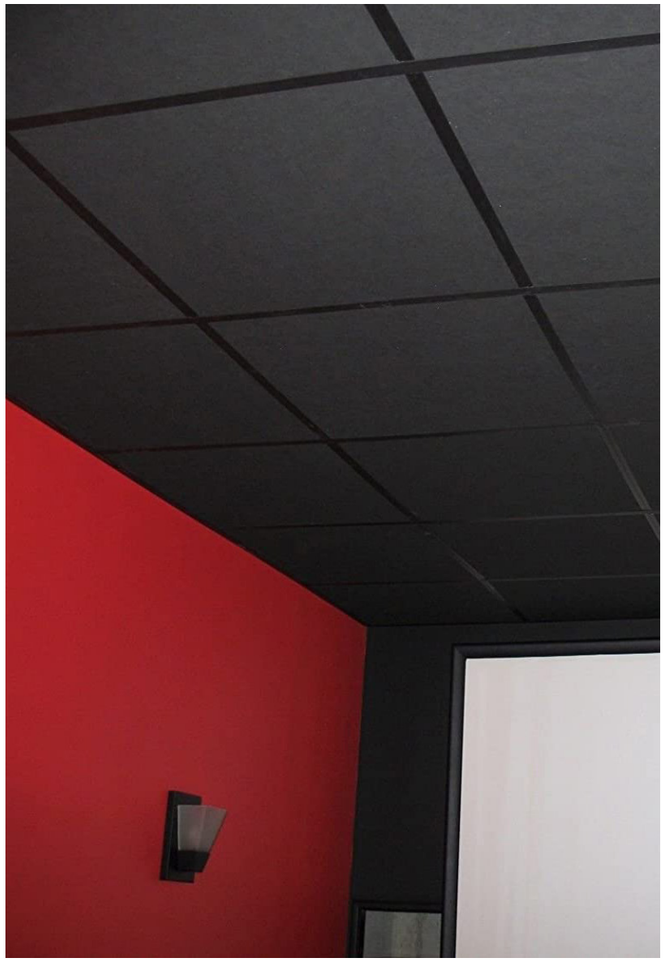


Noise Absorbing

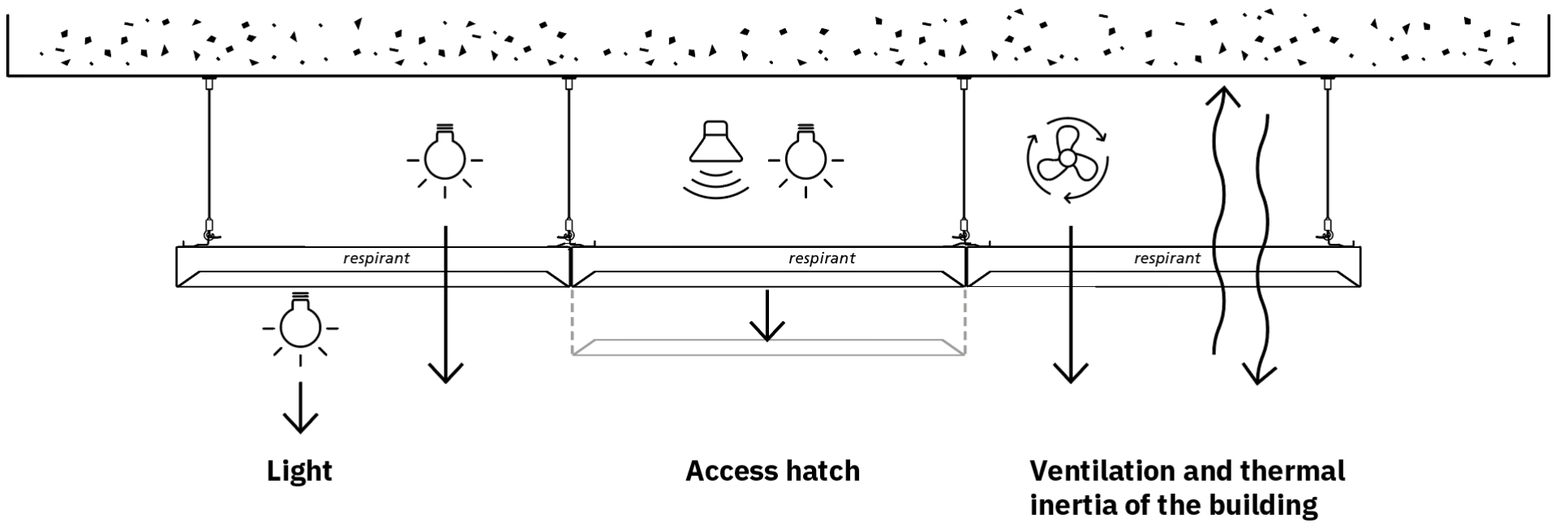


Noise Absorbing



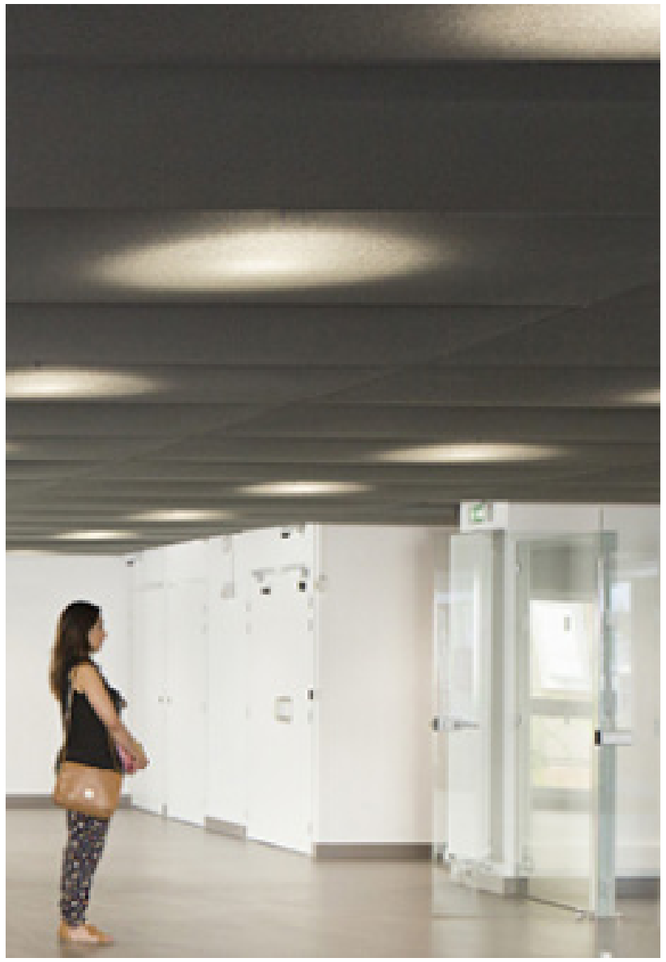


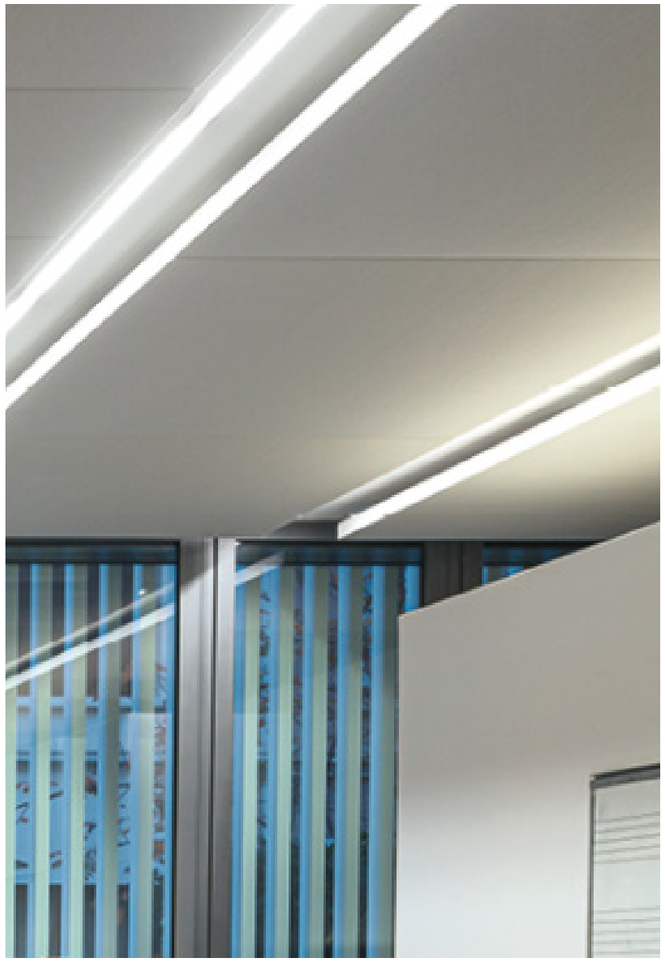
Strato Breathing Ceiling



Source: https://www.texaa.com/products/strato-breathing-ceiling/

Strato Breathing Ceiling





Boarding Area

REFLECTION

MAIN CHALLENGE

Urban Strategy

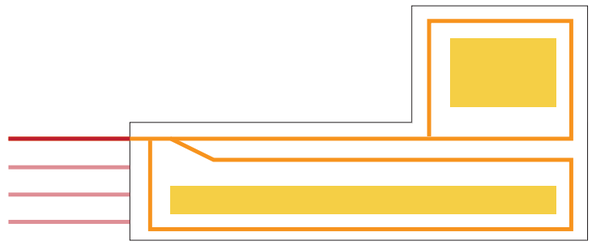
Internal Function & Space

?

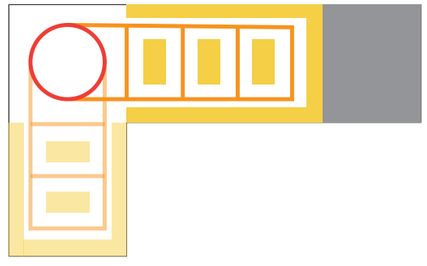
contradiction

Main Challenges

External Ramps



PABT

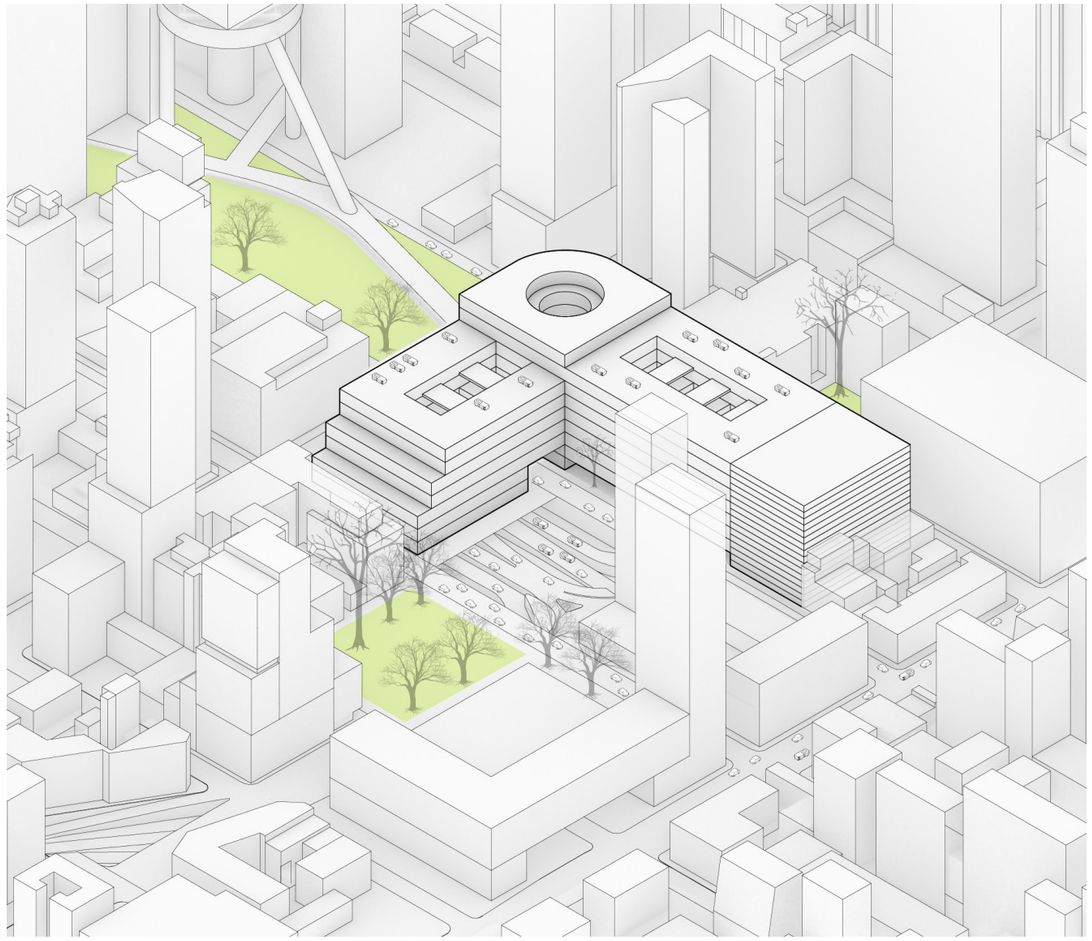


NewPABT

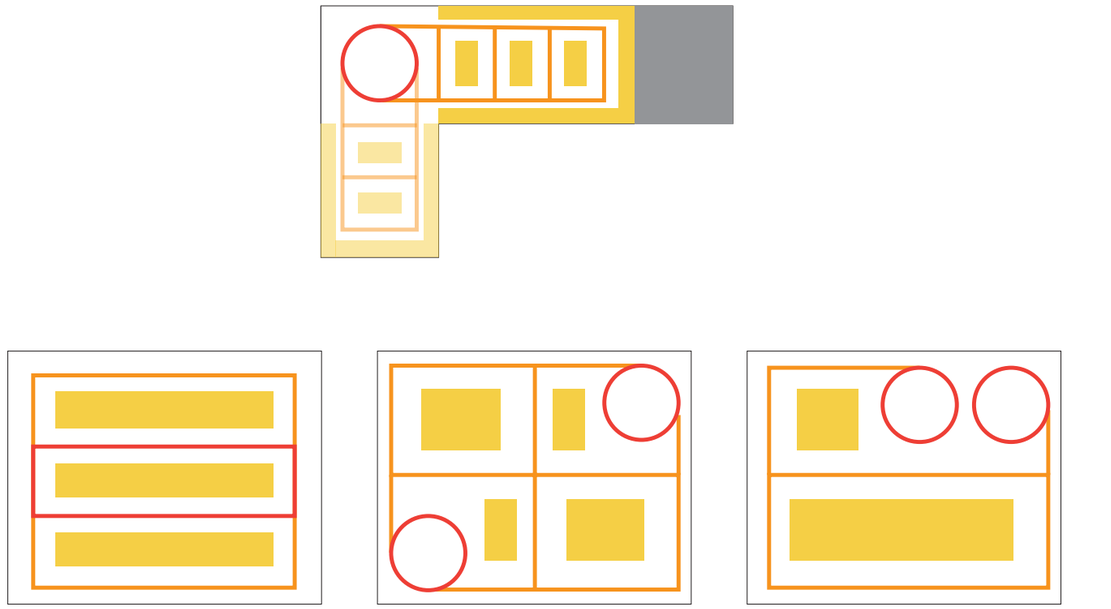
Horizontal Bus Flows

Vertical Bus Flows

Main Challenges

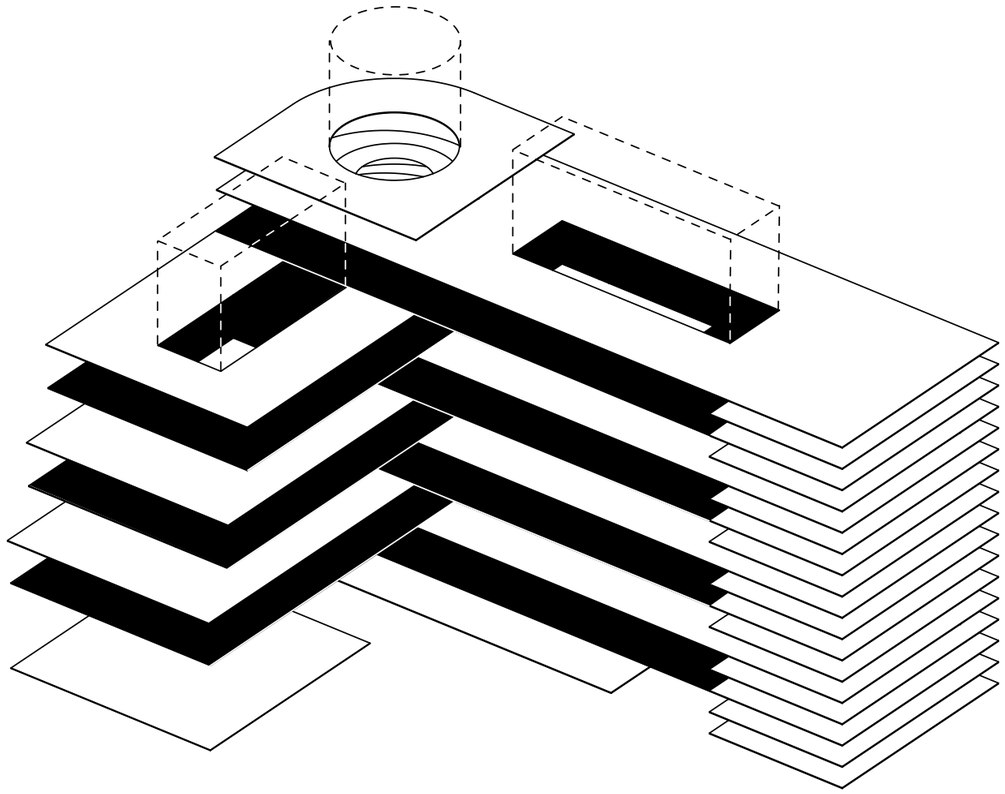


"L" shape volume



Horizontal Bus Flows

Vertical Bus Flows



NEW PORT AUTHORITY BUS TERMINAL

MANHATTAN FUTURE GATEWAY