WoodPecker

Parametric Design Tool for Timber-based High-rise Buildings

Eijckpunt

Rotterdam

Design Study on Redevelopment of Weena 455

Architectural Engineering Graduation Studio

P5 Presentation | Delft, 27-06-2024

Ruben Pot | 5443571

Design Tutor | *Stephan Verkuijlen*
Research Tutor | *Dafne Sara Swank*
Building Technology Tutor | *Gilbert Koskamp*
Delegate of the Board of Examiners | *Rachel Lee*

Contents

Current Crisises in the Build Environment

Current Crisises in the Netherlands

DutchNews 19 JUNE 2024

News | Life in the Netherlands | Jobs | Podcast | About us

Home | Election 2023 | EU election | Economy | Art and culture | Sport | Europe

What's all the fuss about nitrogen in the Netherlands?

June 5, 2022

Photo: Depositphotos.com

Nitrogen-based pollution is behind delays to the building of new homes and roads, has led to plans to reduce the number of cows and pigs in the Netherlands and is causing damage to rare habitats. Here's what you need to know.

Government of the Netherlands

Home > Topics > Energy crisis

- How do I apply for the energy allowance 2022?
- How can I get the one-off energy allowance in 2023?
- Price cap for gas, electricity and district heating
- Documents

Due to the war in Ukraine, energy prices in the Netherlands have risen sharply. To partly compensate for the higher energy bills of households and businesses, the Government of the Netherlands is taking several measures. For instance, low-income households can get an extra one-off energy allowance of about €1 300, and residents can receive help and advice on how to save energy.

Science

Nitrogen crisis threatens Dutch environment—and economy

Ecological damage from manure fumes triggers calls for drastic change to livestock industry

ERIK STOKSTAD Authors Info & Affiliations

SCIENCE · 6 Dec 2019 · Vol 366, Issue 6470 · pp. 1180-1181 · DOI: 10.1126/science.366.6470.1180

6,616

Last we
the thir
to The

'How will I buy?': housing crisis grips the Netherlands as Dutch go to polls

Housing is key in this week's provincial elections after years of soaring prices and government neglect

Protesters taking part in the 'March Against Vacancy' protest in Amsterdam
Photograph: Hollandse Hoogte/Rex/Shutterstock

Niki Struving, a 21-year-old student in Amsterdam, si
umbrella next to a circus tent, in bitter winds and d
is braving icy weather to campaign for more afforda
key topic in Dutch regional elections this week.

Business > Business

Energy crisis: Who has the priciest electricity and gas in Europe?

By Servet Yanatma
Published on 31/10/2023 - 6:15 GMT+1 • Updated 13:46

Share this article | Comments

The pre-tax prices of electricity and natural gas soared after Russia's full-scale invasion of Ukraine, but they're now on the decline. Although slightly higher than the second half of 2022, the final prices for customers, including taxes, reached their peak in the first half of 2023.

Electricity and gas costs, which experienced a sharp increase after the Russian invasion of Ukraine, are now steadying in Europe, after peaking in the first half of 2023.

The Guardian For 200 years

From £1.75 for subscribers

two golds?' Our writers' best moments of Tokyo 2020

Sport

A woman shows her distress as an inferno nears her home in Gouves, on the Greek island of Evia. The EU yesterday began a huge operation to tackle fires on the island. Wildfires in Greece Page 22

Global climate crisis: inevitable, unprecedented and irreversible

Devastating report is 'code red' warning for

Fiona Harvey
Andrew Sparrow

widespread devastation and extreme weather. Only rapid and drastic reductions in greenhouse gases in

Leader comment

The science is

ever there was going to be a wake-up call to the world when it comes to cli mate change, this report is it," said Alok Sharma, the minister who will

Migrant crisis: Couple forced t separate as Germany tighten deportation rules

Hama - not his real name - tells Sky News he was deported from G Iraq at the end of April. He is now indefinitely separated from his w Iranian and was given asylum.

Wednesday 19 June 2024 13:33, UK

Germany

The Asylum Crisis in Europe: Designed Dysfunction

By Elizabeth Collett

Border Security | Border Enforcement | Smuggling & Trafficking | Illegal Immigration & Interior Enforcement

see more...

Much of the chaos and distress being seen in Southeast Europe, as Greece, Hungary, and other countries on the Western Balkans route are grappling with massive inflows of asylum seekers is caused by confusion about who exactly is in need of protection, who should be responsible for protection, and a lack of on-the-ground capacity to respond. The problem is conceptual, political, and practical, and the European Union's legislative proposals—including President Juncker's newly unveiled plan to distribute 160,000 refugees throughout the 28 Member States—aim to manage, rather than solve, what is an international, as well as a European, challenge.

This challenge is, in essence, a product of a deep mismatch between the human imperatives impelling so many to undertake often dangerous journeys and an interlocking set of EU systems and policies unequal to this extraordinary phenomenon, in no small part because each Member State has its own self-interests, capacities, and political realities

Current Crisises in the Netherlands

DutchNews 19 JUNE 2024

News | Life in the Netherlands | Jobs | Podcast | About us

Home | Election 2023 | EU election | Economy | Art and culture | Sport | Europe

What's all the fuss about nitrogen in the Netherlands?

June 5, 2022

Photo: Depositphotos.com

Nitrogen-based pollution is behind delays to the building of new homes and roads, has led to plans to reduce the number of cows and pigs in the Netherlands and is causing damage to rare habitats. Here's what you need to know.

Migrant crisis: Couple forced t separate as Germany tighten deportation rules

Hama - not his real name - tells Sky News he was deported from G Iraq at the end of April. He is now indefinitely separated from his w Iranian and was given asylum.

Wednesday 19 June 2024 13:33, UK

Germany

Government of the Netherlands

Home > Topics > Energy crisis

- How do I apply for the energy allowance 2022?
- How can I get the one-off energy allowance in 2023?
- Price cap for gas, electricity and district heating
- Documents

Due to the war in Ukraine, energy prices in the Netherlands have risen sharply. To partly compensate for the higher energy bills of households and businesses, the Government of the Netherlands is taking several measures. For instance, low-income households can get an extra one-off energy allowance of about €1 300, and residents can receive help and advice on how to save energy.

Science

Nitrogen crisis threatens Dutch environment—and economy

Ecological damage from manure fumes triggers calls for drastic change to livestock industry

ERIK STOKSTAD Authors Info & Affiliations

SCIENCE · 6 Dec 2019 · Vol 366, Issue 6470 · pp. 1180-1181 · DOI: 10.1126/science.366.6470.1180

6,616

Last we the thi to The

two golds?' Our writers' best moments of Tokyo 2020

Sport

The Guardian For 200 years

From £1.75 for subscribers

A woman shows her distress as an inferno nears her home in Gouves, on the Greek island of Evia. The EU yesterday began a huge operation to tackle fires on the island. Wildfires in Greece Page 22

Global climate crisis: inevitable, unprecedented and irreversible

Devastating report is 'code red' warning for

Fiona Harvey Andrew Sparrow

widespread devastation and extreme weather. Only rapid and drastic reductions in greenhouse gases in

Leader comment

The science is

ever there was going to be a wake-up call to the world when it comes to cli mate change, this report is it," said Alok Sharma, the minister who will

'How will I buy?': housing crisis grips the Netherlands as Dutch go to polls

Housing is key in this week's provincial elections after years of soaring prices and government neglect

Protesters taking part in the 'March Against Vacancy' protest in Amsterdam last month. Photograph: Hollandse Hoogte/Rex/Shutterstock

Niki Struving, a 21-year-old student in Amsterdam, sits under an umbrella next to a circus tent, in bitter winds and driving rain. She is braving icy weather to campaign for more affordable housing - a key topic in Dutch regional elections this week.

Energy crisis: Who has the priciest electricity and gas in Europe?

The pre-tax prices of electricity and natural gas soared after Russia's full-scale invasion of Ukraine, but they're now on the decline. Although slightly higher than the second half of 2022, the final prices for customers, including taxes, reached their peak in the first half of 2023.

Electricity and gas costs, which experienced a sharp increase after the Russian invasion of Ukraine, are now steadying in Europe, after peaking in the first half of 2023.

Crisis in Europe: Designed Dysfunction

istress being seen in Southeast Europe, as Greece, Hungary, and other countries on the are grappling with massive inflows of asylum seekers is caused by confusion about who tection, who should be responsible for protection, and a lack of on-the-ground capacity to s conceptual, political, and practical, and the European Union's legislative proposals— icker's newly unveiled plan to distribute 160,000 refugees throughout the 28 Member States r than solve, what is an international, as well as a European, challenge.

ience, a product of a deep mismatch between the human imperatives impelling so many to erous journeys and an interlocking set of EU systems and policies unequal to this extraordinary hall part because each Member State has its own self-interests, capacities, and political

Housing Crisis & Urbanisation

Housing Crisis

Leads to Increasing housing prices
and Shortage of housing units

Rapid Urbanization

Leading to explosion in size of Urban Population
Without corresponding increase housing supply

Sustainable Urban Development

Compact City Concept: Efficient land use, reducing urban sprawl.

Photo Credit: Hollandse Hoogte/Rex/Shutterstock

Climate and Materialisation

Climate Crisis

Paris Proof Agreement & European Green Deal
Climate neutral 2050

Traditional (High-Rise) Building materials

Concrete and steel
Concrete industry accounts for 8% global CO2
While Undeniable Structural Qualities still unsustainable

Photo Credit: Reuters

Solution: Urban Densification & Sustainable Construction Practices

Addressing the housing shortages *while* ***mitigating environmental impact.***

Photo Credit: Hollandse Hoogte/Rex/Shutterstock

Photo Credit: Reuters

Structure as the most impactful Layer for Sustainability

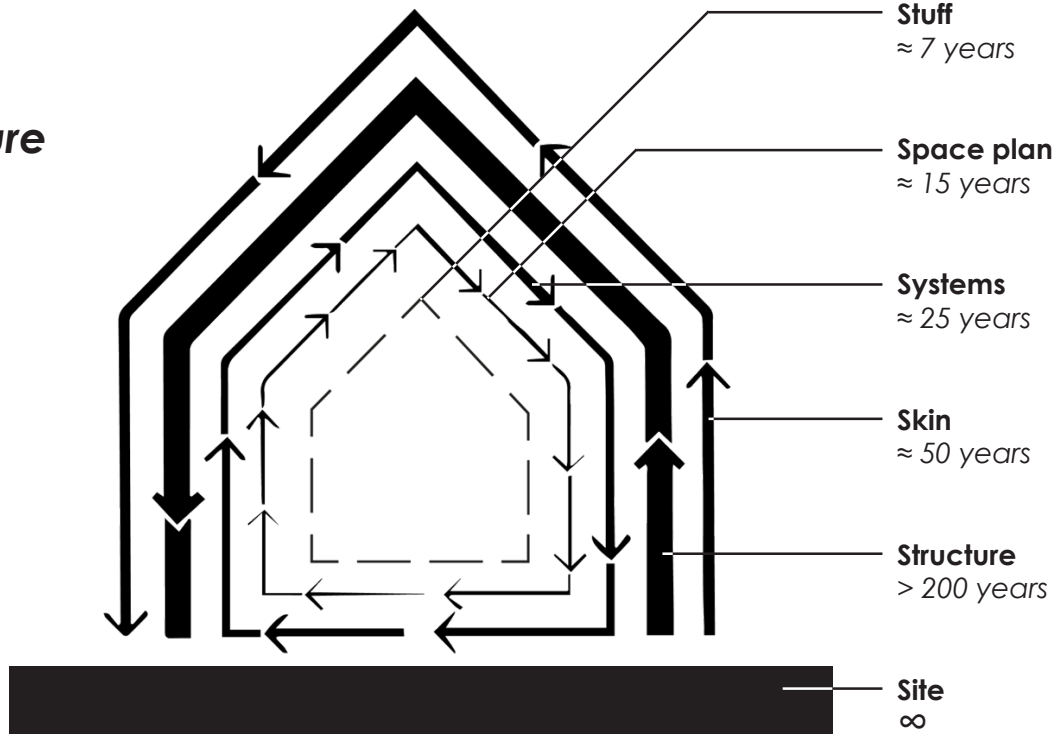
Approximate Material ratio of a Buildings Structure

Structure = ~75%

(in contrast; Skin = ~10%)

Therefore, the structure is the layer with the most potential to reduce a buidlings carbon footprint.

(Robert Winkel, partner architect at Mei Architects)



Stewart Brand: Shearing Layers of Change

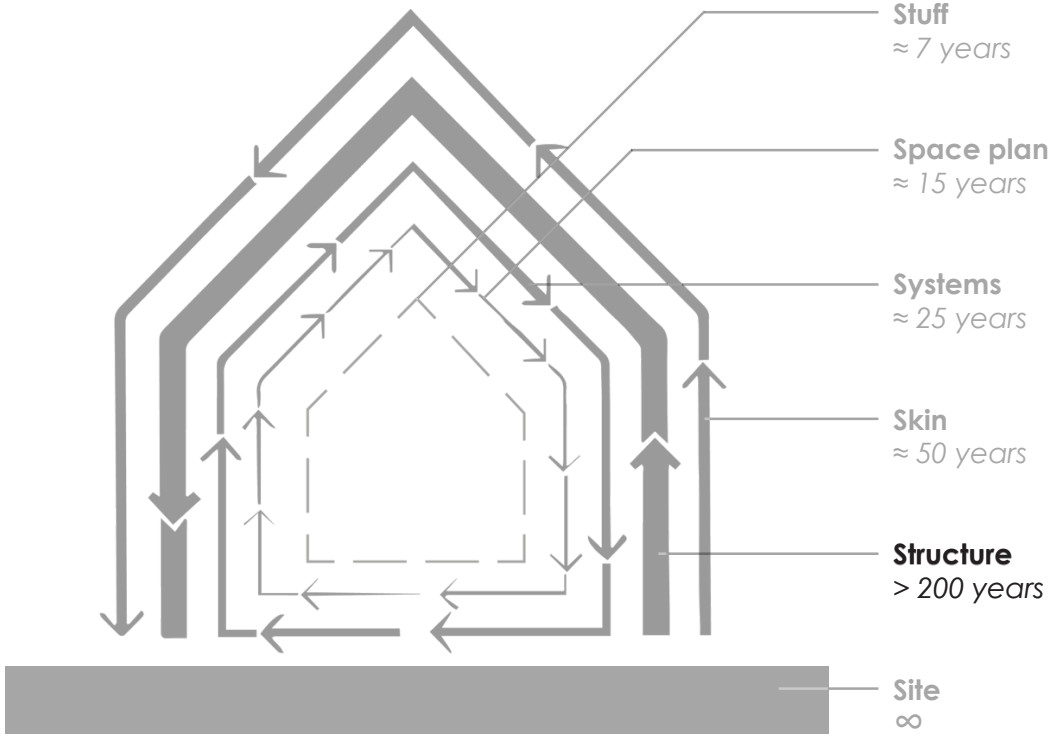
Solution: Timber-Based High-Rise Construction

Timber Construction Advantages

- Already very effective in reducing CO2 emissions in low and midrise construction.
- Potential to store CO2 for over 200 years, reducing carbon footprint.

Industry Shift

- Switching from reliance on unsustainable materials.



Stewart Brand: Shearing Layers of Change

Research

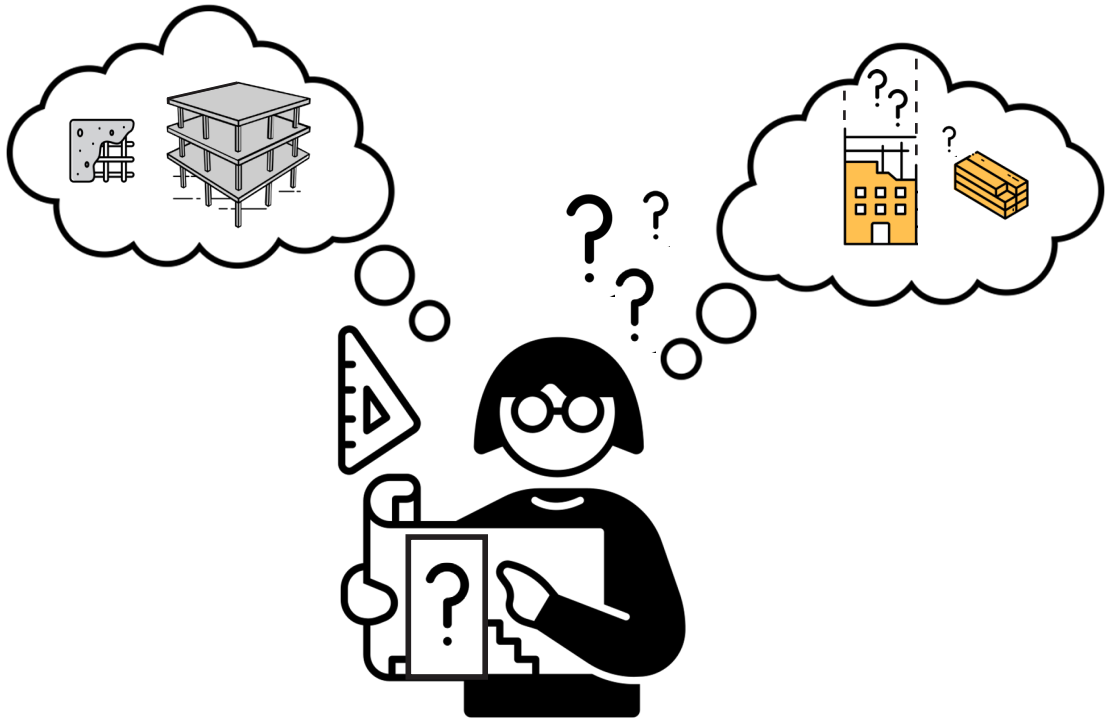
Current State of High-rise Construction

Minimal Amount of Timber High-Rise Buildings

Vast majority of contemporary high-rise construction still relies on traditional materials, concrete and steel.

Resulting in that only a small percentage of modern high-rise projects are constructed with timber.

Research Gap



Consequently, many architects are unfamiliar with designing timber-based high-rises.

Research Objective

Developing a parametric design tool to make it easier for architects to design timber-based high-rises.

Products: Research, Design and Parametric Design Tool

Research

to understand how to build the designtool

&

Designstudy

as a Research tool to test and develop the first set of options for the design tool

Extra product:

Parametric Design Tool

Research Question

RQ: "***How can a parametric design tool be developed*** *in order* ***to aid architects*** *in the design of sustainable and innovative timber high-rise buildings, guided by* ***fundamental structural principles*** *and* ***performance criteria****?"*

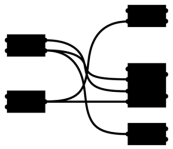
Methodology

Literature Study

Case Study Analysis

Interviews with Industry Experts

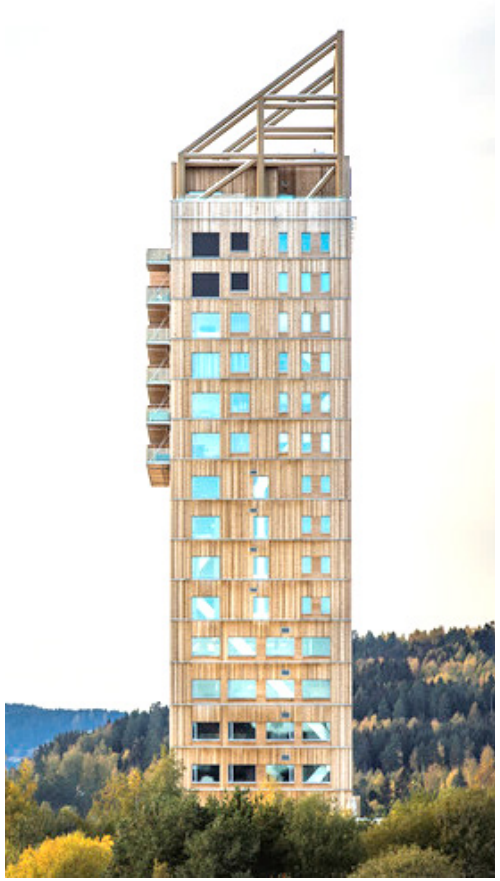
Data Analysis



Tool Development

Tool Evaluation & Optimalisation

Methodology

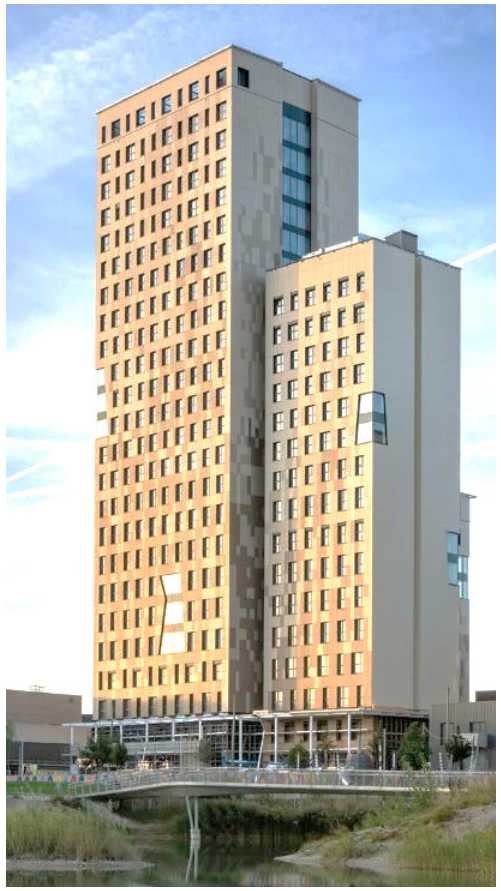


Case Study 1
Worlds Tallest Timber Building

Mjøstårnet

Case Study 2
Tallest Hybrid Timber Building in The Netherlands

HAUT



Case Study 3
Tallest Hybrid Timber Building in Europe

HOHO Wien

Methodology

Interview 1
Structural Engineering Company:

Pieters Bouwtechniek

Interviewee information:

Company	Pieters Bouwtechniek
Interviewee	Siemon Bisschop
Job title	Project leader, Structural Engineer
Date	Wed 15/11/2023 11:00 - 12:00
Location	- [Online Microsoft-Teams Meeting]

Interview 2
Consulting Engineers and Advisers Office:

Buro Happold

Interviewee information:

Company	Buro Happold
Interviewee	Dirk Visser
Job title	Partner
Date	Fri 08/12/2023 13: 30 - 14:00
Location	Julianalaan 134, 2628 BL Delft, The Netherlands

Interview 3
Consulting Engineers and Advisers Office:

Arup

Interviewee information:

Company	Arup
Interviewee	Rick Titulaer
Job title	Structural Engineer and Computational Designer
Date	Fri 15/12/2023 15:30 - 14:00
Location	- [Online Microsoft-Teams Meeting]

Interview 4
Architectural Firm:

Elephant,

Interviewee information:

Company	Elephant
Interviewee	Dafne Sara Swank
Job title	Partner, Project Architect
Date	Tue 12/12/2023 13: 15 - 14:00
Location	Weesperstraat 103, 1018 VN Amsterdam, The Netherlands

Interview 5
Architectural Firm:

wv-studio

Interviewee information:

Company	wv-studio
Interviewee	Stephan Verkuijlen
Job title	Architect and founder
Date	Tue 12/12/2023 14:00a - 14:30p
Location	Julianalaan 134, 2628 BL Delft, The Netherlands

Interview 6
BIM Workflow Optimalisation Company:

API Objects

Interviewee information:

Company	API Objects
Interviewee	Arjan Noya
Job title	Founder
Date	Tue 19/12/2023 13:00 - 13:30
Location	- [Online Microsoft-Teams Meeting]

Architectural Firm:

Wubben.Chan

Interviewee information:

Company	Wubben.Chan
Interviewee	Kevin Snel
Job title	Business Developer
Date	Wed 11/15/2023 11:00 - 12:00
Location	Tiendweg 2-H, 2671 SB Naaldwijk, The Netherlands

Additional interviews:

Kees van Oorschot
Gemeente Rotterdam

Timea Sandor
LEVS Architecten

Paul Stavert
Powerhouse Company

Robert Platje
MEI Architecten

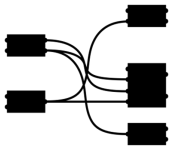
Methodology

Literature Study

Case Study Analysis

Interviews with Industry Experts

Data Analysis



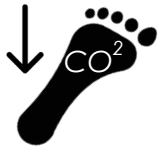
Tool Development

Tool Evaluation & Optimalisation

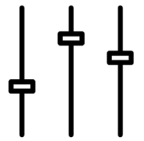
During Design Phase

Essential Aspects researched for developing the Parametric Design Tool

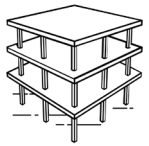
***Key challenges** in adopting timber as the main construction material for high-rise buildings*



*Ways for effectively **reducing the carbon footprint** of timber based high-rise structures.*



***Key parameters** needed for developing the parametric design tool for Tall Timber buildings*



***Methods are currently in use** in the latest Tall Timber developments*

*How Timber-based High-rise structures could be an **economically viable alternative** to conventional high-rise construction materials?*

***Key rules of thumb** needed for developing the parametric design tool*

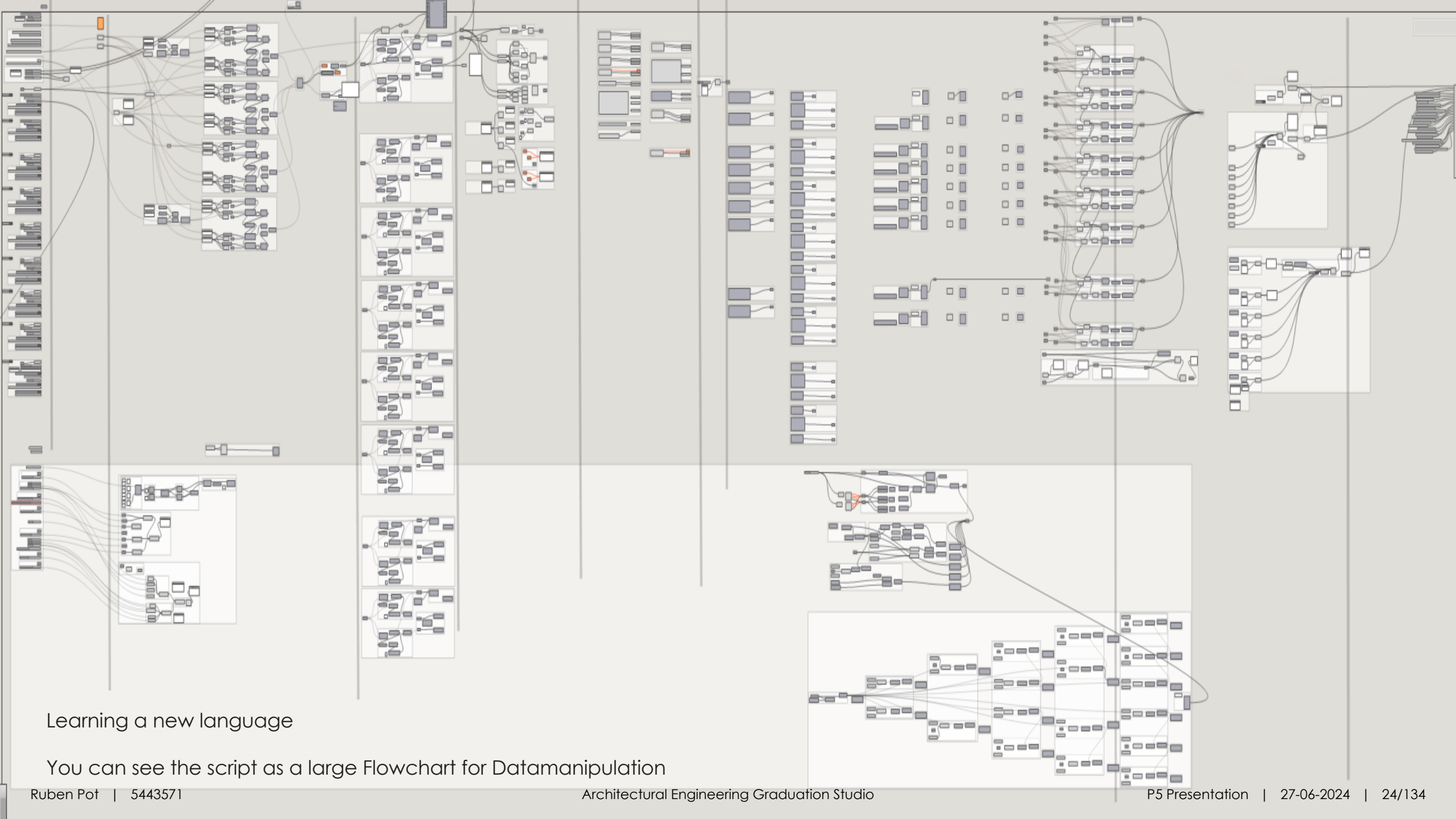
The Parametric Design Tool

What is Parametric Design?

Parametric design *is an approach to design that uses algorithmic thinking to define relationships between design elements. By adjusting parameters, architects and designers can quickly generate and explore multiple design variations.* Enabeling rapid iteration and optimization of designs.

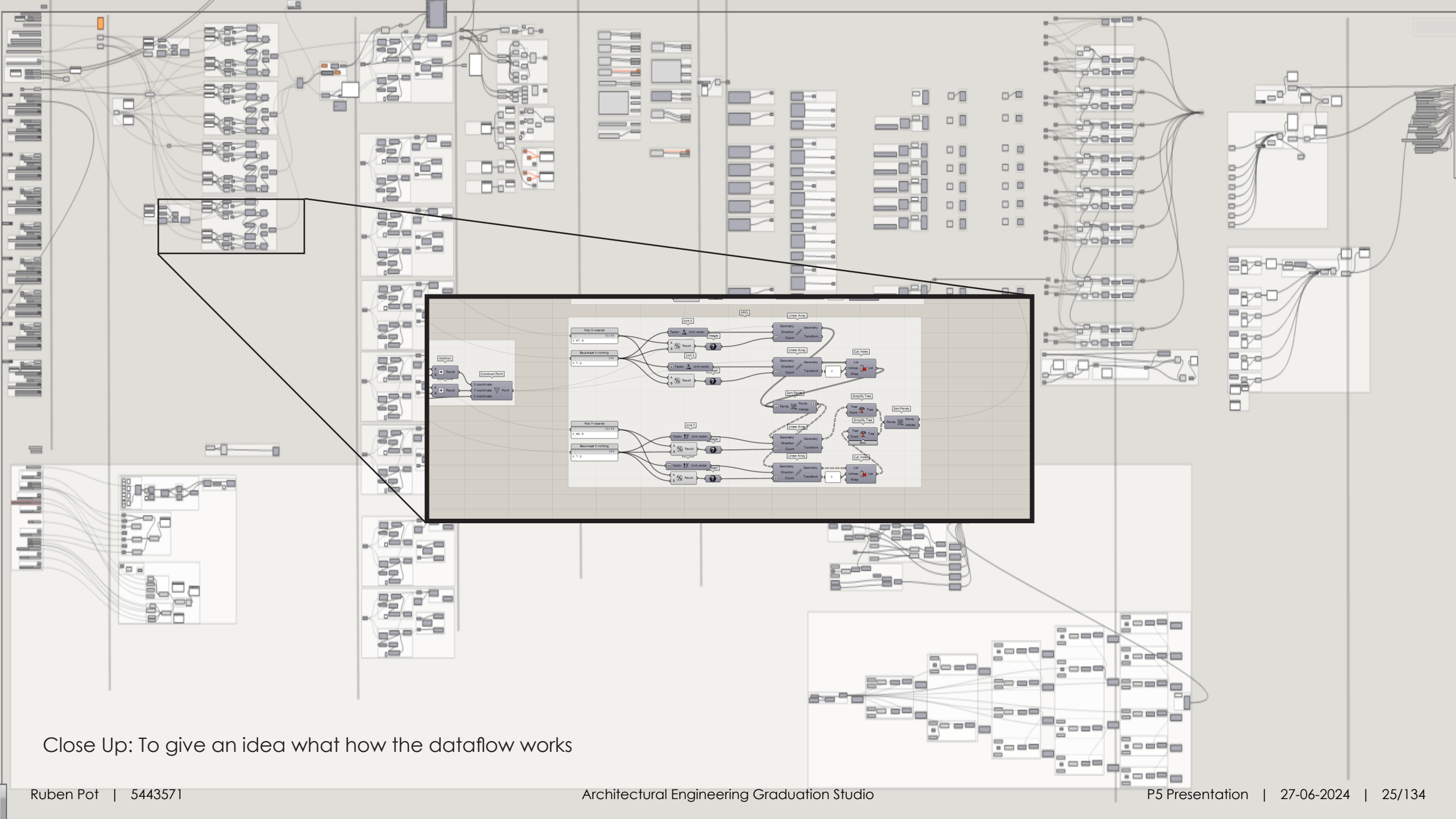
Applications:

- Architectural forms
- **Structural optimization**
- **Environmental performance analysis**

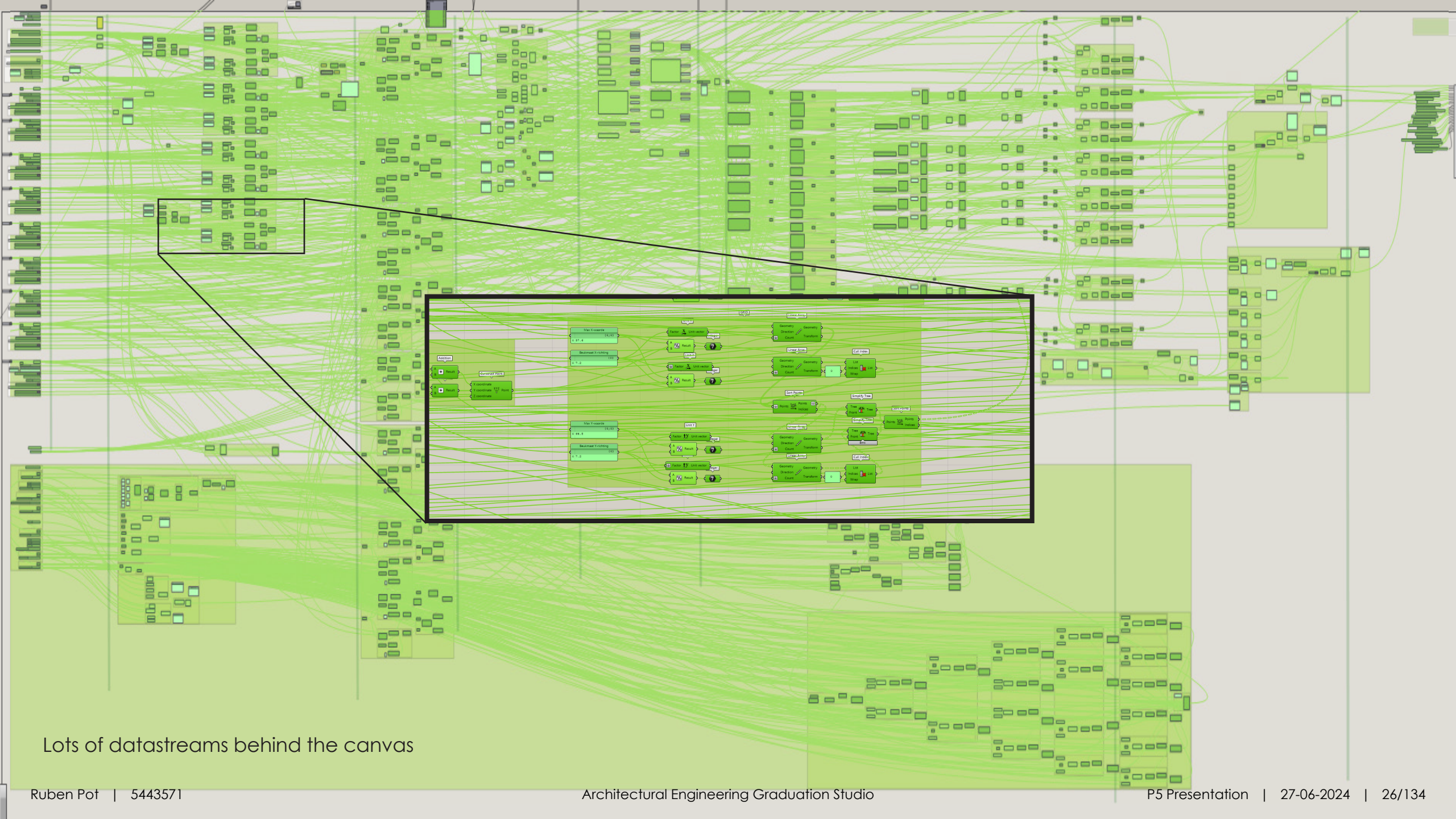


Learning a new language

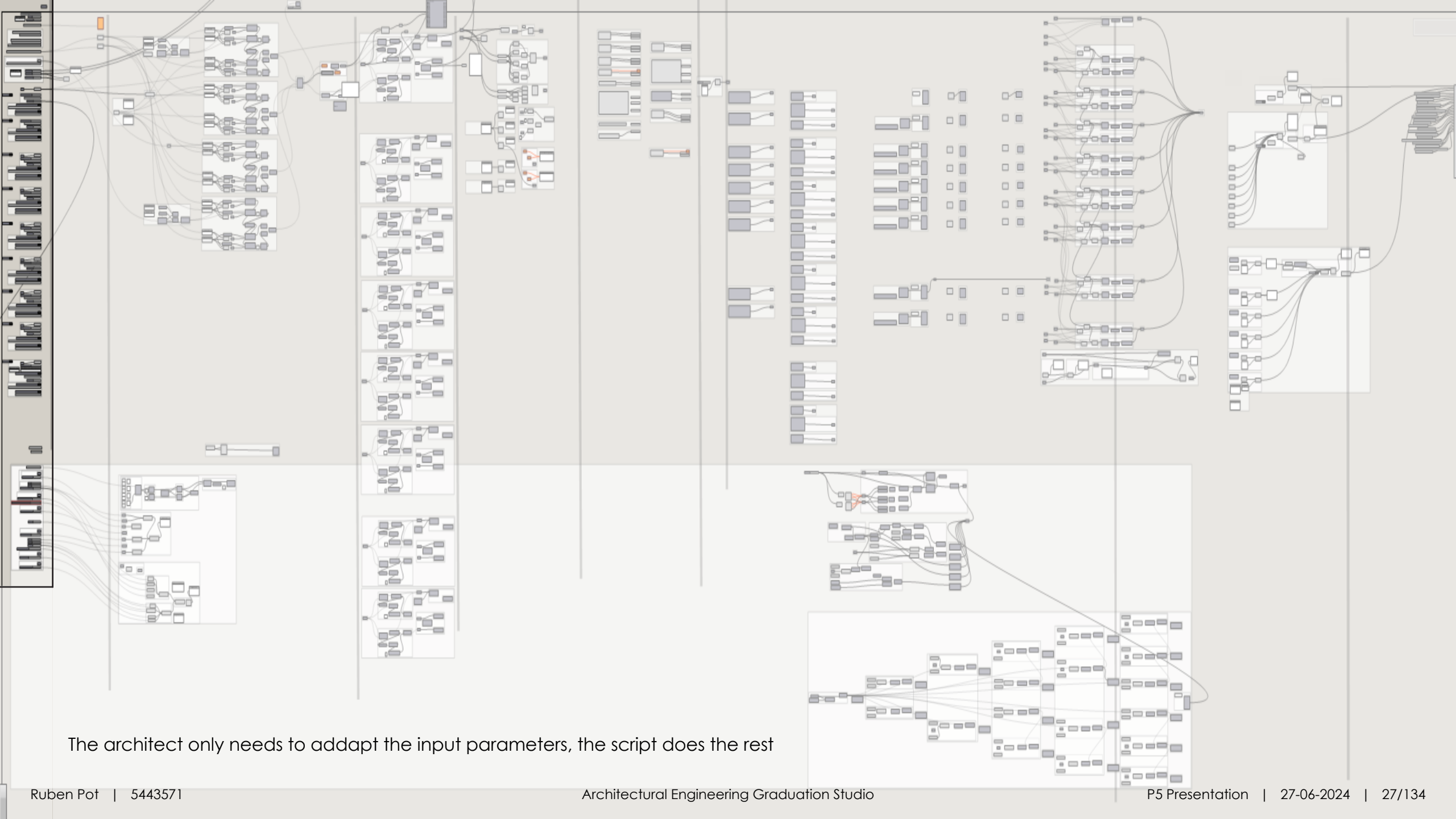
You can see the script as a large Flowchart for Datamanipulation



Close Up: To give an idea what how the dataflow works



Lots of datastreams behind the canvas

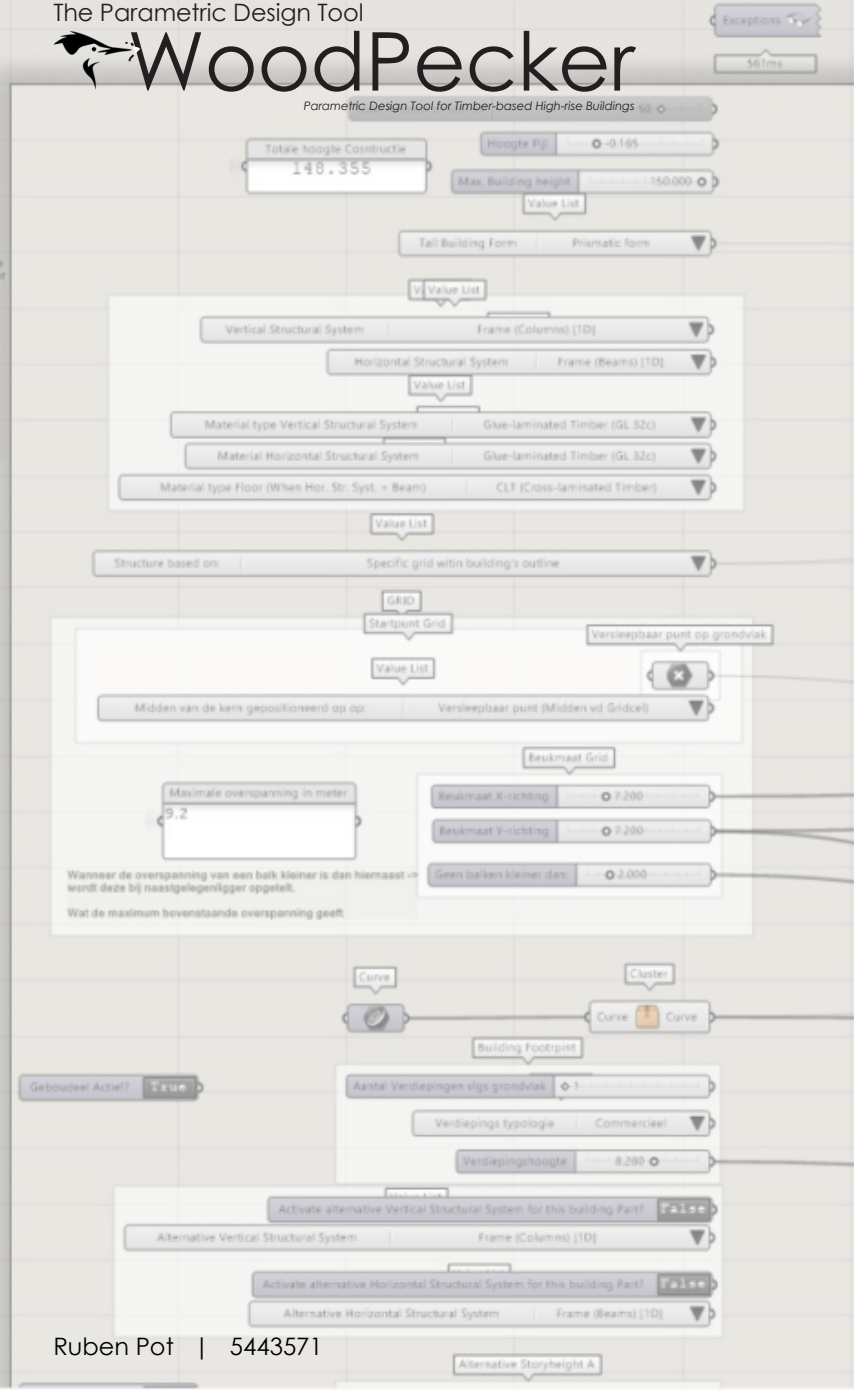


The architect only needs to addapt the input parameters, the script does the rest

The Parametric Design Tool

WoodPecker

Parametric Design Tool for Timber-based High-rise Buildings



*Helps to get an overview of the **Key Parameters** for designing Timberbased High-rise Buildings, including:*

1. Core Planning

Central Core (1), Atrium Core (2), External Core (3), and Peripheral Core (4).

2. Building Form

Prismatic forms (1), Setback forms (2), Tapered forms (3), Twisted forms (4), Leaning/ Tilted forms (5), and Free forms (6).

3. Floor-to-Floor Height

Minimum clearance height of 2.6 meters, additional space in office-buildings ranging 0.5 to 1 meter.

4. Structural System

Mass Timber Framing Systems, Shear walled systems.

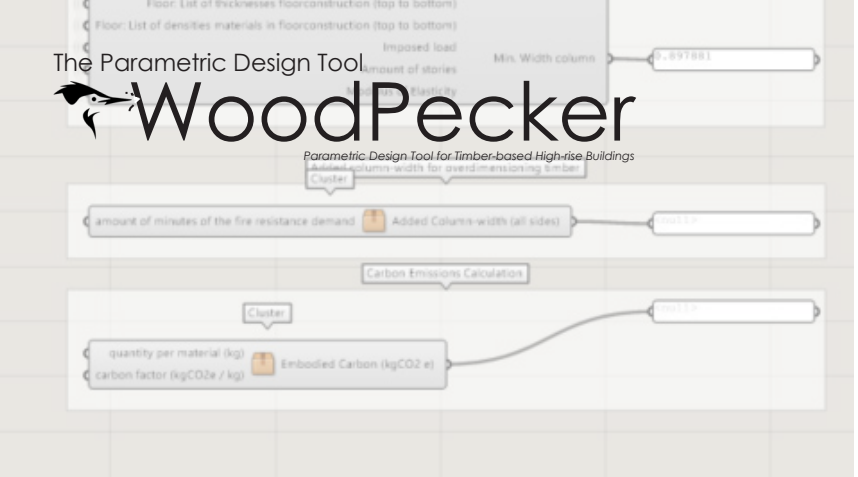
5. Grid size

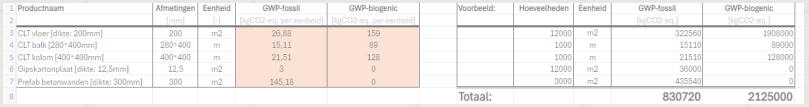
Planning-grids for offices and Structural-grids.

The Parametric Design Tool

WoodPecker

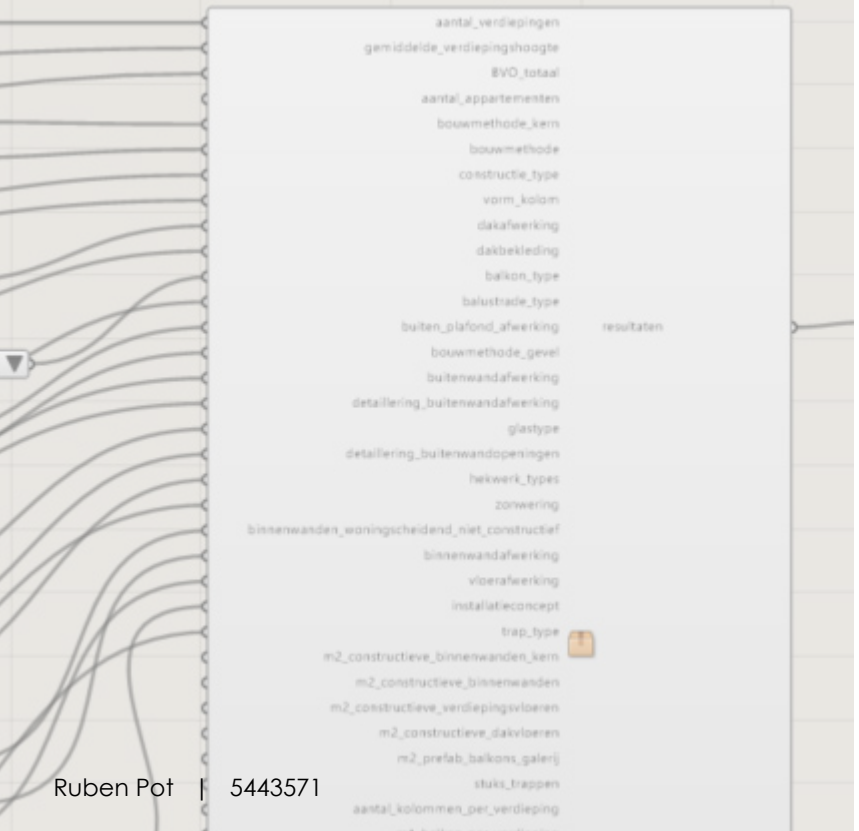
Parametric Design Tool for Timber-based High-rise Buildings





Productnaam	Afmetingen [mm]	Eenheid [-]	GWP-fossil [kgCO2-eq. per eenheid]	GWP-biogenic [kgCO2-eq. per eenheid]
CLT vloer [dikte: 200mm]	200	m2	26,88	159
CLT balk [280*400mm]	280*400	m	15,11	89
CLT kolom [400*400mm]	400*400	m	21,51	128
Gipskartonplaat [dikte: 12,5mm]	12,5	m2	3	0
Prefab betonwanden [dikte: 300mm]	300	m2	145,18	0

Voorbeeld:	Hoeveelheden	Eenheid	GWP-fossil [kgCO2-eq.]	GWP-biogenic [kgCO2-eq.]
	12000	m2	322560	1908000
	1000	m	15110	89000
	1000	m	21510	128000
	12000	m2	36000	0
	3000	m2	435540	0
Totaal:			830720	2125000



*Helps to get an indication of the buildings **Carbon Emissions** and **Building Costs**:*

1. Carbon Emission Calculation

   for all the structural elements in the building

2. Calculation of building costs

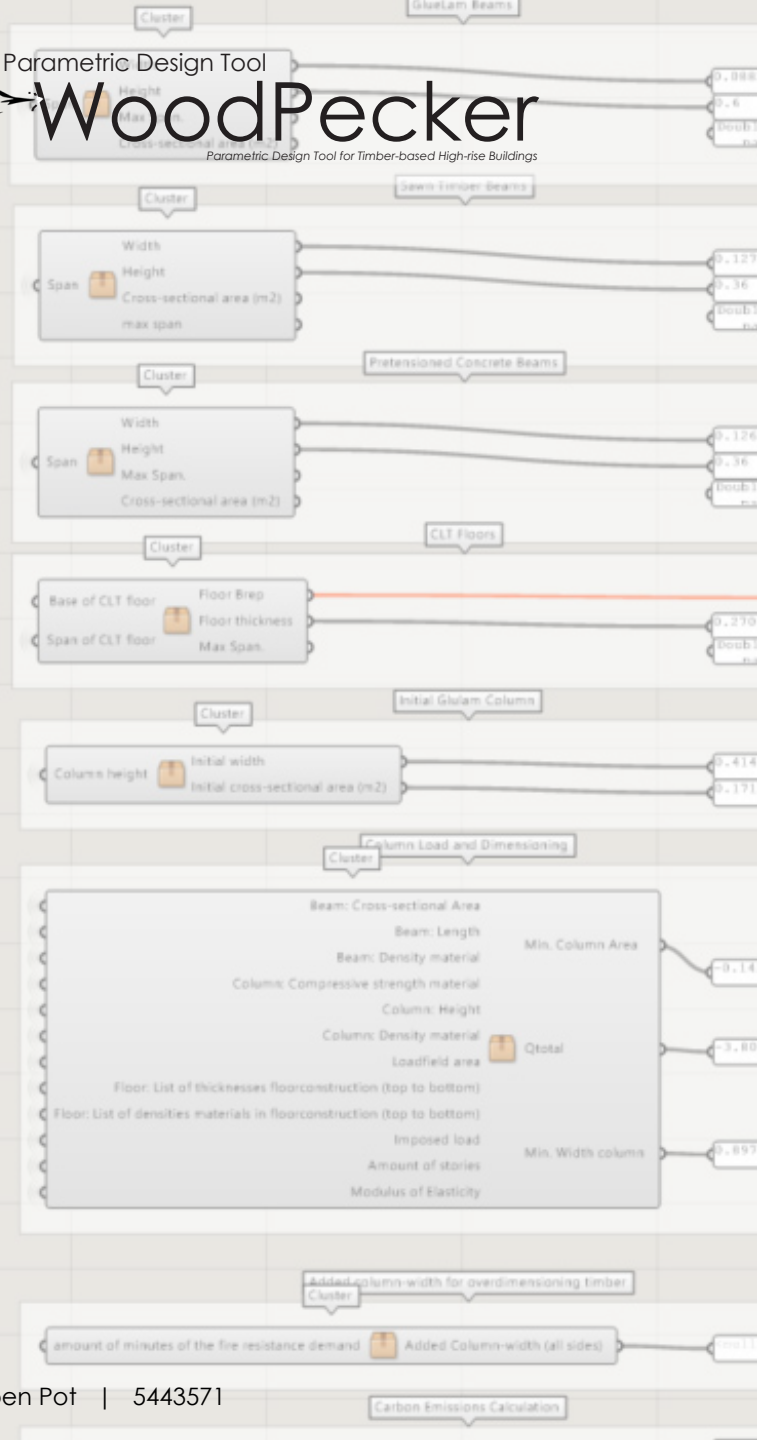
   *external plugin, to get an estimated indication of potential costs of the project *****

****** Courtesy of Elephant Architecture Studio: BEETLEBOT, Parametric Cost Calculation Script*

The Parametric Design Tool

WoodPecker

Parametric Design Tool for Timber-based High-rise Buildings



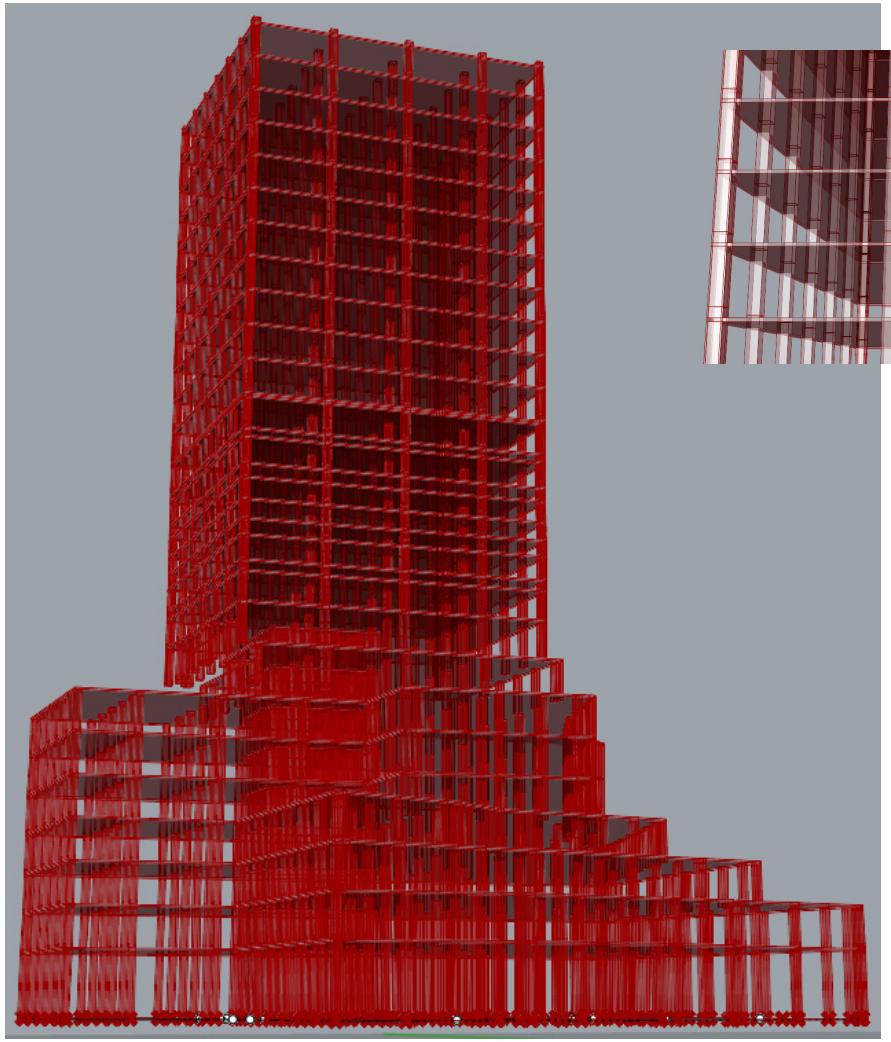
*Gives an indication of the **dimensioning of the Timber Structure**:*

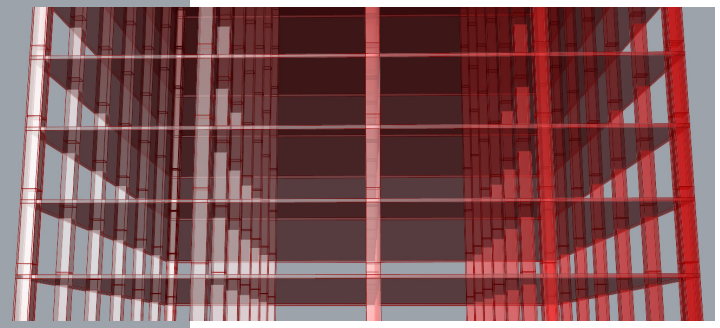
1. Rules of Thumb for Element Dimensions and Spans
2. Total Load & Column Size Calculation
3. Rules of Thumb for Fire Safety

Application of WoodPecker

Parametric Design Tool for Timber-based High-rise Buildings

To illustrate a possible outcome, you can see what a structure of a design looks like:





Chosen parameters:

1. Core Planning
   and Peripheral Core (4).
2. Building Form
   Setback forms (2)
3. Floor-to-Floor Height
   3.6 meter (and 6m plinth)
4. Structural System
   Column & Twoway Paneldeck
5. Grid size
   Structural-grids 7,2 x 4.6 meter

Design Studies as Research Tools for Tool Development

Development of an extensive Design Tool requires multiple test cases to explore and develop various building forms, construction systems, techniques, etc., within a script.

Therefore I conducted a design study aimed at creating a design for a plot located in a designated high-rise area.

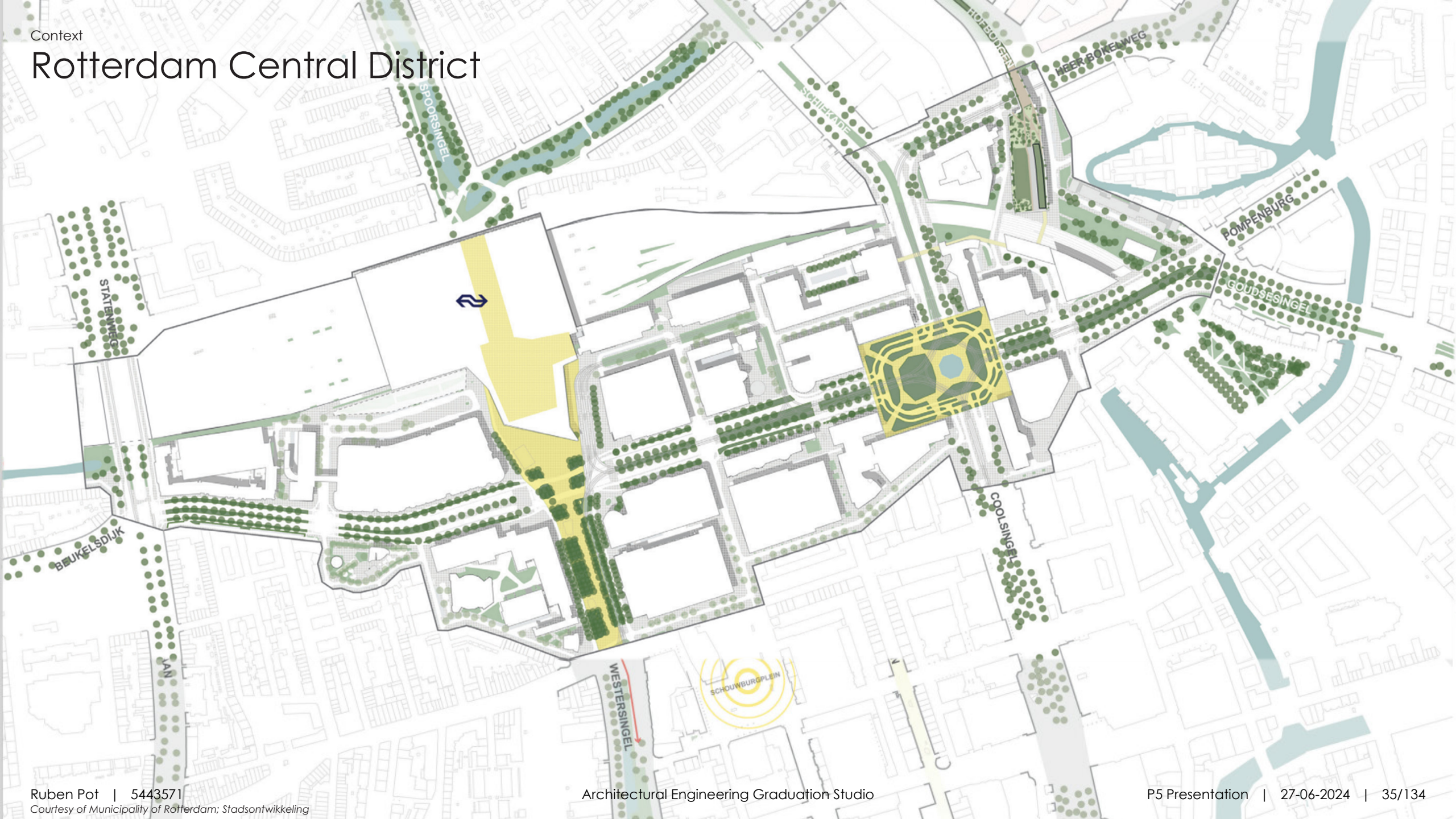
Viewed as an **opportunity to address the the housing crisis**, and other **project related goals**, which i will mention in a bit.

Project Location and Context

Rotterdam Central District

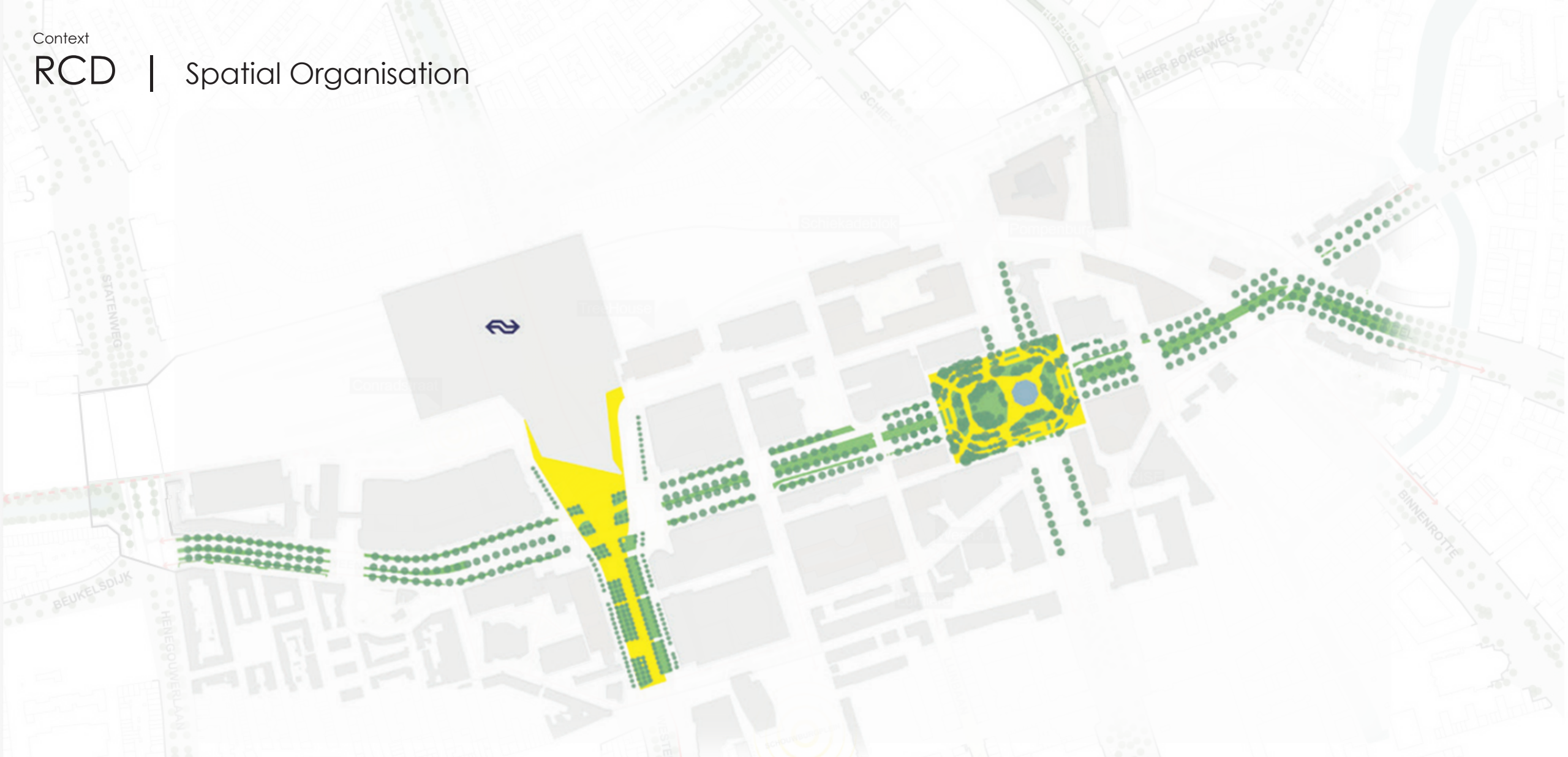
Photo Credit: Wouter Meeles

Rotterdam Central District



Courtesy of Municipality of Rotterdam; Stadsontwikkeling

RCD | Spatial Organisation



Weena, **Stationsplein** and **Hofplein** are the green outdoor spaces that serve as the backbone fo the RCD.

Courtesy of Municipality of Rotterdam; Stadsontwikkeling

RCD | Connectivity of Communal Plazas

Fine-grained network of routes and places that connect the various squares with each other.

Courtesy of Municipality of Rotterdam; Stadsontwikkeling

RCD | Active Plinths

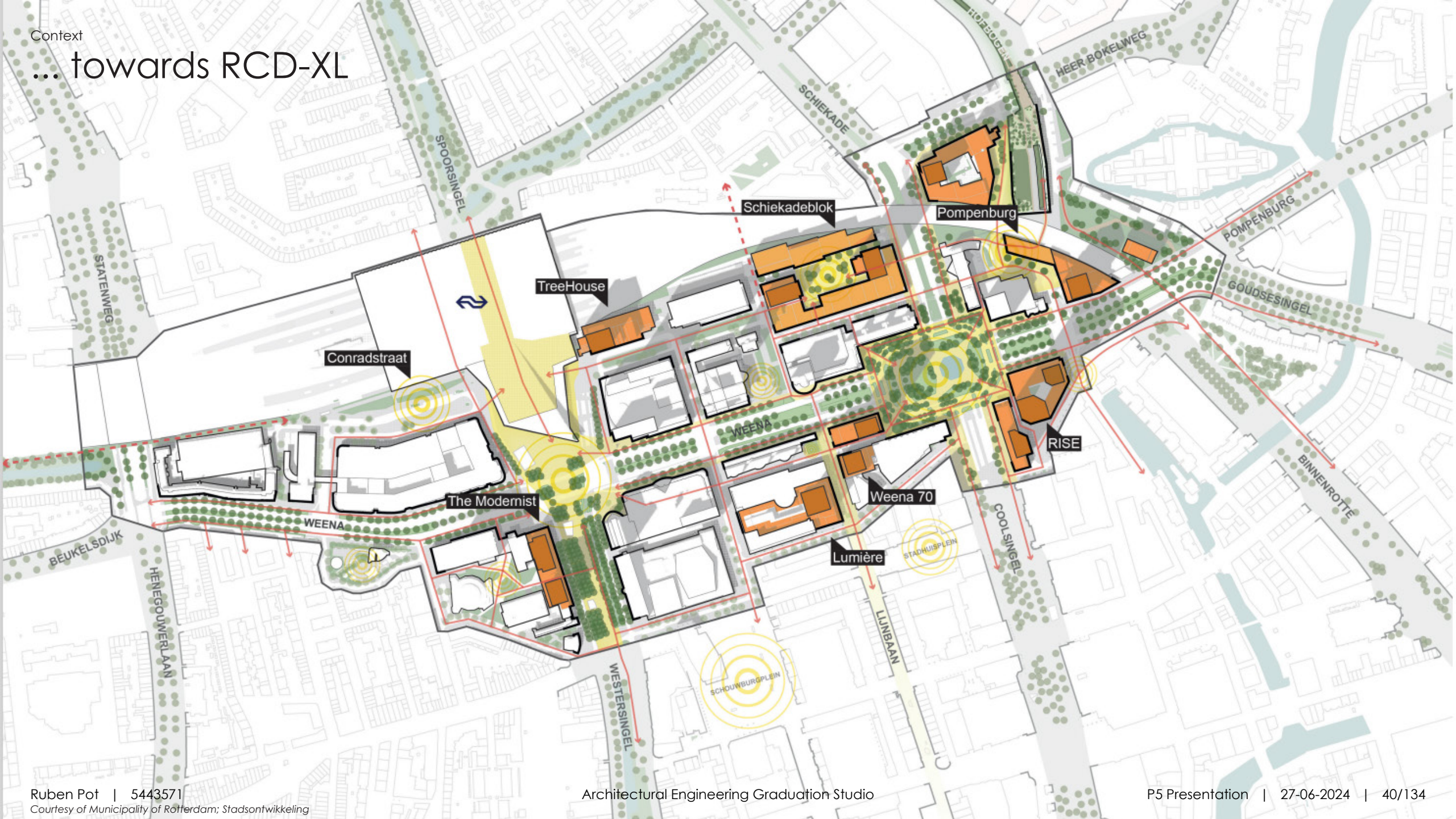
Well-programmed active plinths are essential for sufficient **liveliness on the streets.**

Courtesy of Municipality of Rotterdam; Stadsontwikkeling

From RCD...

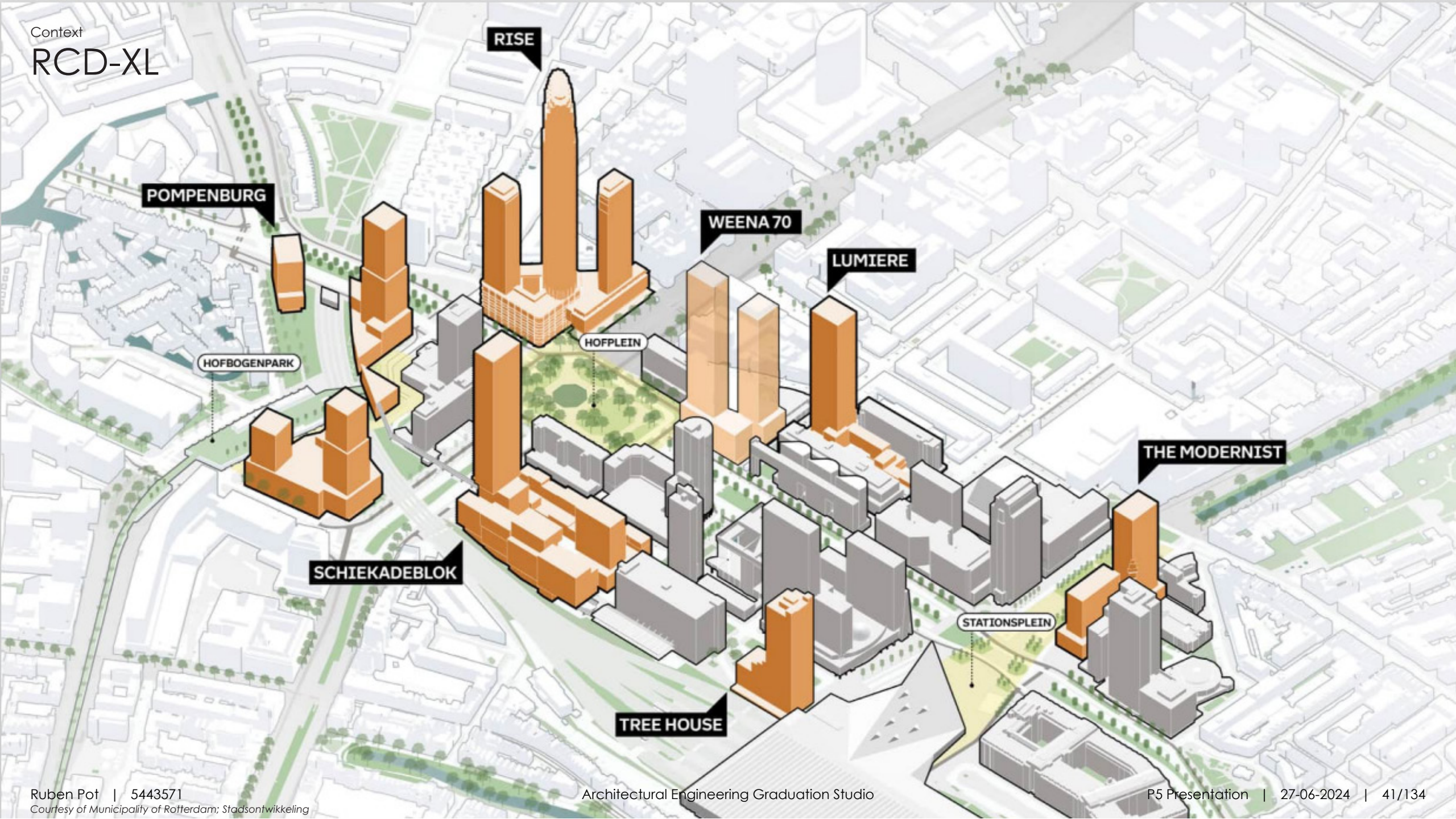
Courtesy of Municipality of Rotterdam; Stadsontwikkeling

... towards RCD-XL



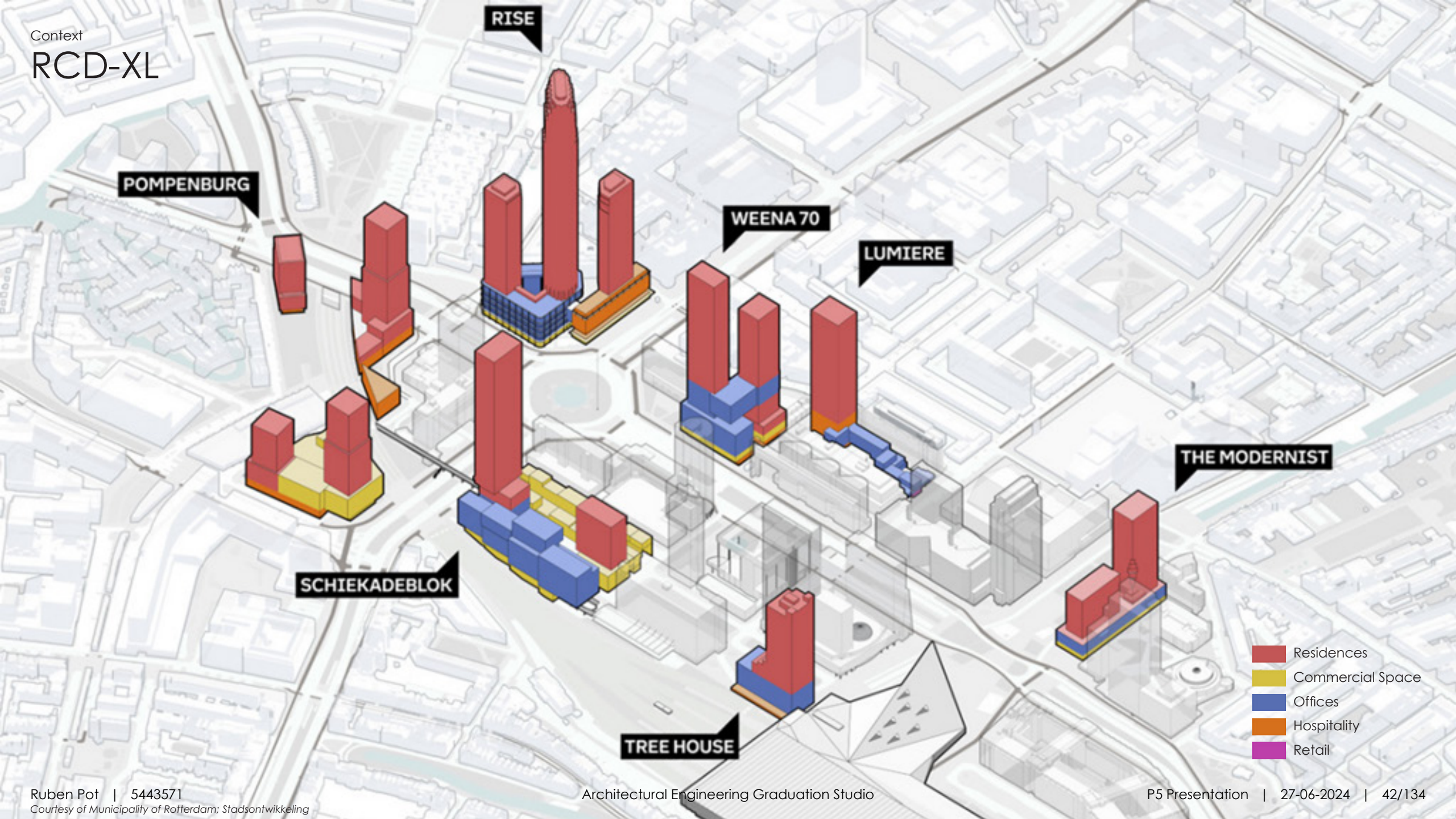
Courtesy of Municipality of Rotterdam; Stadsontwikkeling

RCD-XL



Courtesy of Municipality of Rotterdam; Stadsontwikkeling

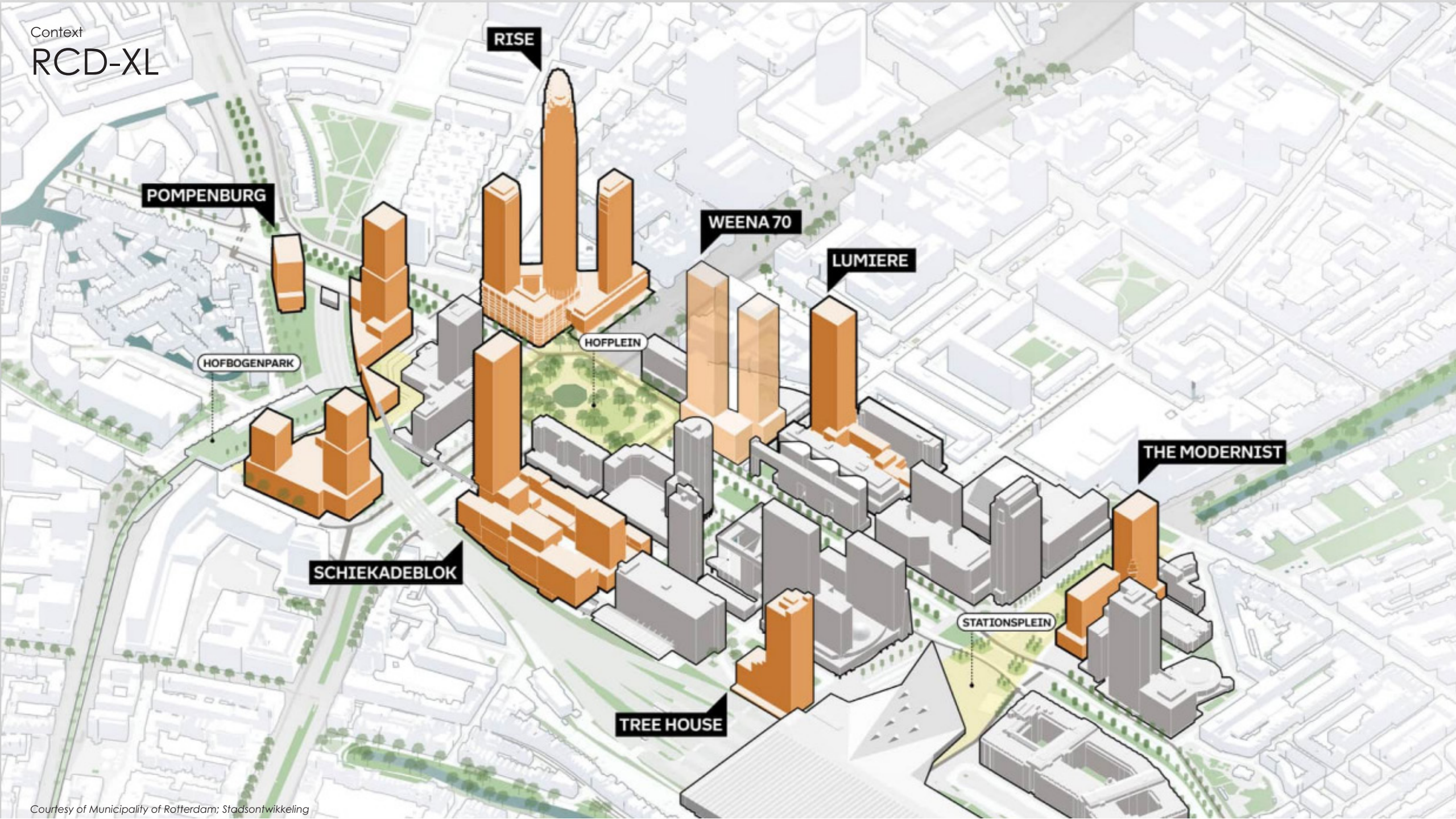
RCD-XL



Courtesy of Municipality of Rotterdam; Stadsontwikkeling

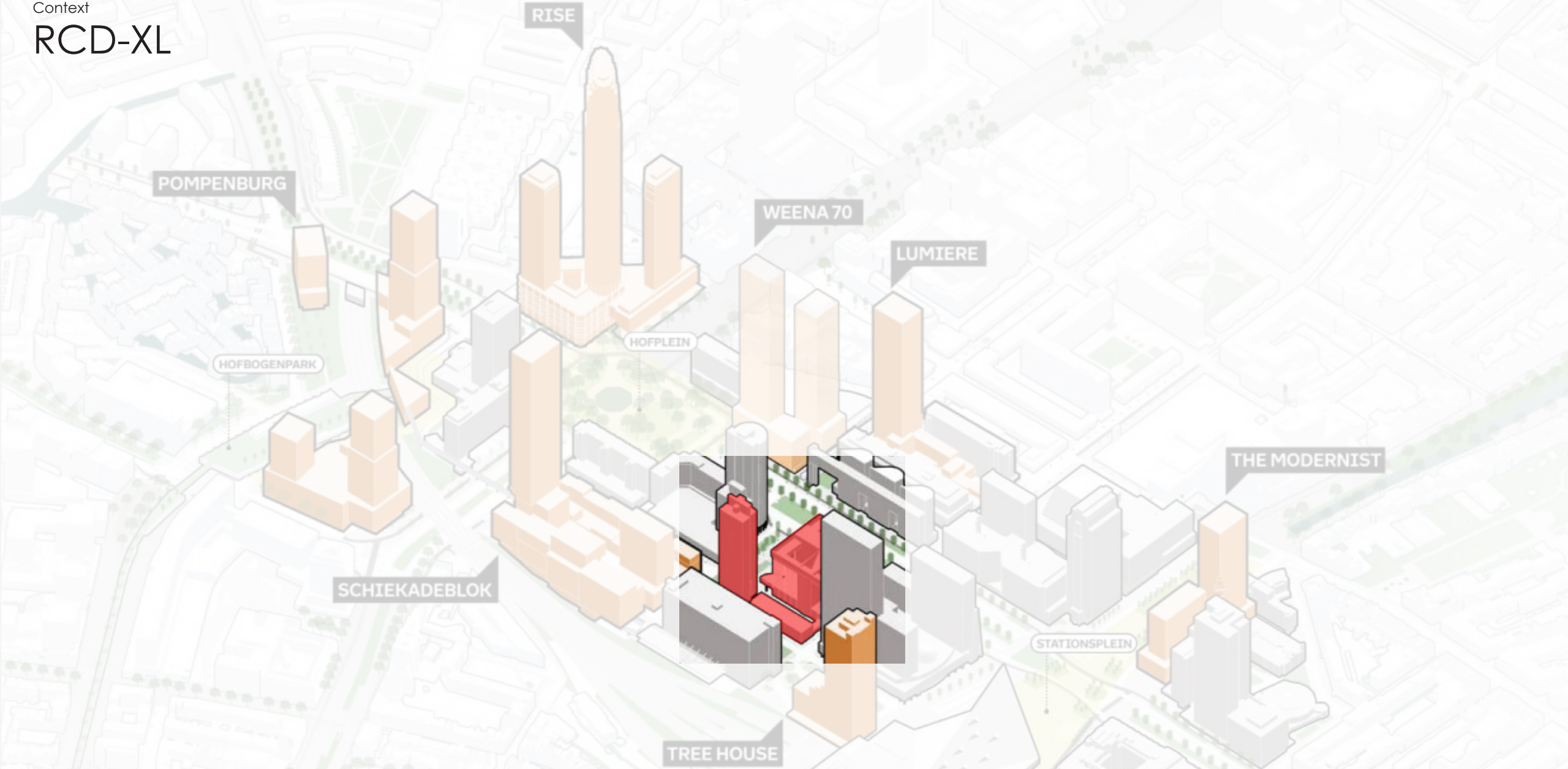
Context

RCD-XL



Courtesy of Municipality of Rotterdam; Stadsontwikkeling

RCD-XL



Courtesy of Municipality of Rotterdam; Stadsontwikkeling (Edited)

Vision

Designstudy Goals

Urban Densification

- Adding dwellings by the means of high-rise construction.

- Efficient use of availible building space

Addressing the climate crisis

- Addressing the climate crisis through materialization of the buildings structure (which accounts approximately for 75% of the buildings material)

Enhance Vibrancy

- Active building block for round-the-clock activity: work, recreation, and socializing.

- Linking the lively city between new developments of the area.

- Stimulating interaction between the various building programs

Enhance Livability

- Addressing the livability in the city by focusing on Building Climate, Greenery and Biodiversity.

Mobility and Accessibility

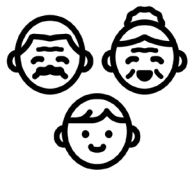
- Discouraging car use, encouraging cycling and public transport. (Compact City Concept)

Target Group

The redevelopment should attract a diverse target audience; including: **Residents**, **Workers** and **Visitors** to the City.

For the dwellings, the goal is to include a wide range of people, **all who have the desire to live in high-rise in this part of the city**.

Which means:



residents of all **ages:**

from young, to middle-aged, to elderly

residents of all **income levels**

from low-income, to middle-income, to high-income, to wealthy

residents of all **familysizes**

from singles, to couples, to families with children

Building Program

The existing program will be retained, and new diverse program will be added:

Residences *(Weena Center)*	*min. 15.000m2*
Offices *(Unilever)*	*min. 22.000m2*
Education *(TIO)*	*min. 2.500m2*

Staying	**(5.300 m2)**
Sports	**(670 m2)**
Leisure	**(3.370 m2)**
Working/Studying	**(400 m2)**
Other	**(5.400 m2)**

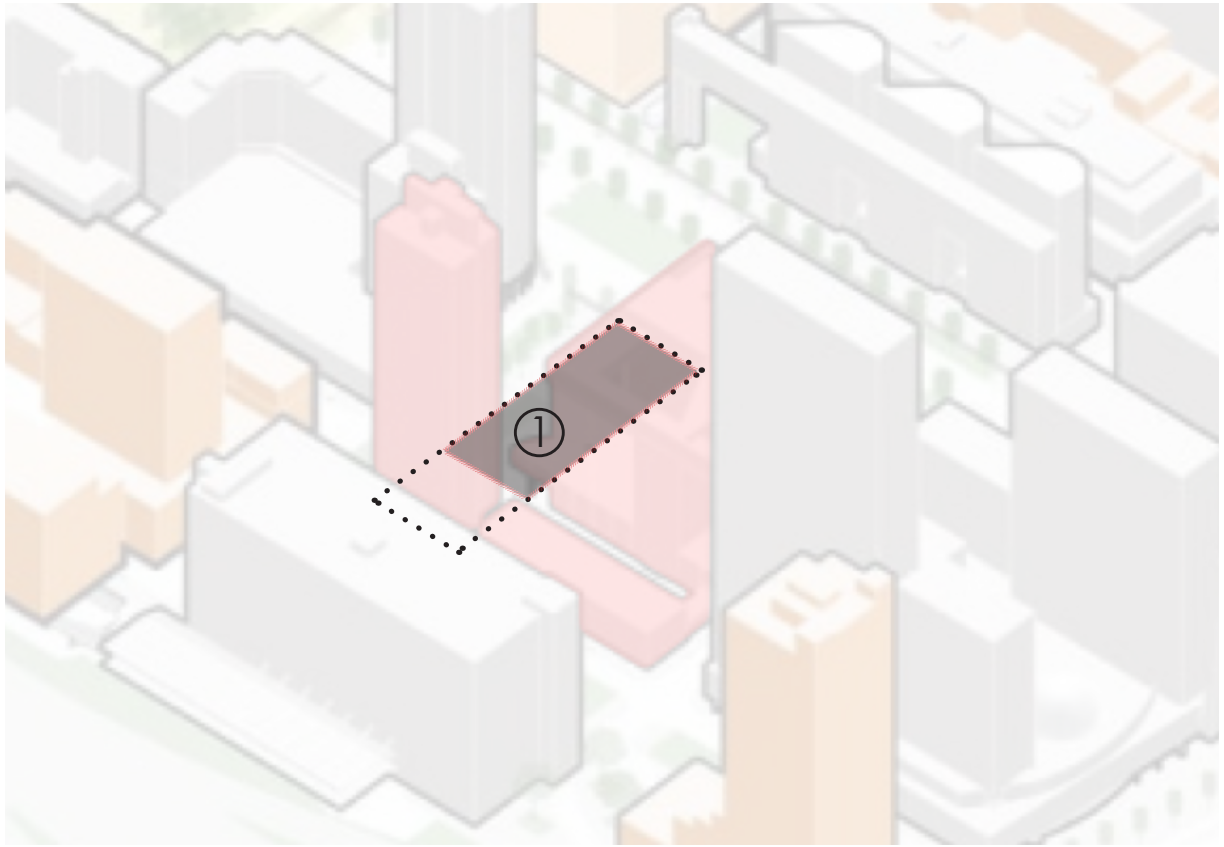
Staying (5.300 m2)	
Hotel	(4.800 m2)
Daycare	(500 m2)
Sports (670 m2)	
Yoga	(170 rm2)
(High-end) Gym	(500 m2)
Leisure (3.370 m2)	
Viewing Platform	(280 m2)
Restaurant	(460 m2)
Coffee Bar	(150 m2)
Grandcafe:	(160 m2)
Art Gallery:	(170 m2)
Roof garden:	(1.800 m2)
(Comedy) Club	(350 m2)
Working/Studying (400 m2)	
Library and Co-working Spaces	(400 m2)
Other (5.400 m2)	
Car-sharing Station	(400 m2)
(Bicycle) Parking garage	(5.000 m2)

Site Analysis

Project Location

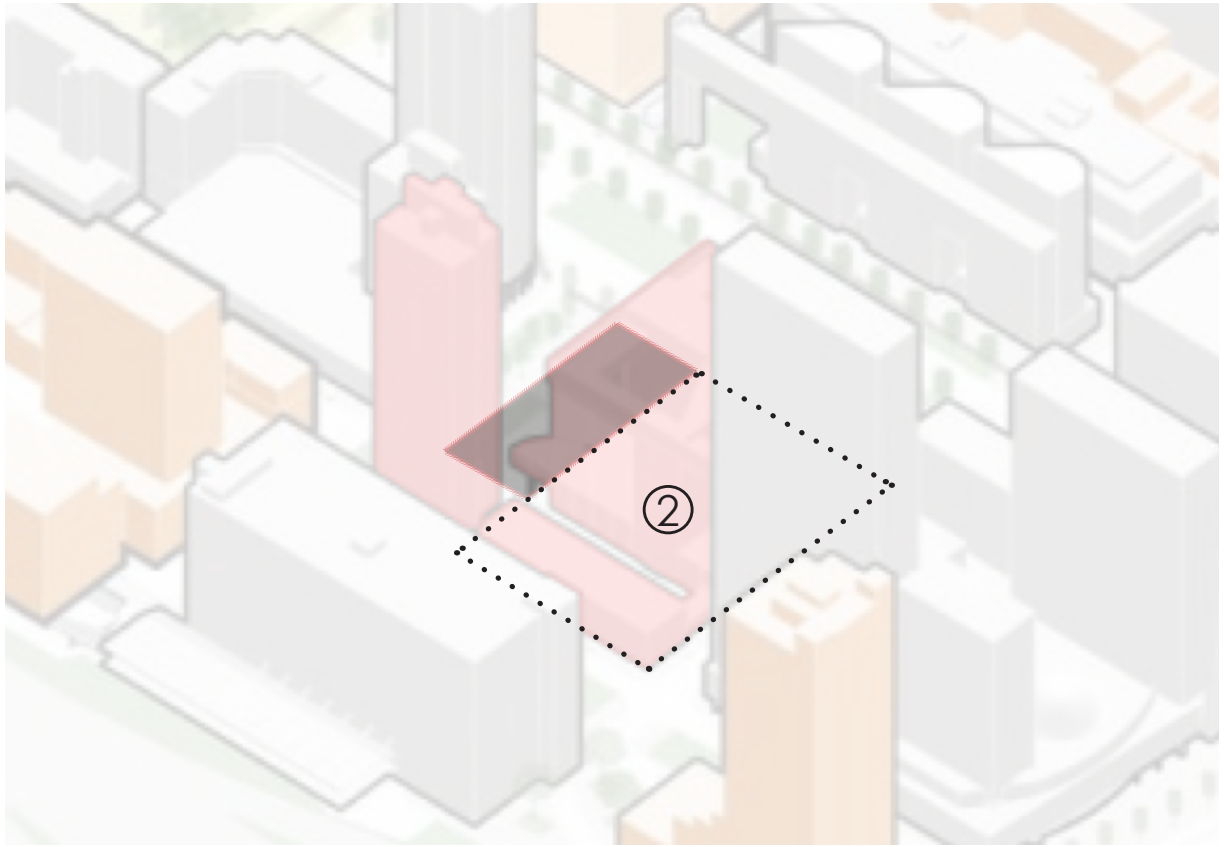
*If we zoom in a bit we can see that the Project Location holds **3 Buildings***

Project Location



*Plot 1: Hosts the **Weena Center Tower** with a square in front that prohibits construction.*

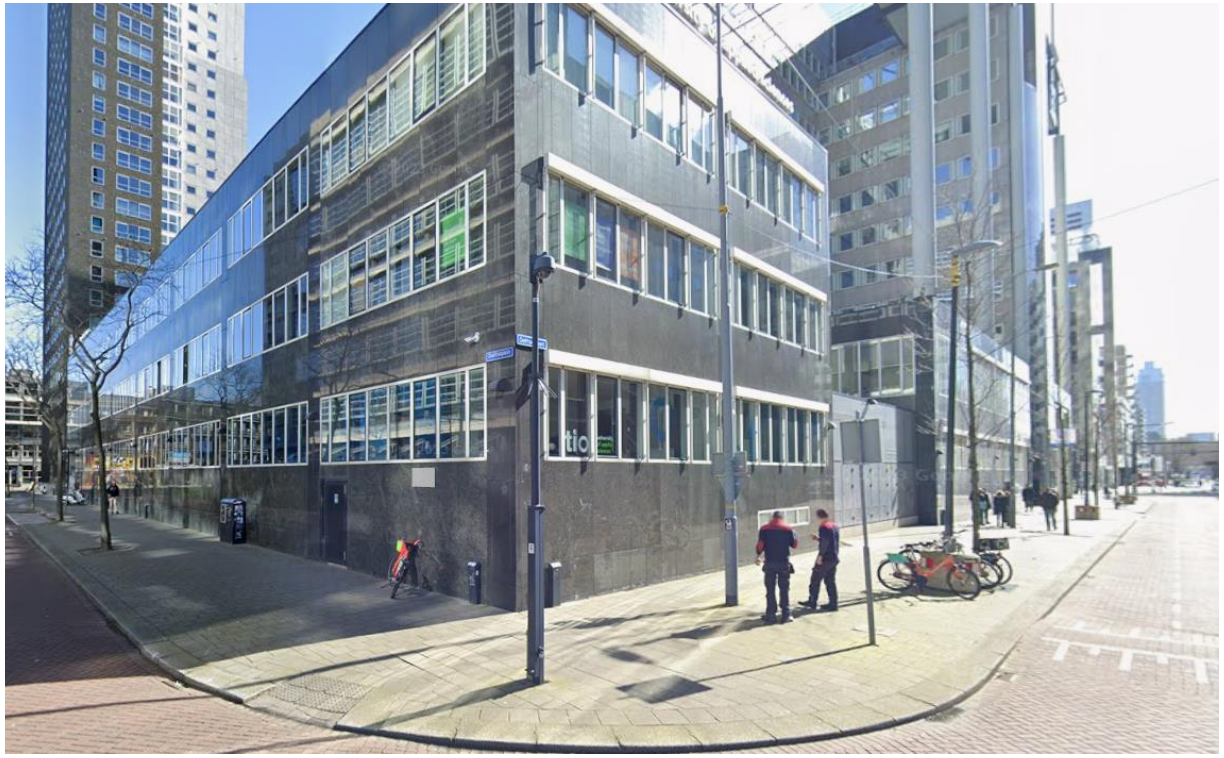
Project Location



*Plot 2: Currently hosts the **Unilever Building** and **TIO University of Applied Sciences** and is determined suitable for highrise construction up to 150m.*

Analysis Existing Buildings

Analysis Existing Buildings



Closed plinths *that do not contribute to interaction between the interior and exterior of the building*

Analysis Existing Buildings

Closed-off facades *at the ends of the office wings facing the street*

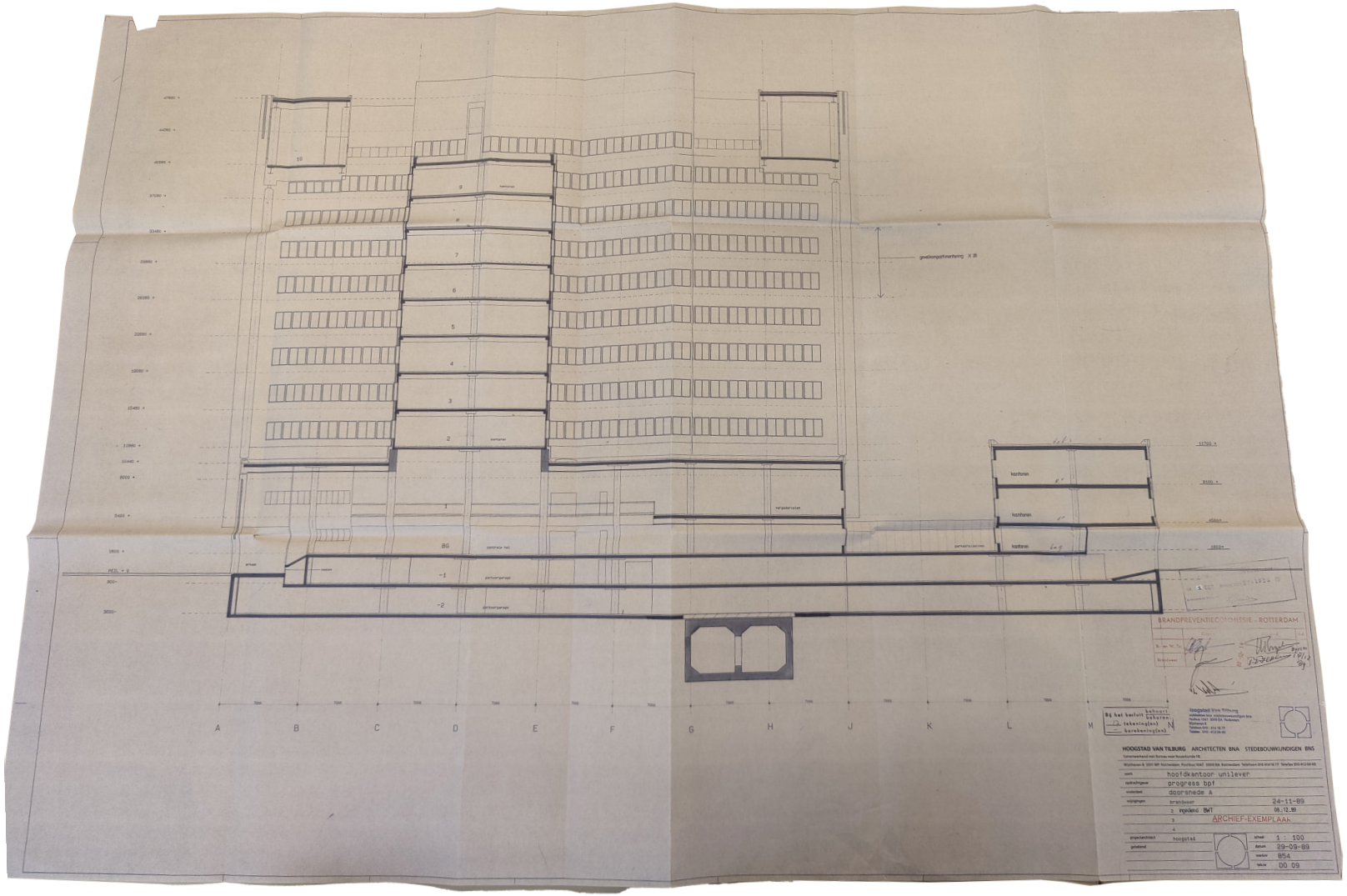
Analysis Existing Buildings

Recessed facades *leave significant potential space for urban densification unused.*

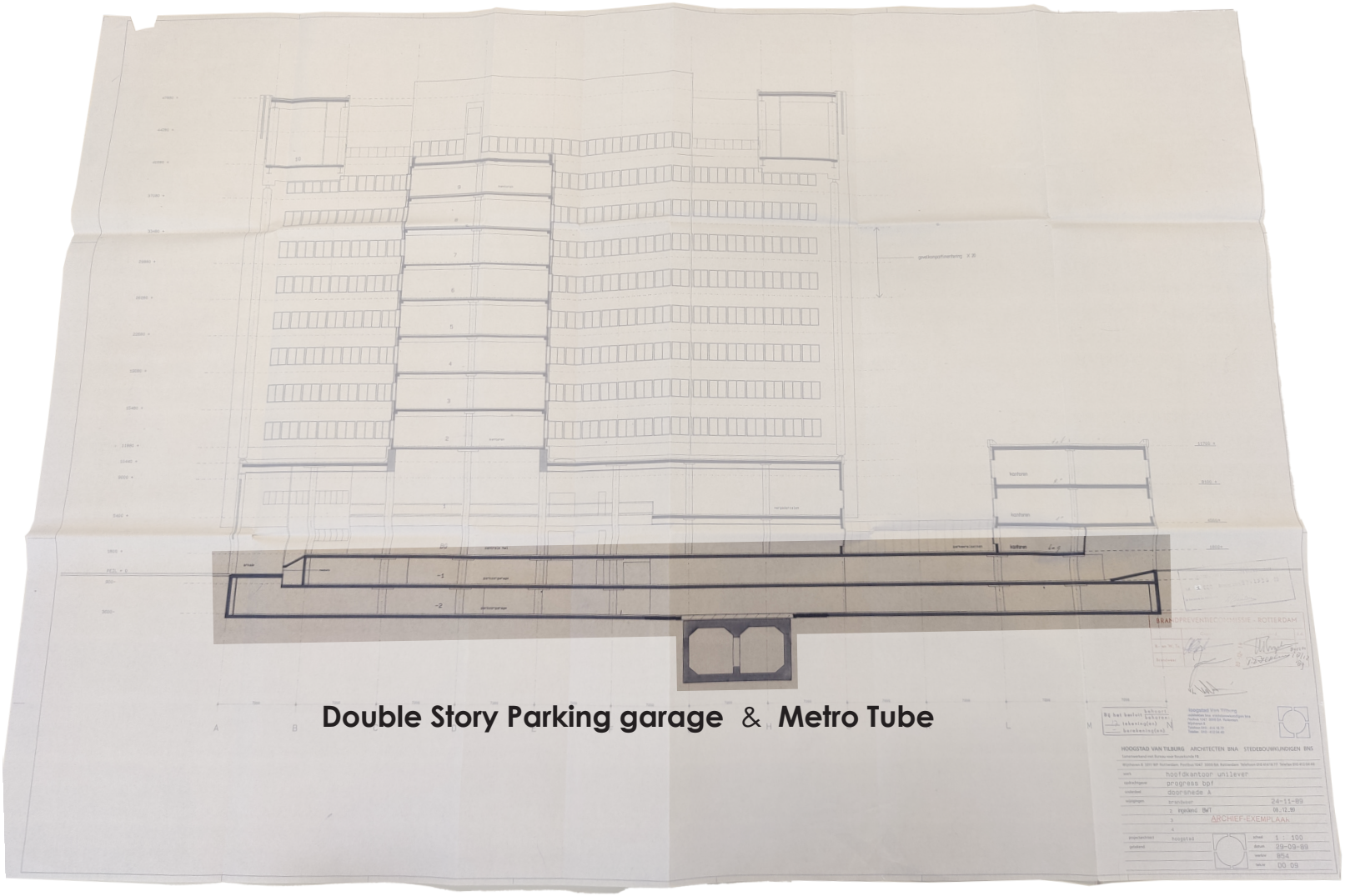
Analysis Existing Buildings

Dark, unpleasant arcades *that do not contribute to interaction between the interior and exterior*

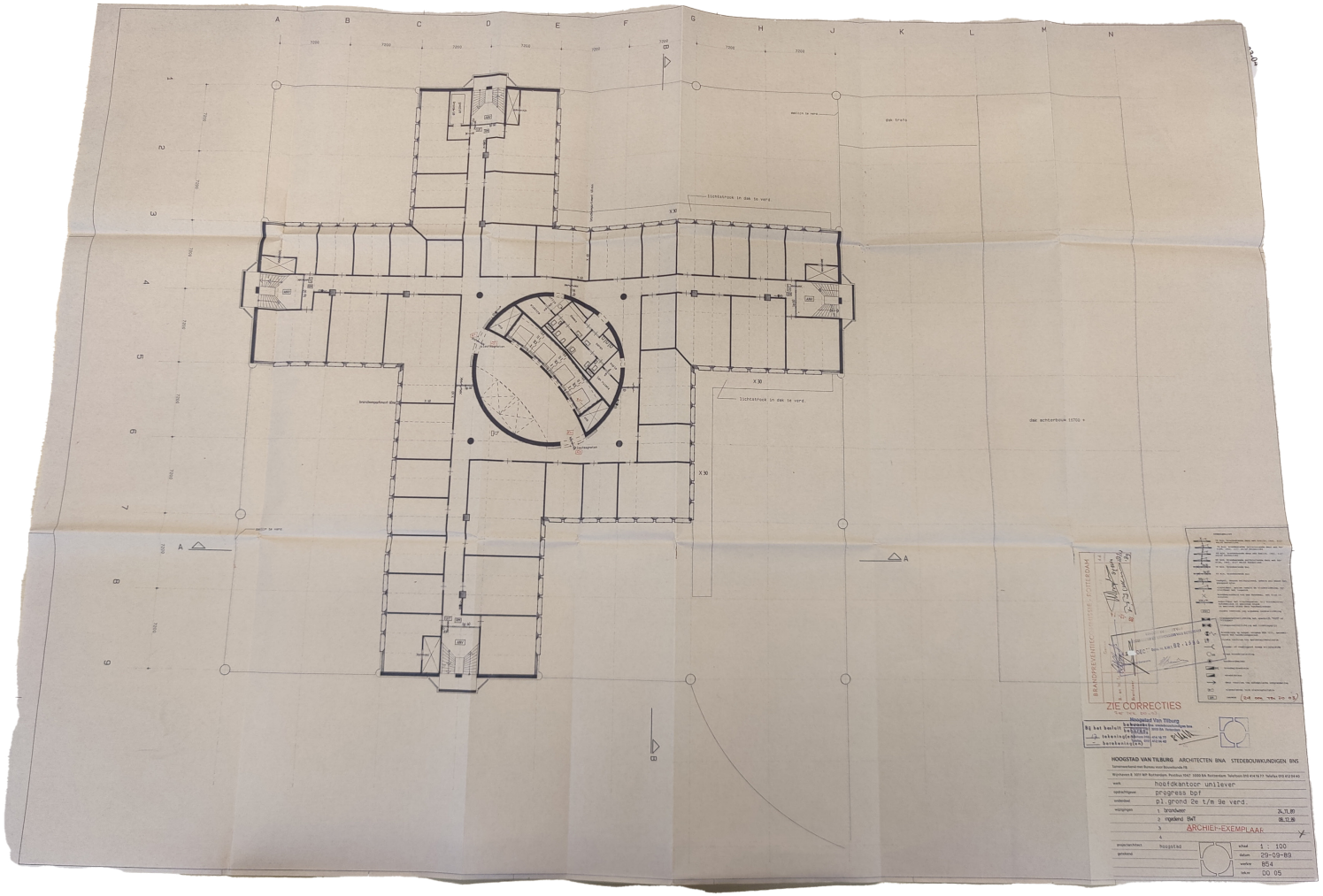
Analysis Existing Buildings



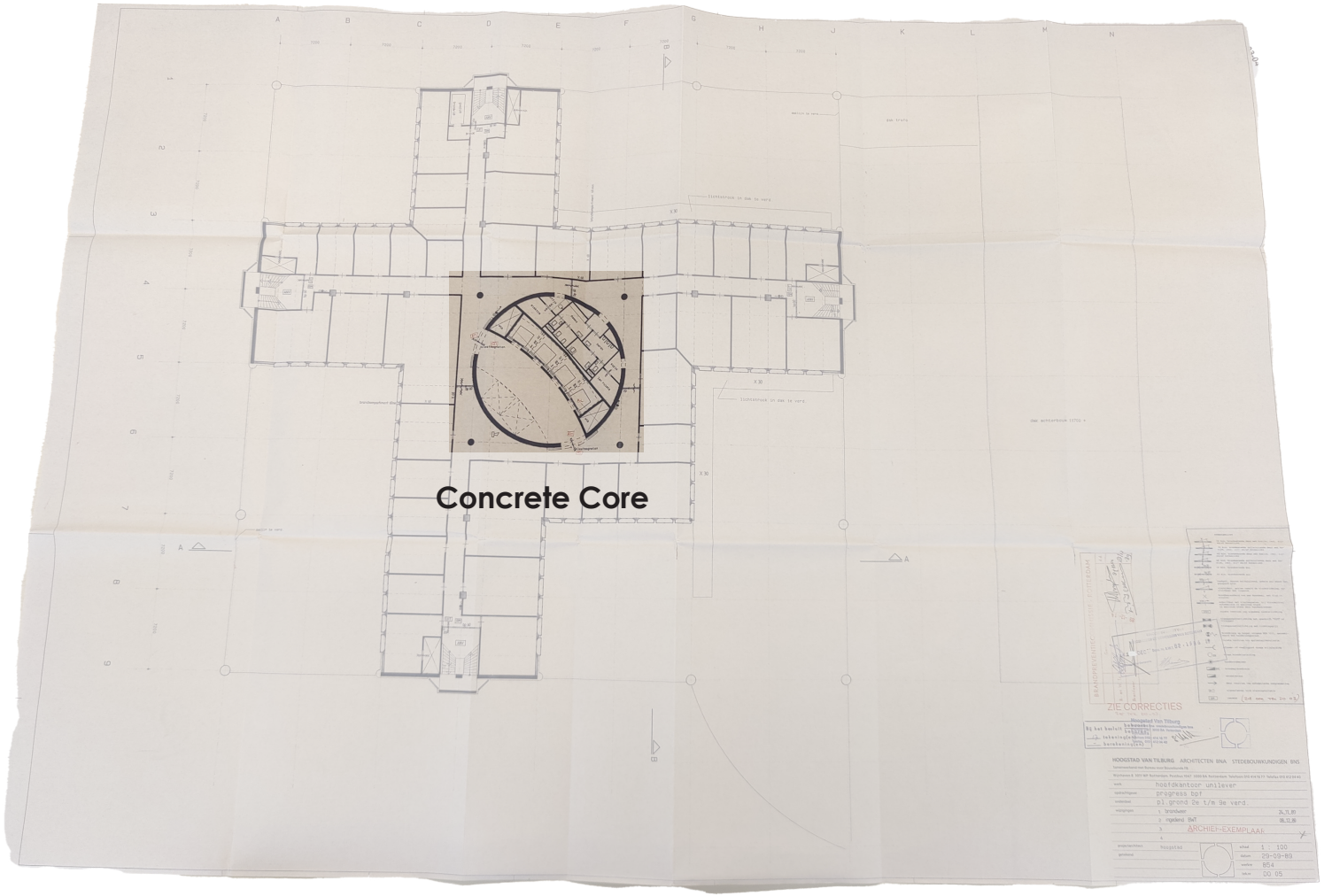
Analysis Existing Buildings



Analysis Existing Buildings



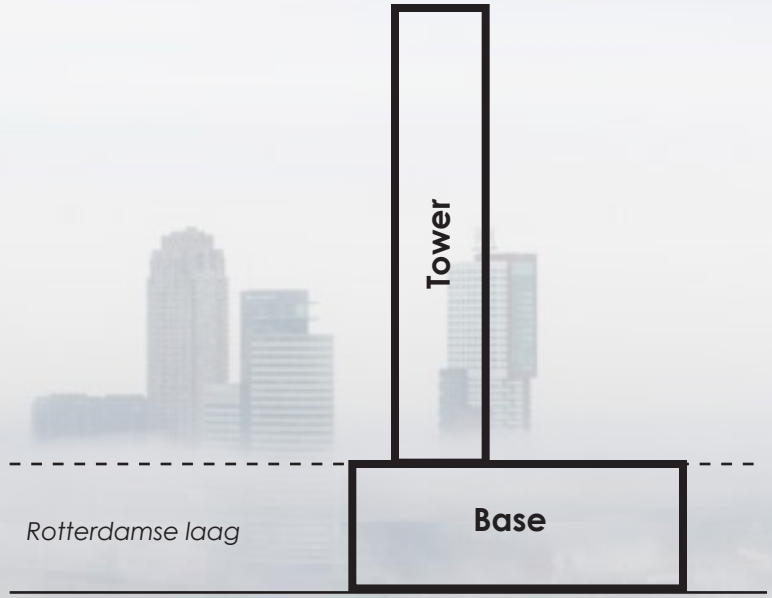
Analysis Existing Buildings



Rotterdamse Laag

Rotterdam Highrise Vision

- Base (Rotterdamse laag) + Tower
- Visual and Functional Continuity
- Towers are placed on a base



Overall Design

Building Volume, Organisation, Adaptiveness & Structural Design

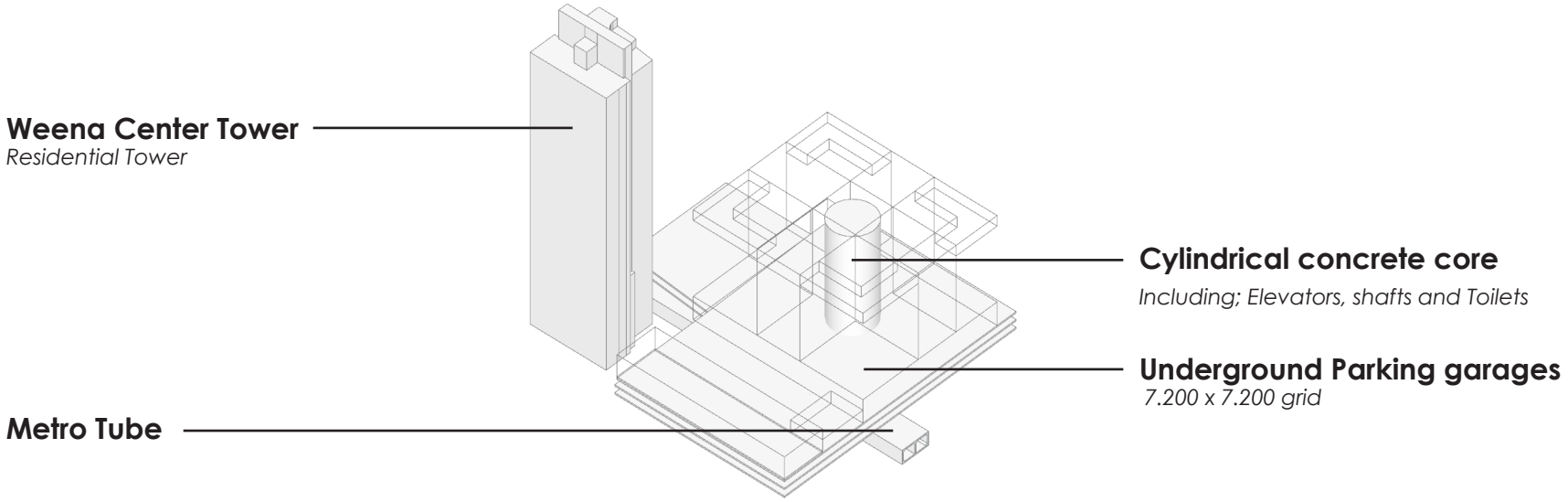
Current Situation

To summarize, I intend to do this design study for the following reasons:

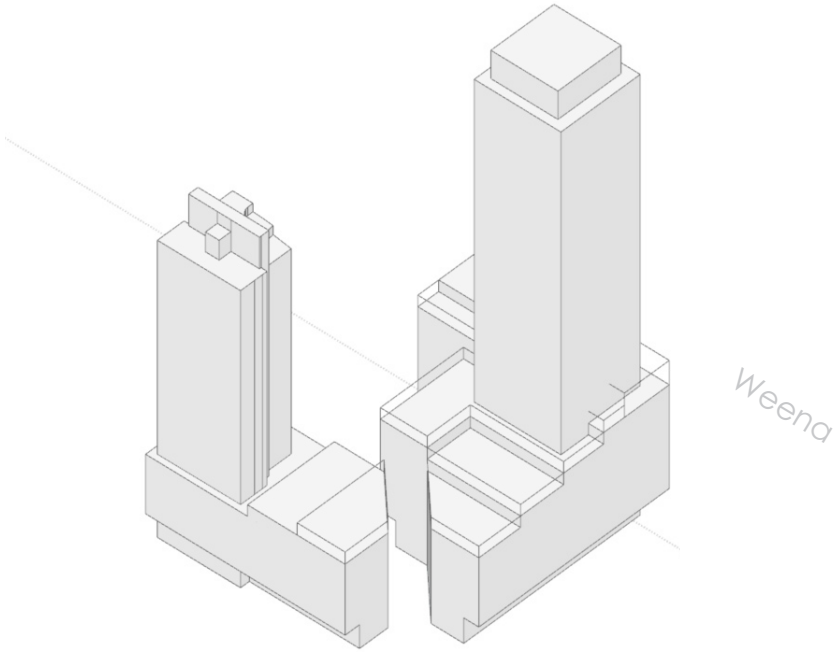
- *To experiment and develop the design tool*
- *Solve the housing criss & improve the current situation*

Valuable Existing structures to Preserve

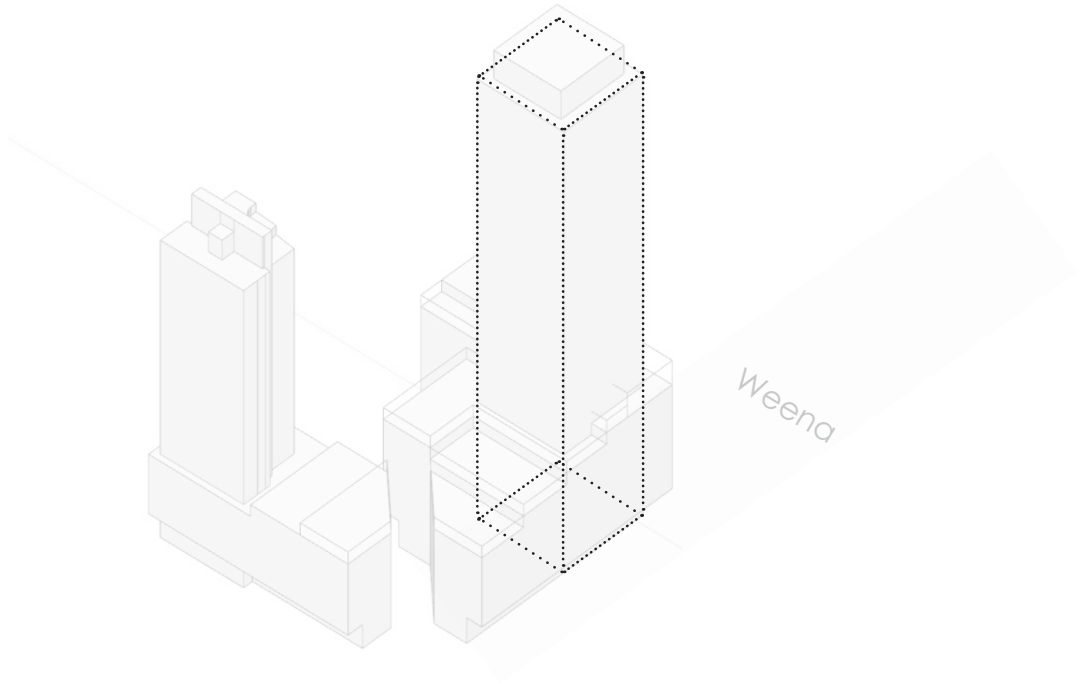
To achieve this: I want to preserve Valuable existing structures:



New Building volume

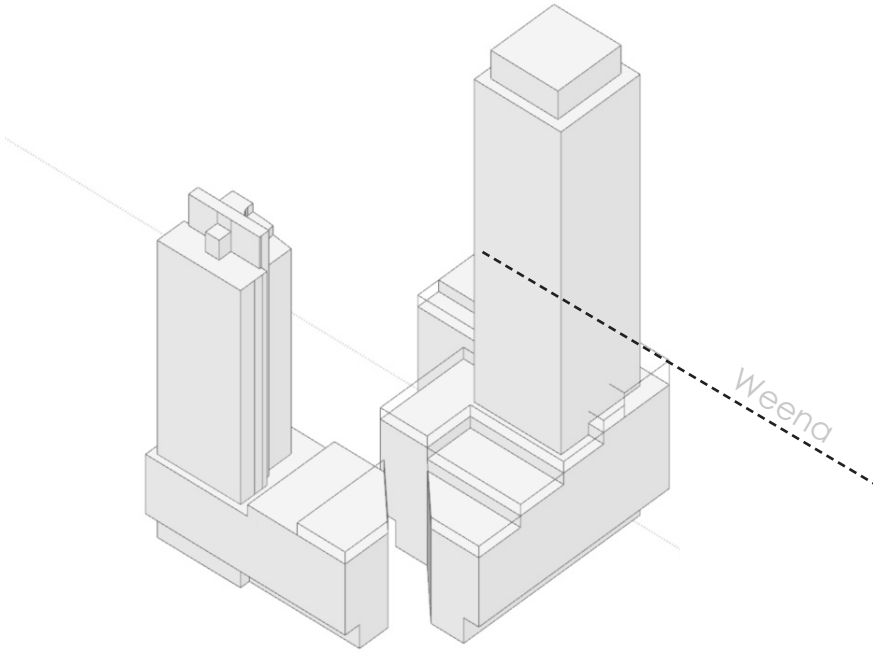


Building Massing & Urban Composition



Due to its alignment with the **urban rhythm**, the presence of the **metro tunnel**, and the designation of high-rise construction **exclusively on the Unilever plot**, there is one logical location for the tower.

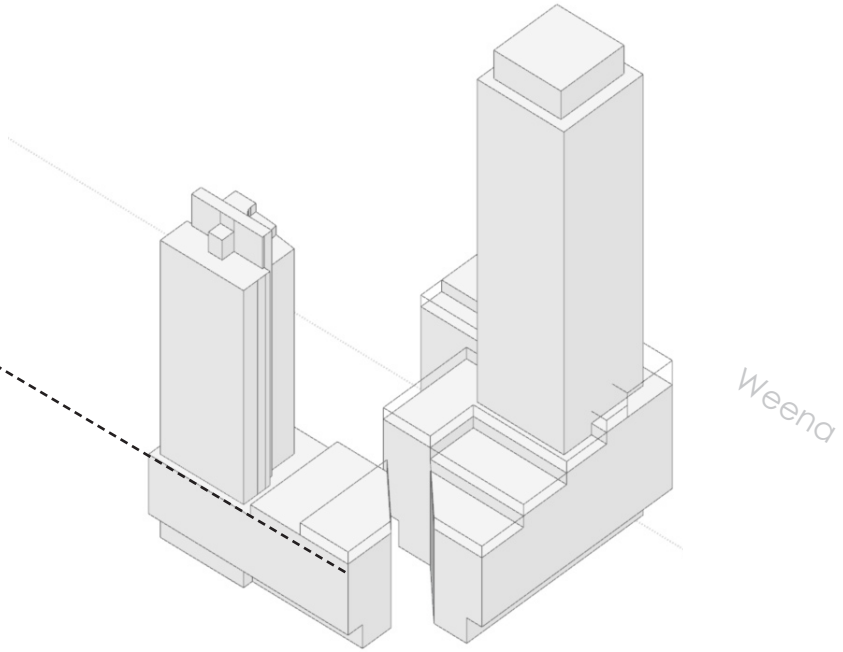
Building Massing & Urban Composition



Maximizing officespaces on the Unilever-plot by extruding the volume it up to the '**Hiltonhoogte**', similar to the adjacent building-volume of 'Delftse Poort',

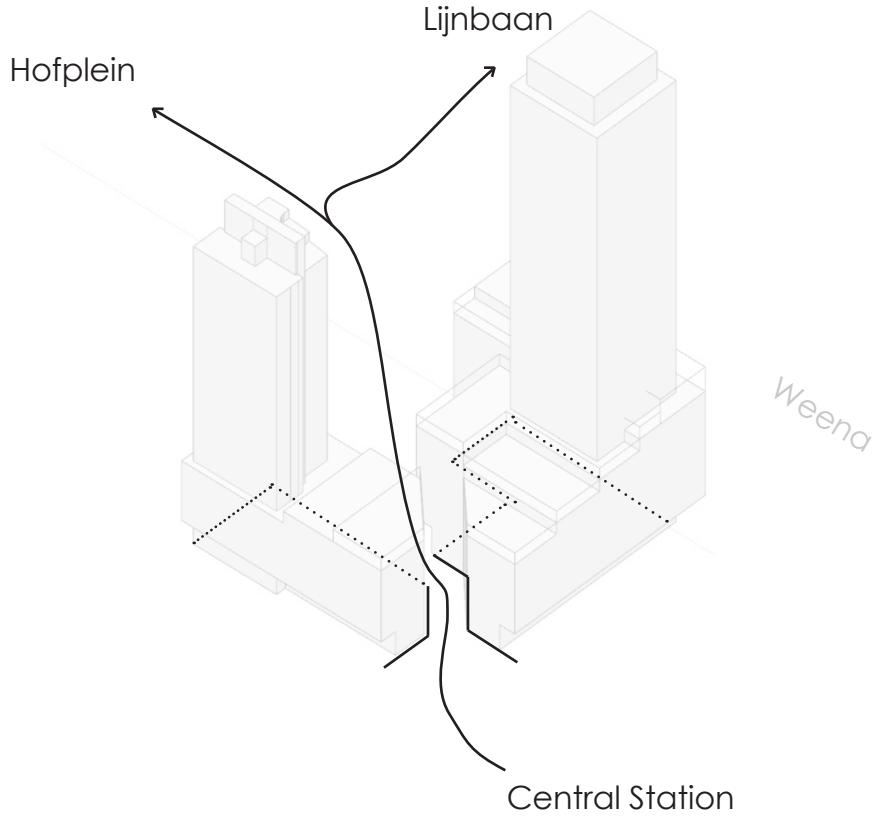
Building Massing & Urban Composition

Delftsche blok
~ 27m



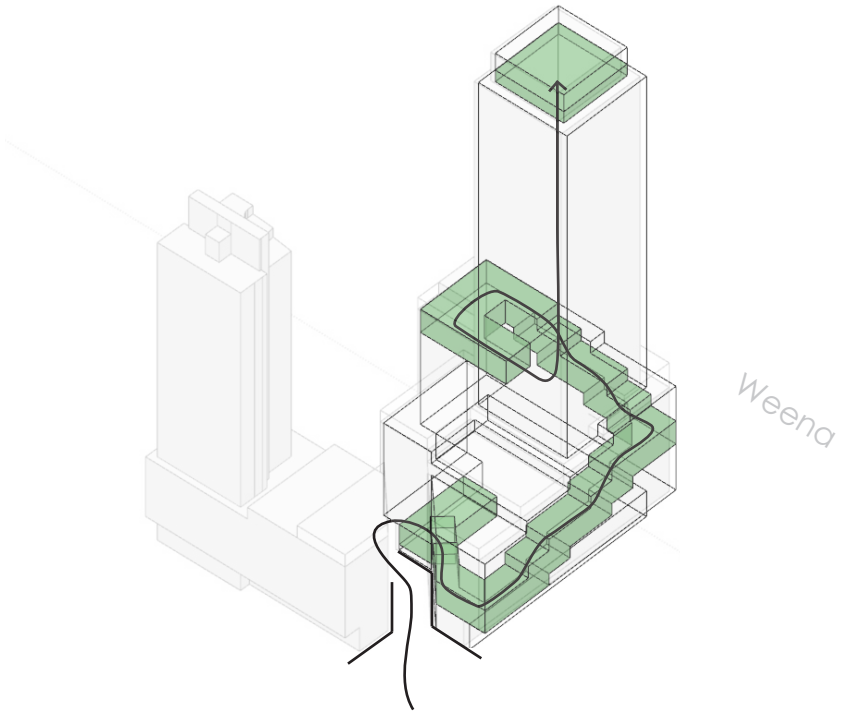
At the North-side the building gradually cascades down to relate to the buildings of the **'Delftsche Blok'** building ensemble

Building Massing & Urban Composition



A passageway between the building volumes leading to the opposite side of the plot serves as a **shortcut** between Central Station and Hofplein / Lijnbaan

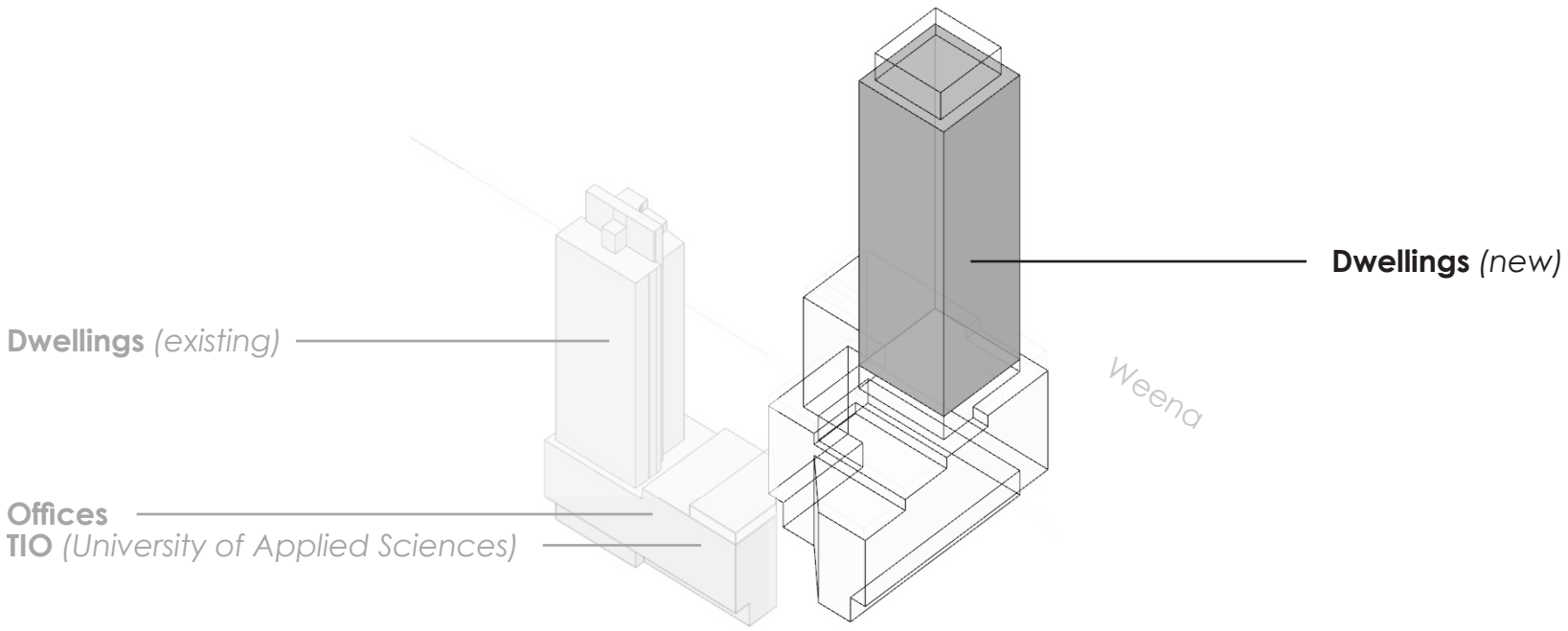
Organisation



Central Station

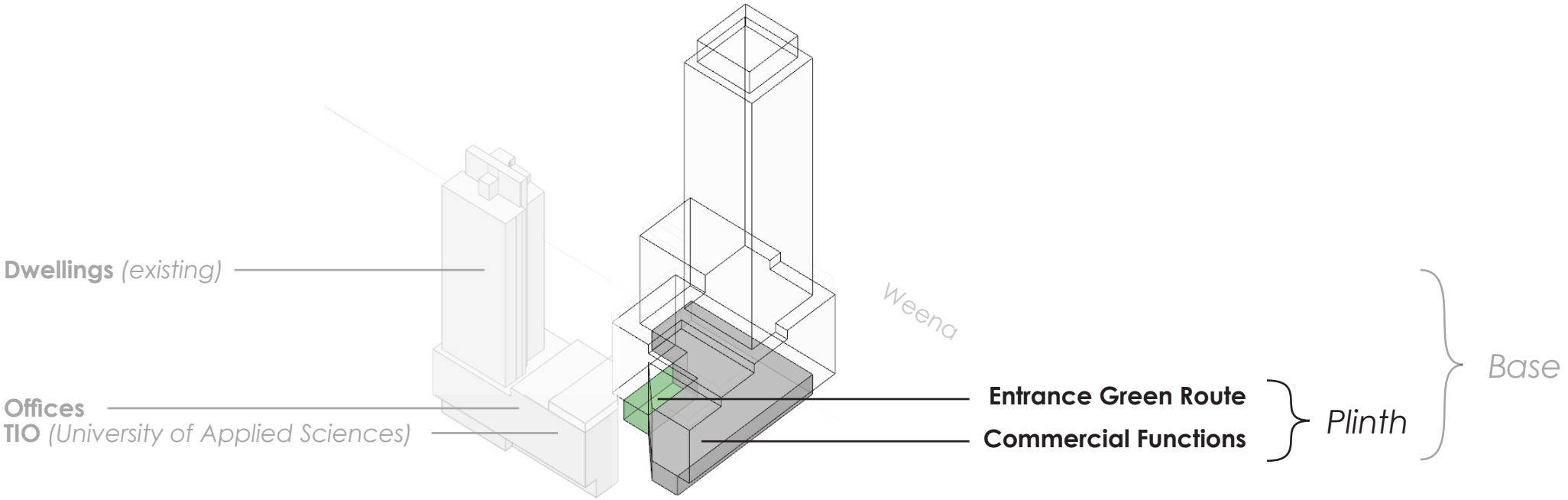
To **intensify vibrancy** throughout the building, a green comunal space runs along the facade through the building. Which is accentuated with the setback of the facade.

Organisation

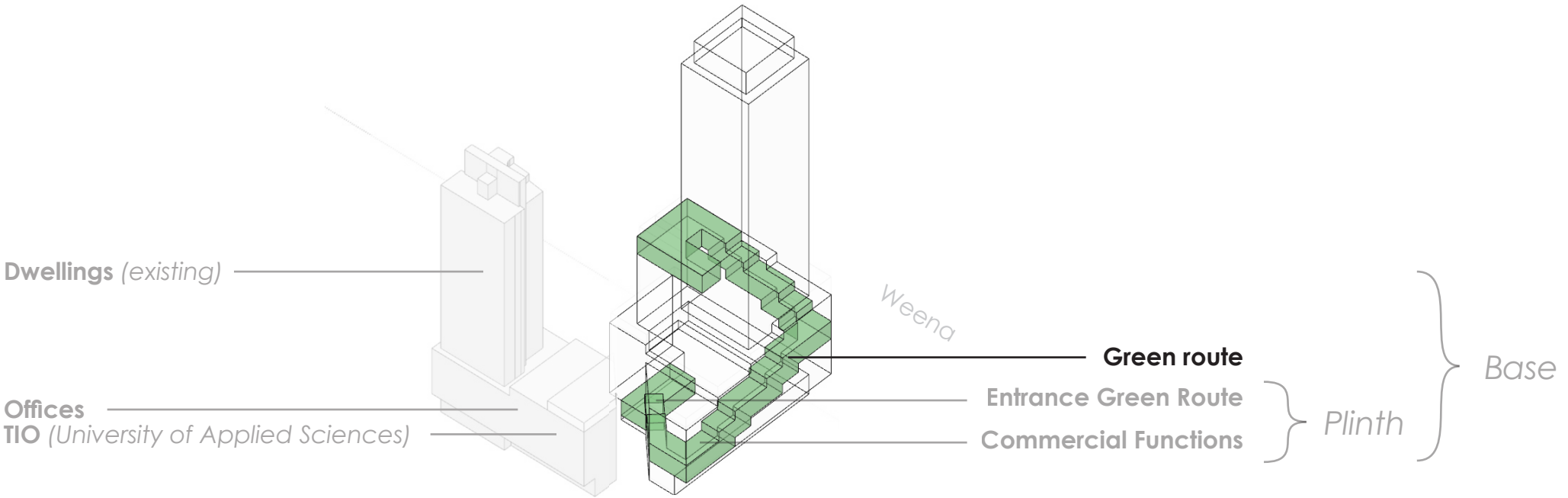


For further development of the design, we zoom in on the **right building volume**, as it features the new wooden tower central to my research and design tool application.

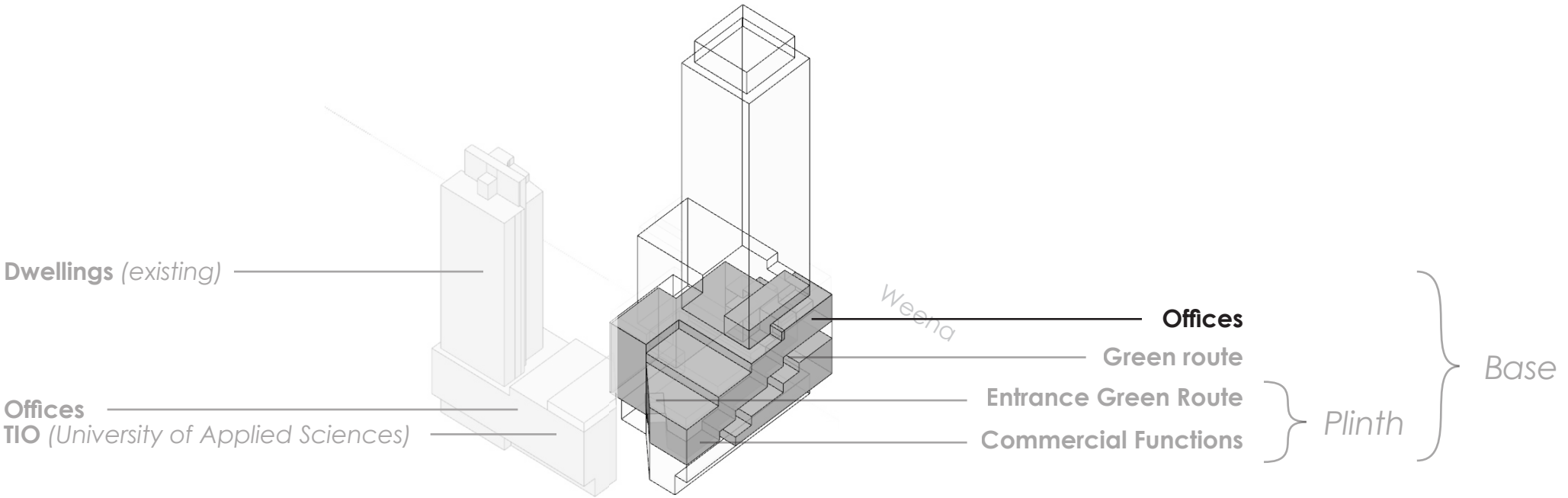
Organisation



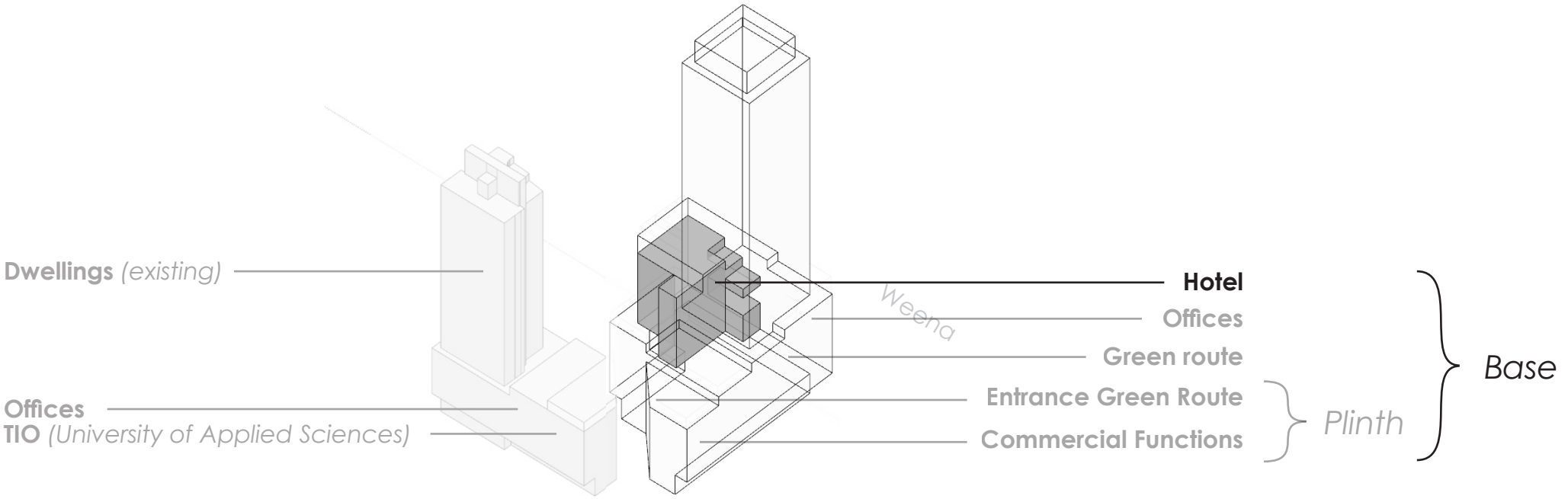
Organisation



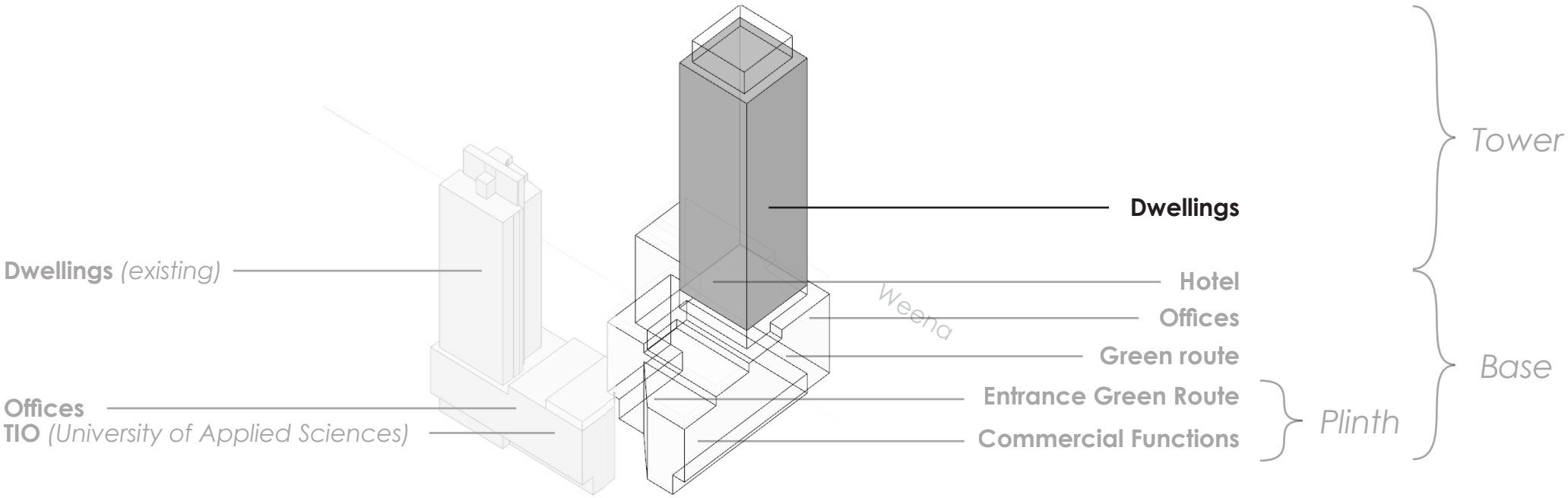
Organisation



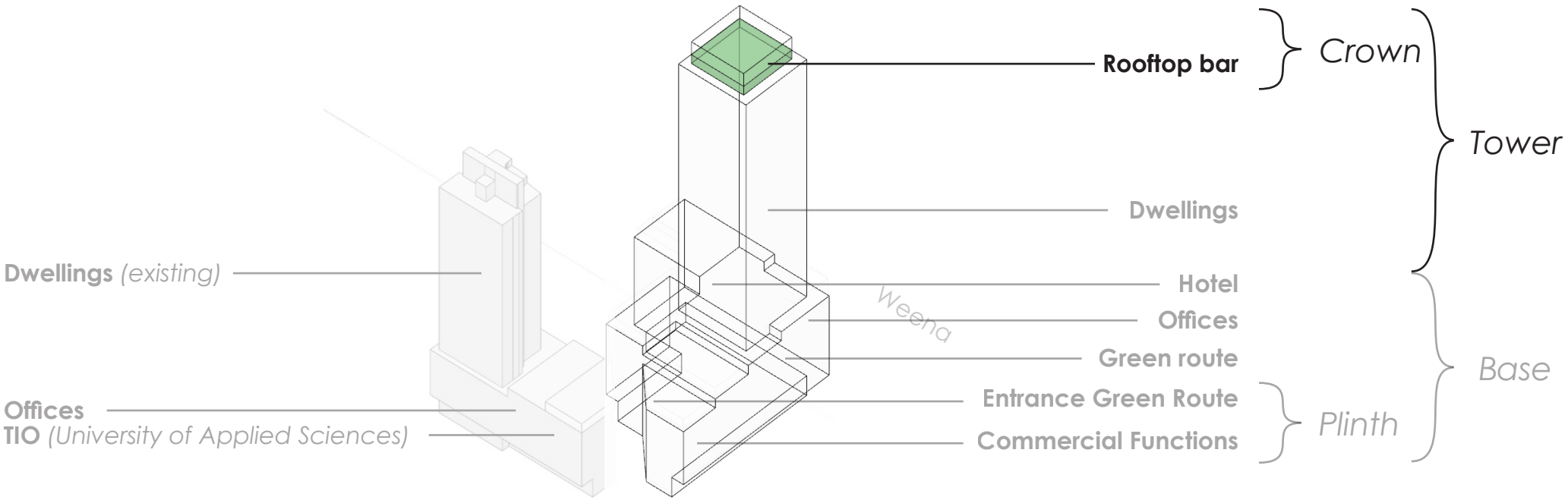
Organisation



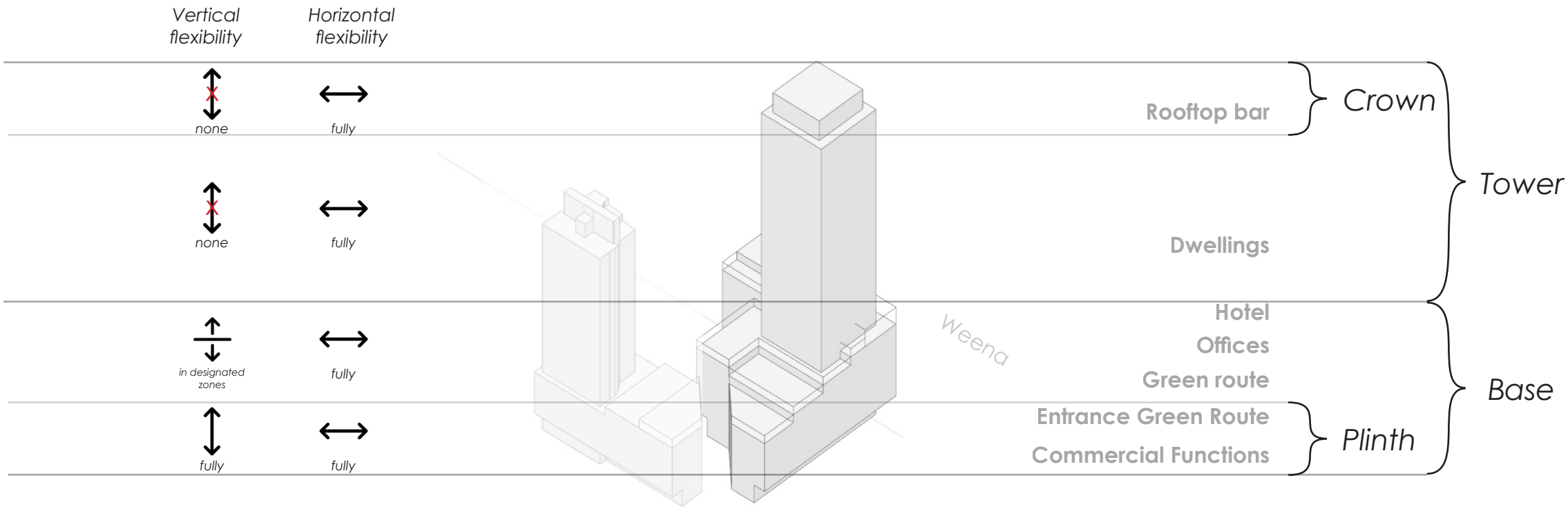
Organisation



Organisation

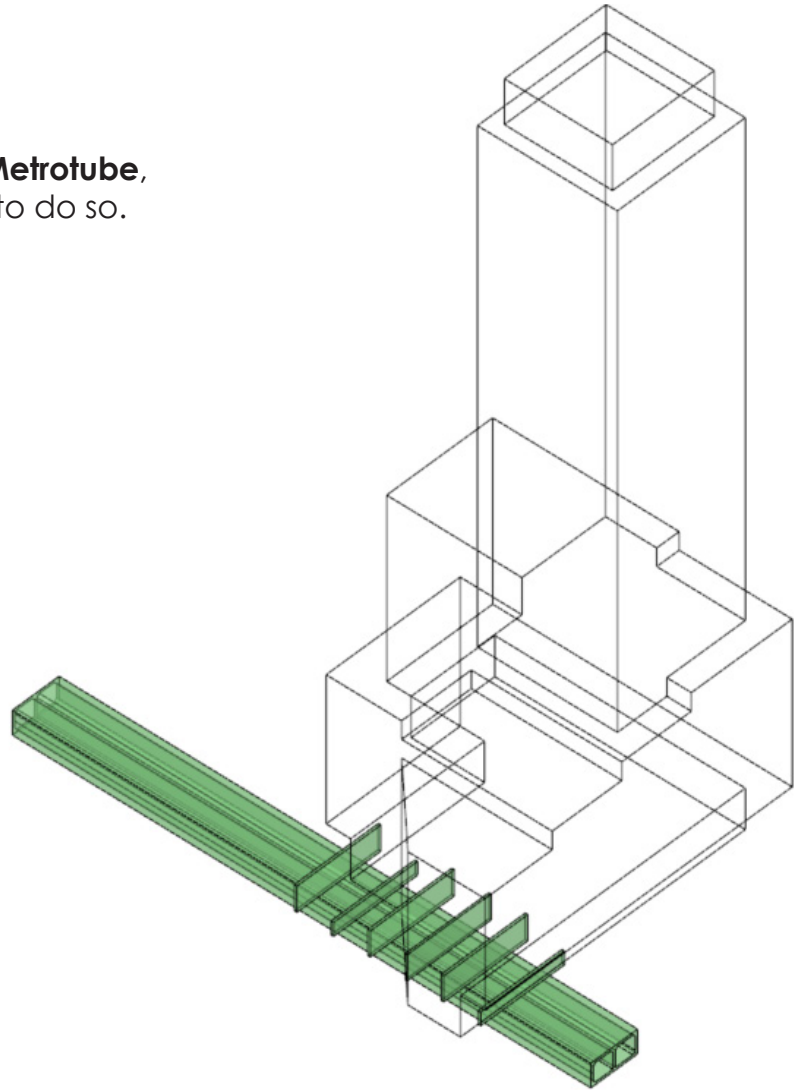


Open Building Concept: Flexibility



Structural Design

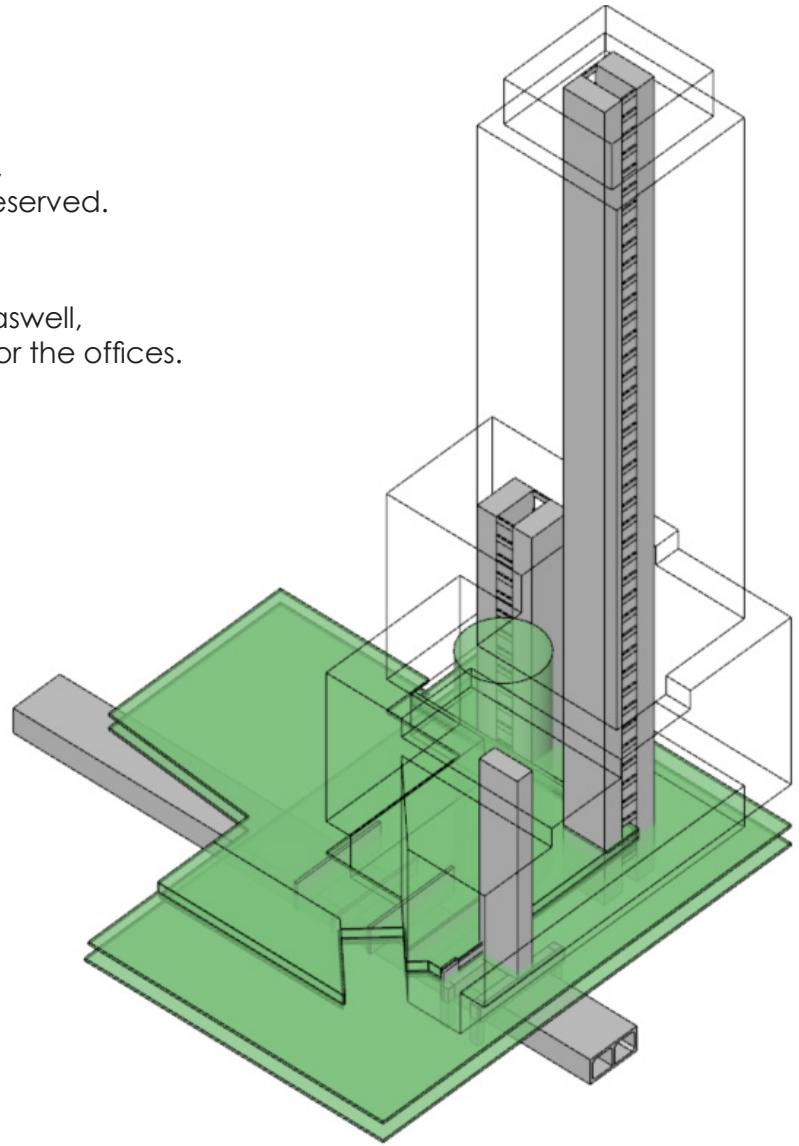
The building is placed over the existing **Metrotube**, using the existing **overpass construction** to do so.



Structural Design

The entire lower story of the **parking garage**,
and largest part of the upperstory will be preserved.

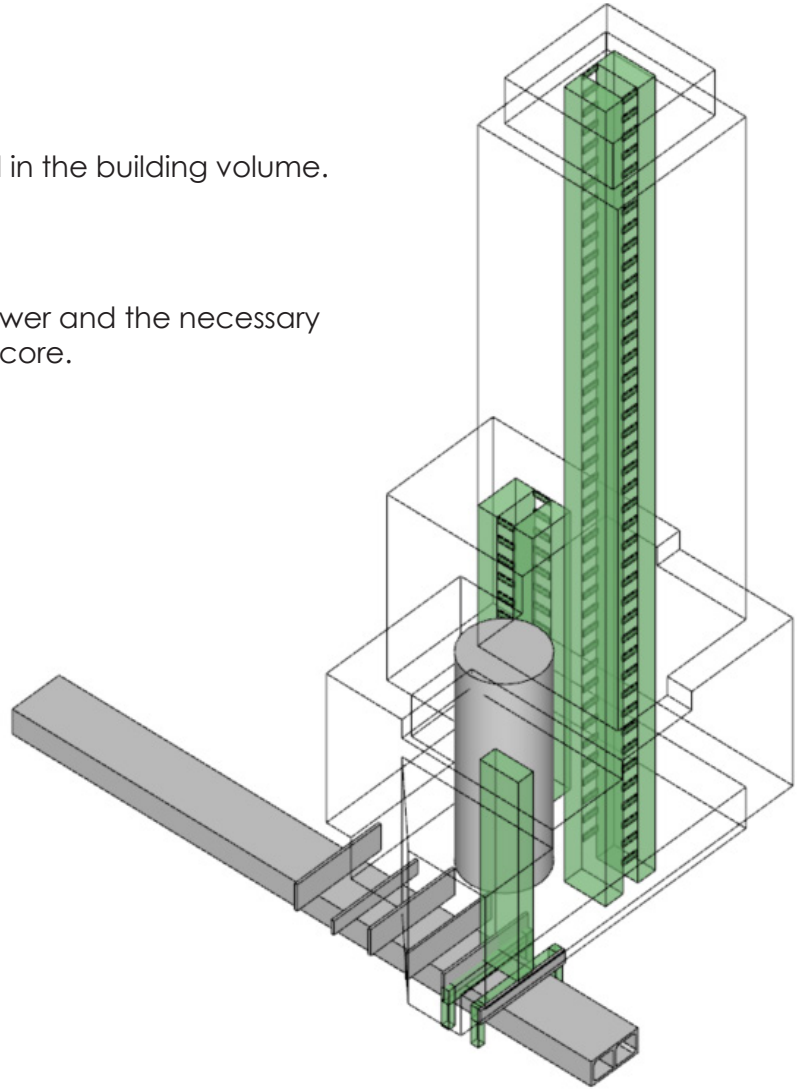
The large cylindrical core will be preserved aswell,
which includes **elevators**, **shafts** and **toilets** for the offices.



Structural Design

The building's cores are **stragetically placed** in the building volume.

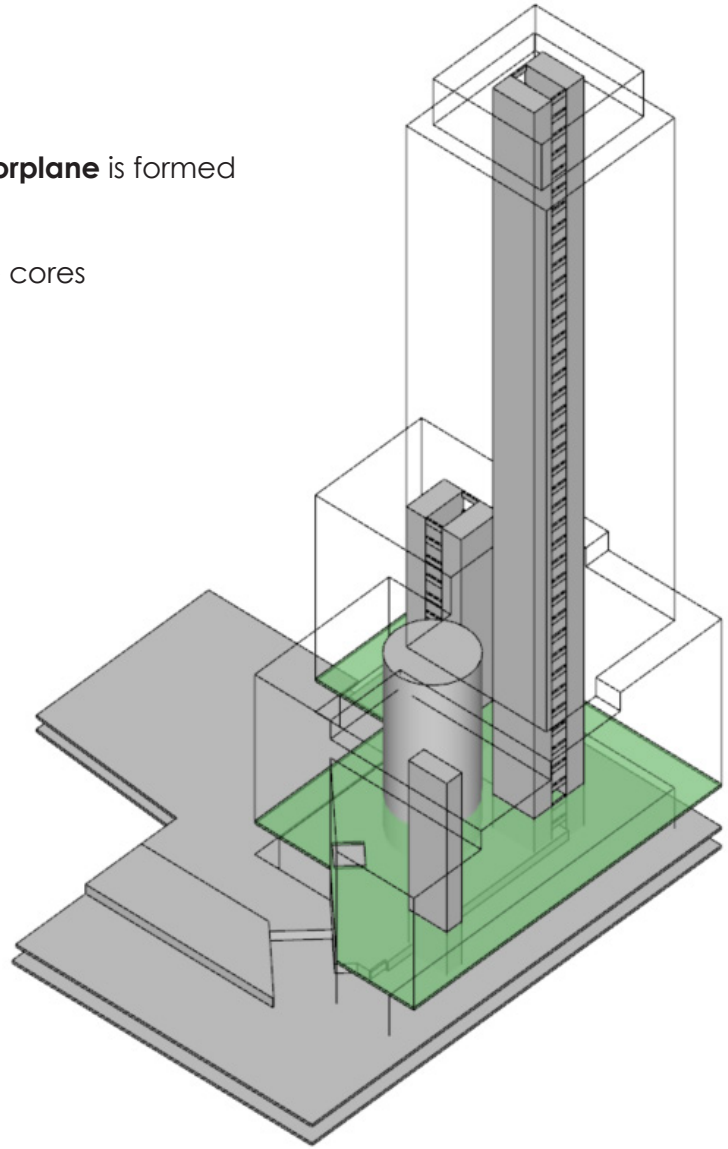
Adopting the **centercore** principle for the tower and the necessary **overpass construction** for the most northern core.



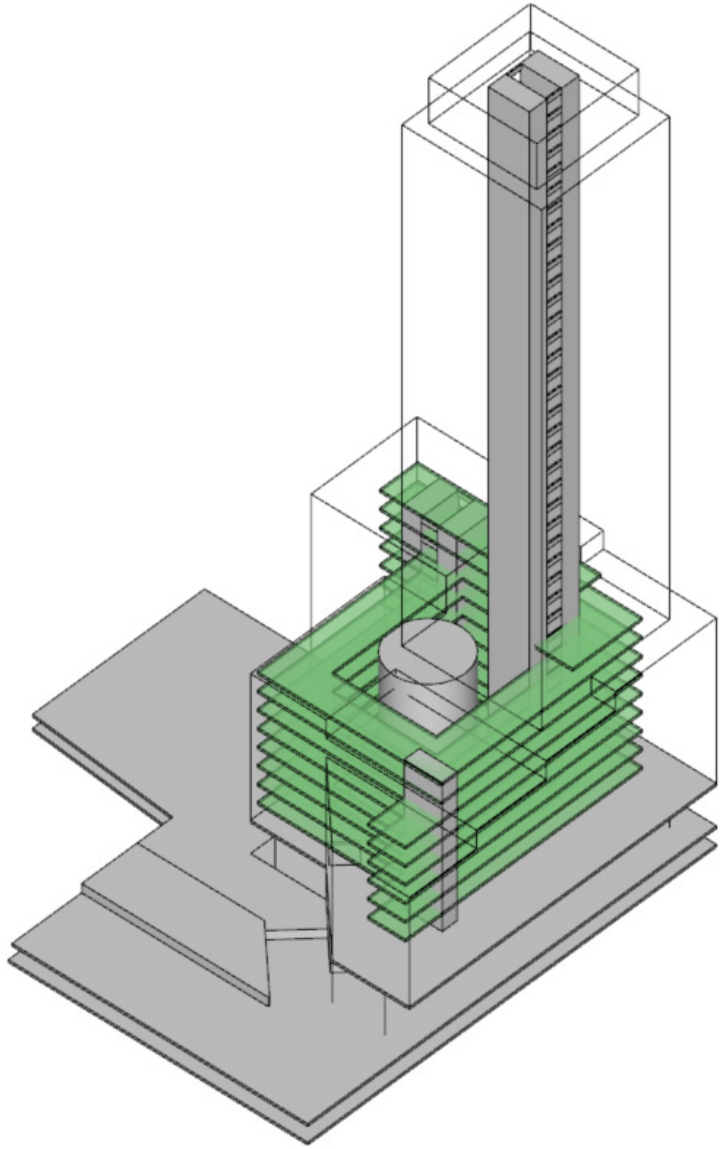
Structural Design

On top of the building's plinth, one large **rigid floorplane** is formed by utilizing Hybrid CLT-Concrete floorslabs.

Transfering latheral forces from the facade to the cores in the bottom-part of the building.

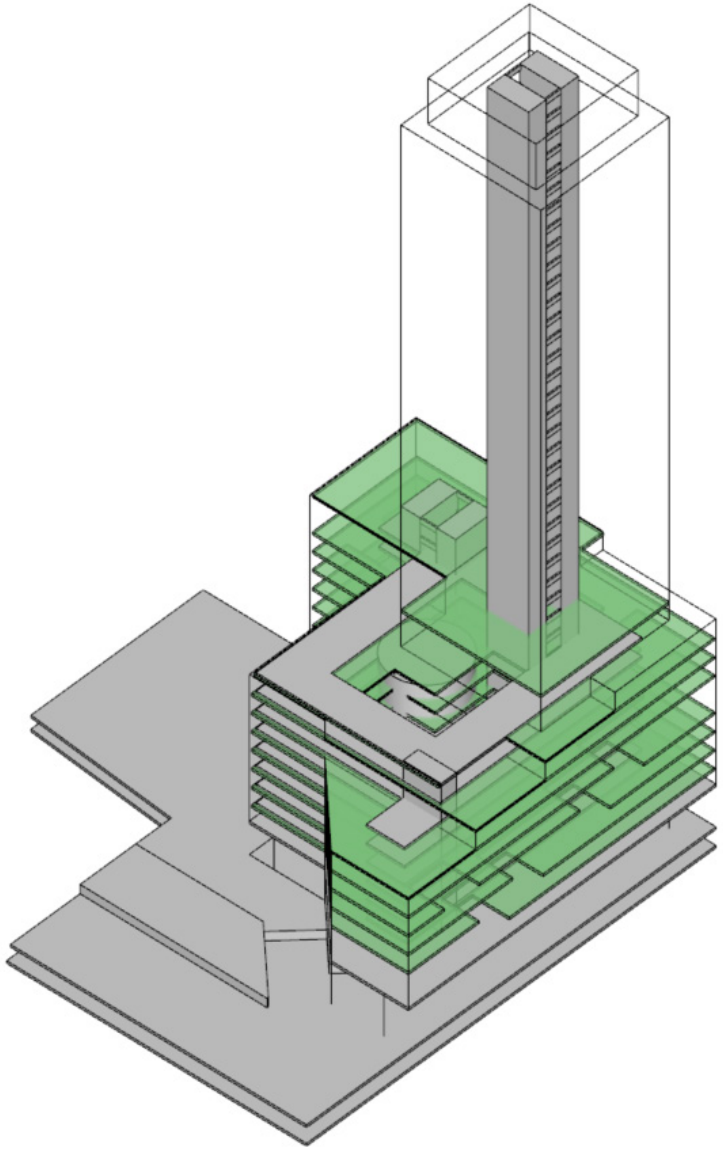


Structural Design



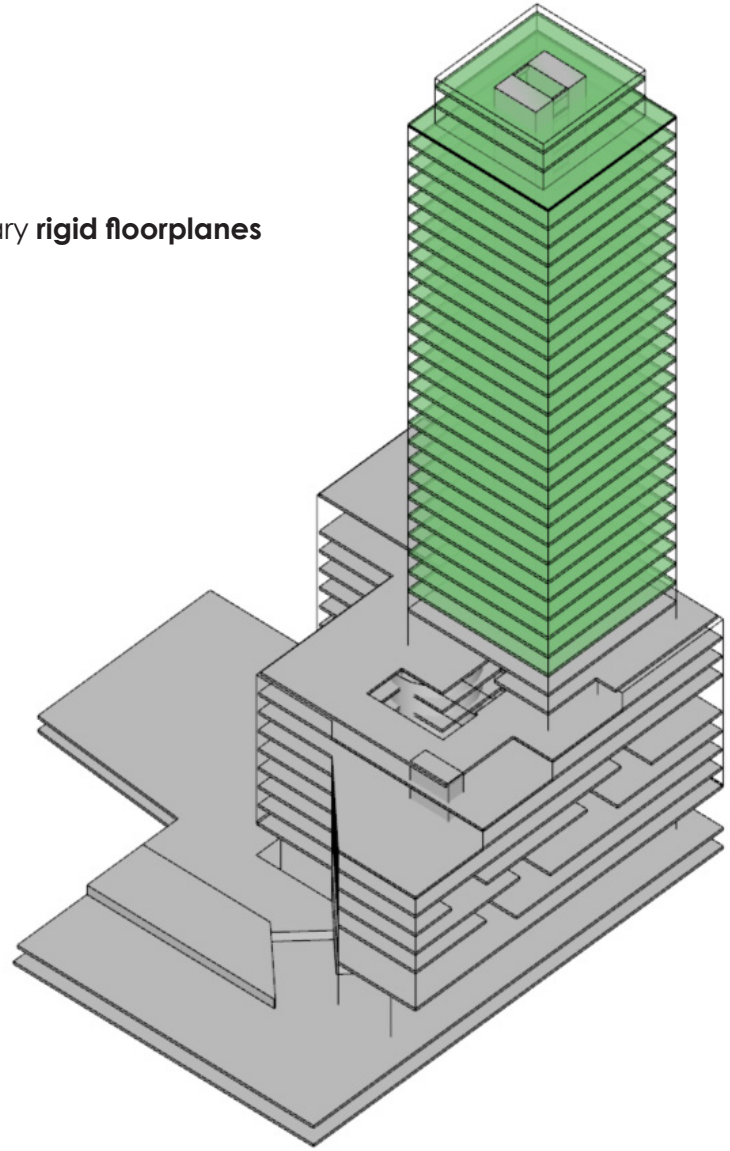
Structural Design

Removable CLT floors in the designated zones

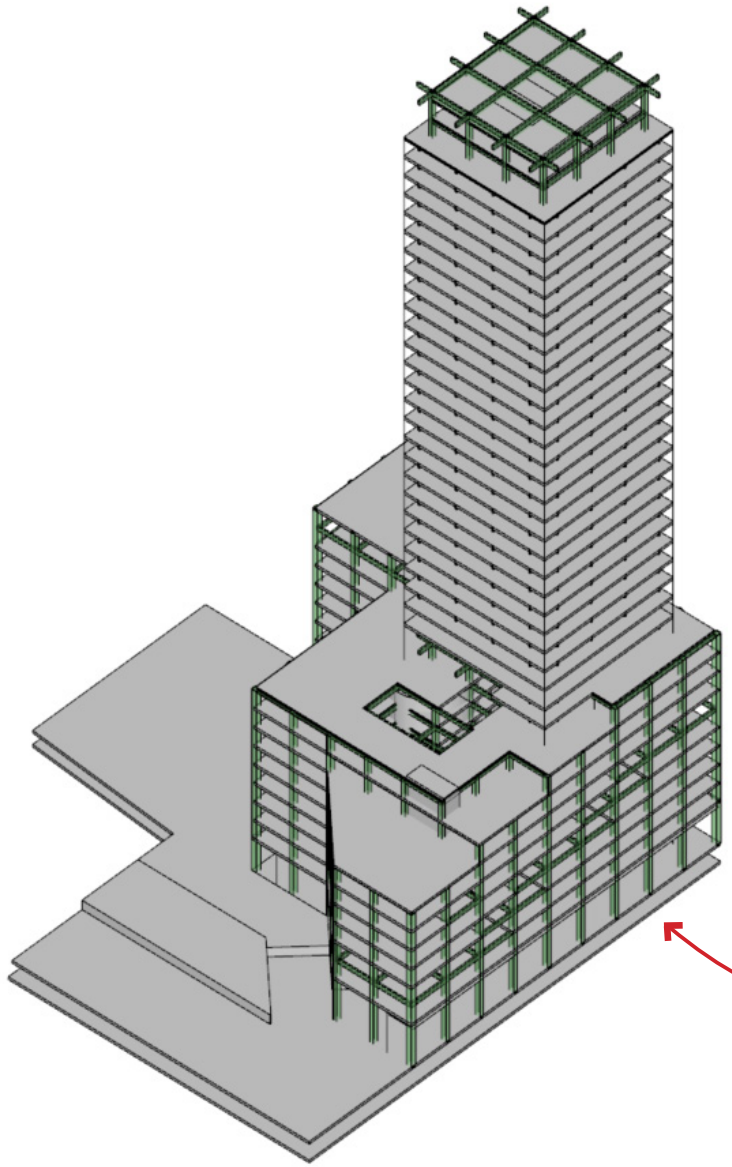


Structural Design

The Hybrid CLT-Concrete floorslabs.
are also placed in the tower forming the necessary **rigid floorplanes**

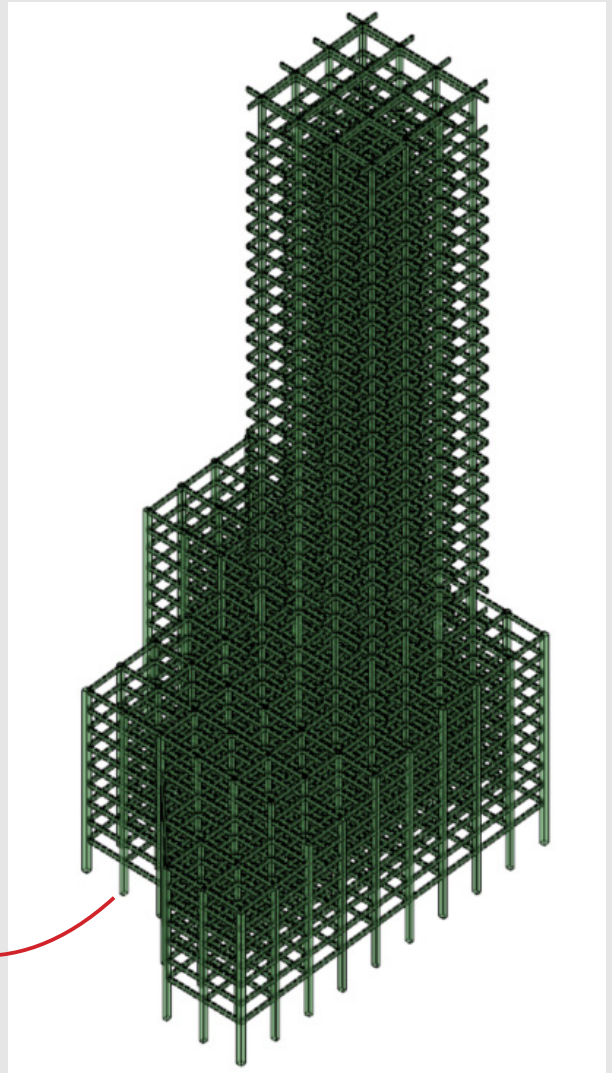


Structural Design

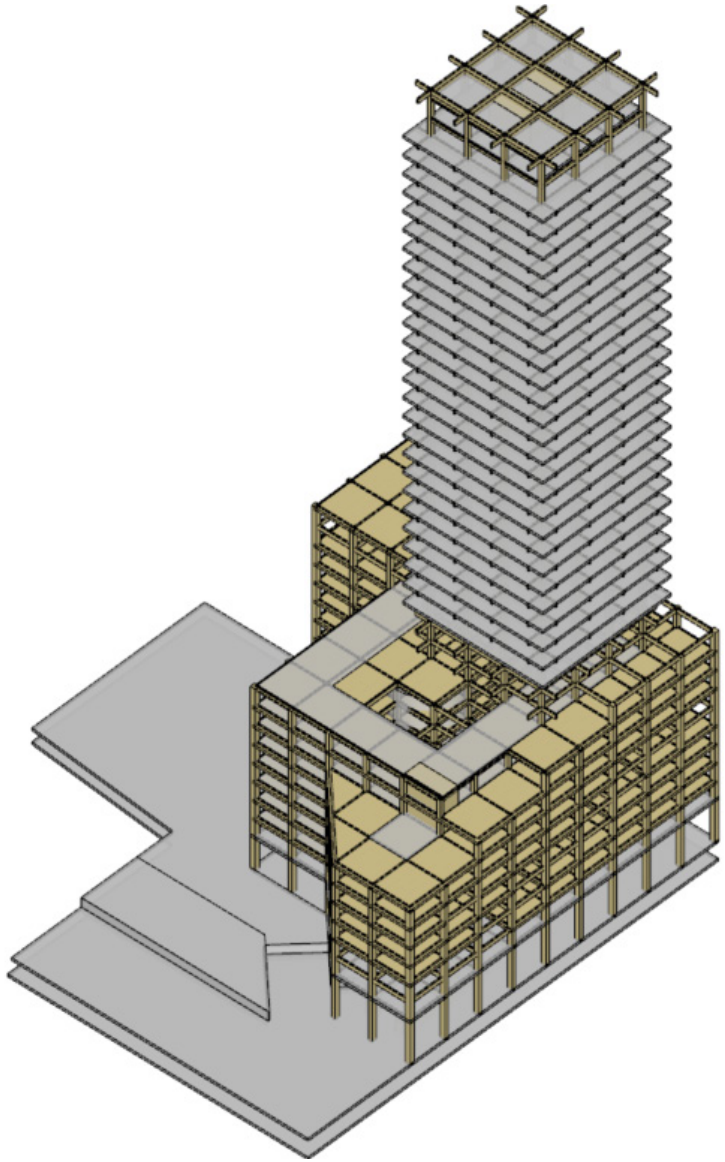


WoodPecker

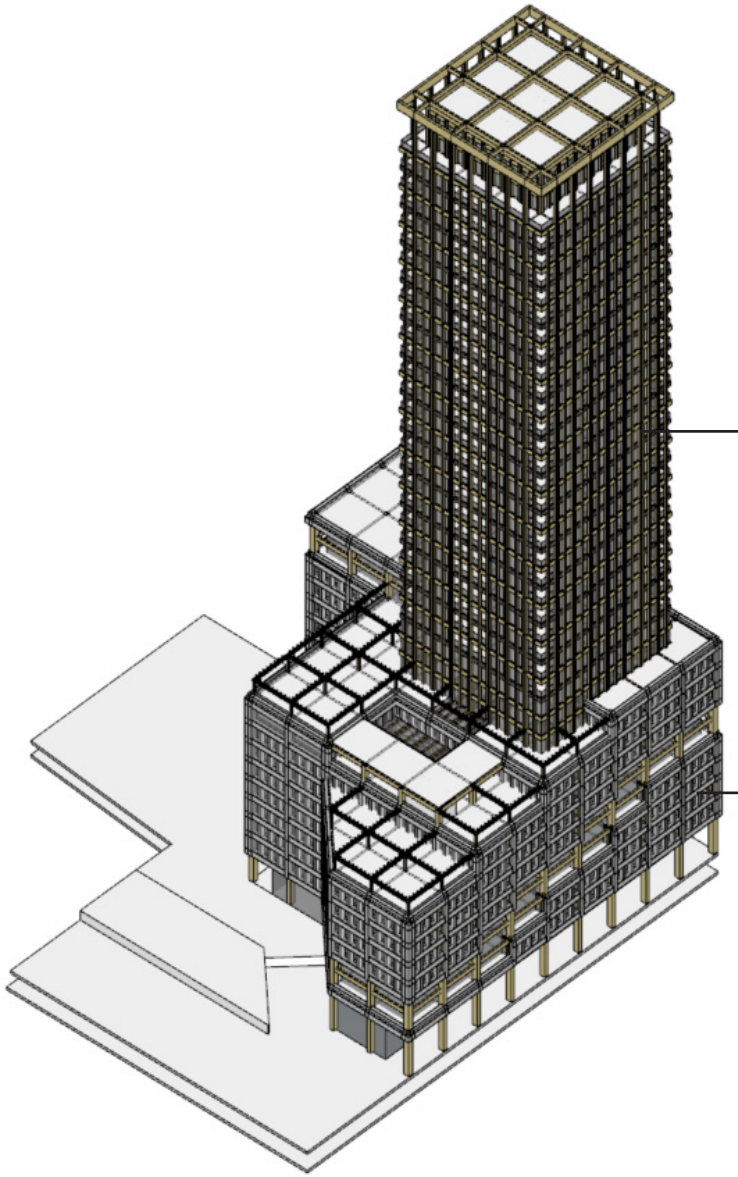
Parametric Design Tool for Timber-based High-rise Buildings



Structural Design



Facade Design

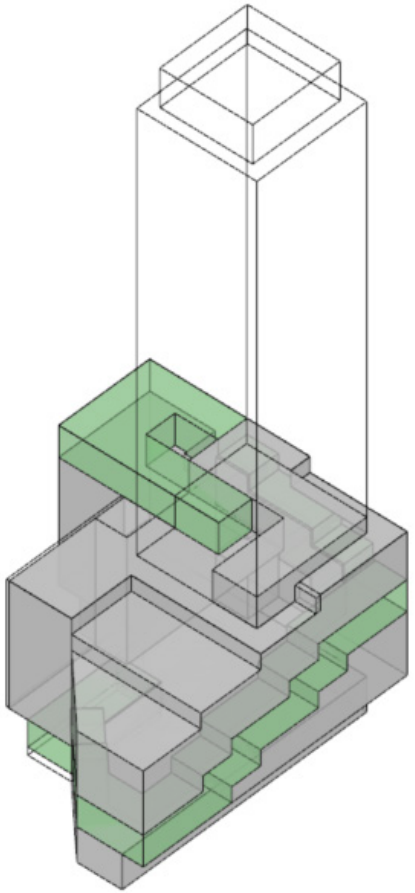


Timber cladding

Reused Natrual Stone

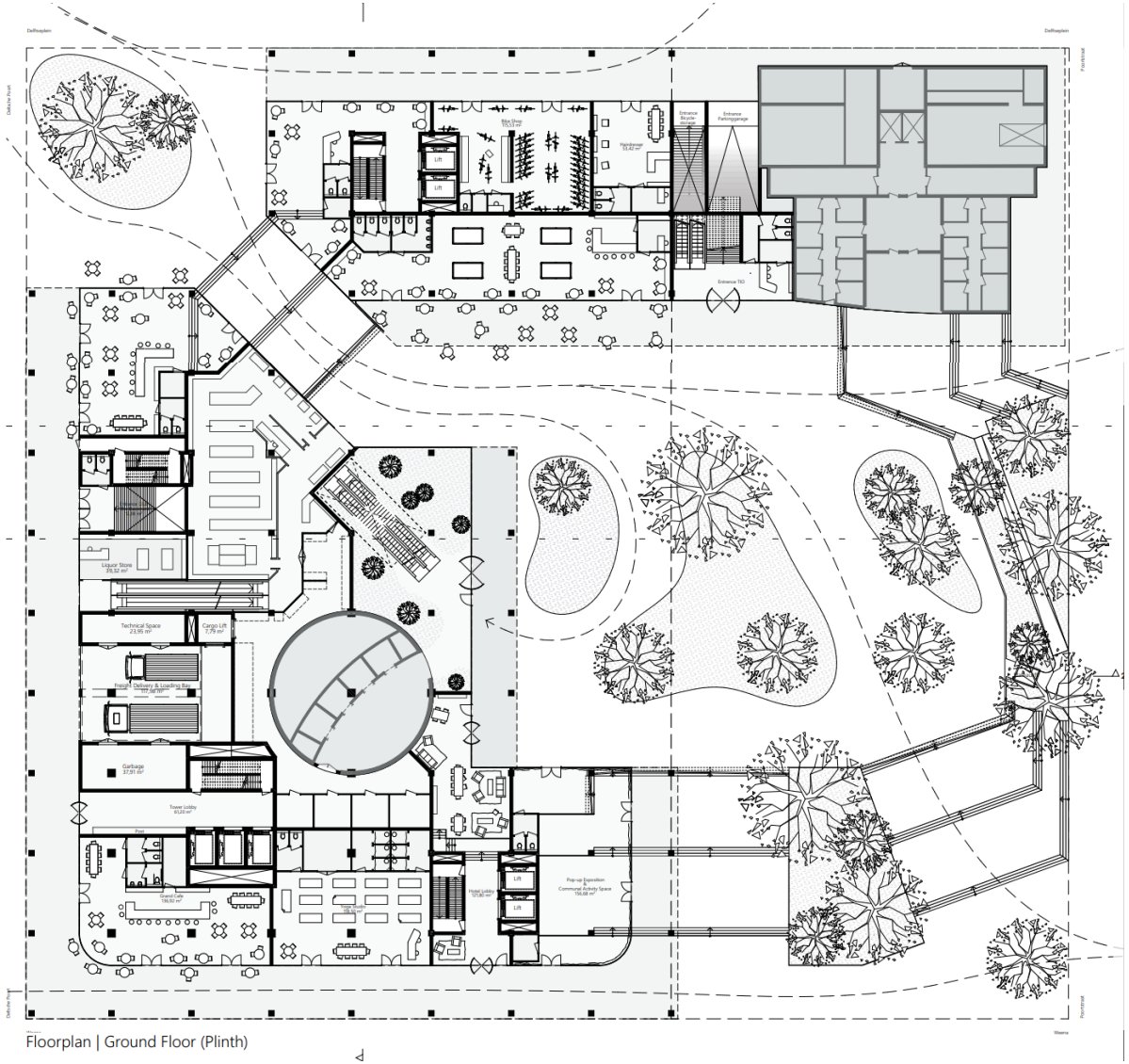
Design

Floorplans, Fragments & Sections

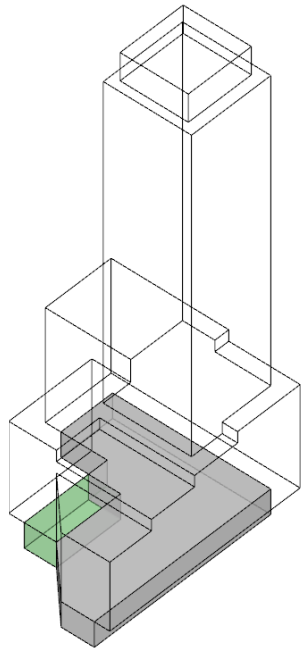


Base

Organisation | Ground Floor (Plinth)



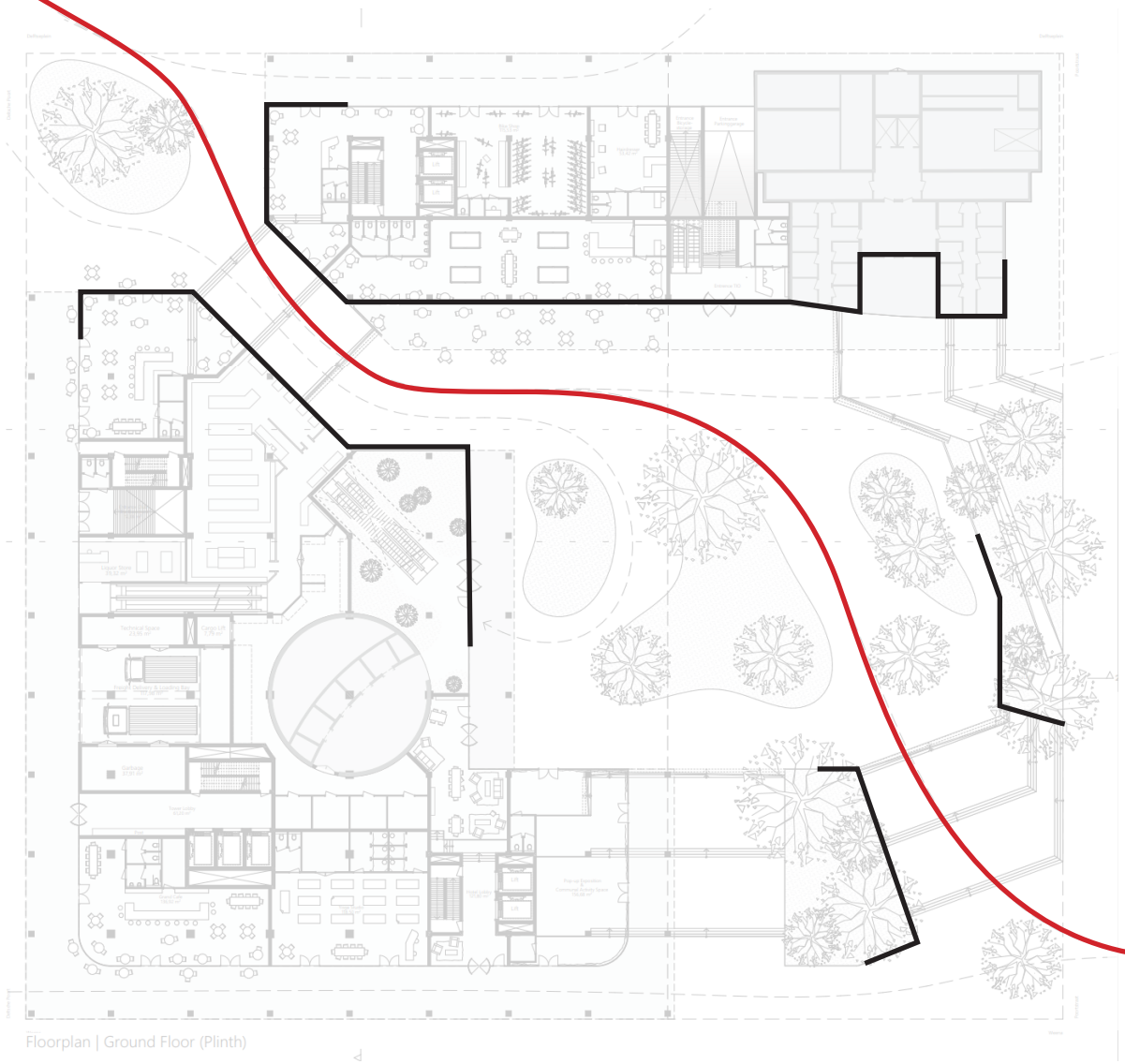
Floorplan | Ground Floor (Plinth)



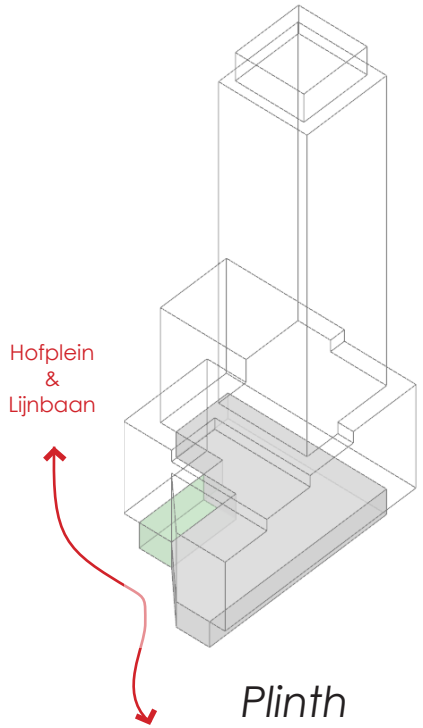
Plinth

Organisation | Ground Floor (Plinth)

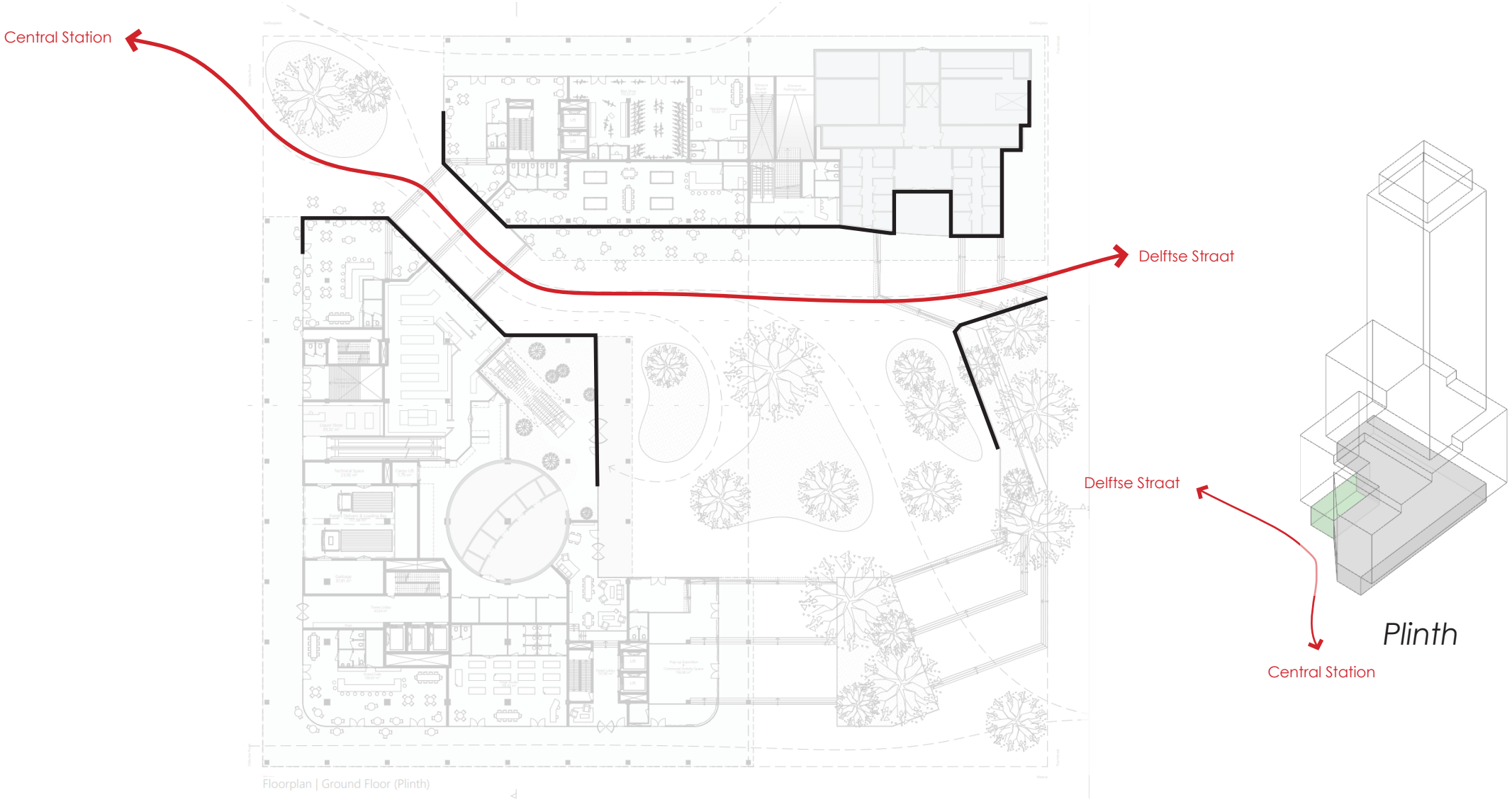
Central Station



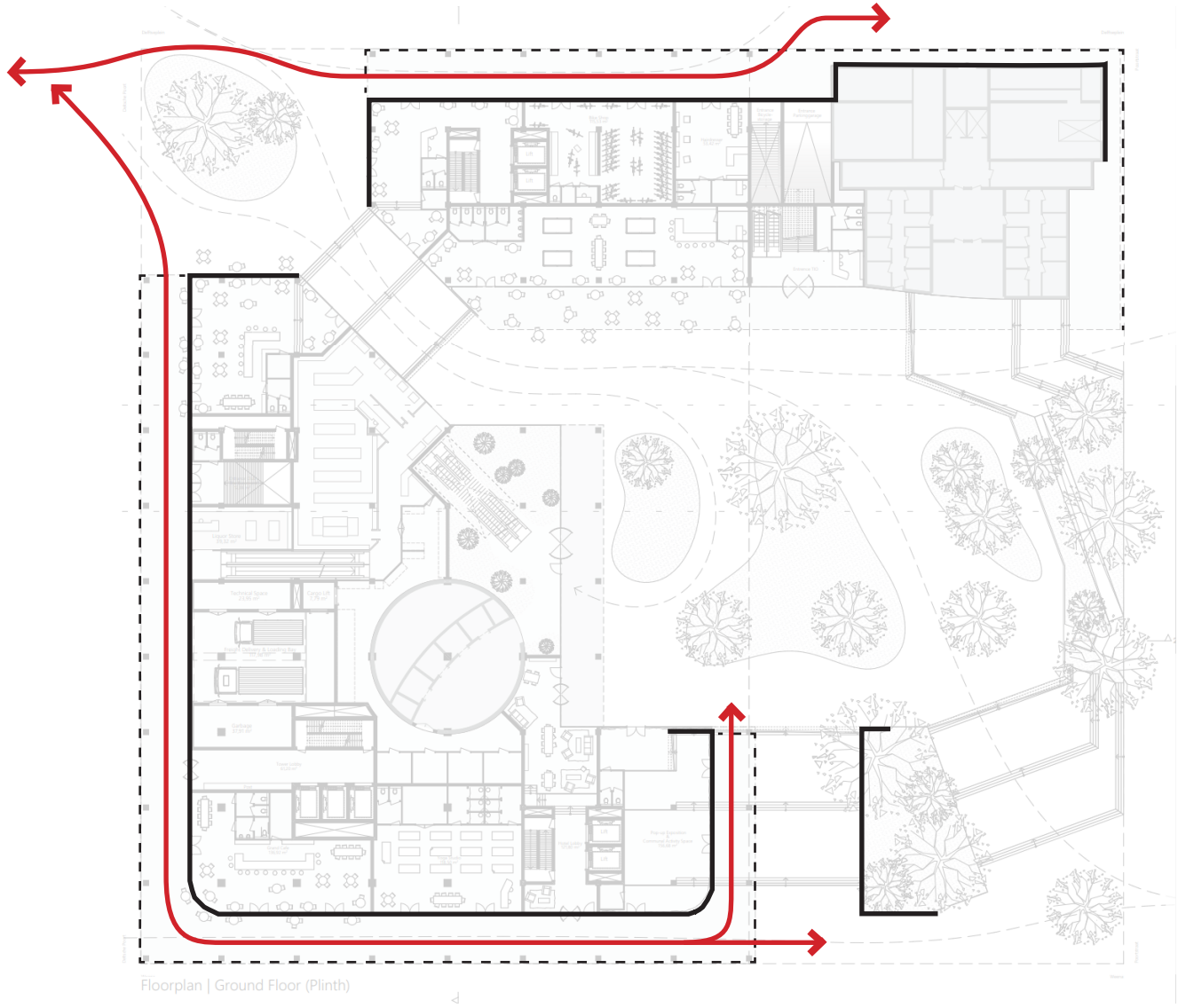
Hofplein
&
Lijnbaan

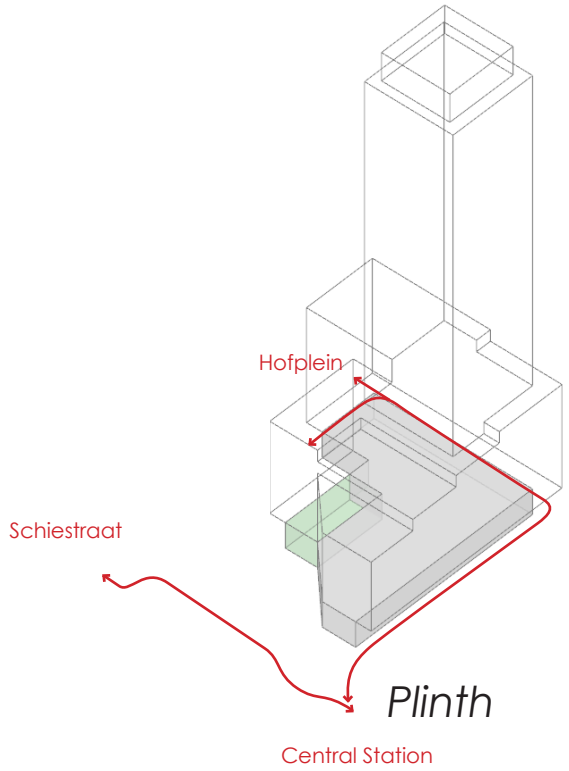


Organisation | Ground Floor (Plinth)

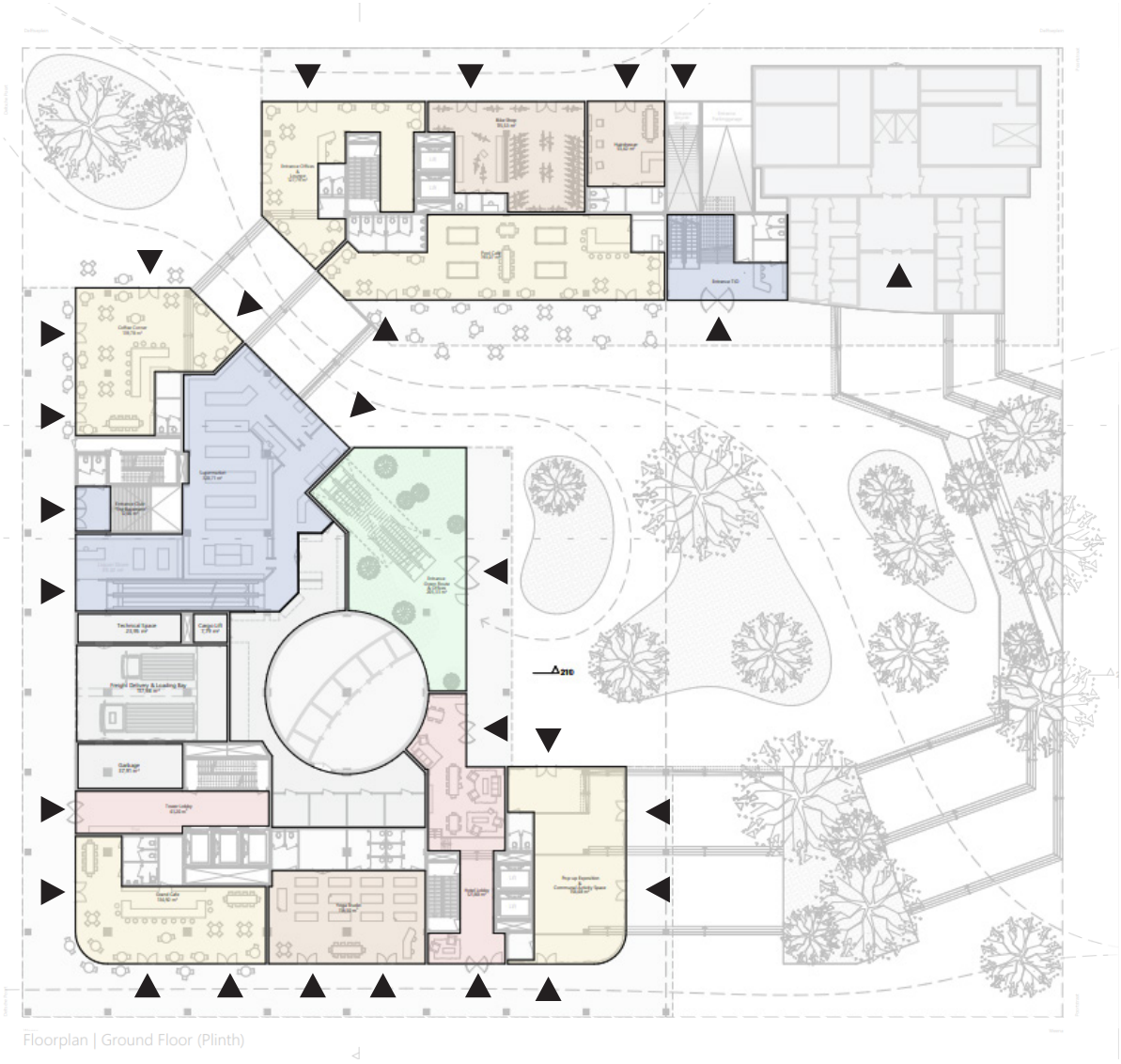


Organisation | Ground Floor (Plinth)

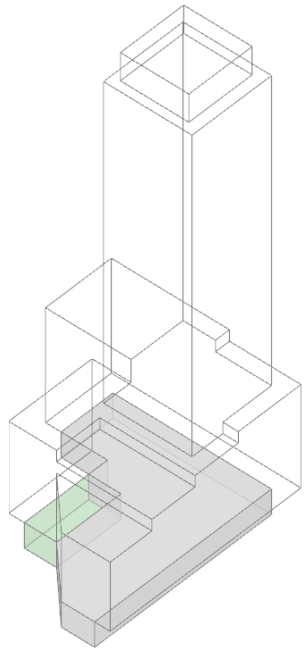




Program | Ground Floor (Plinth)

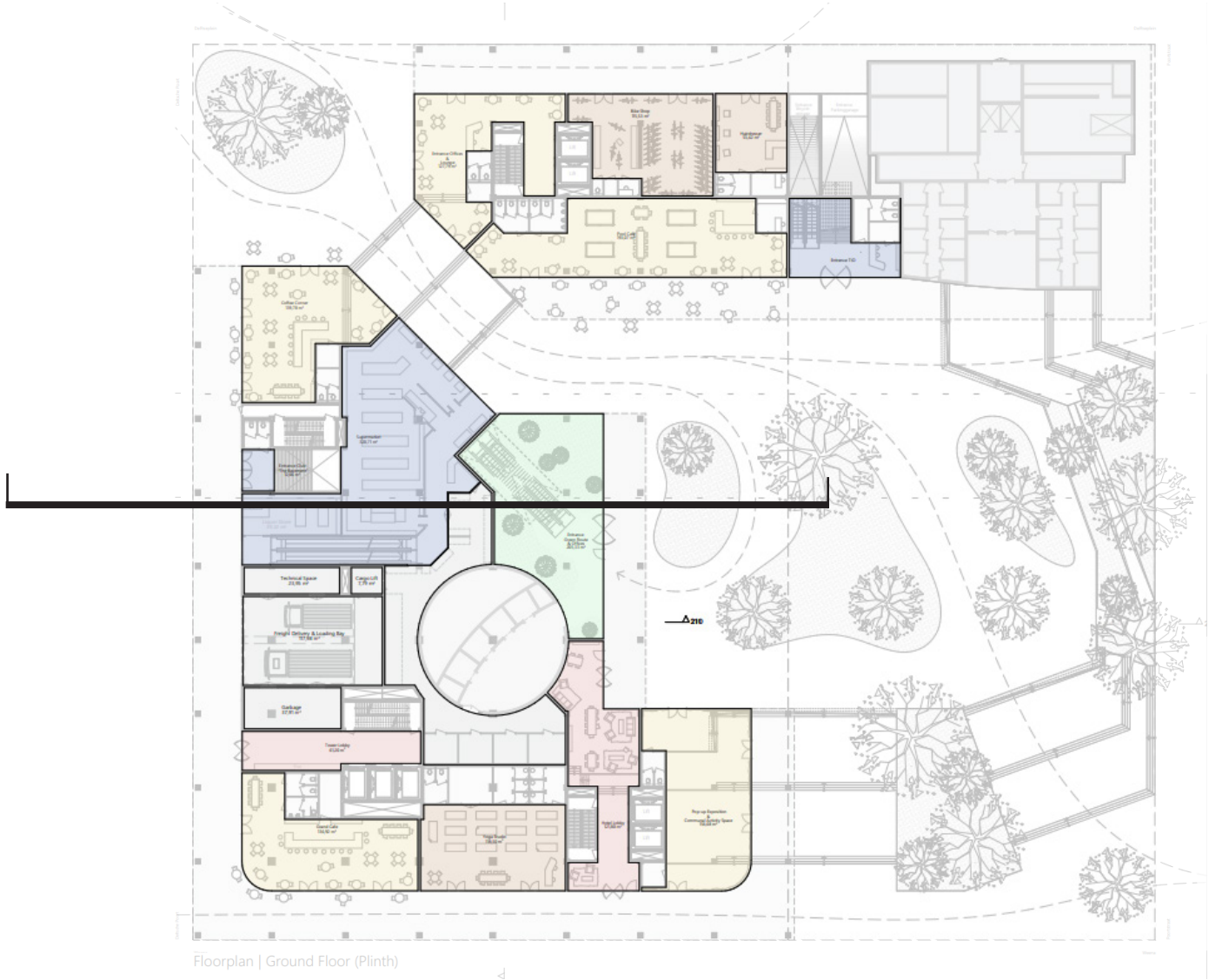


Floorplan | Ground Floor (Plinth)

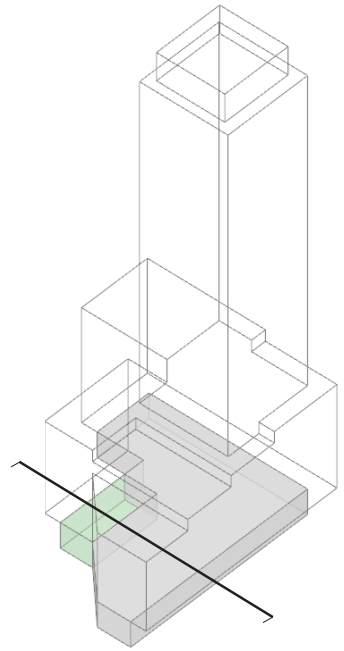


Plinth

Program | Ground Floor (Plinth)

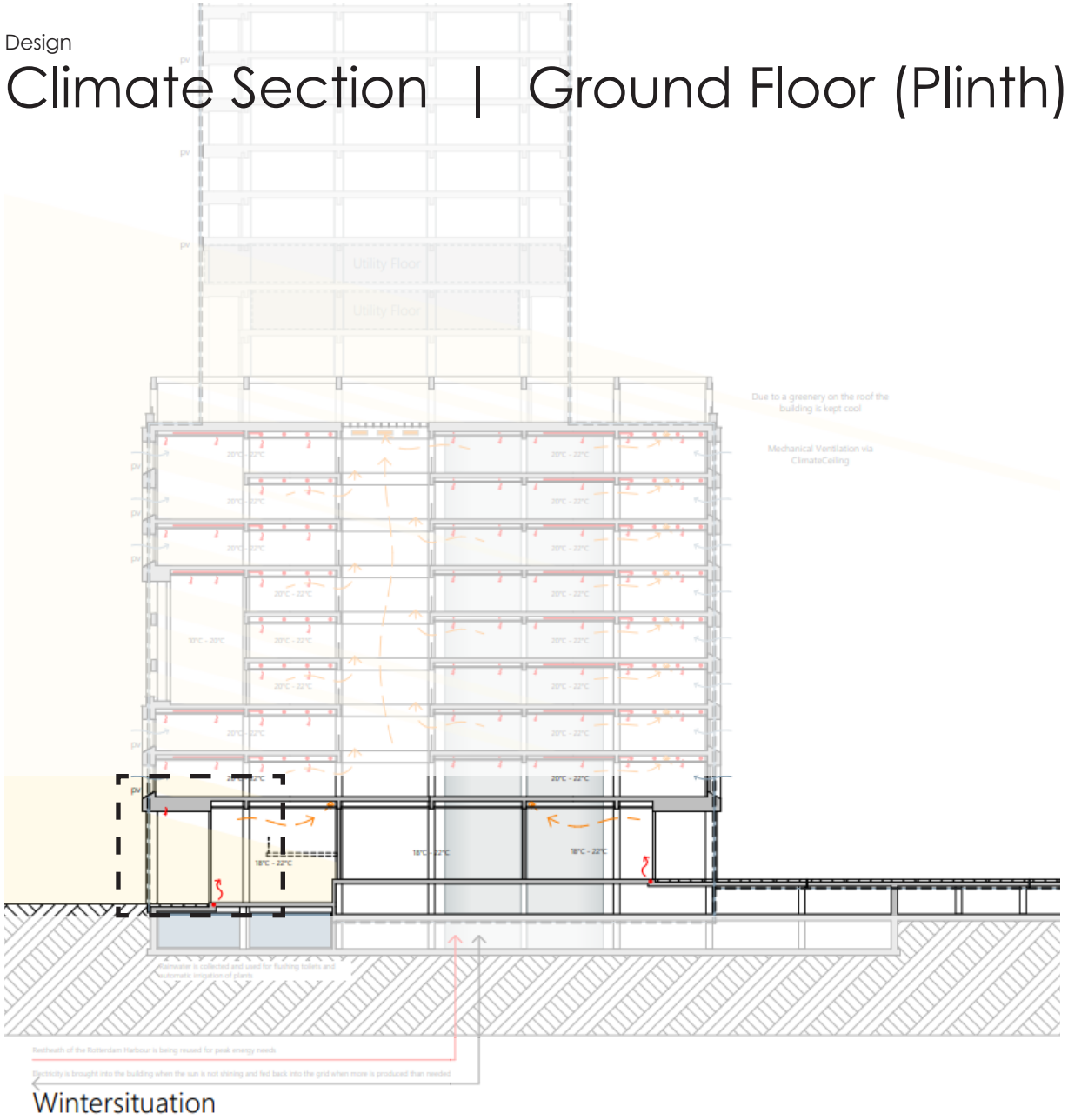


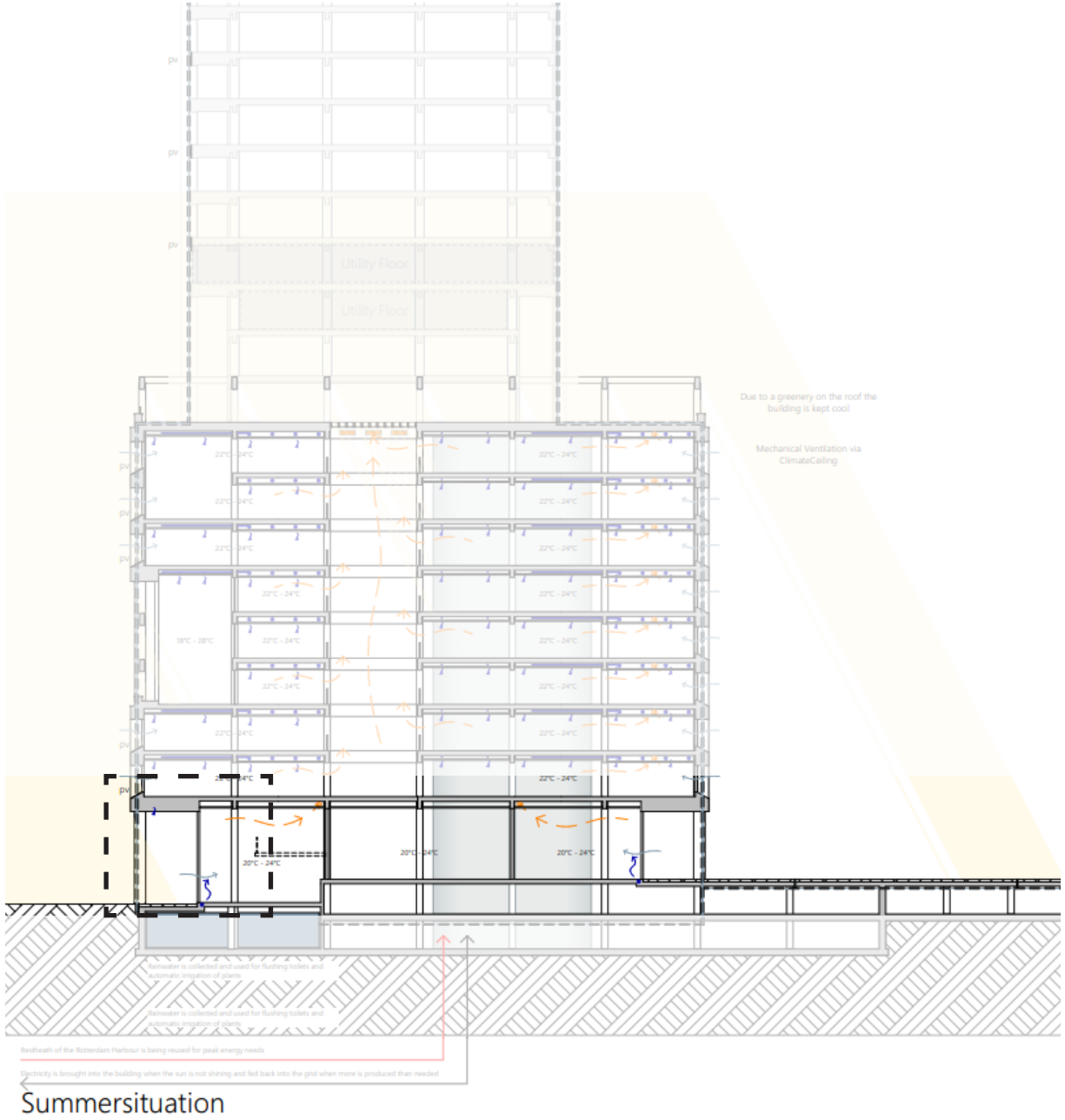
Floorplan | Ground Floor (Plinth)



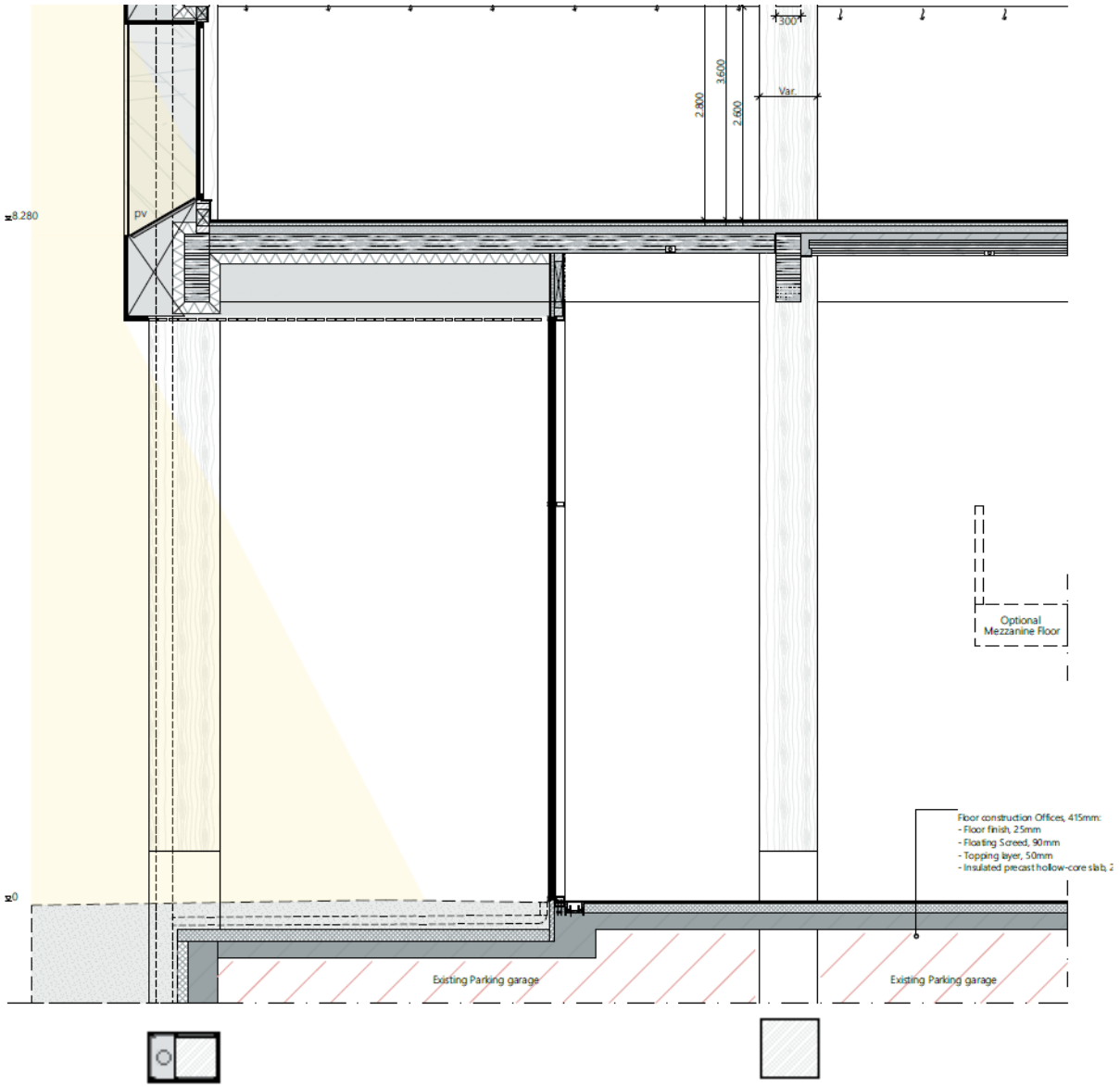
Plinth

Climate Section | Ground Floor (Plinth)

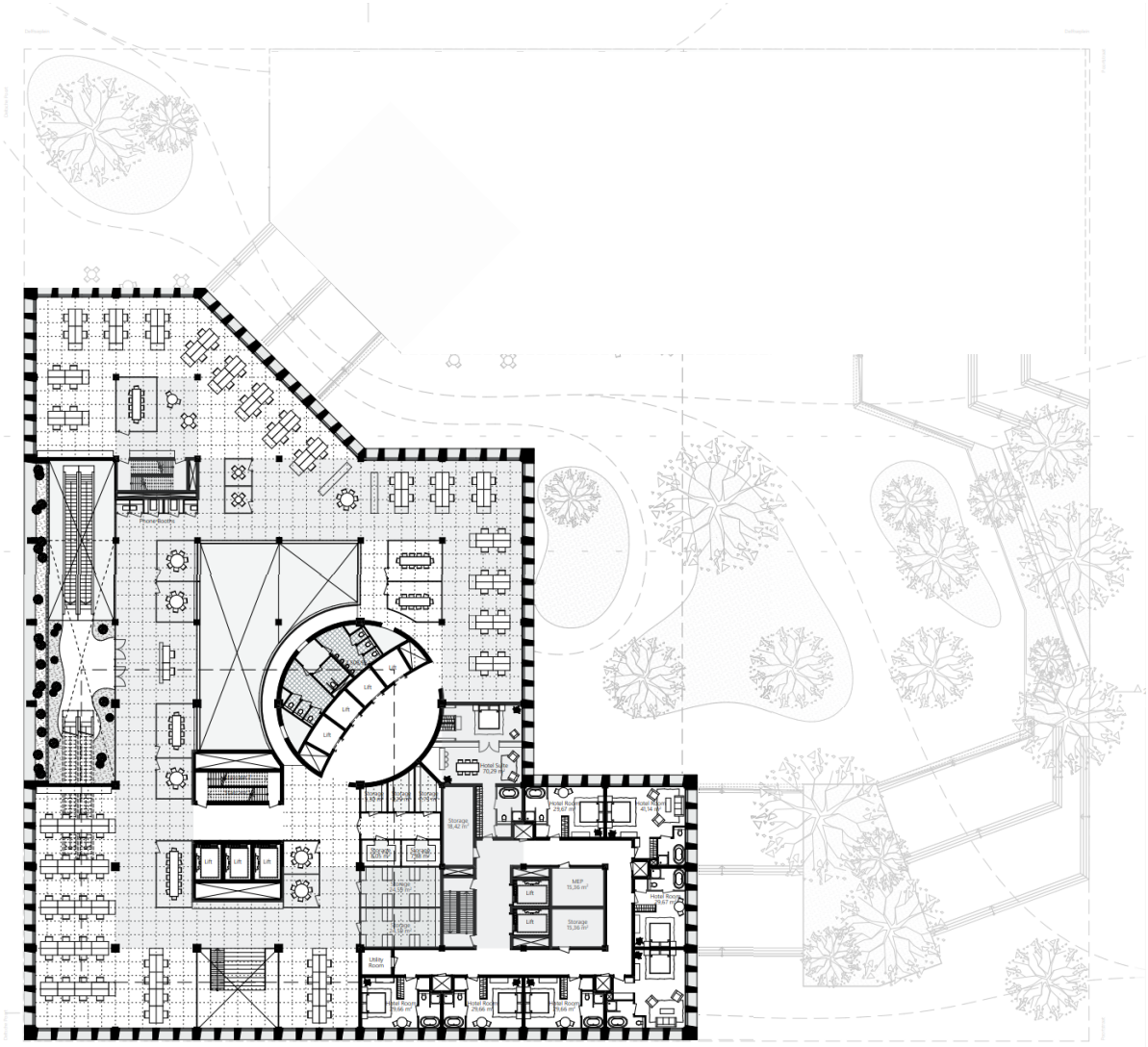


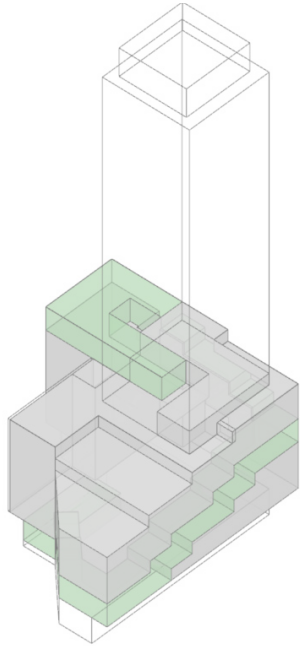


Fragment | Ground Floor (Plinth)



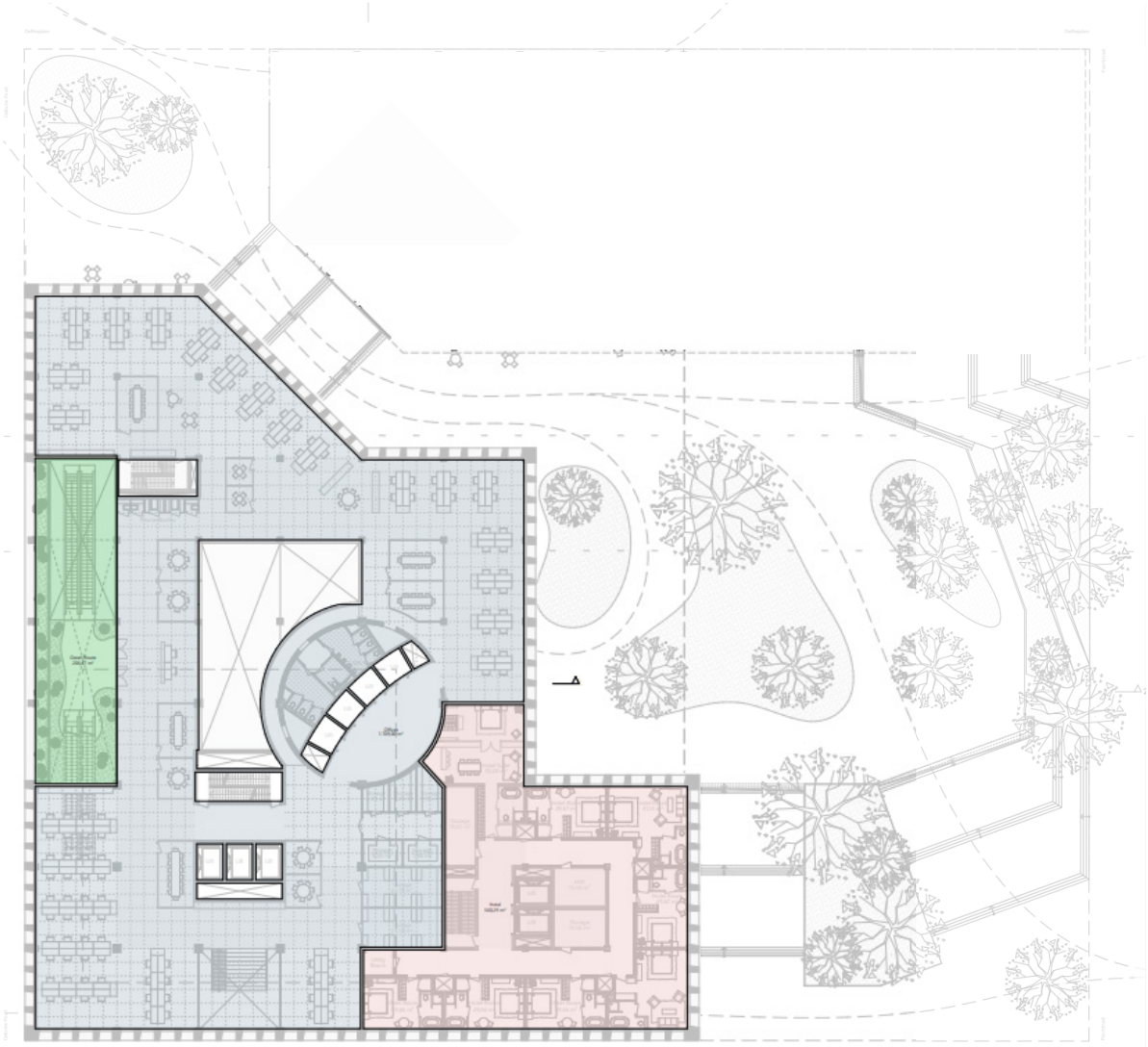
Organisation | 5th Floor (Base)

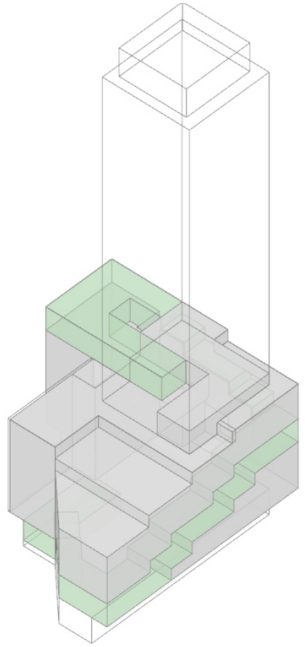




Base

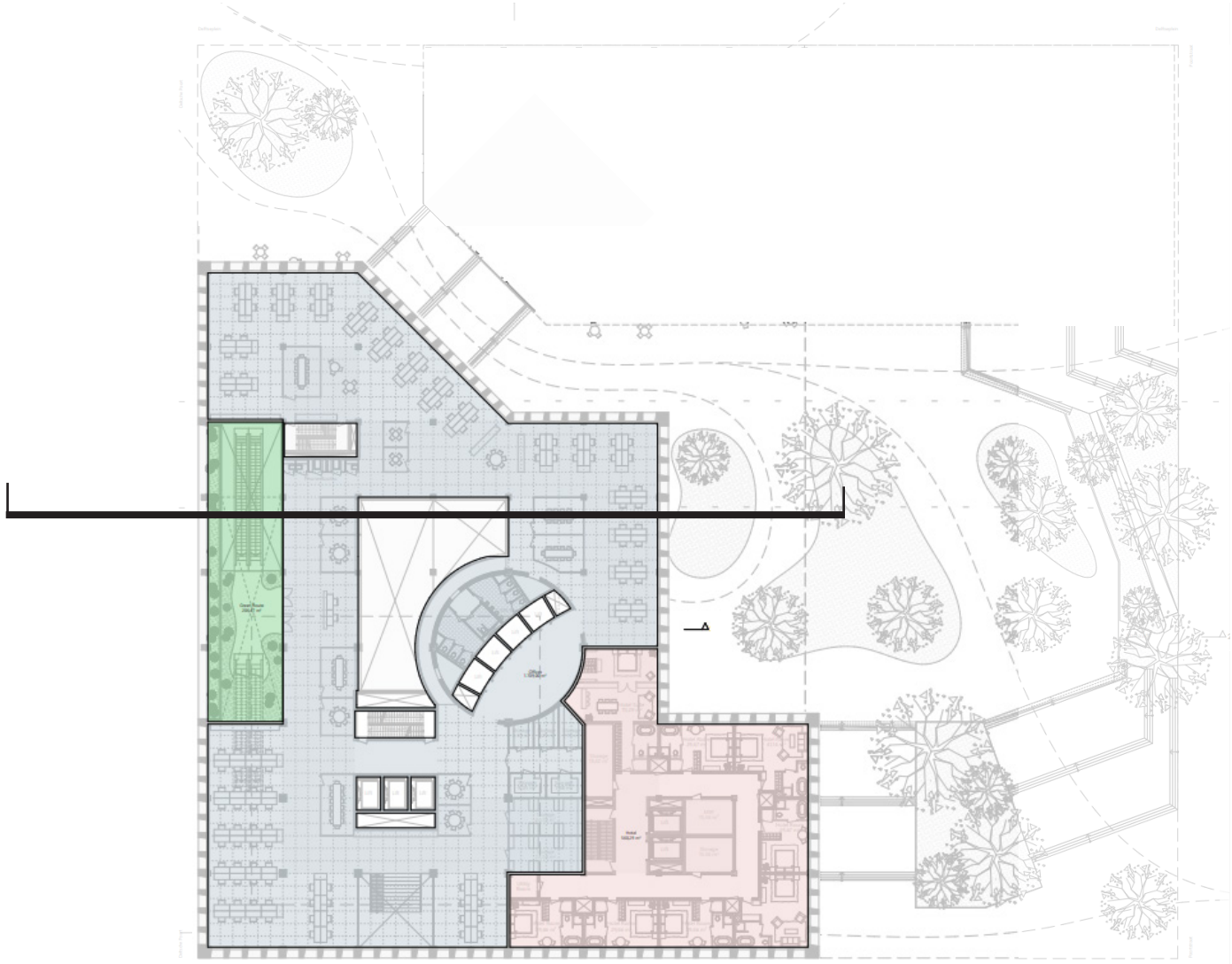
Program | 5th Floor (Base)

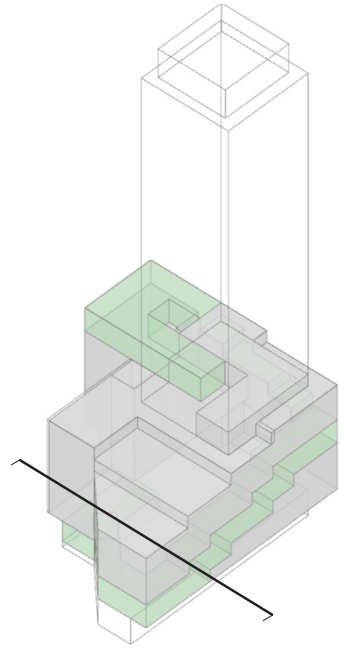




Base

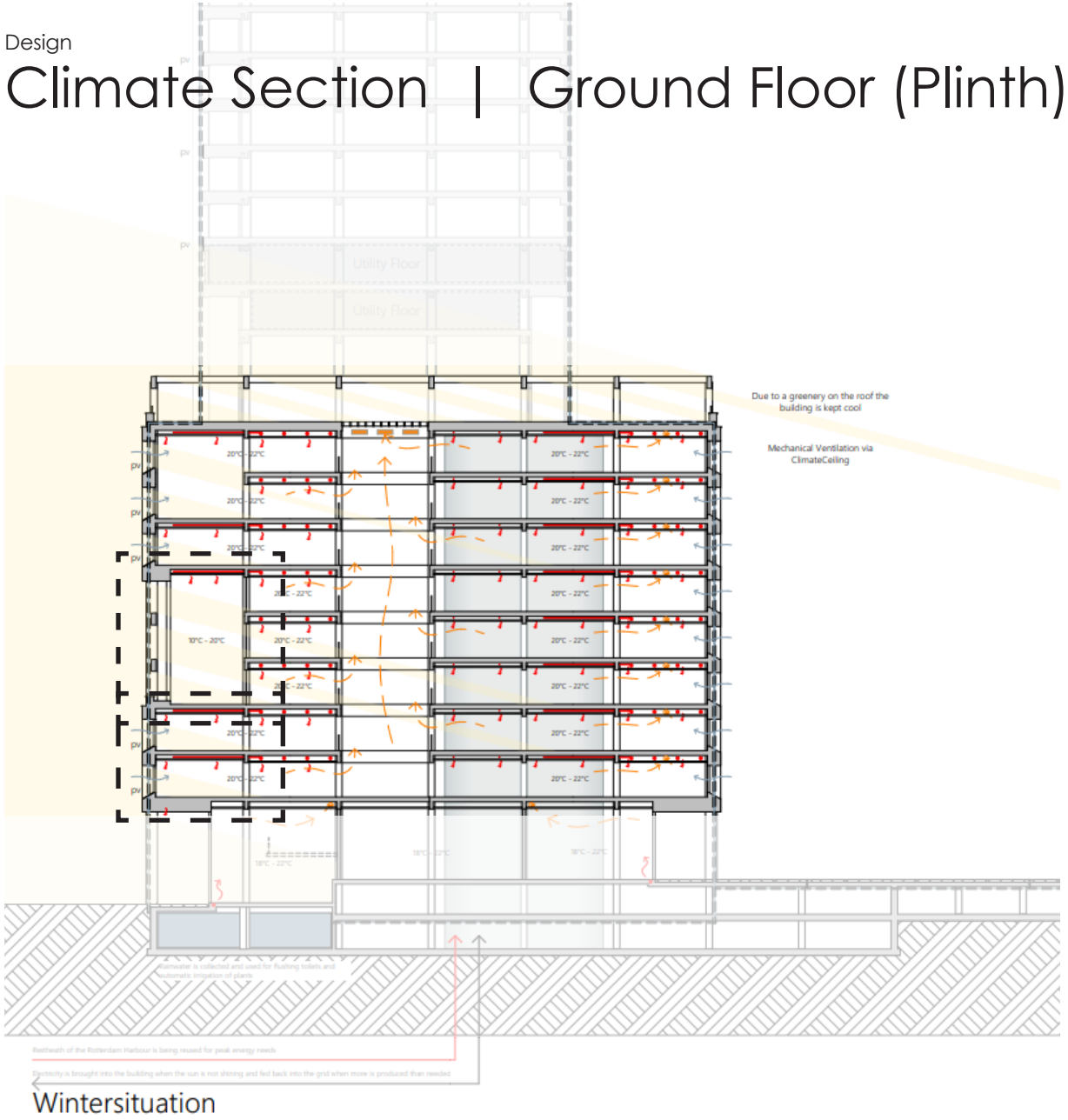
Program | 5th Floor (Base)

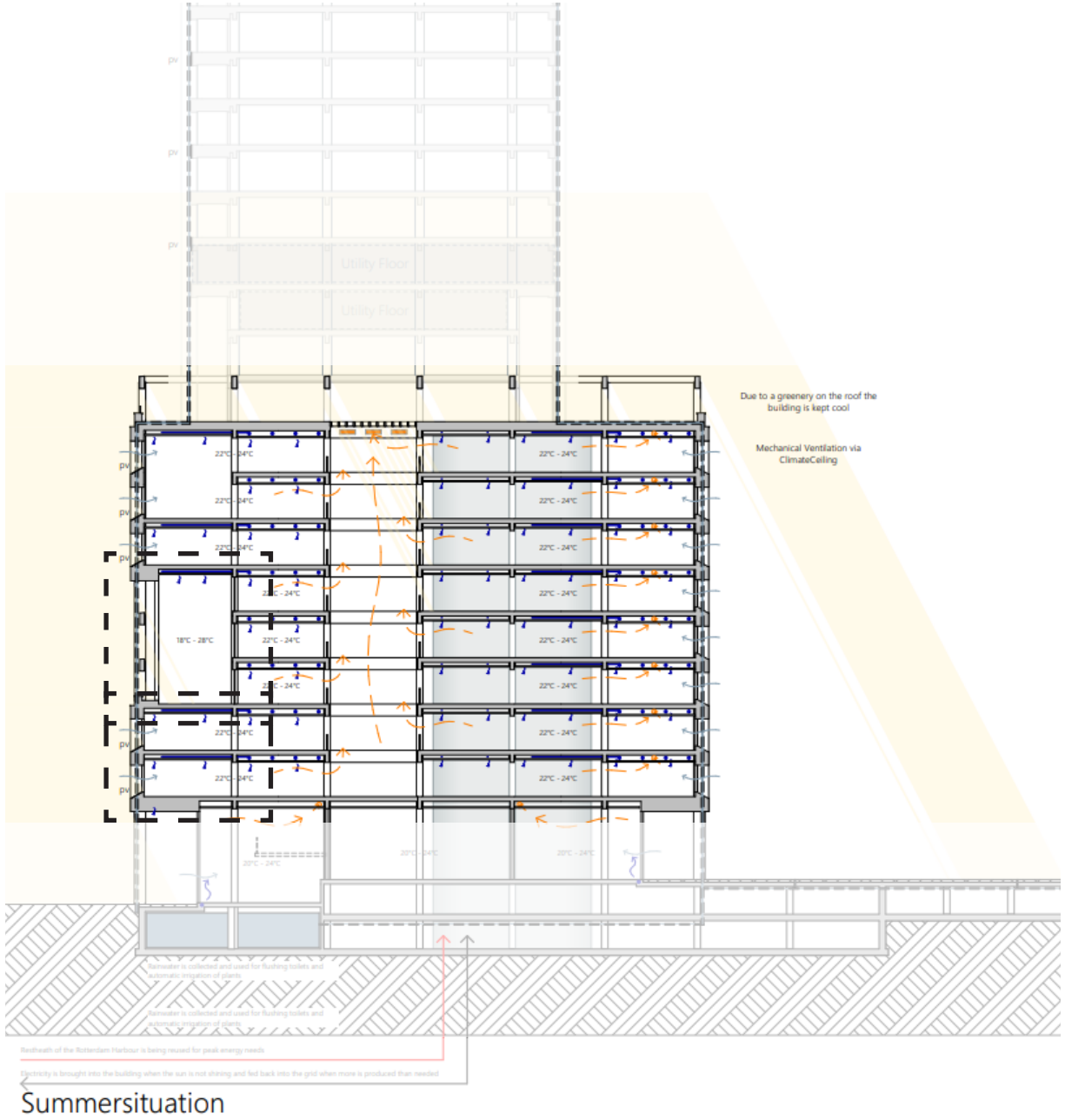




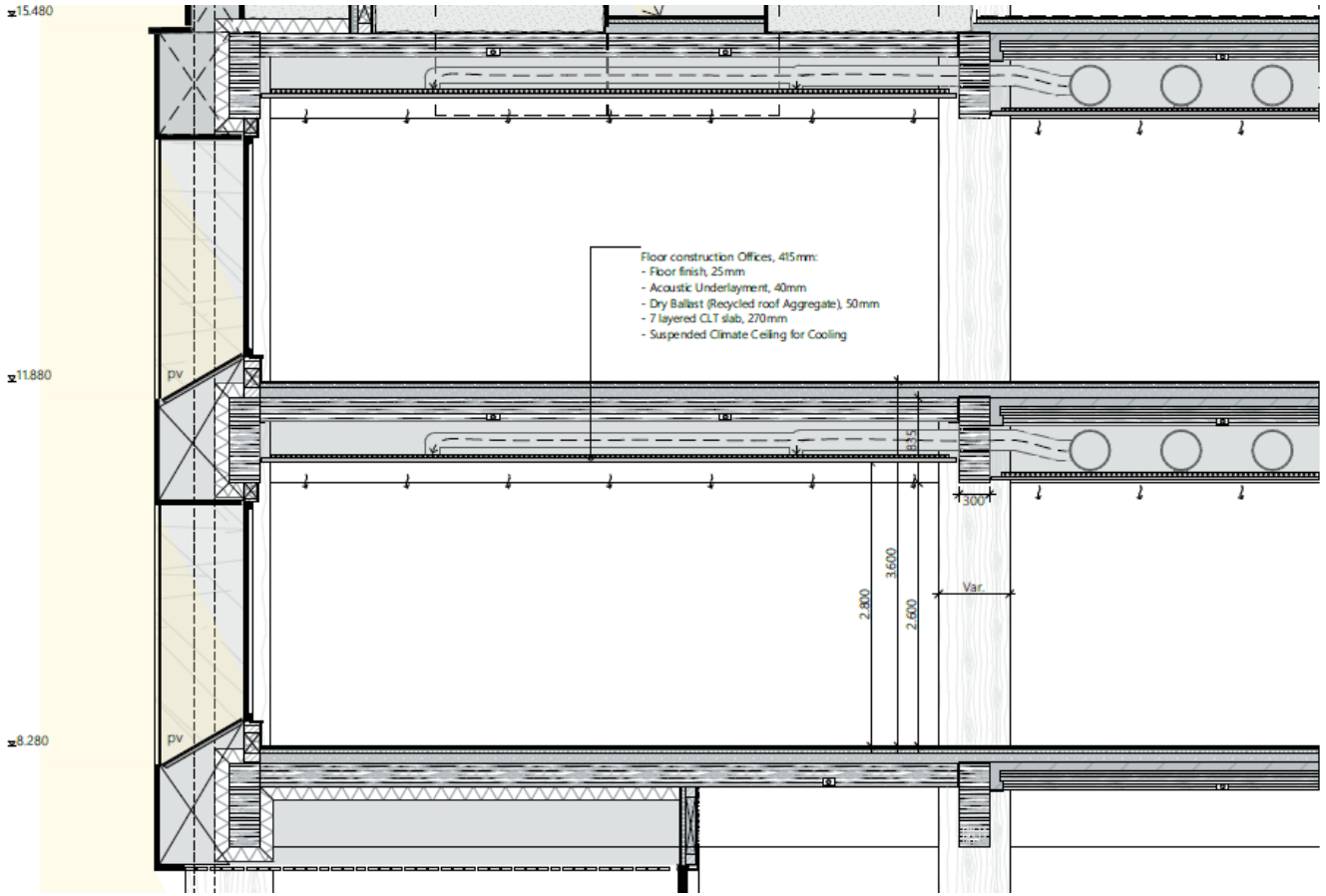
Base

Climate Section | Ground Floor (Plinth)

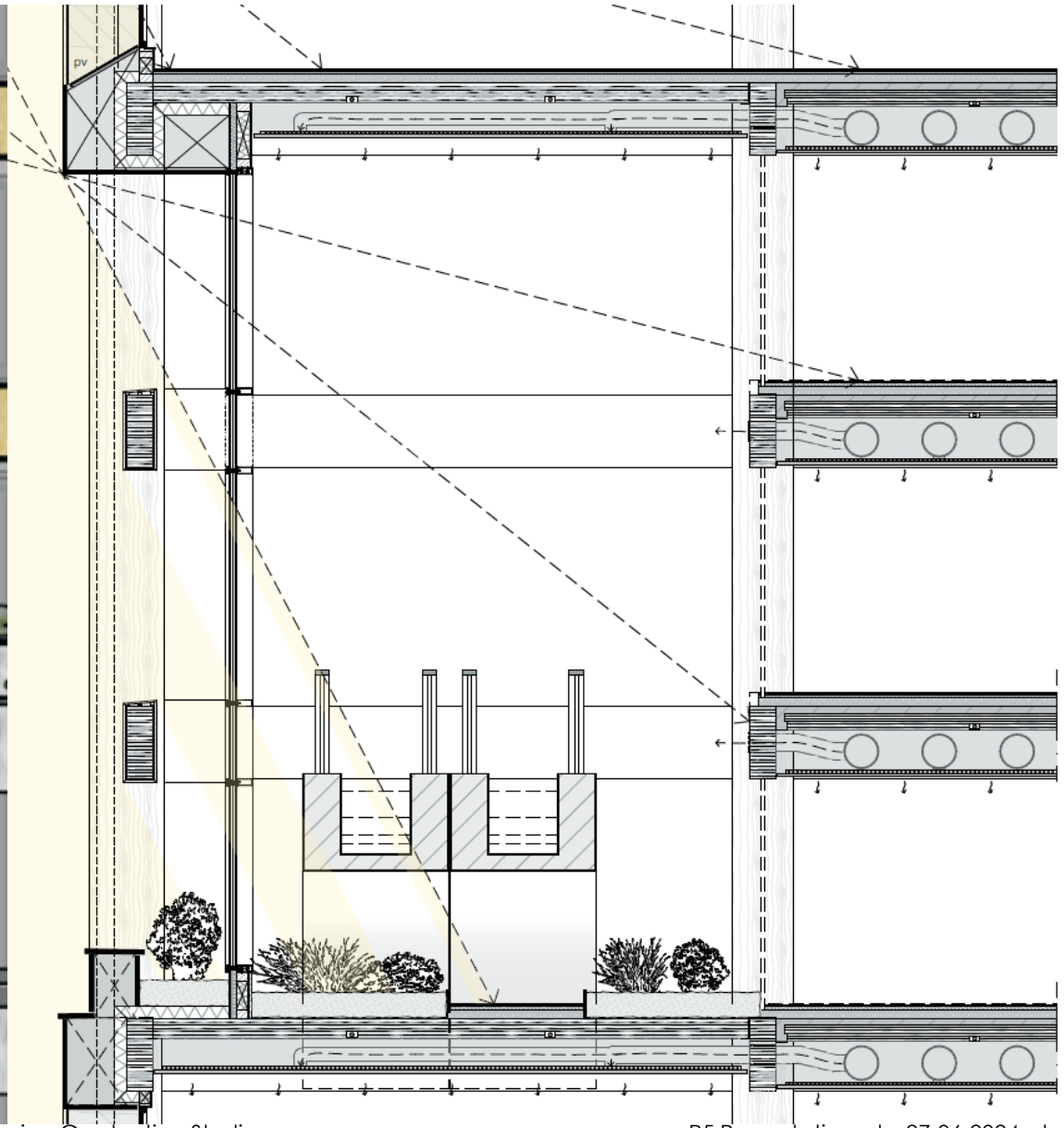




Fragment | 3th & 4th Floor (Base)

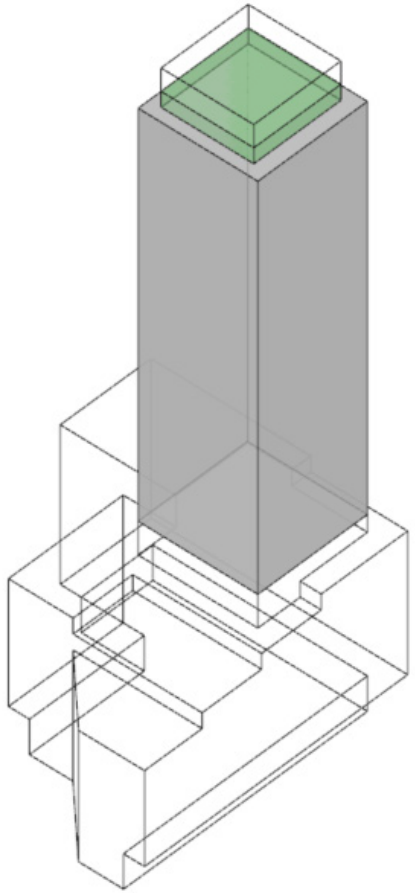


Fragment | 5th, 6th and 7th Floor (Base)



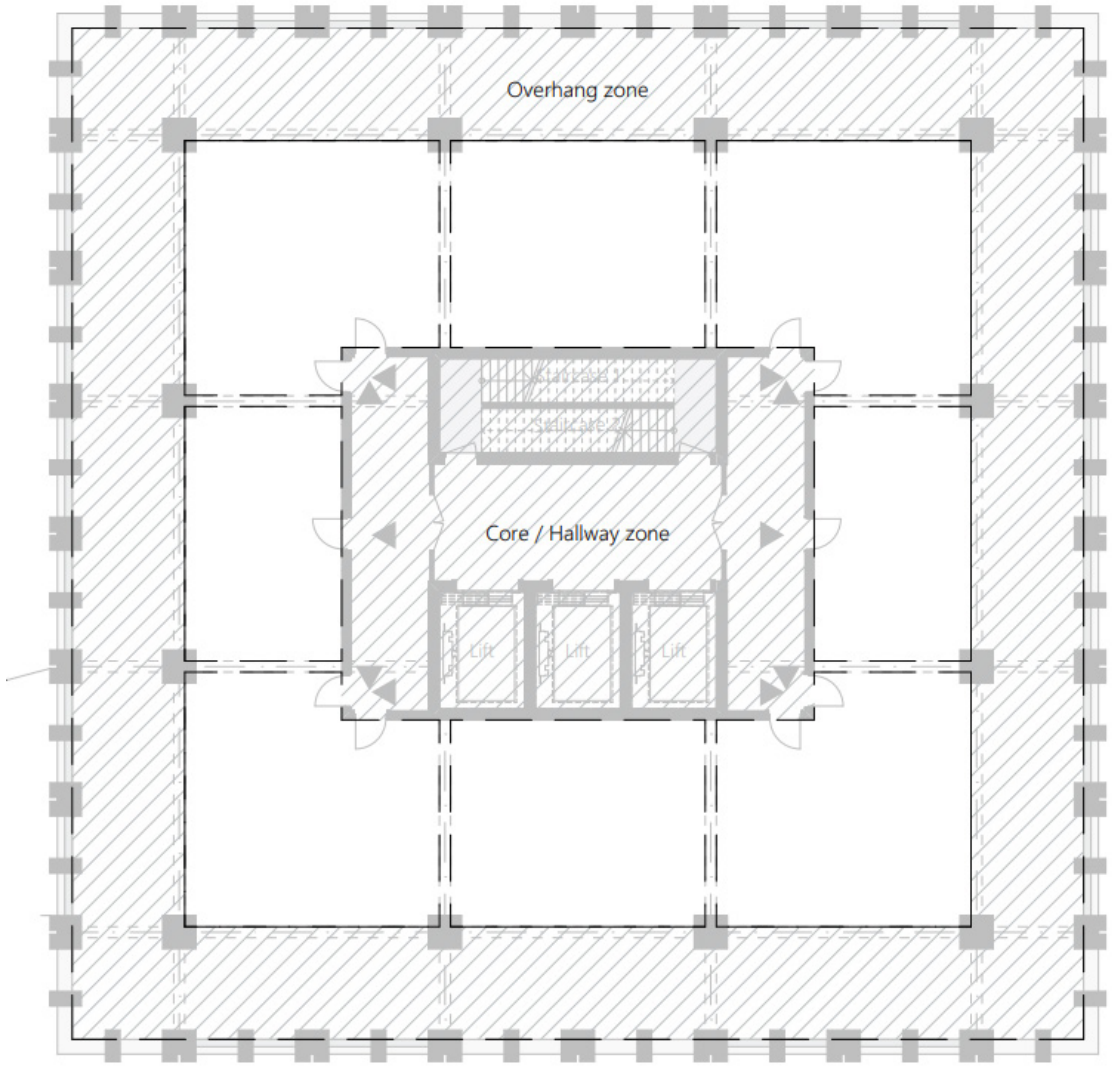
3D Impression | Delfseplein

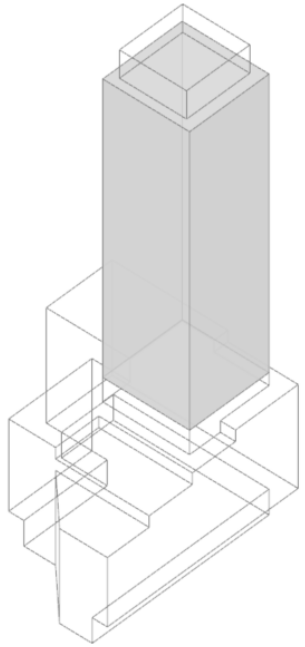
3D Impression | Weena



Tower

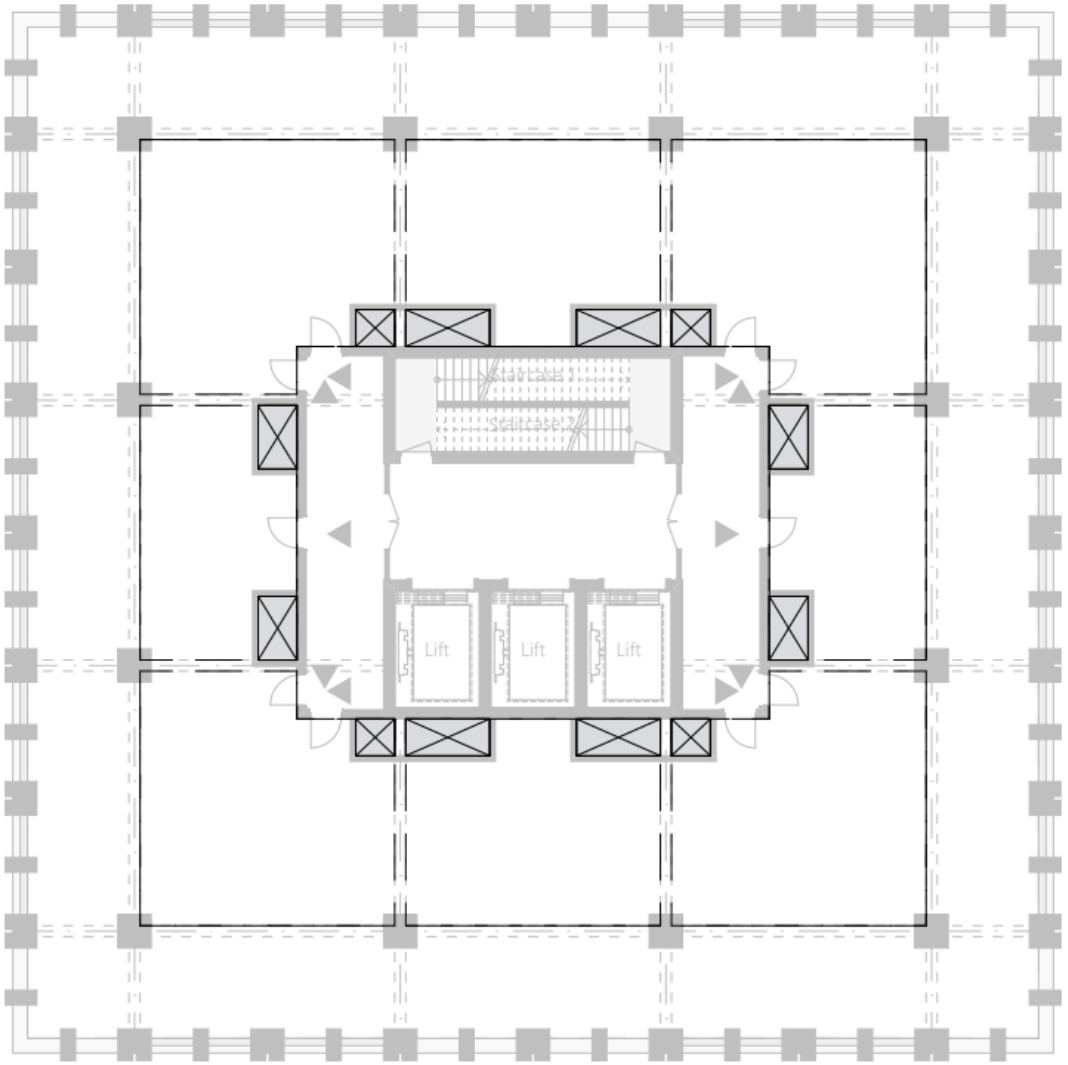
Organisation | 22th Floor (Tower)

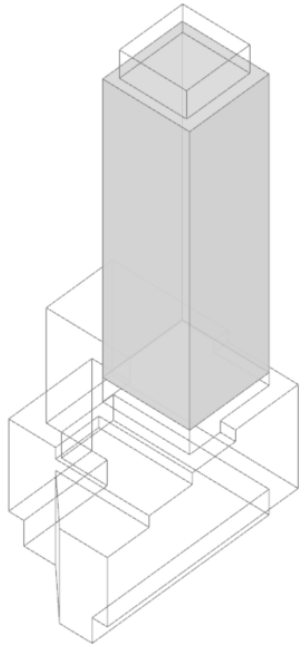




Tower

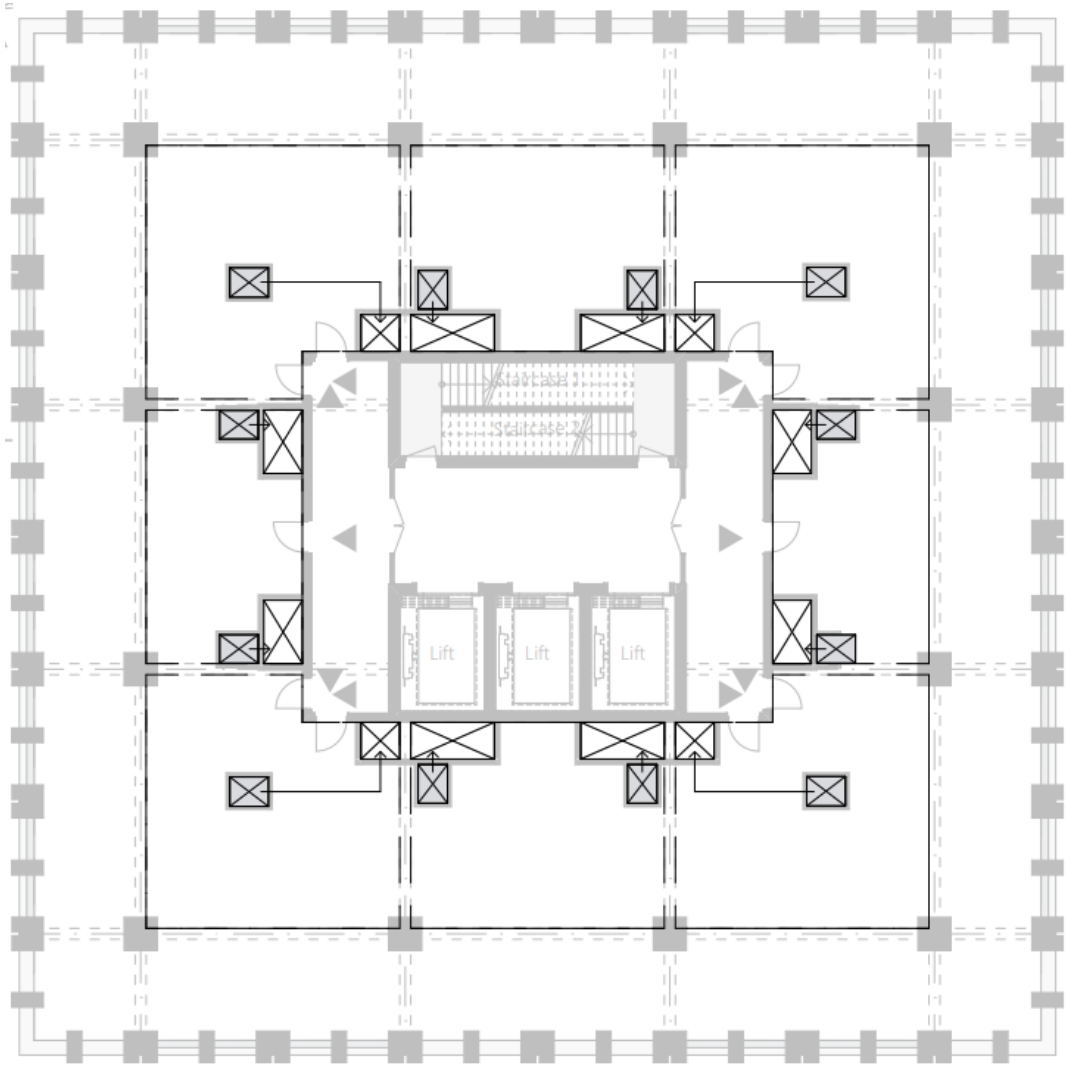
Organisation | 22th Floor (Tower)



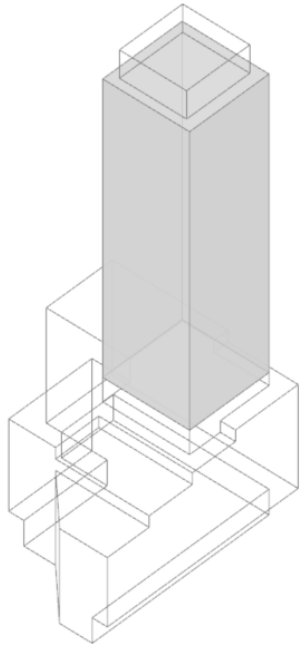


Tower

Organisation | 22th Floor (Tower)

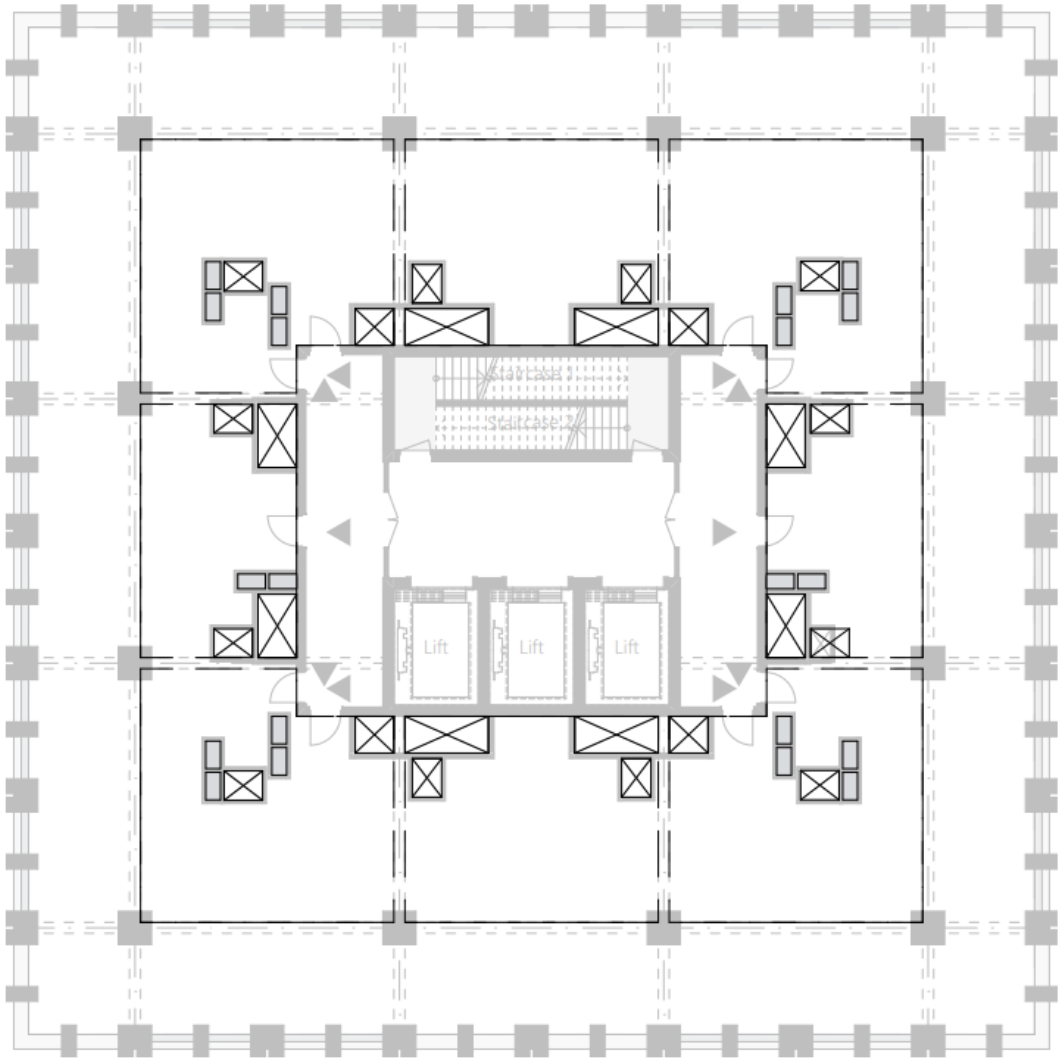


Strategically positioned smaller shafts for the dedicated dwellings can be connected underneith the floors to the main shafts.

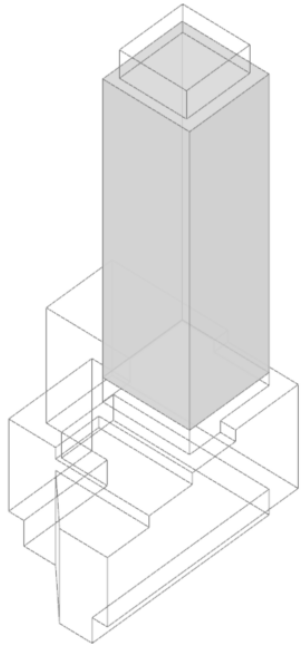


Tower

Organisation | 22th Floor (Tower)

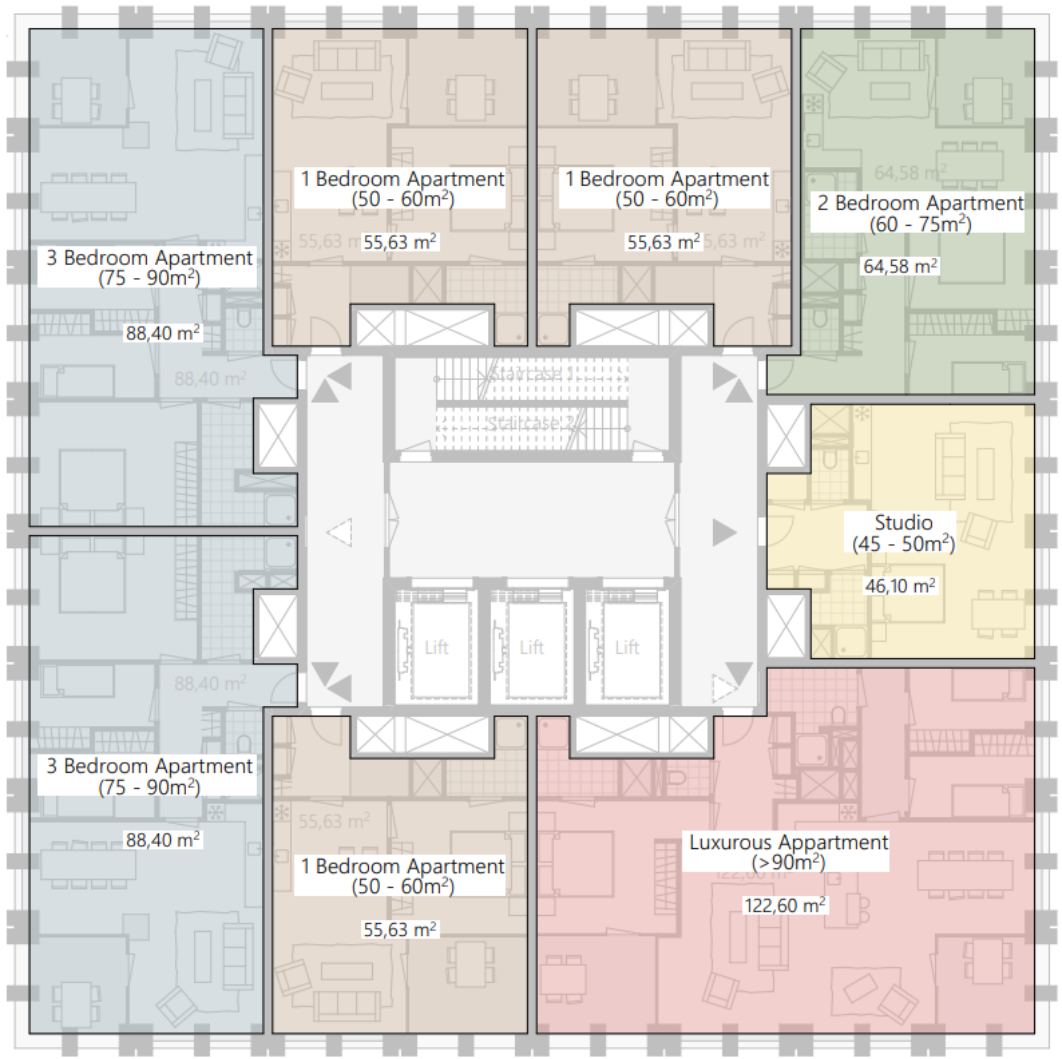


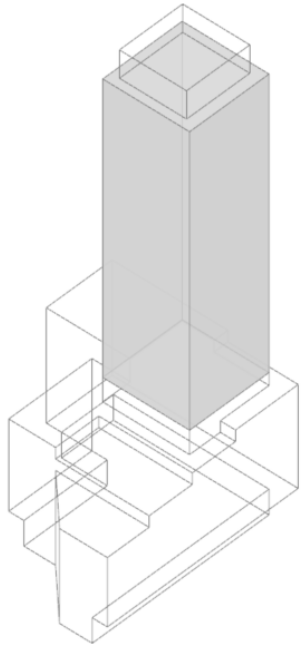
Additionally the utility cupboards are also uniformly positioned on the same position on every floor



Tower

Organisation | 22th Floor (Tower)





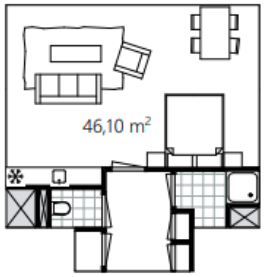
Tower

Bedrooms not directly positioned too the south facade, but with a large setback (balcony in between facade and bedroom) so no direct

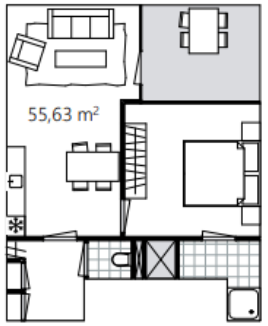
Organisation | Apartment typologies

Appartementen van alle Categrorien:

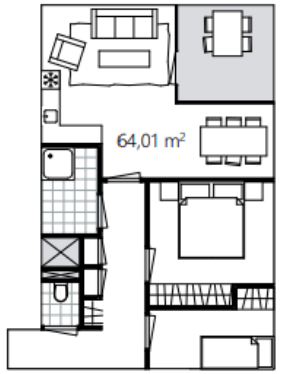
Studio	(45 - 50m²)
1 Bedroom Appartement	(50 - 60m²)
2 Bedroom Appartement	(60 - 75m²)
3 Bedroom Appartement	(75 - 90m²)
Penthouse	(>90m²)



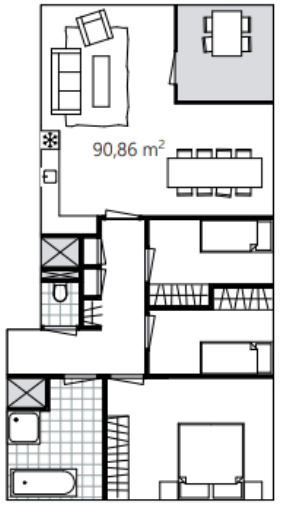
Studio
(45 - 50m²)



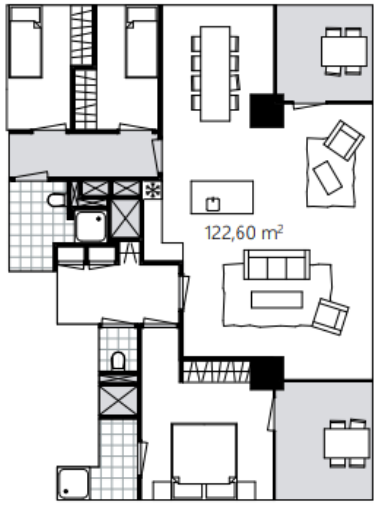
1 Bedroom Apartment
(50 - 60m²)



2 Bedroom Apartment
(60 - 75m²)

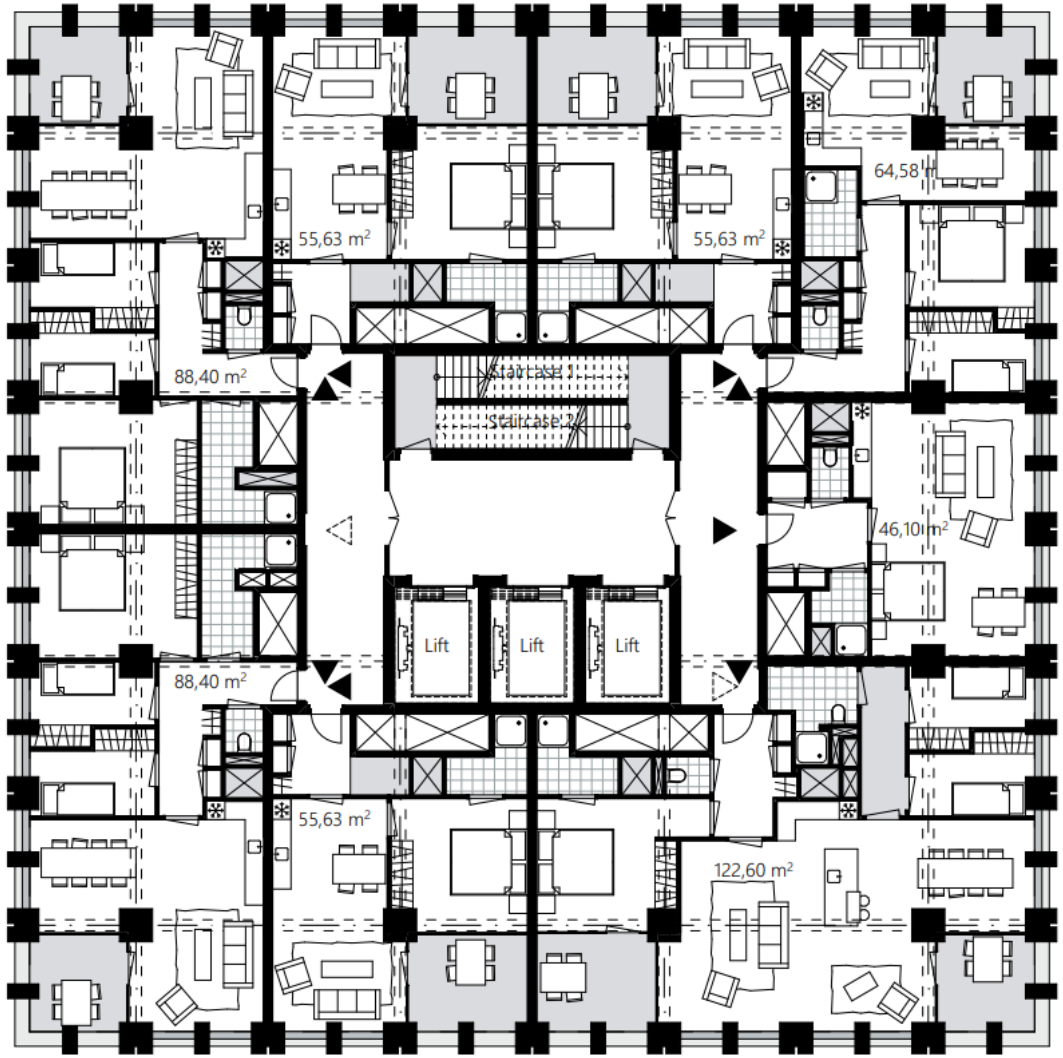


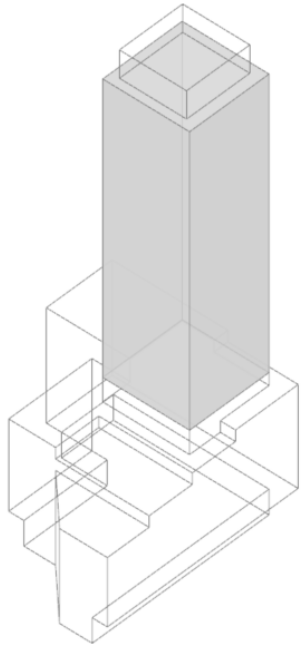
3 Bedroom Apartment
(75 - 90m²)



Luxurous Appartment
(>90m²)

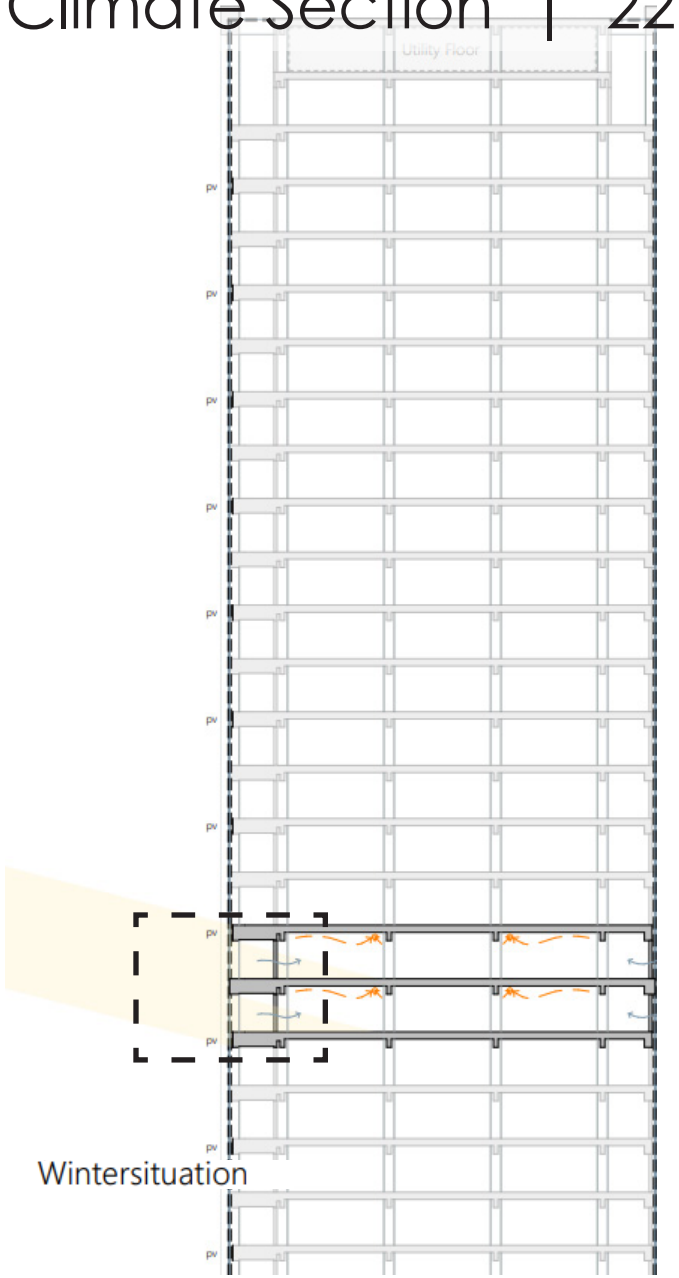
Organisation | 22th Floor (Tower)



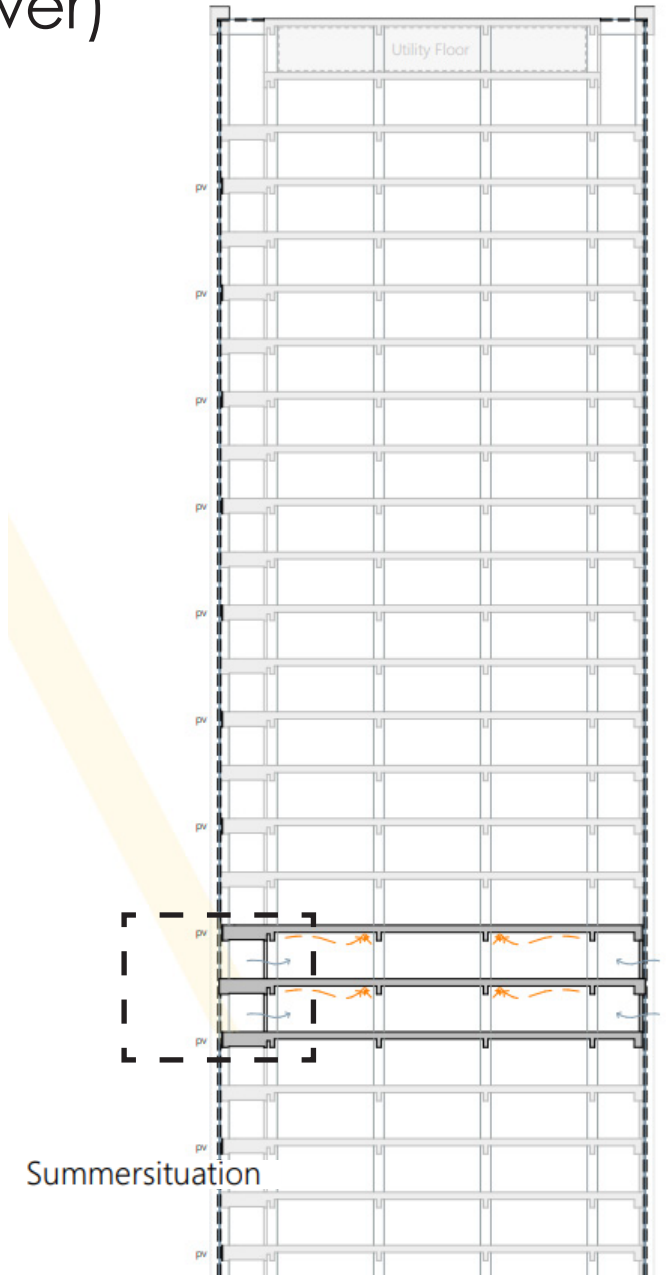


Tower

Climate Section | 22th & 23th floor (Tower)

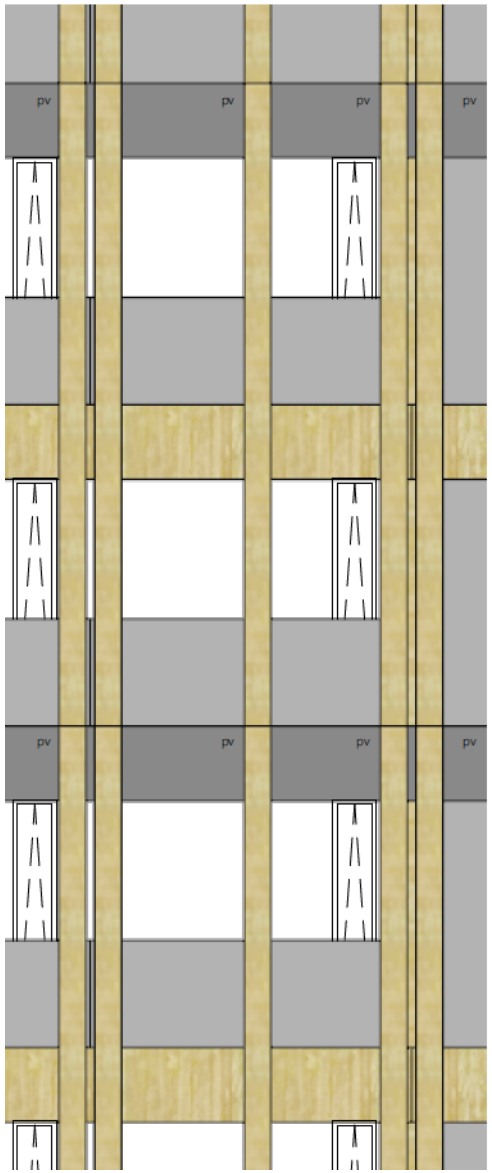


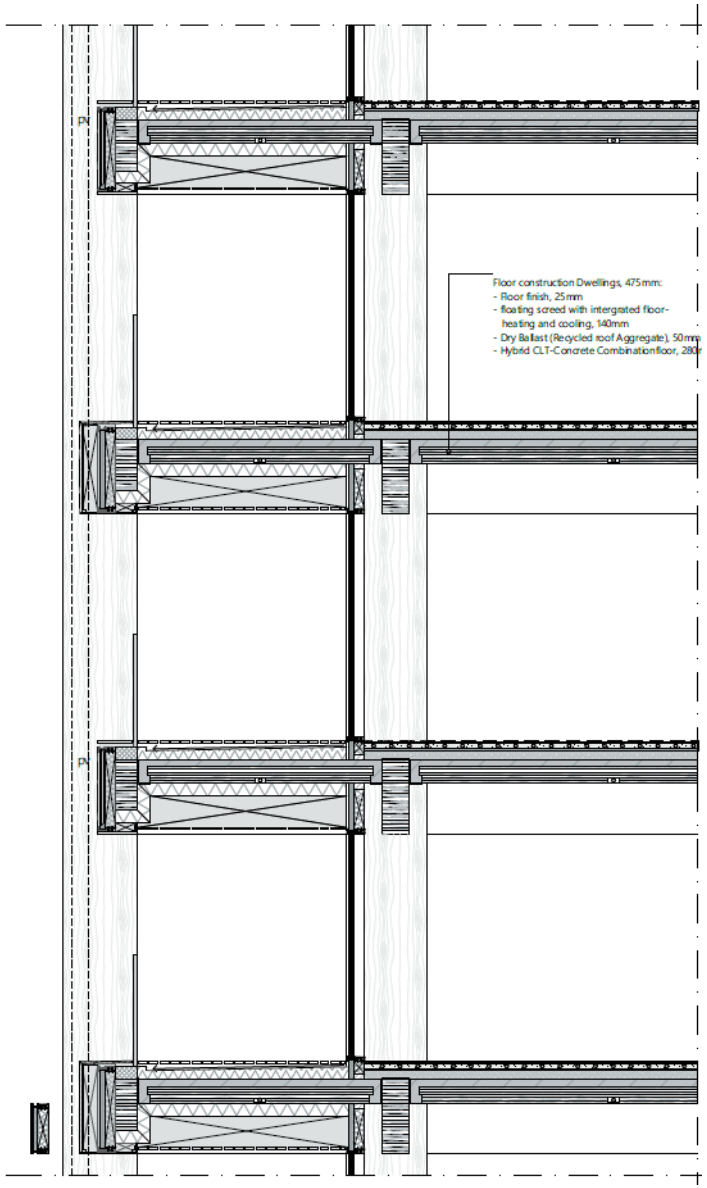
Wintersituation

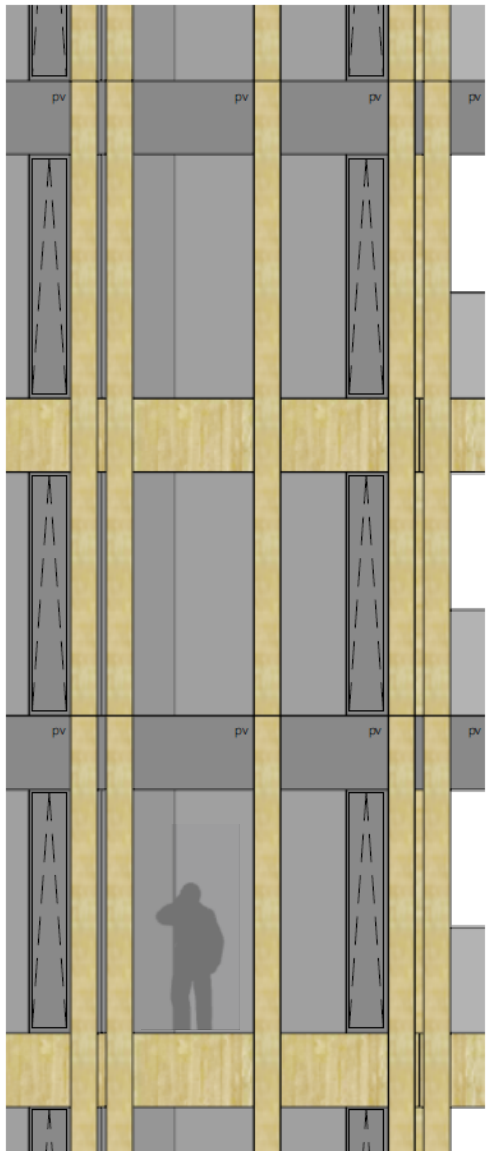


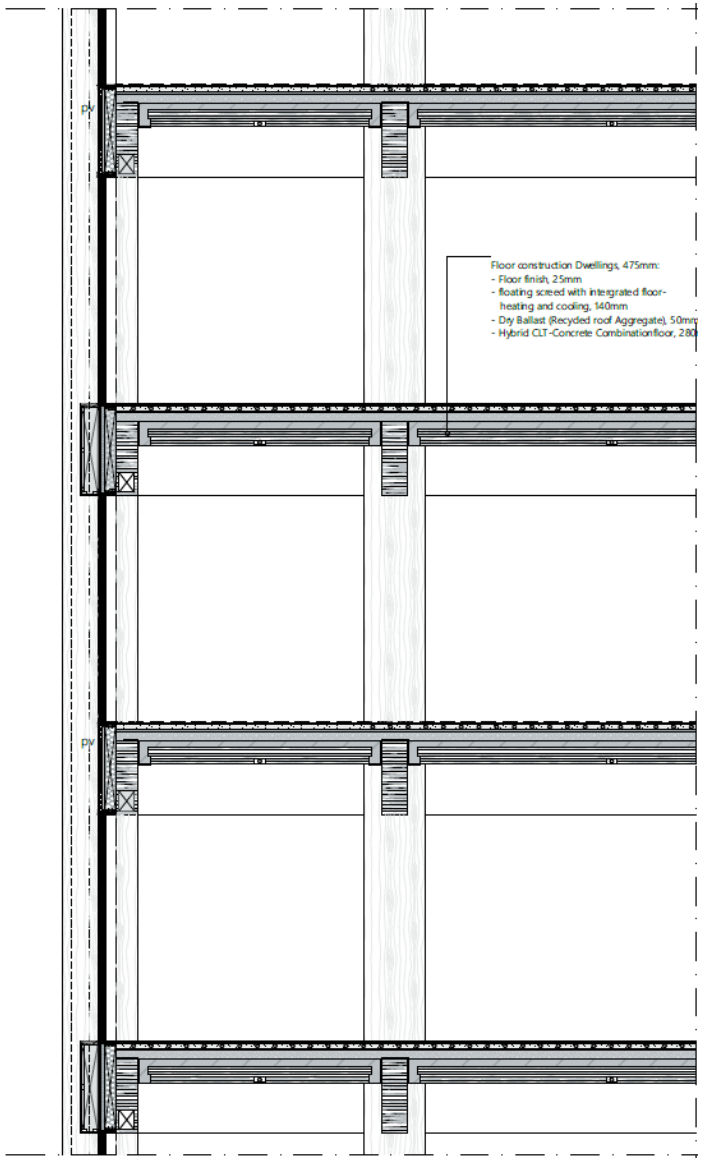
Summersituation

Fragment | 22th & 23th floor (Tower)









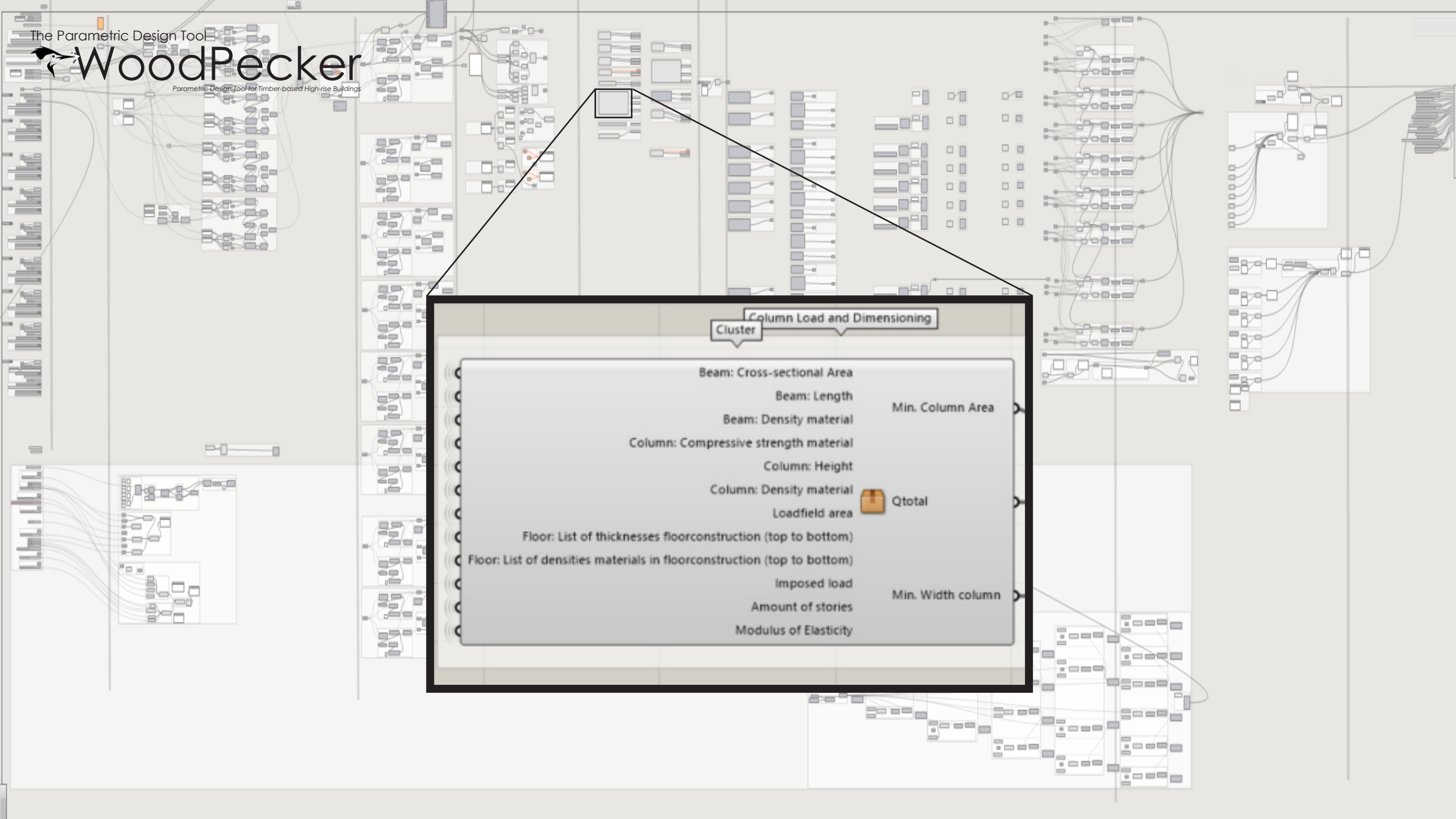
3D Impression | Hofplein

Thank you!

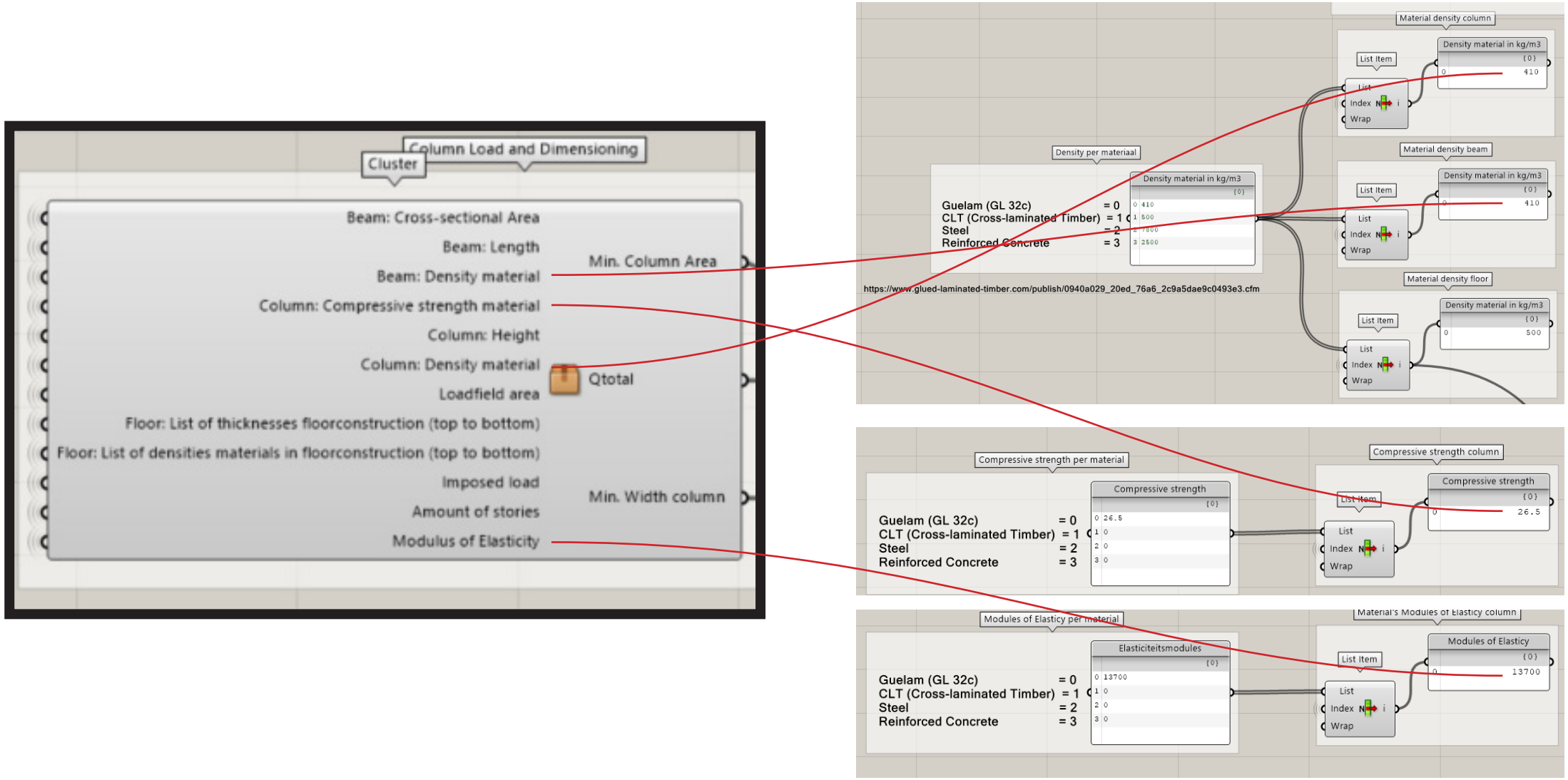
The Parametric Design Tool

WoodPecker

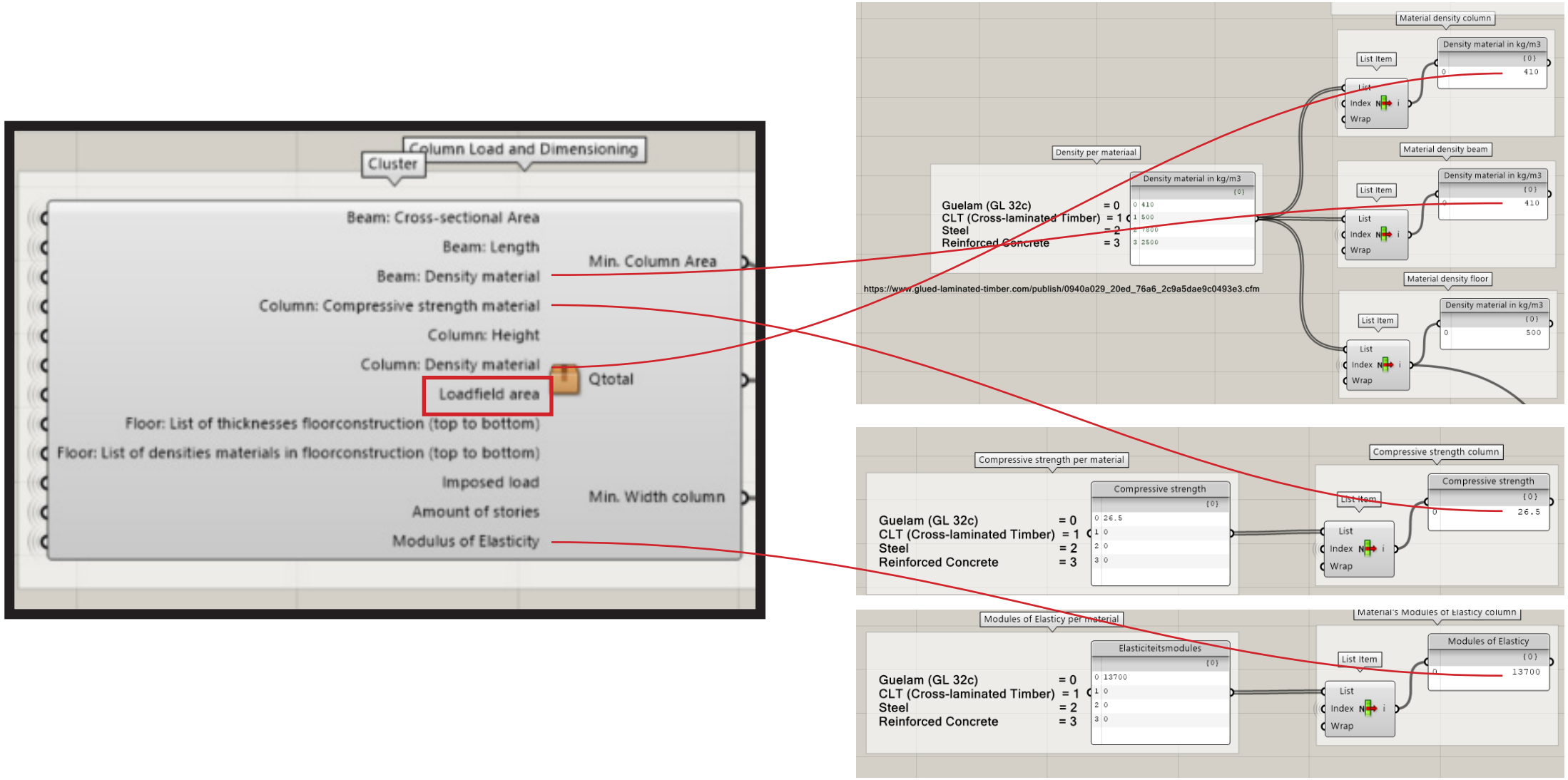
Parametric Design Tool for Timber-based High-rise Buildings



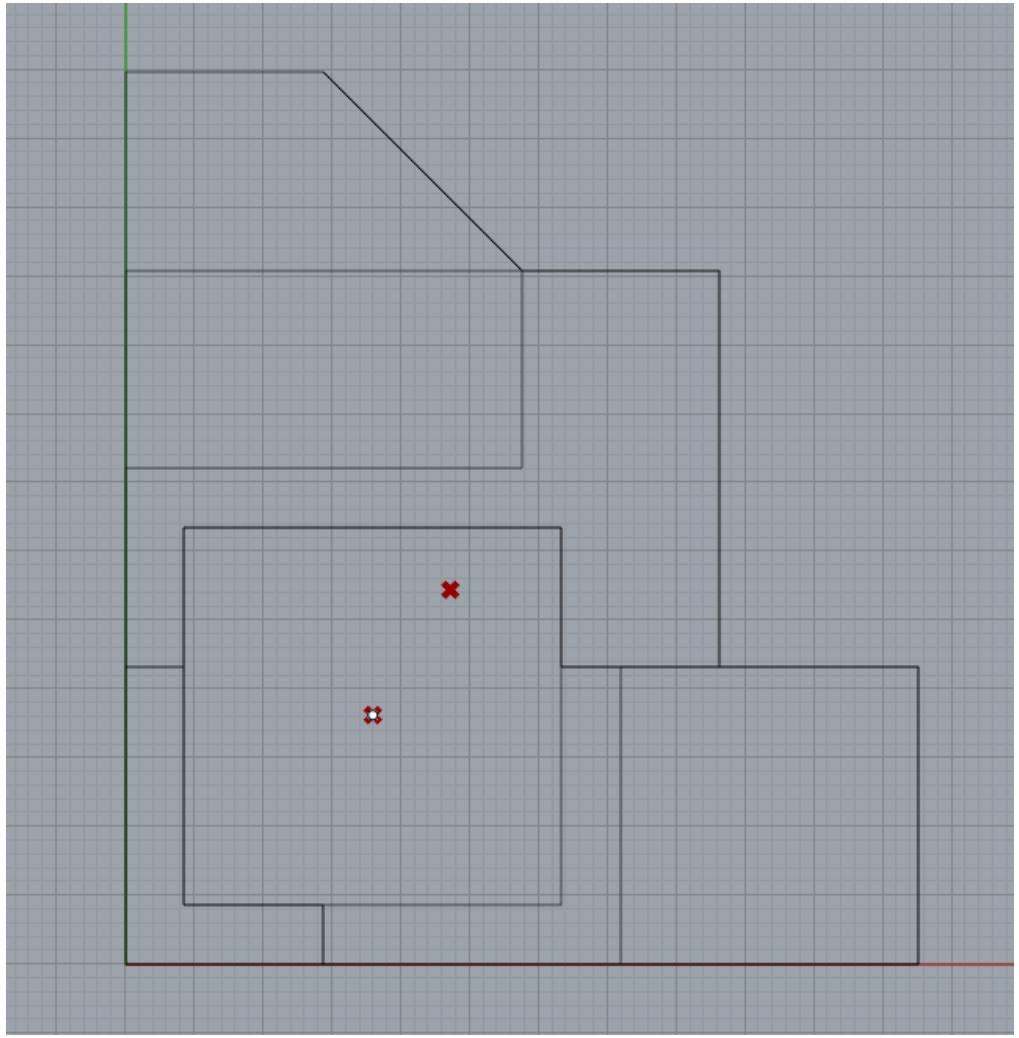
Visual Representation ofColumn Size Calculation

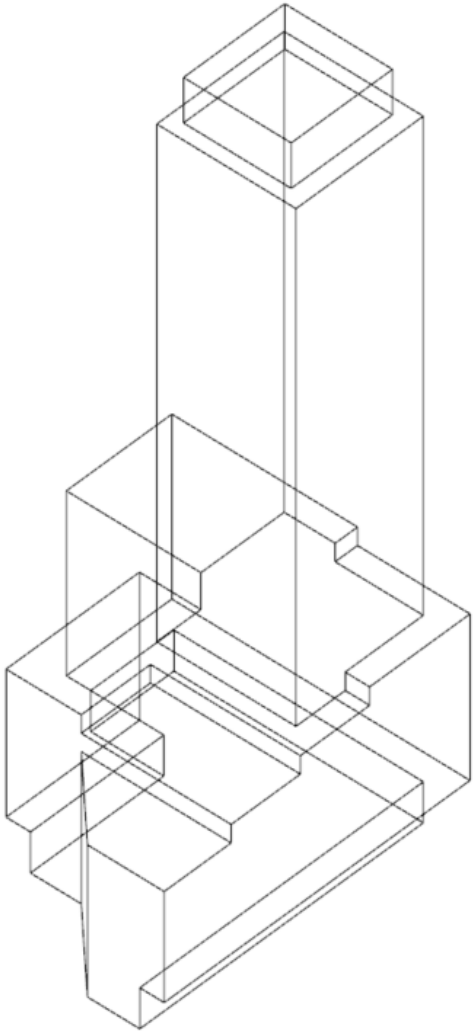


Visual Representation ofColumn Size Calculation

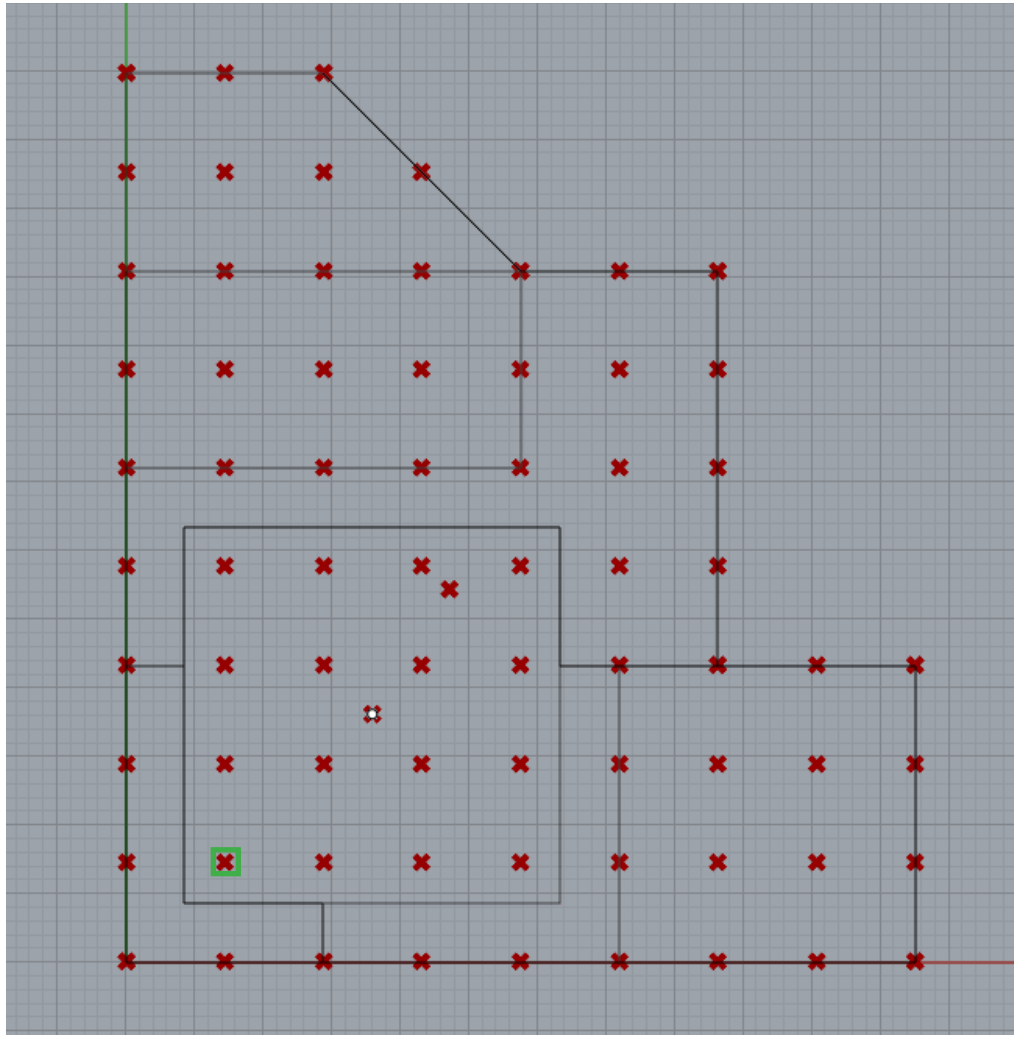


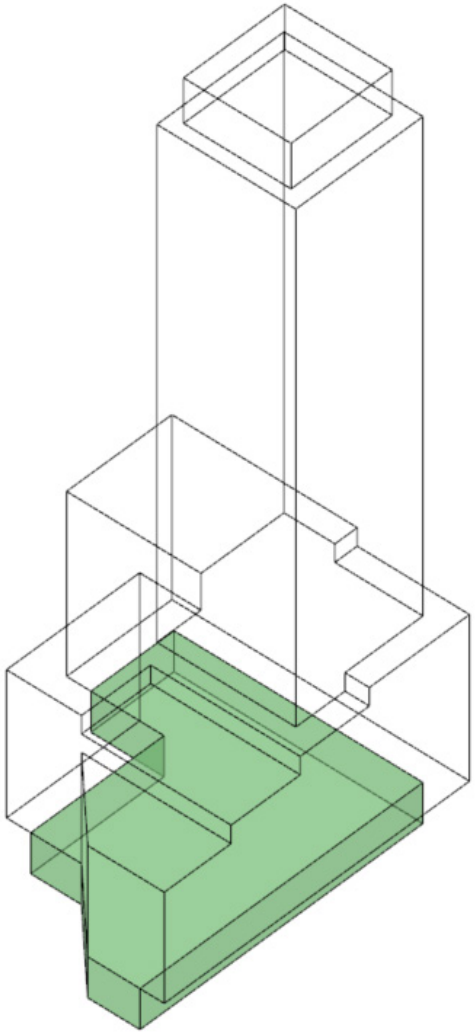
Global Representation ofColumn Size Calculation



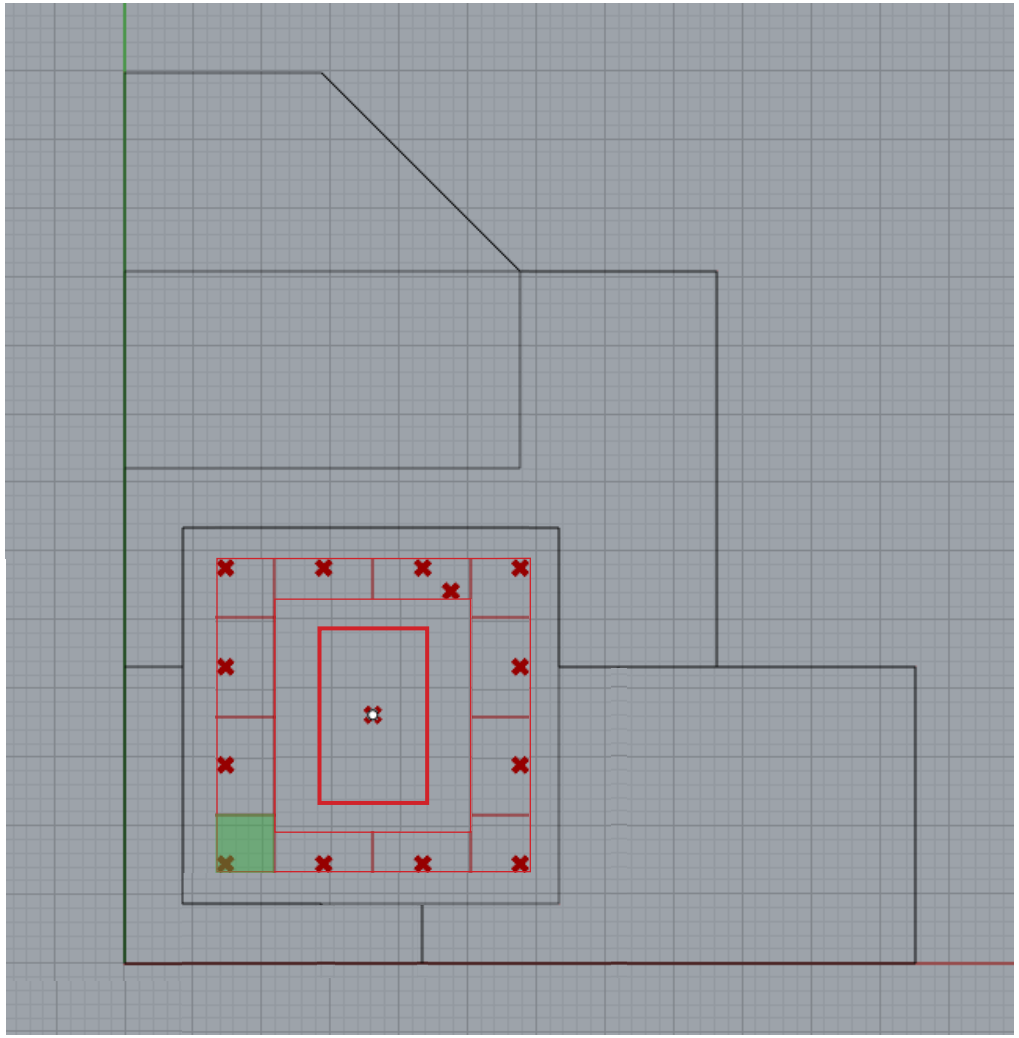


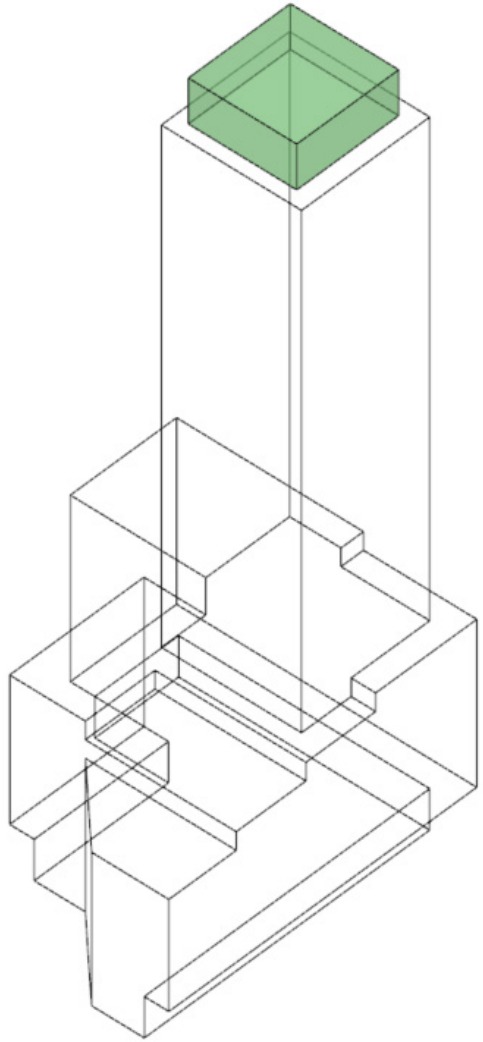
Visual Representation of Column Size Calculation



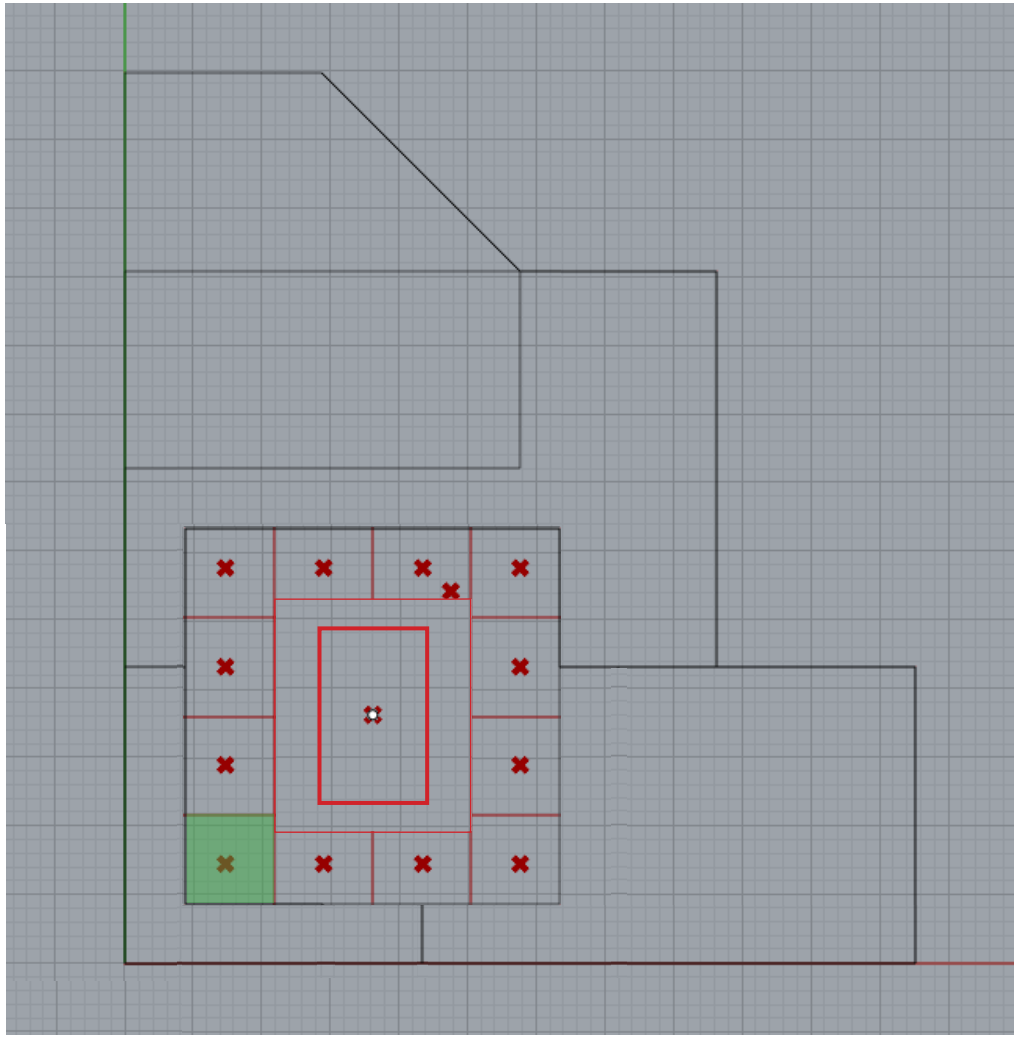


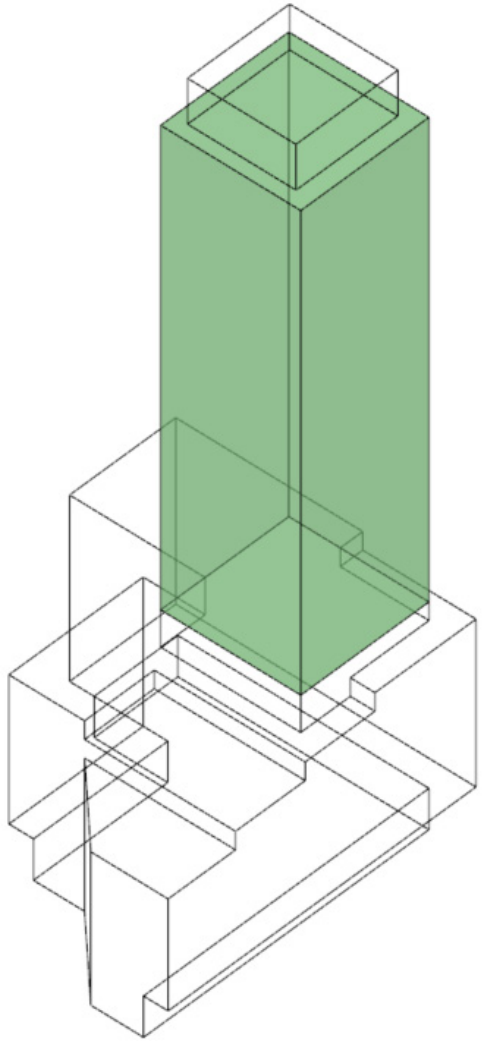
Visual Representation of Column Size Calculation



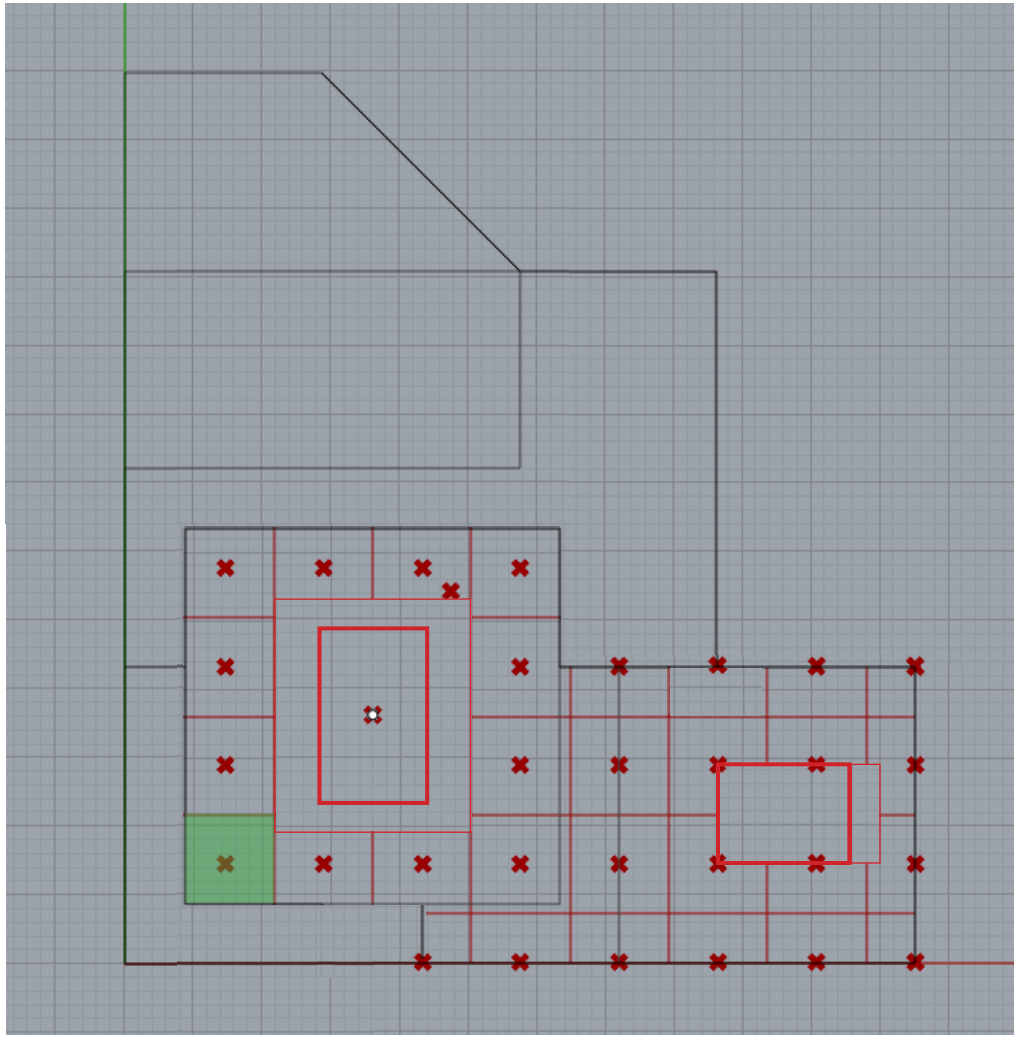


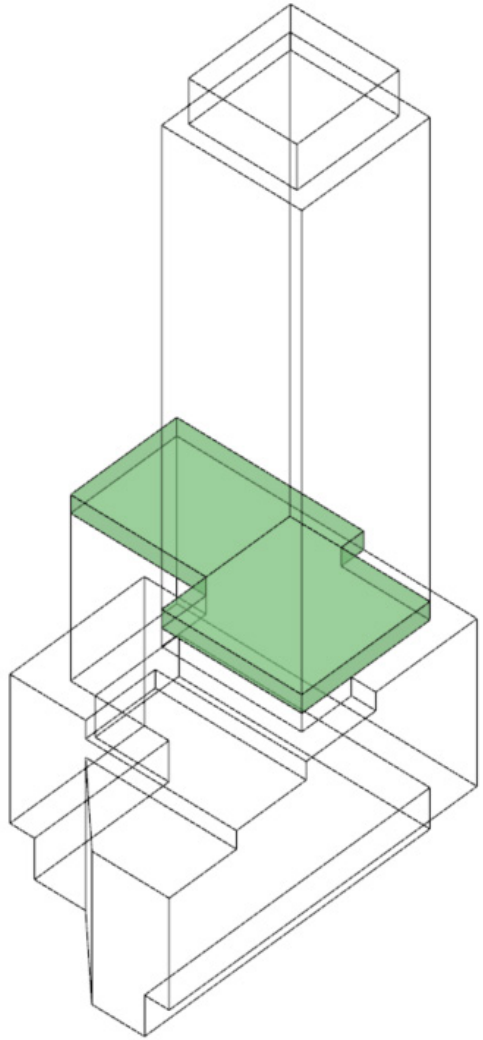
Visual Representation of Column Size Calculation



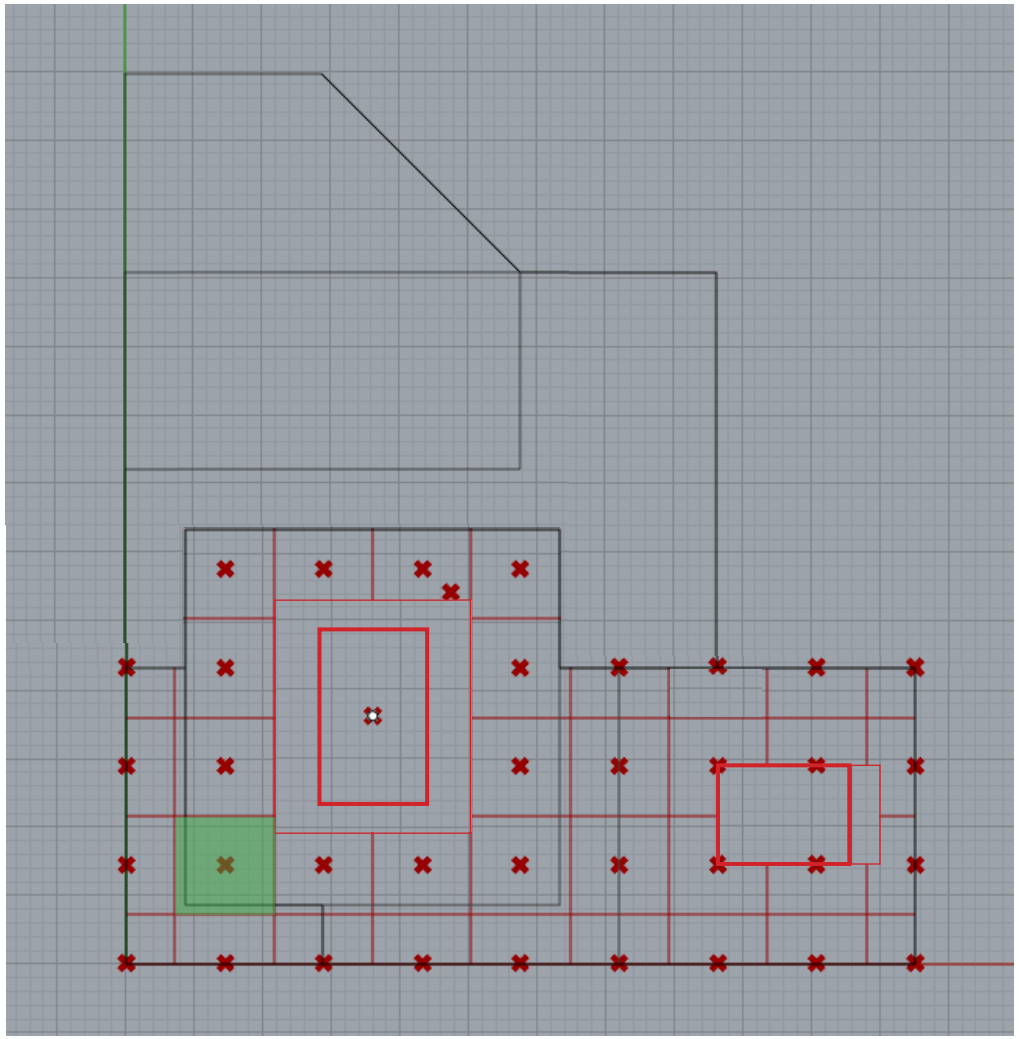


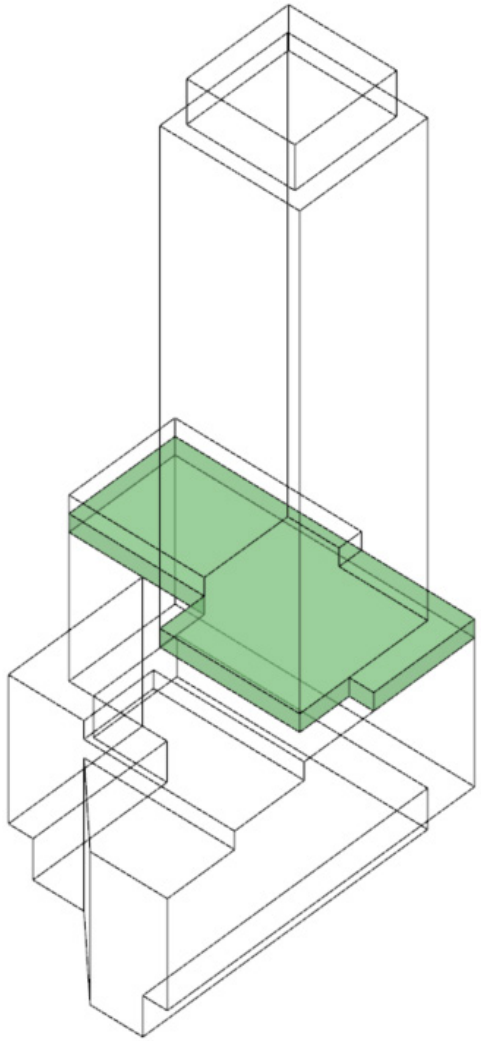
Visual Representation of Column Size Calculation



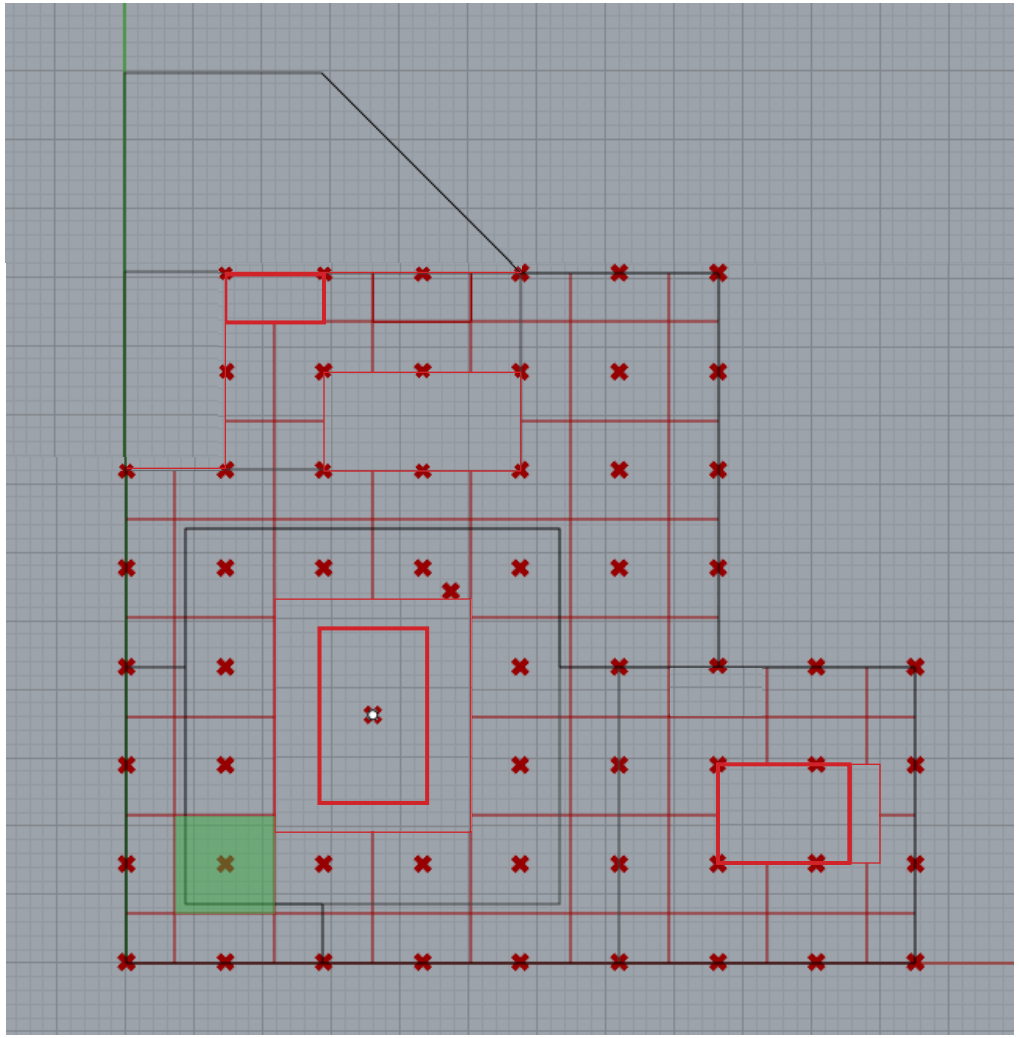


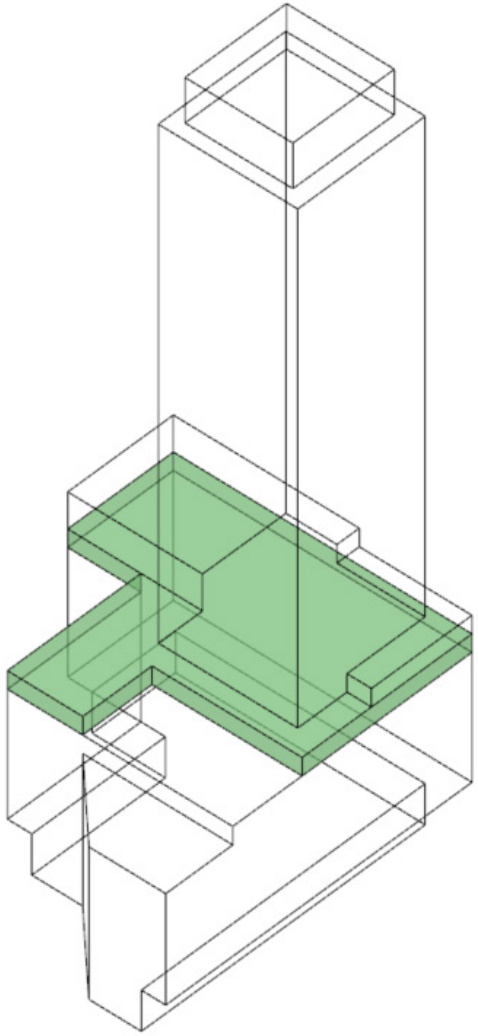
Visual Representation of Column Size Calculation



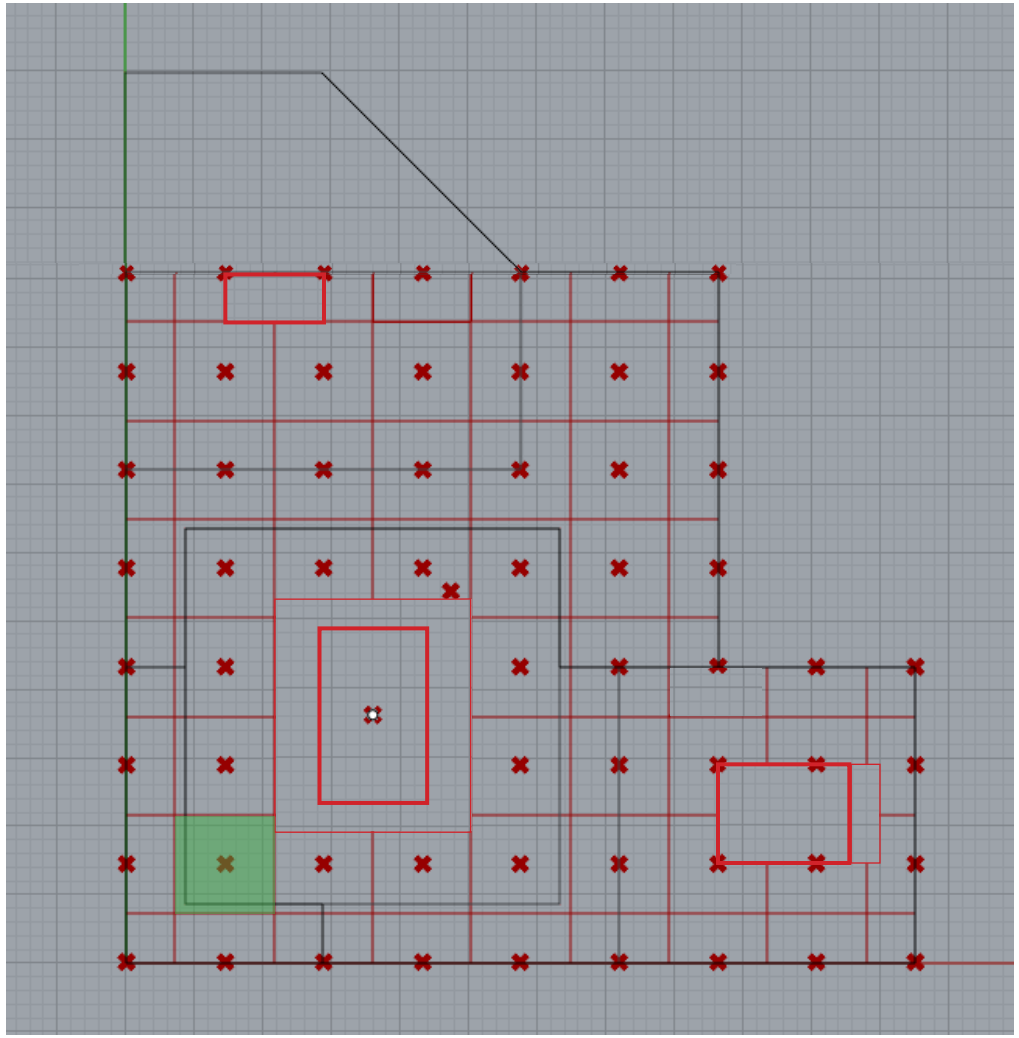


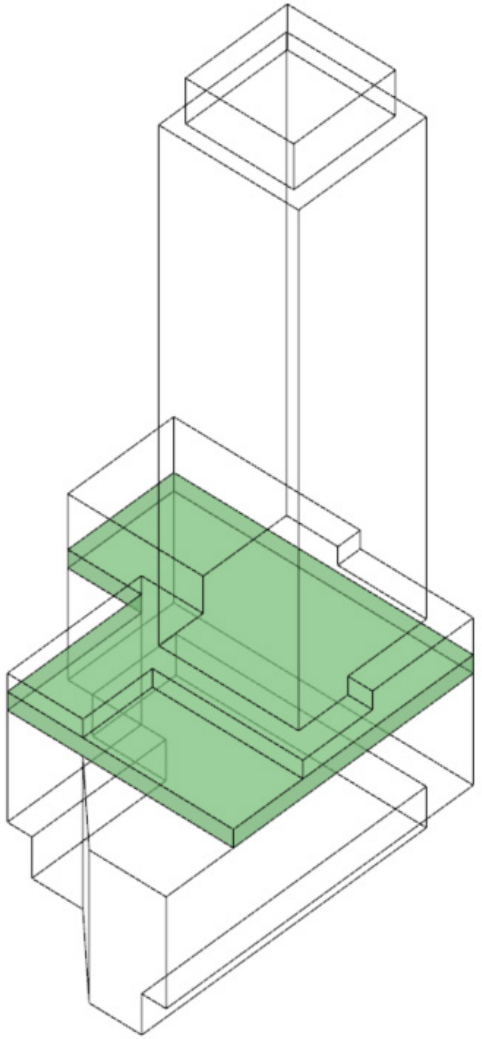
Visual Representation of Column Size Calculation



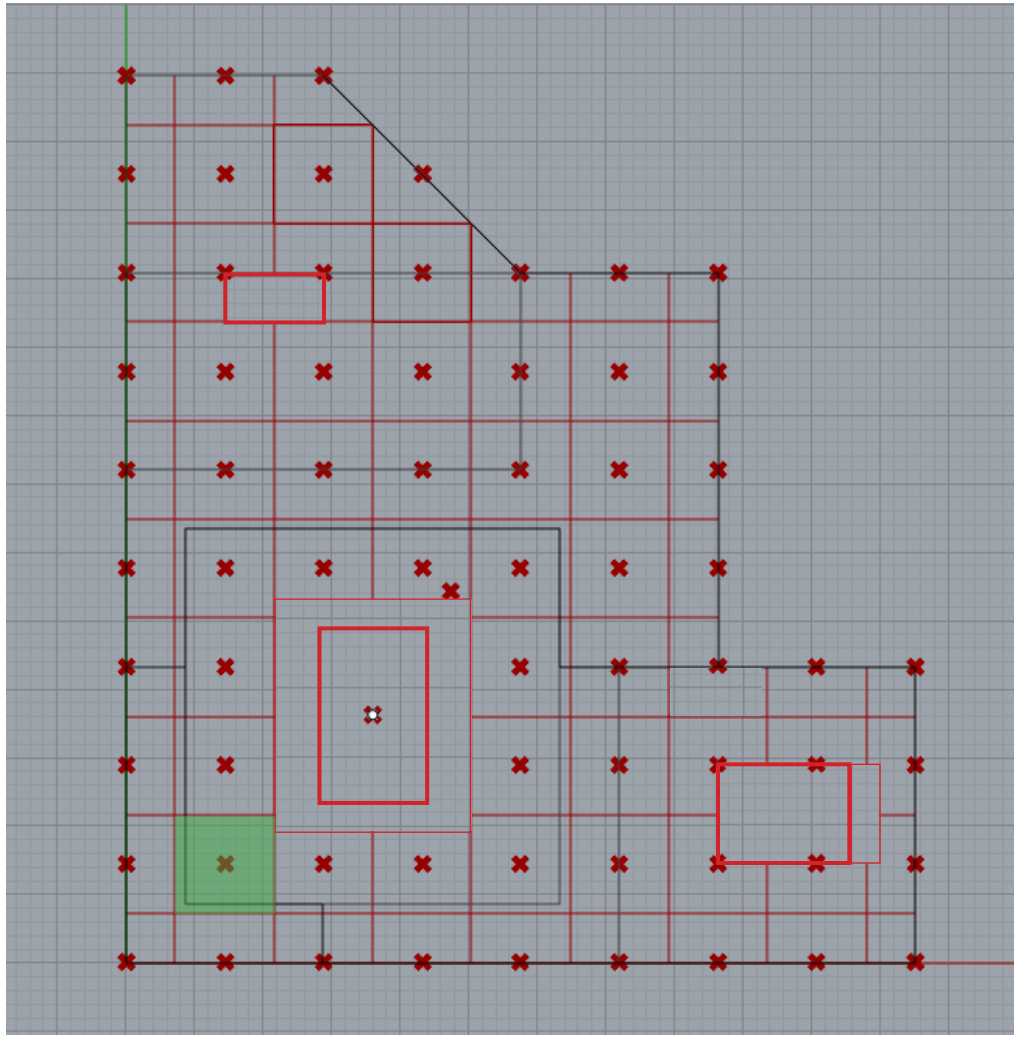


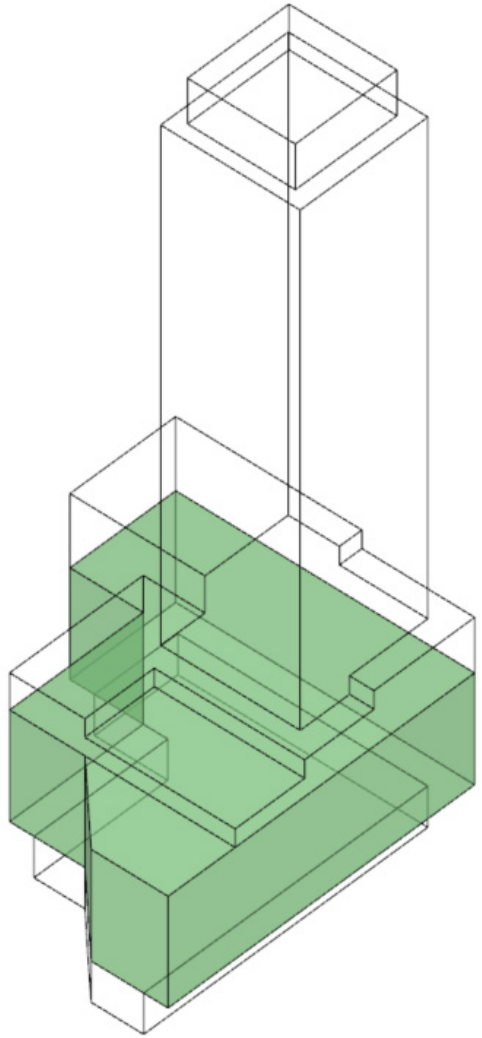
Visual Representation of Column Size Calculation



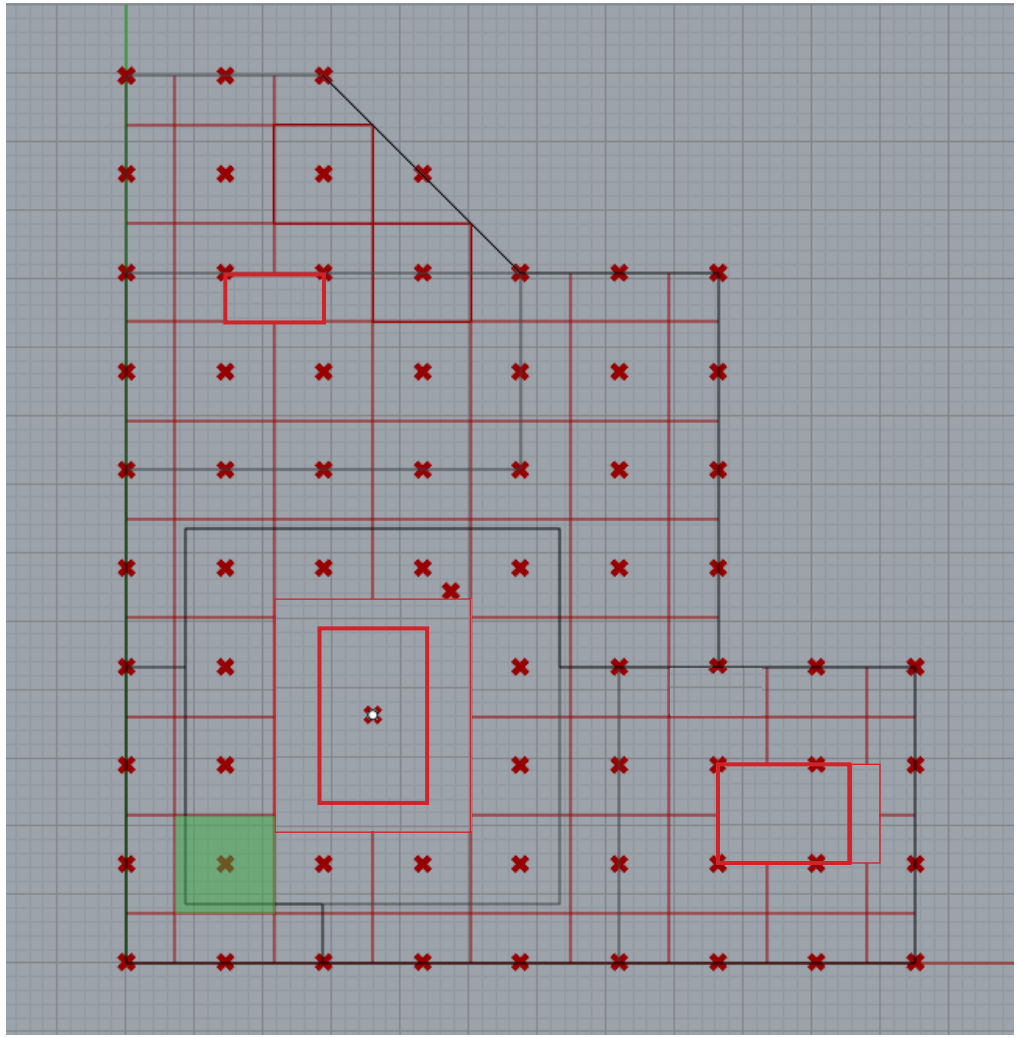


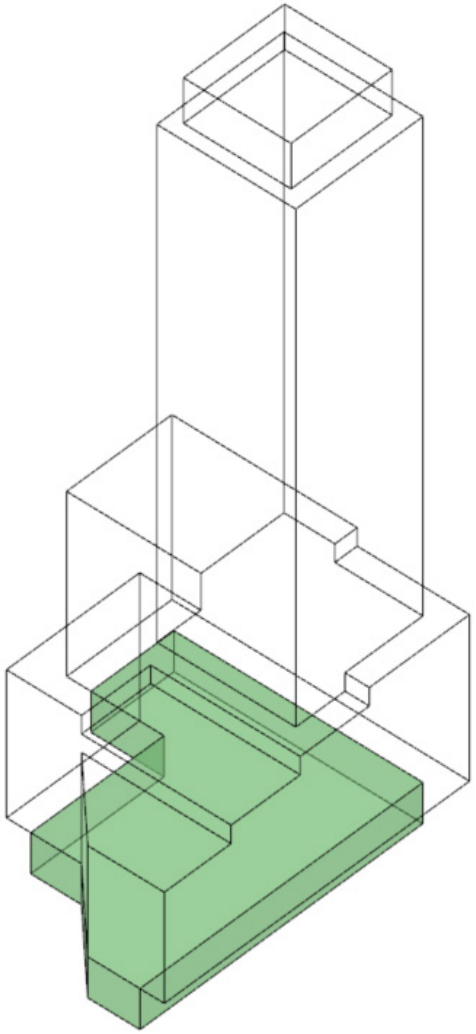
Visual Representation of Column Size Calculation



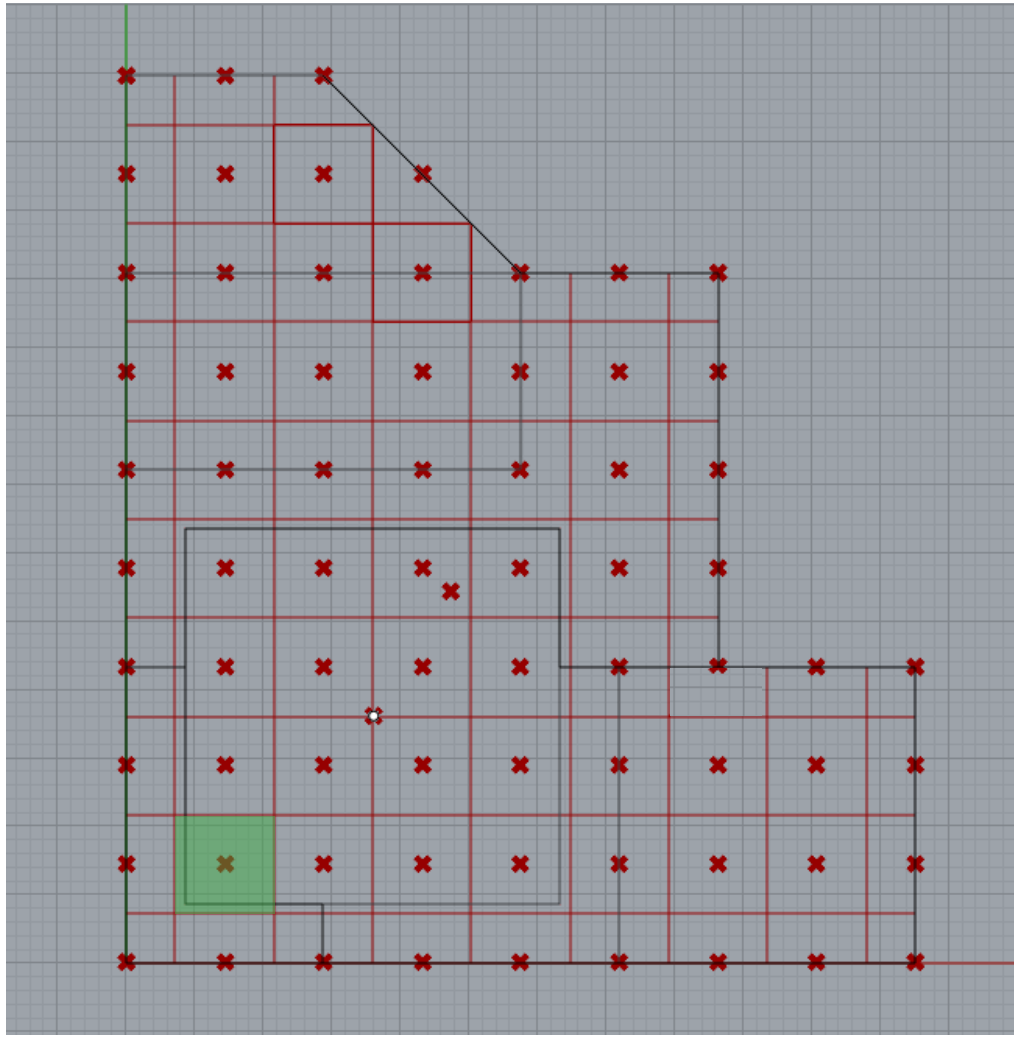


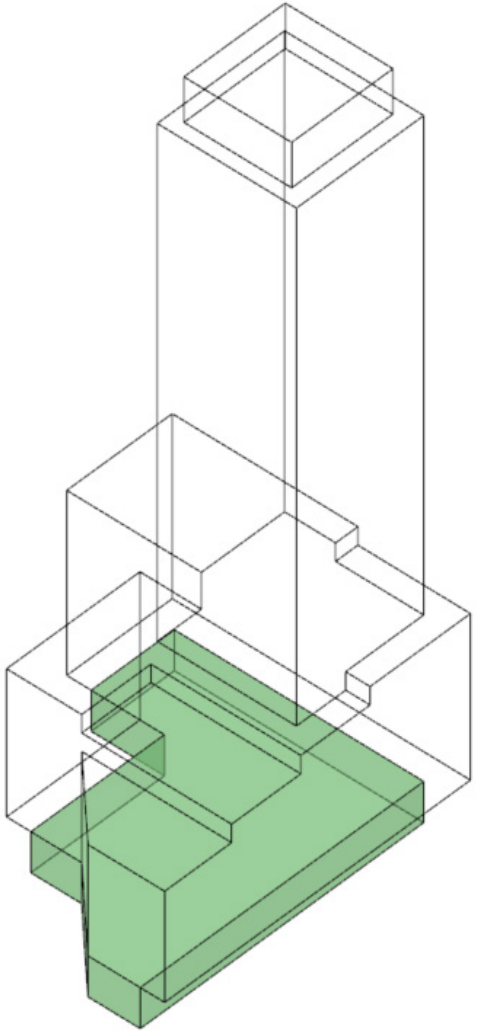
Visual Representation of Column Size Calculation





Visual Representation of Column Size Calculation





Visual Representation of Column Size Calculation