Algaetecture

Living designs integrated in the built environment

Structure

_Fascination

_algae cultivation methods

_location

_relevance

_algae Cultivation methods

_architecture

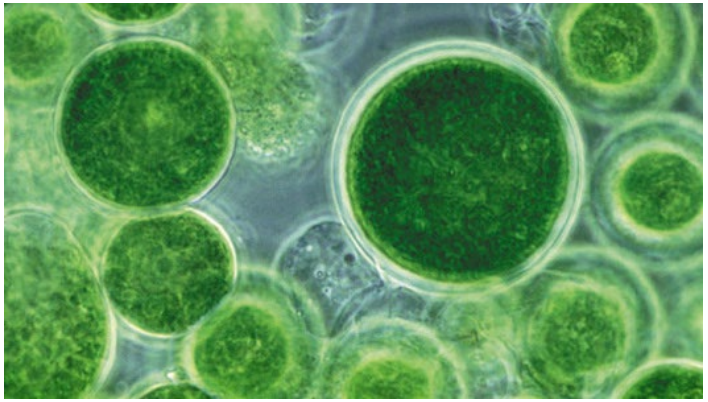
fascination

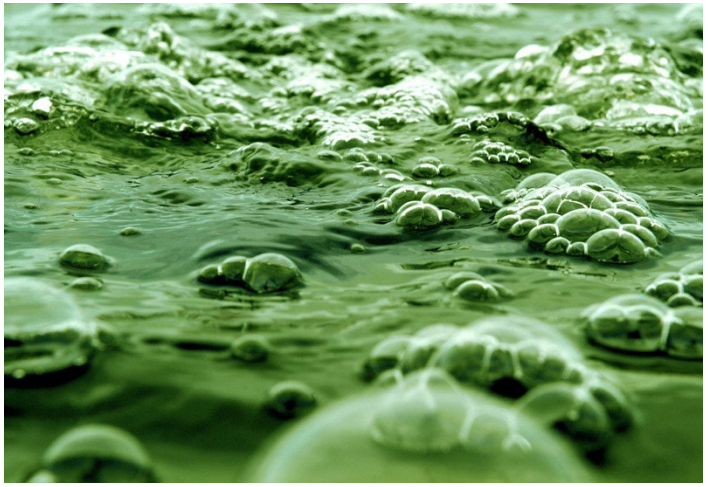
_research question:

How can we incorporate algae as a renewable energy generating component in architecture?

fascination

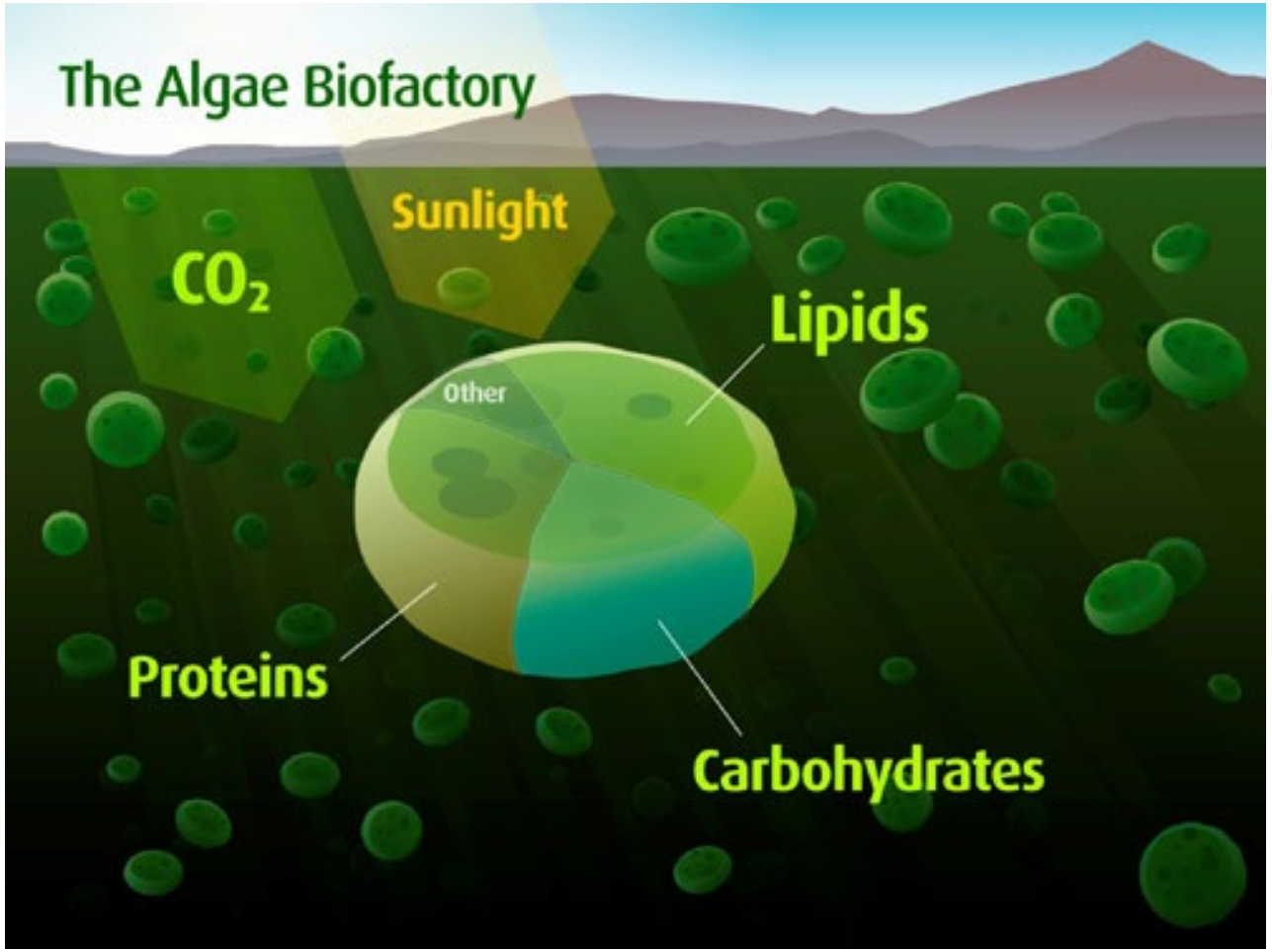
_Algae





fascination

_How do algae grow

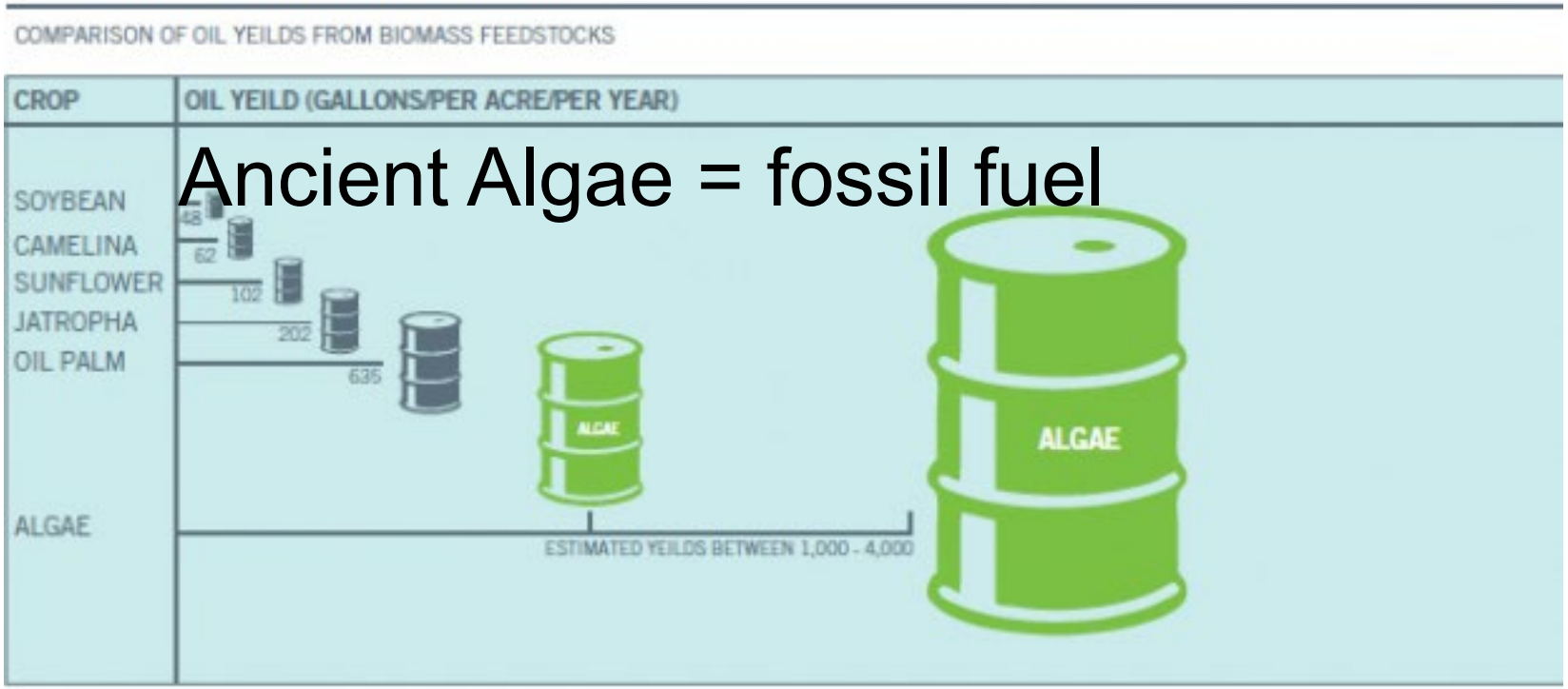


fascination

_Lipids

__bio-diesel

__bio-jetfuel



Source: globalccsinstitute

fascination

_gases

__Biogas

__Biohydrogen

__oxygen

fascination

_Algae in todays products

Food of the future?

Source: Al Fin Energy

Fascination

_Algae as renewable energy in architecture

Fascination

_BIQ building, Hamburg – Arup/splitterwerk

Relevance

_Why using algae in architecture

__Adaptive sunshading

__Application of algae cultivation in the design (living building)

__exciting new renewable energy production

__different appearance of architecture

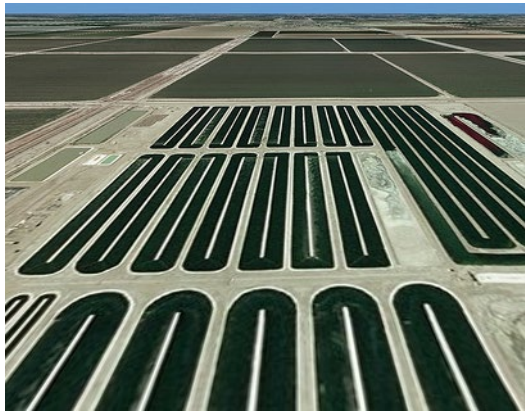
__Small scale algae production in the built environment

__reduce or neutralize CO2 emissions

__food security in the future

Algae cultivation methods

_Open raceway ponds



Source: www.pnnl.gov

_closed photo bioreactors

Source: *Tarpan Bio-Industries*

_closed fermenters

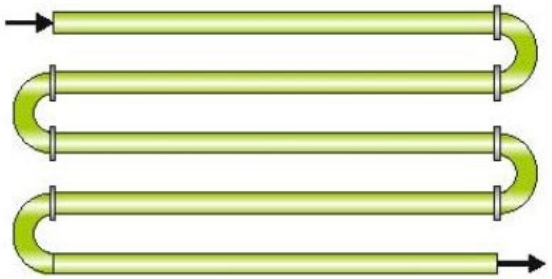
Source: Linzihou

Algae cultivation methods

Closed photobioreactor

_tubes

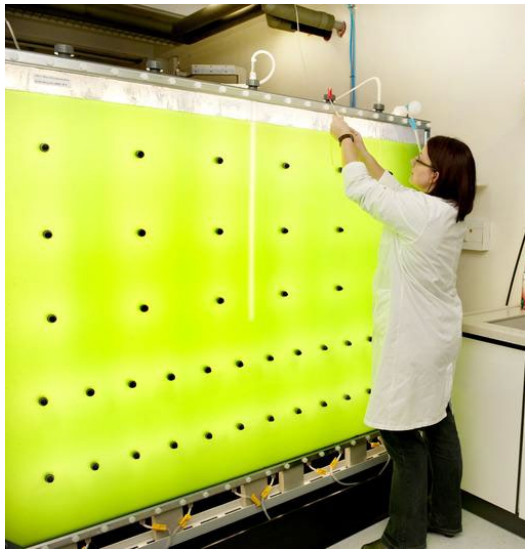
Source: algaePARC

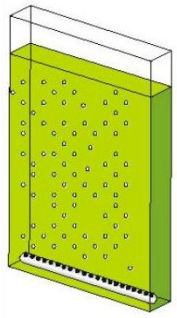


Algae cultivation methods

Closed photobioreactor

_panels





Algae cultivation methods

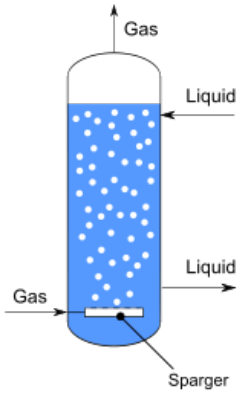
Closed photobioreactor

_bubble columns

Source: Southern Regional Aquaculture Center

Source: Algaeindustrymagazine

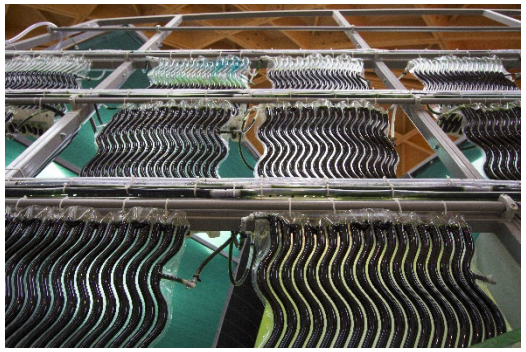
Source: Tom Story

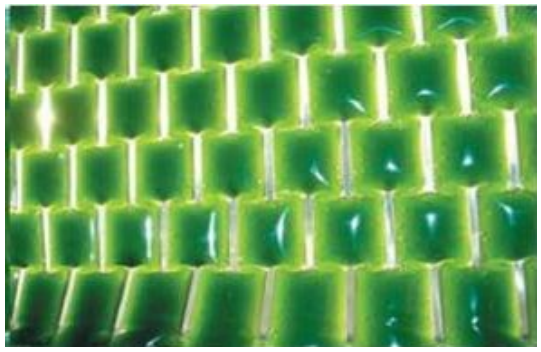


Algae cultivation methods

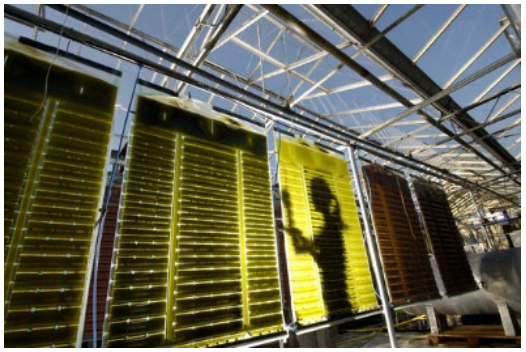
Closed photobioreactor

_polycarbonate bags





Source: Proviron

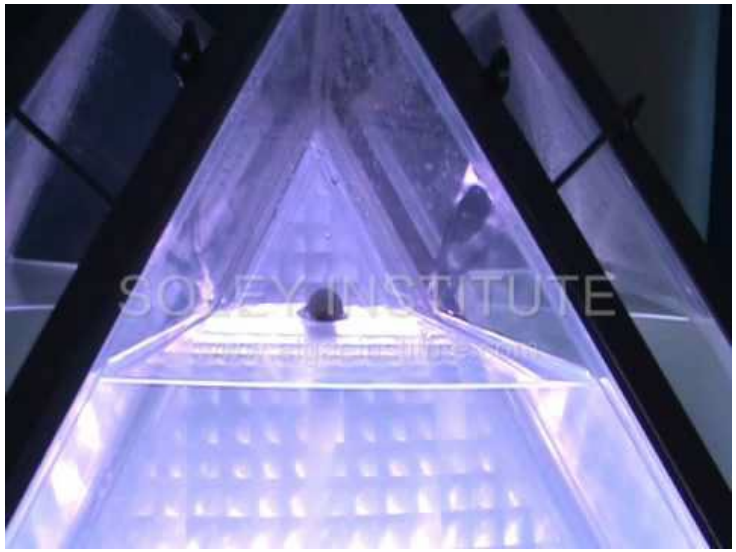


Source: Subitec

Algae cultivation methods

Closed photobioreactor

_pyramid (soley institute)



Algae cultivation methods

Closed photobioreactor

_conclusion

__panels

__tubes

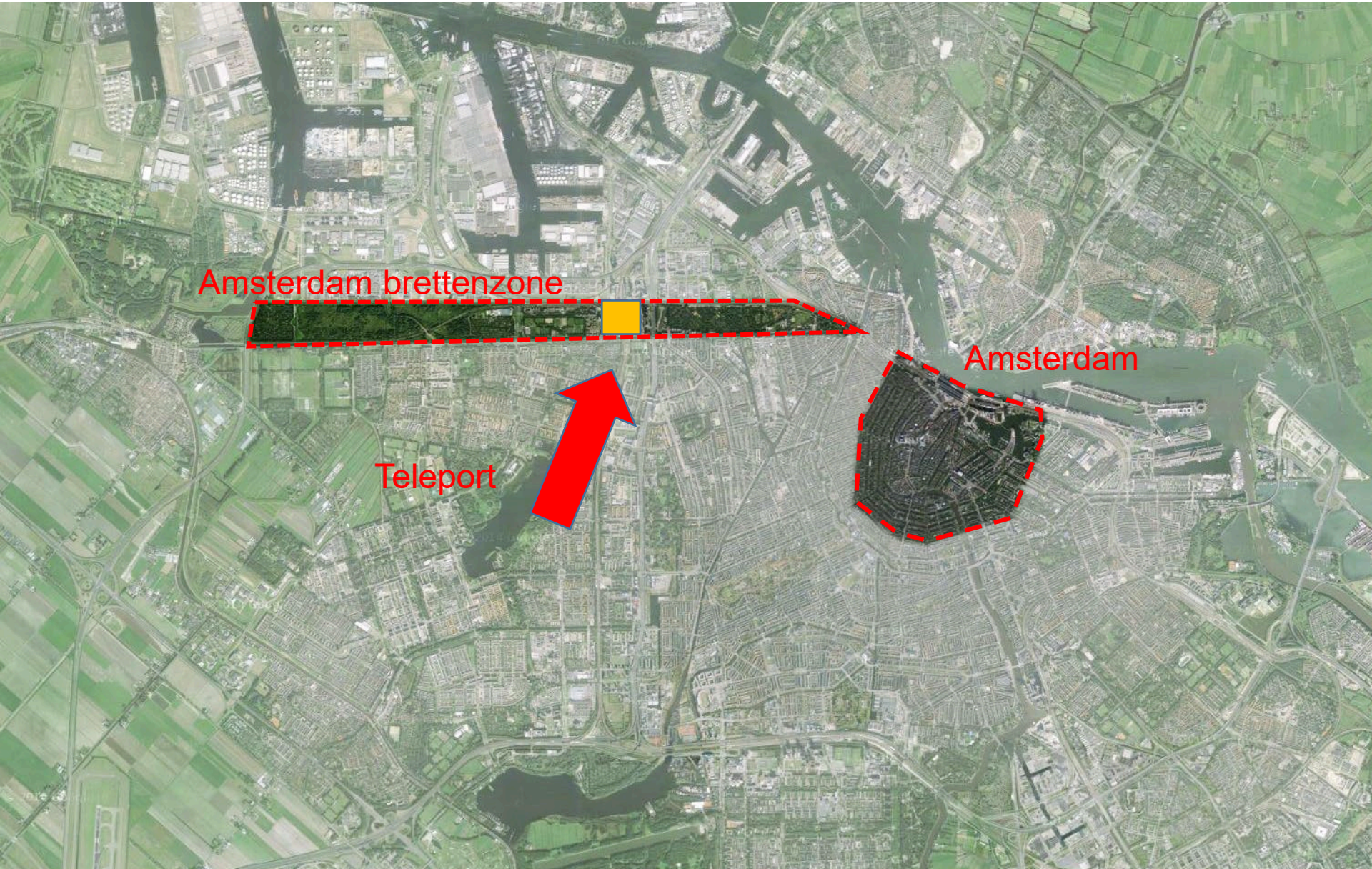
__bags

__columns

__pyramid

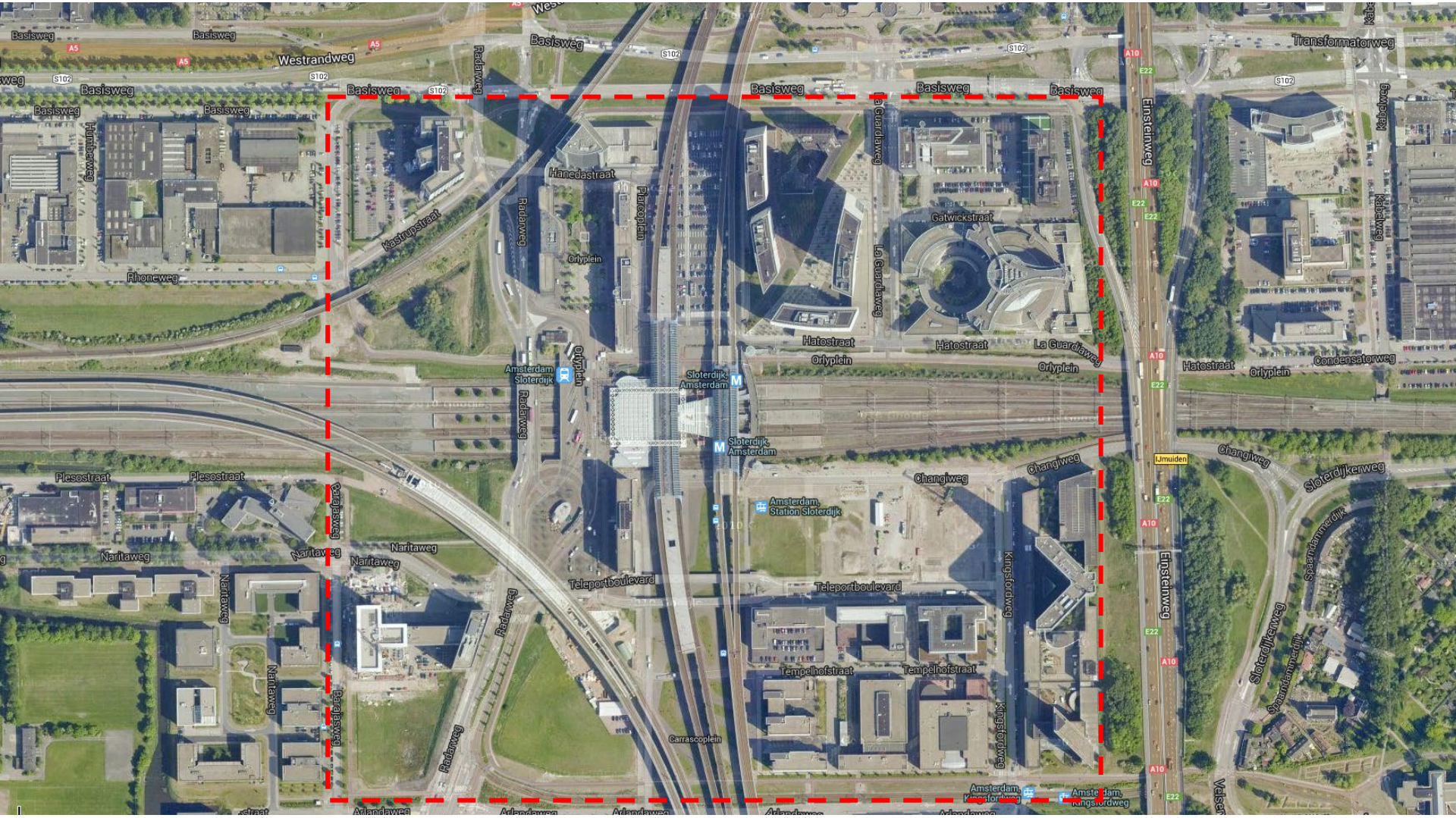
Location

Location



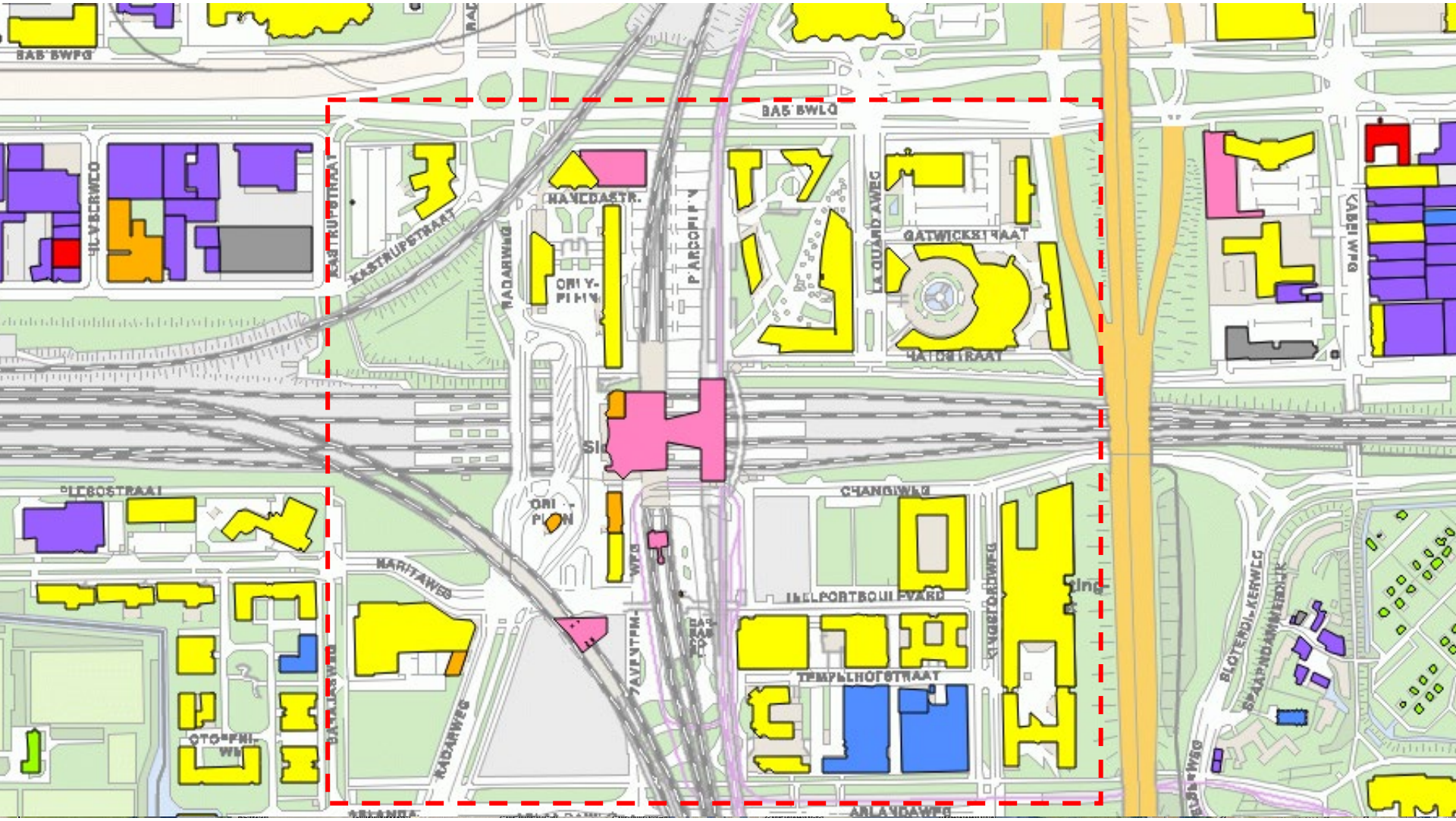
location

Situation



location

Situation



Problem statement

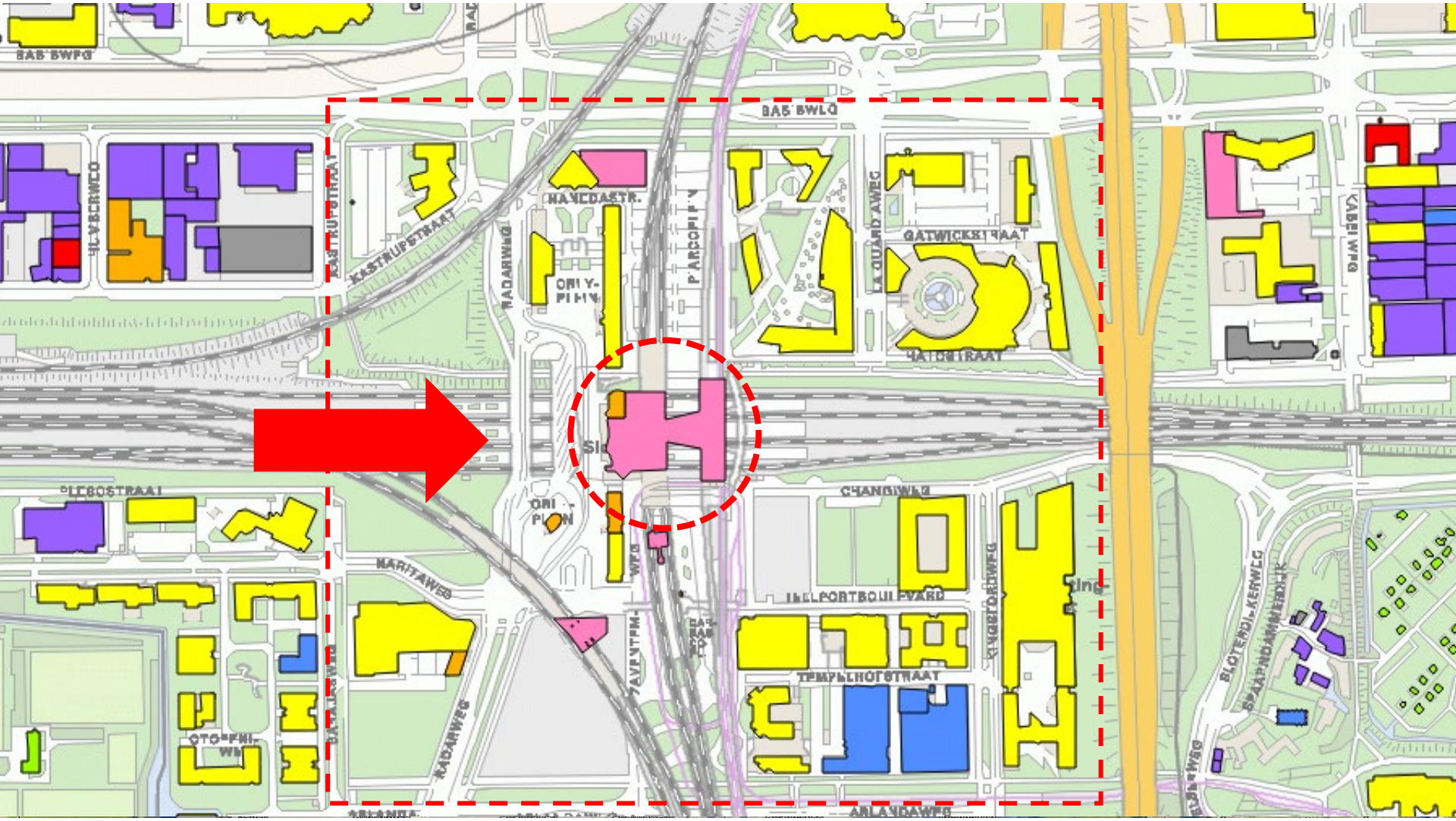
_teleport is monofunctional

_No vibrancy during off-peak hours

_dull and grey urban context

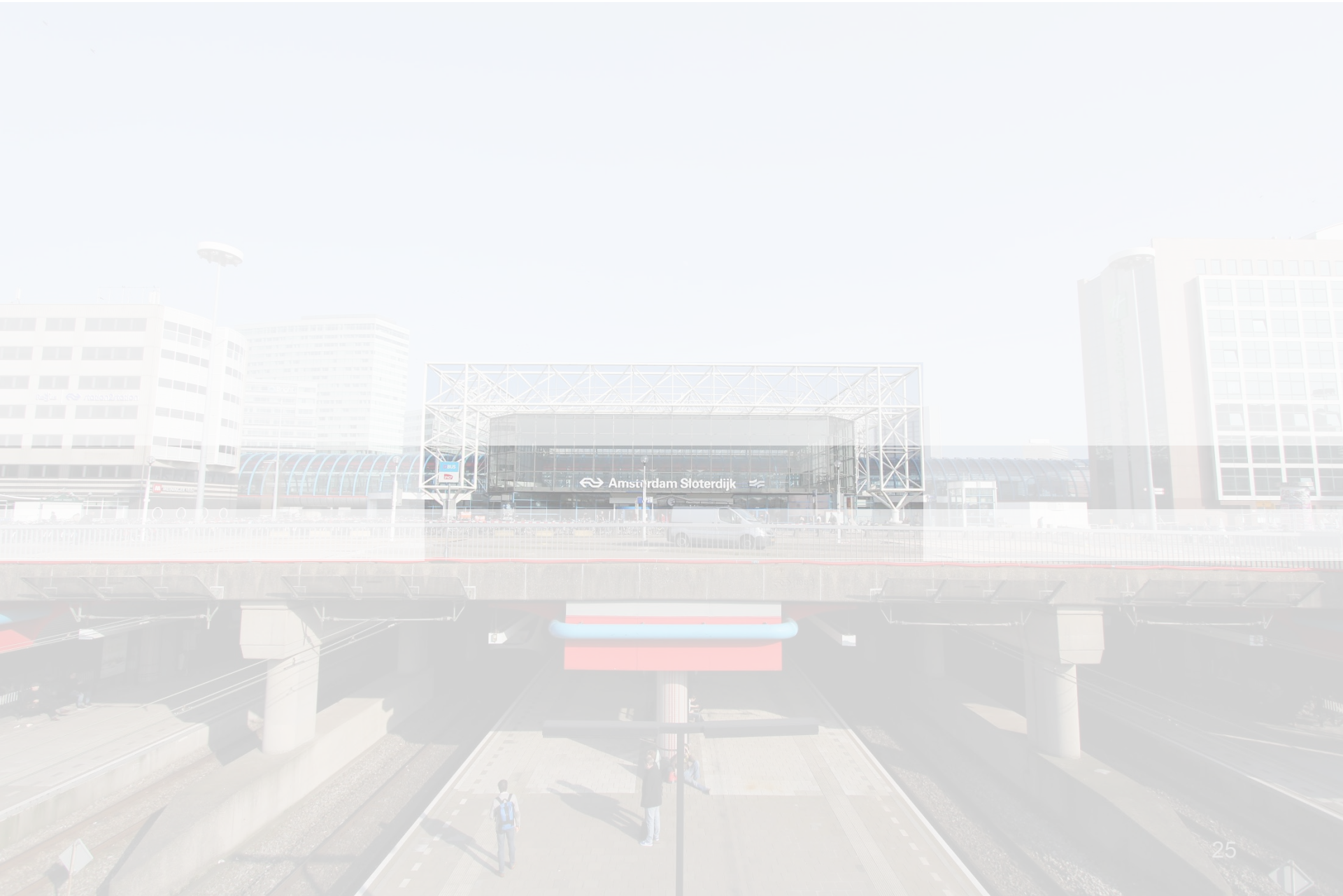
location

Situation



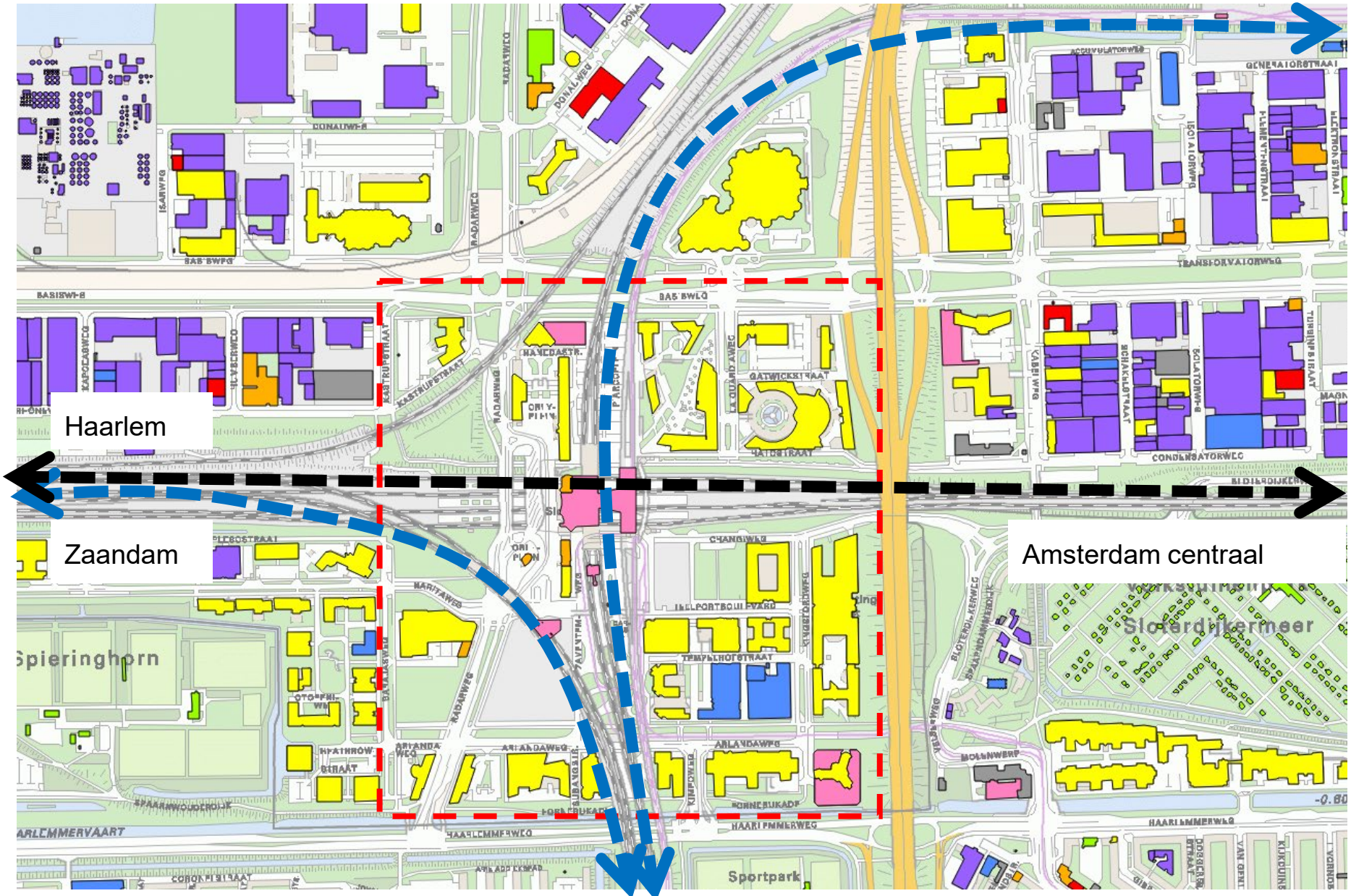
location

Situation

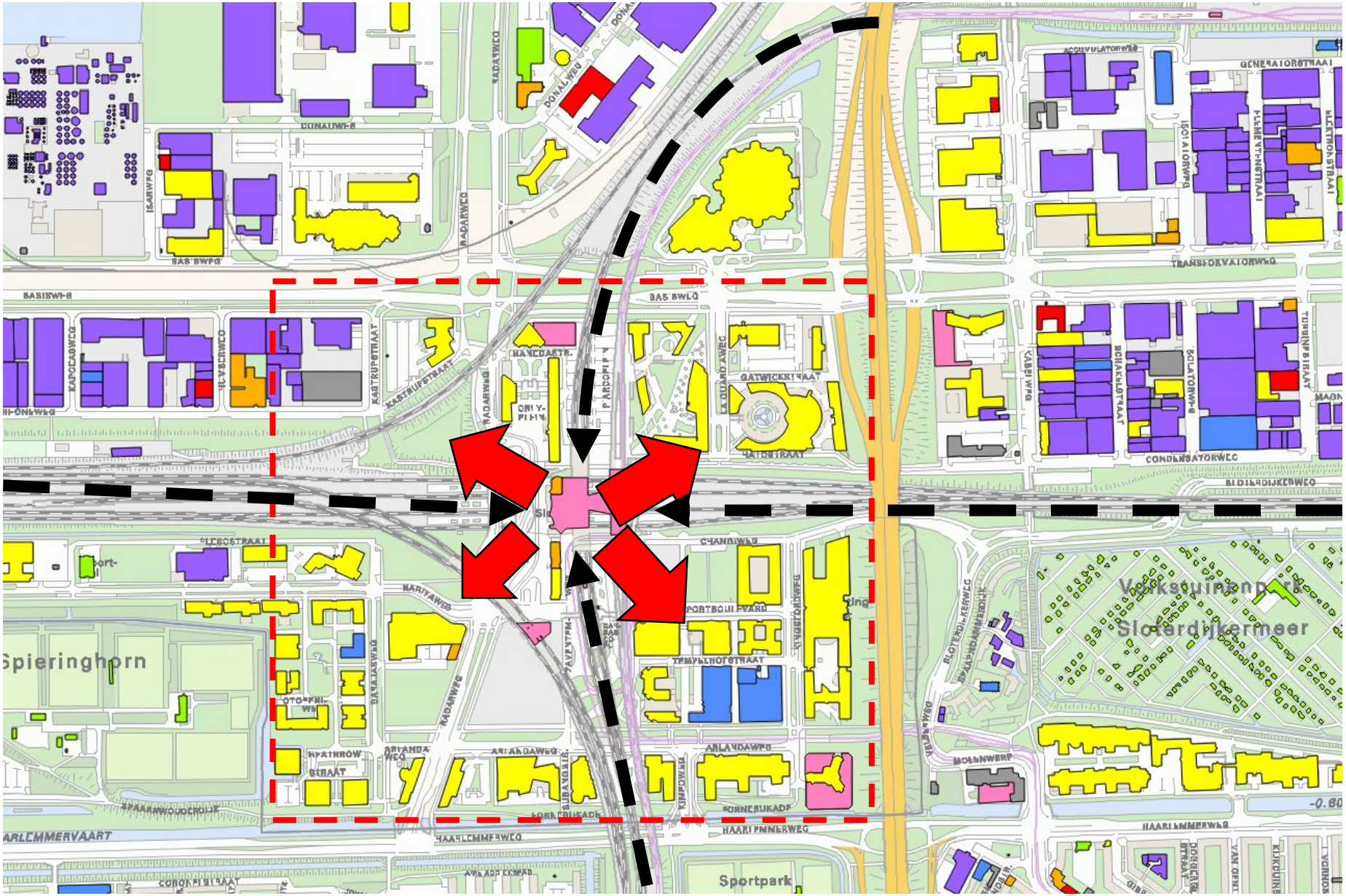


Location

Amsterdam centraal

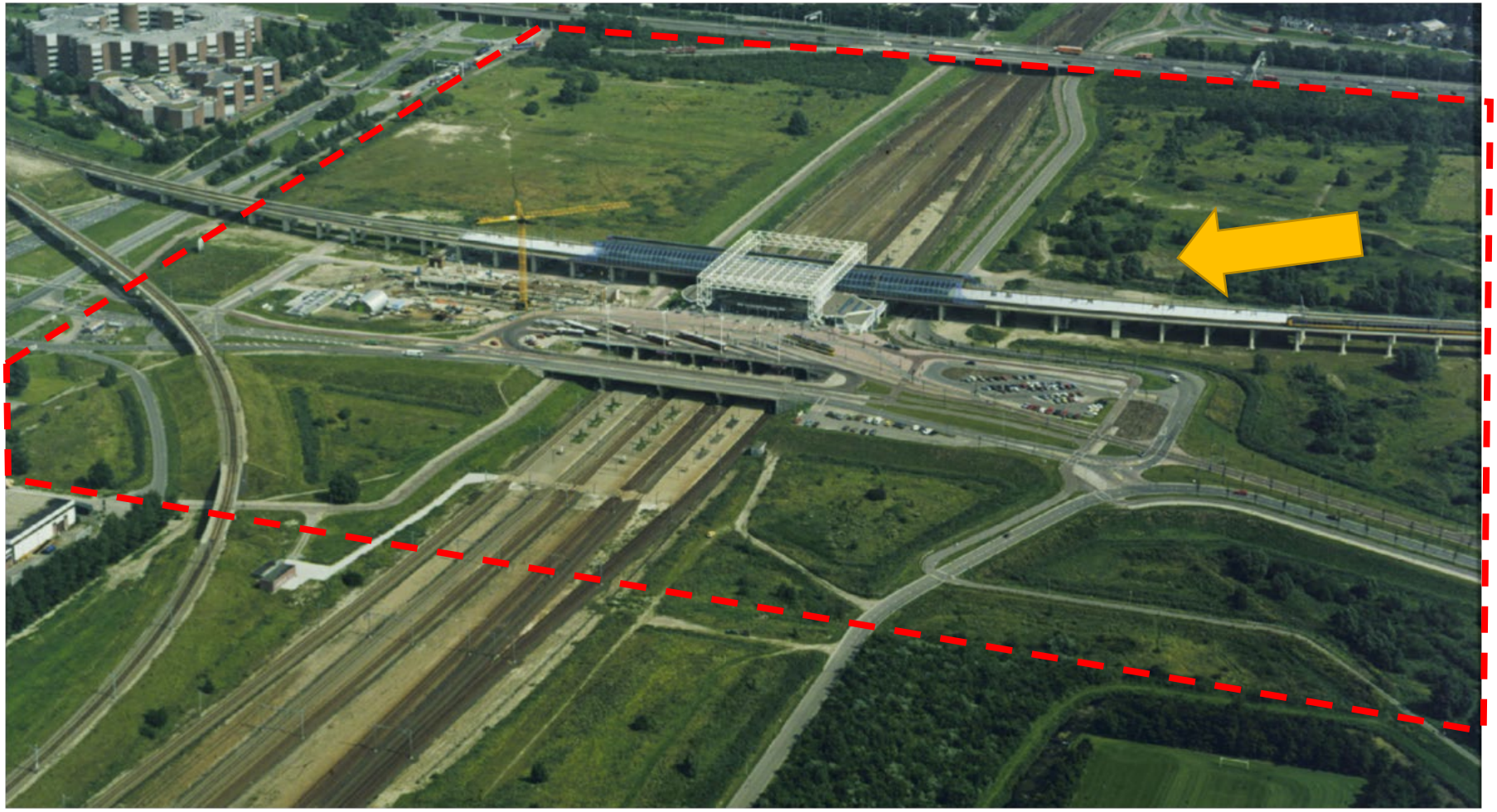


Location


Spieringhorn
Sportpark
Volkstuinenpark
Sloterdijkermeer

Location

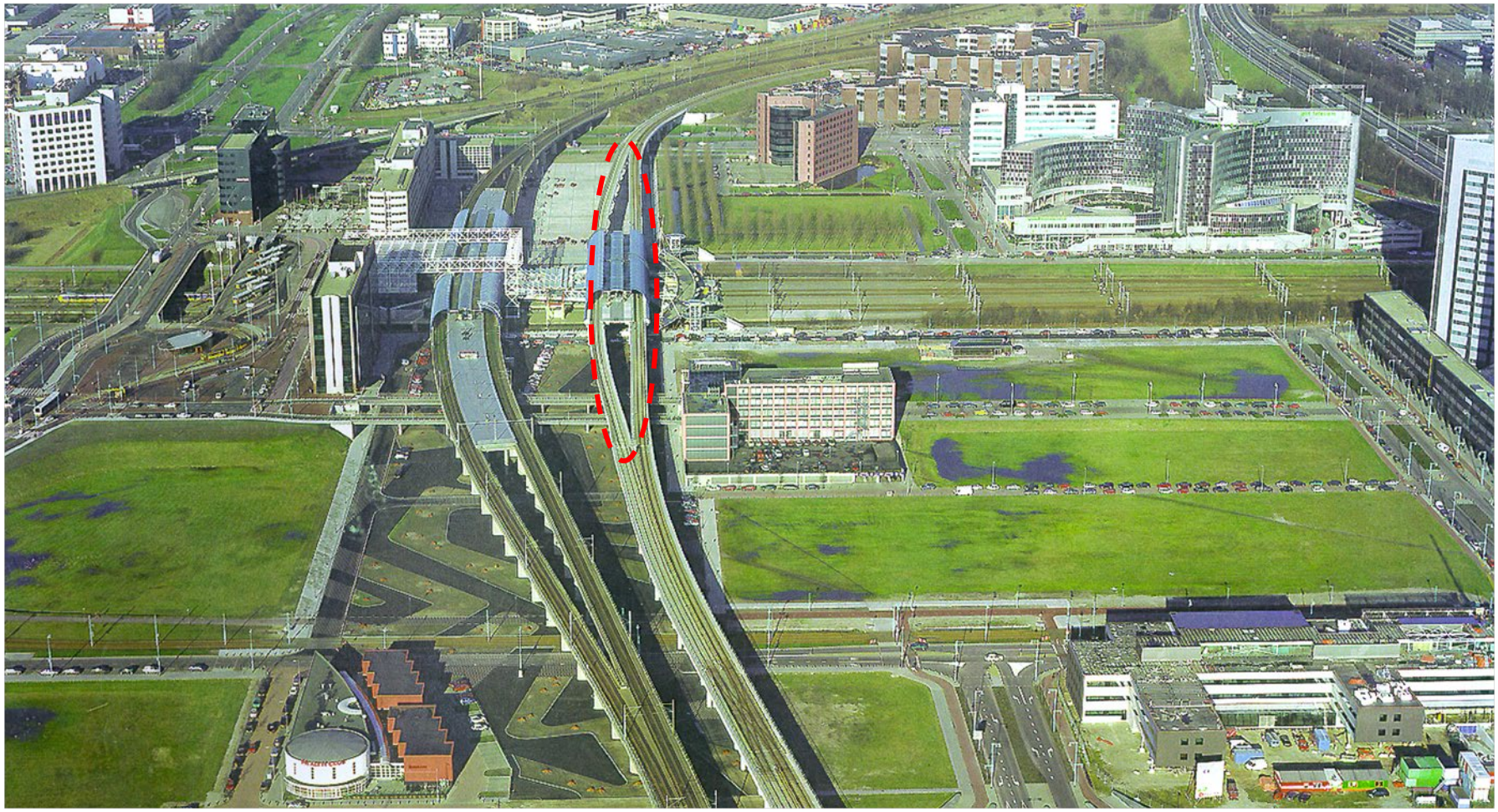
_Amsterdam sloterdijk station 1986



Source: Jan Duffhues

Location

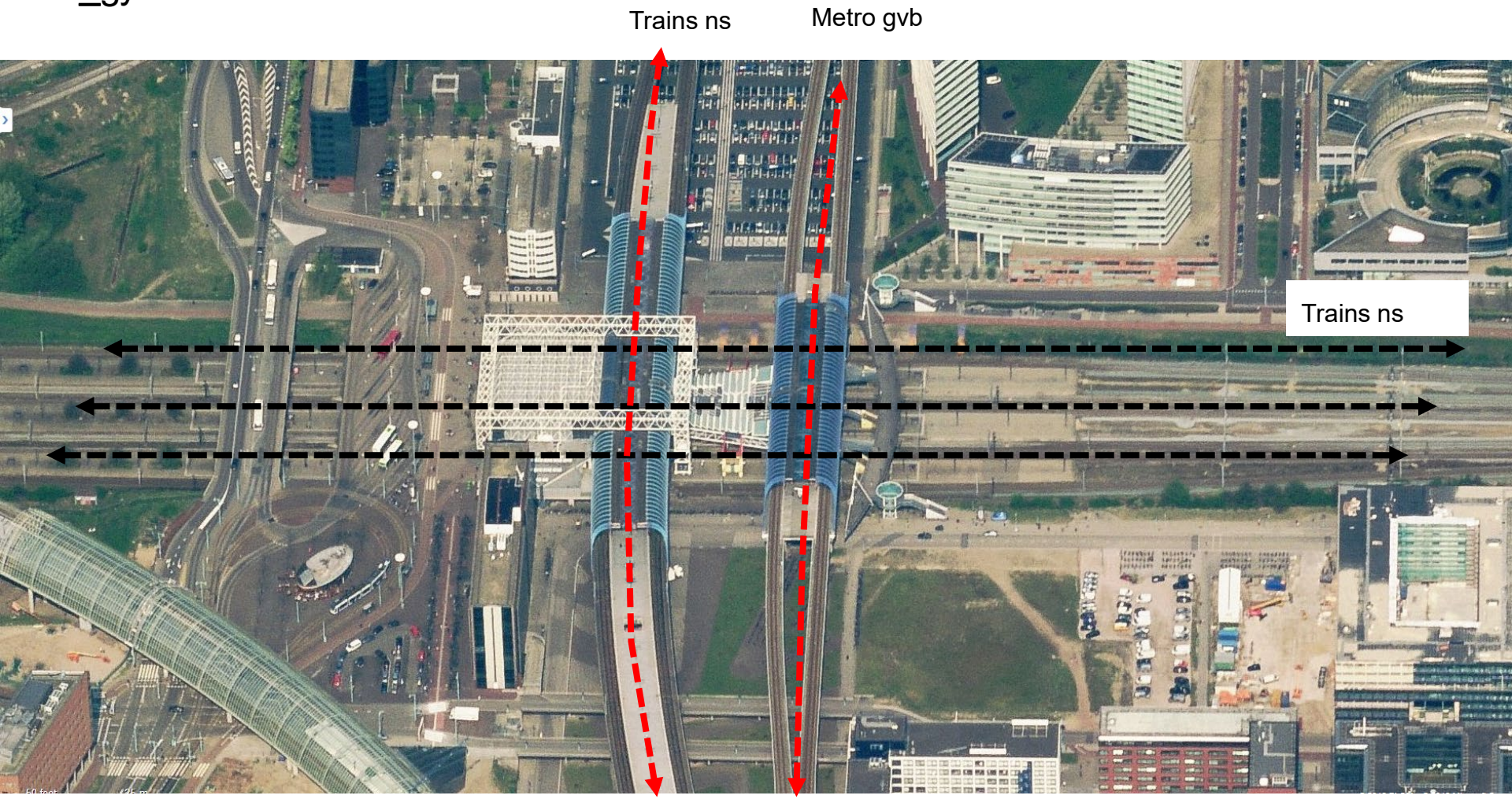
_Amsterdam sloterdijk station 1995



Source: Jan Duffhues

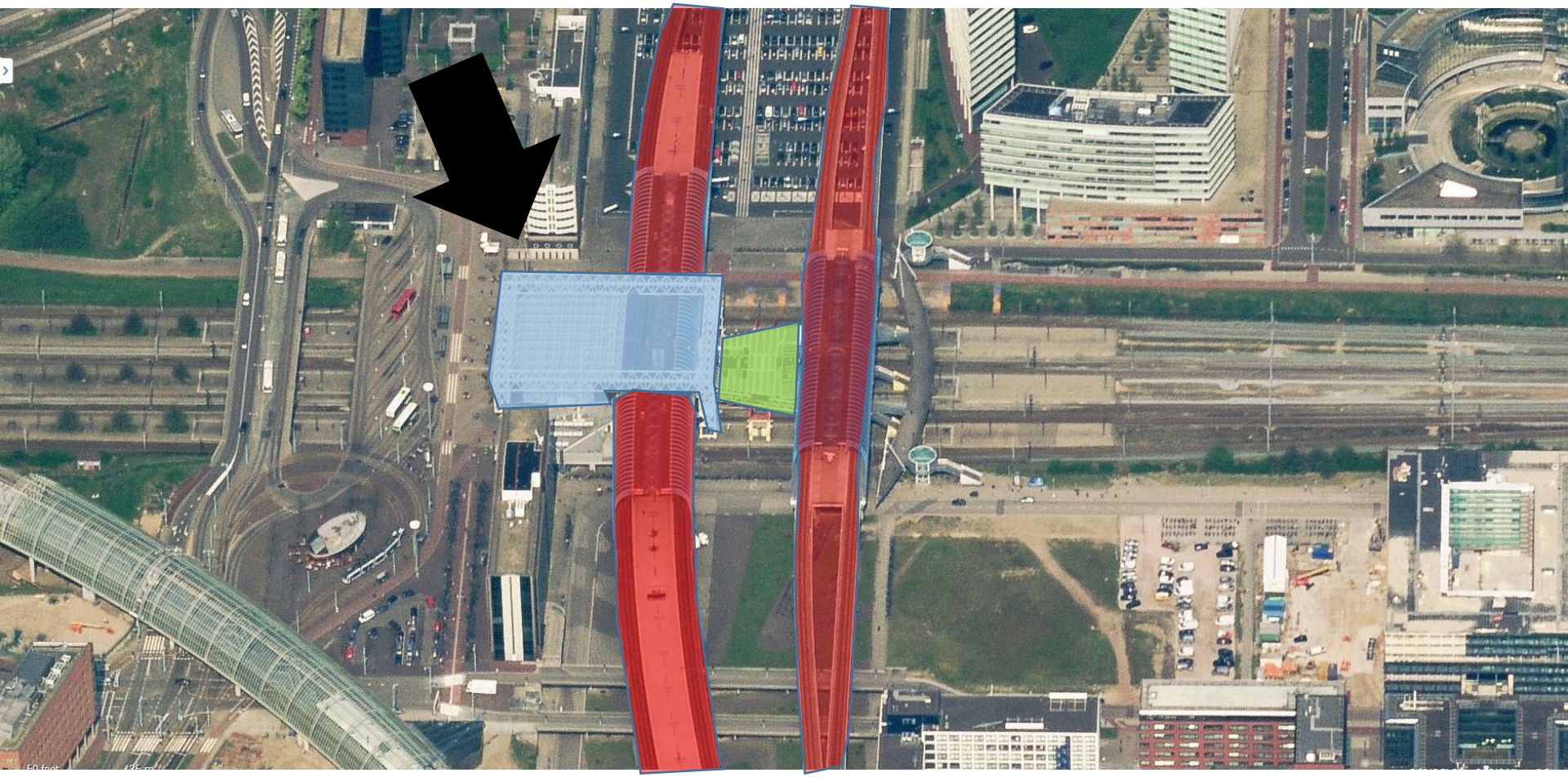
Amsterdam sloterdijk

_ground level trains



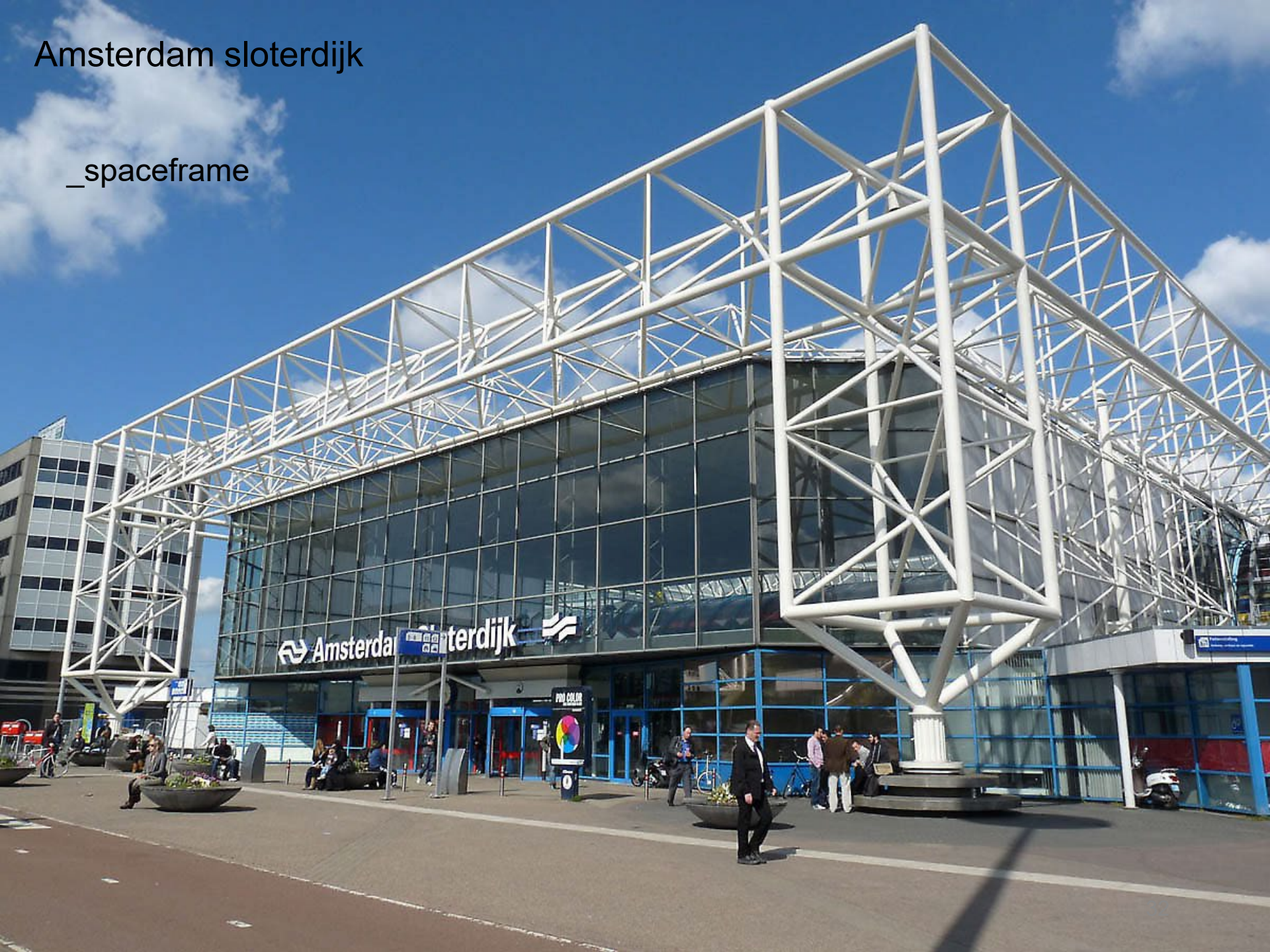
Amsterdam sloterdijk

_3 types of structures



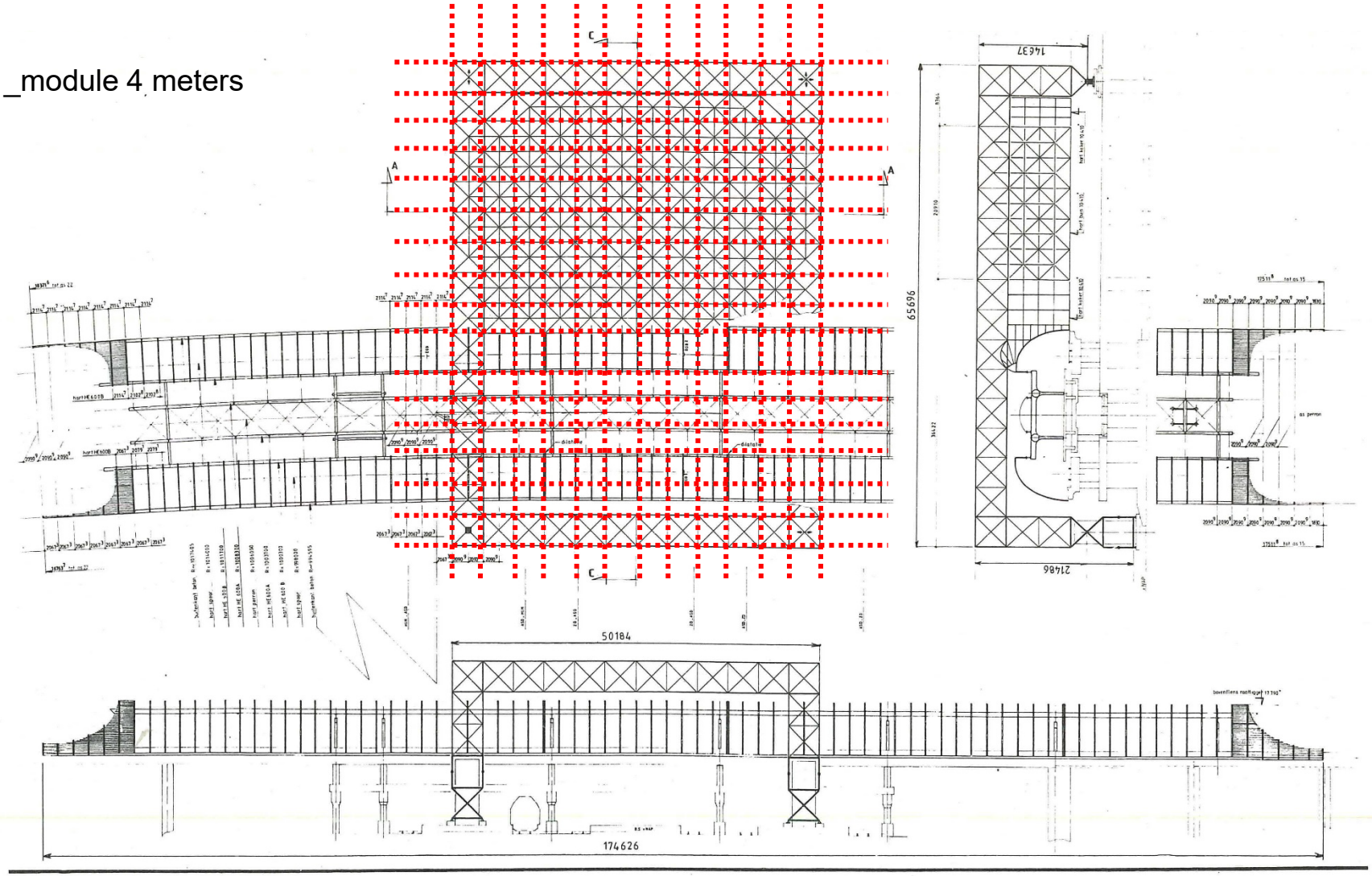
Amsterdam sloterdijk

_spaceframe



Amsterdam sloterdijk

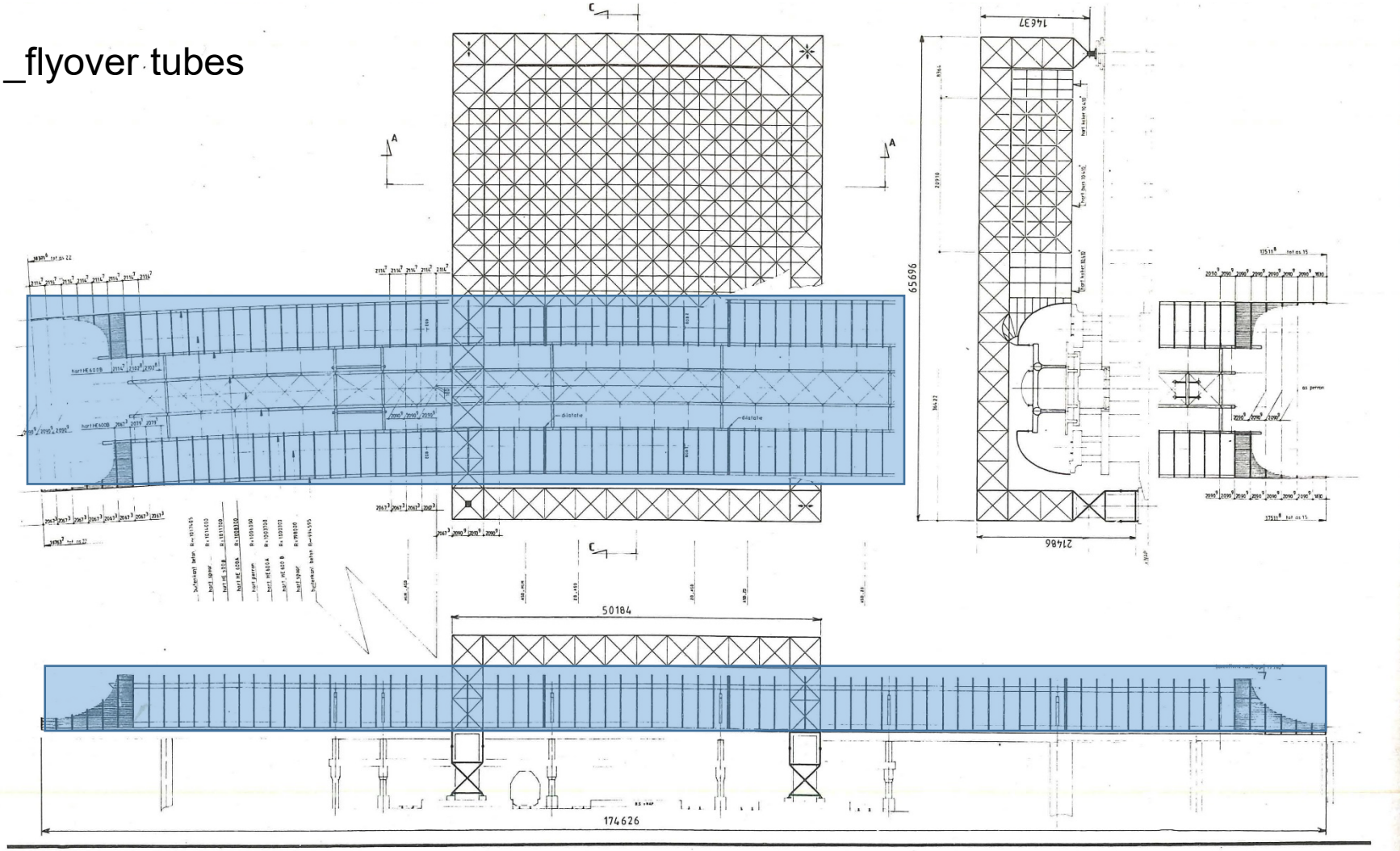
_module 4 meters



Afbeelding 3. Overzichtstekening

Amsterdam sloterdijk

_flyover tubes



Afbeelding 3. Overzichtstekening

Amsterdam sloterdijk

_flyover tubes

Location

_Goals

__improve orientation of the station

__connect north-south areas

__Add services

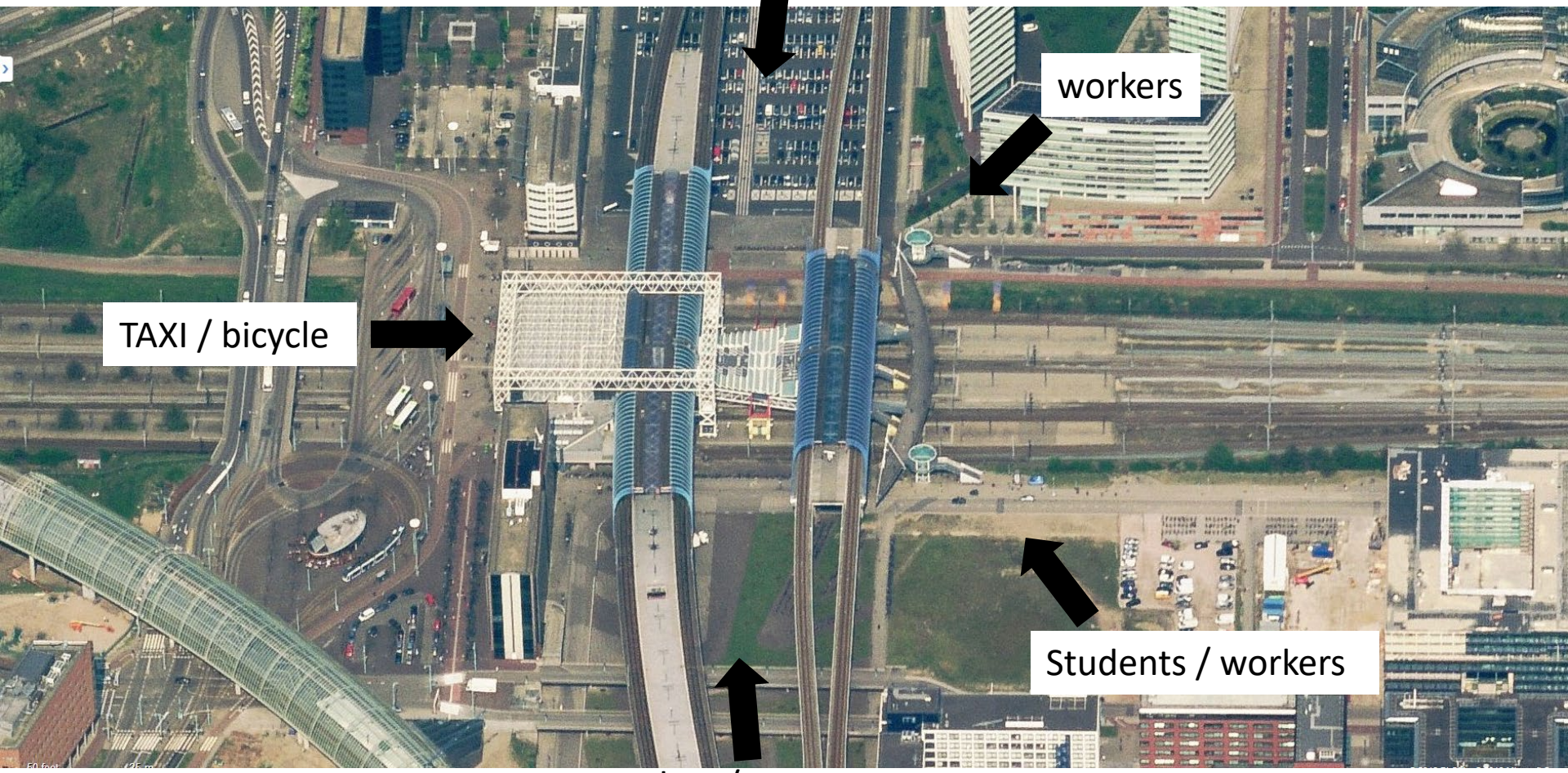
__a place to live, recreate and stay

__add color to the area

__add positive energy that creates a new impulse for the area

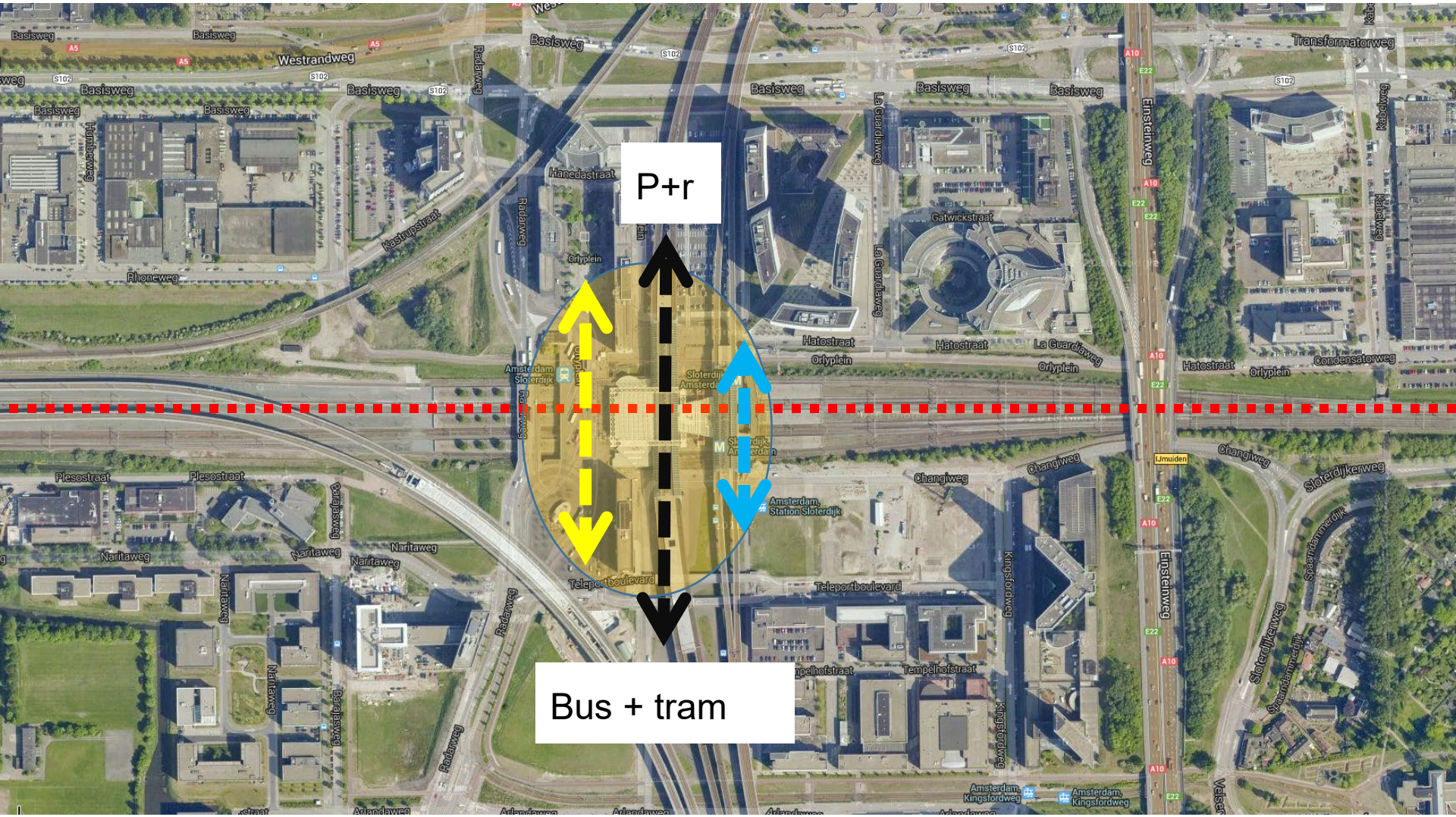
Amsterdam sloterdijk

_usage



Amsterdam sloterdijk

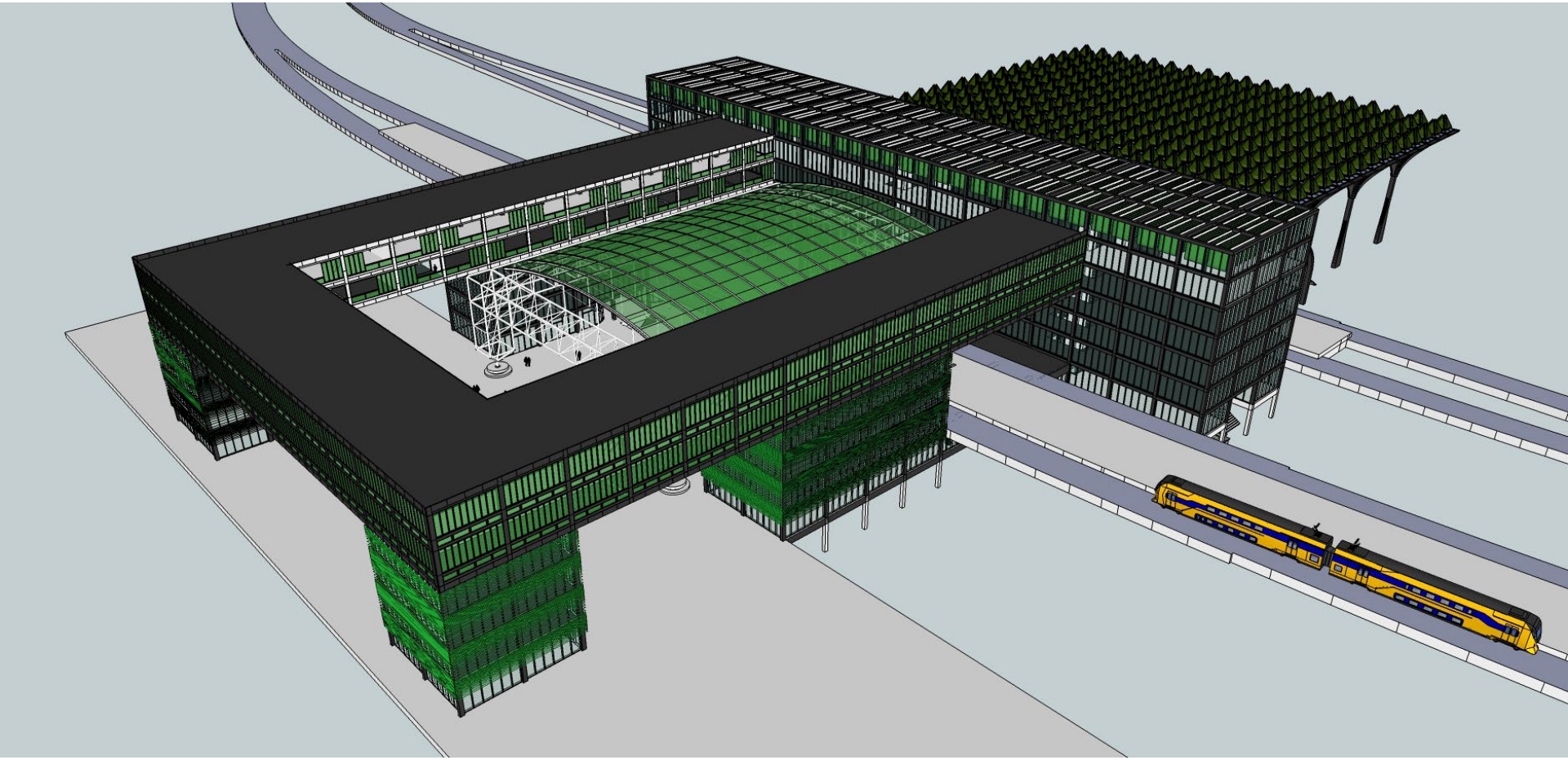
concept



Architecture

concept

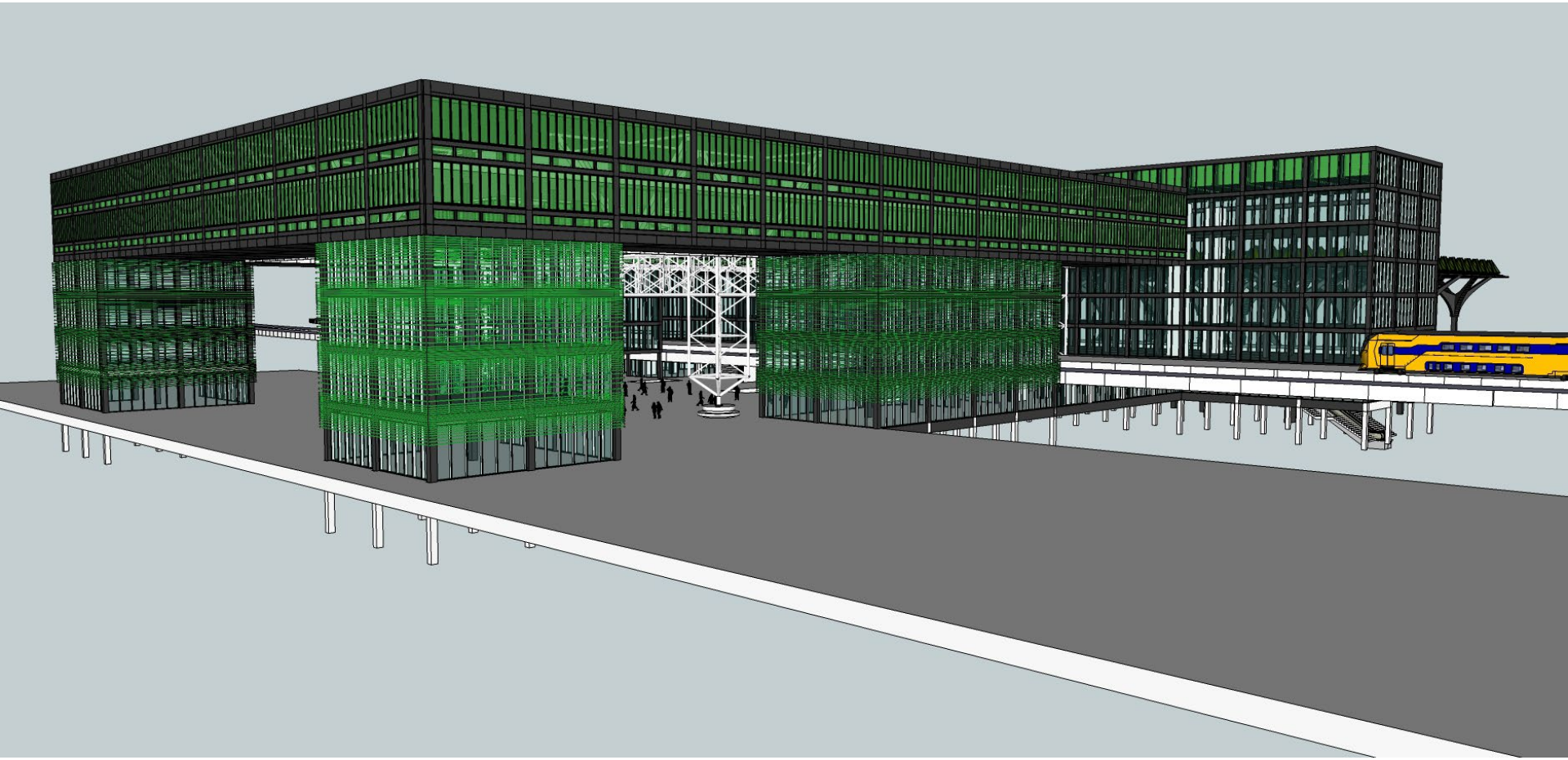
_impression building



Architecture

concept

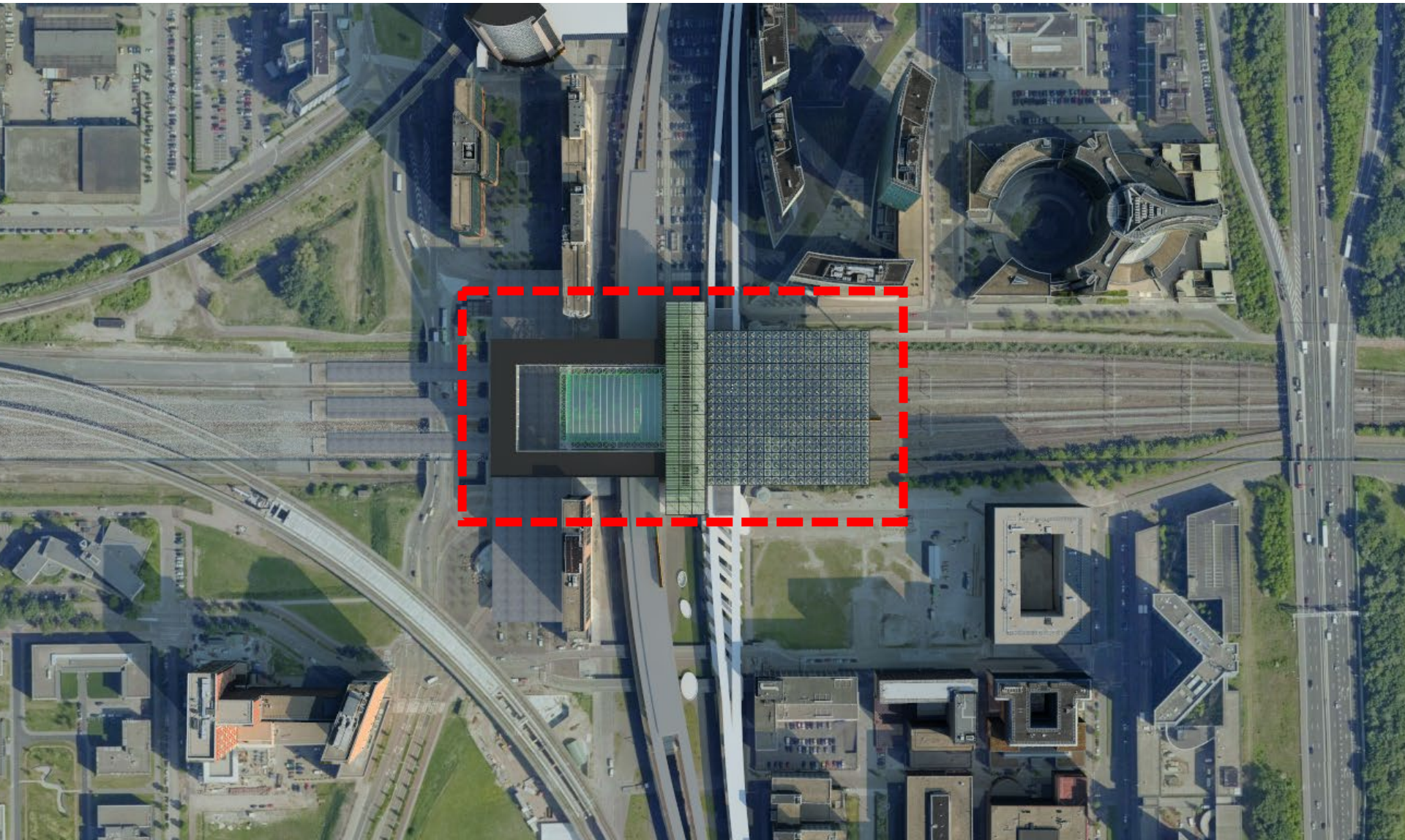
_impression building



Architecture

concept

_topview

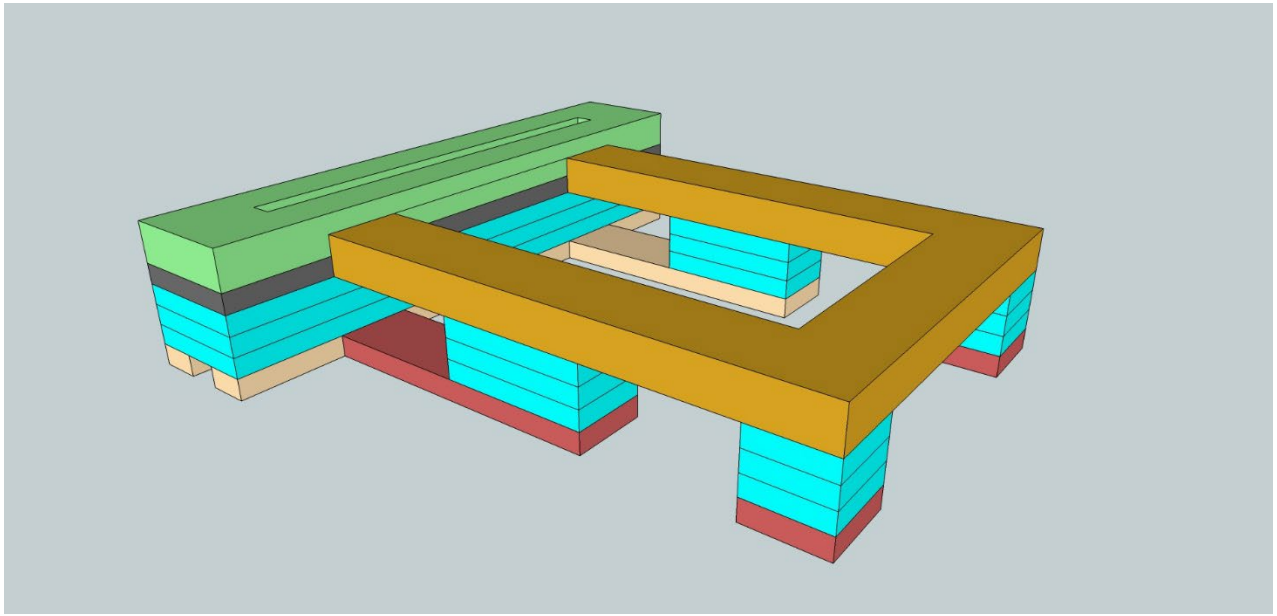


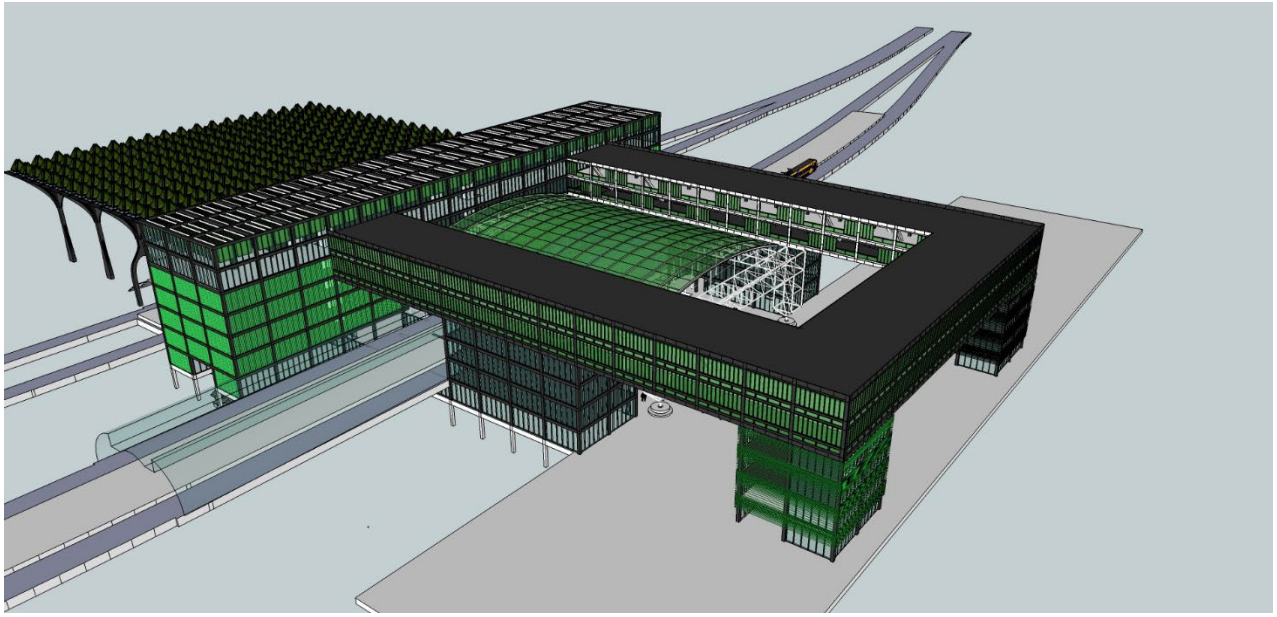
Architecture

Transformation

_function layout

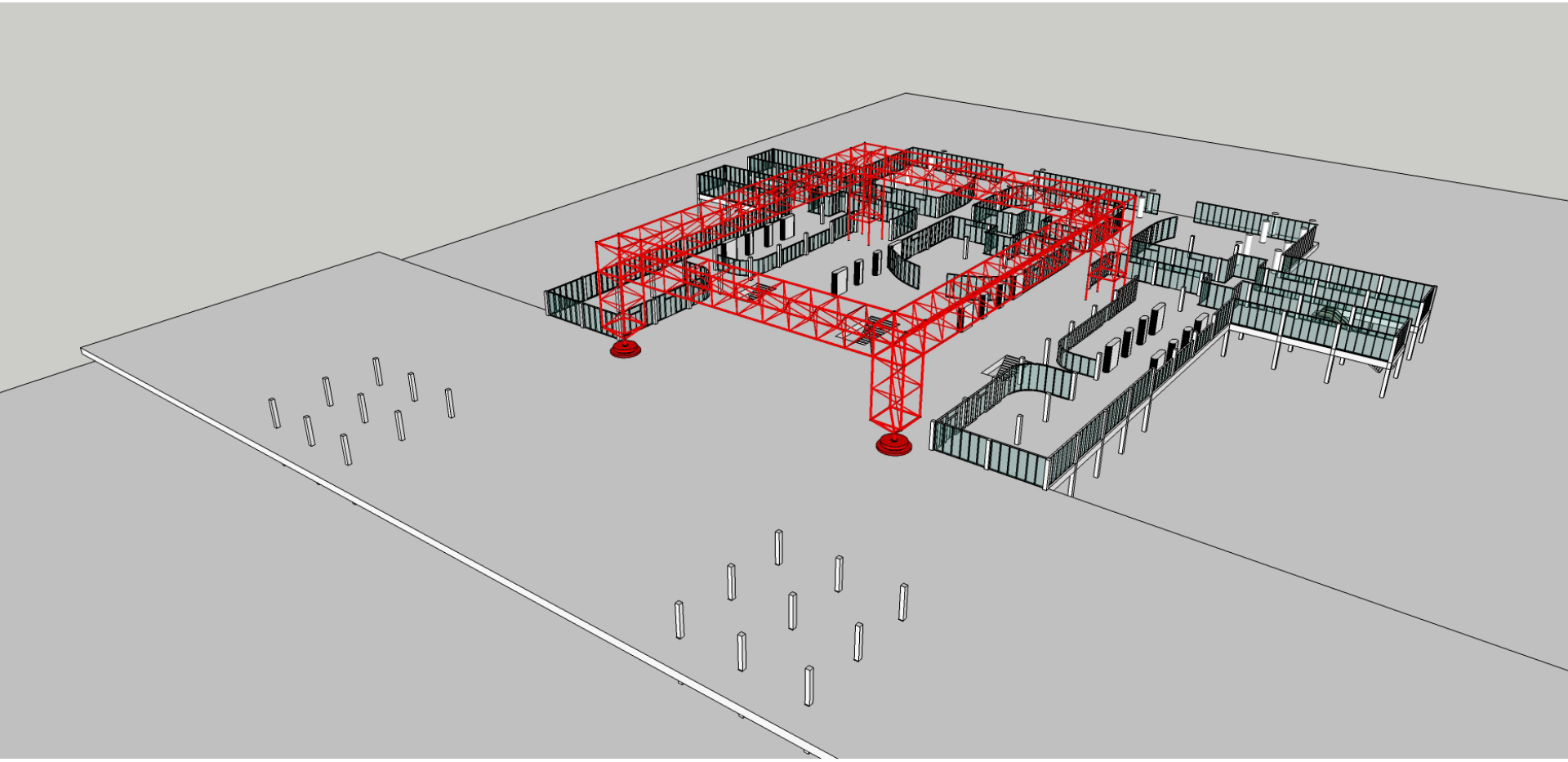
- residential
- offices
- shopping
- exhibition
- Catering
- Service space





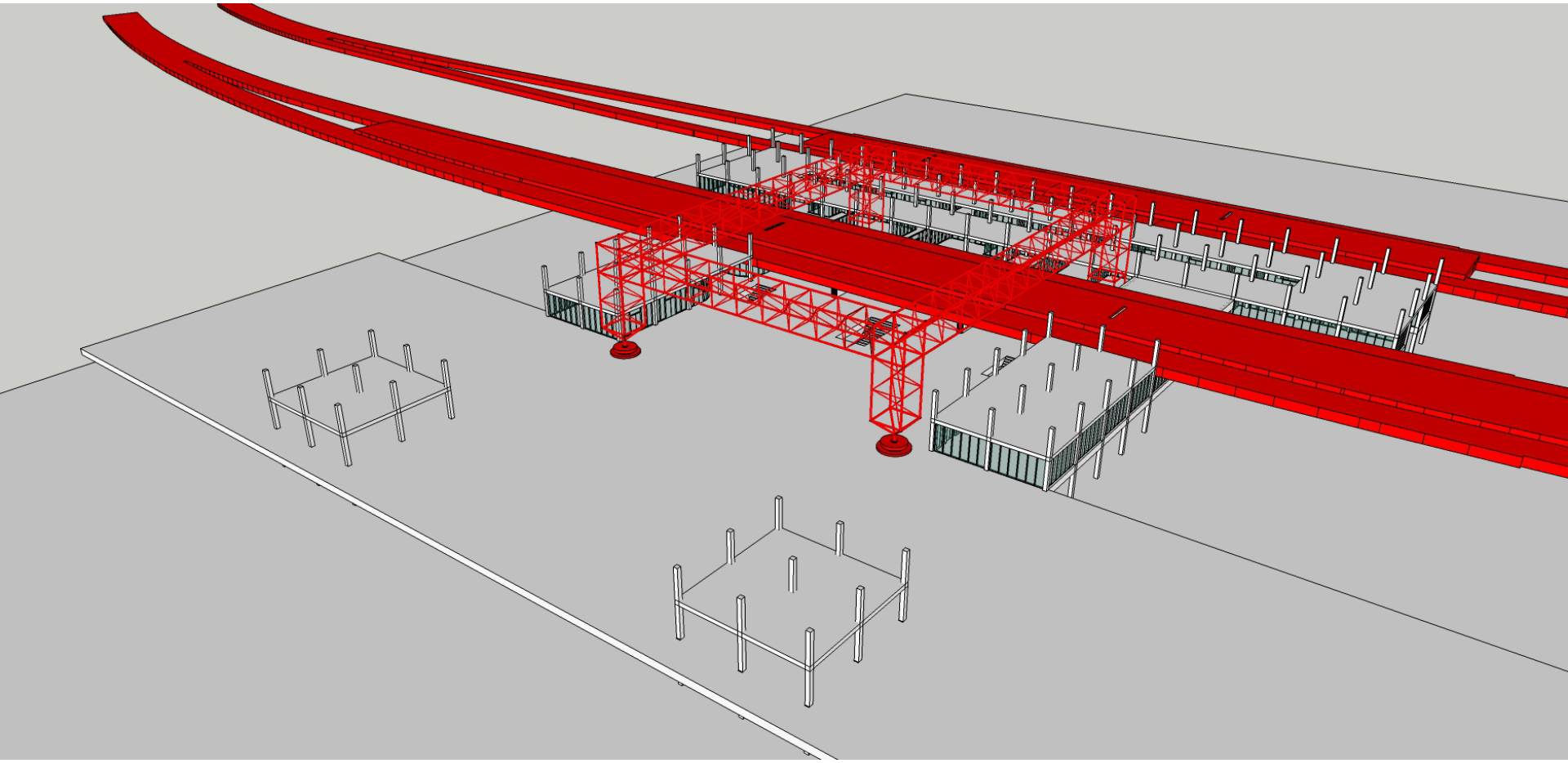
Architecture

construction



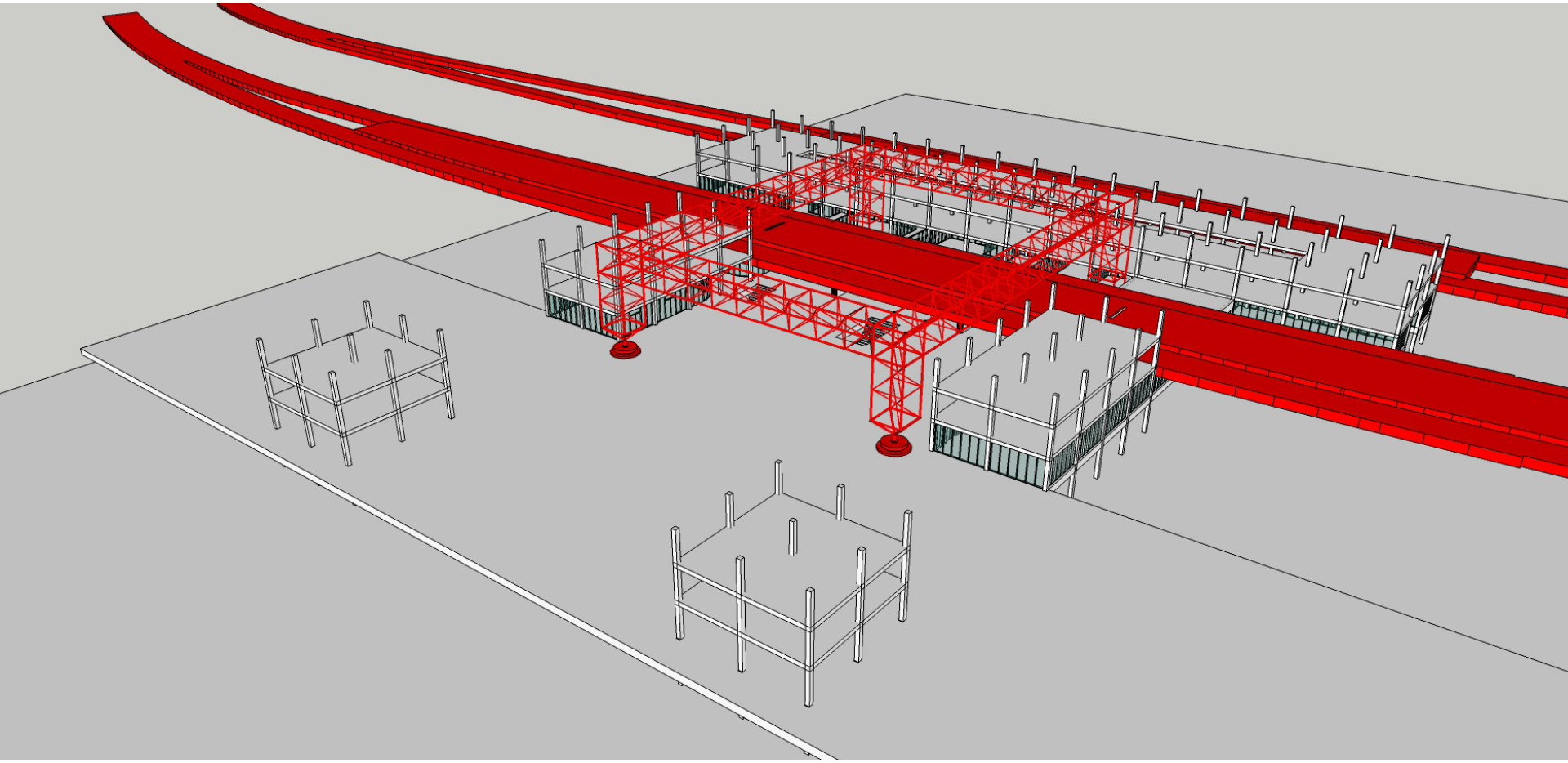
Architecture

construction



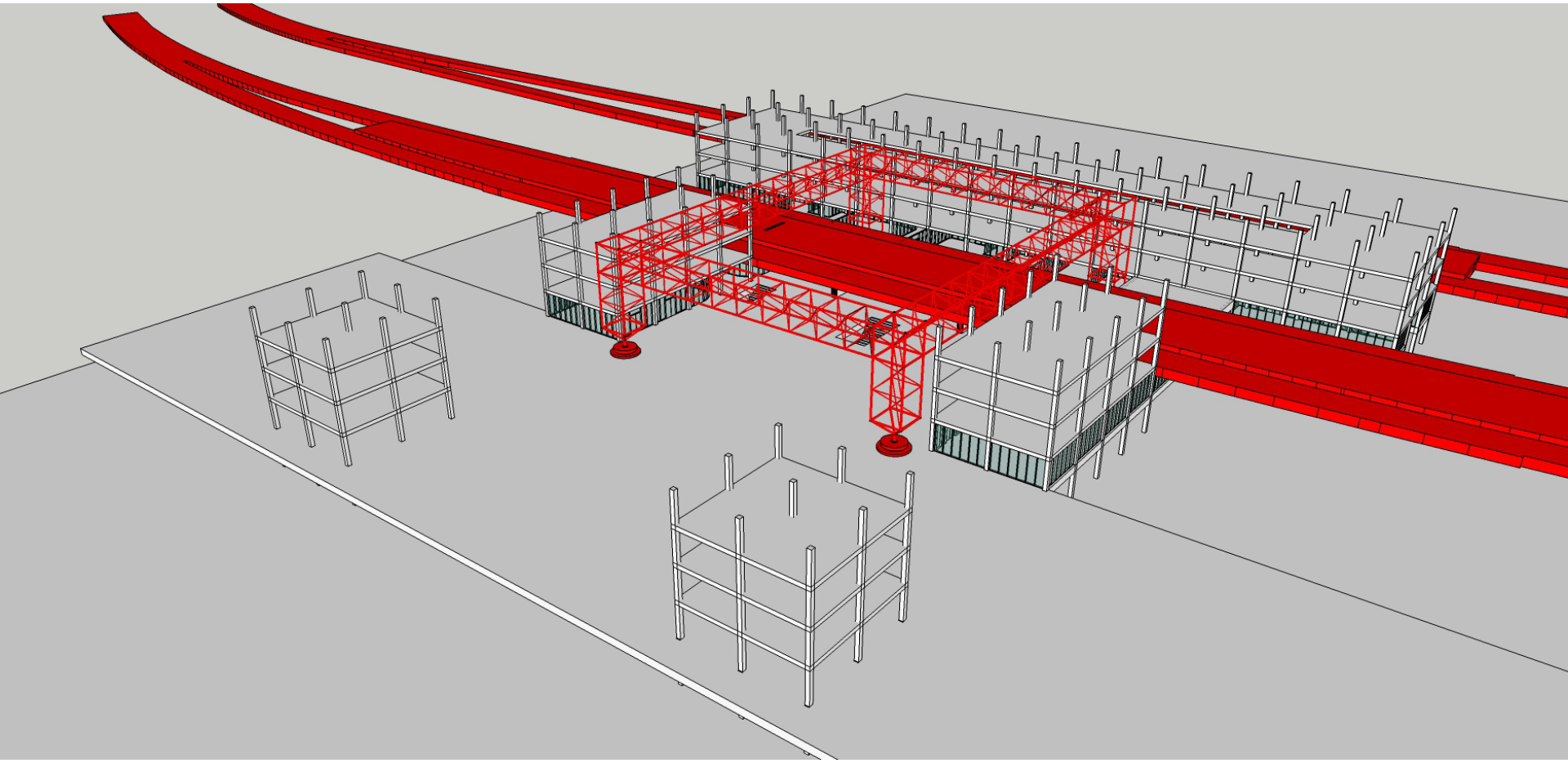
Architecture

construction



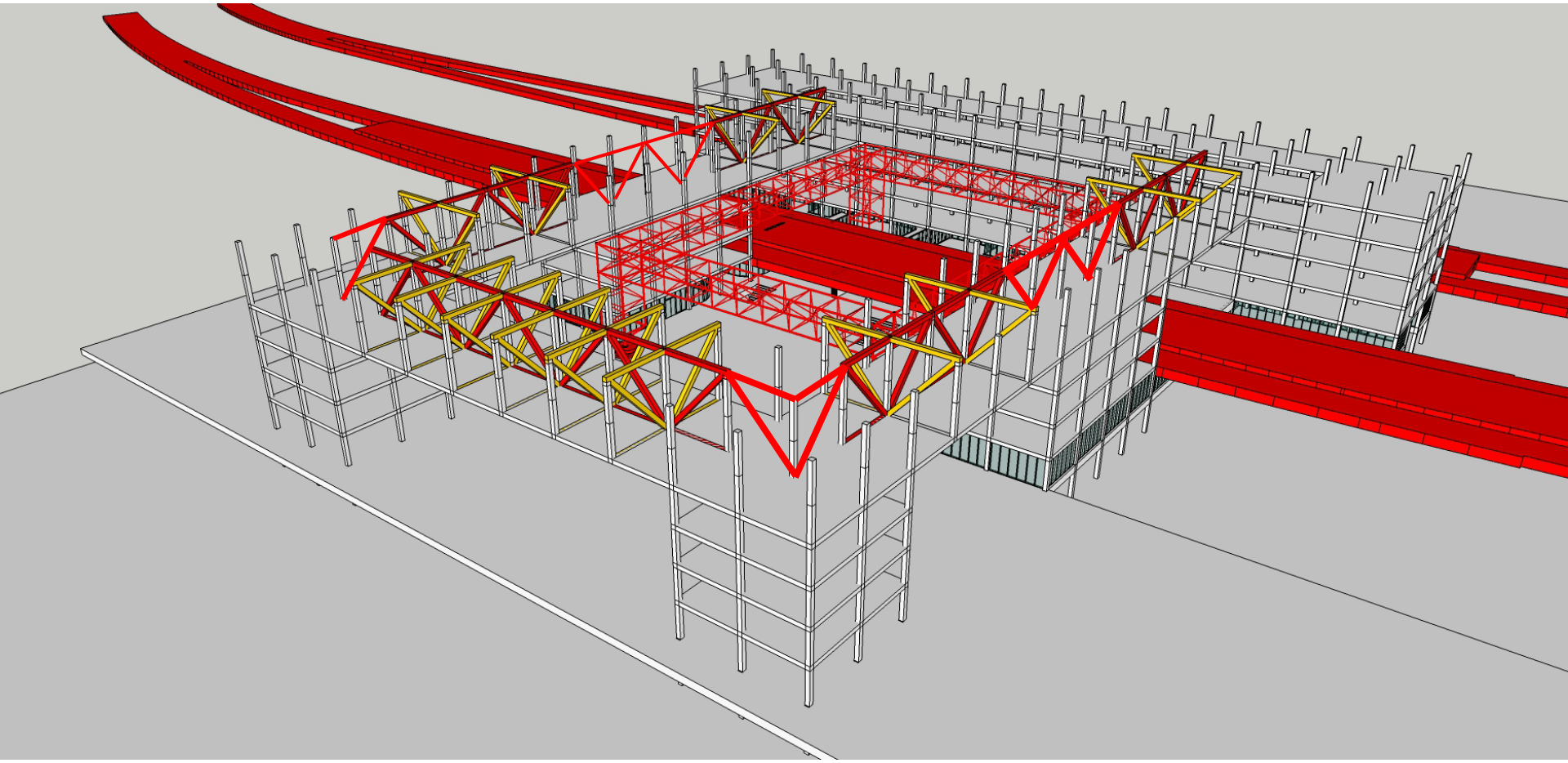
Architecture

construction



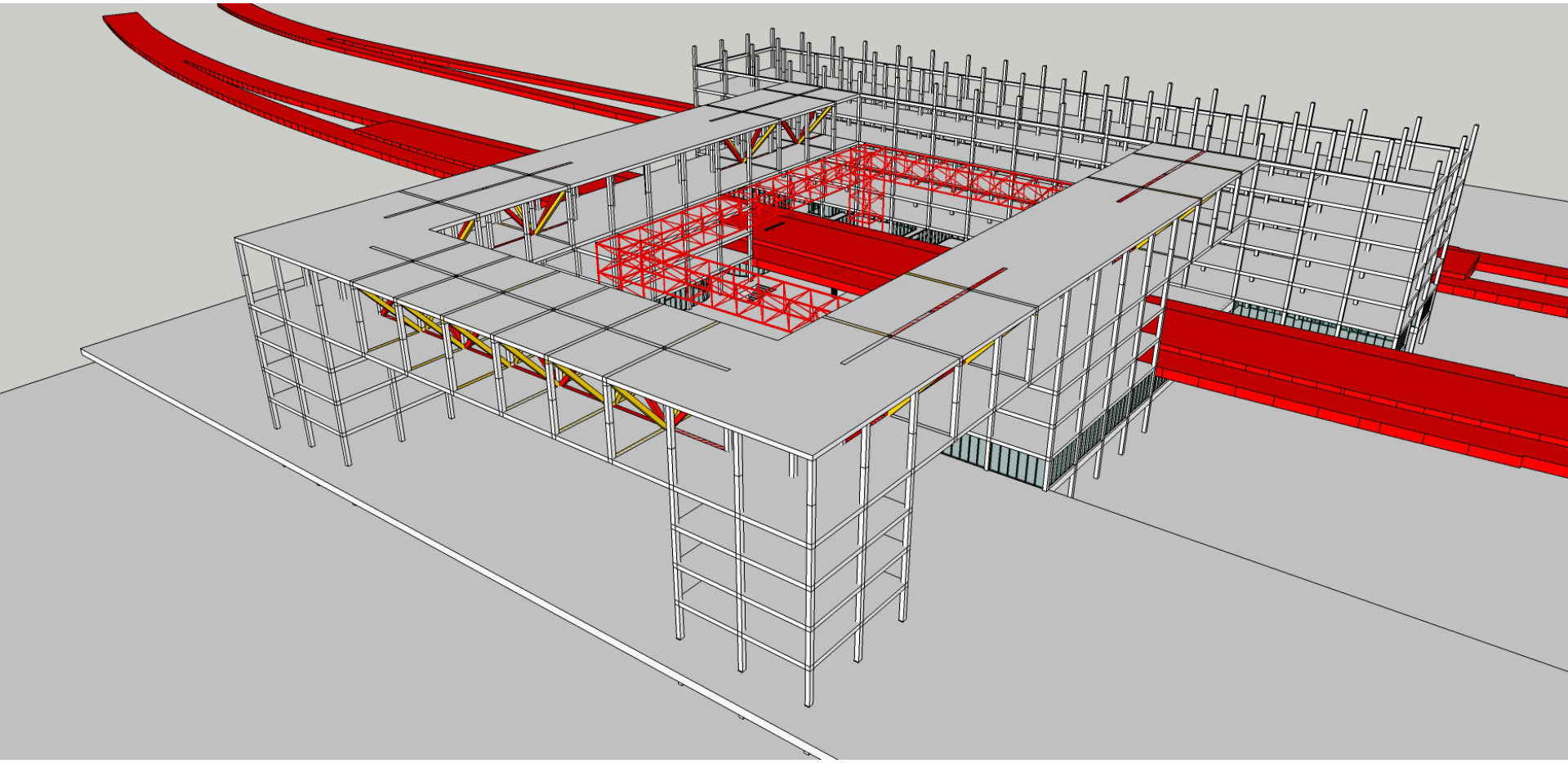
Architecture

construction



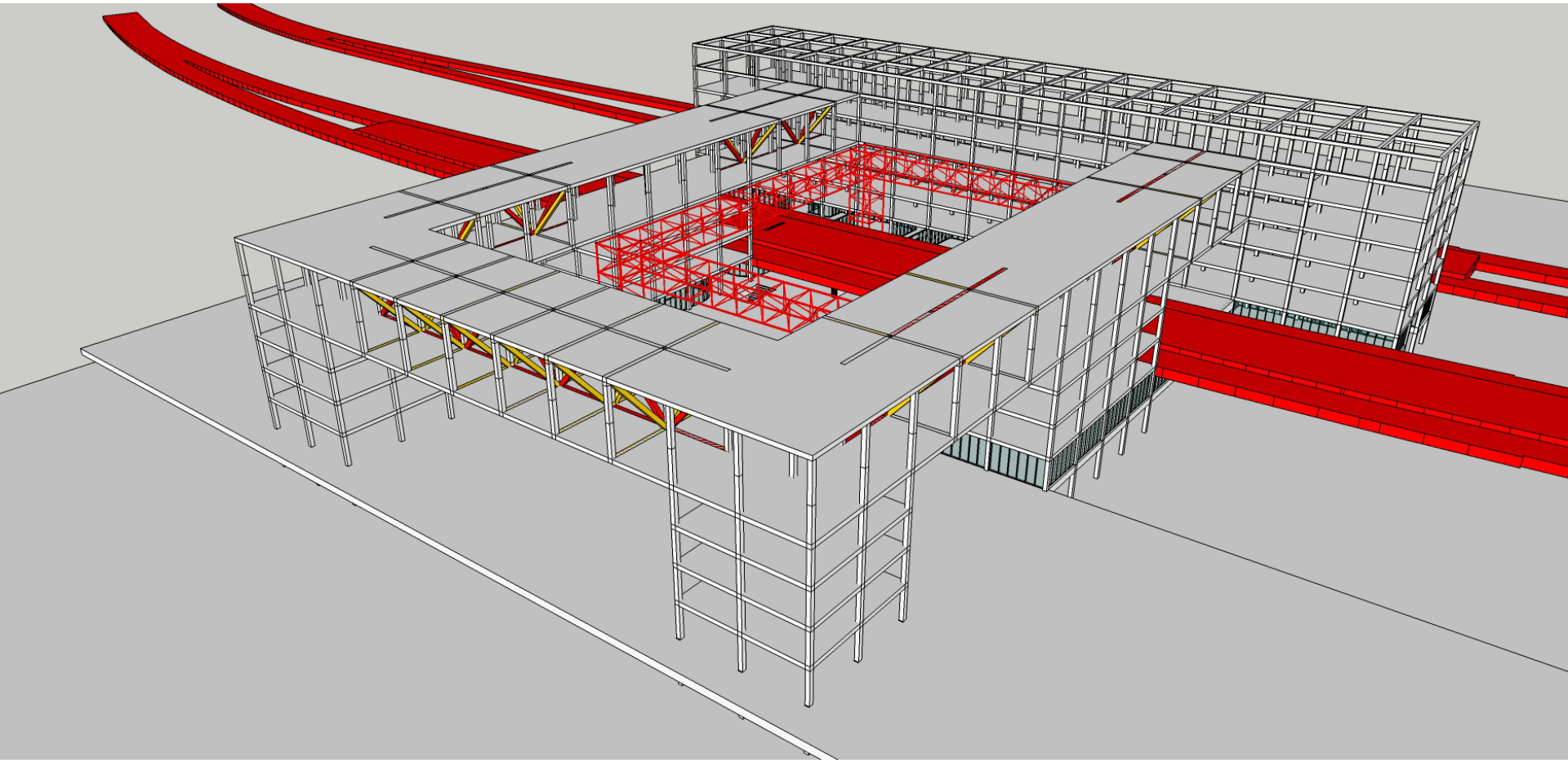
Architecture

construction



Architecture

construction

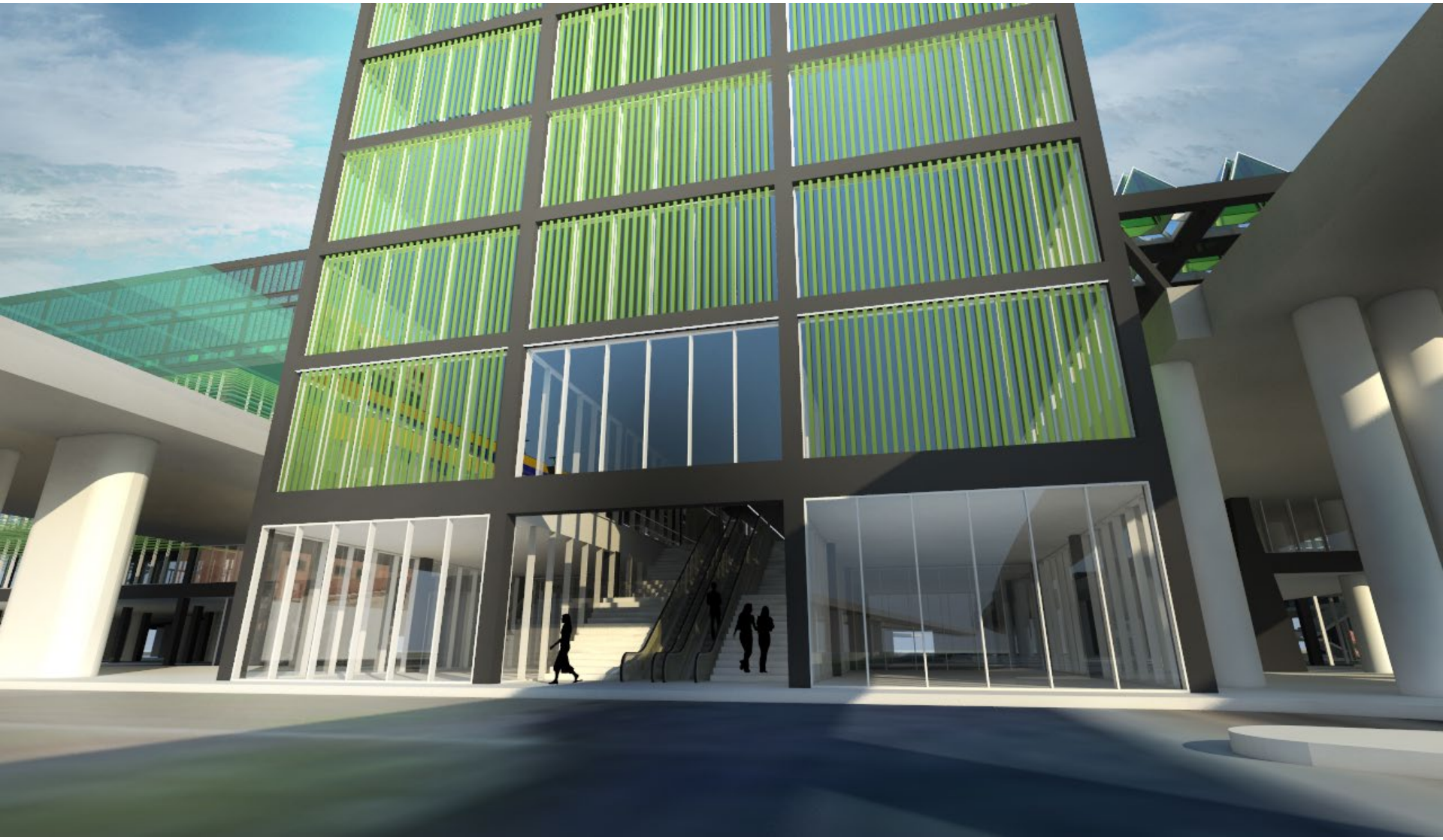


architecture

Floorplan +1

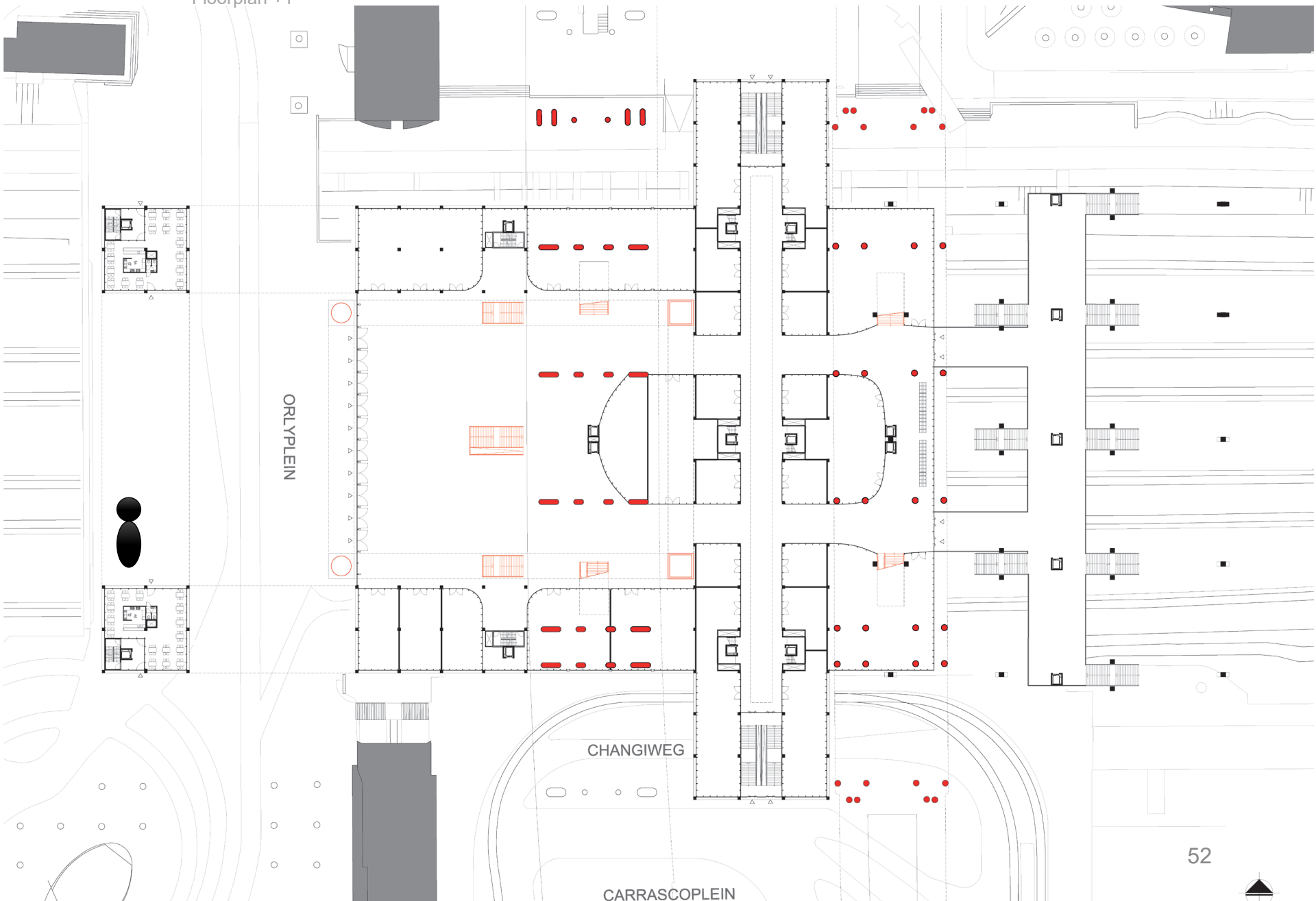
architecture

Main entrance



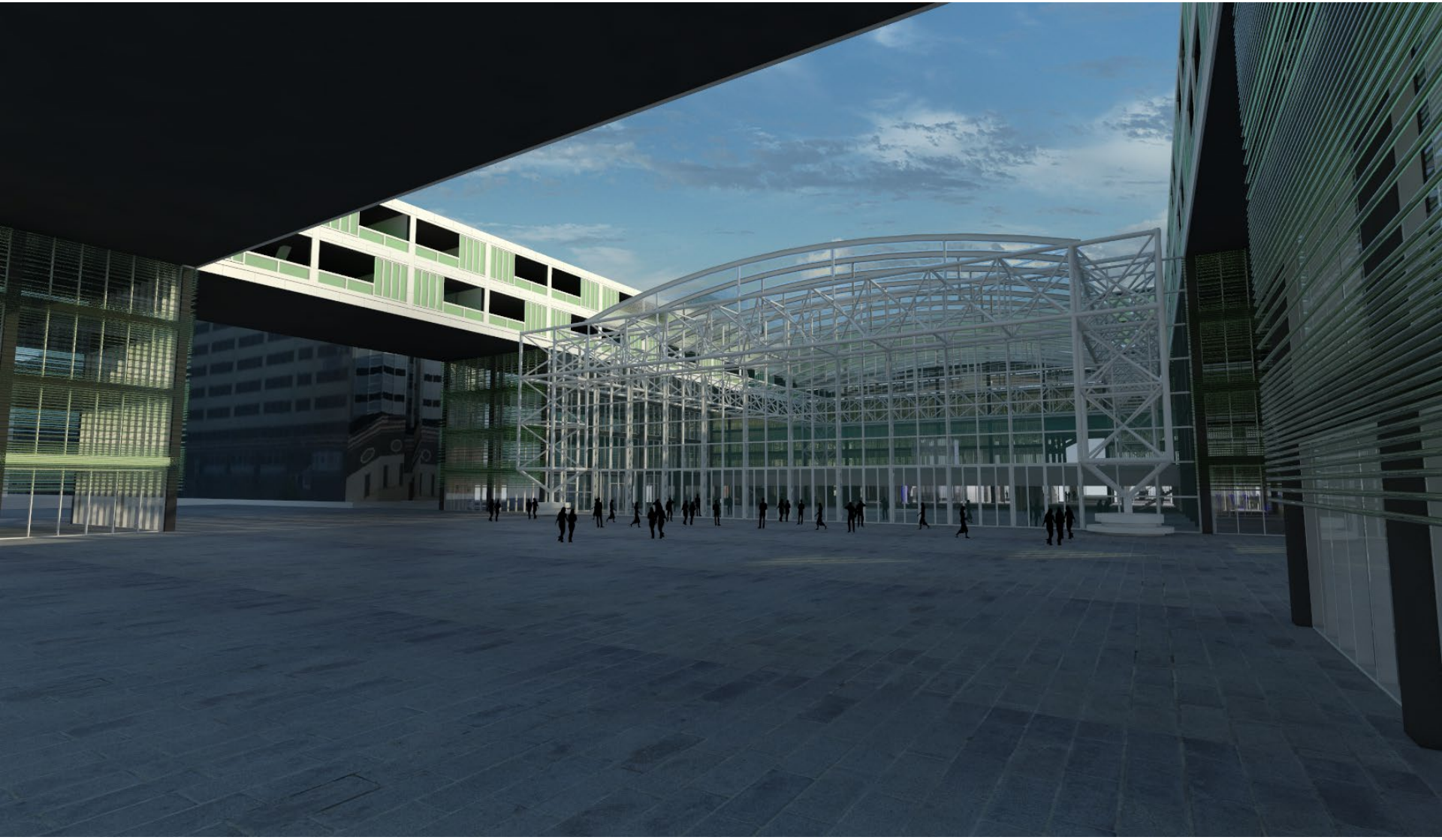
architecture

Floorplan +1



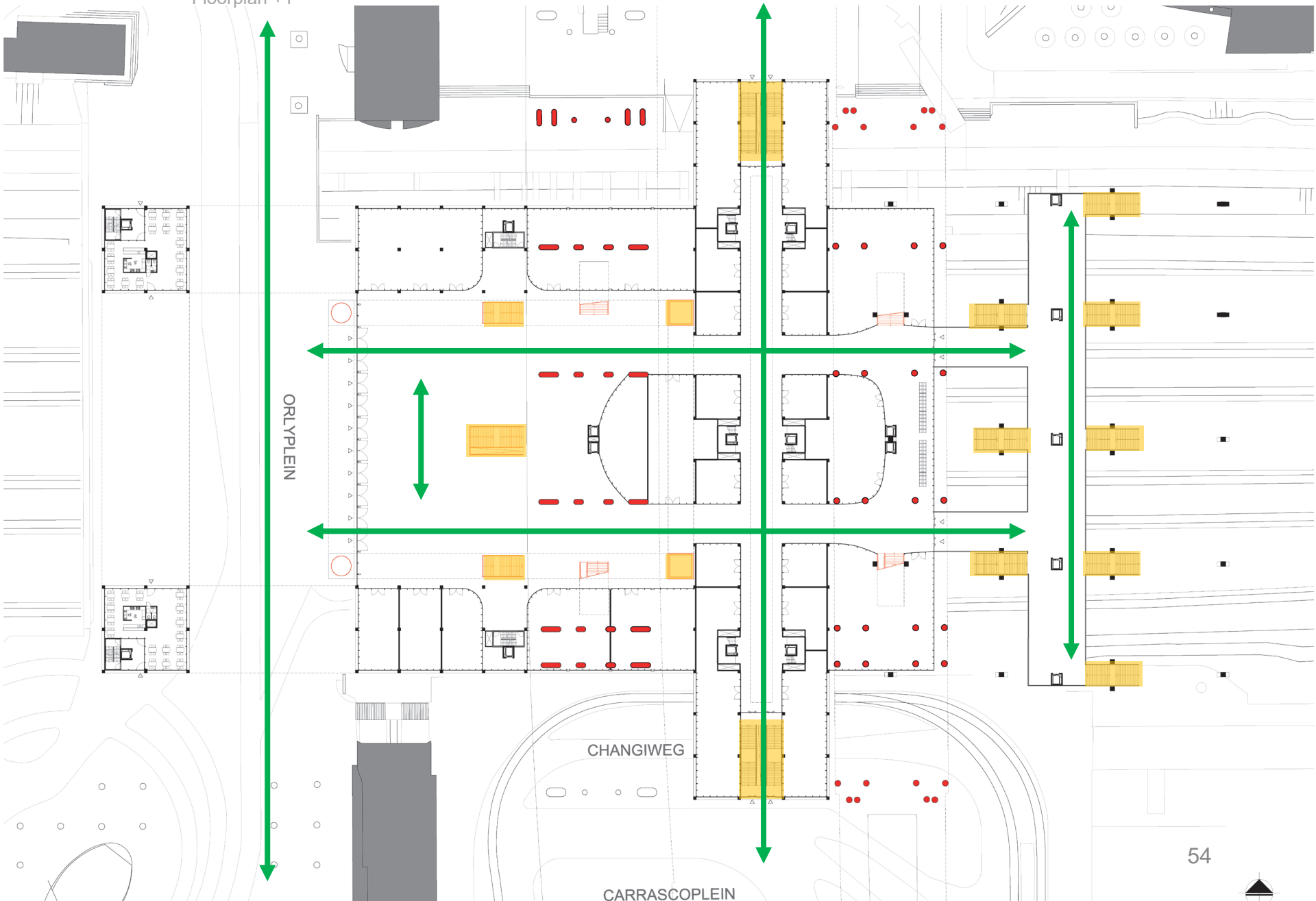
architecture

Floorplan +1



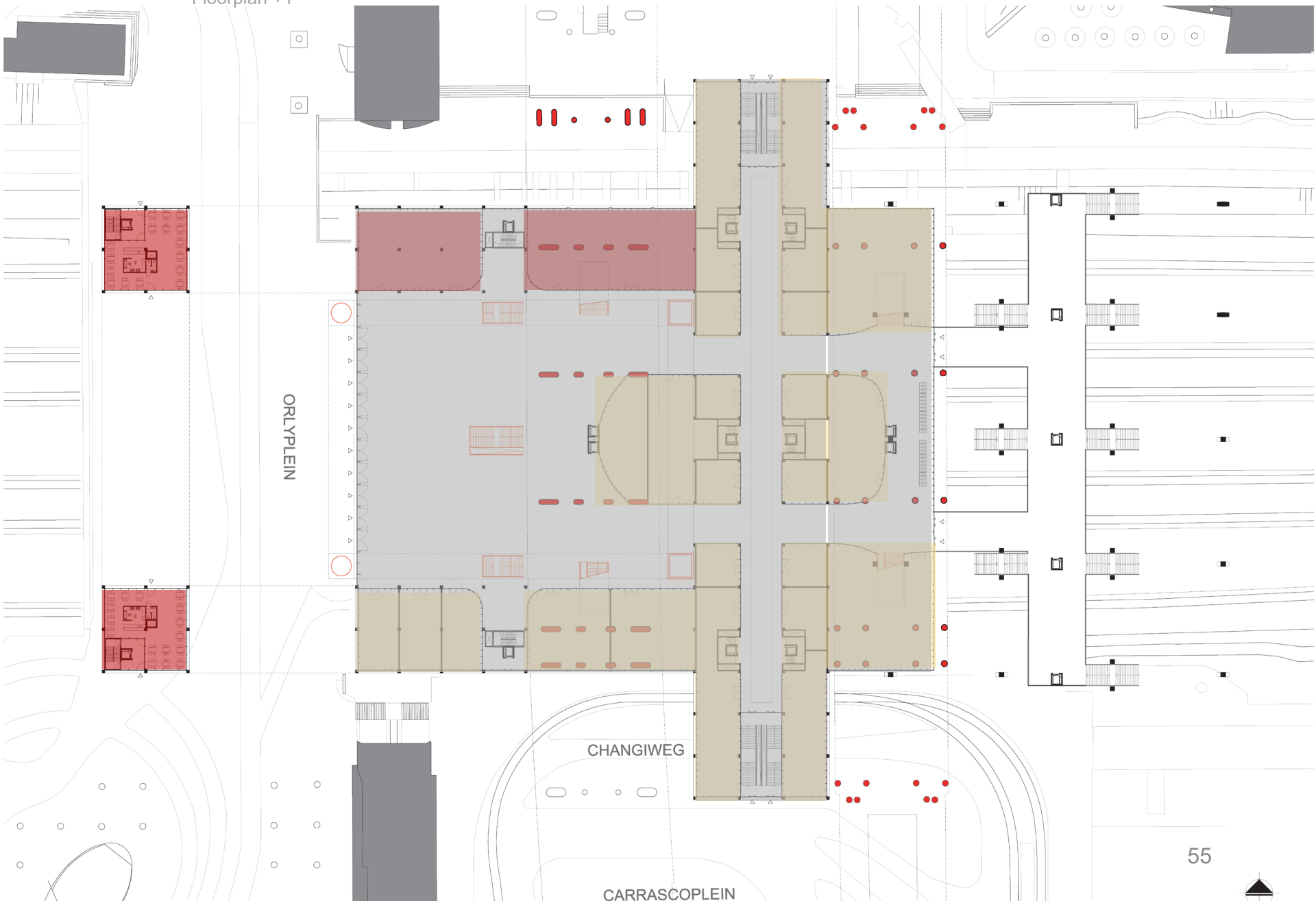
architecture

Floorplan +1



architecture

Floorplan +1

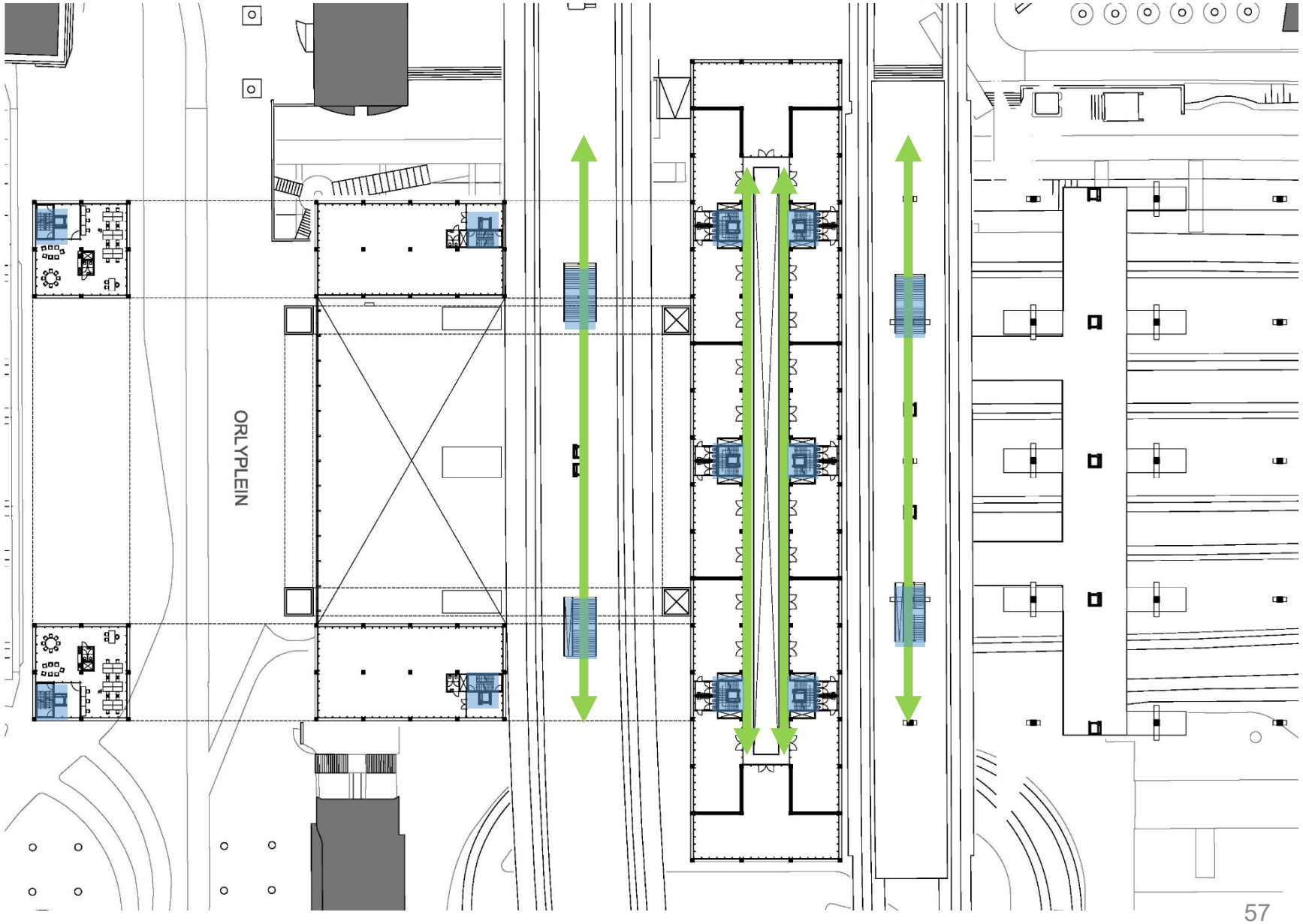


architecture

Floorplan +1

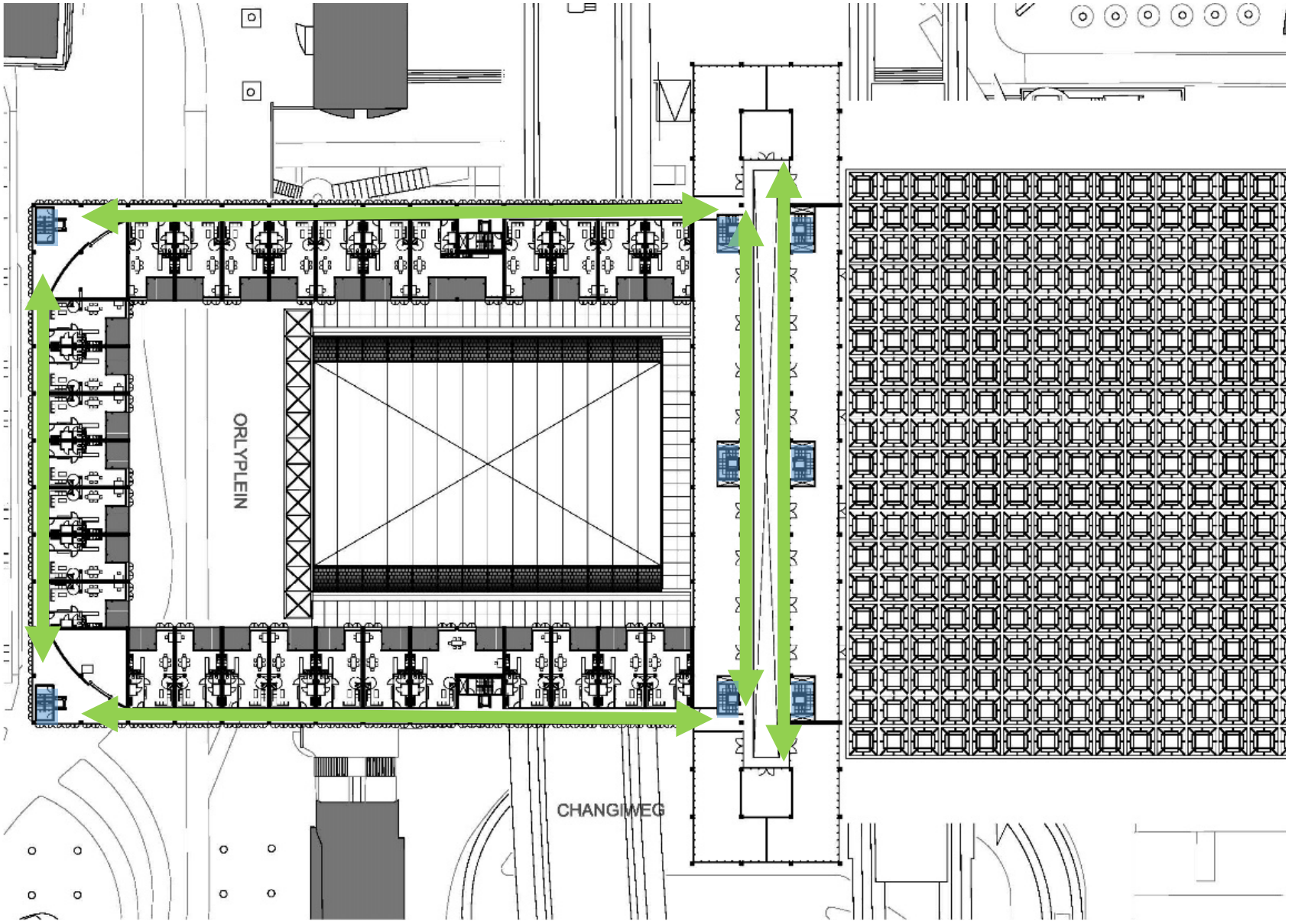
architecture

Floorplan_+2



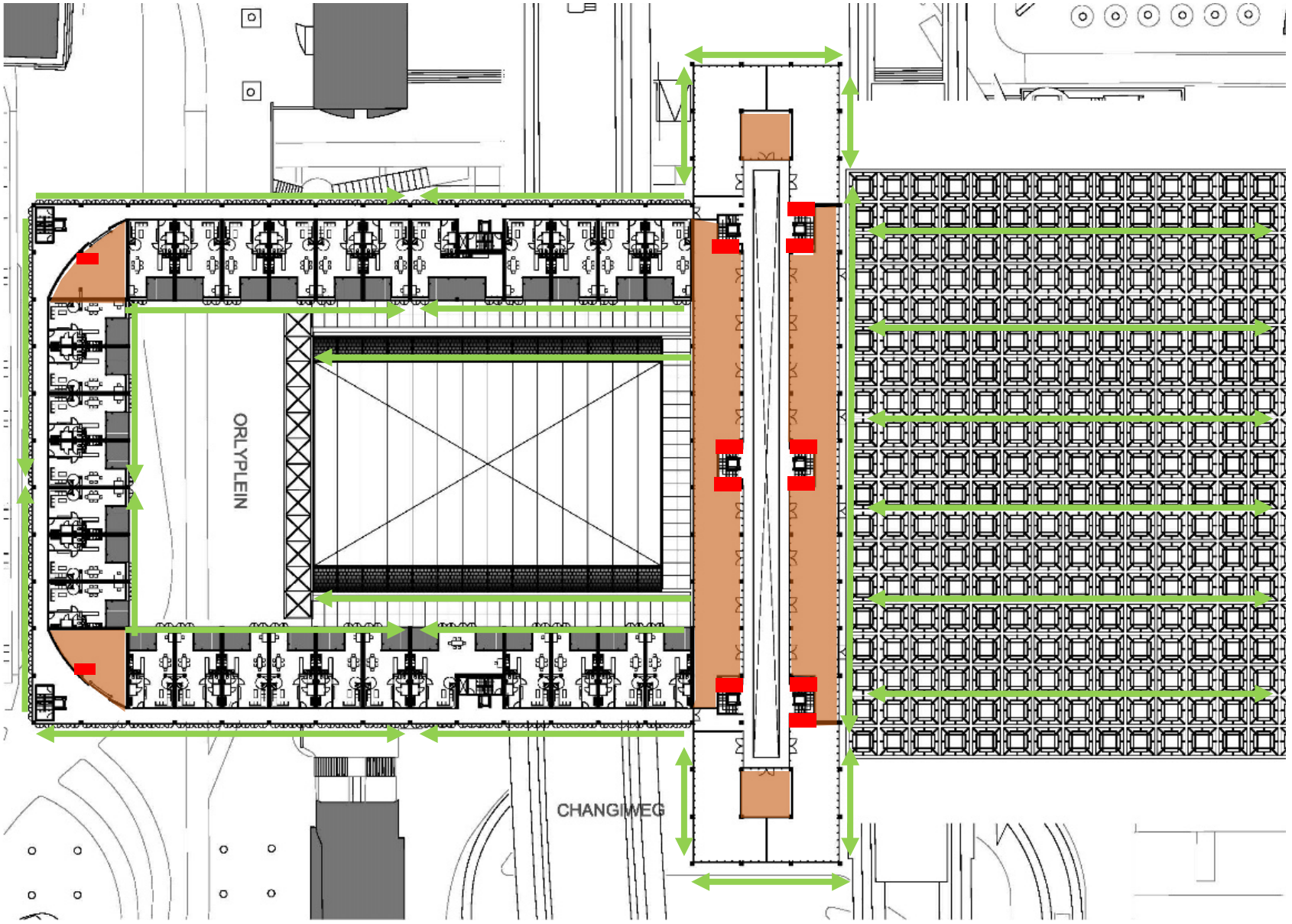
architecture

Floorplan_+5



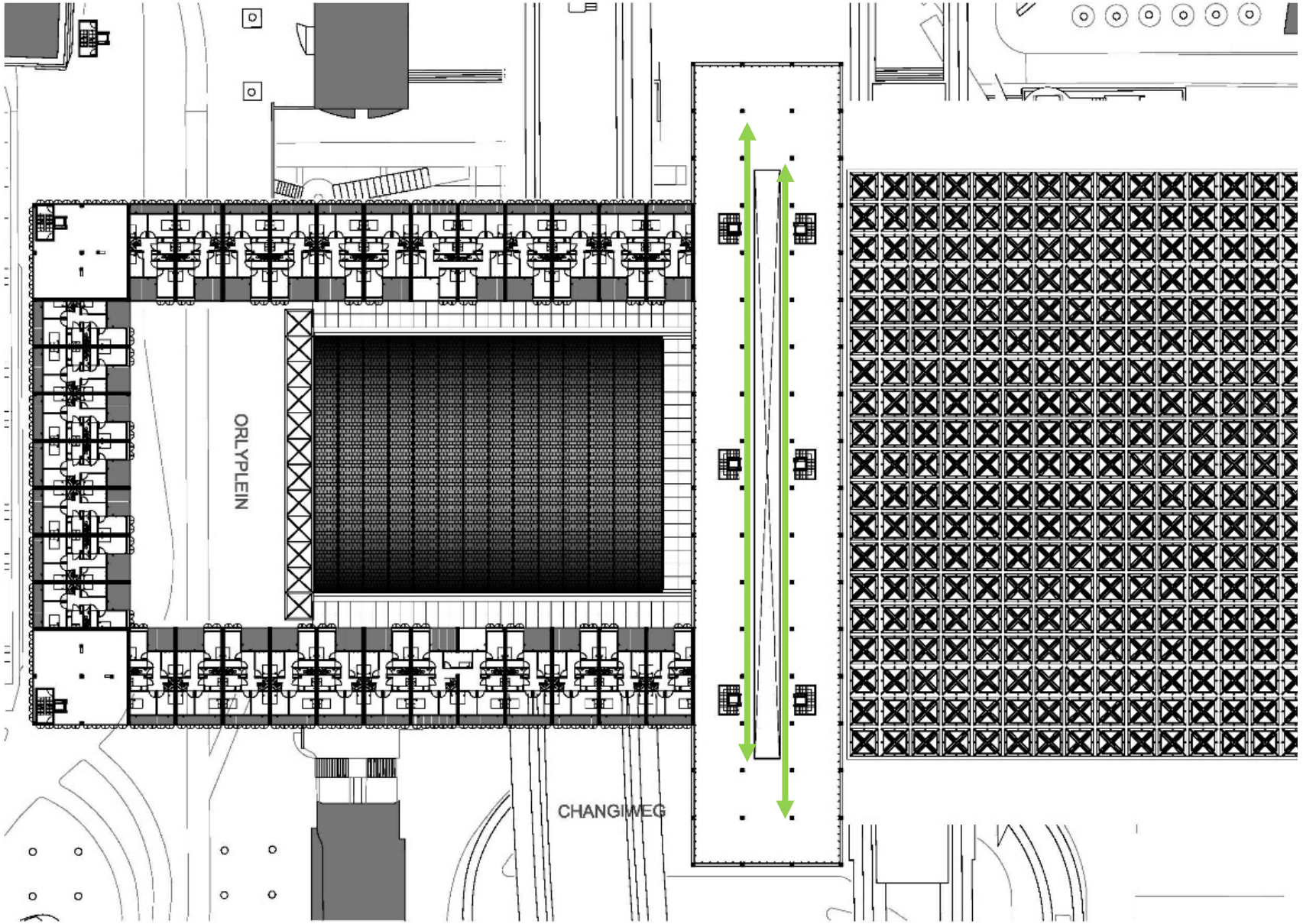
architecture

Floorplan_+5



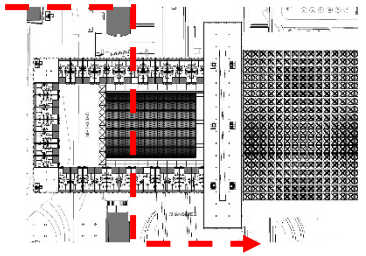
architecture

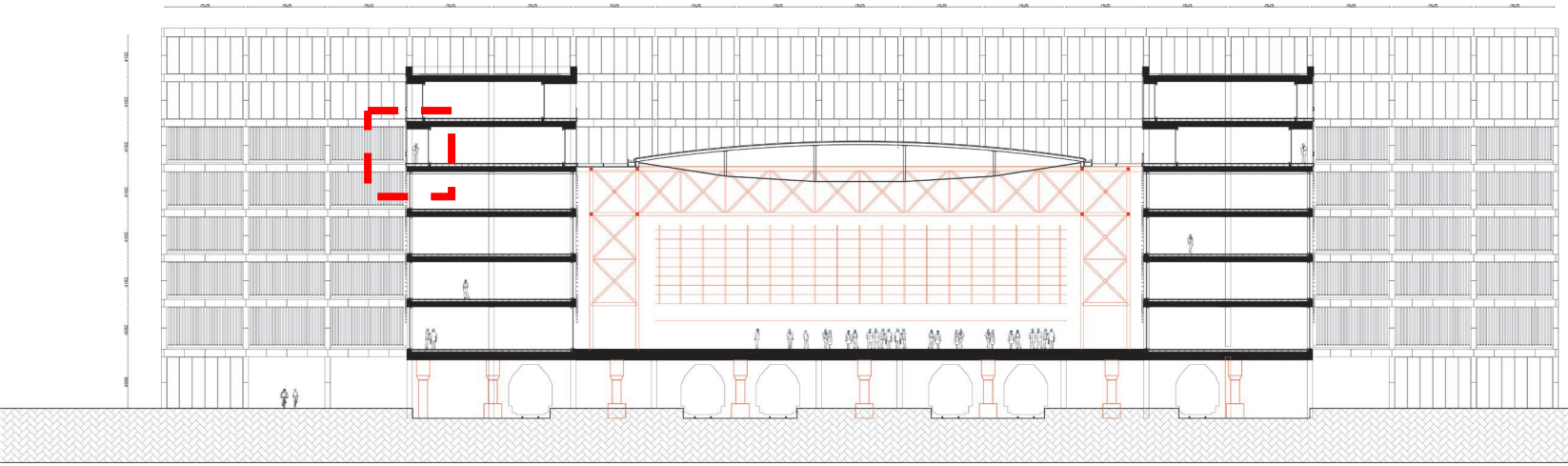
Floorplan_+6



architecture

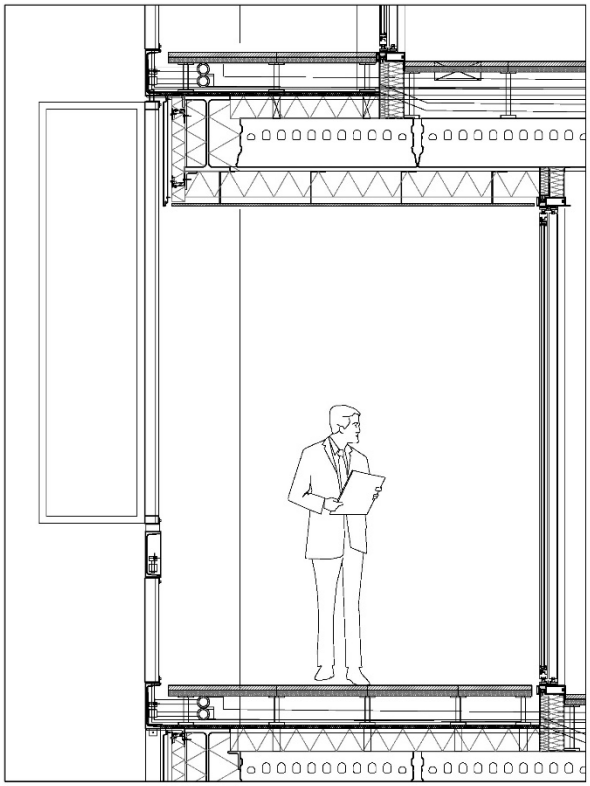
section

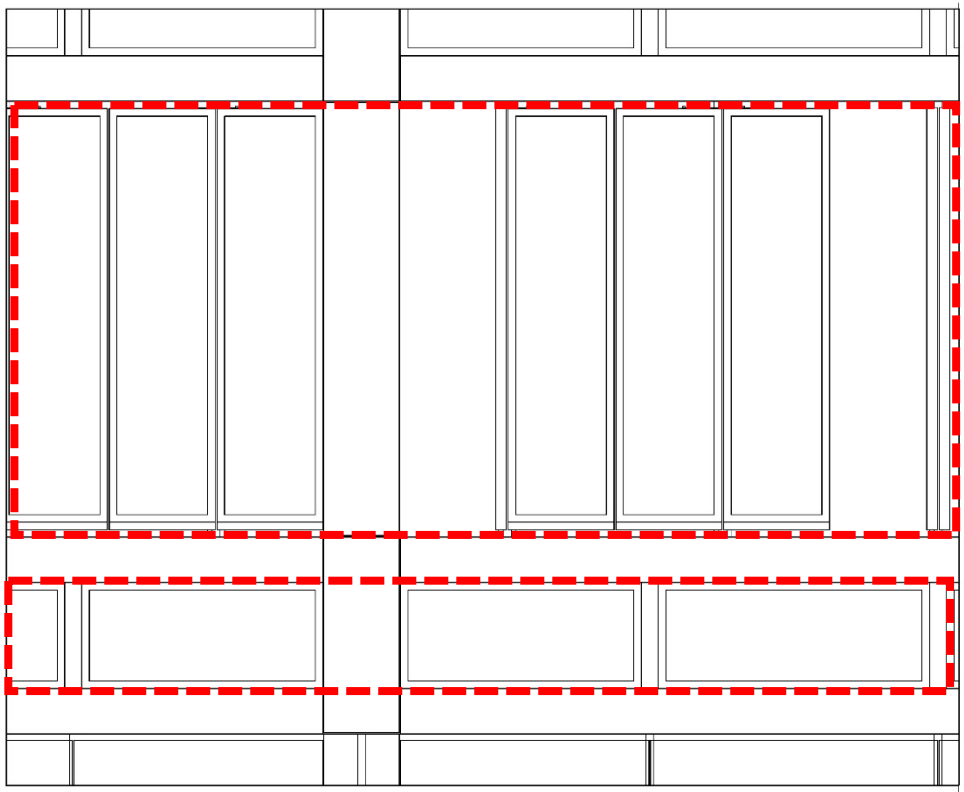


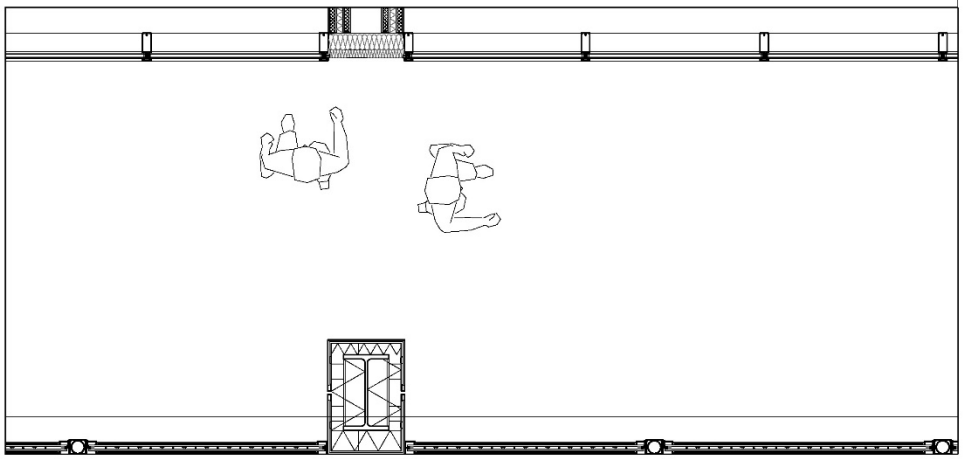


architecture

section



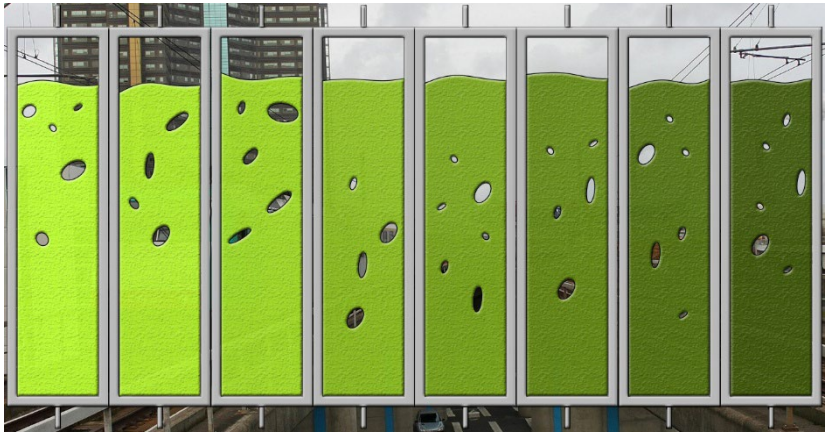


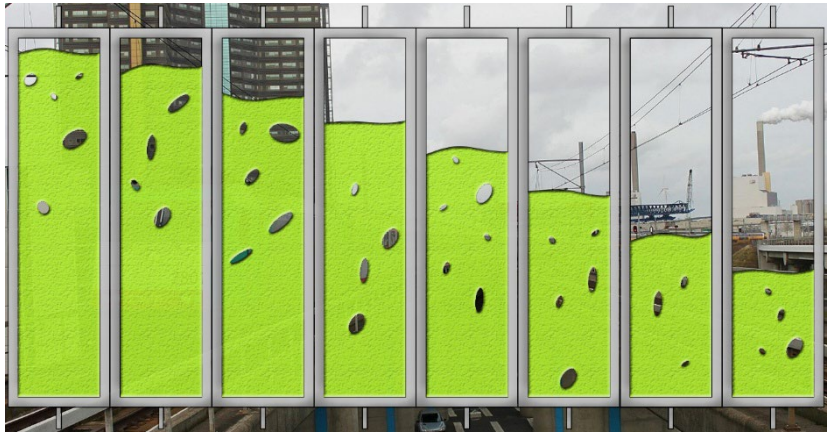


Architecture

concept

_adaptable algae cultivation



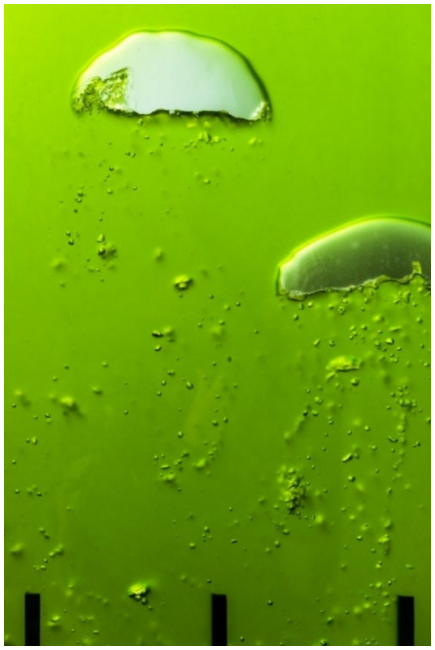


_fill rate

_harvesting rate

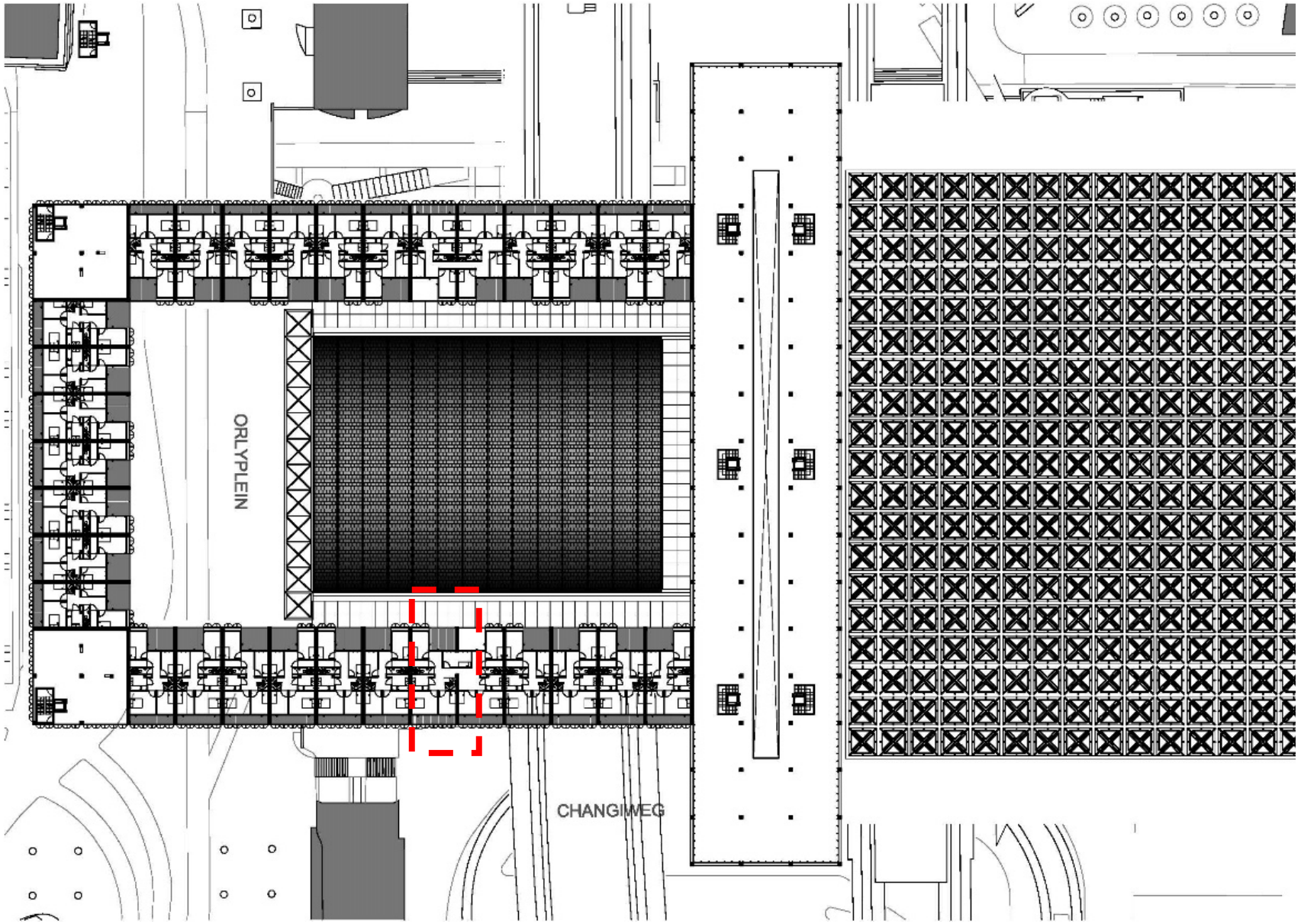
Architecture

concept

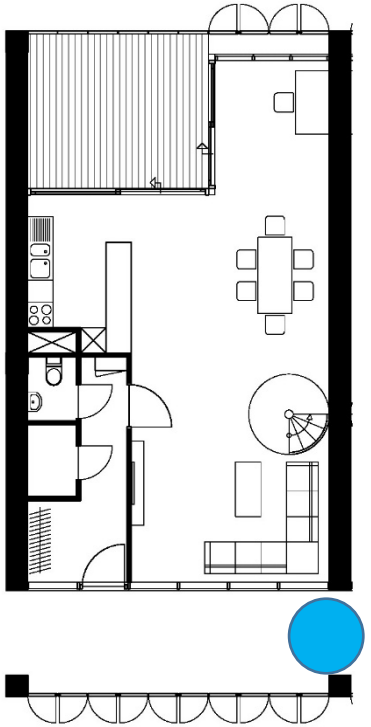


architecture

Floorplan_+6



1st floor



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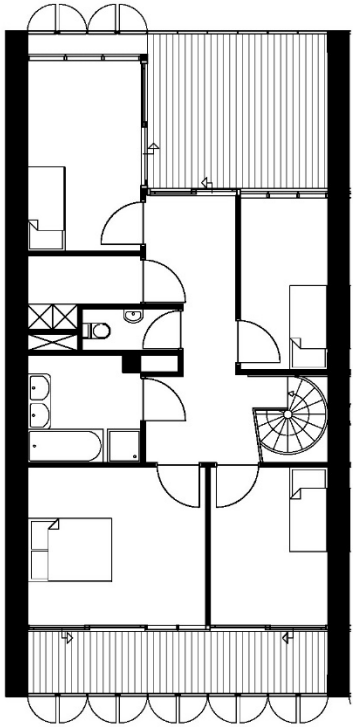

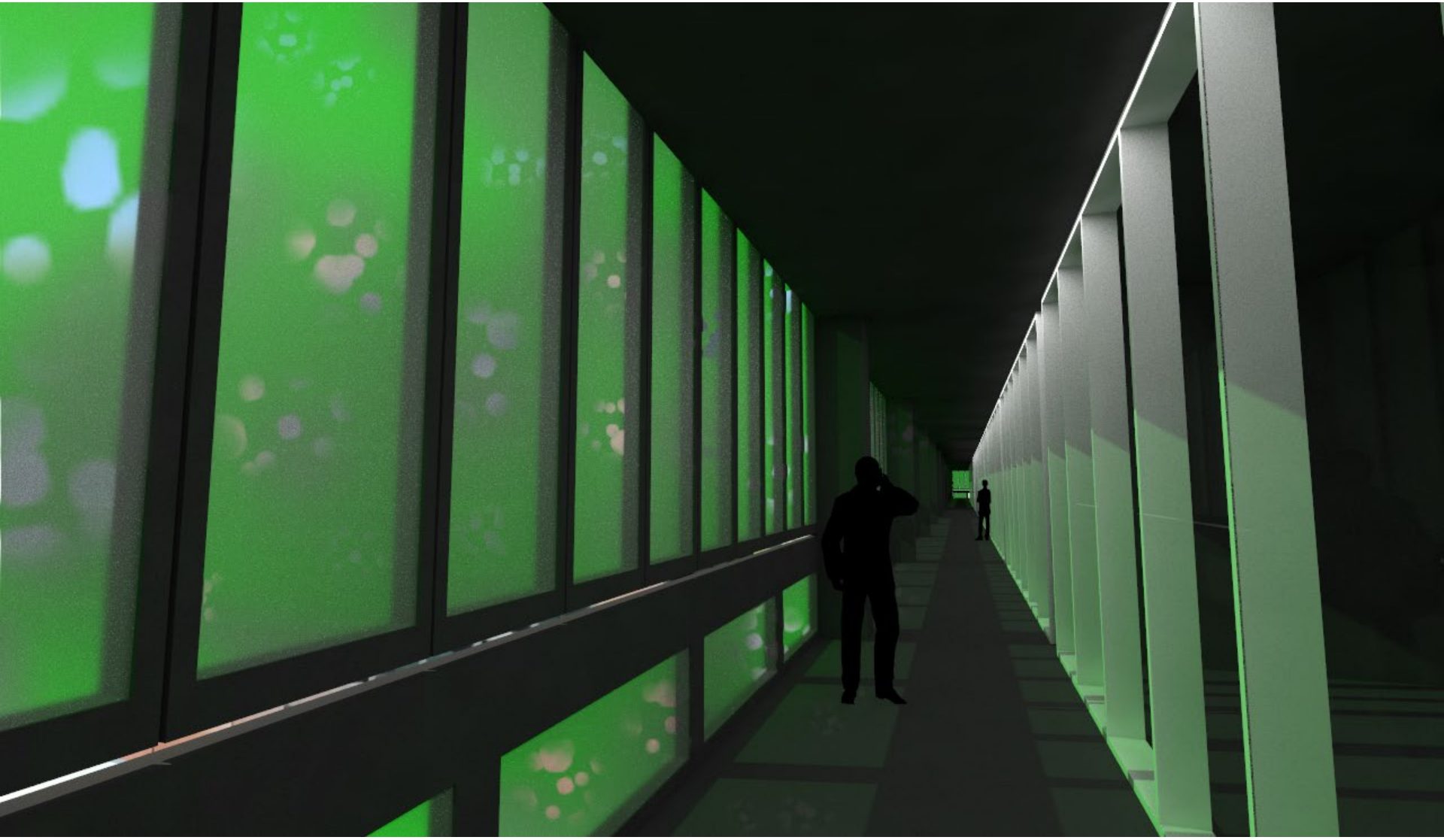

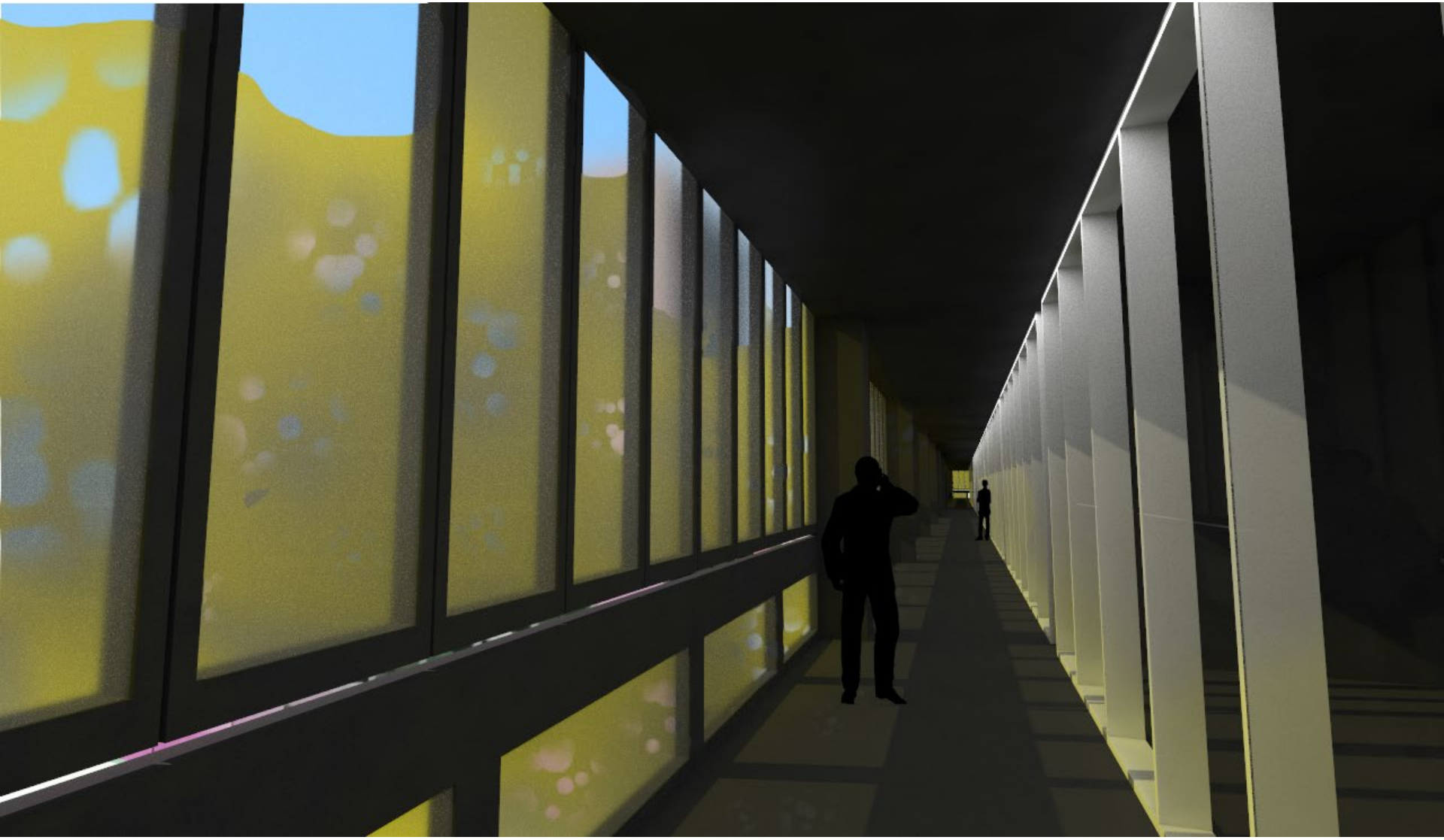

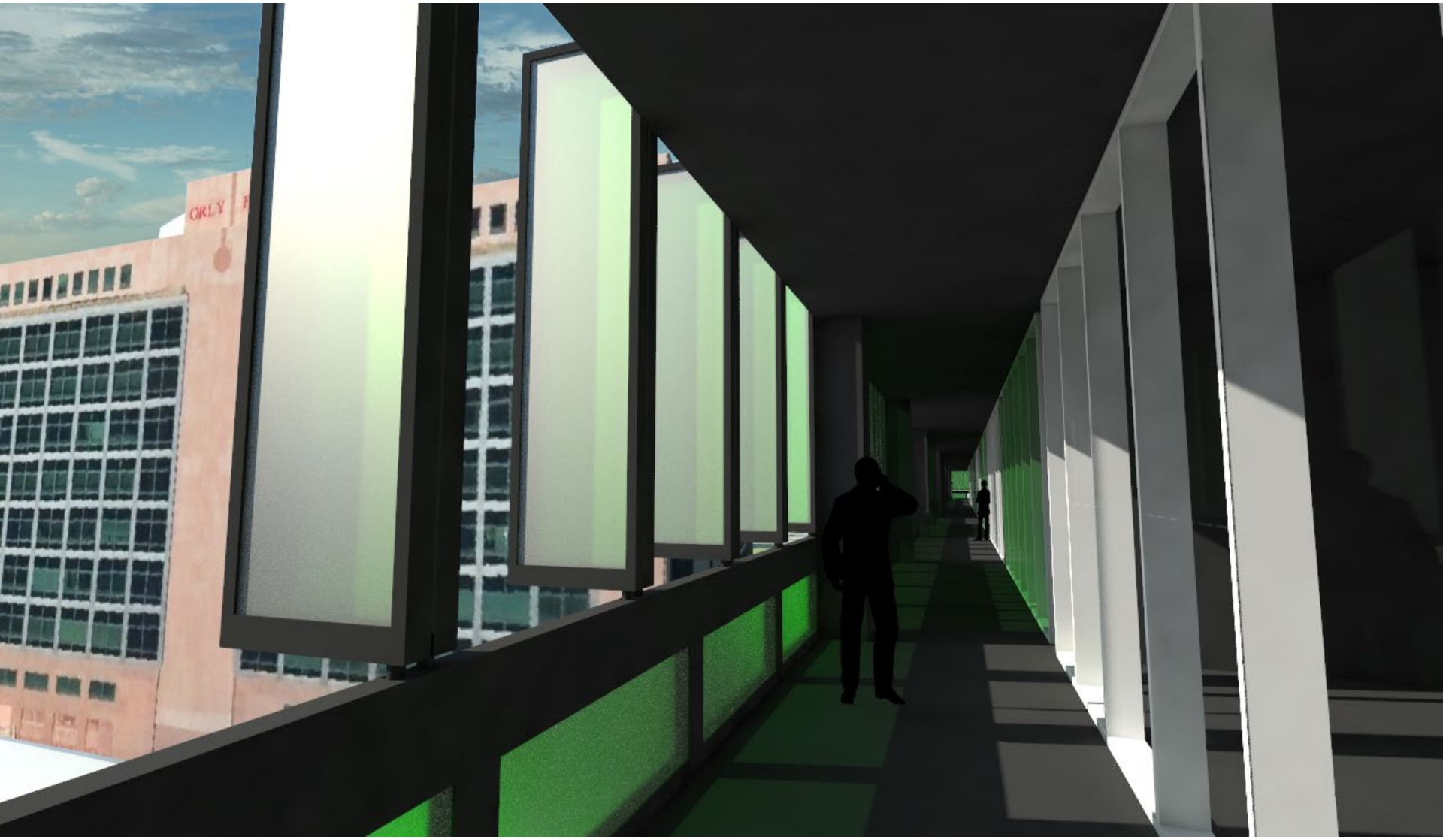
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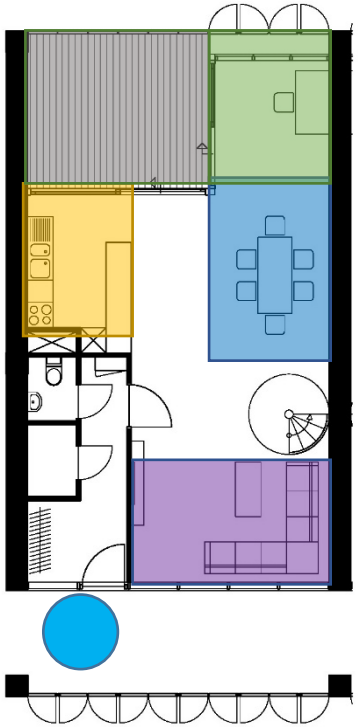
1st floor



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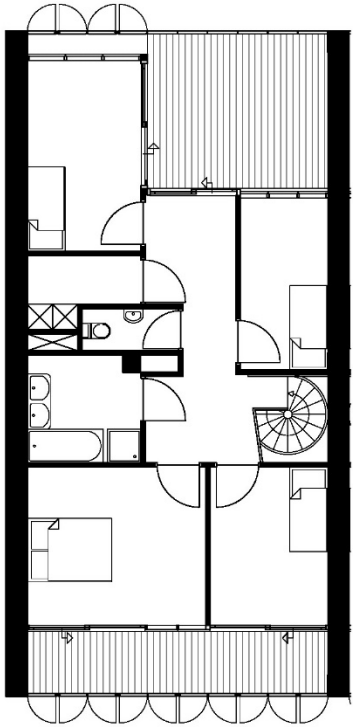

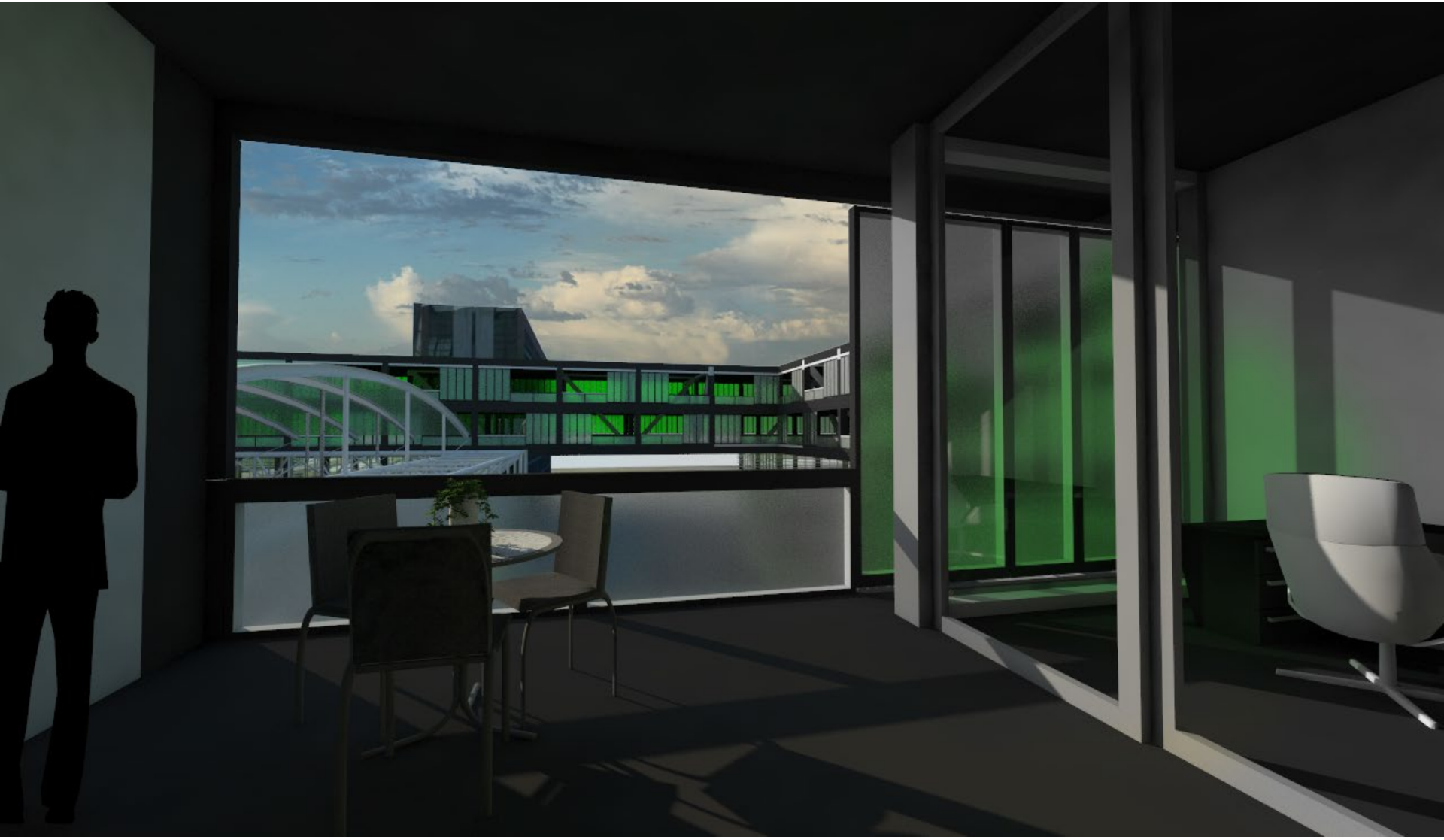

architecture

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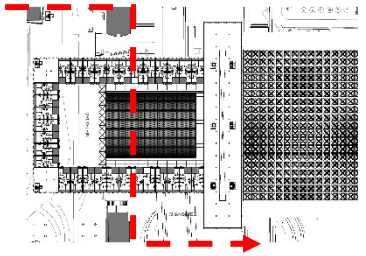
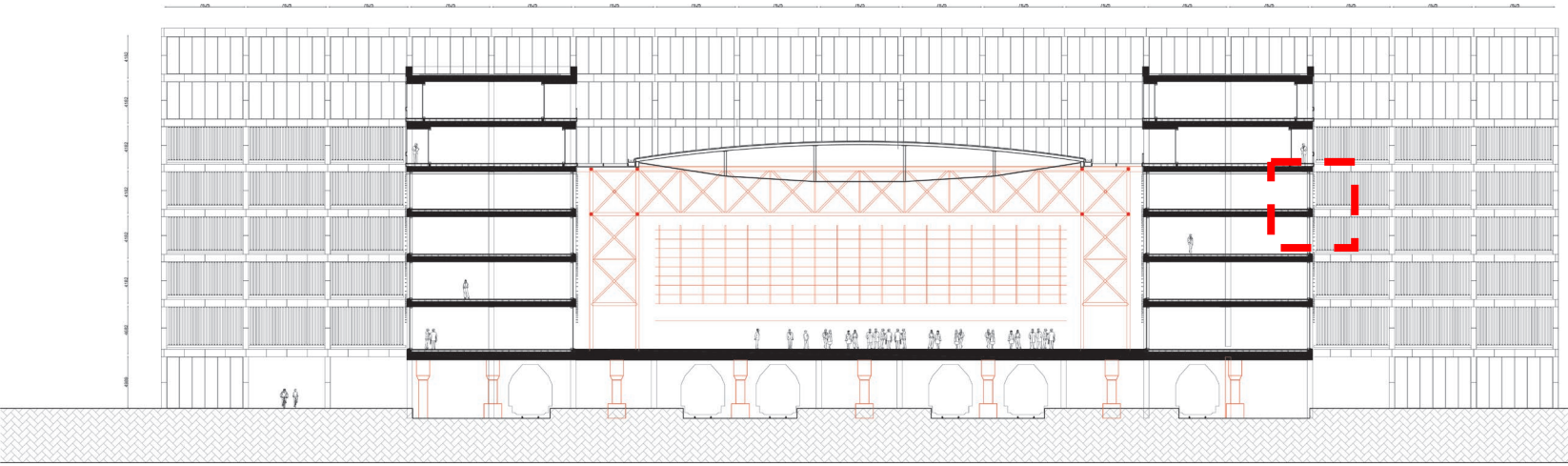
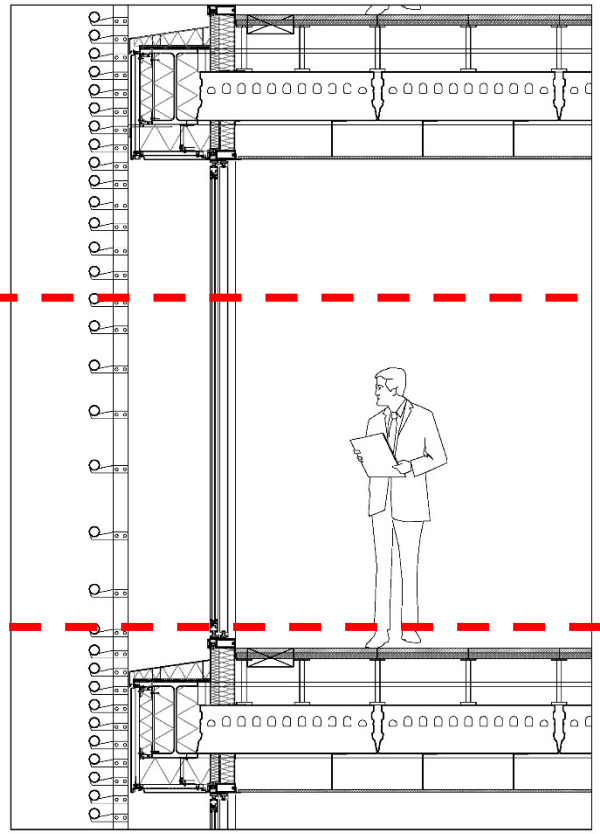
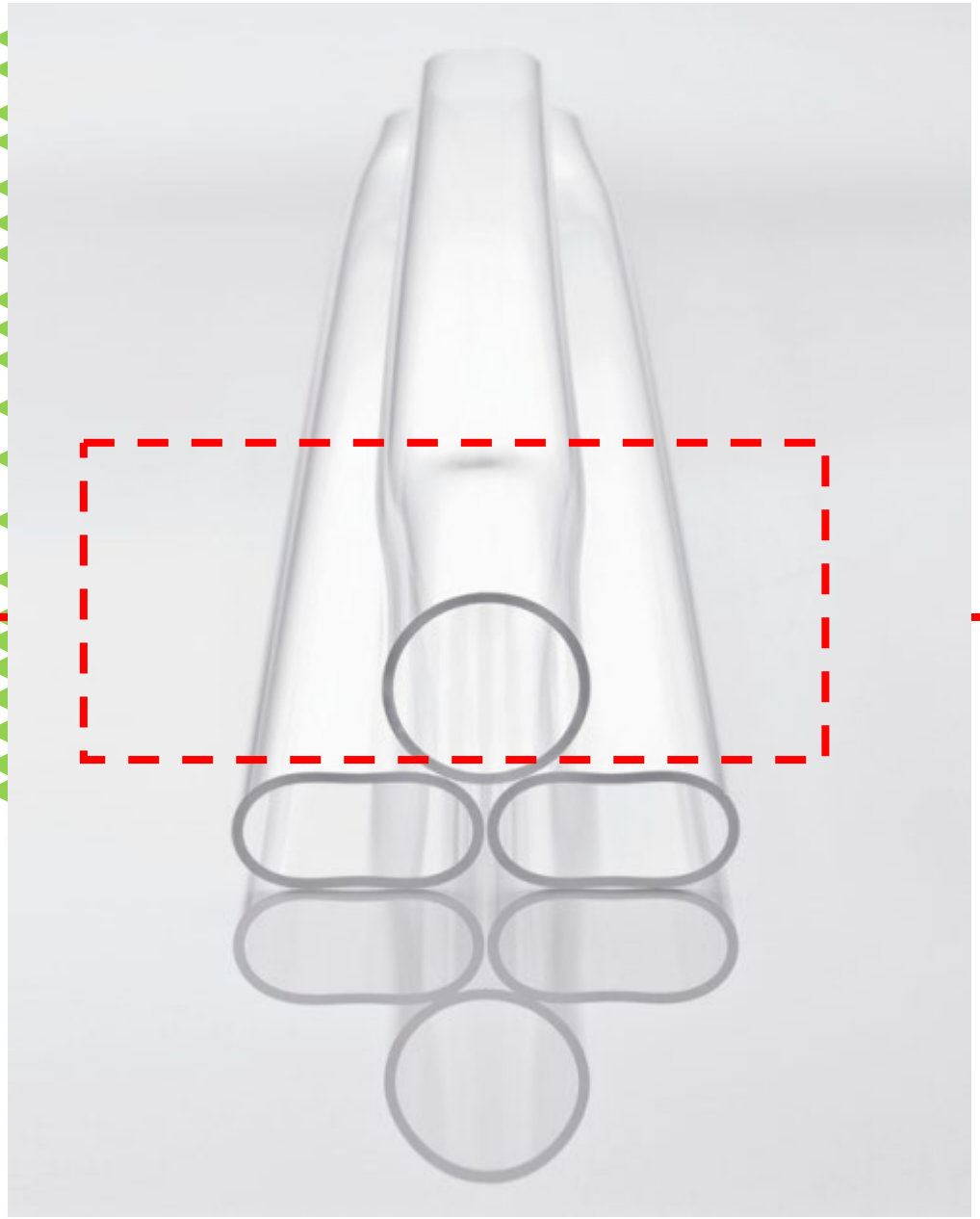




architecture

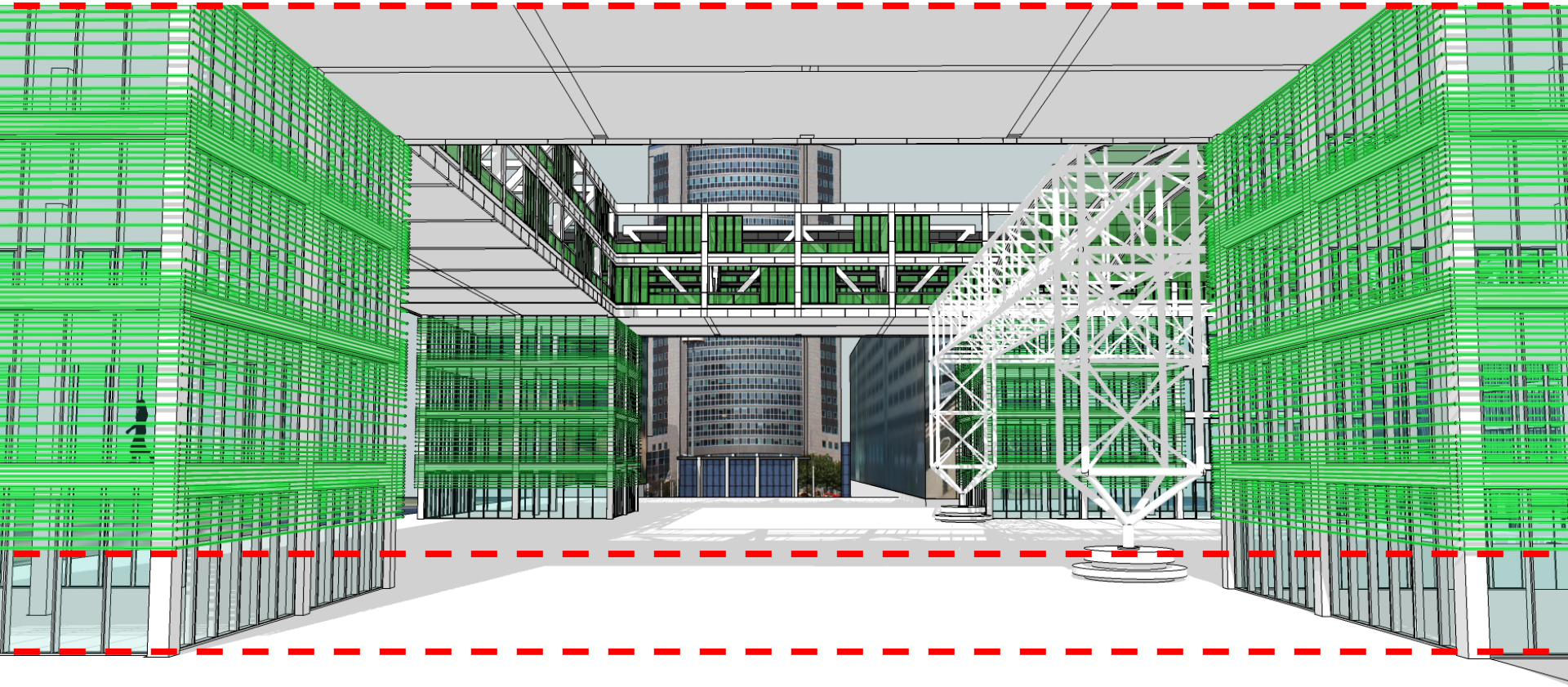
section





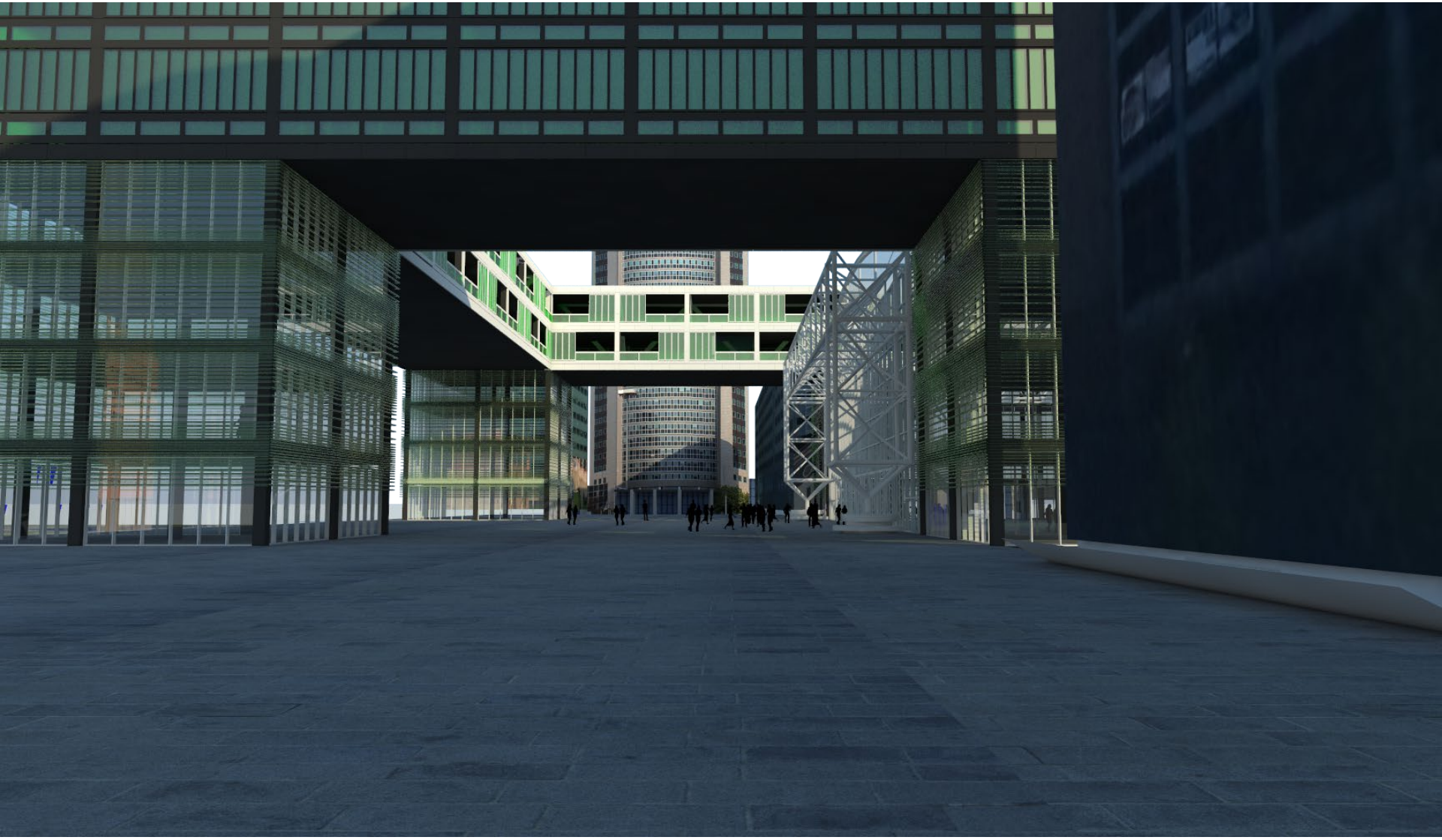
architecture

impression



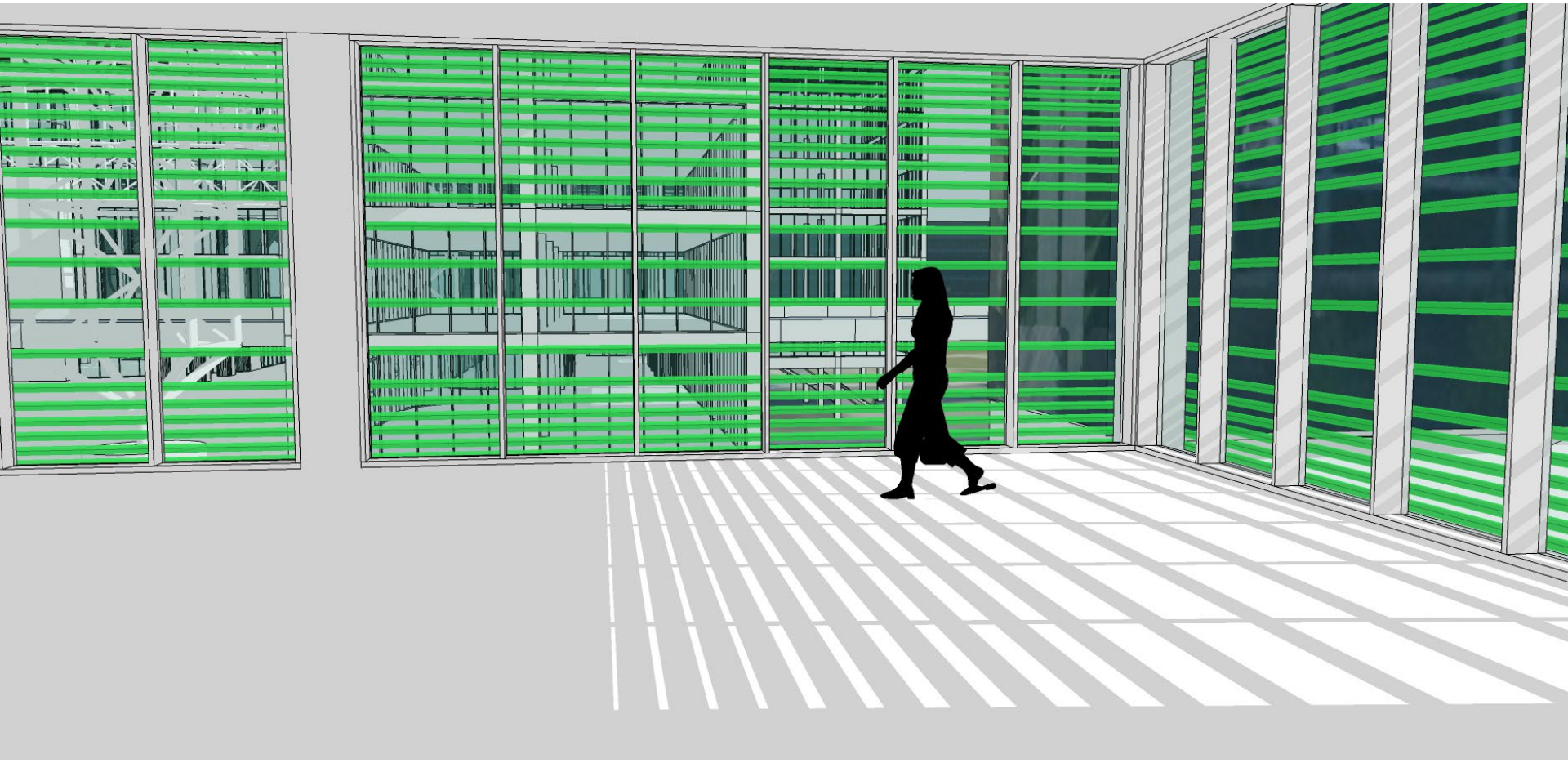
architecture

impression



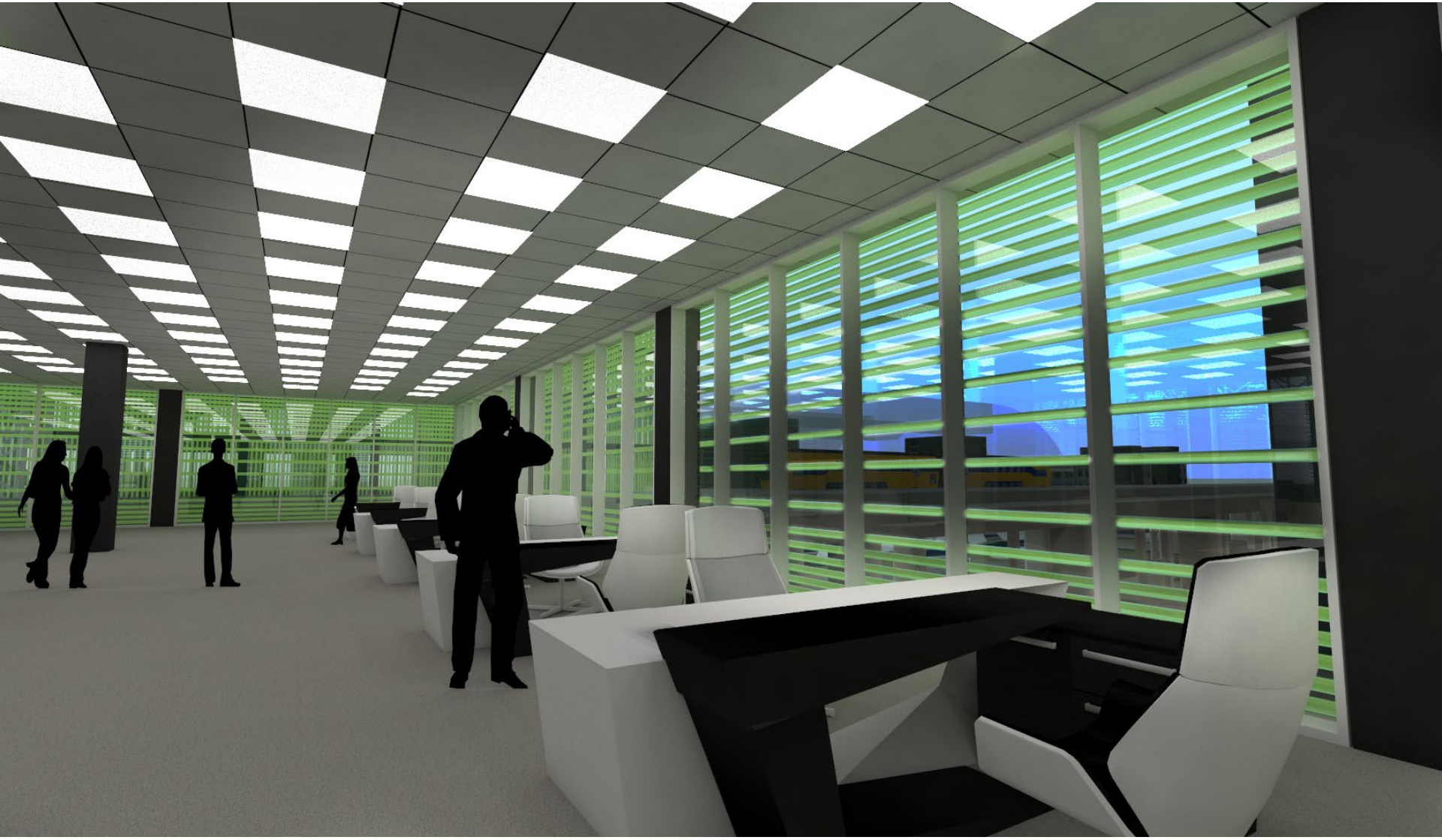
architecture

impression



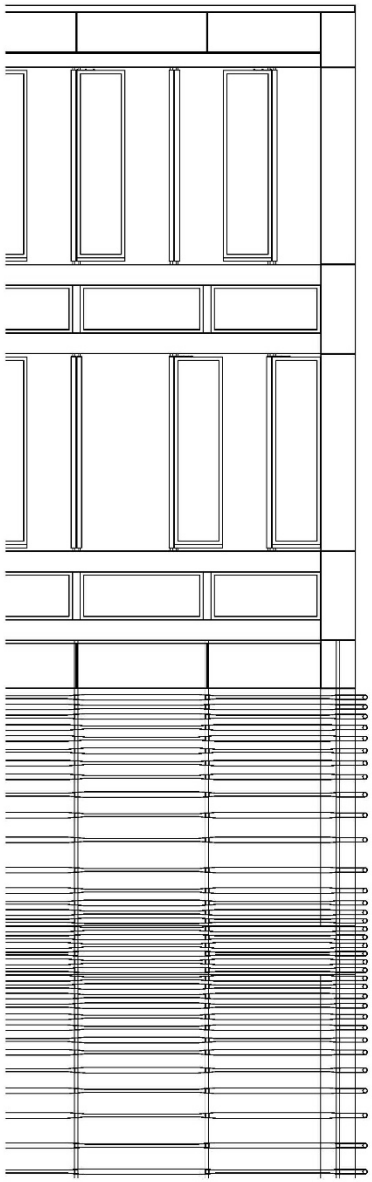
architecture

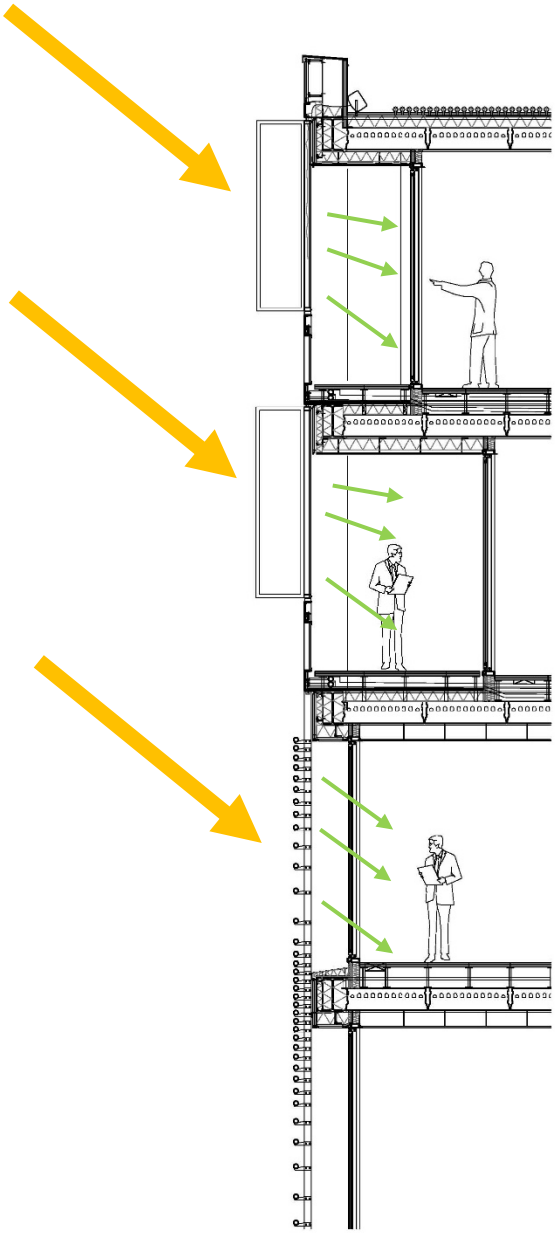
impression



architecture

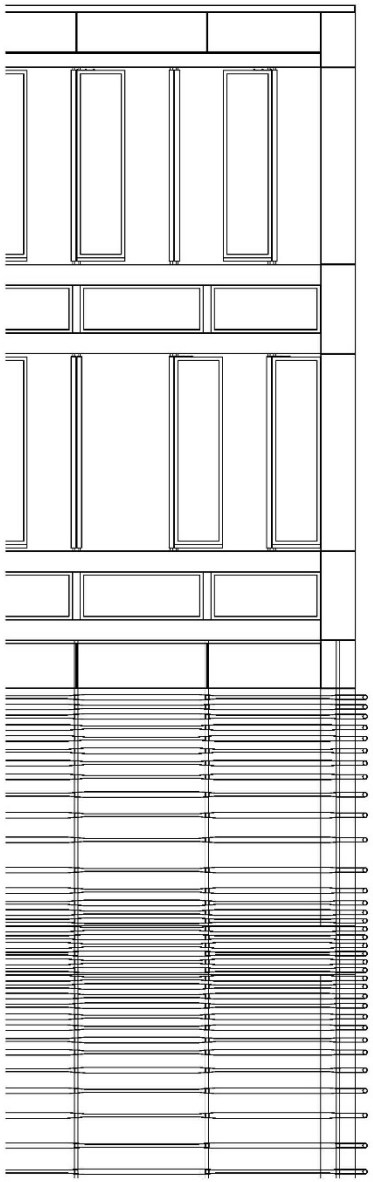
climate

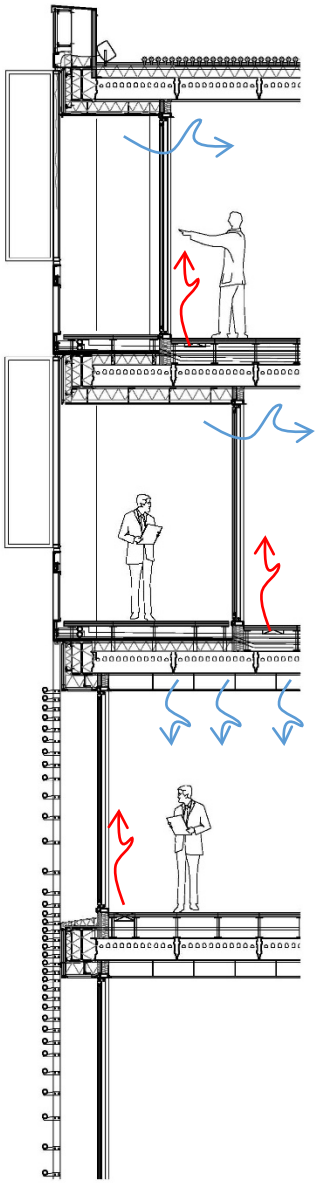


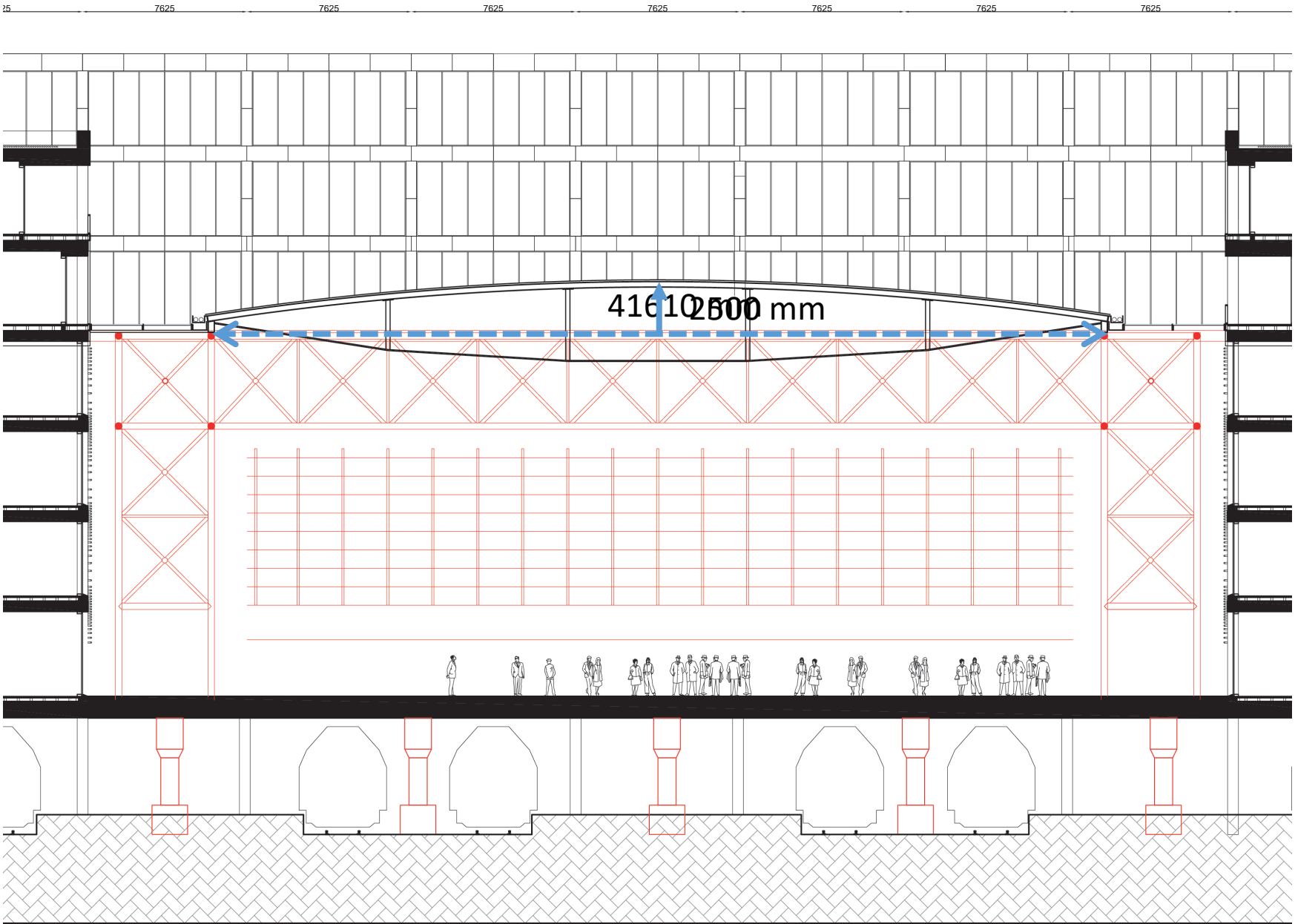


architecture

climate






7625
7625
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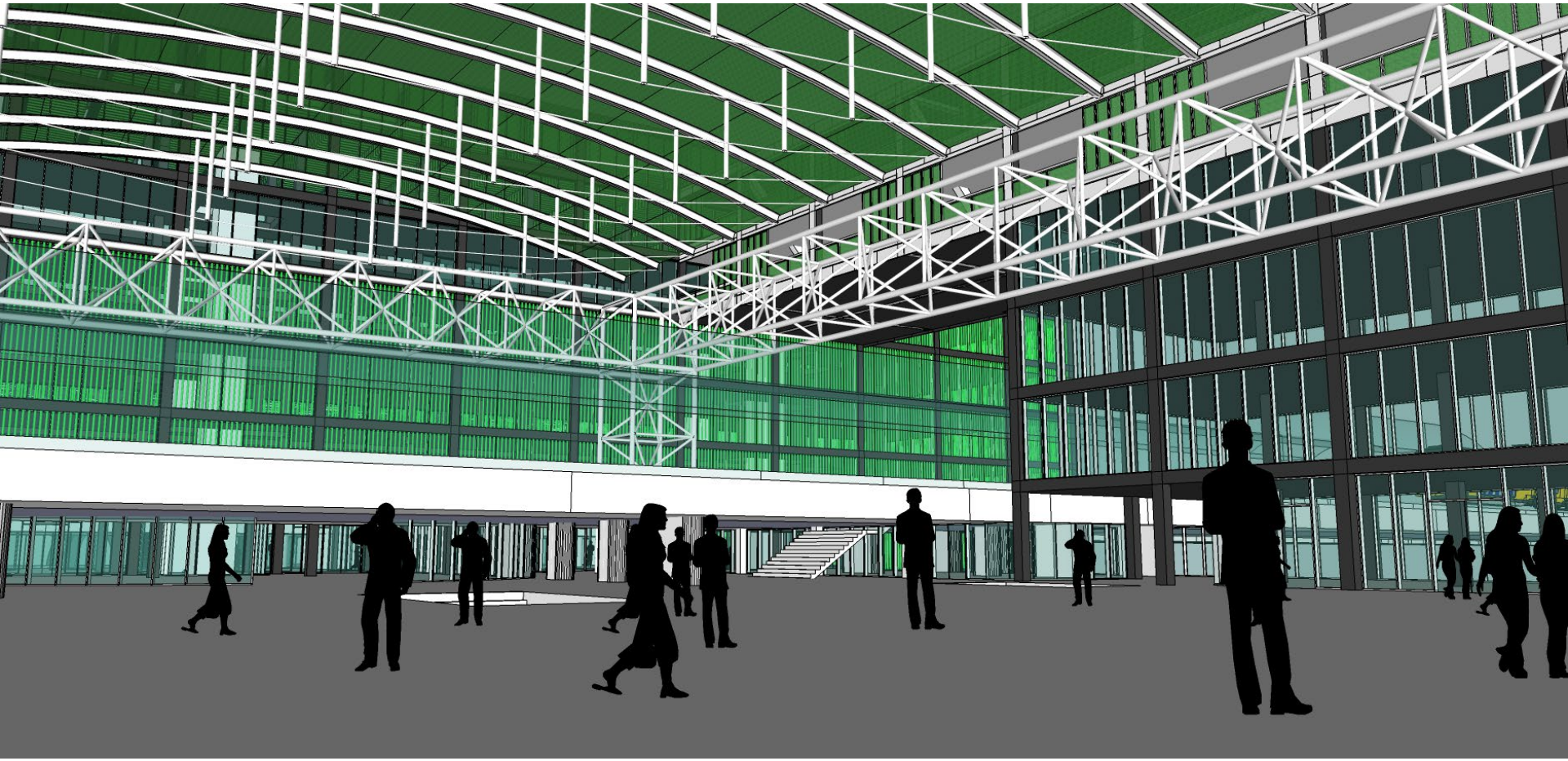
7625
2500 mm

Architecture

impression

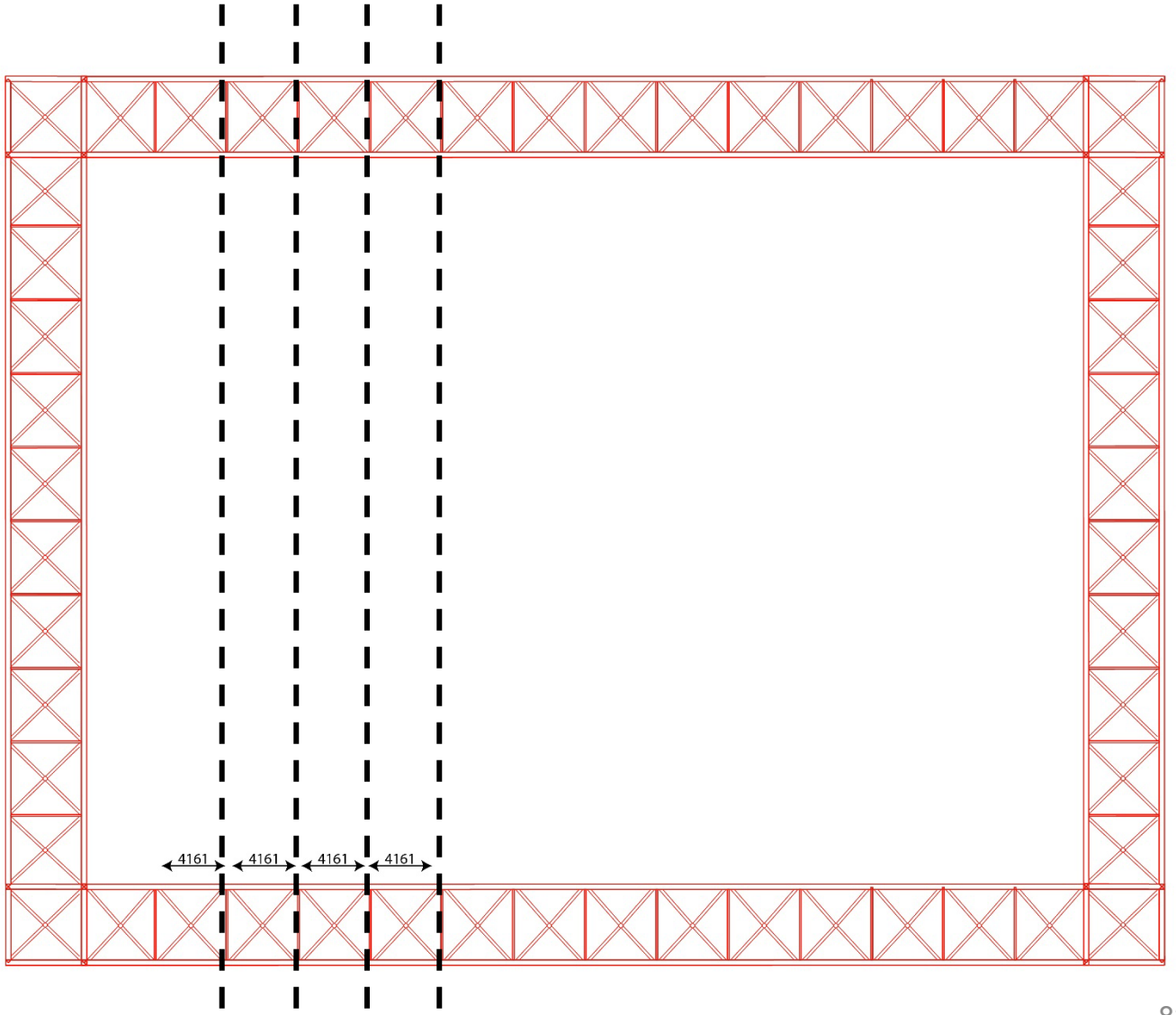
_Central hall

__arches



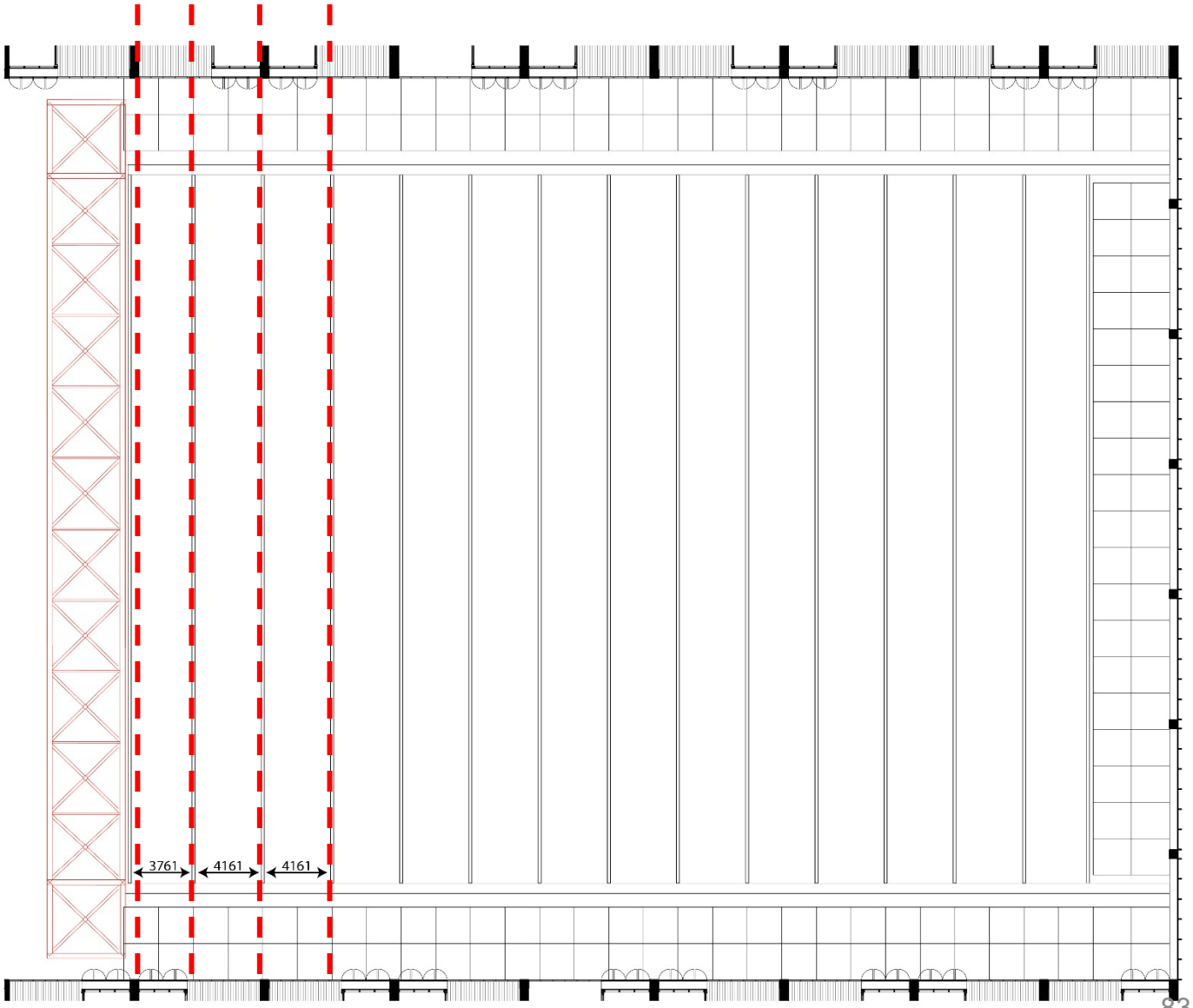
Architecture

concept



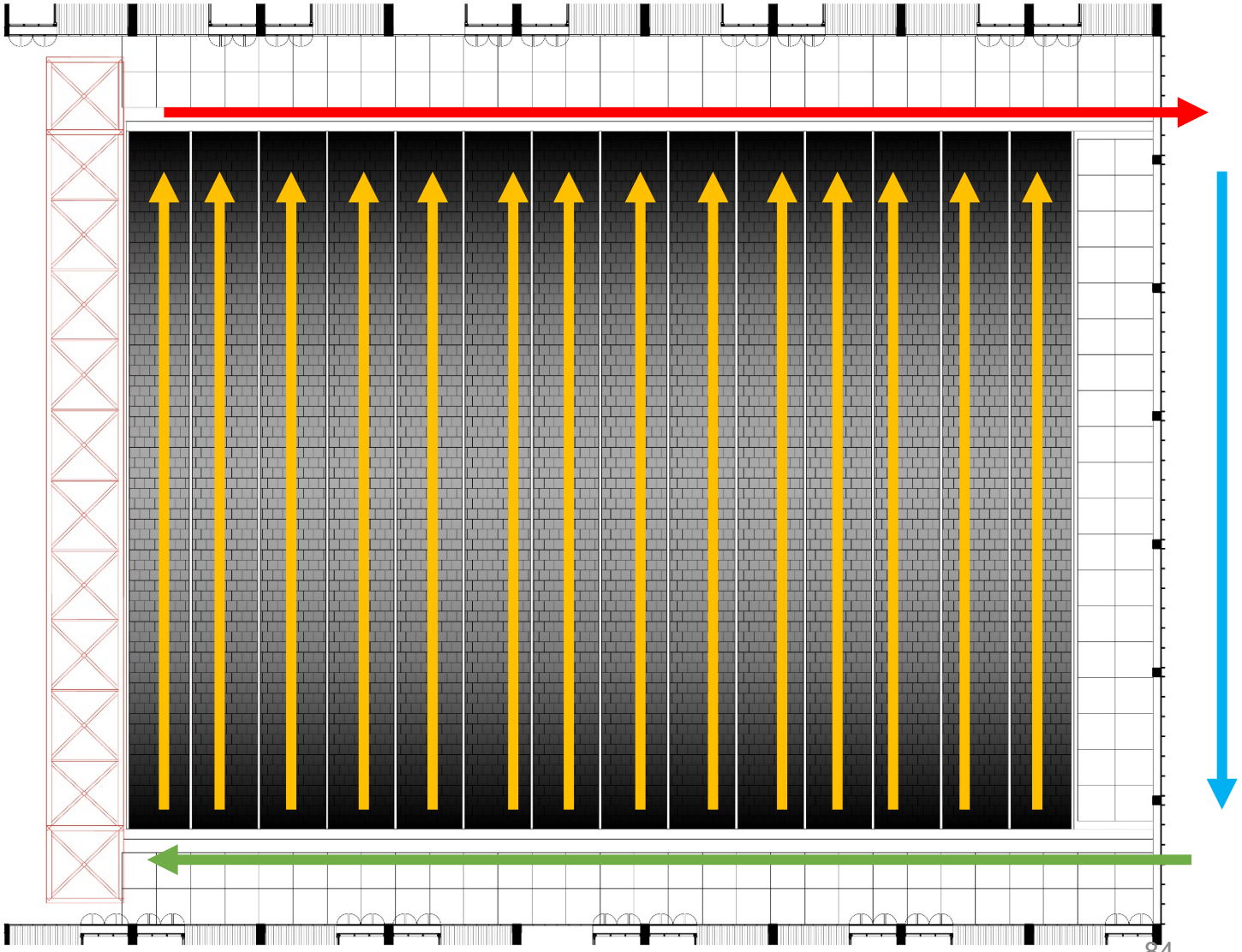
Architecture

concept



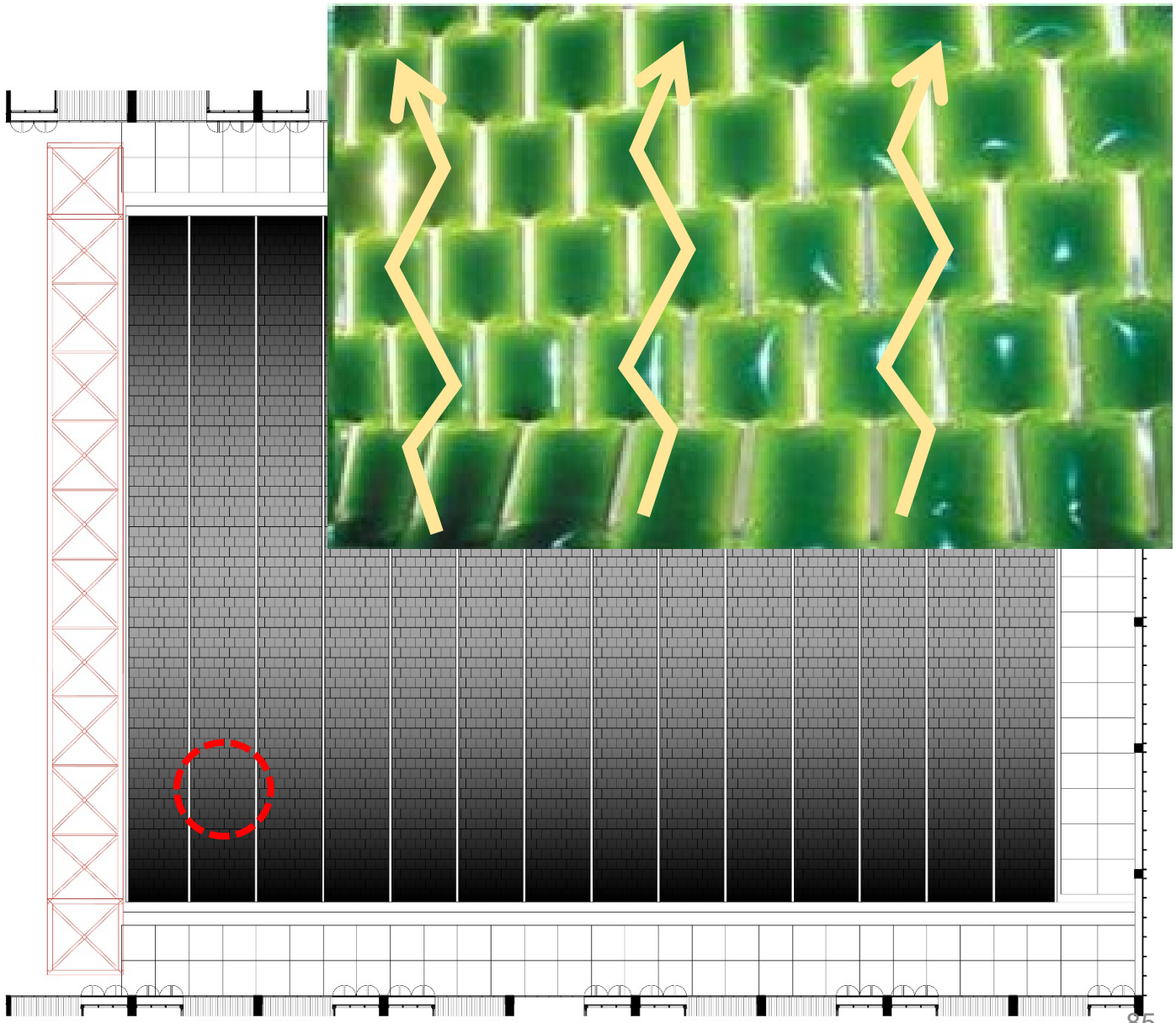
Architecture

concept



Architecture

concept

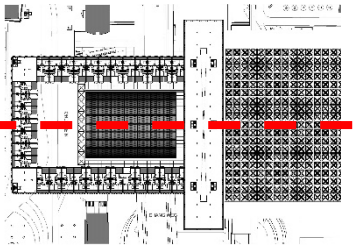


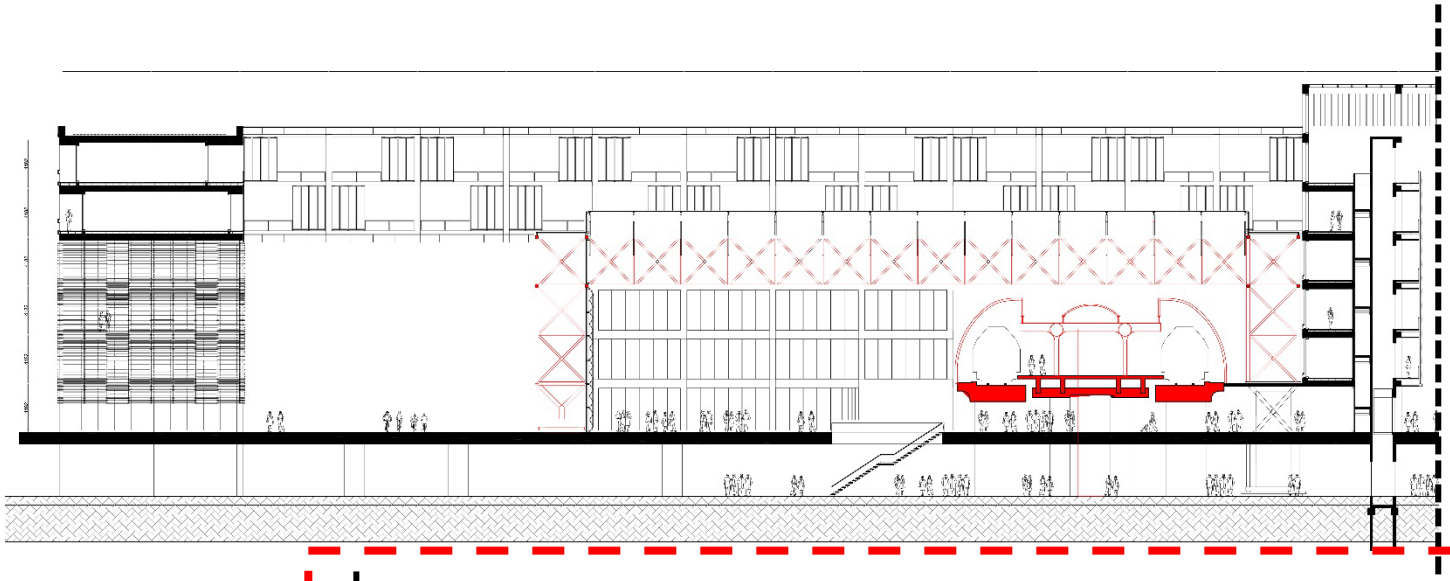
Architecture

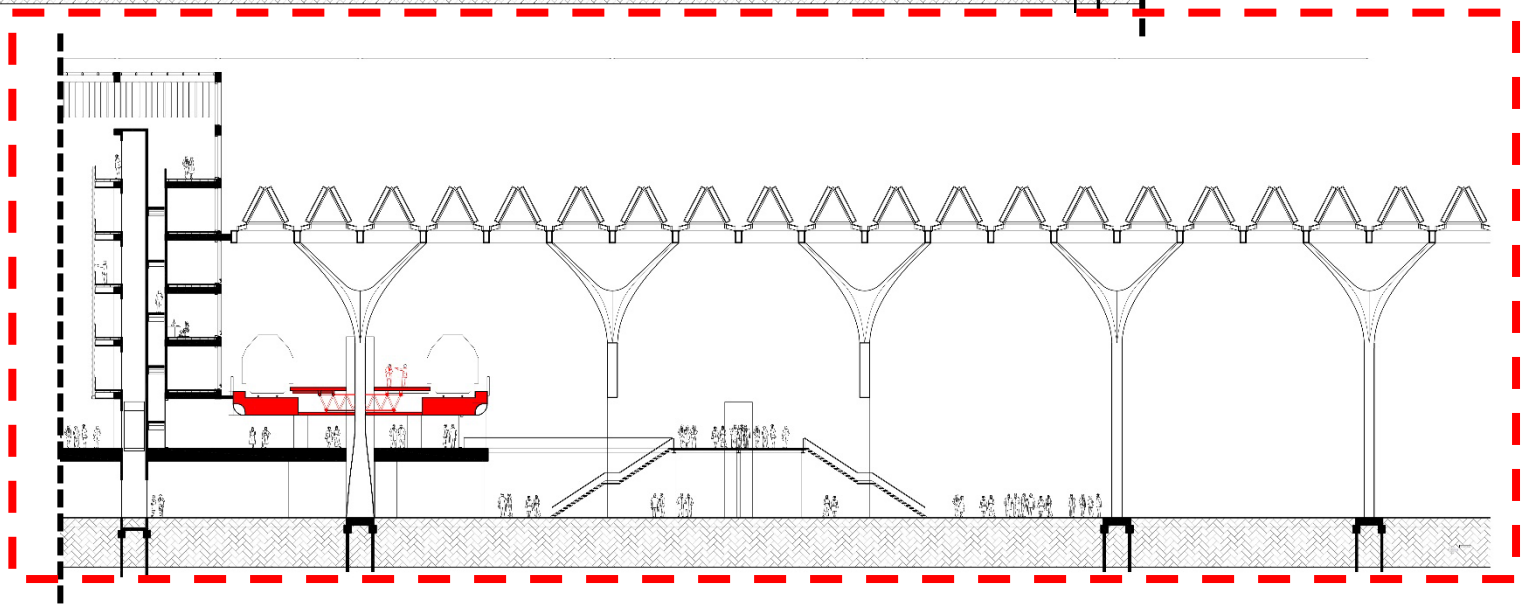
impression

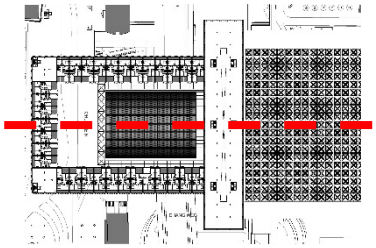
architecture

section









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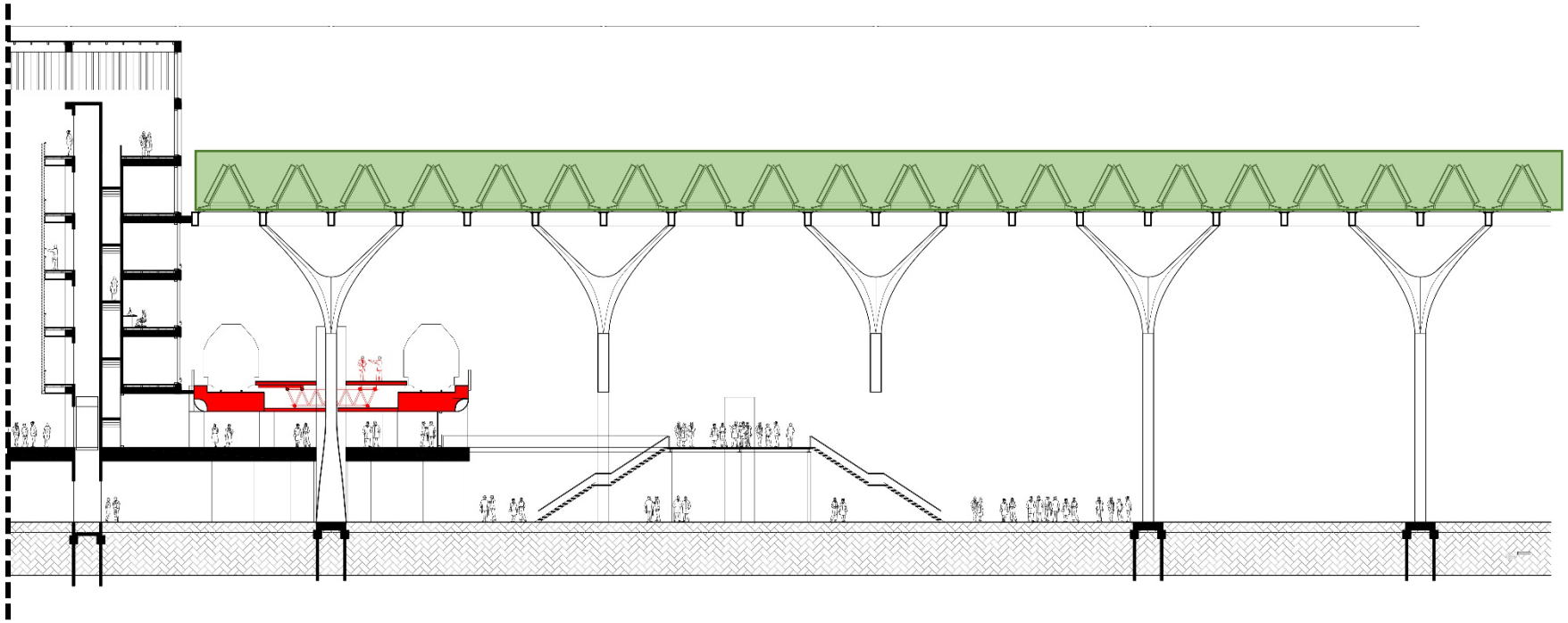
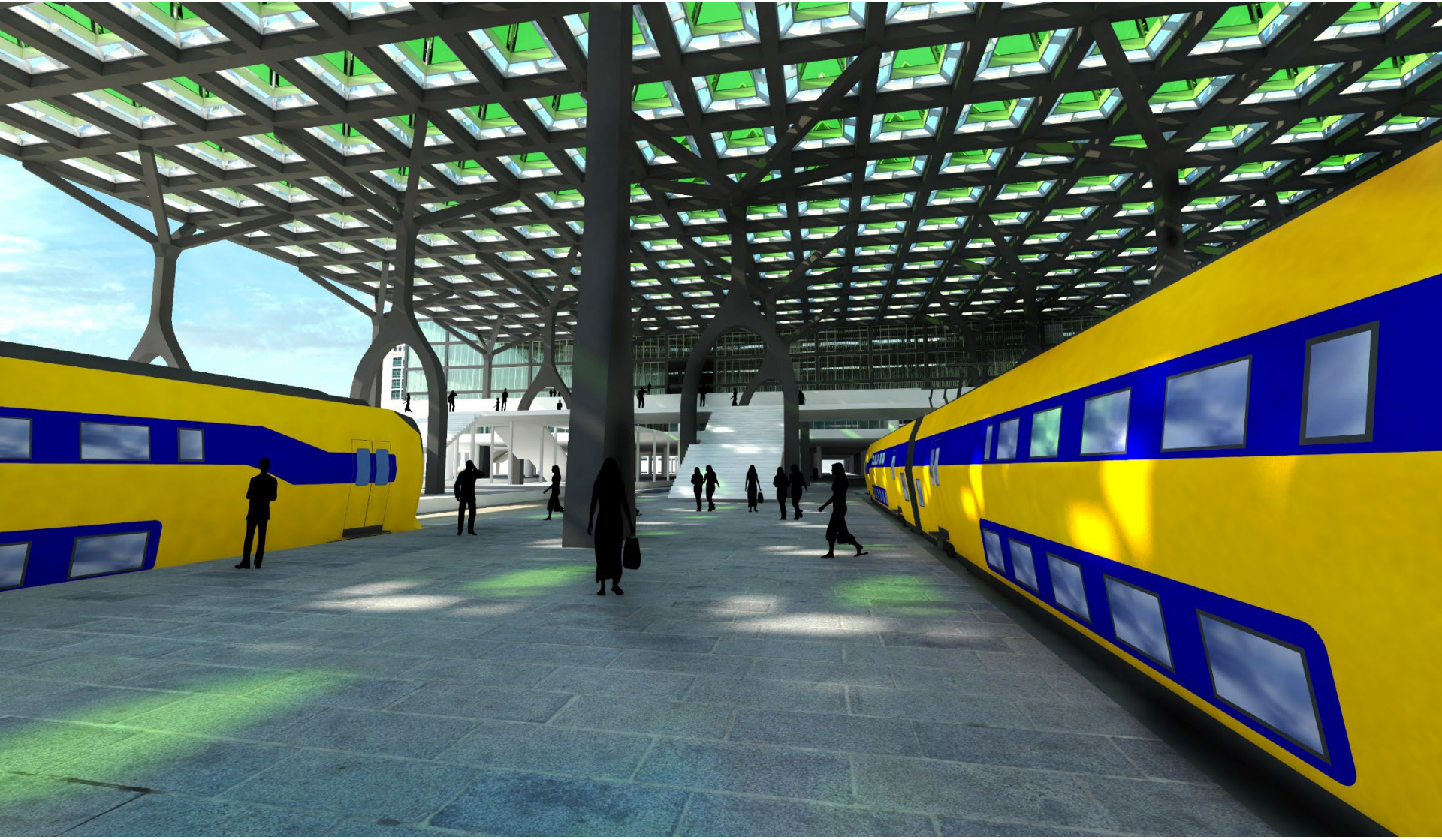


Architecture

impression



architecture

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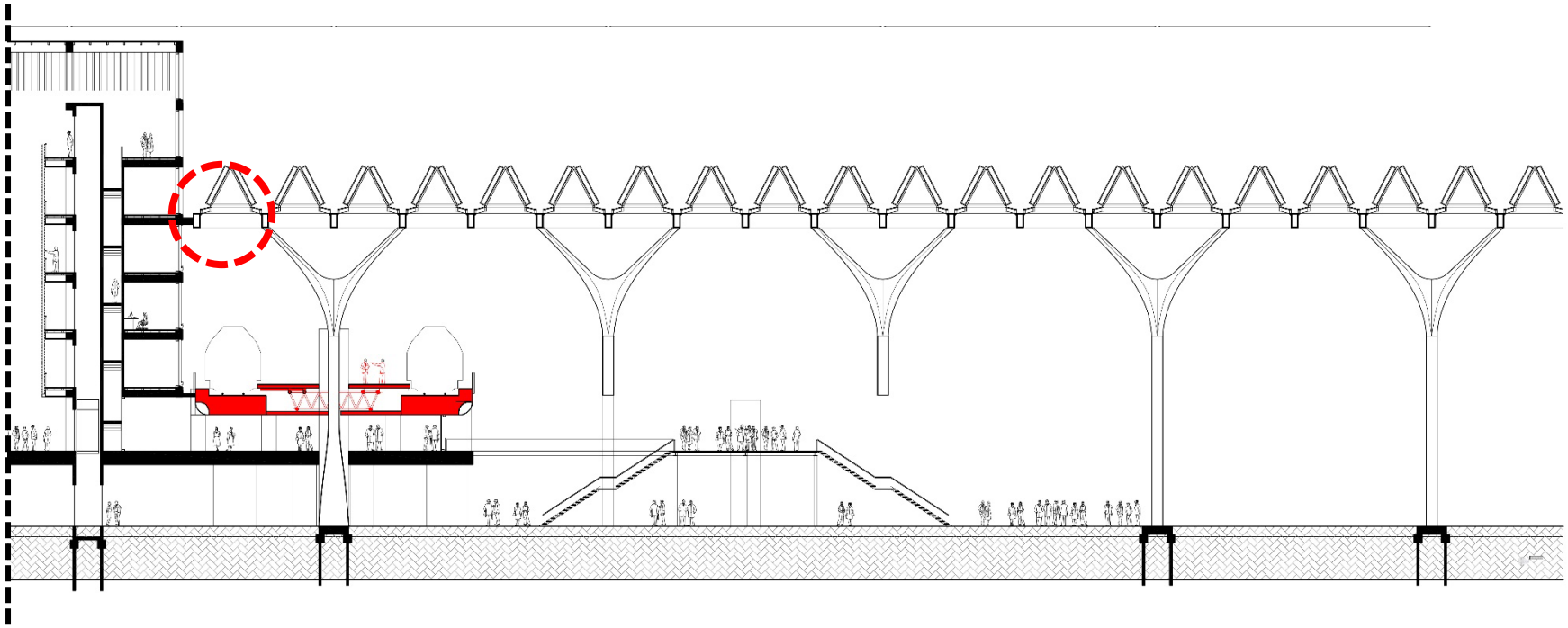
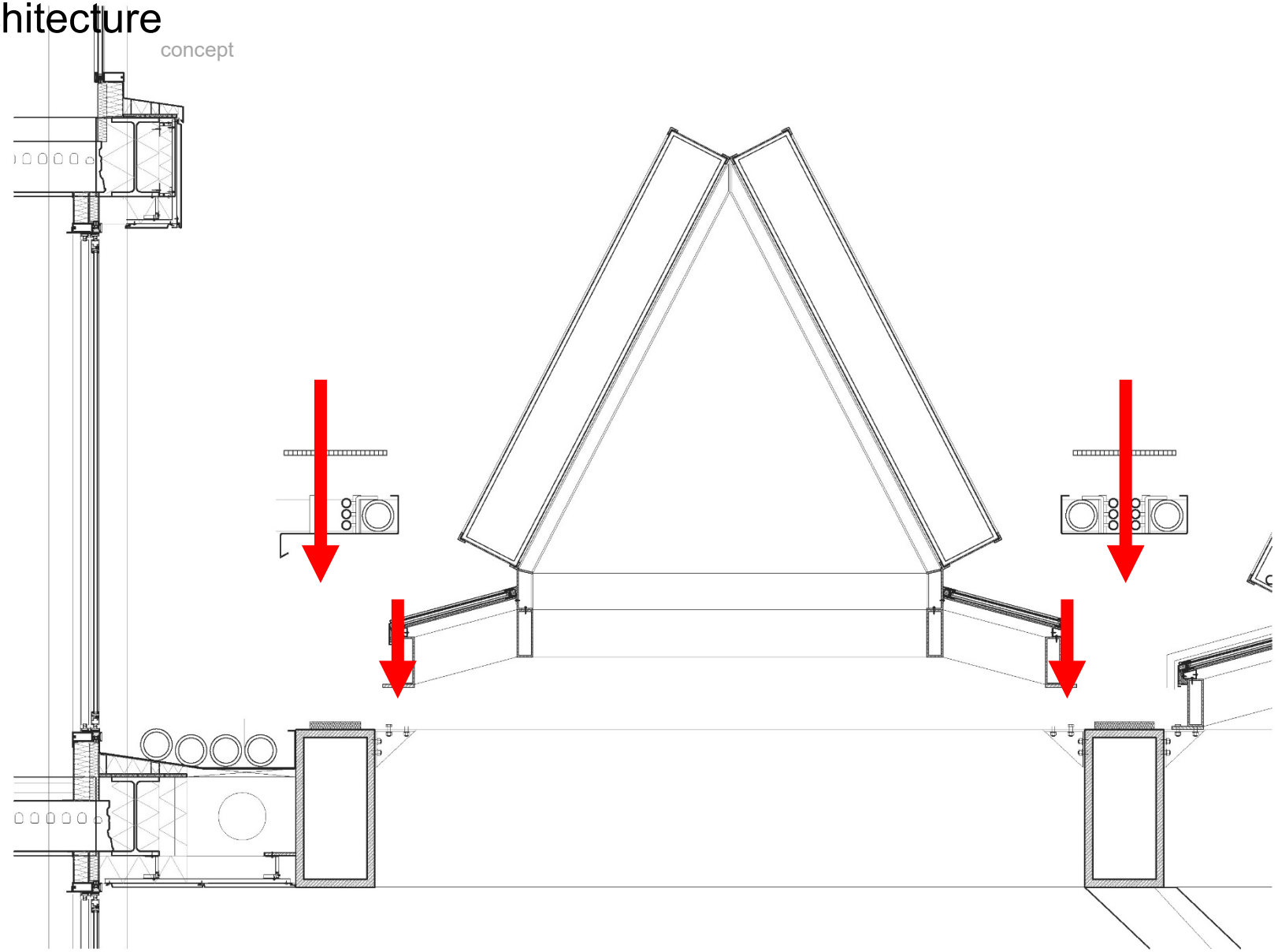


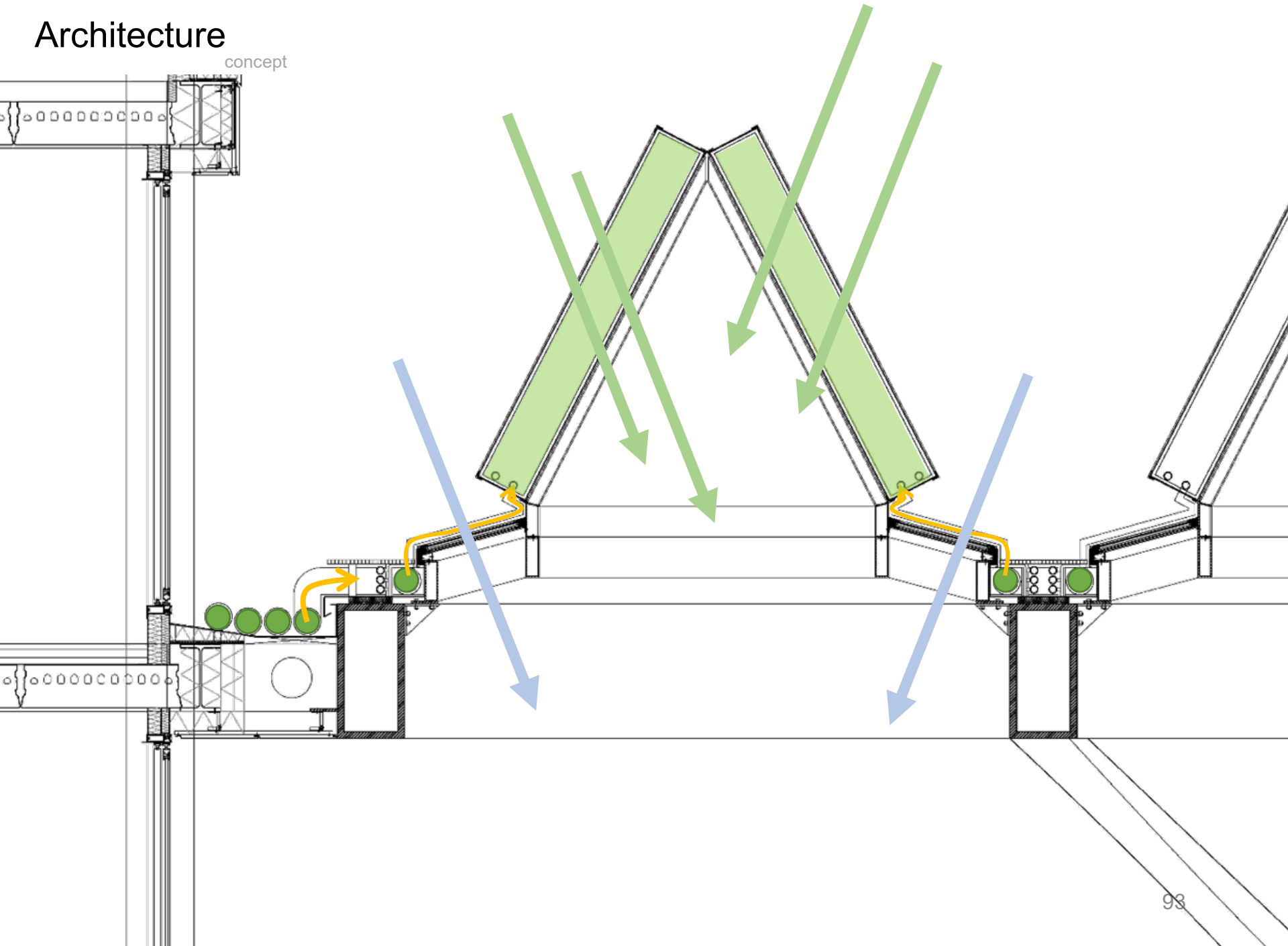
Architecture

concept



Architecture

concept



Architecture

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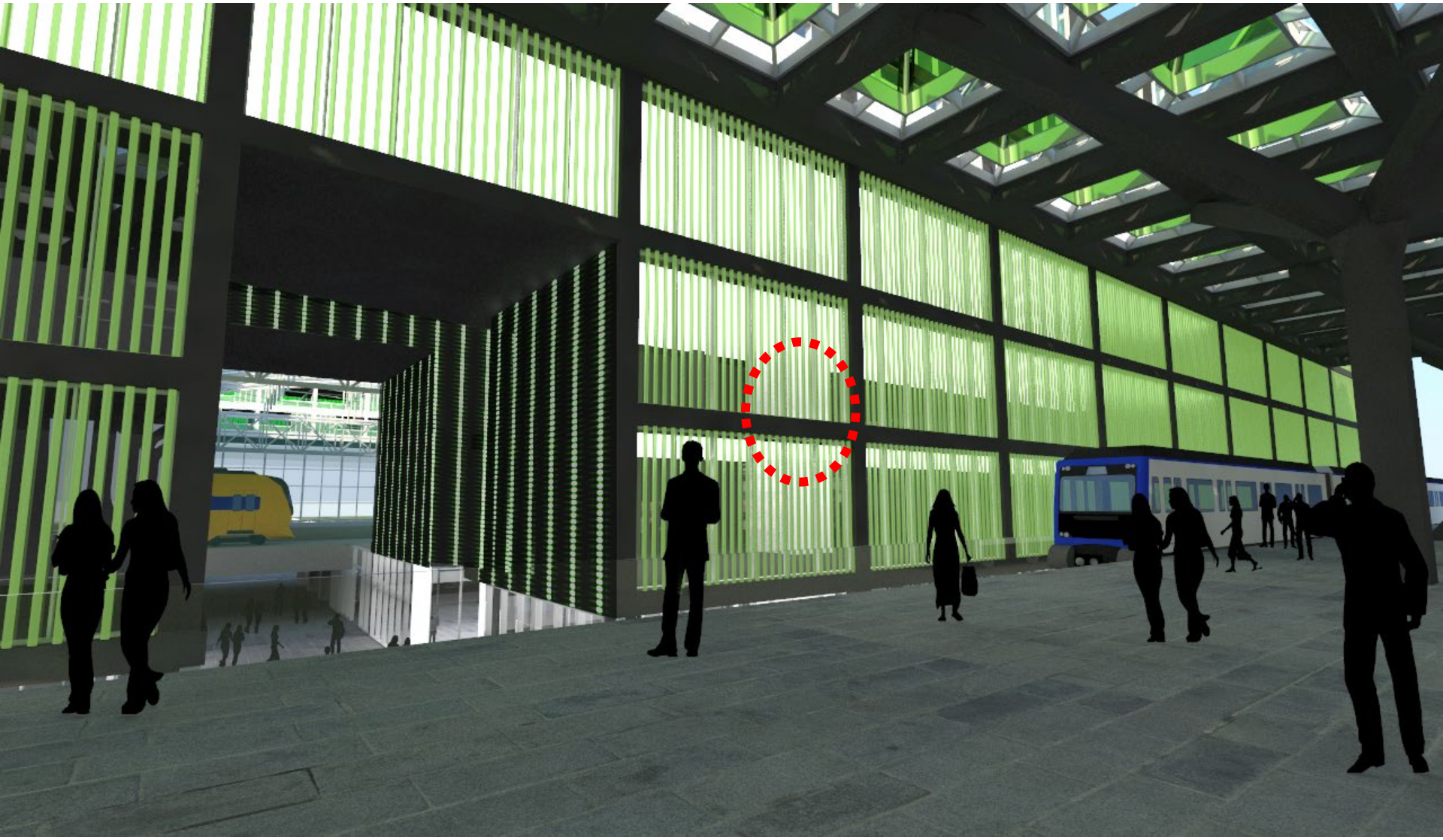

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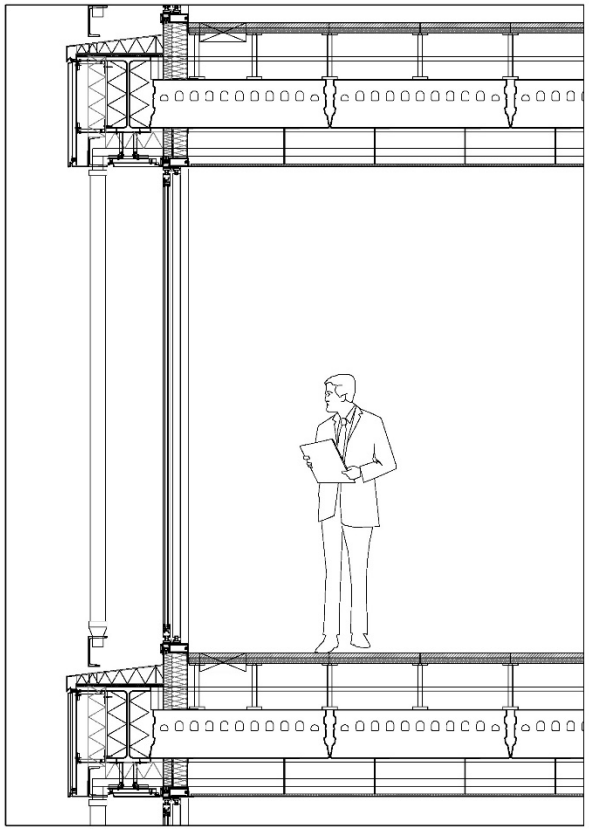
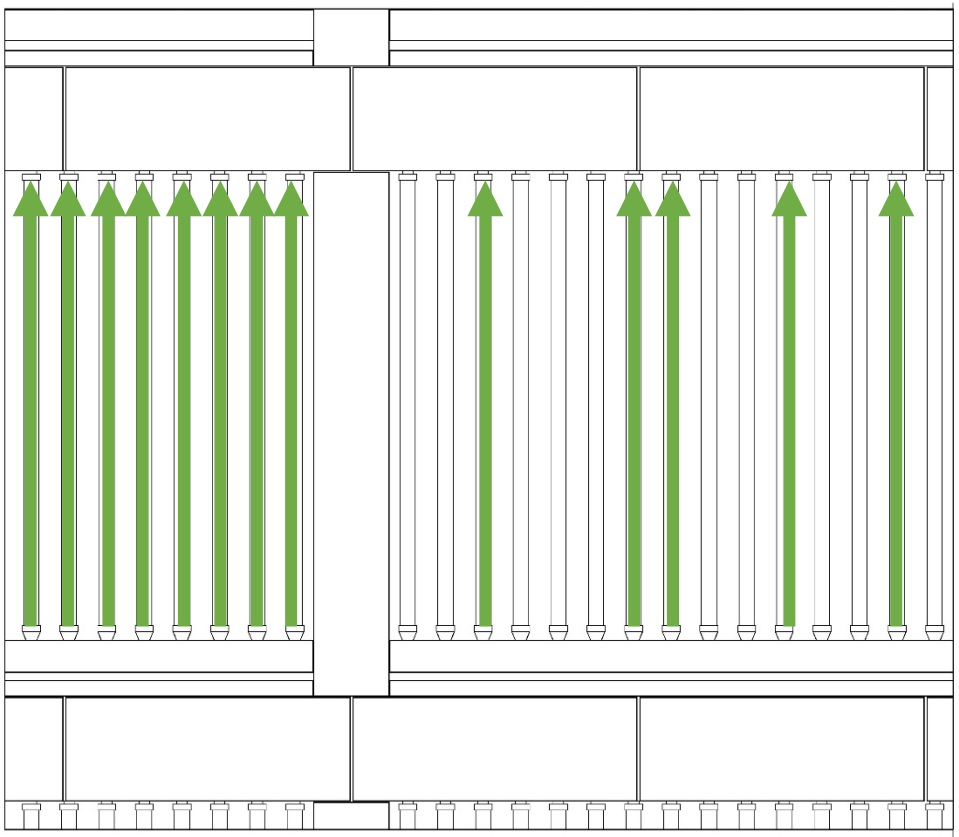
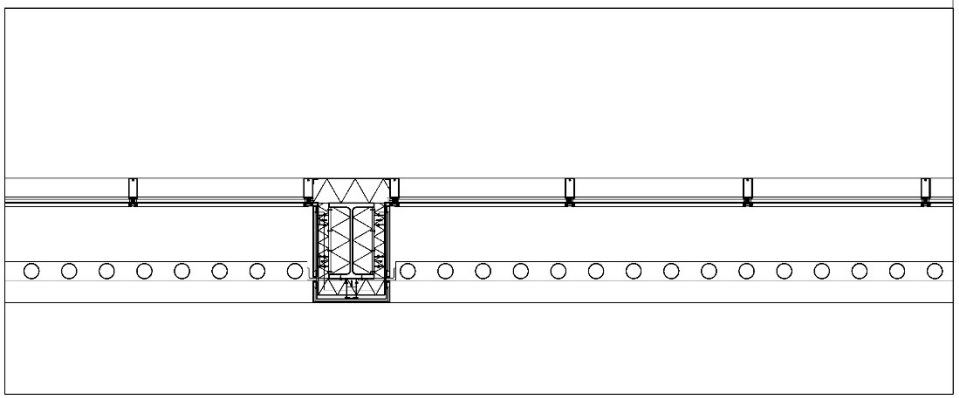




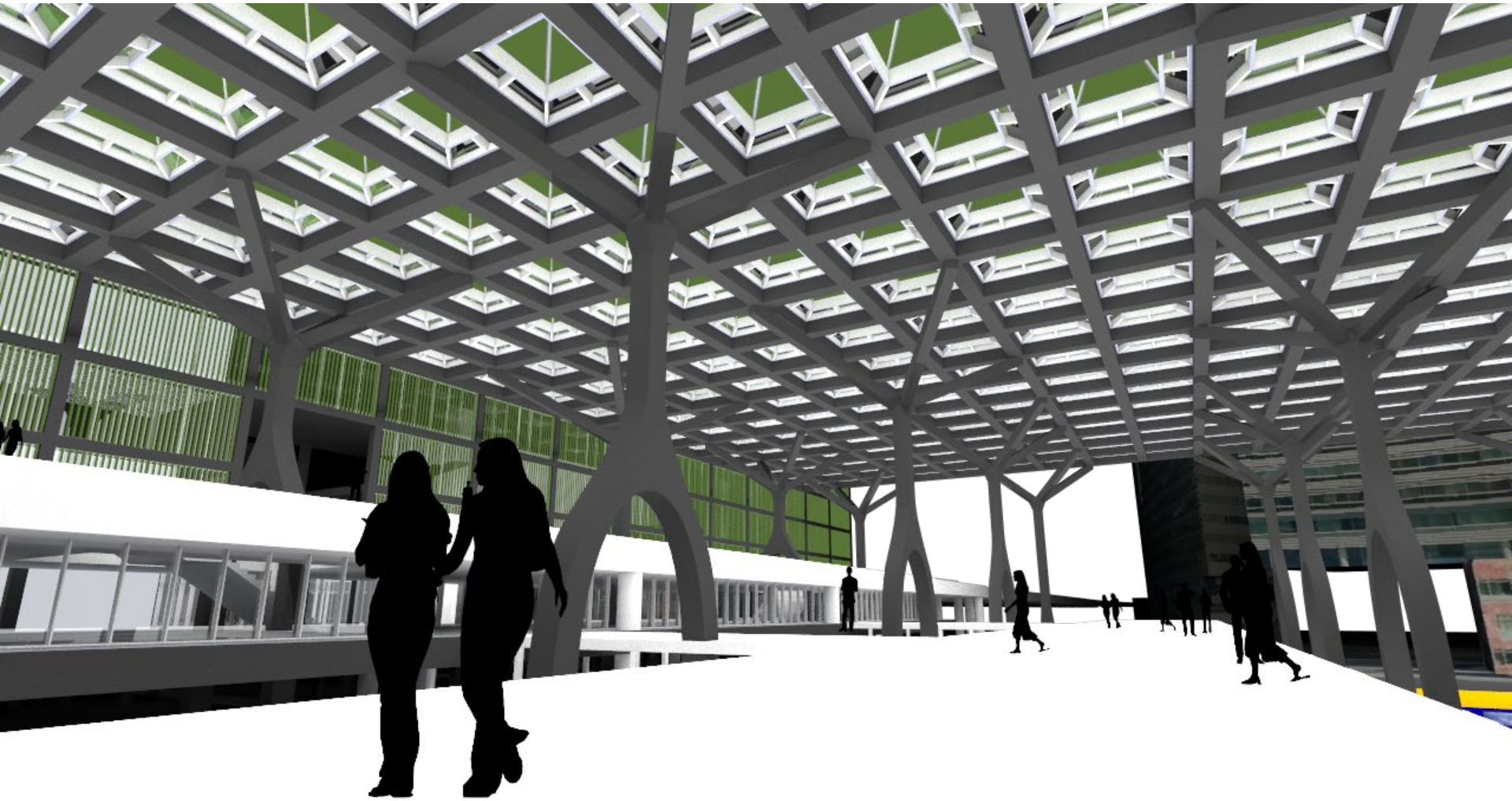


Architecture

impression

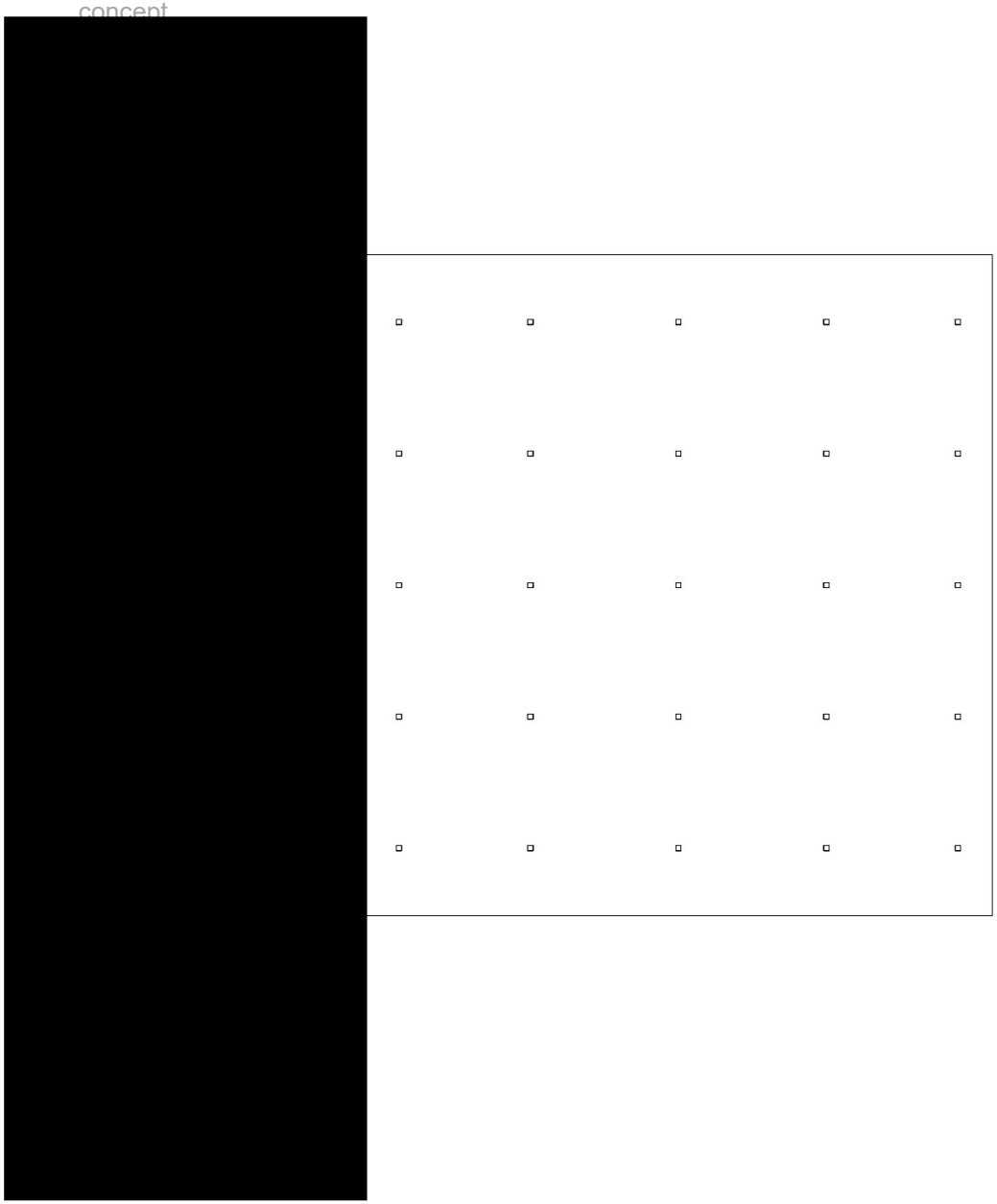
Architecture

Impression



Architecture

concept



Architecture

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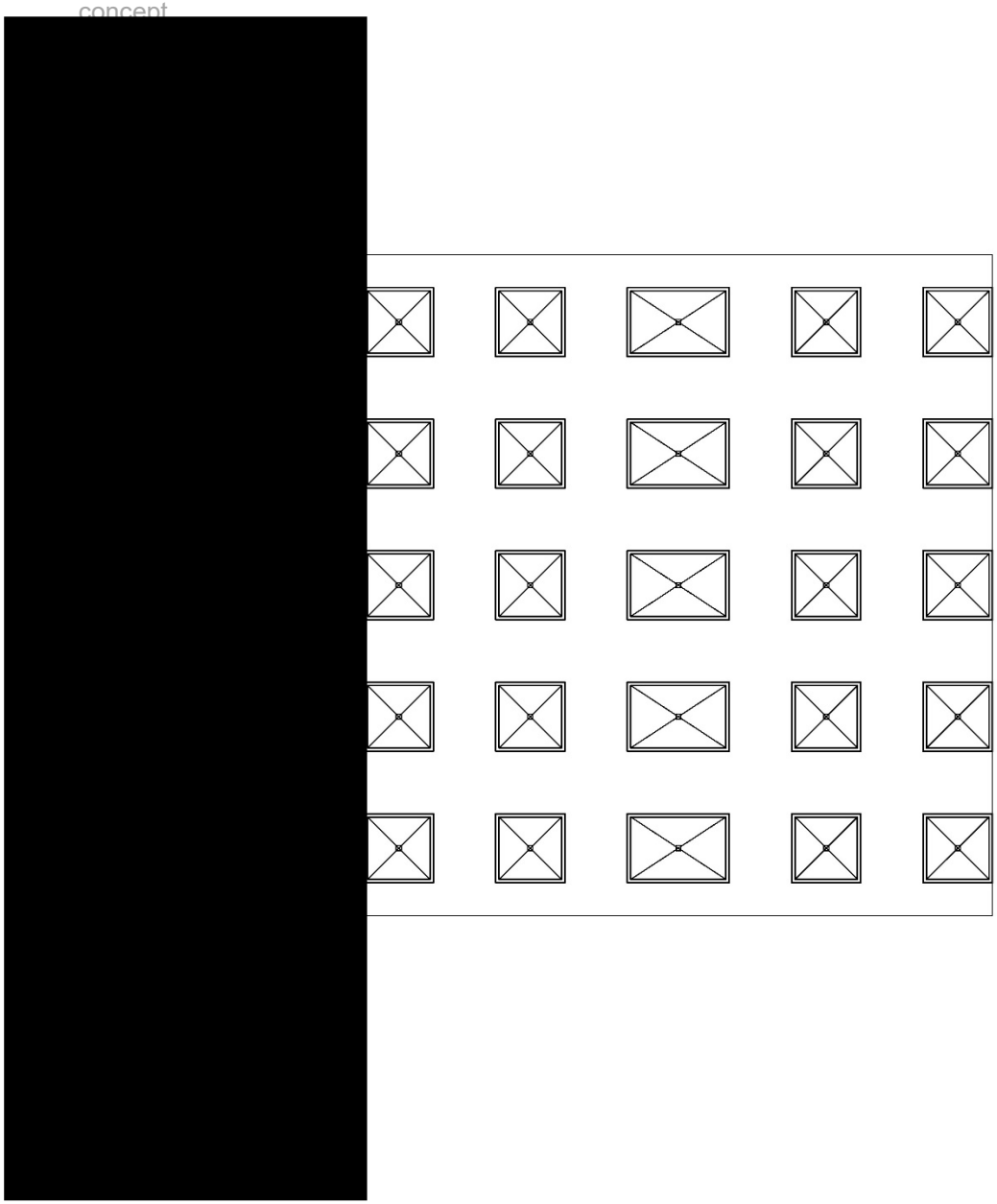
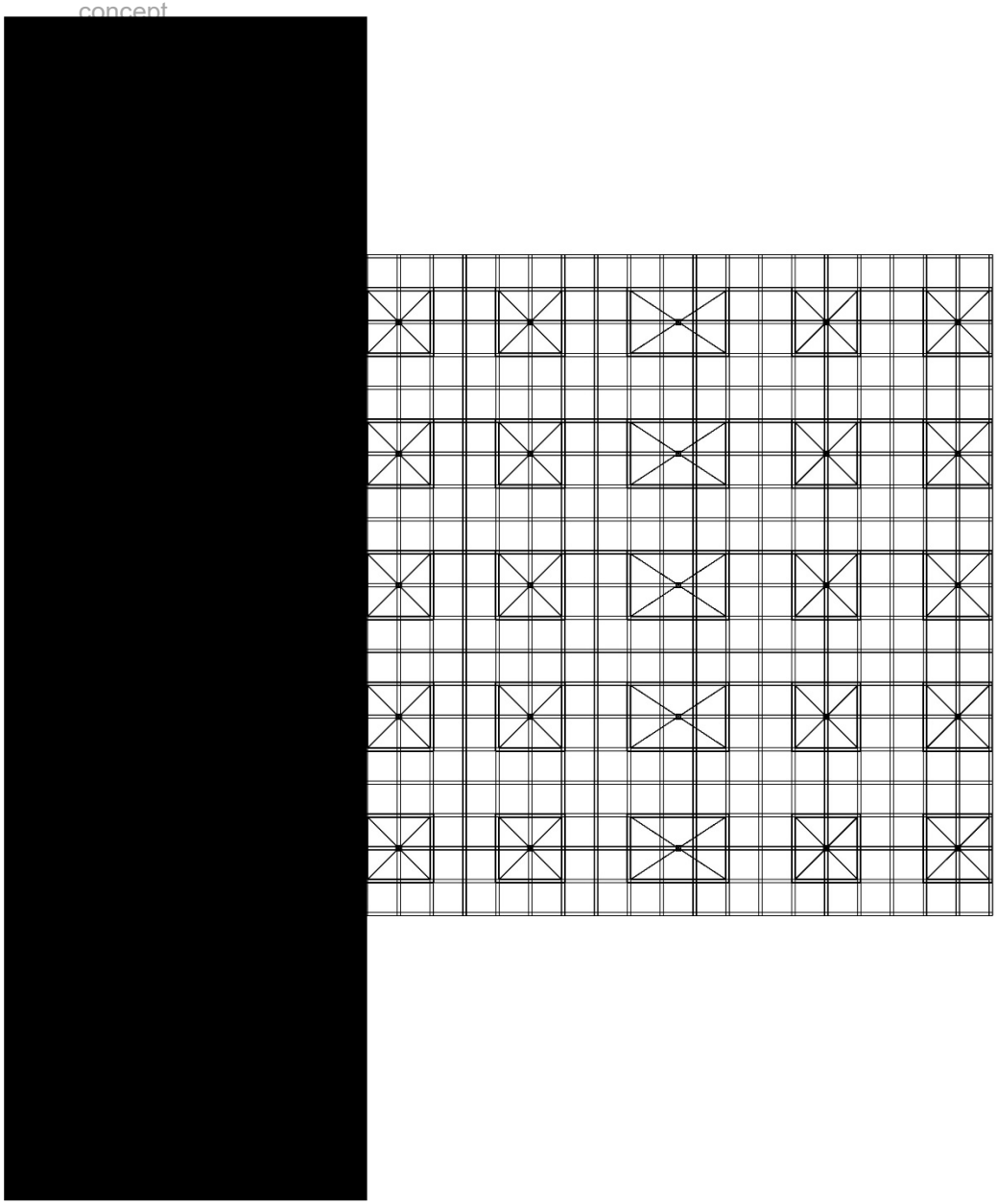


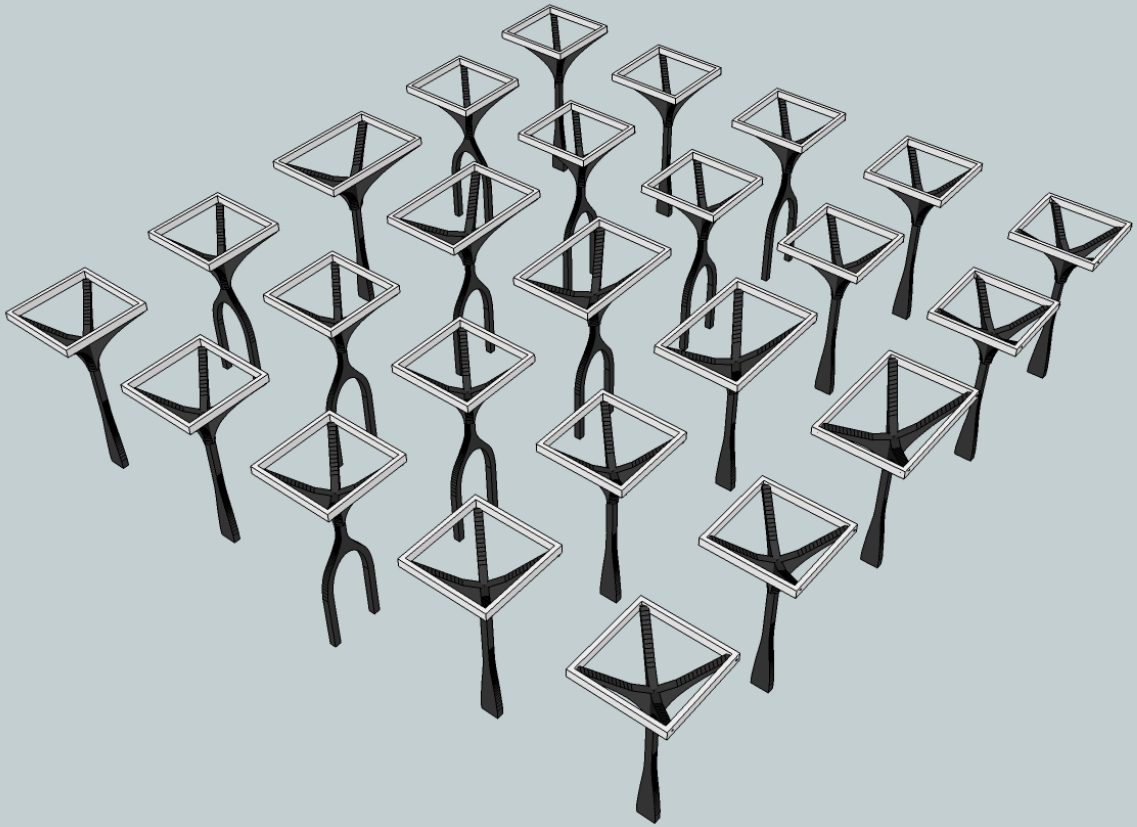
Architecture

concept



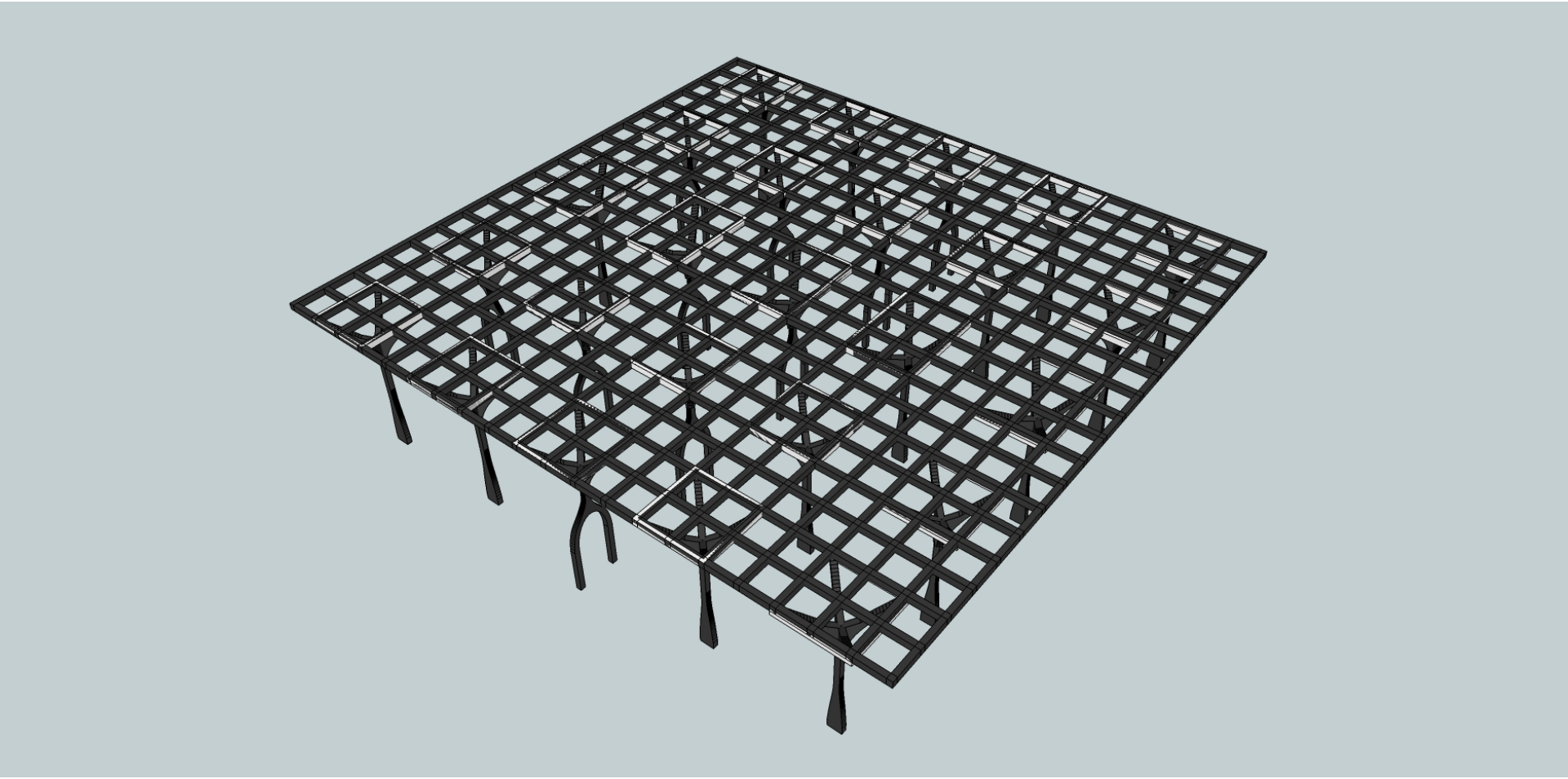
Architecture

concept



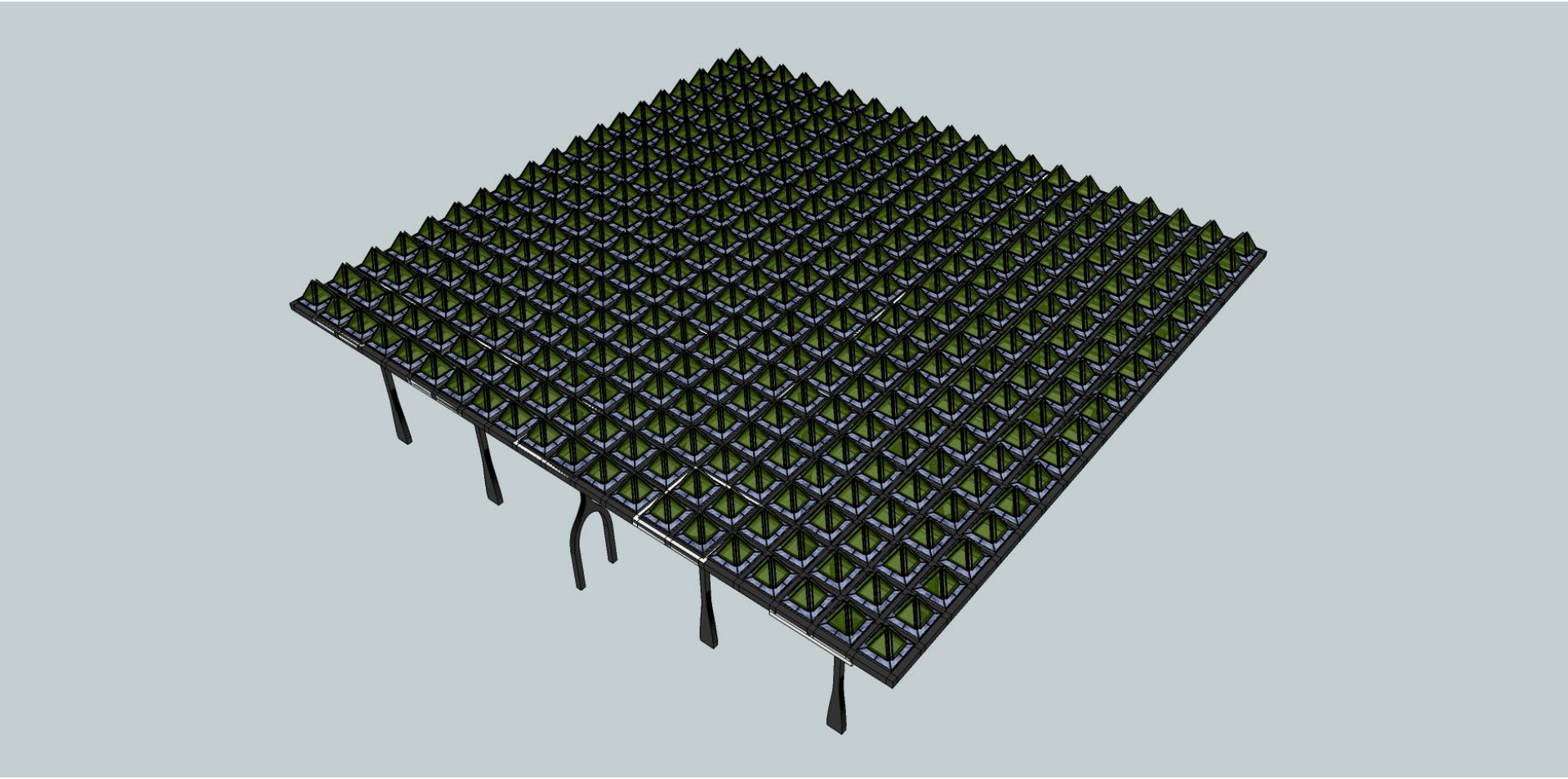
Architecture

concept



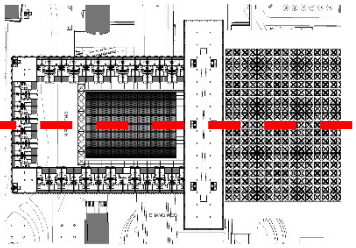
Architecture

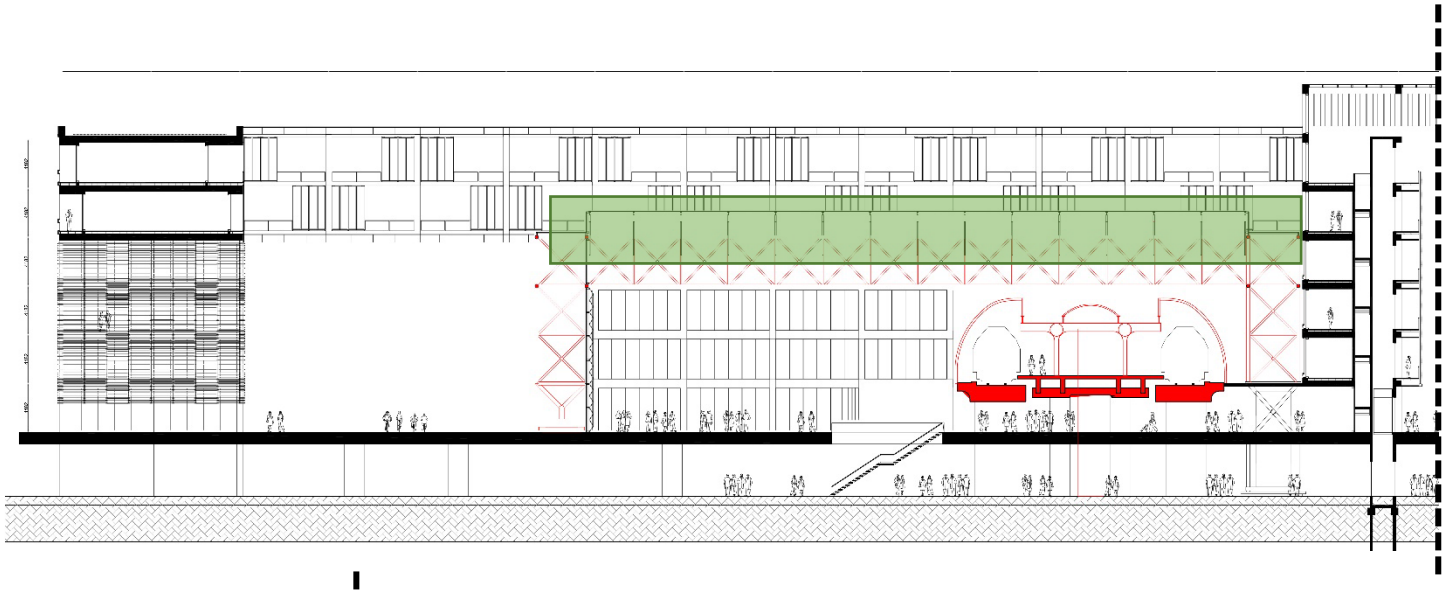
concept

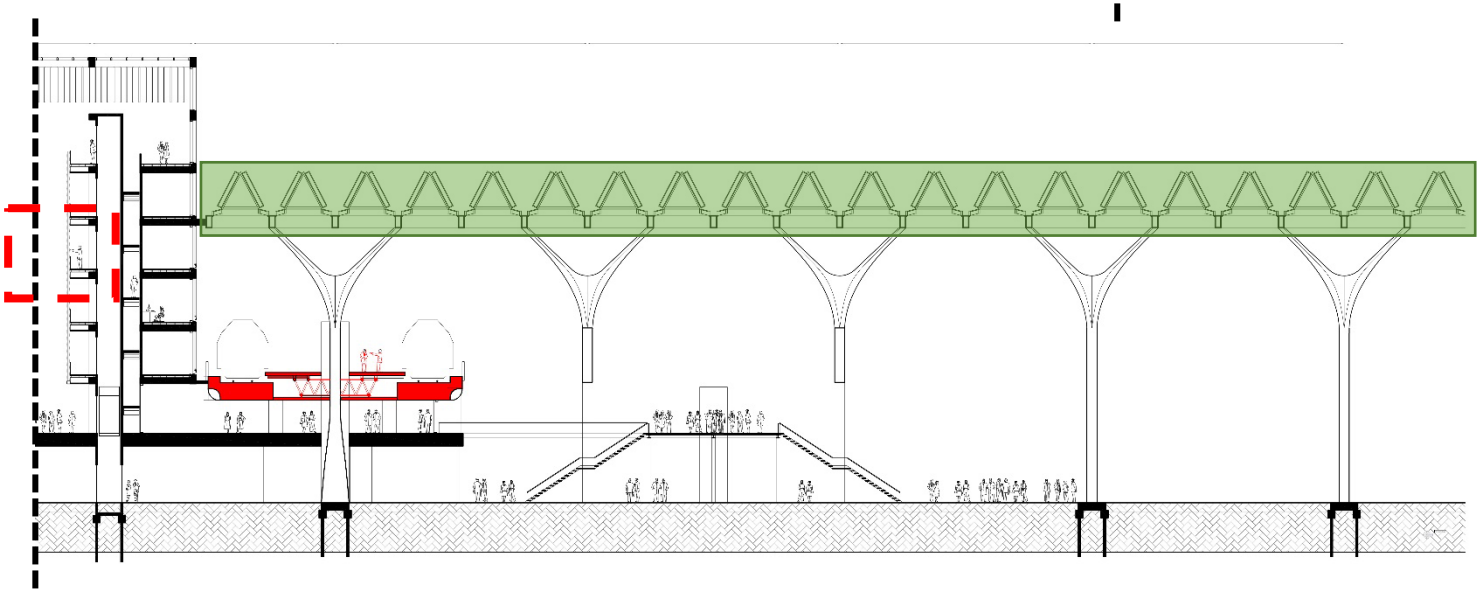


architecture

section

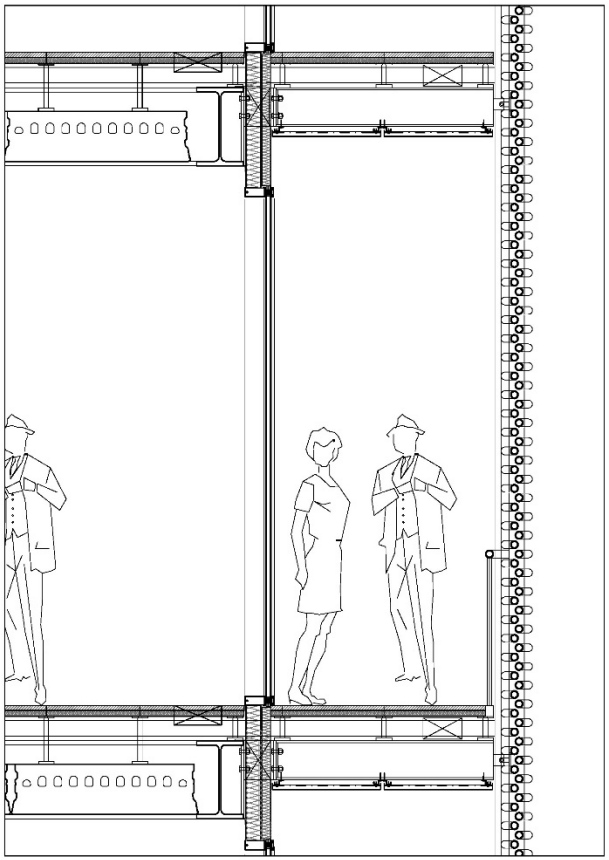


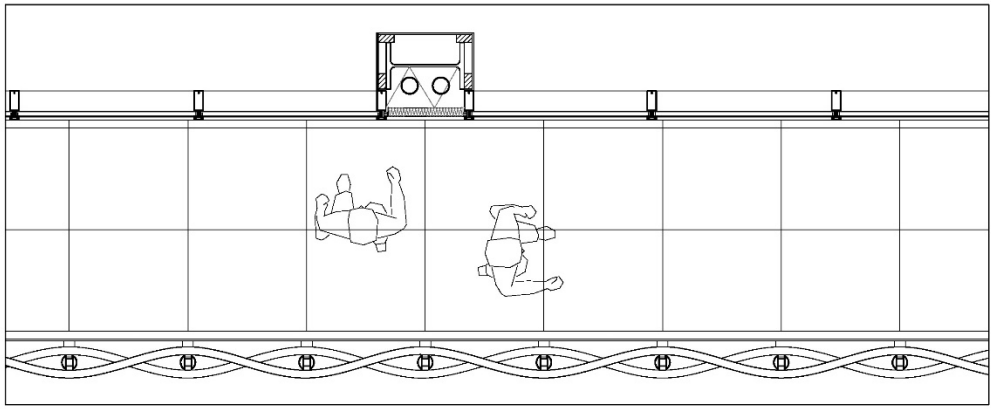




Architecture

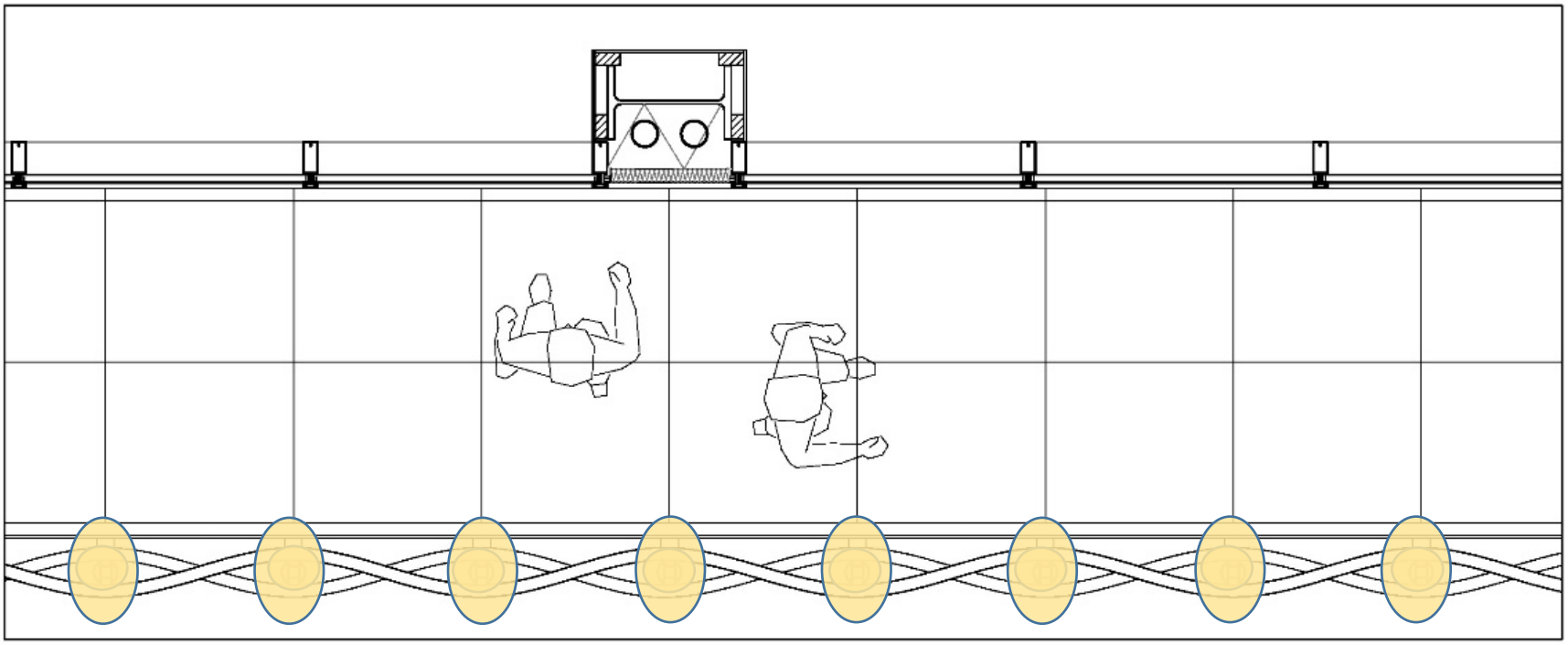
concept





Architecture

concept

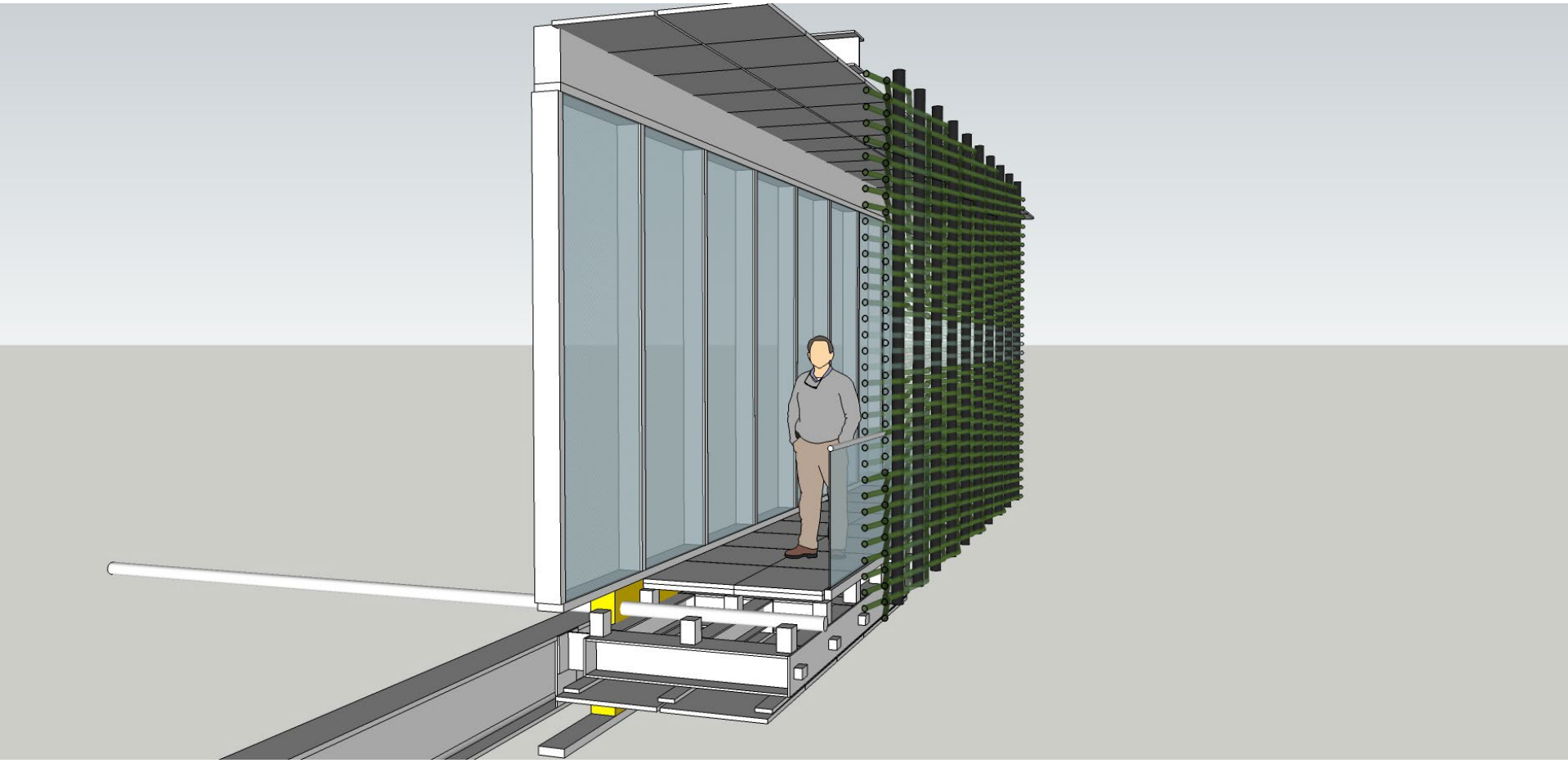


Integrated LED light

760 mm 760 mm 760 mm

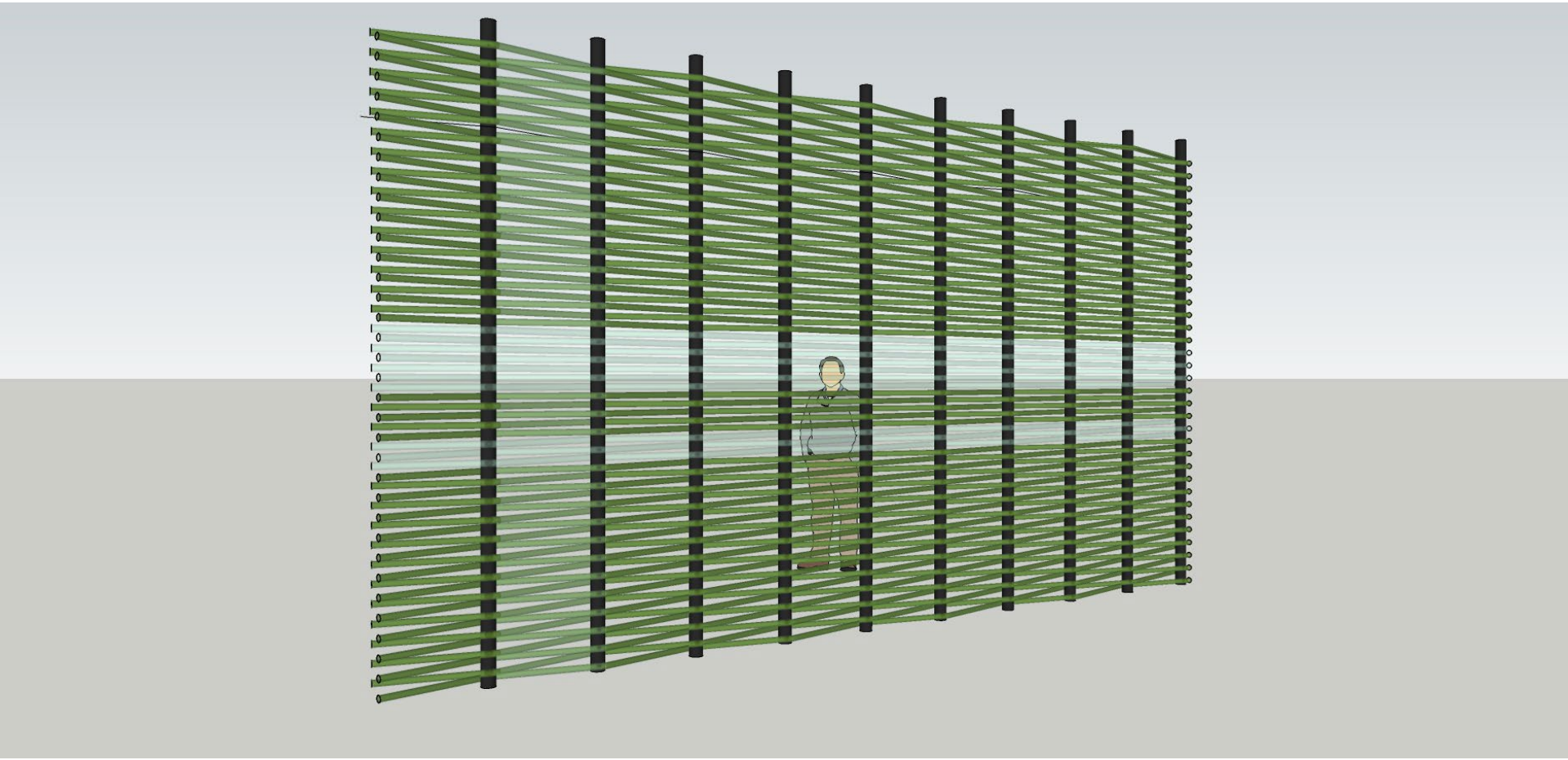
Architecture

concept



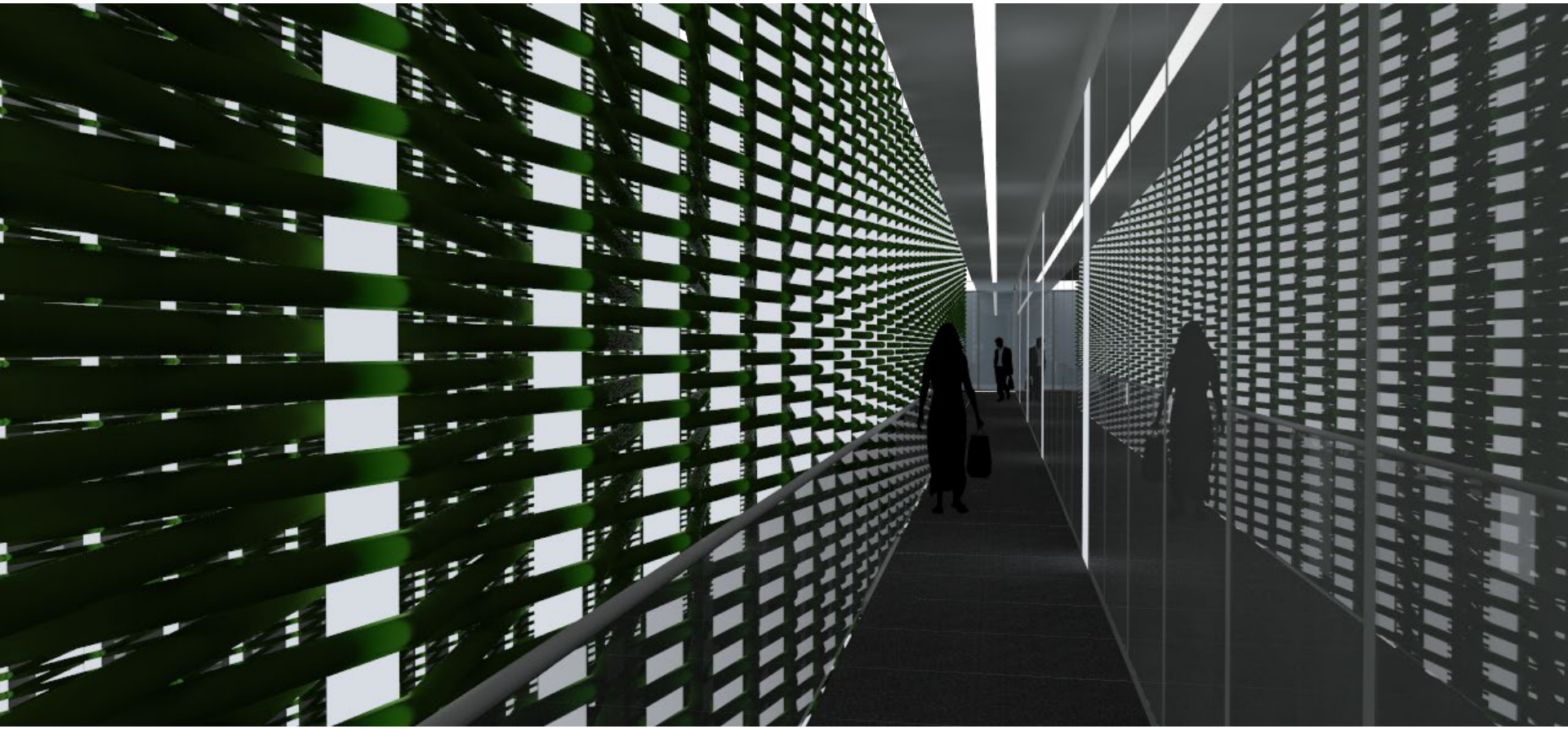
Architecture

concept



Architecture

impression

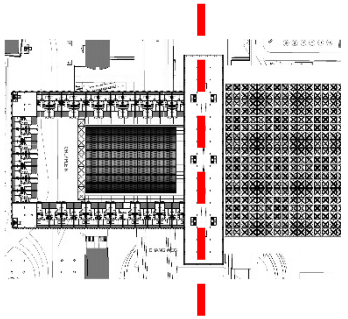


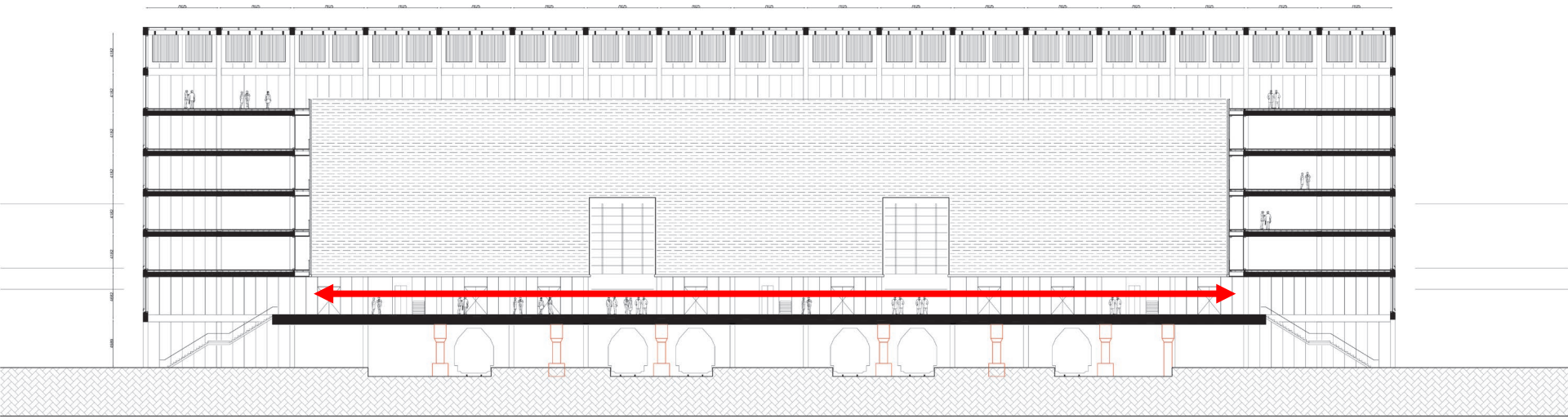
Architecture

Impression

architecture

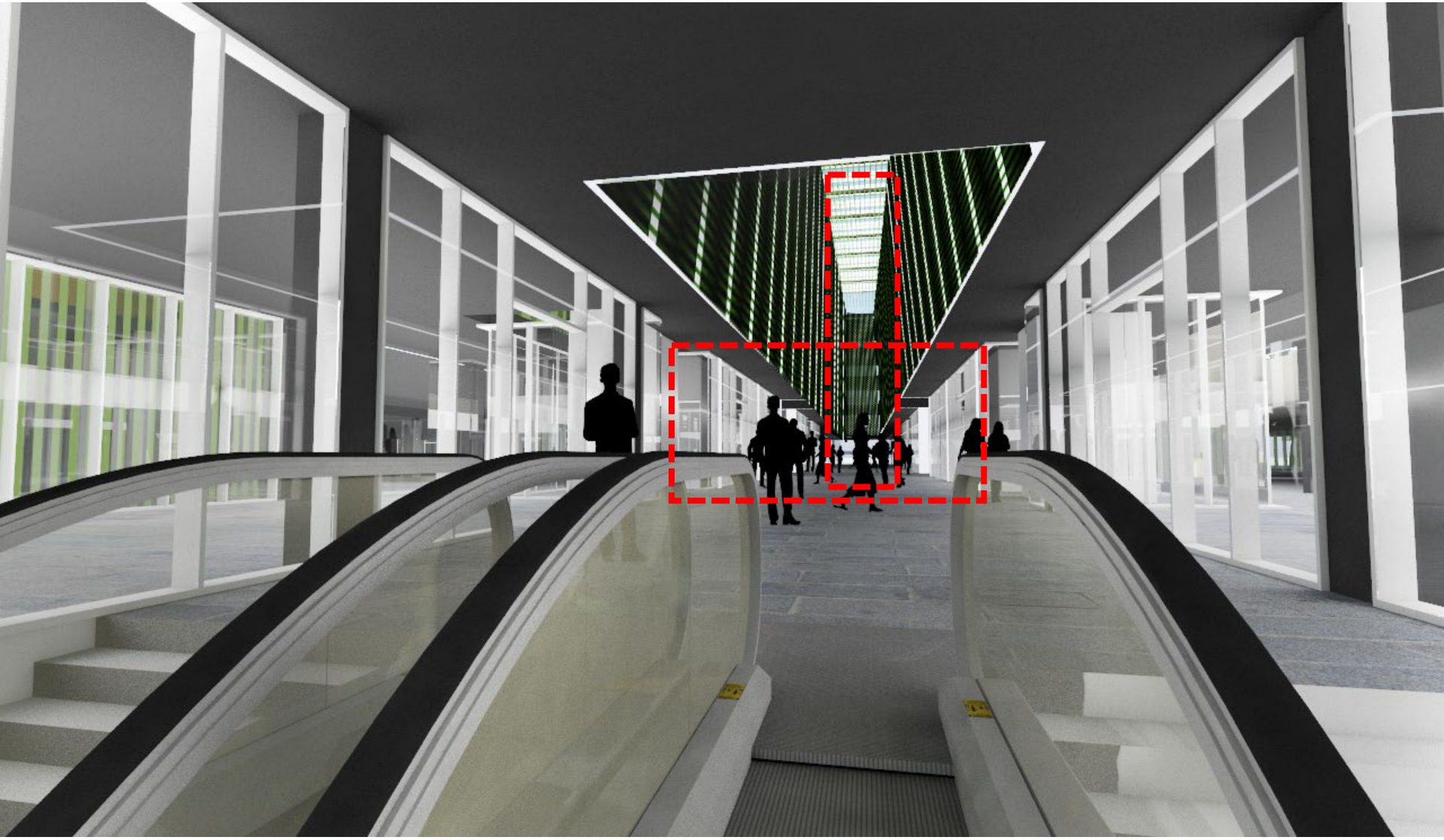
section





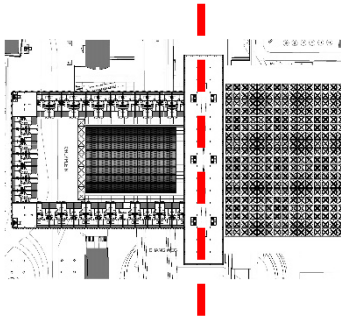
Architecture

impression



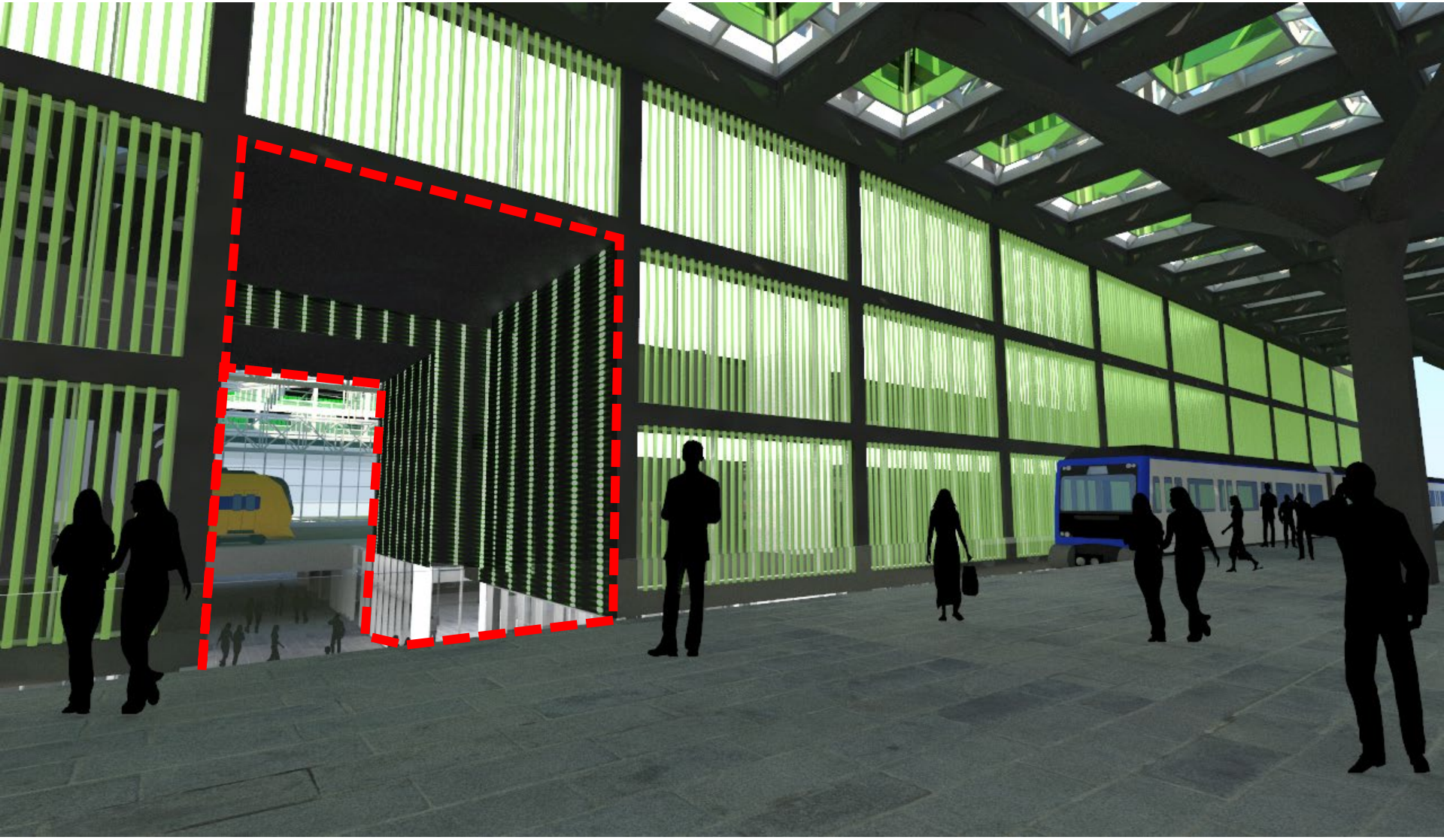
architecture

section



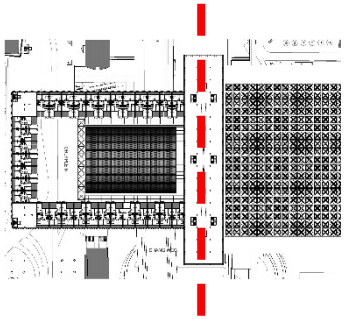
Architecture

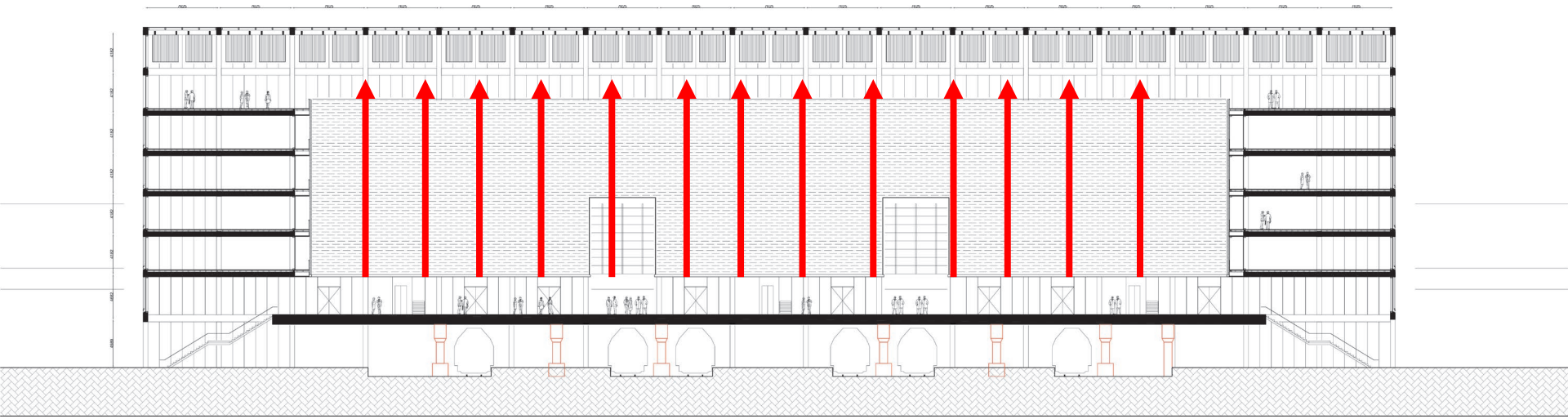
impression



architecture

section



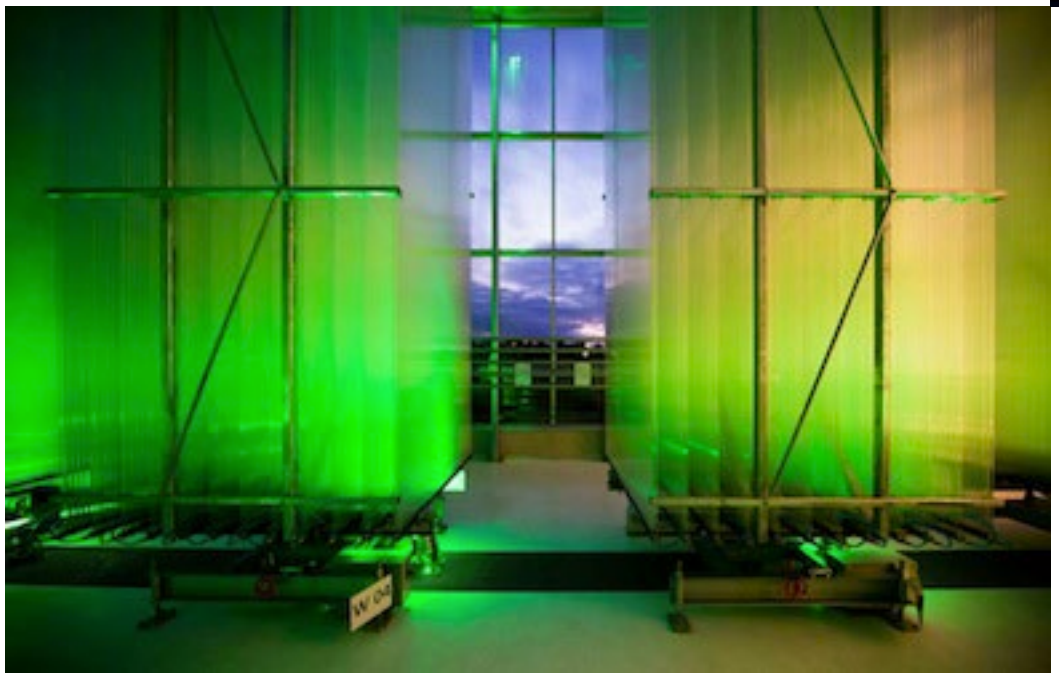


Architecture

concept

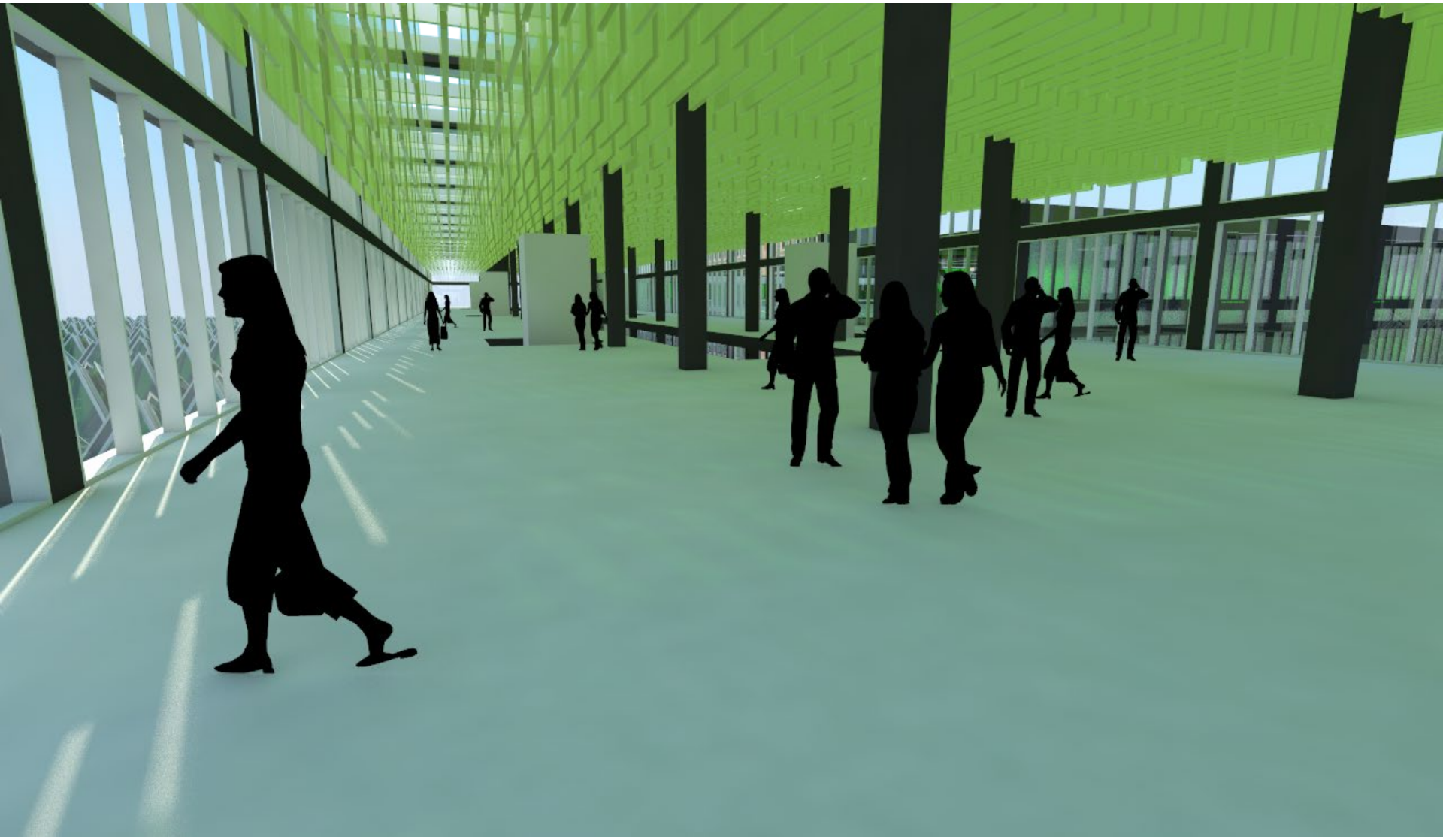
_Center slab

__algae roof ecoduna panels



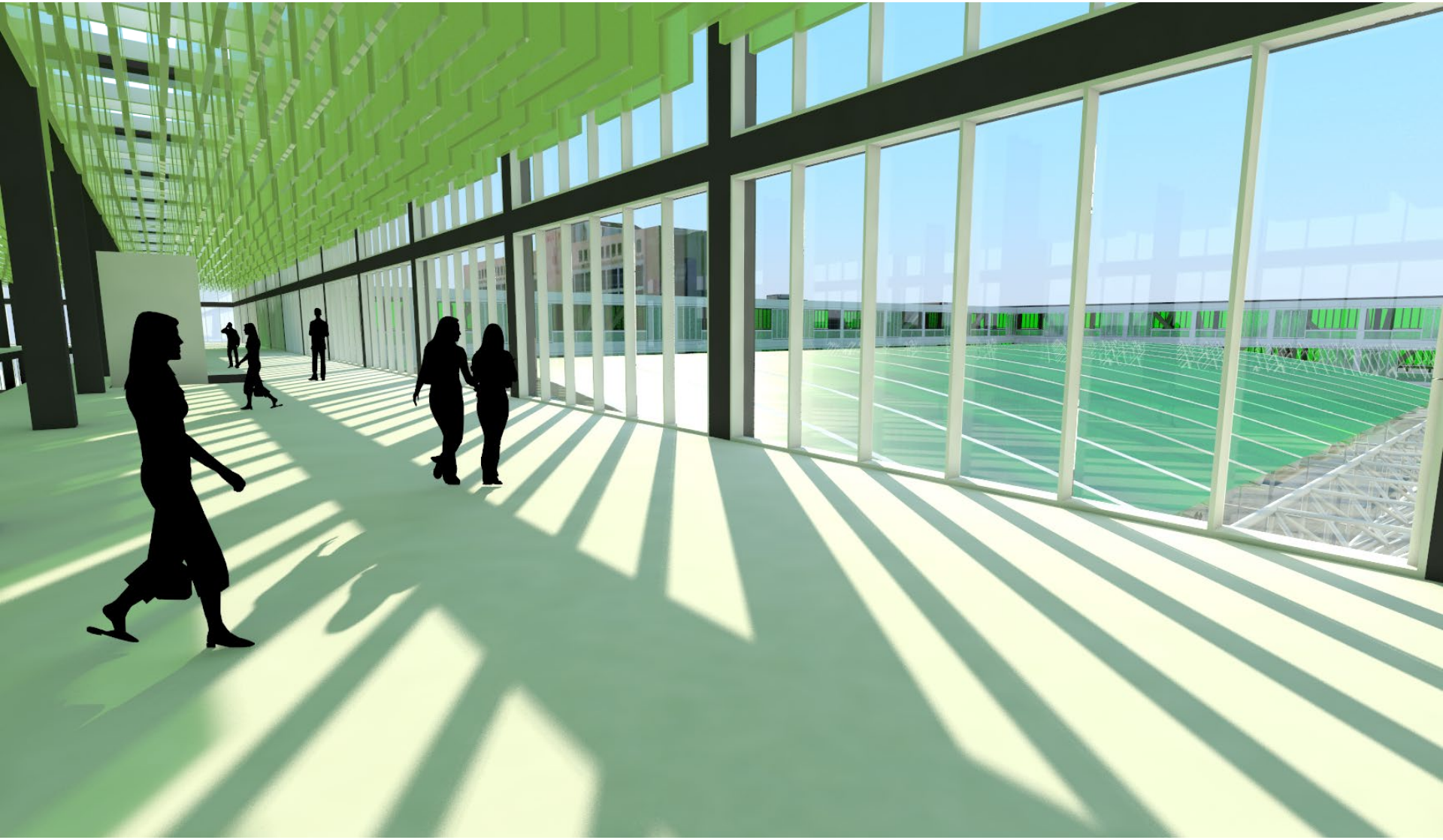
Architecture

concept



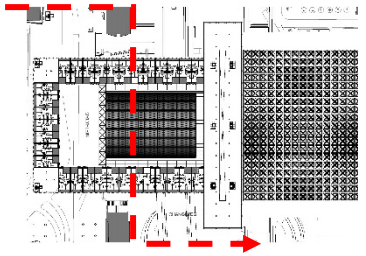
Architecture

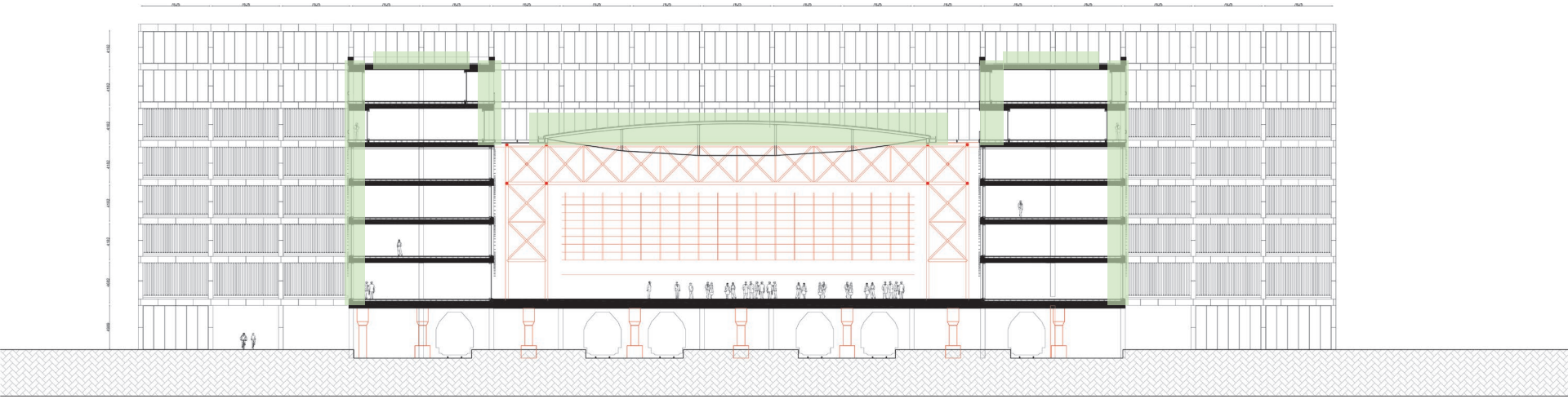
concept



architecture

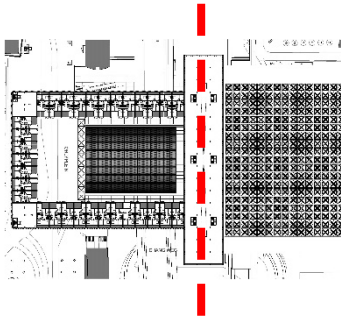
Algae location

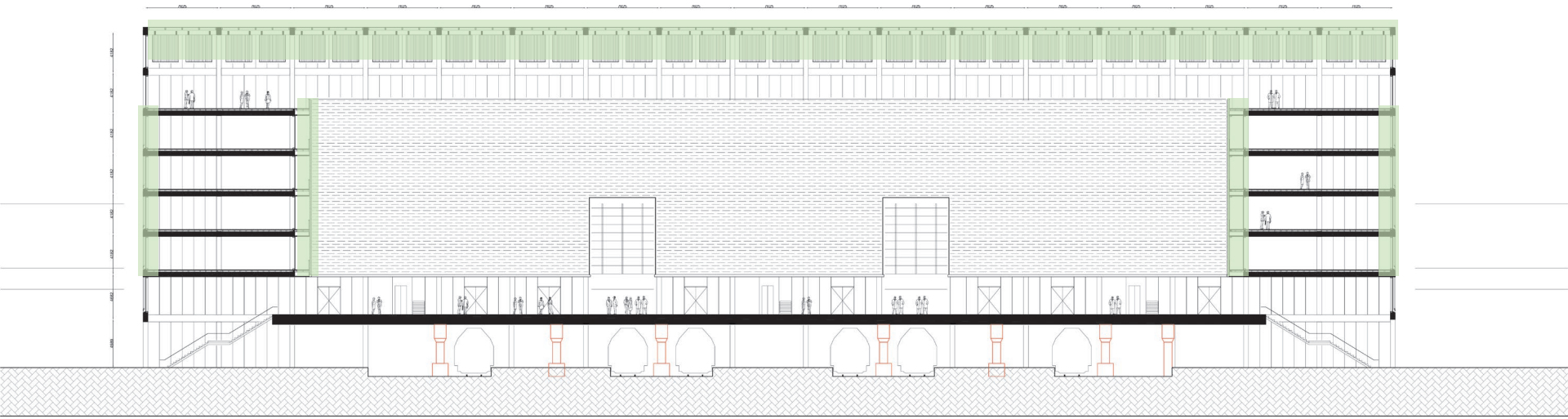




architecture

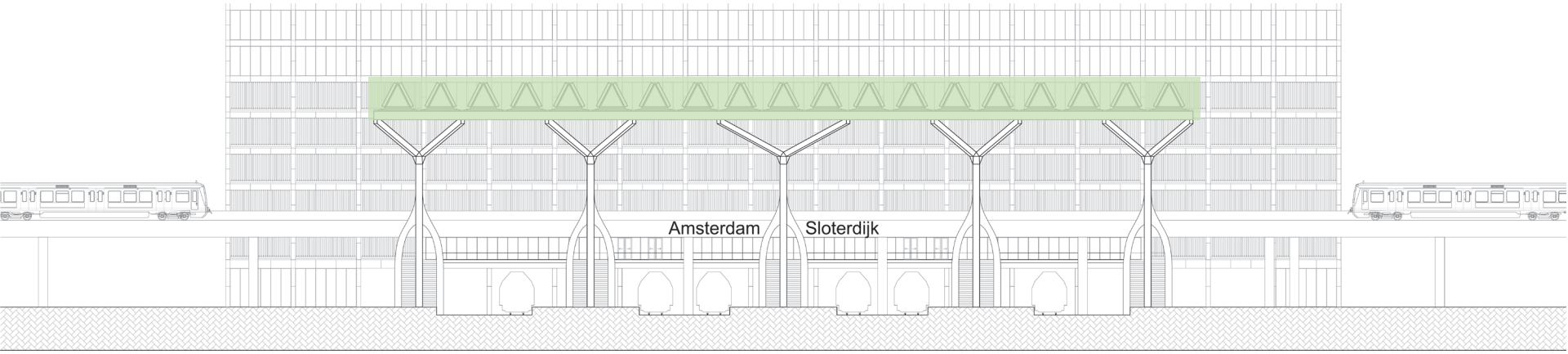
Algae location





Architecture

east facade

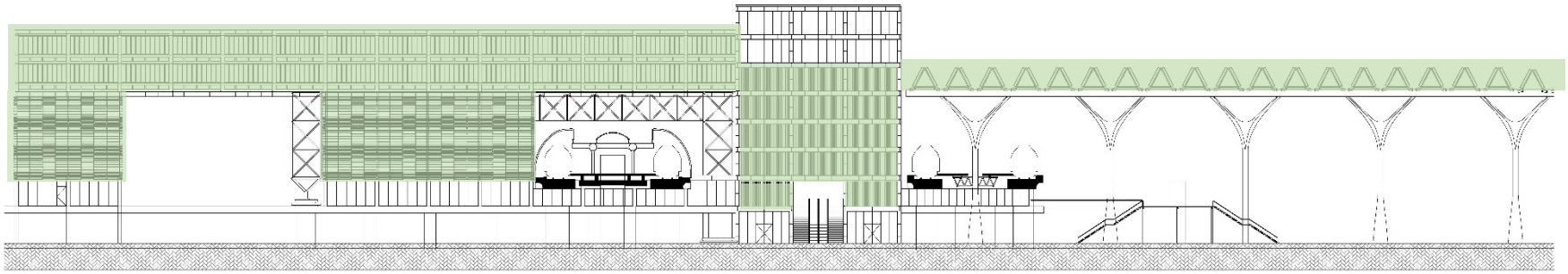


Architecture

east facade

Architecture

South facade

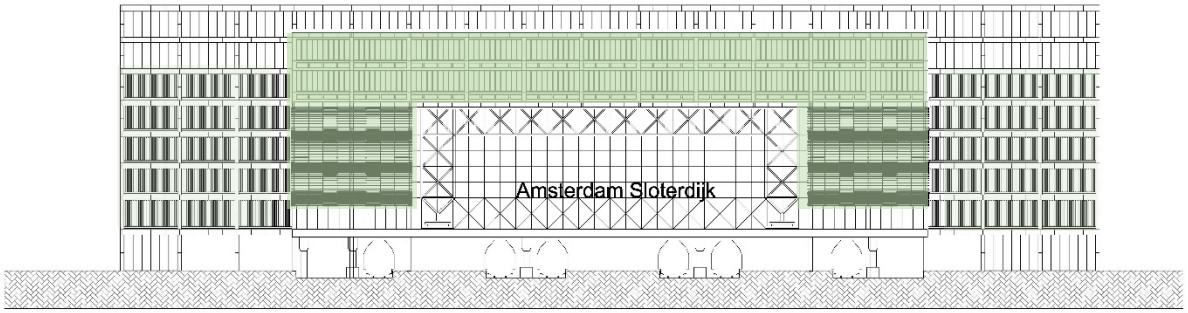


Architecture

South facade

Architecture

West facade

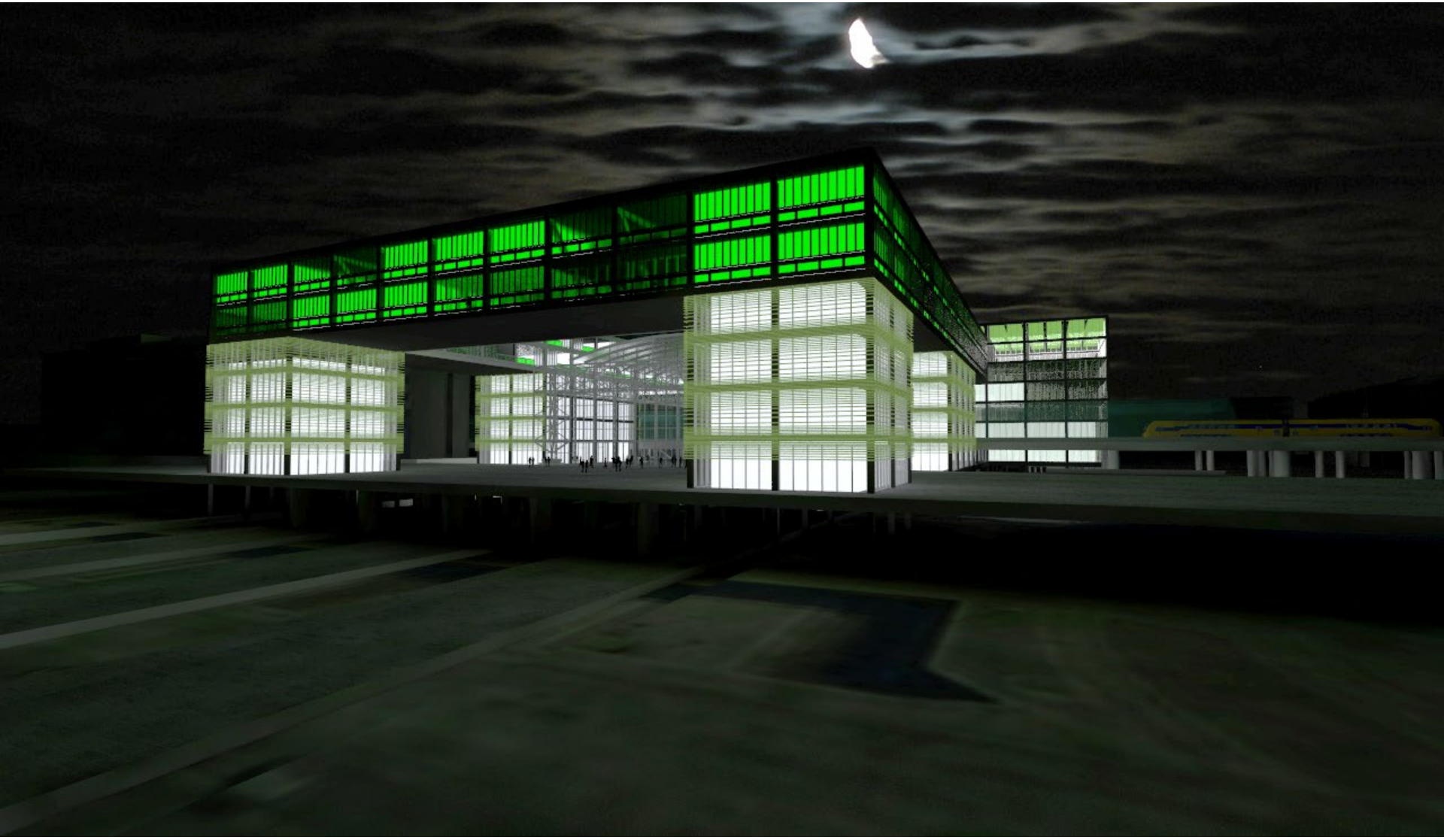


Architecture

West facade

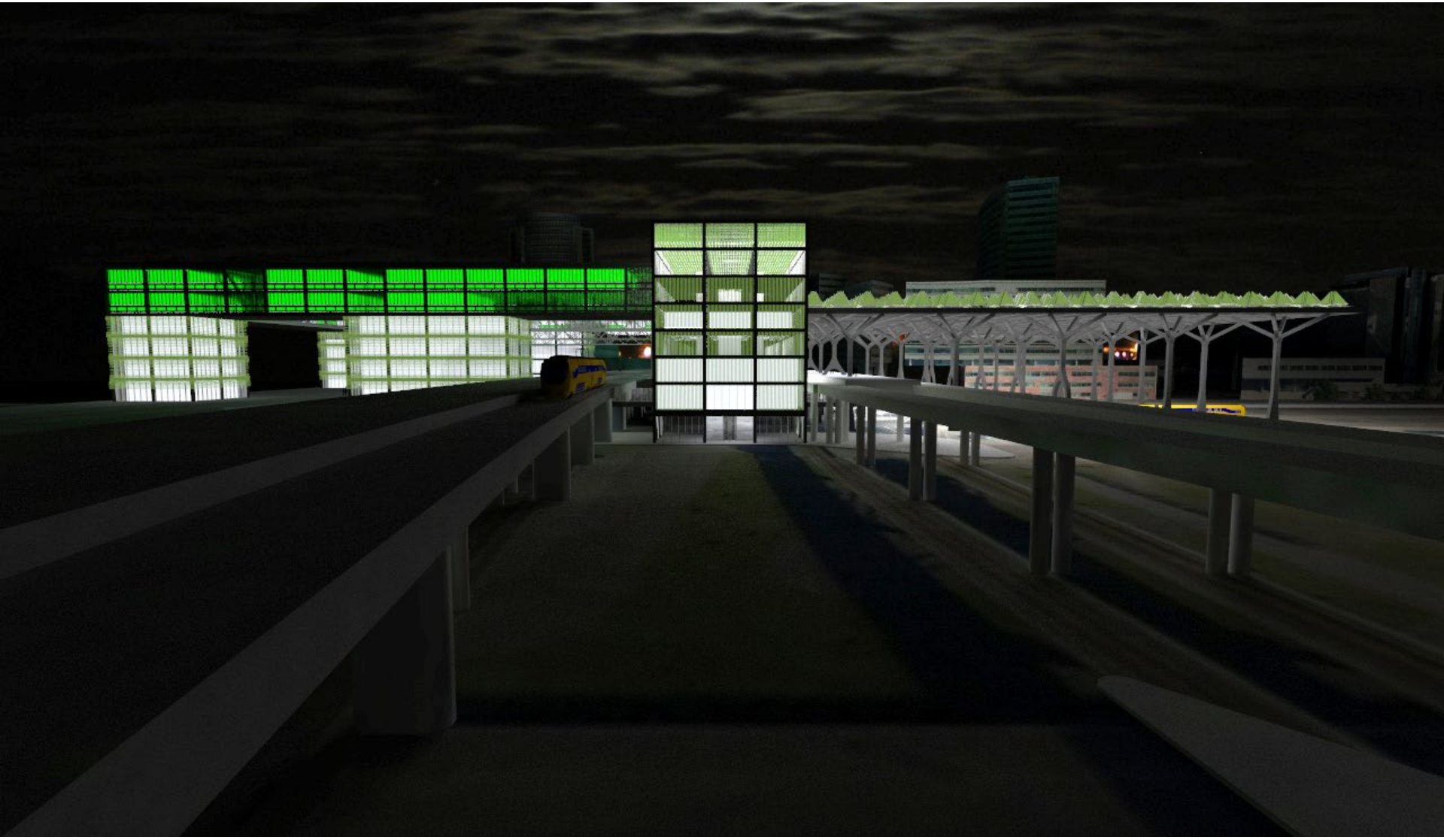
Architecture

Night renders



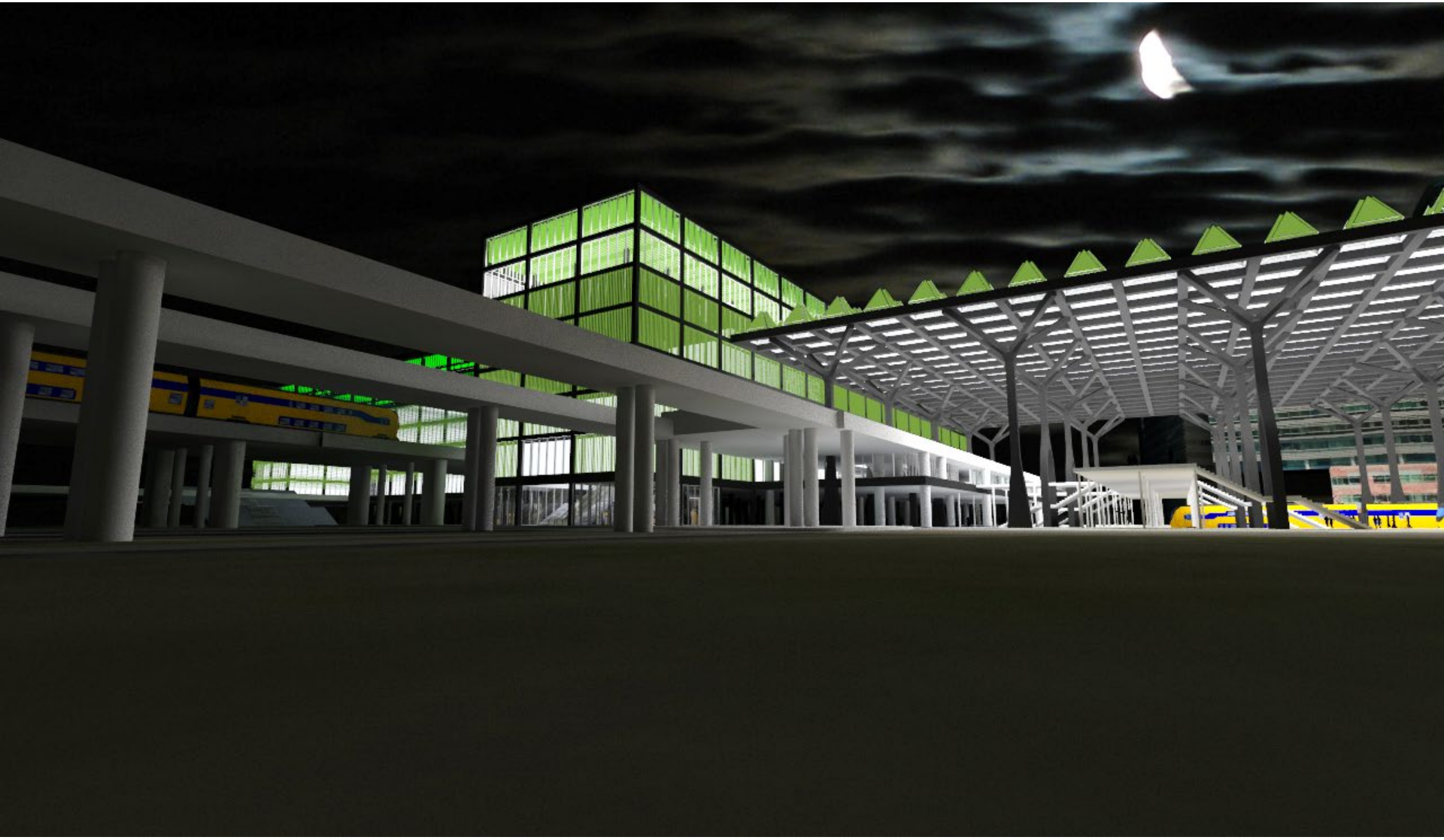
Architecture

Night renders



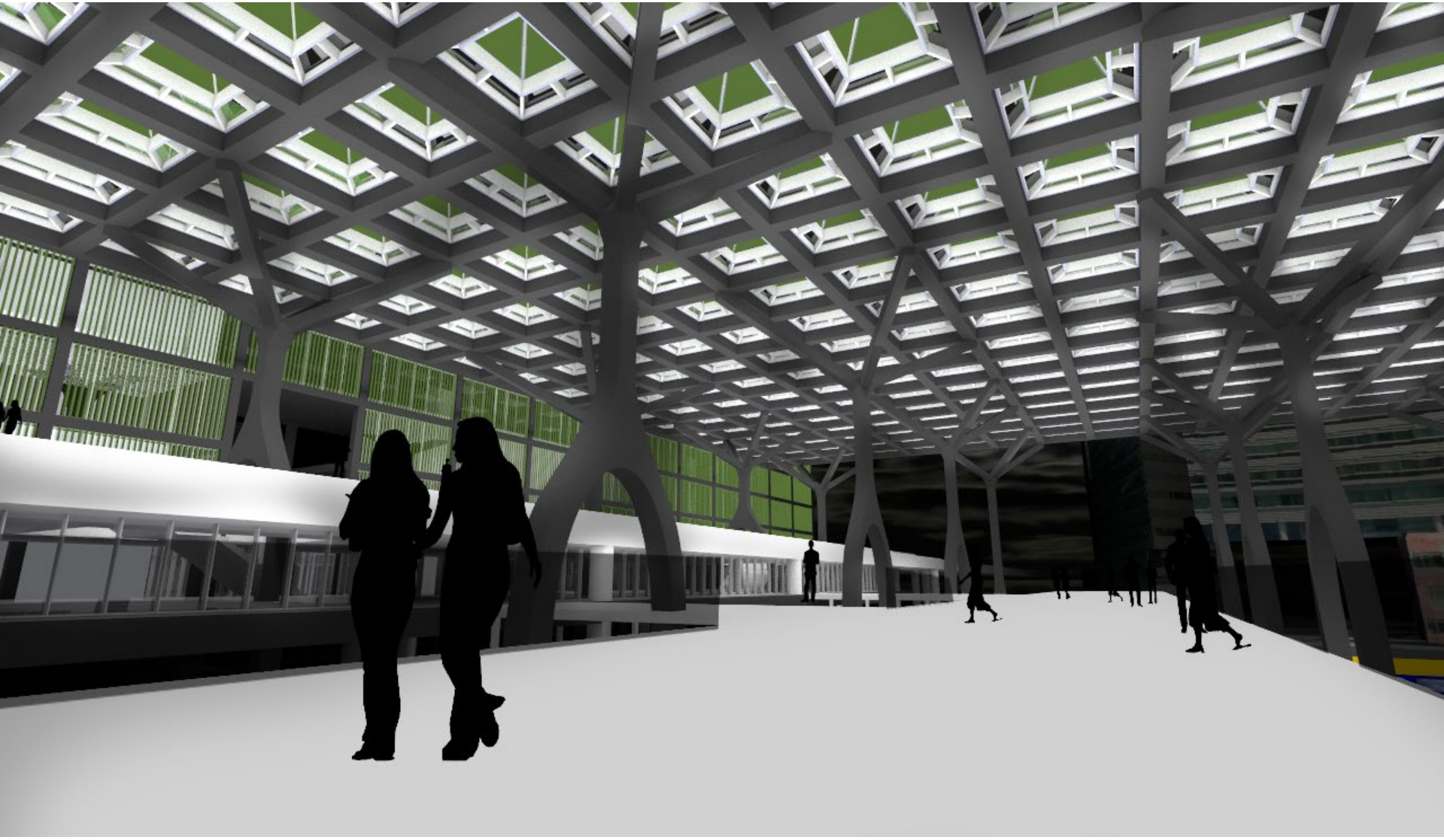
Architecture

Night renders

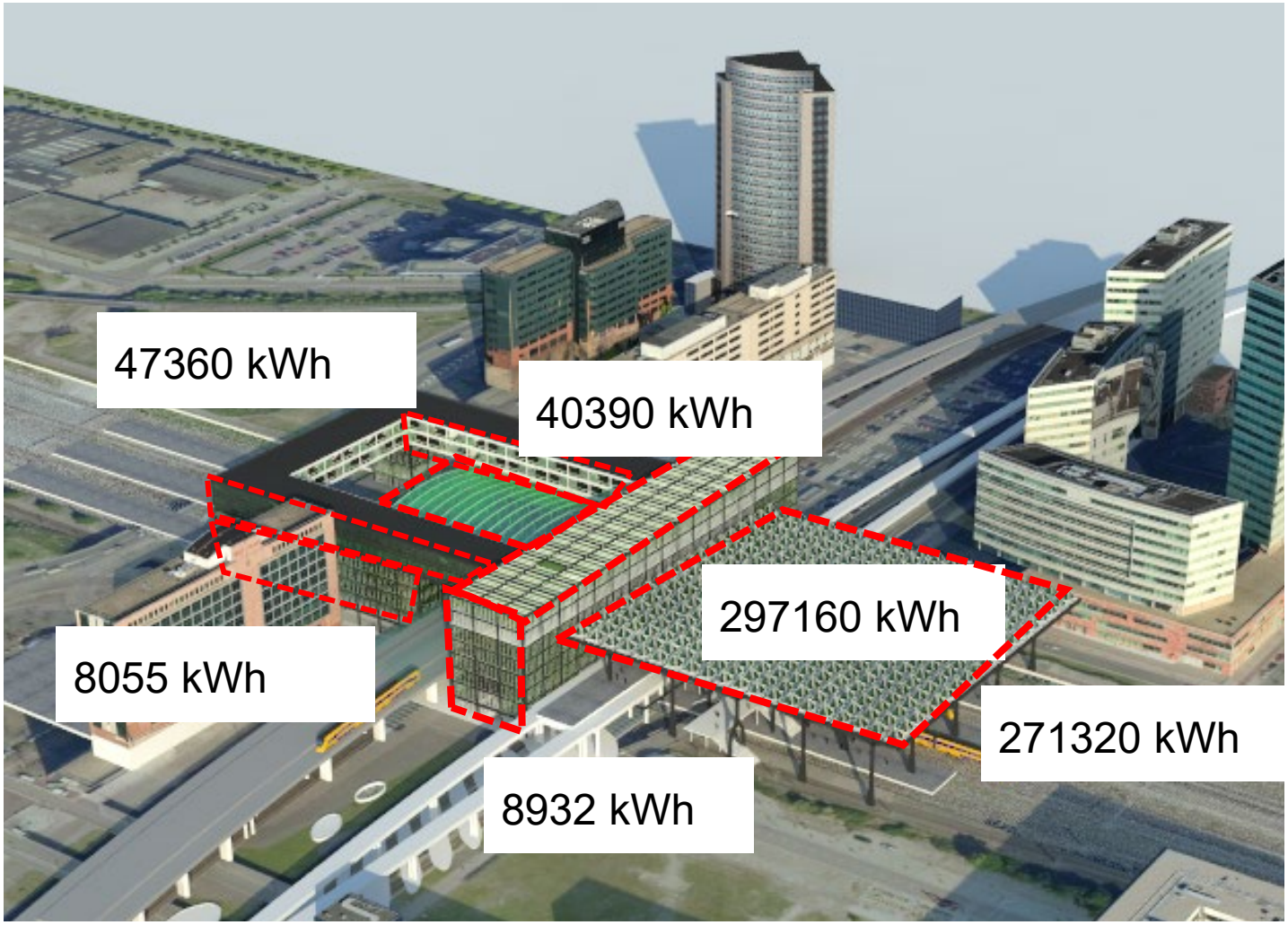


Architecture

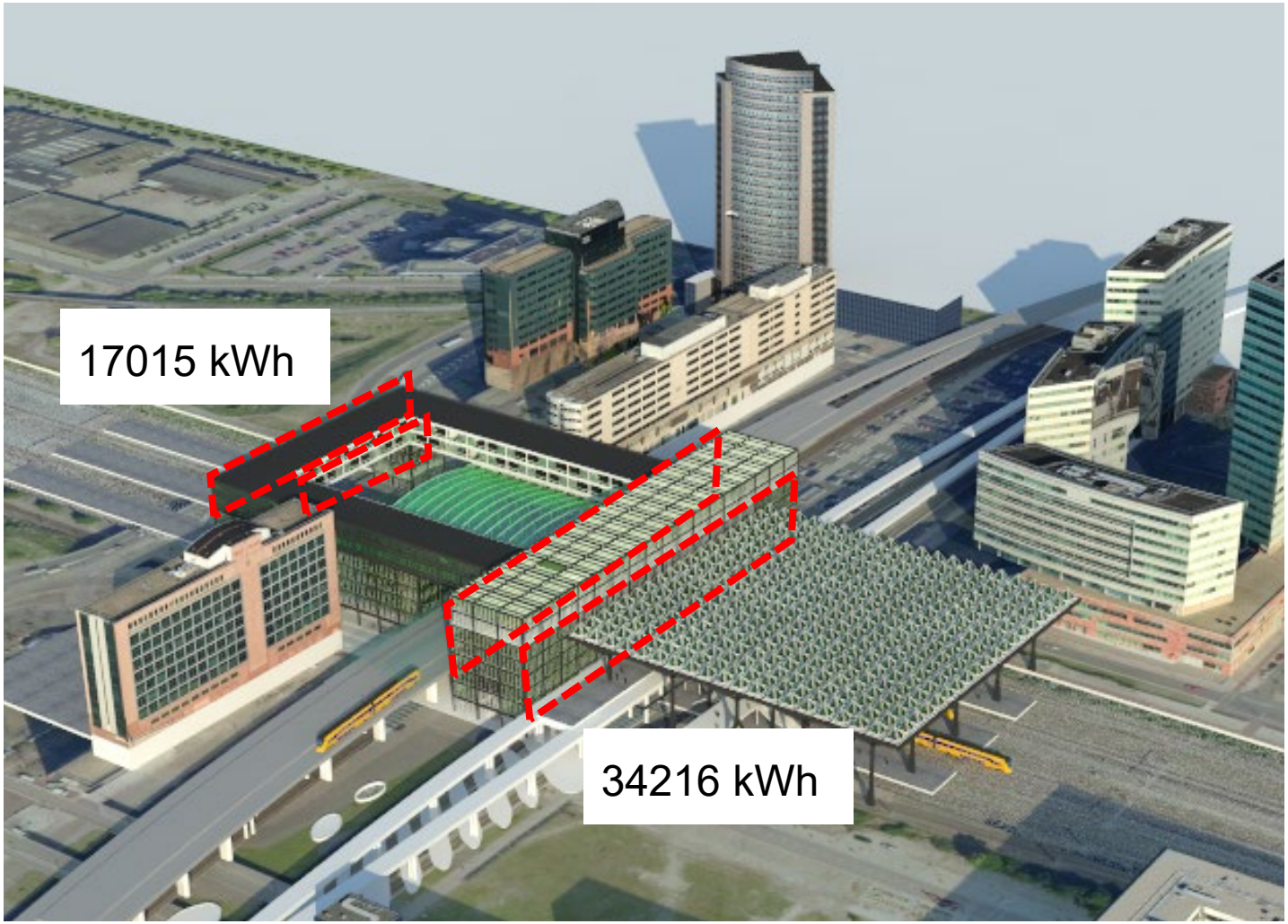
Night renders



_calculation



_calculation



_calculation

__total of 724448 kwh

__31 households – 3300kwh = 102300 kwh

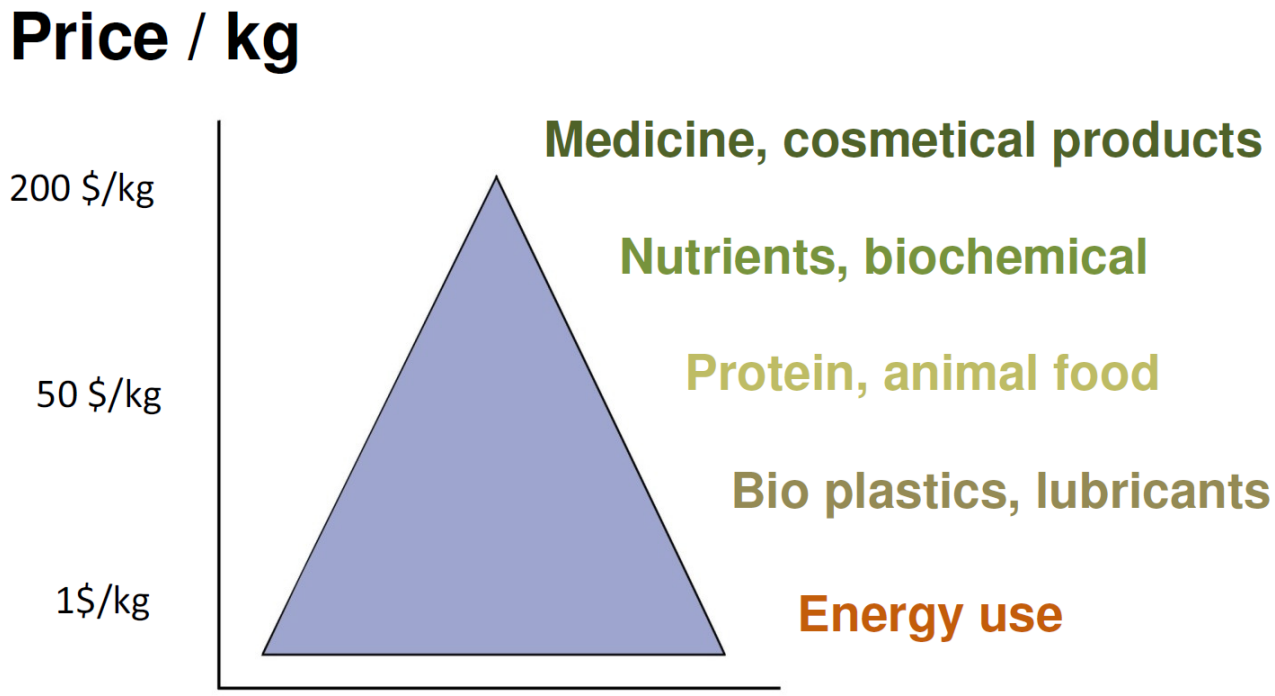
__10584 m2 office – 109kwh/m2 = 1153656 kwh +

_Total needed = 1255956 kwh

_Total generated 724448

1255956 –

_total = – 531508 kwh


Price / kg
200 $/kg
50 $/kg
1$/kg
Medicine, cosmetical products
Nutrients, biochemical
Protein, animal food
Bio plastics, lubricants
Energy use

Thank you for your attention