

P5**A+BT**

KEVIN VAN DER WEIJDEN

**ARCHITECTUUR**

FACULTEIT DER BOUWKUNDE

**BOUWTECHNIEK**

AKOESTISCH BETON

**BOUWTECHNIEK**

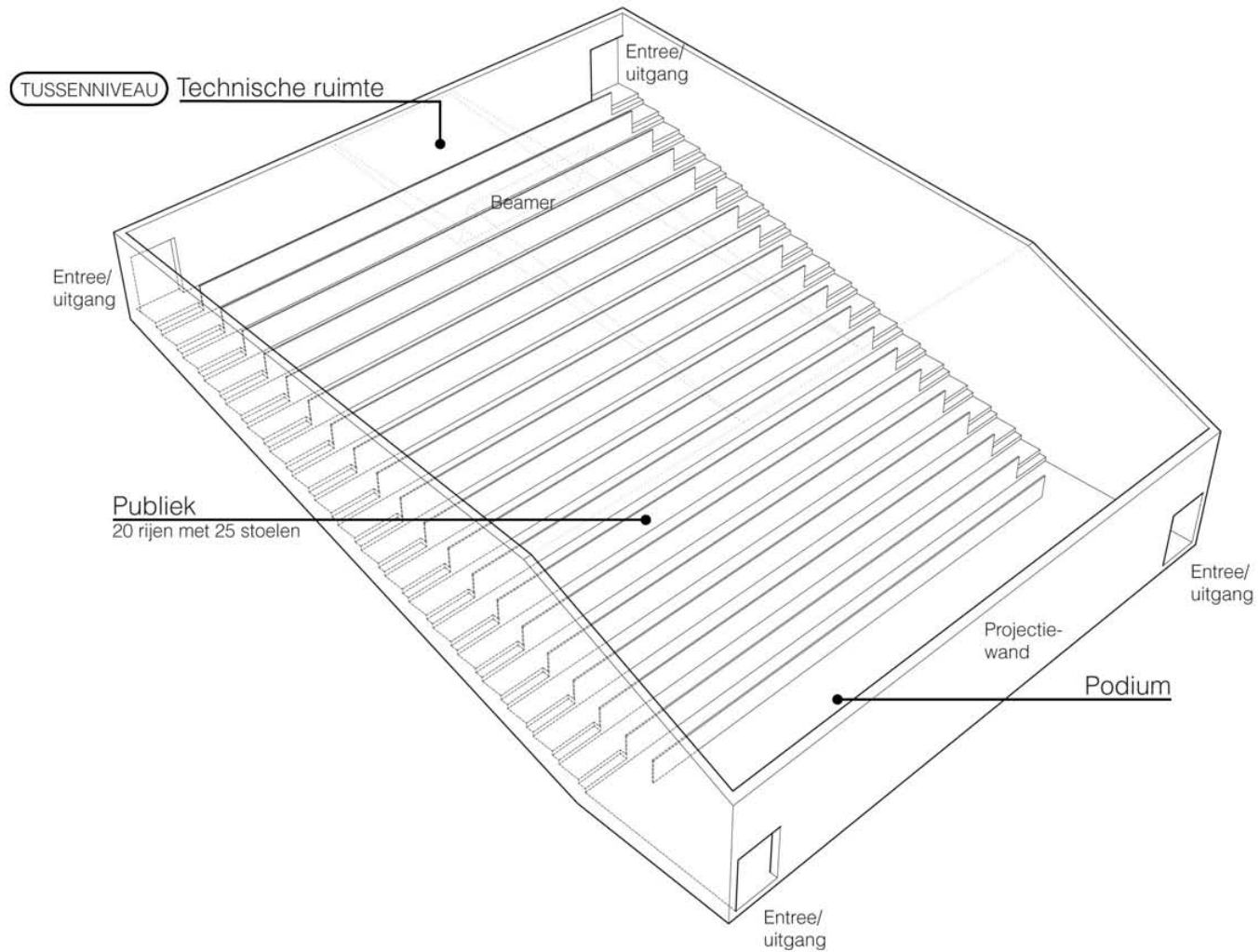
AKOESTISCH BETON

## Onderzoeksvraag

Hoe kan in een ruimte door uitsluitend gebruik te maken van beton voor de afwerking een voor de specifieke functie goede akoestiek worden gerealiseerd?

# Akoestiek

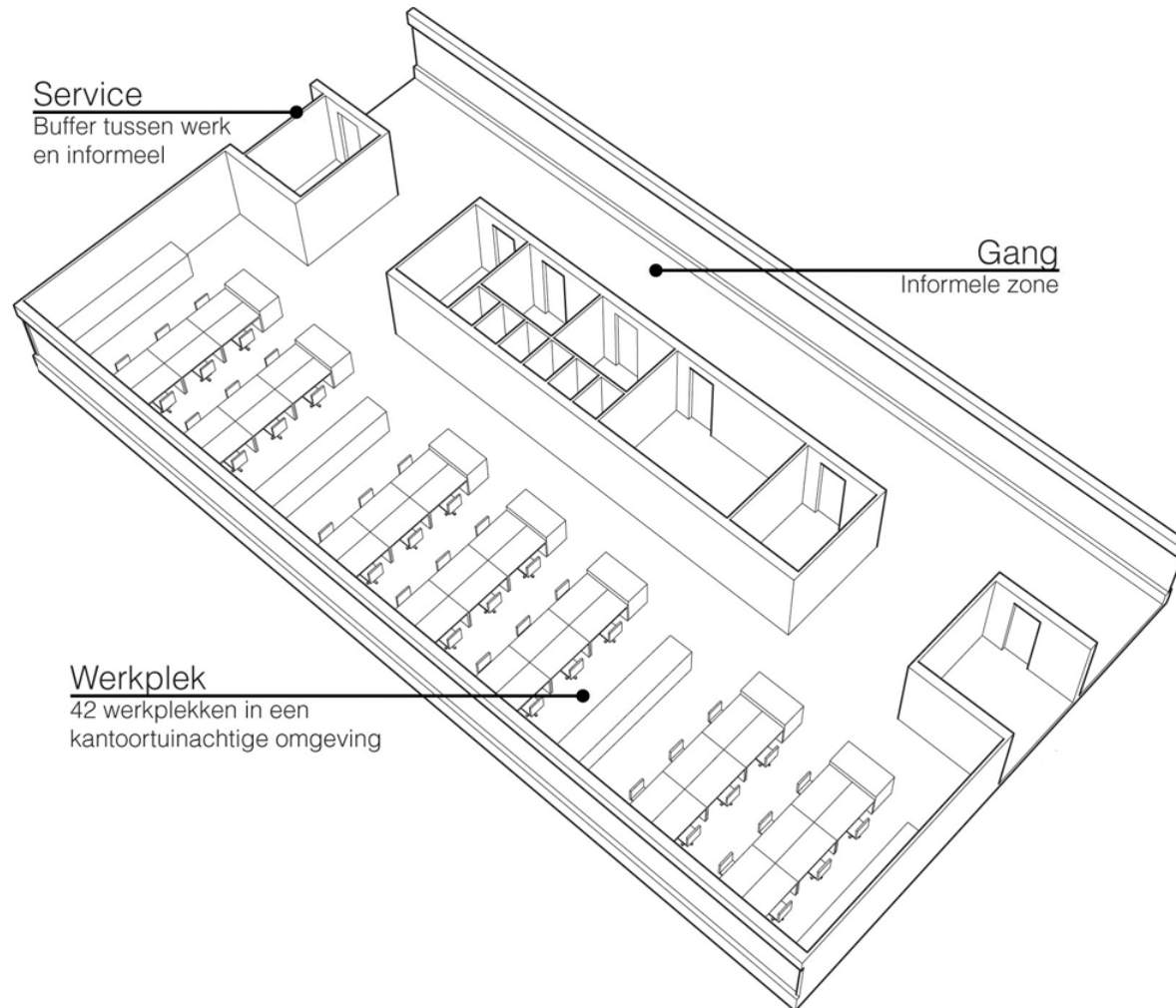
## Auditorium





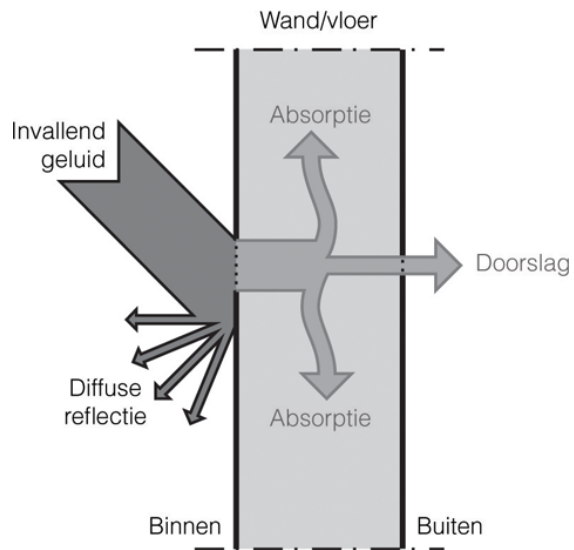
# Akoestiek

## Werkplek

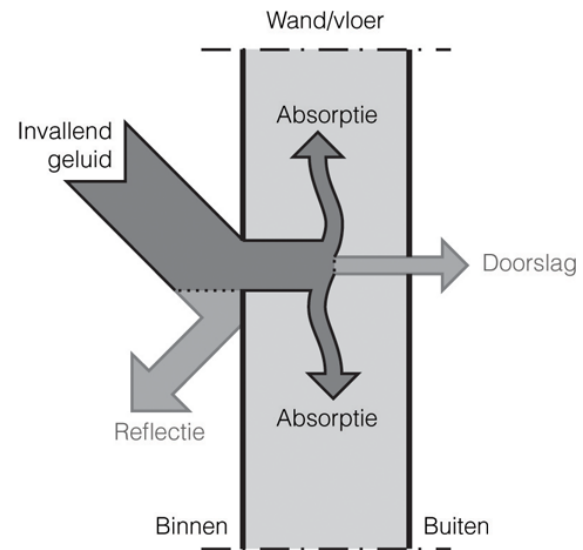


# Proefstukken

## Diffuse geluidsreflectie

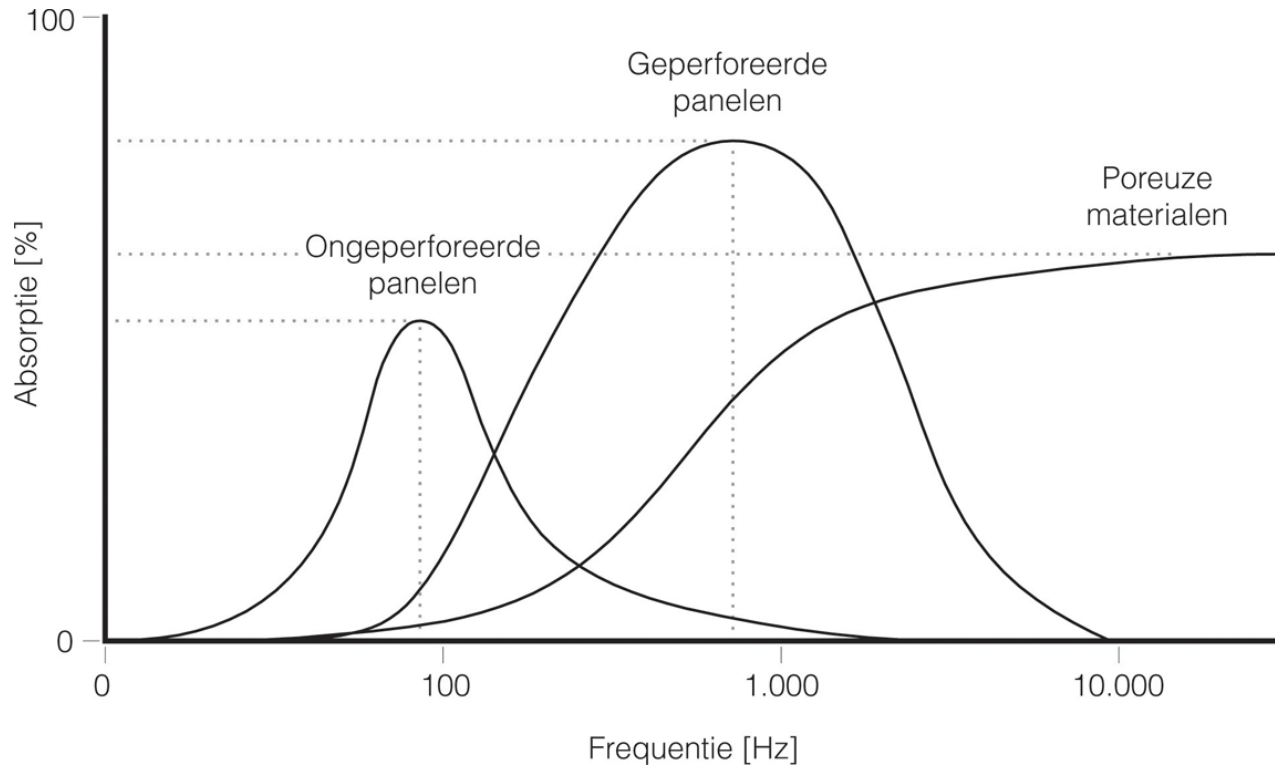


## Geluidsabsorptie



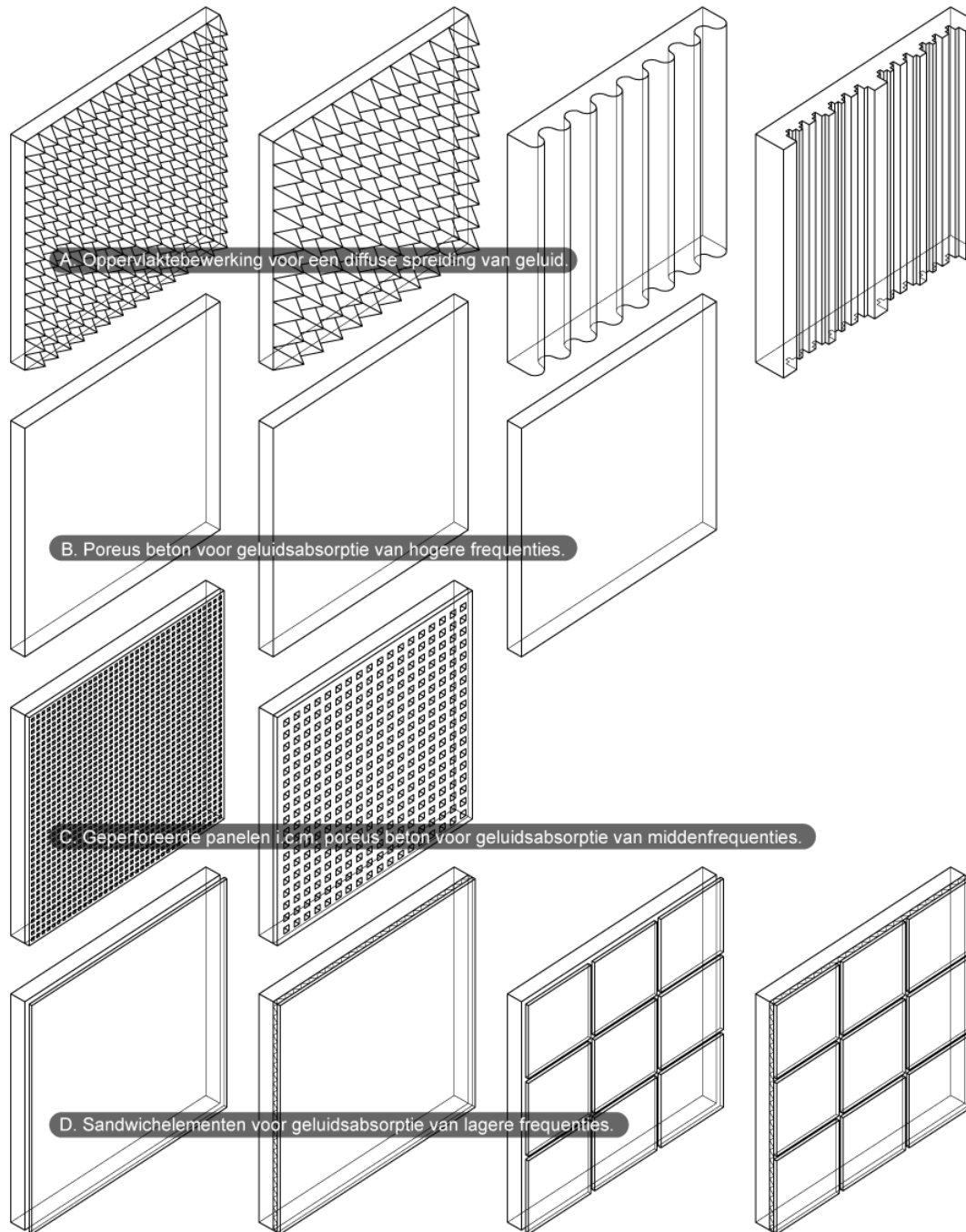
# Proefstukken

## Karakteristieke absorptiespectra van paneelconstructies



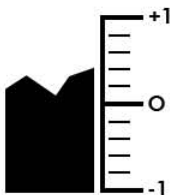
# Proefstukken

## Overzicht ontwerpen





Het verdichten van poreus beton d.m.v. aanstampen is zeer **arbeidsintensief**.



Door het handmatig aanstampen kunnen **onnauwkeurigheden** ontstaan.



# Proefstukken

Poreus beton





# Proefstukken

Poreus beton, achteraf gezandstraald





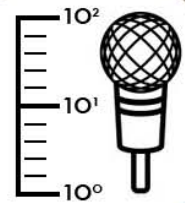
# Proefstukken

Geperforeerd beton i.c.m. poreus beton



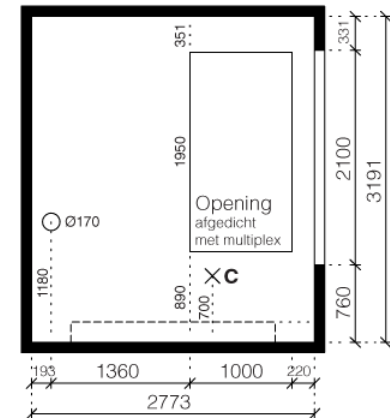
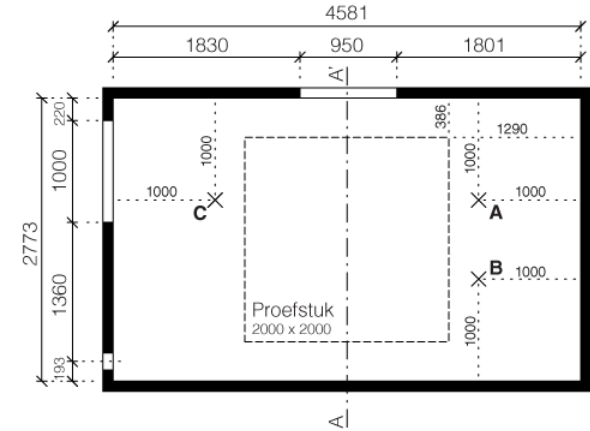
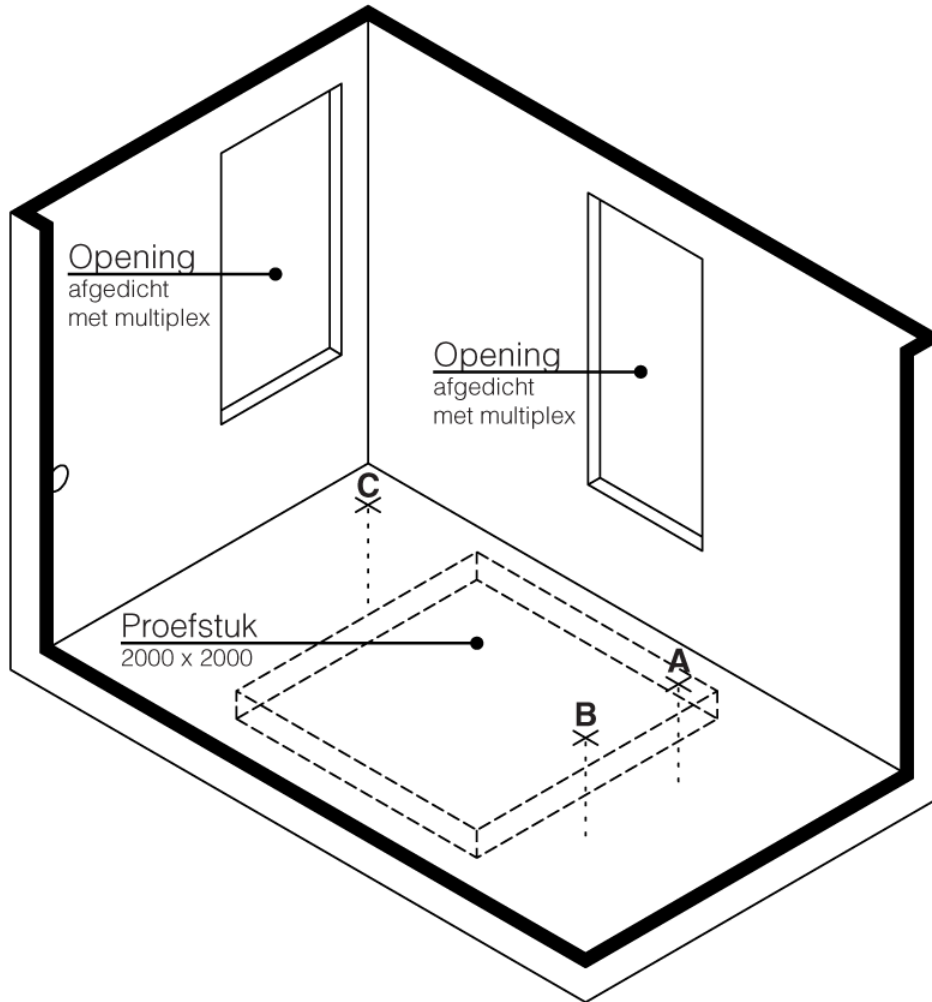


De gebruikte **nagalmkamer** is een glasvezelhuis, op het moment van meten in productie bij Westo, met 10 cm dikke betonnen muren en een volume van 28 m<sup>3</sup>.



# Metingen

## Meetruimte



# Metingen

Meetopstelling

**Geluidsbron**  
Ballon



**Geluidsniveaumeter**  
Norsonic Nor140

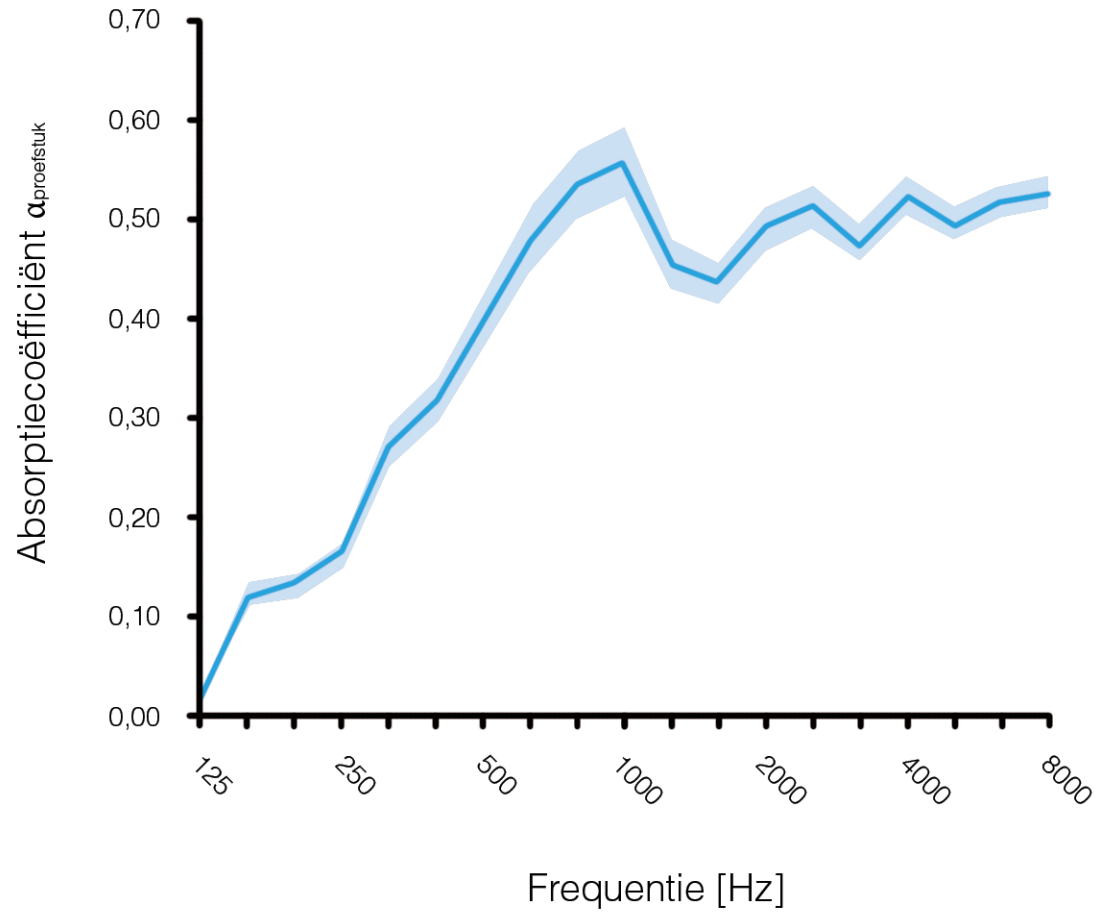


**Proefstuk**  
Positie proefstuk



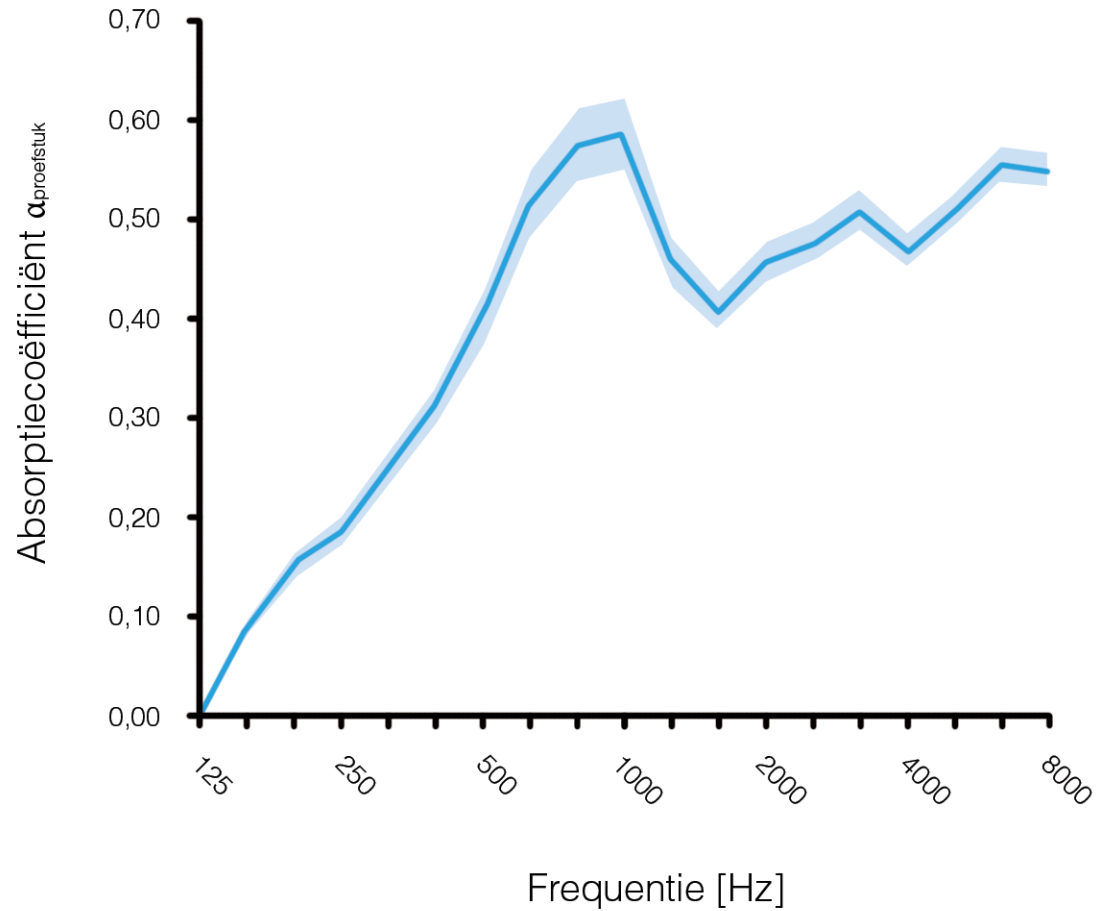
# Metingen

Poreus beton



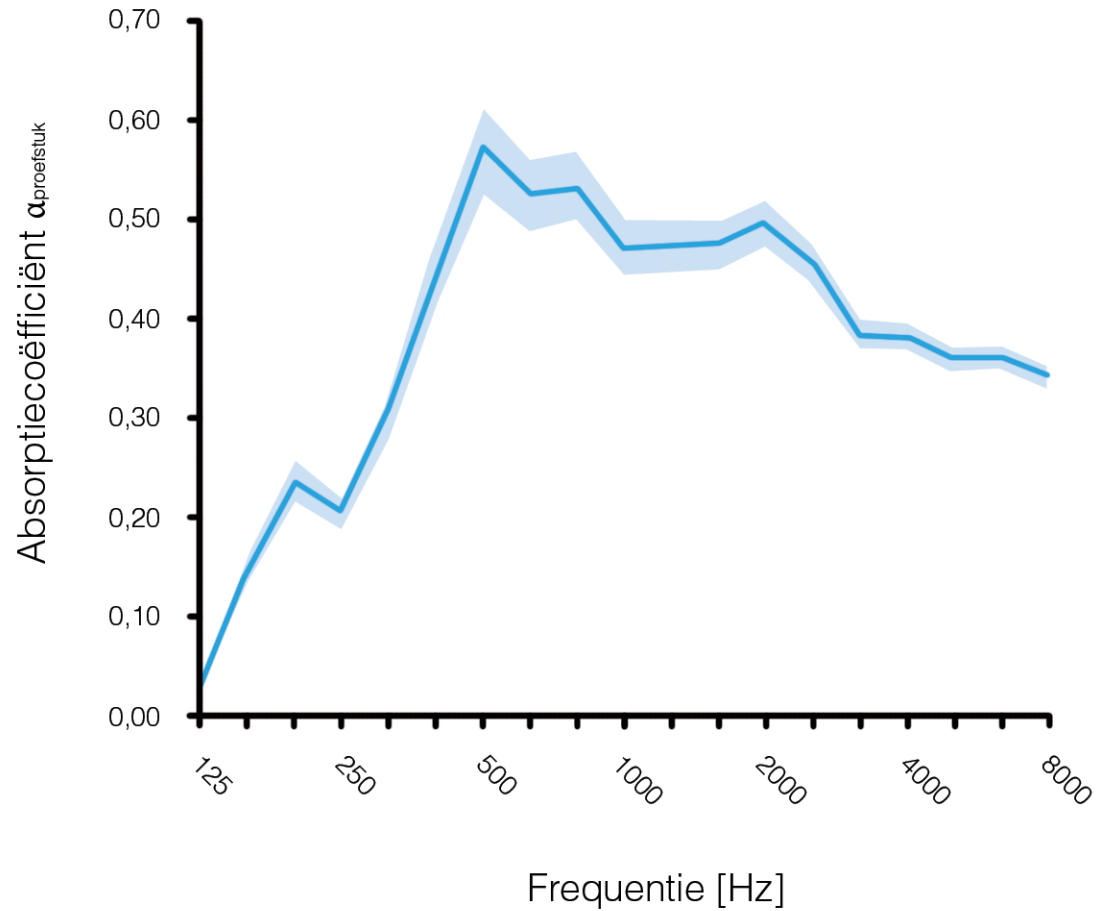
# Metingen

Poreus beton, achteraf gezandstraald



# Metingen

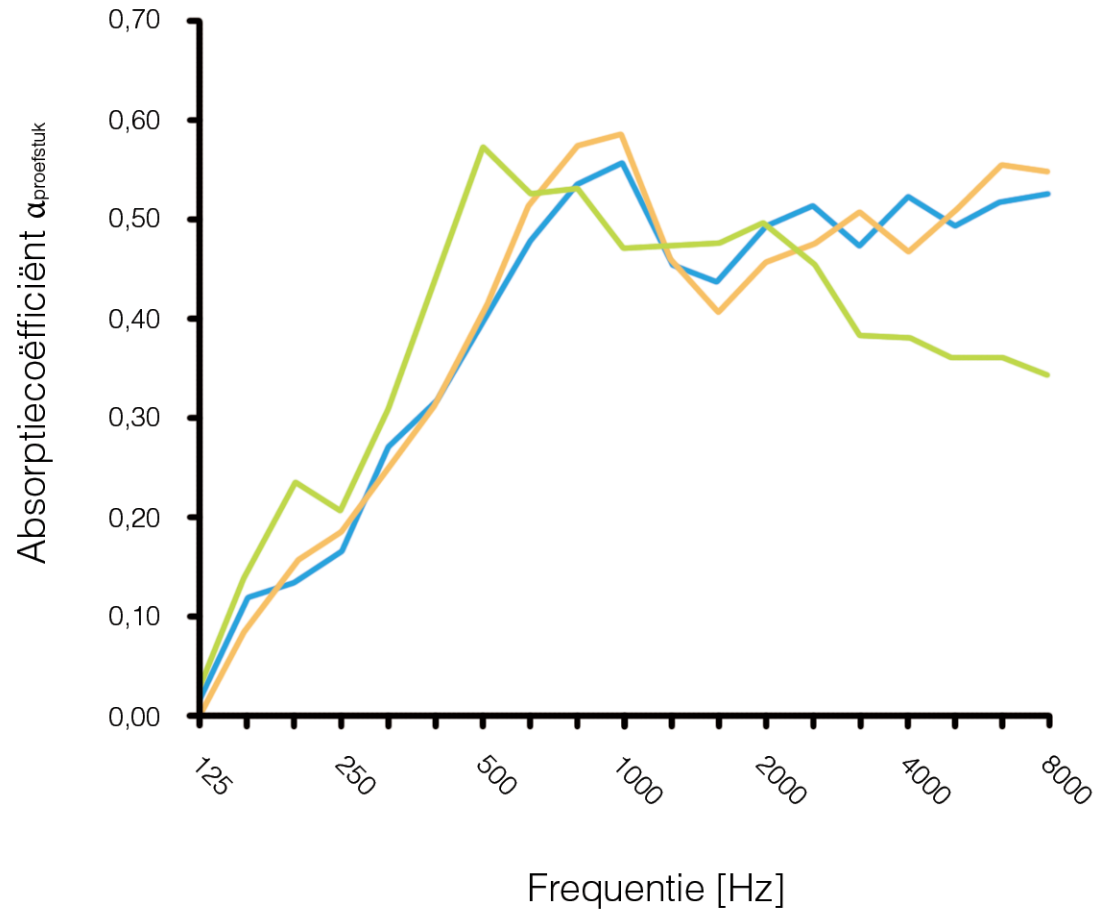
Geperforeerd beton i.c.m. poreus beton





# Metingen

## Absorptiespectra



# **ARCHITECTUUR**

## FACULTEIT DER BOUWKUNDE

# Masterplan

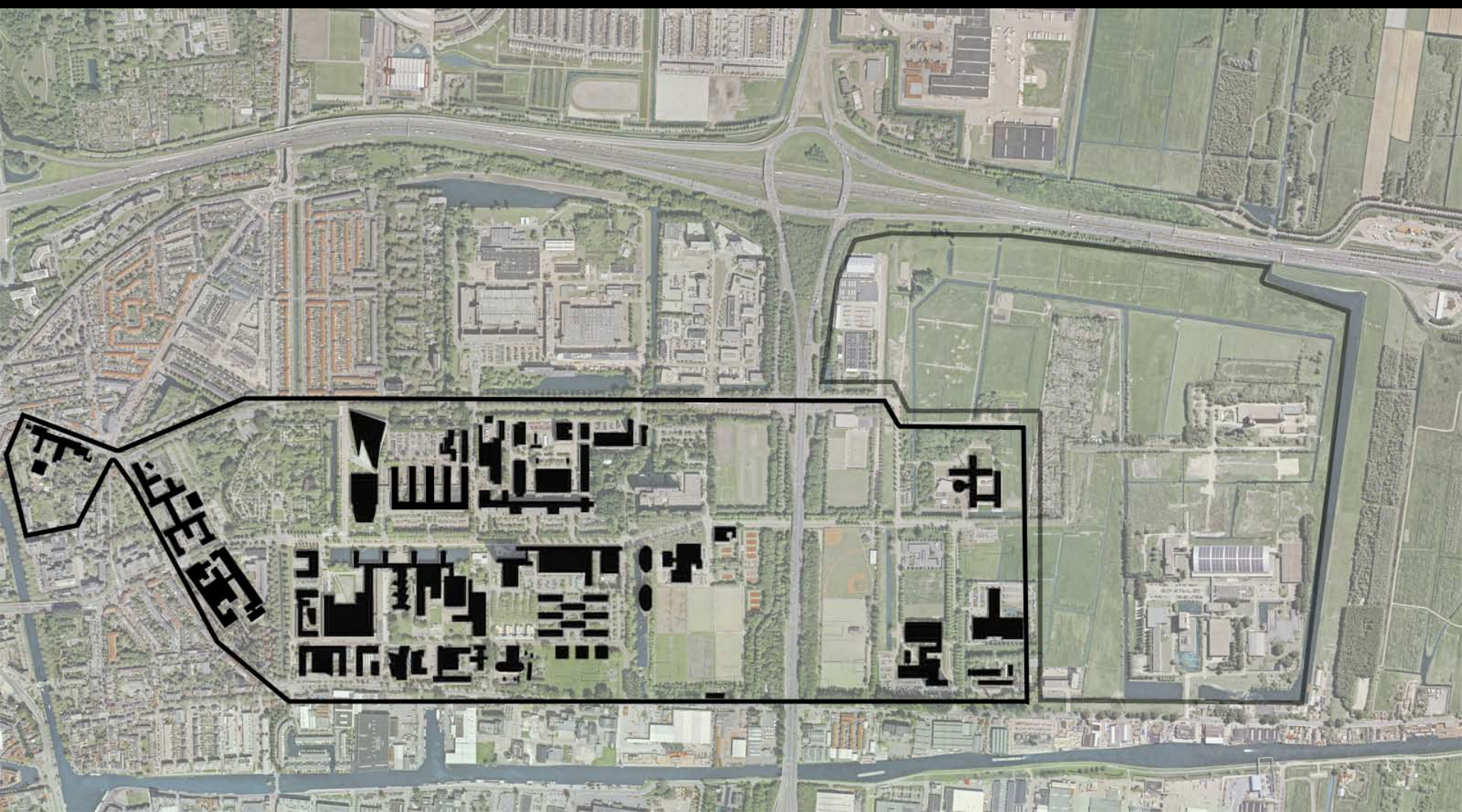
Huidige situatie





# Masterplan

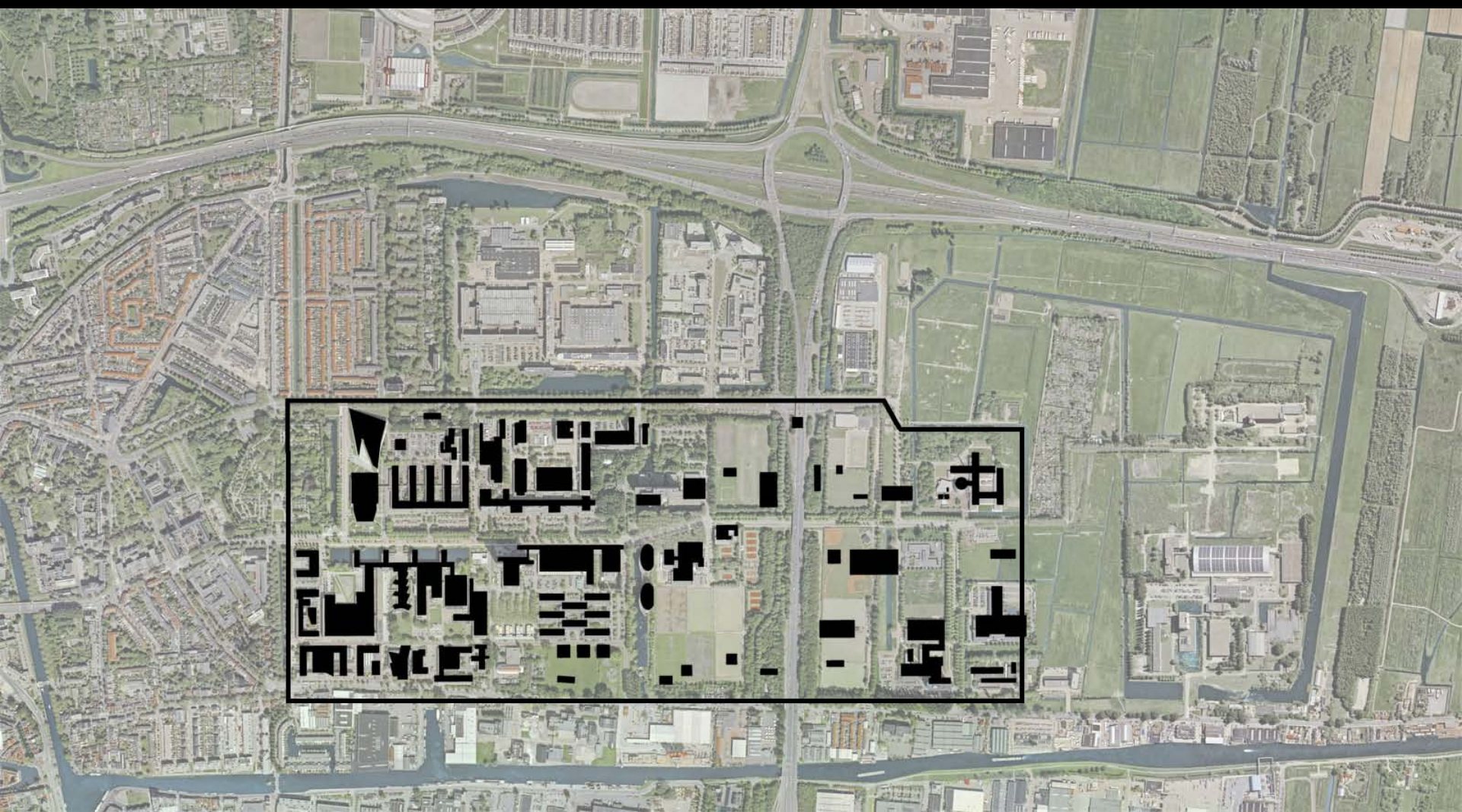
## Spreiding faculteiten





# Masterplan

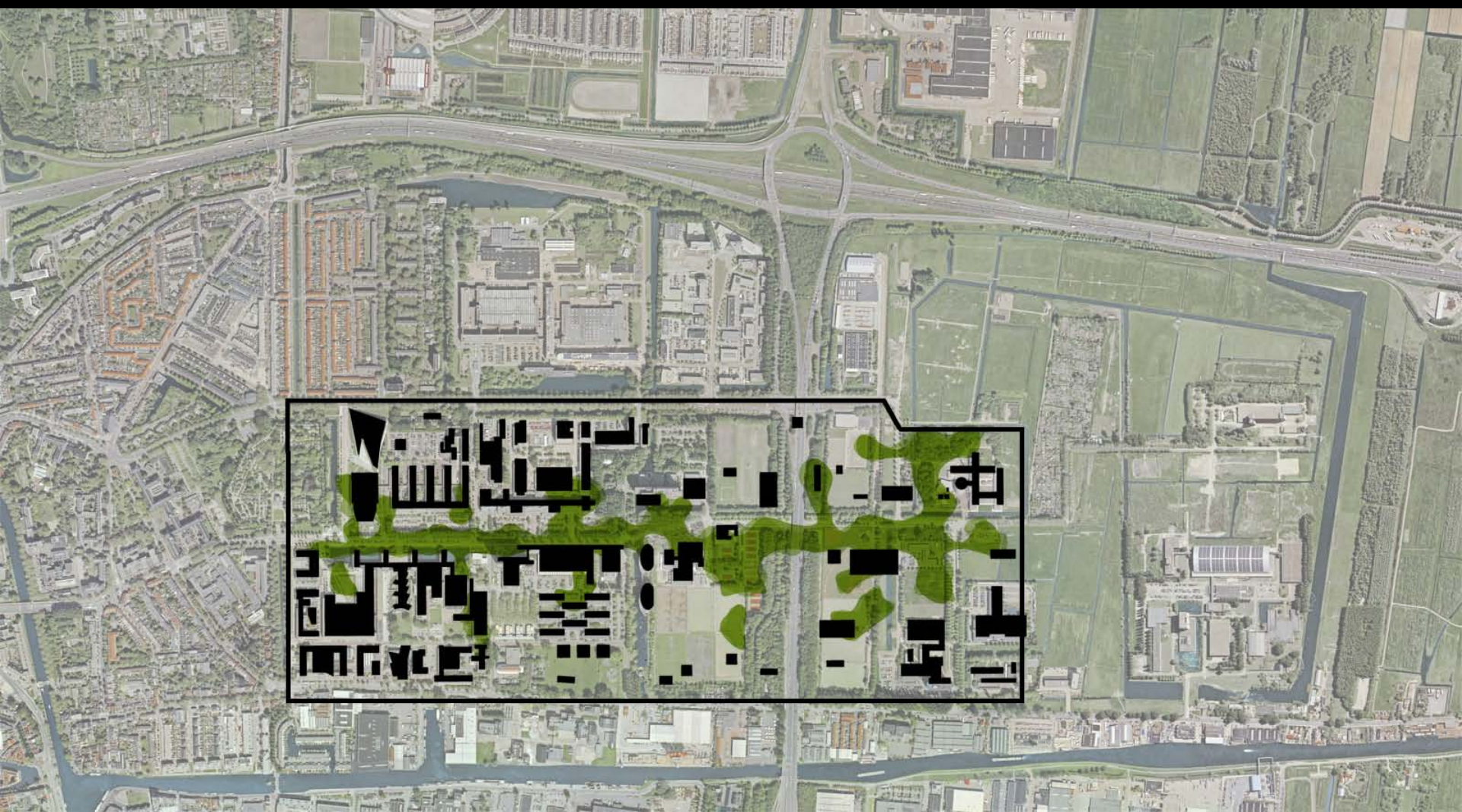
Creëren van een centrale campus





# Masterplan

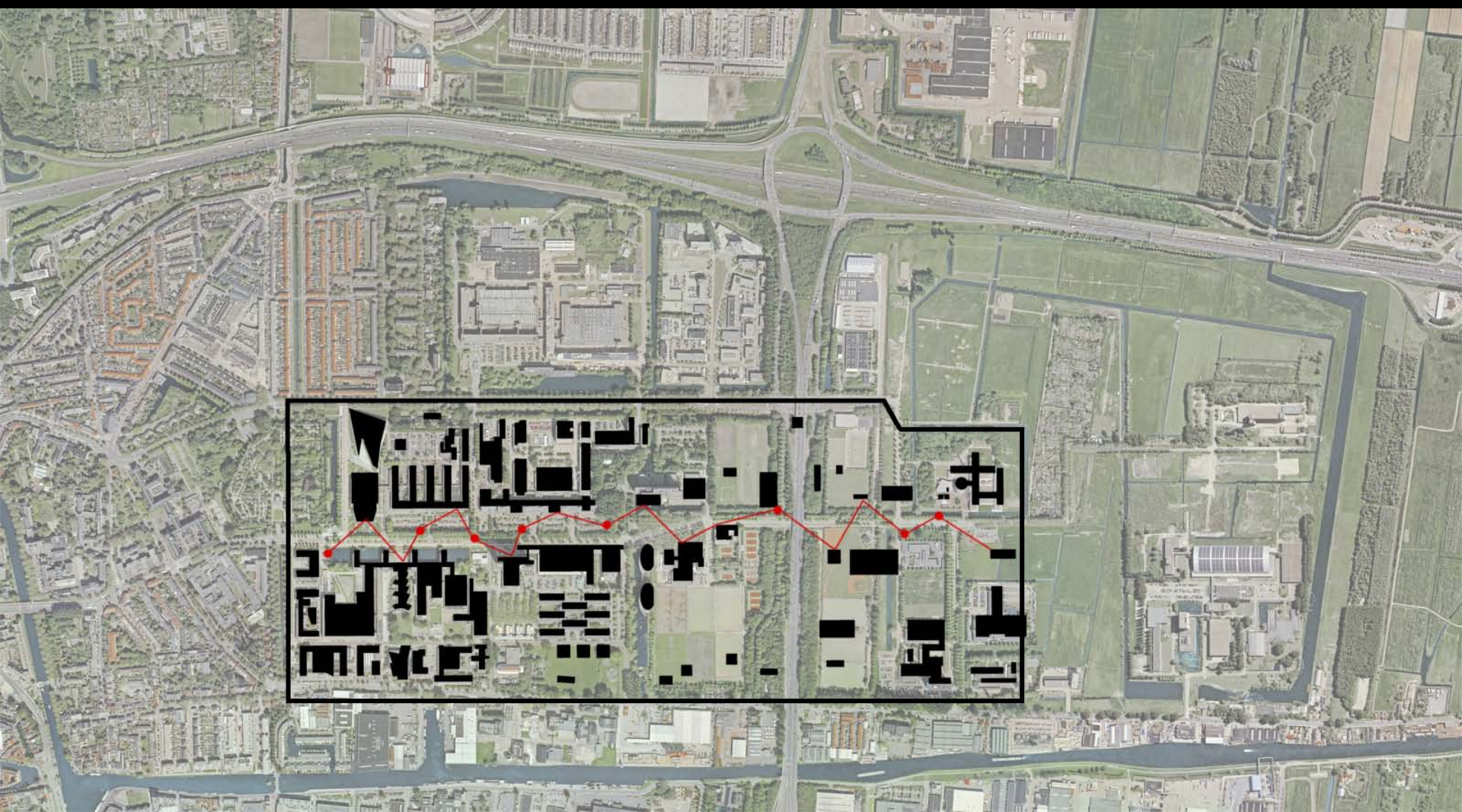
## Groenstructuur van het Mekelpark





# Masterplan

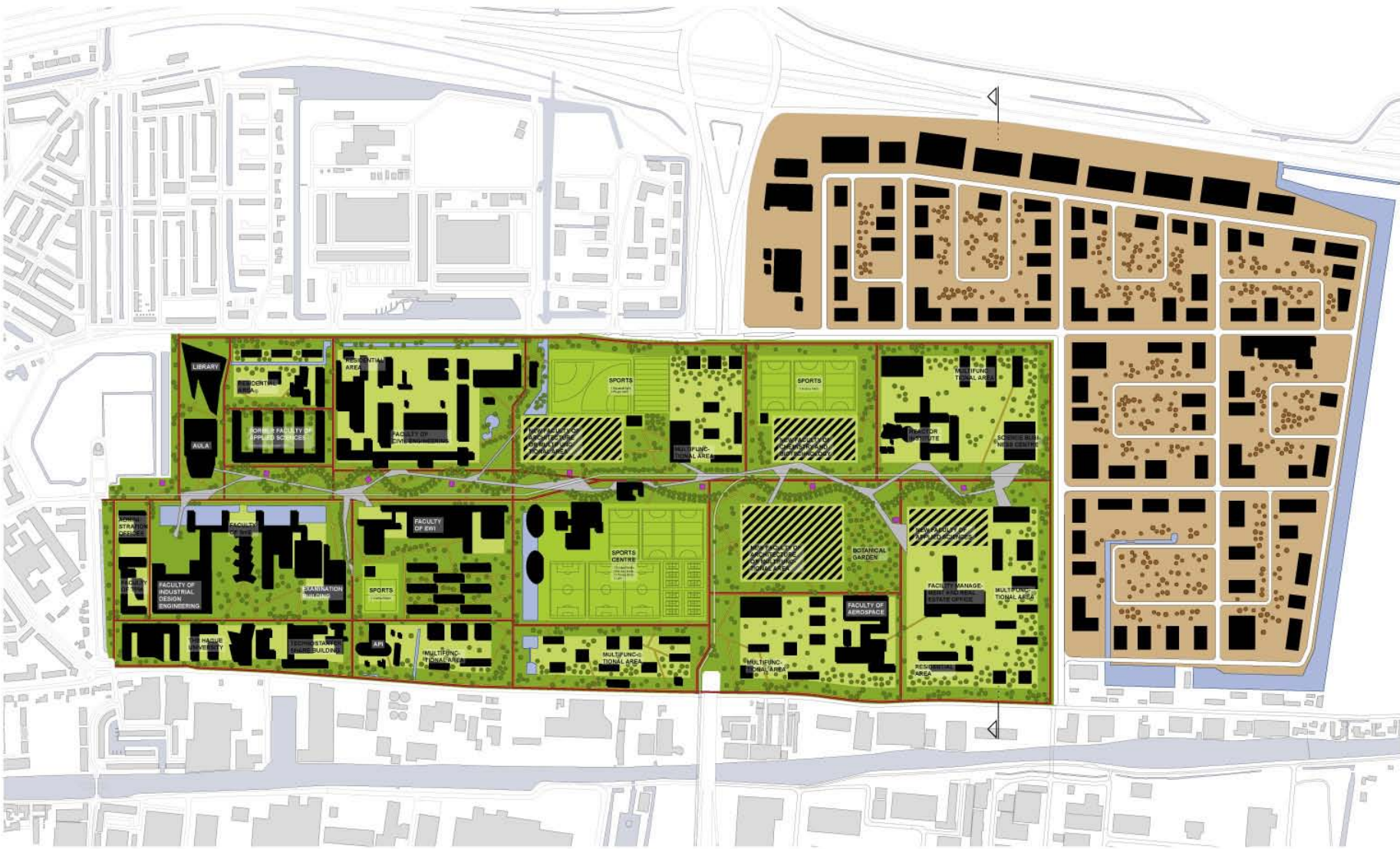
Verbinden van de faculteiten aan het Mekelpark





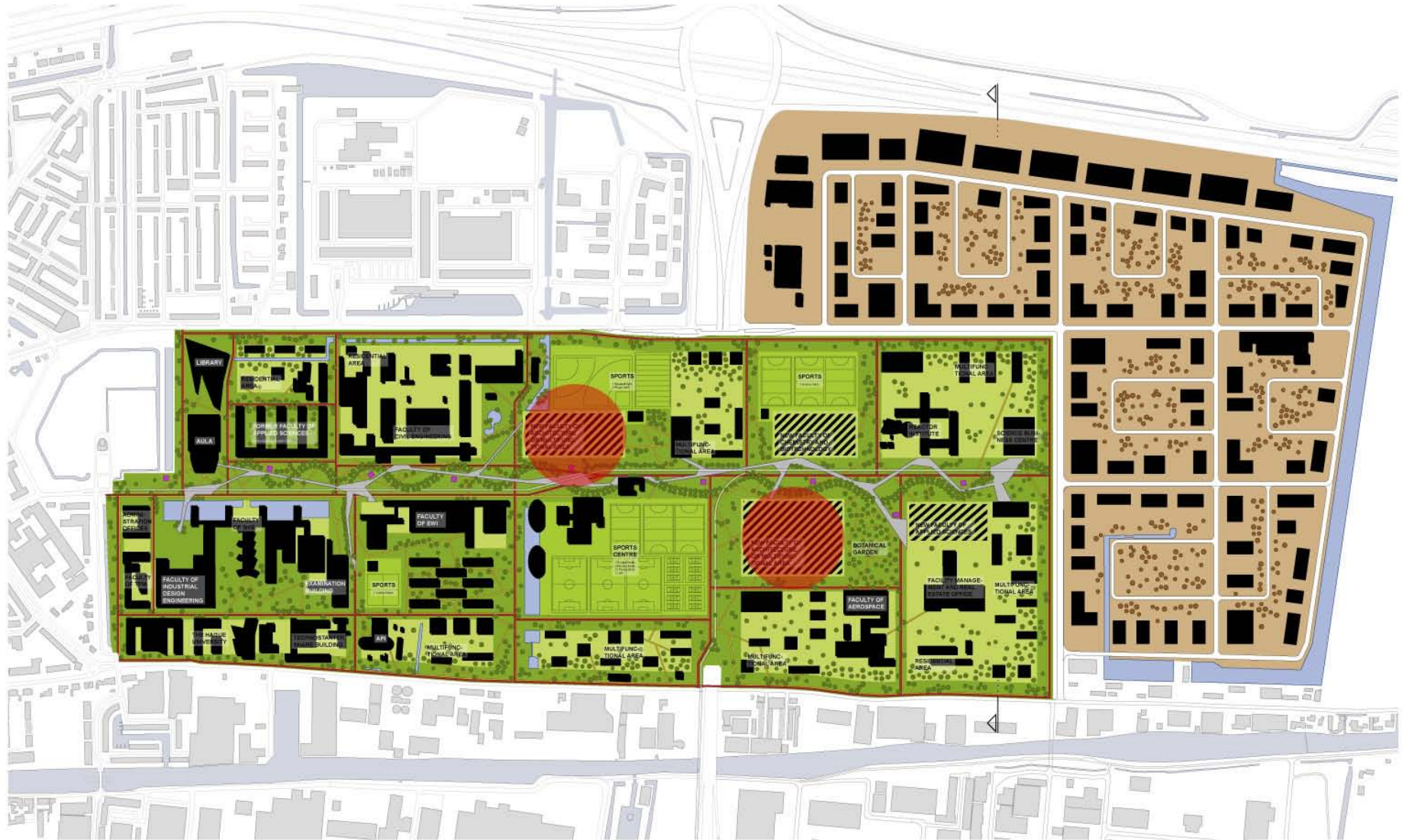
# Masterplan

Ontwerp



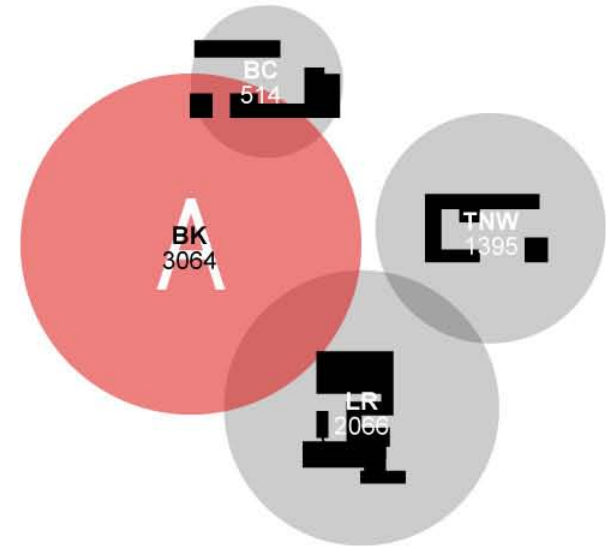
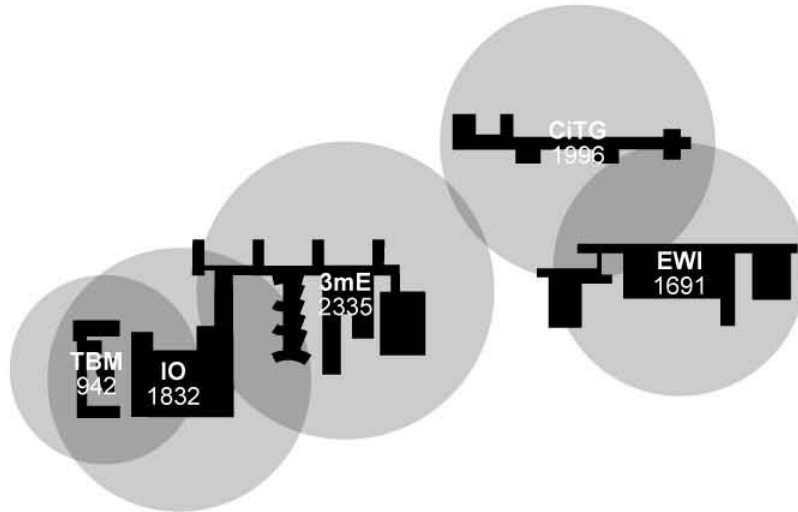
# Masterplan

Mogelijke locatie nieuwe Bouwkunde faculteit



# Masterplan

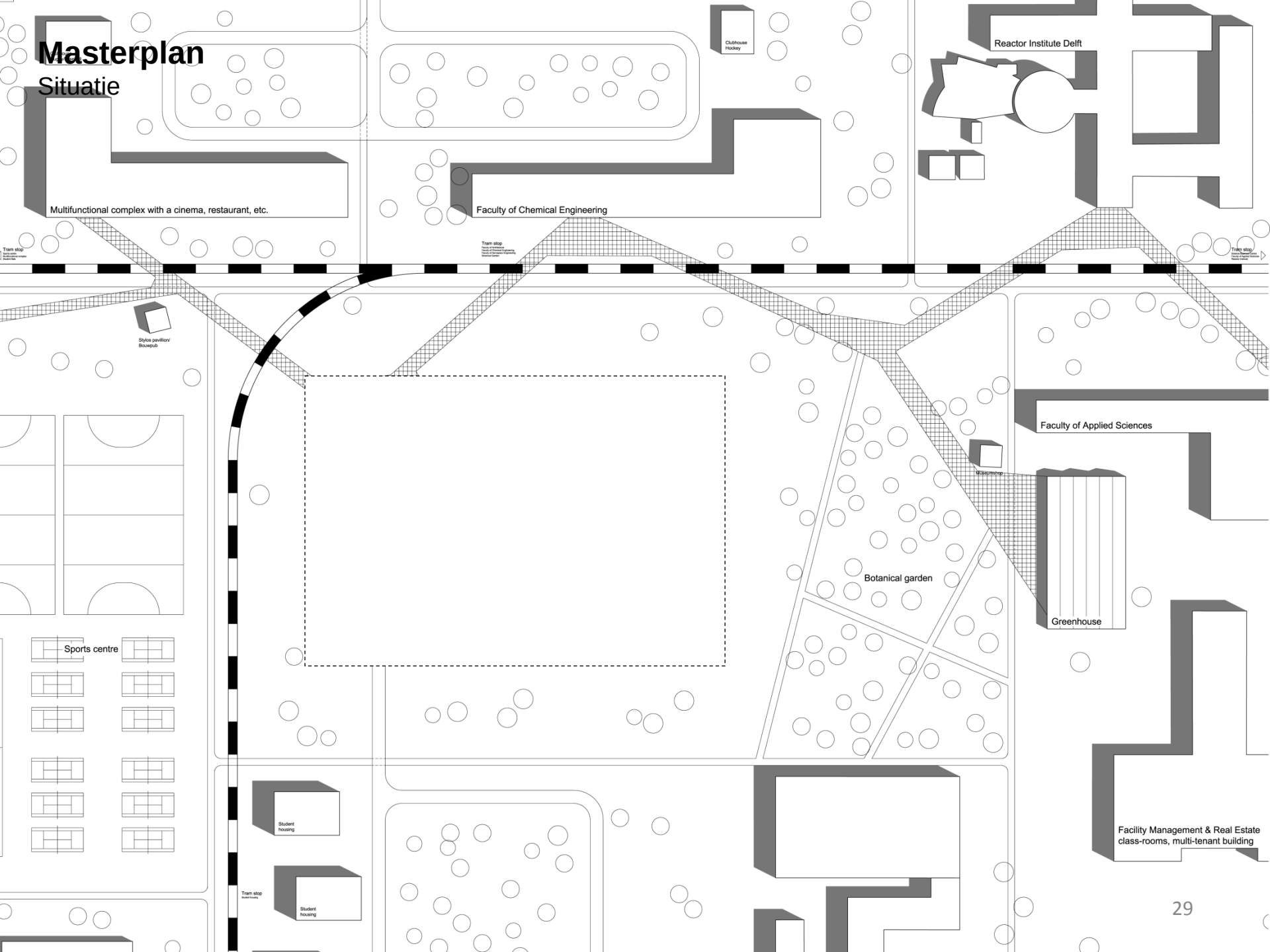
## Studentenpopulatie





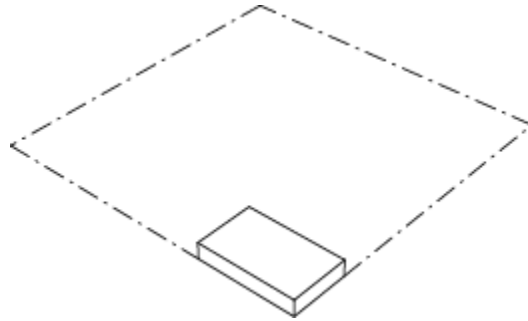
# Masterplan

## Situatie



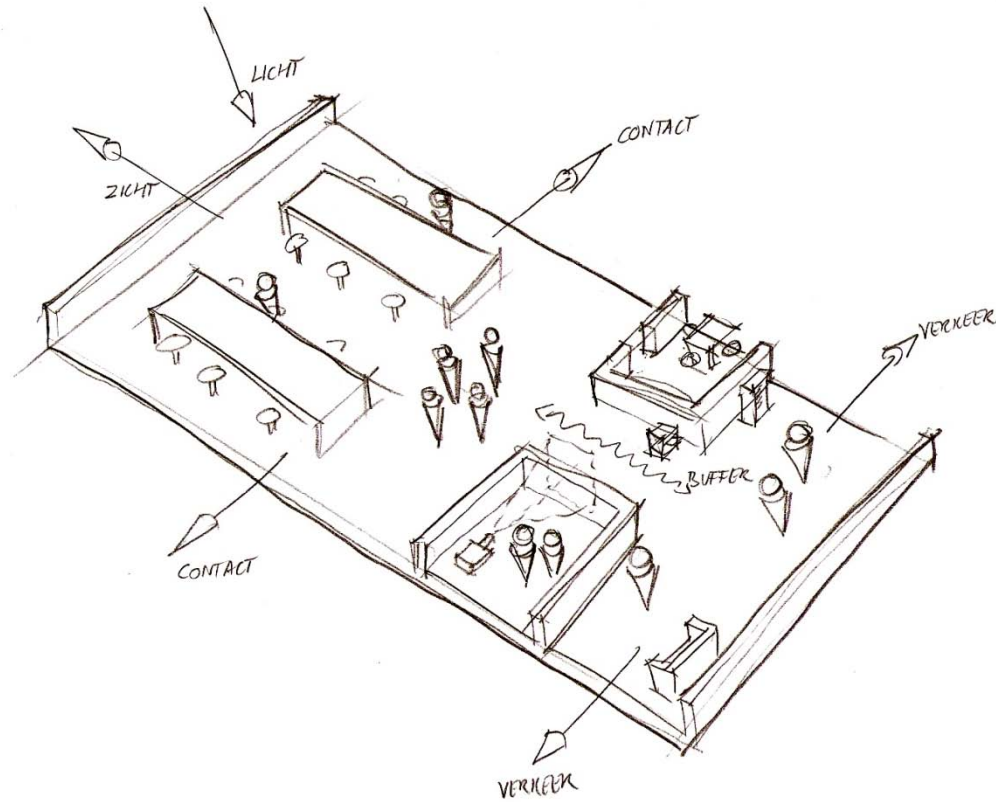
# Design development

Onderzoek naar de ideale studio



# Design development

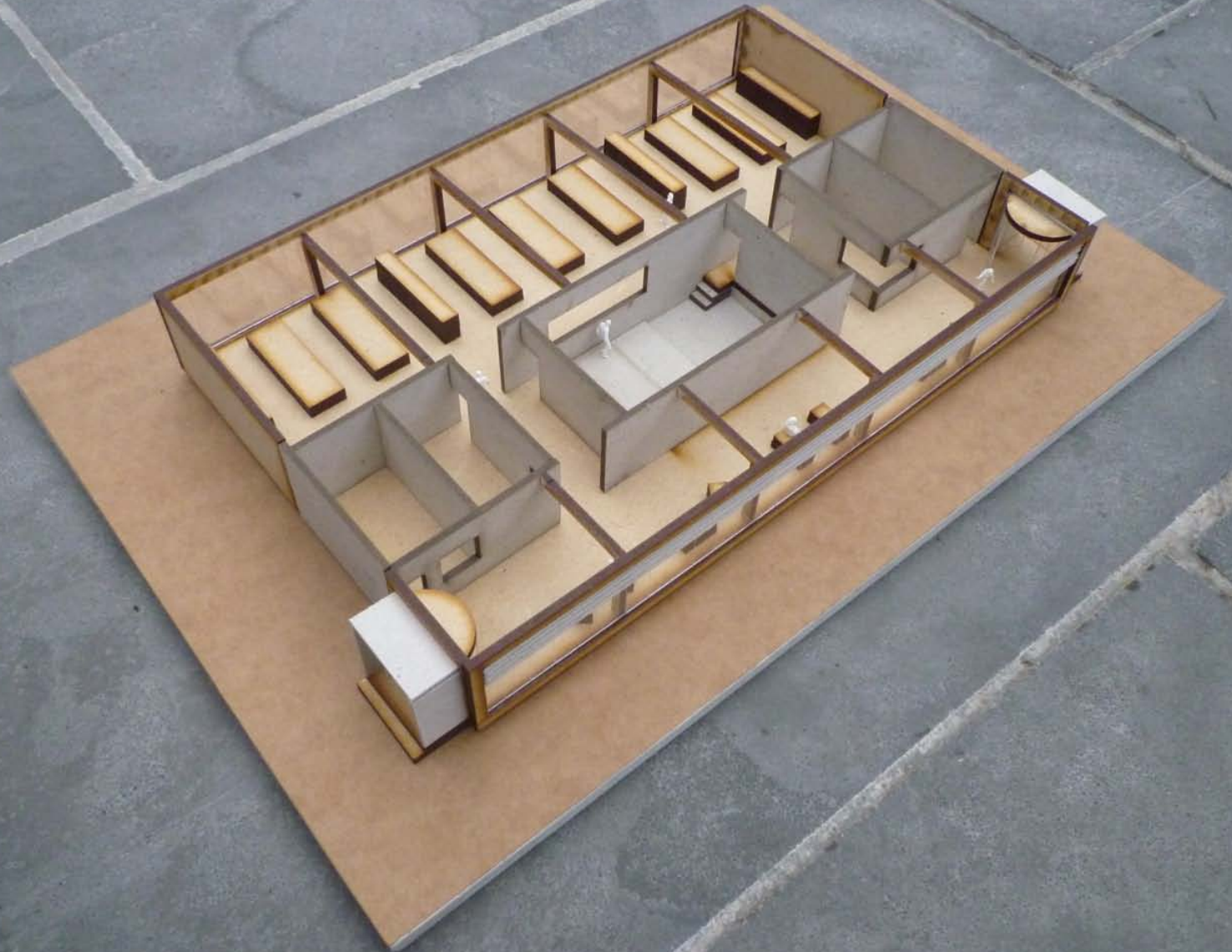
Onderzoek naar de ideale studio





# Design development

## Ontwerpmodule





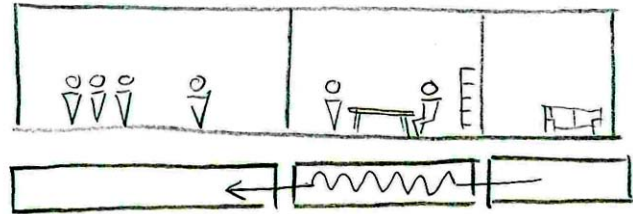
# Design development

Ontwerpmodule

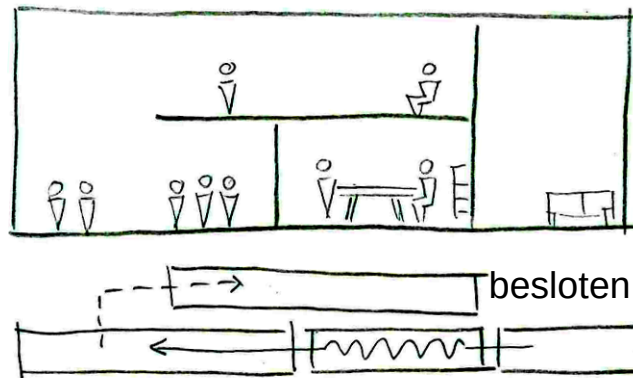


# Design development

Transformatie van de doorsnede



werkrumte | service | informeel



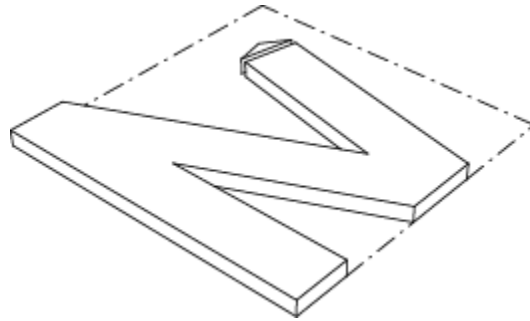
besloten werkrumte

werkrumte | service | informeel



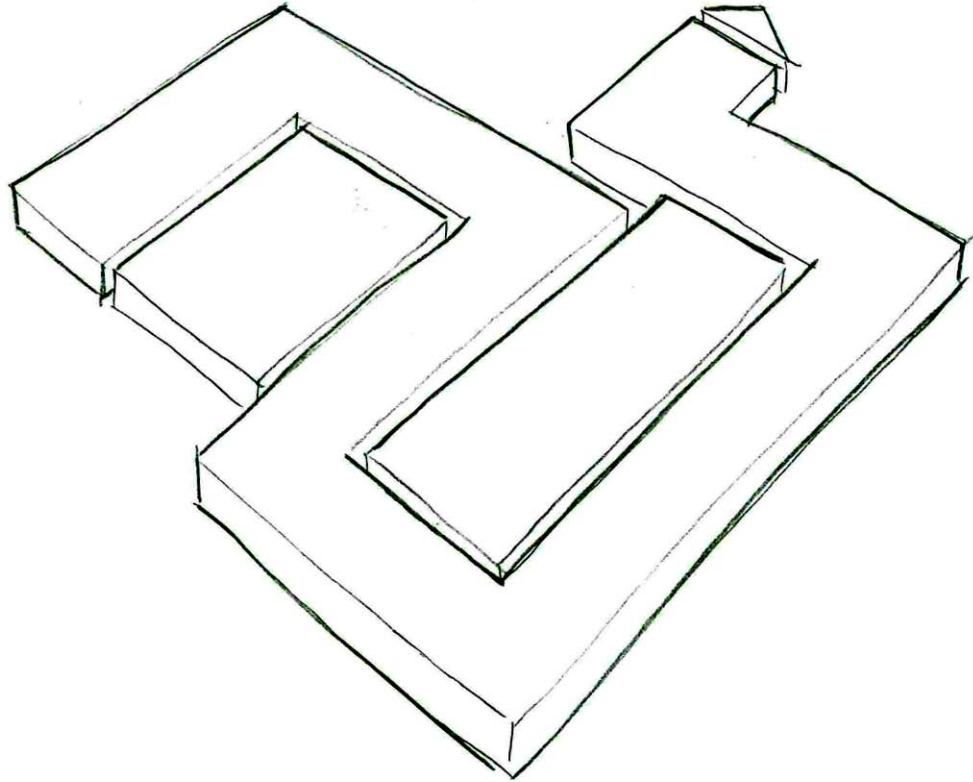
# Design development

Extrusie van de module



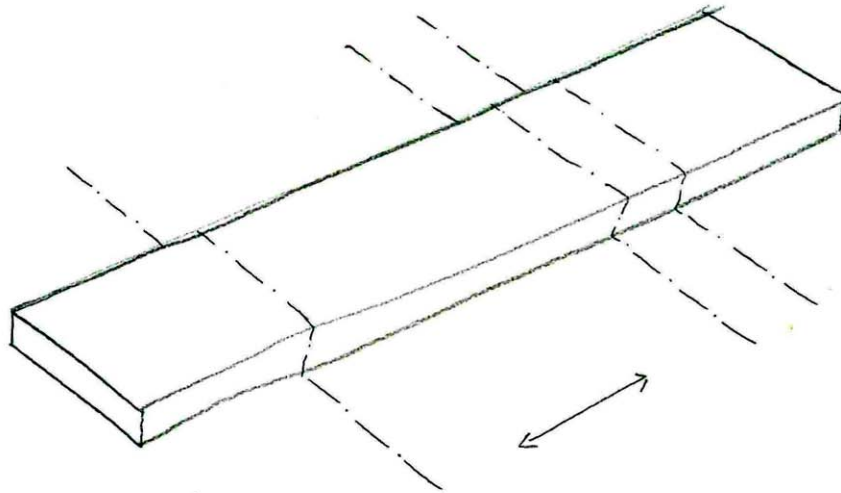
# Design development

Inpassen van grote functies



## Design development

Indeling is variabel in de lengterichting





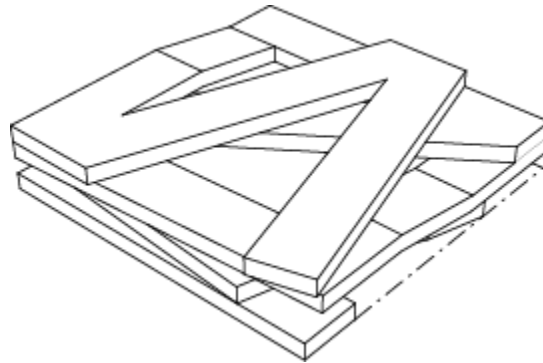
# Design development

Effect van extrusie



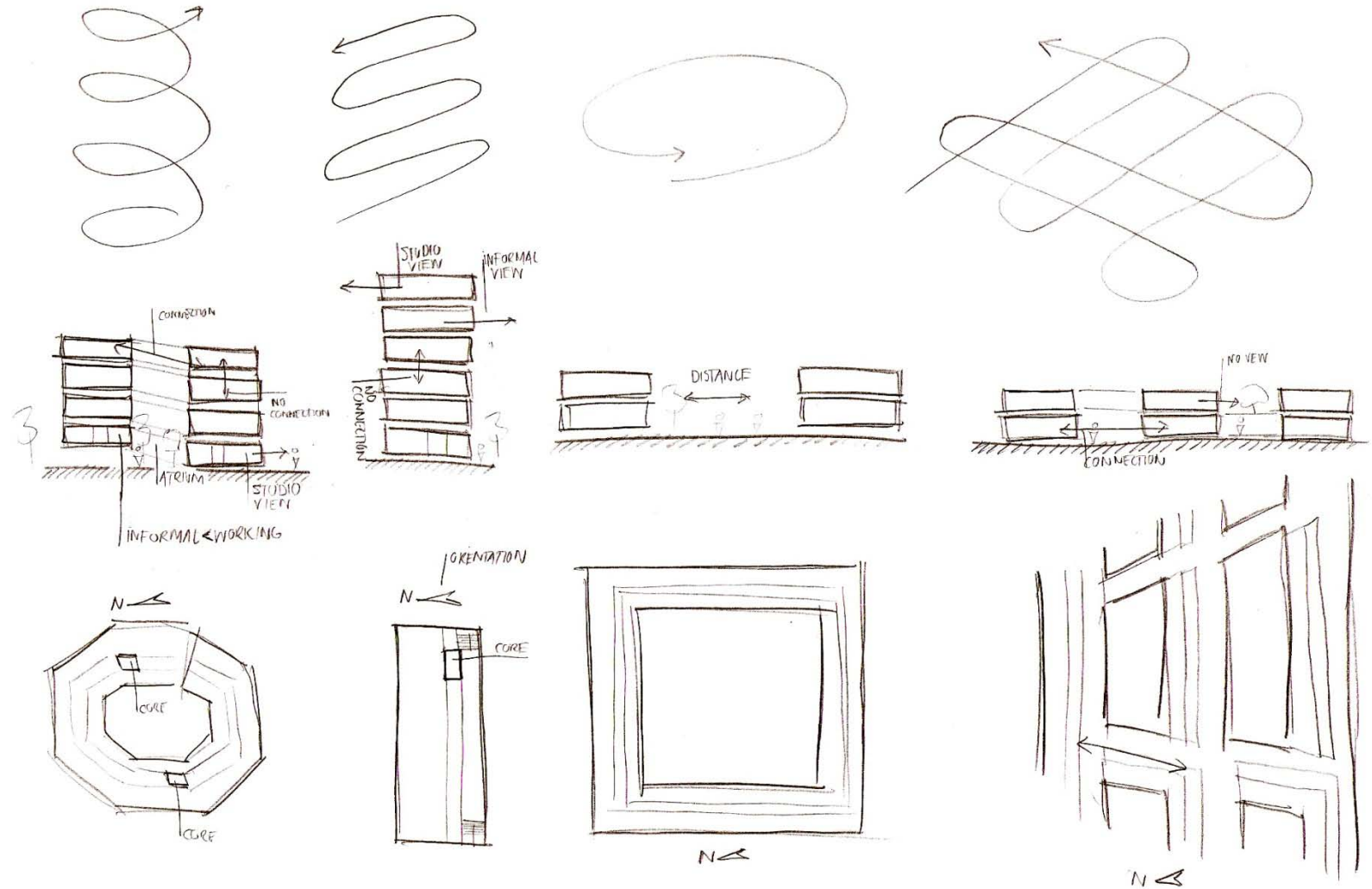
# Design development

Organiseren van de extrusie



# Design development

## Typologie van extrusie



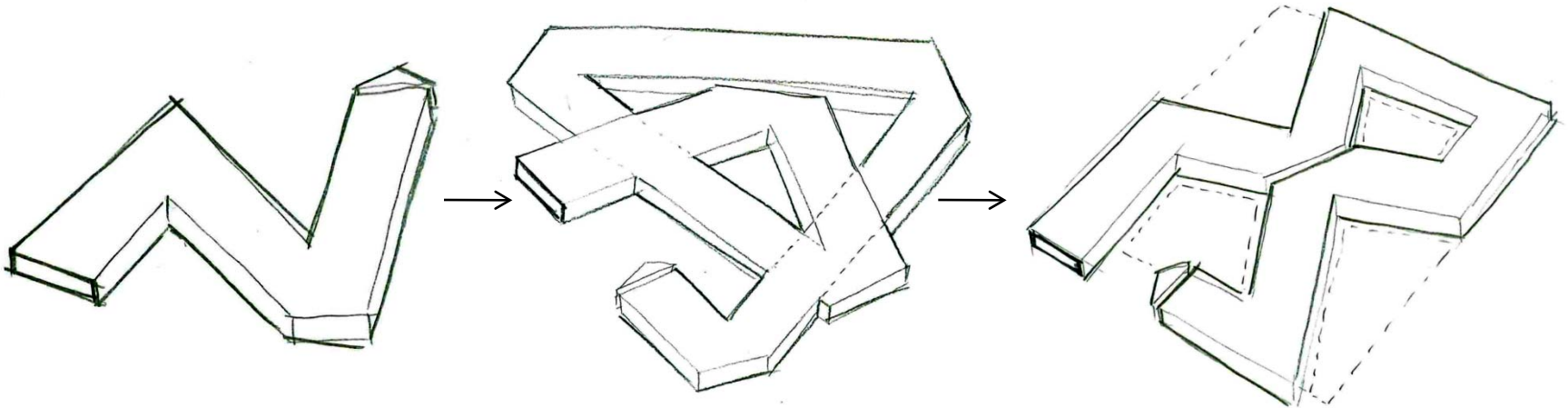
high-rise

low-rise



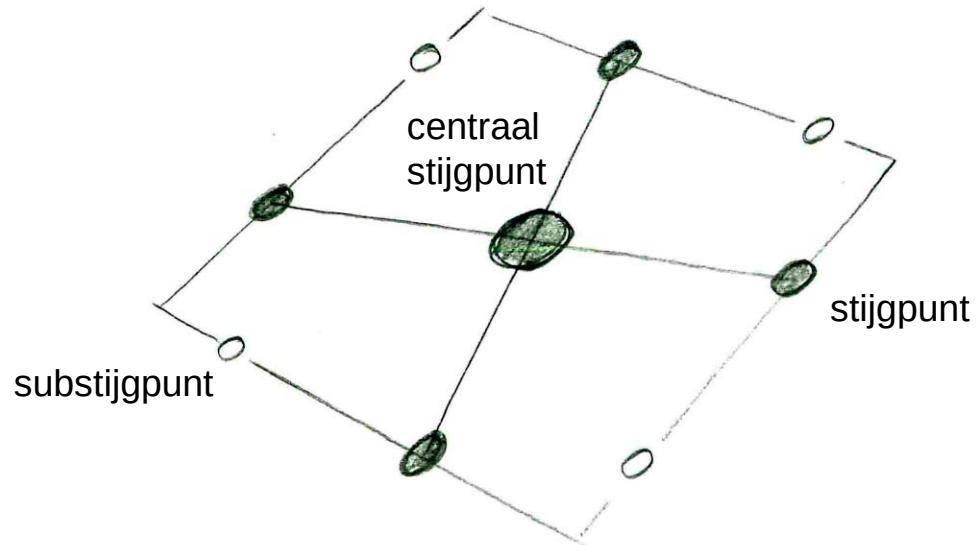
# Design development

Structurering van extrusie naar grid



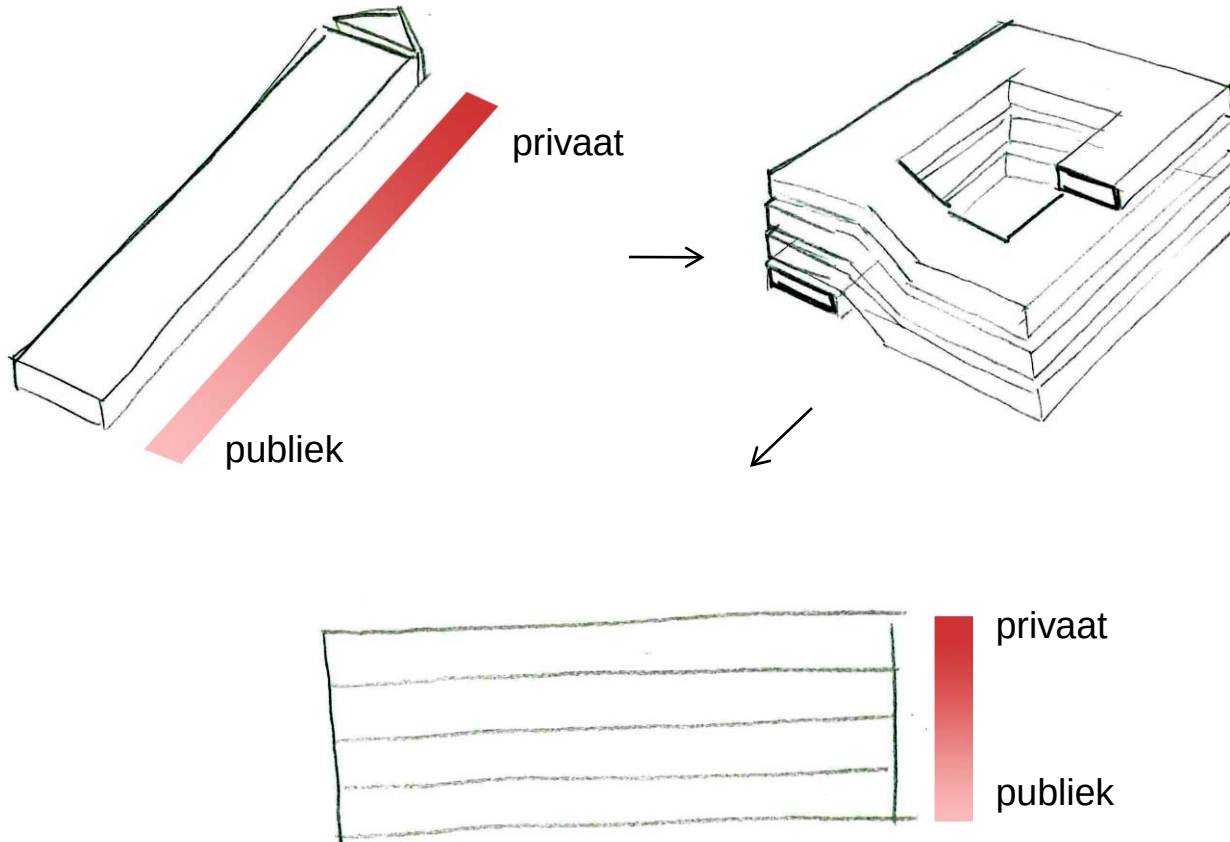
## Design development

Kruispunten vormen verticale stijgpunten  
en substijgpunten i.v.m. brandveiligheid



# Design development

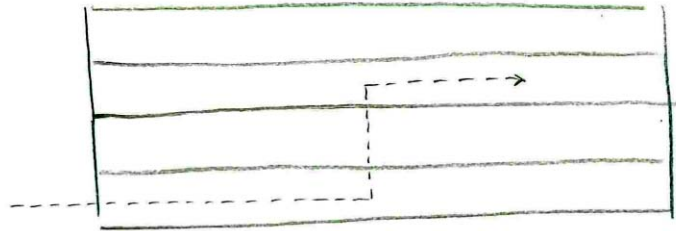
Organiseren van publieke en private ruimten





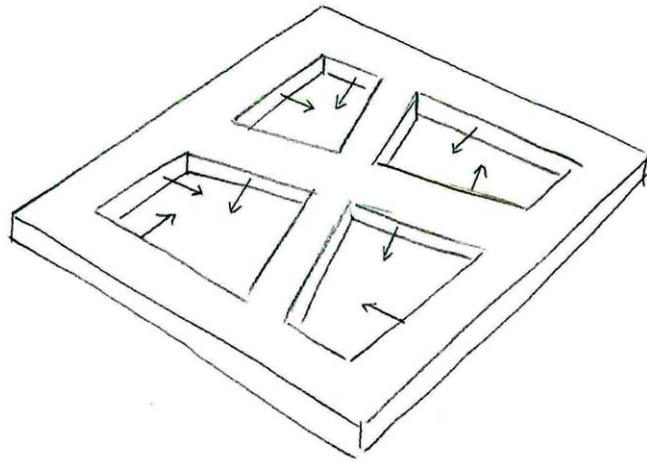
## Design development

Gridstructuur maakt verticale verplaatsing [kortere loopafstanden] mogelijk  
terwijl horizontale verplaatsing aanwezig blijft [zicht op studio's projecten]



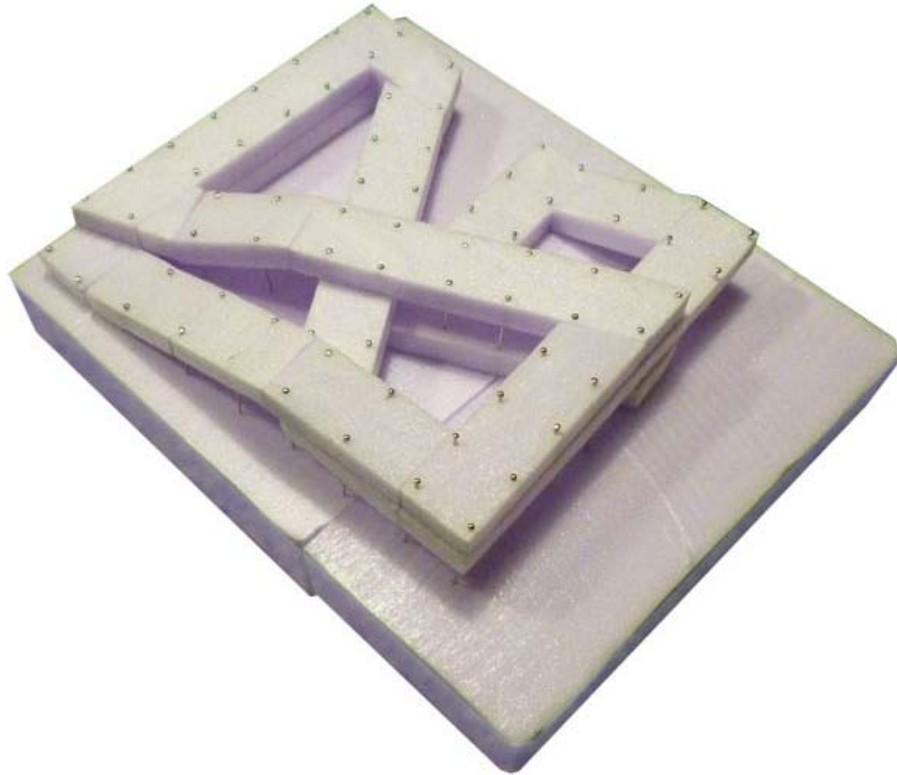
# Design development

Oriëntatie relateren aan verschillend vormgegeven atria



# Design development

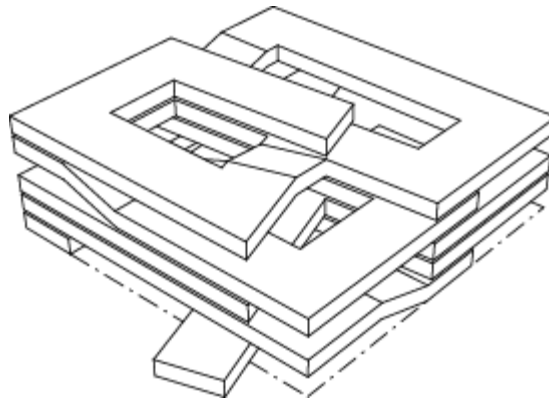
Basis voor structuur





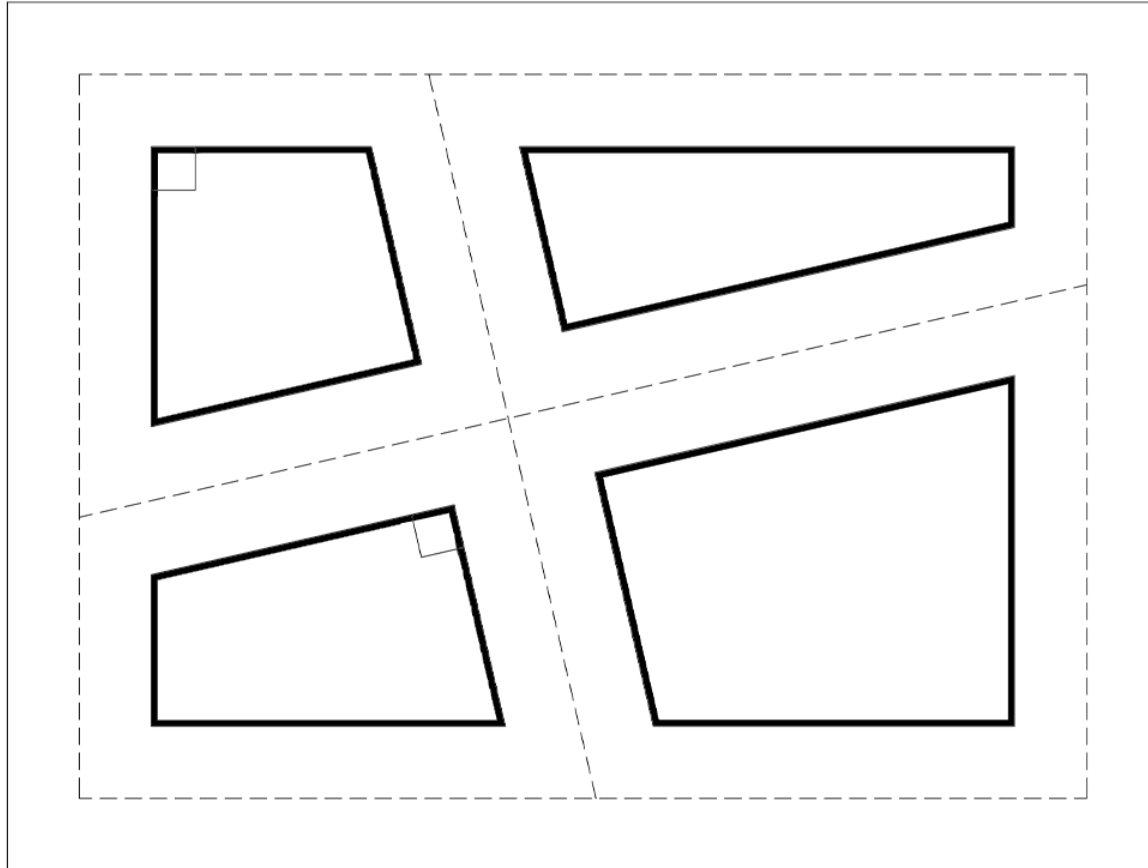
# Design development

Inpassen van extrusie concept in de situatie



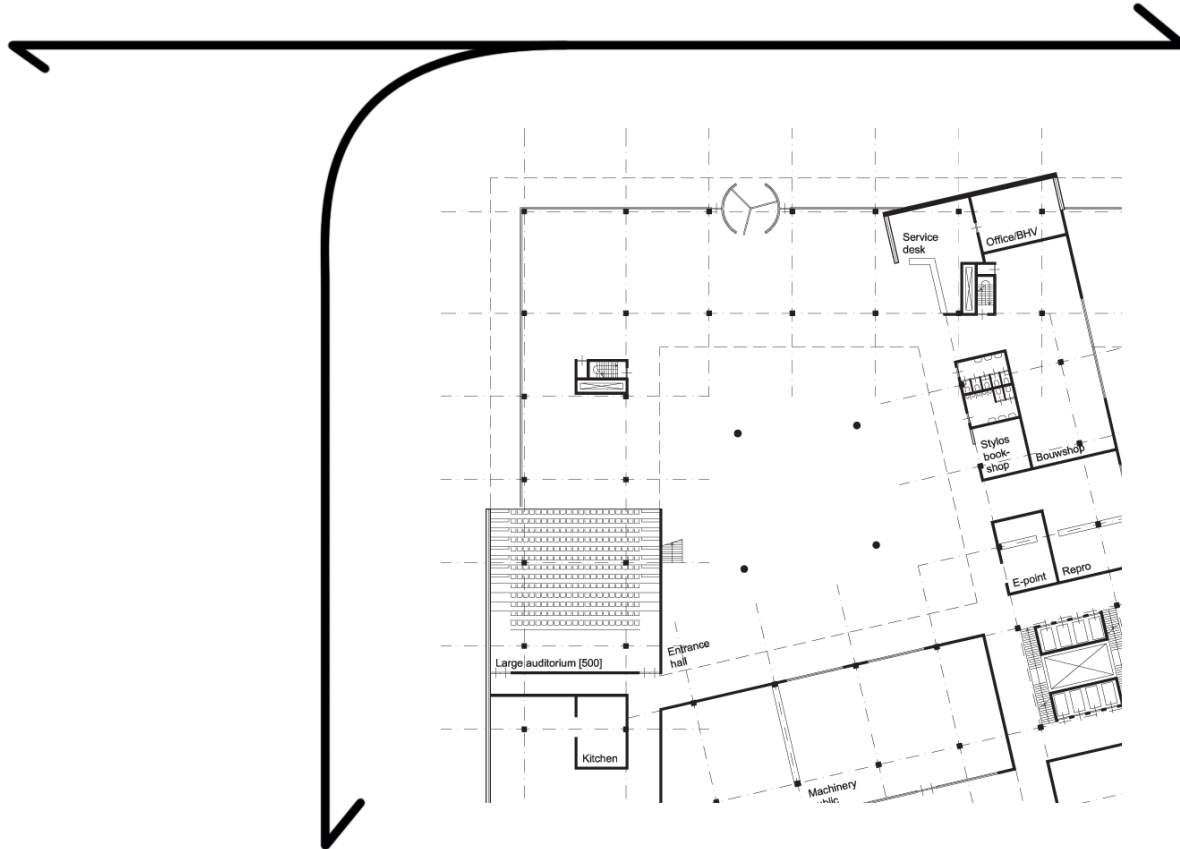
# Design development

Vormgeving atrie



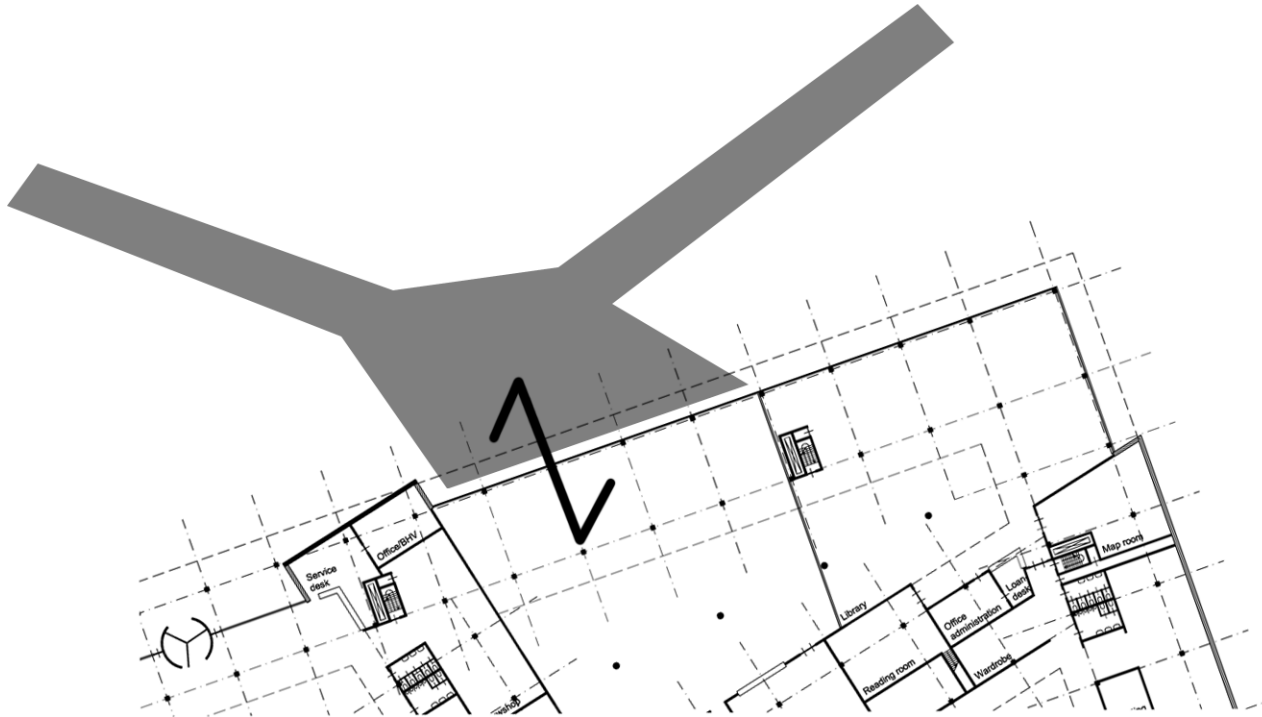
# Design development

Noord-oost atrium: entreehal



# Design development

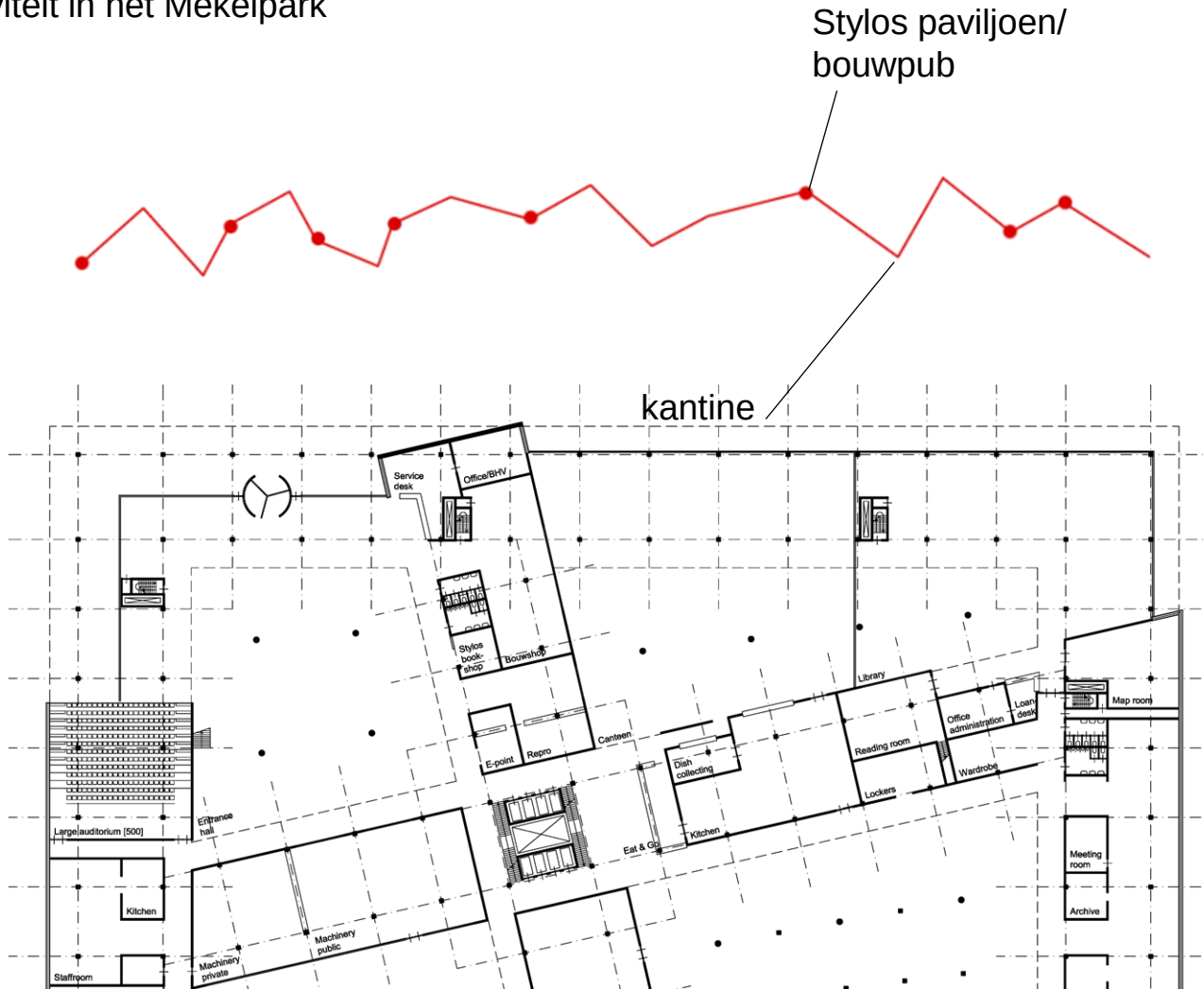
Zuid-oost atrium: kantine





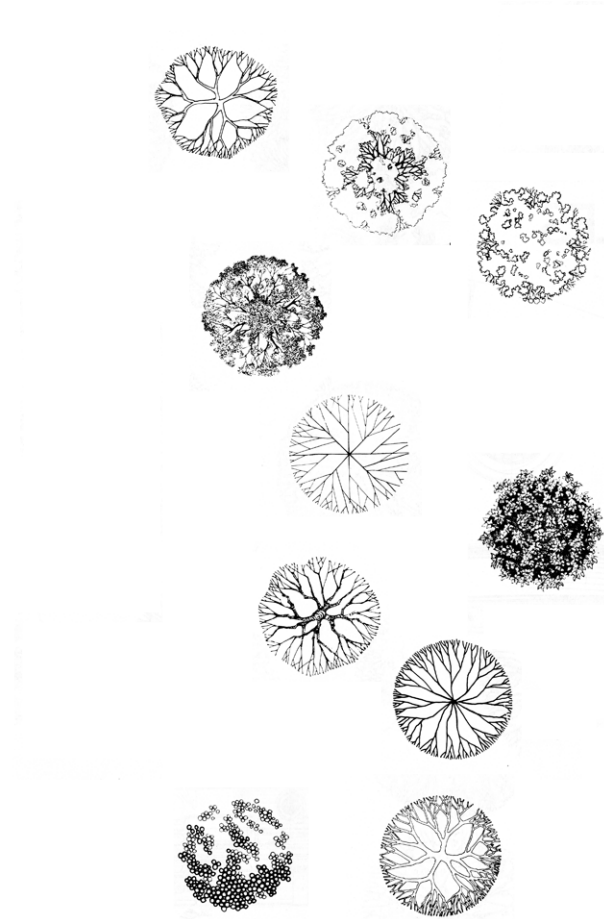
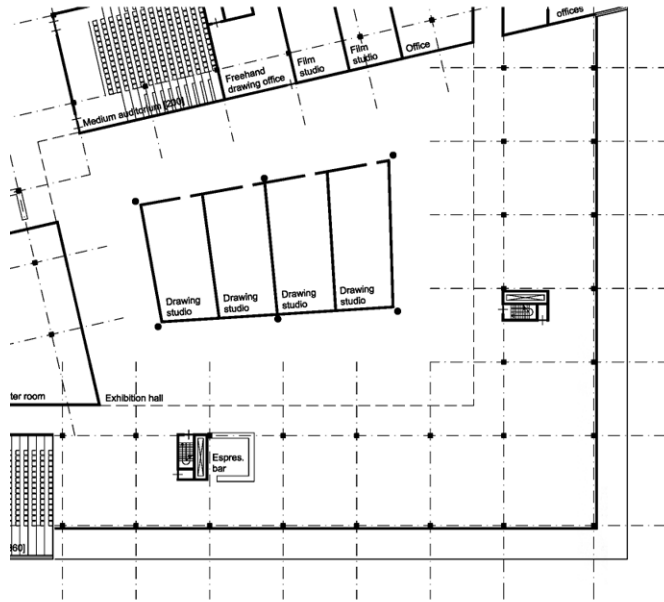
# Design development

Vergroten activiteit in het Mekelpark



# Design development

Zuid-west atrium: tentoonstellingshal met tekenstudio's met overzicht over nabijgelegen Hortus Botanicus



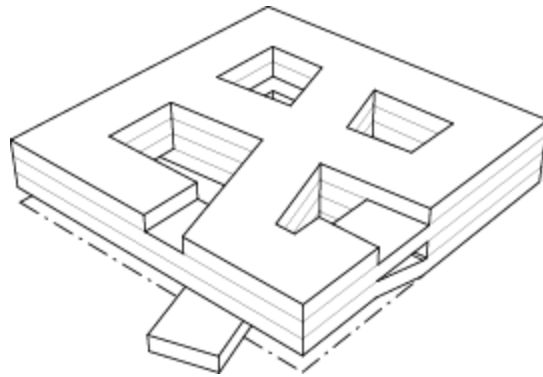
# Design development

Door extrusie gevormd gebouw



## Design development

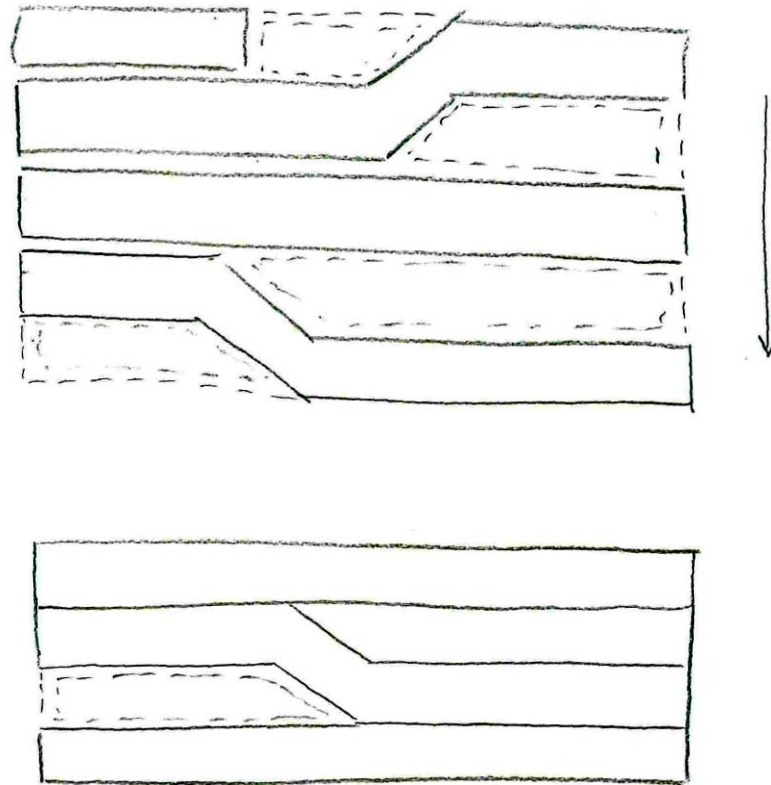
Compacter gebouw met de extrusie  
van de module als formeel concept





# Design development

Samenvoegen van lagen



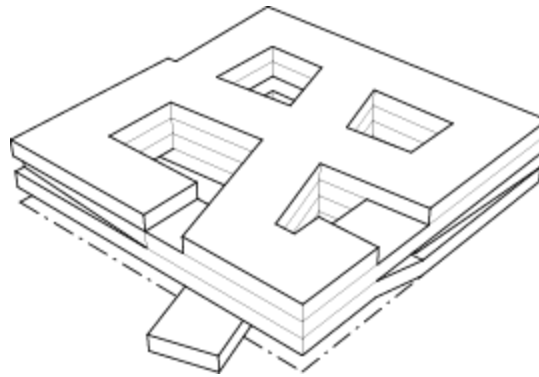
## Design development

Samenvoeging van de lagen vormt een compact geheel



# Design development

Vormen van de gevel



## Design development

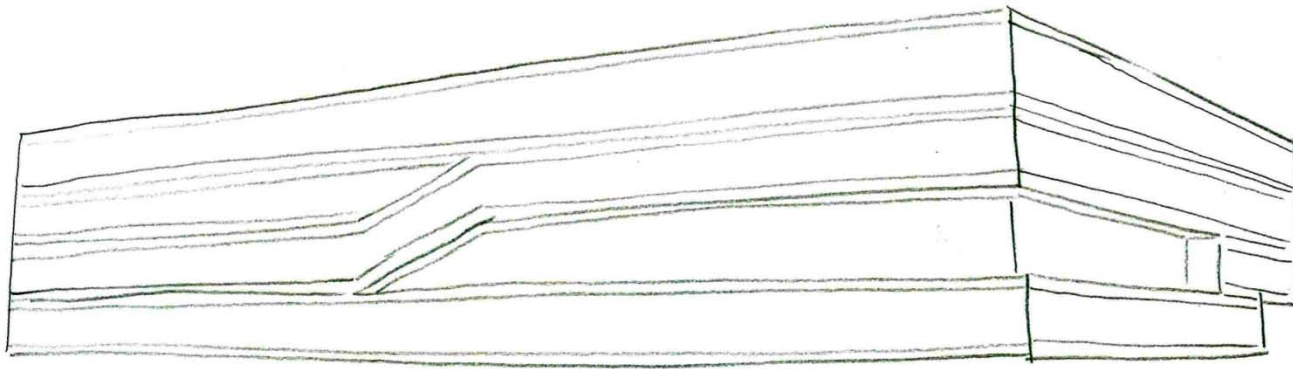
Het geheel vormt één massa met uitsneden van de atria





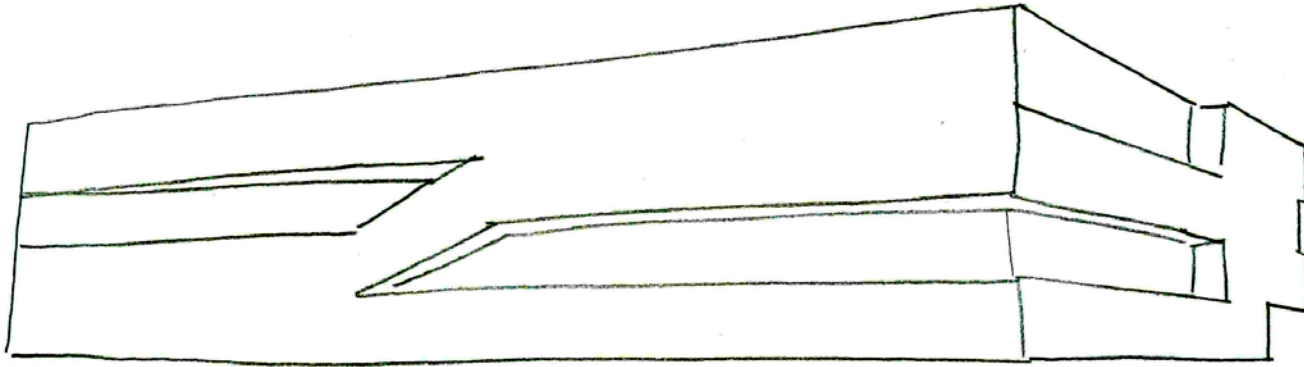
## Design development

Terugbrengen van de gelaagdheid in de gevel



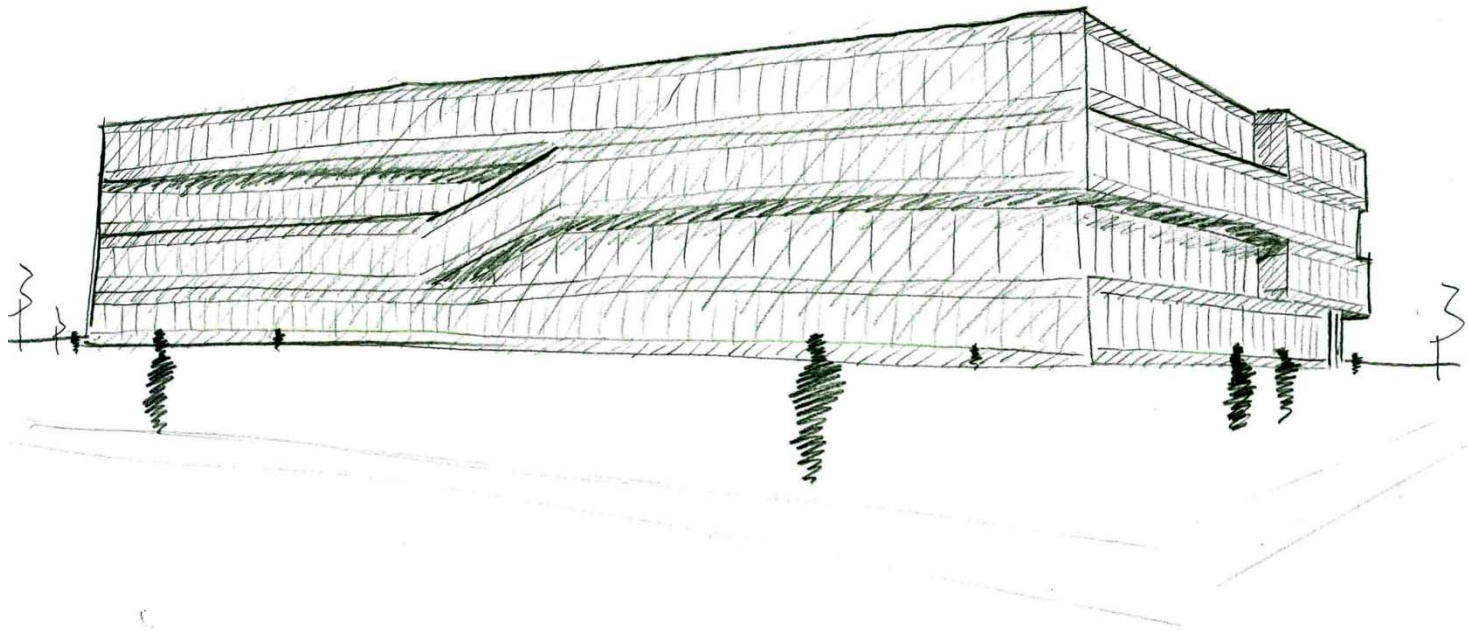
## Design development

Accentueren van de gevel voor betere  
expressie van het formele concept

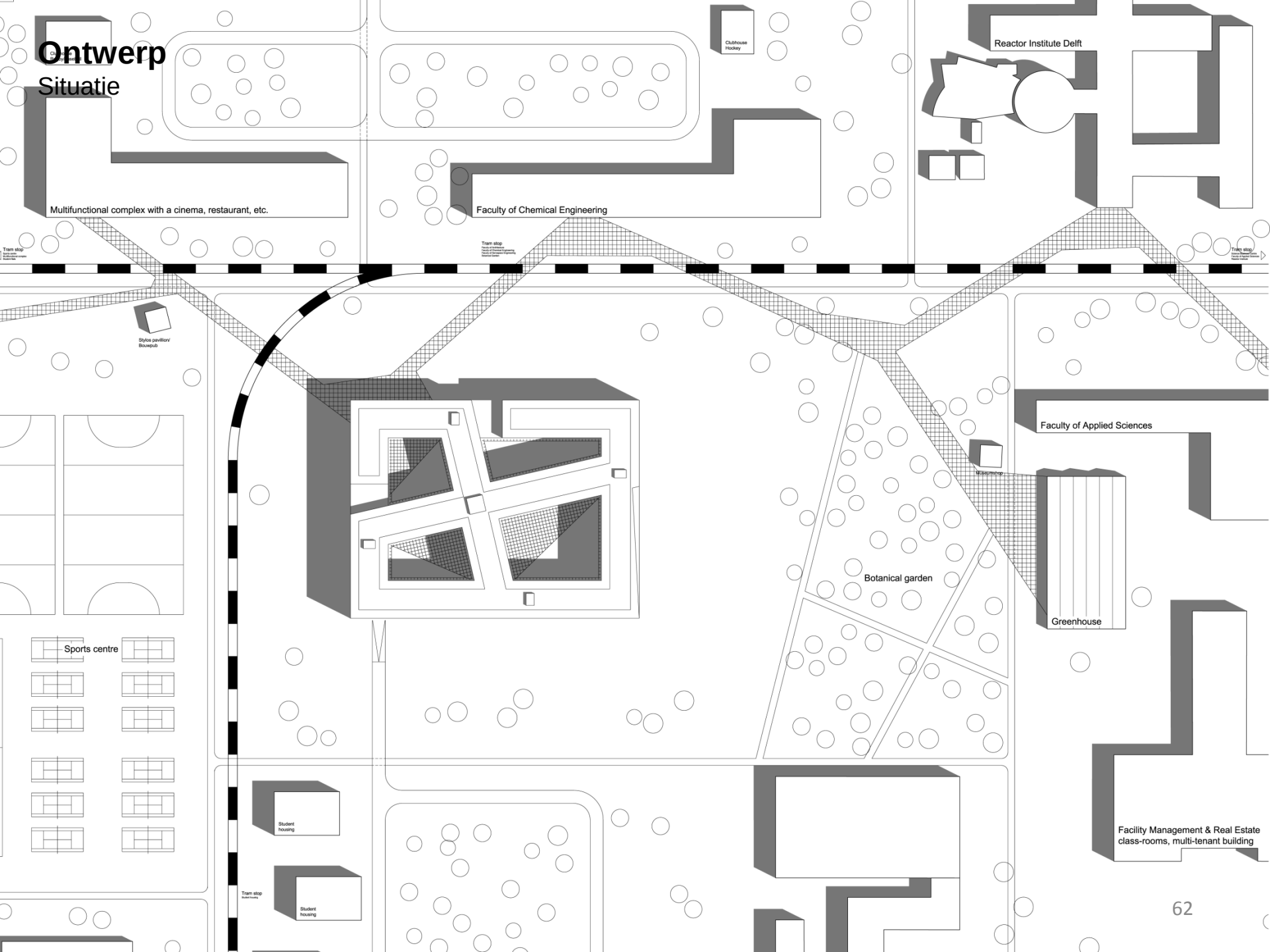


## Design development

Samen brengen de maatregelen het gelaagde effect van de geëxtrudeerde module naar voren in de gevel



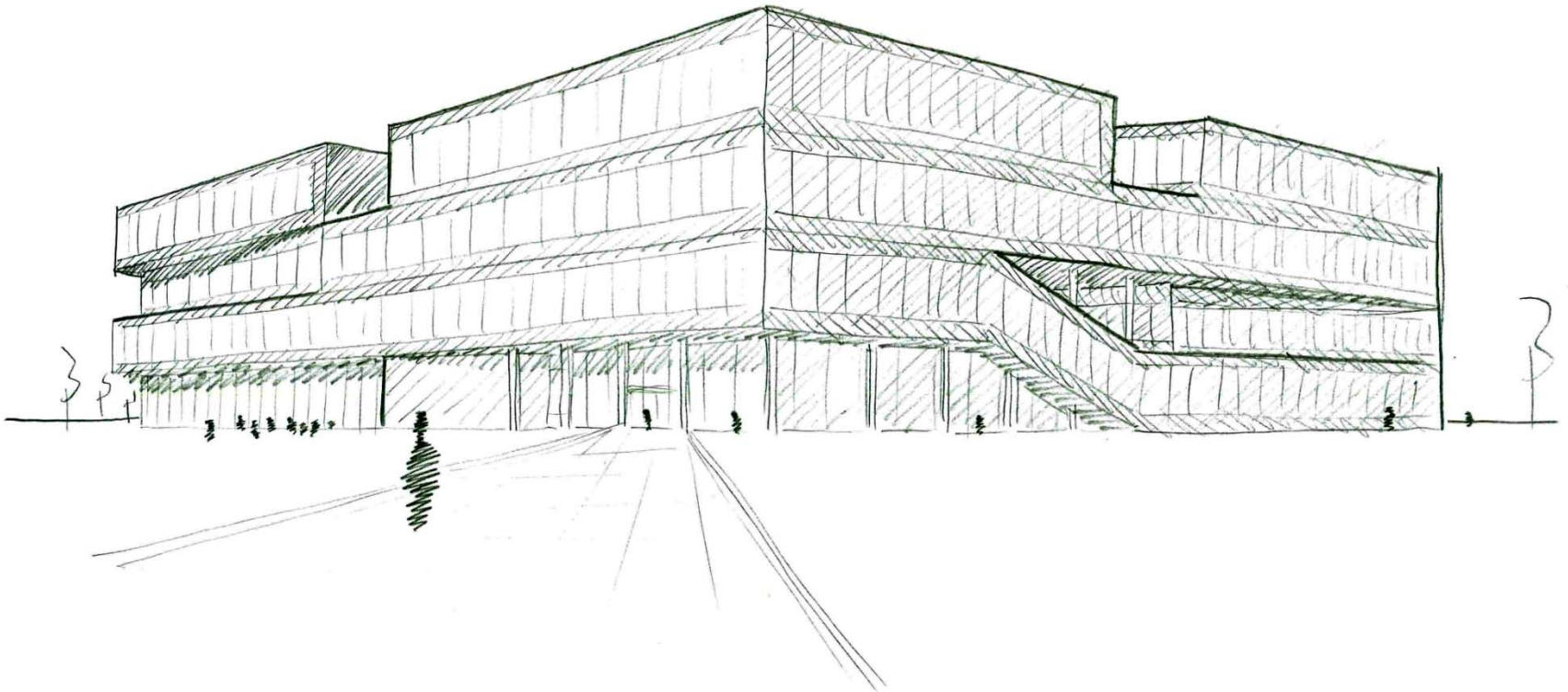
# Ontwerp Situatie





# Ontwerp

## Buitenperspectief

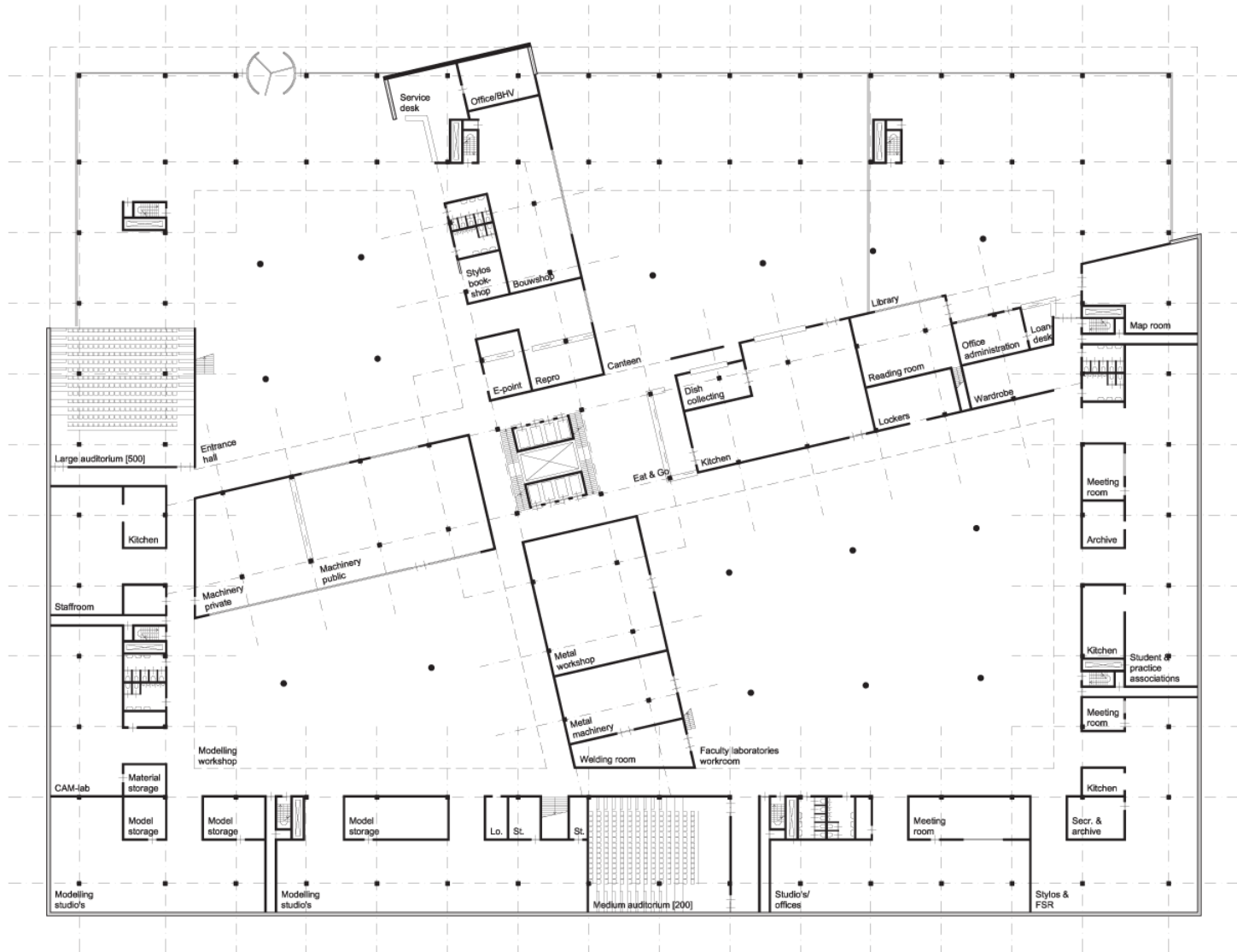


**Ontwerp**  
Buitenperspectief



# Ontwerp

## 00.Begane grond





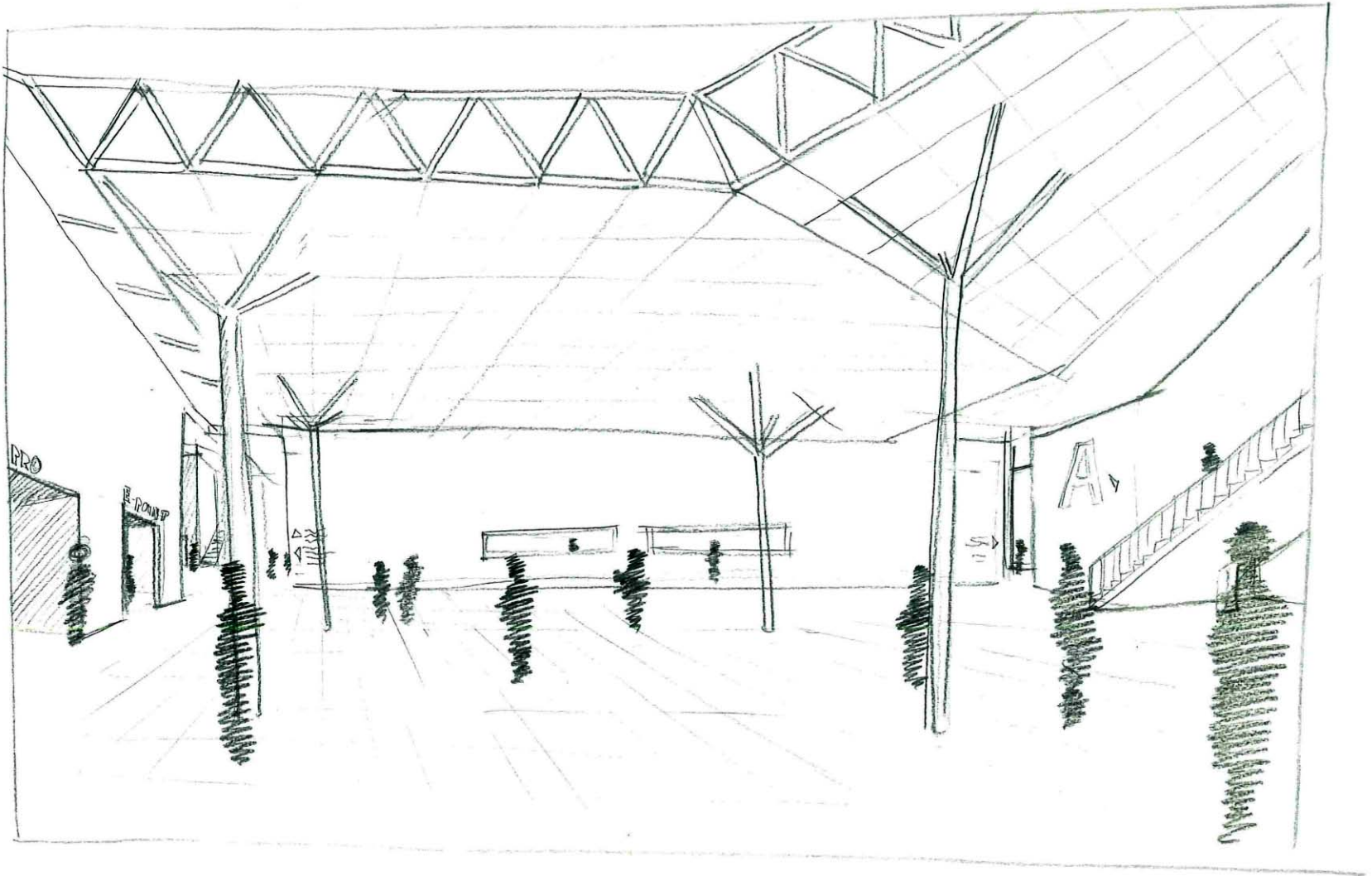
# Ontwerp

## 00.Begane grond



# Ontwerp

## Entreehal







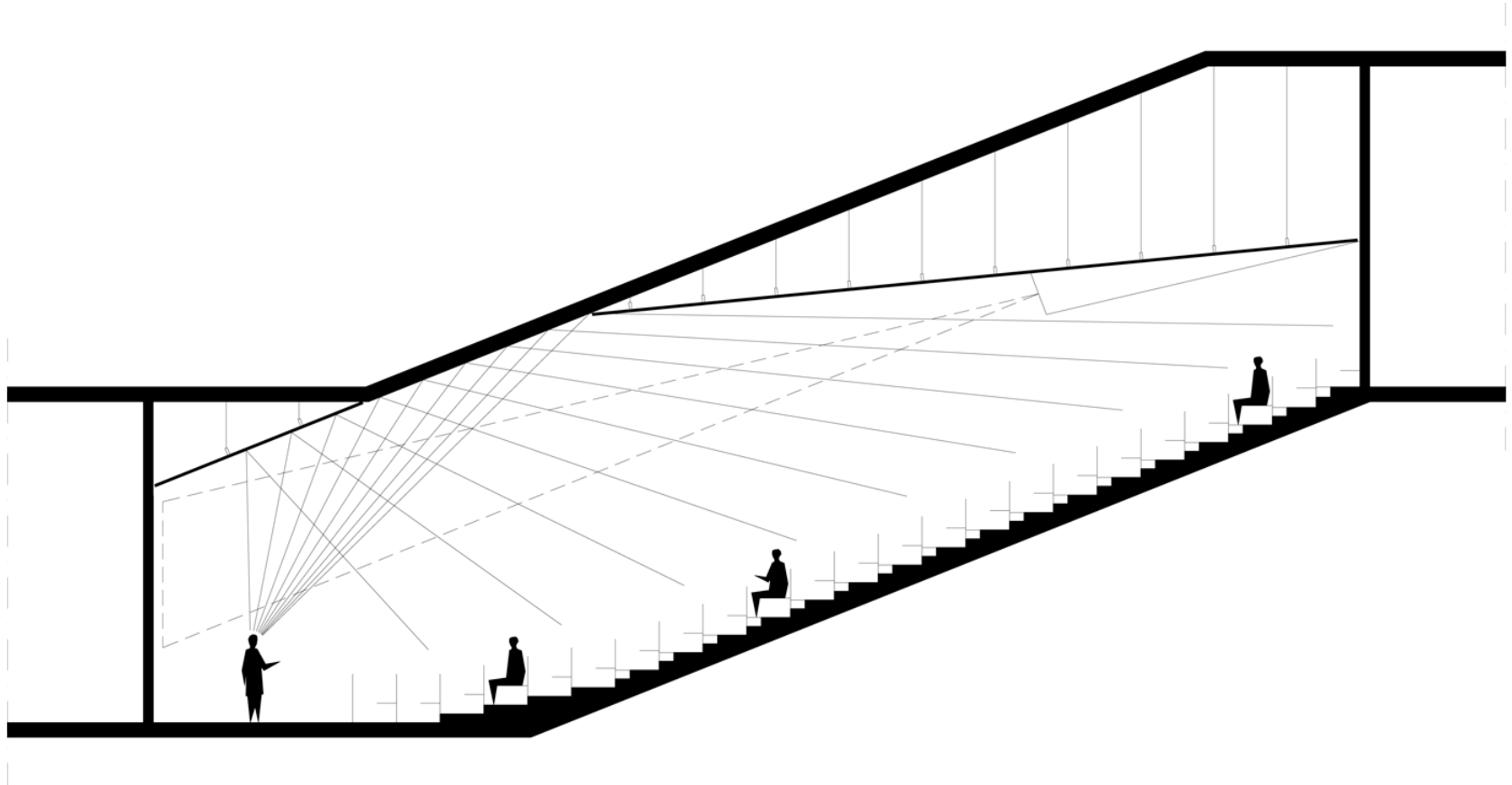
# Ontwerp

## Entreehal



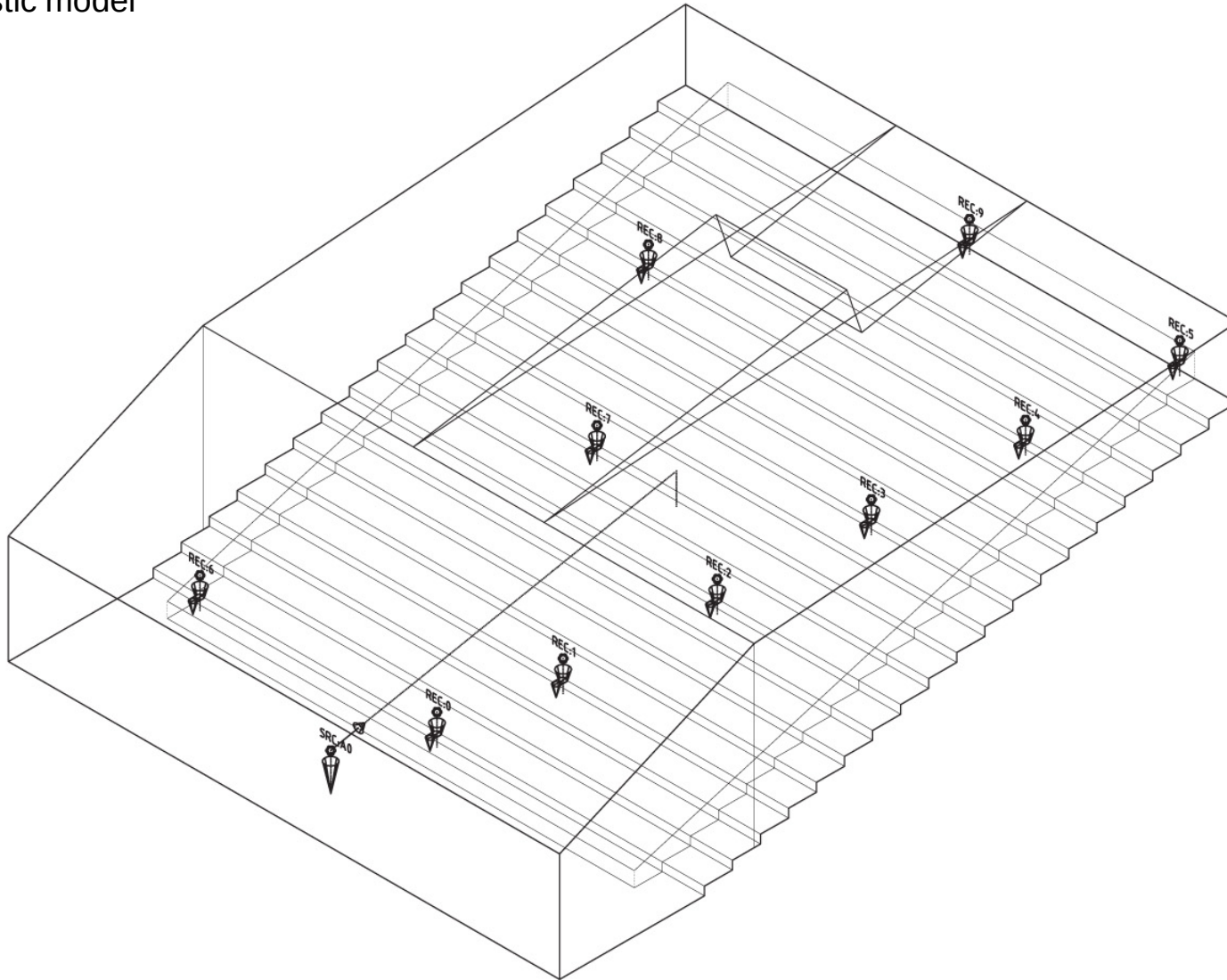
# Ontwerp

## Akoestiek in het auditorium



# Ontwerp

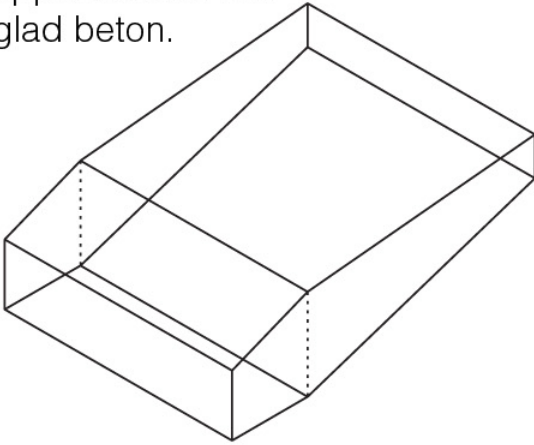
## CATT-Acoustic model



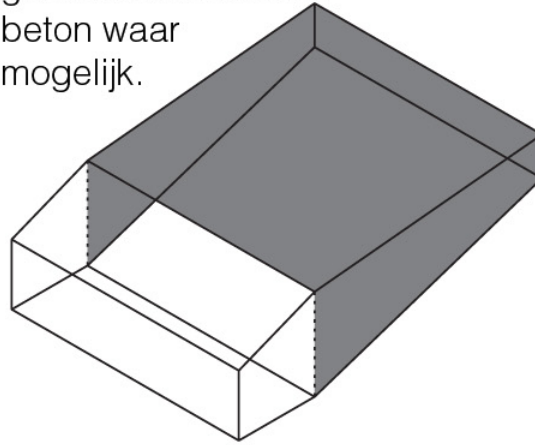
# Ontwerp

## Akoestische ingrepen

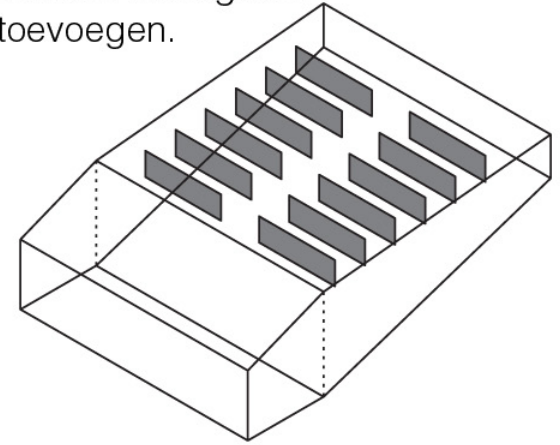
**Fase 1:** basisruimte, oppervlakken van glad beton.



**Fase 2:** toepassen van geluidsabsorberend beton waar mogelijk.



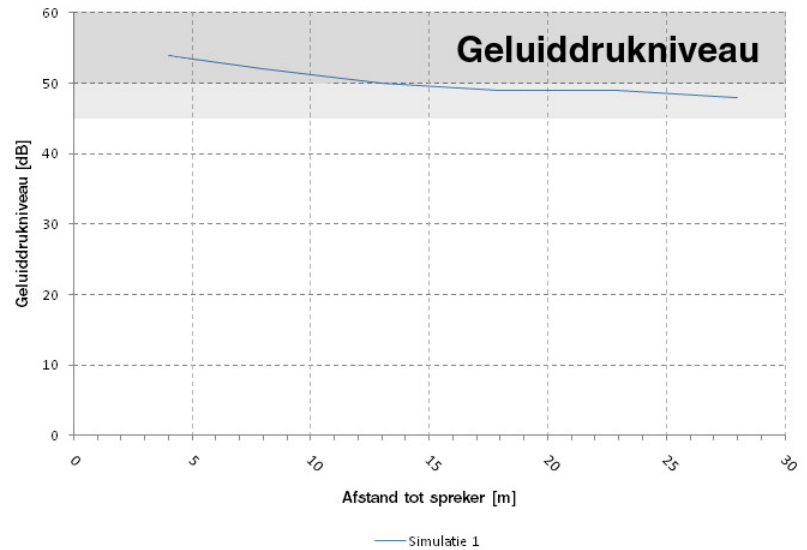
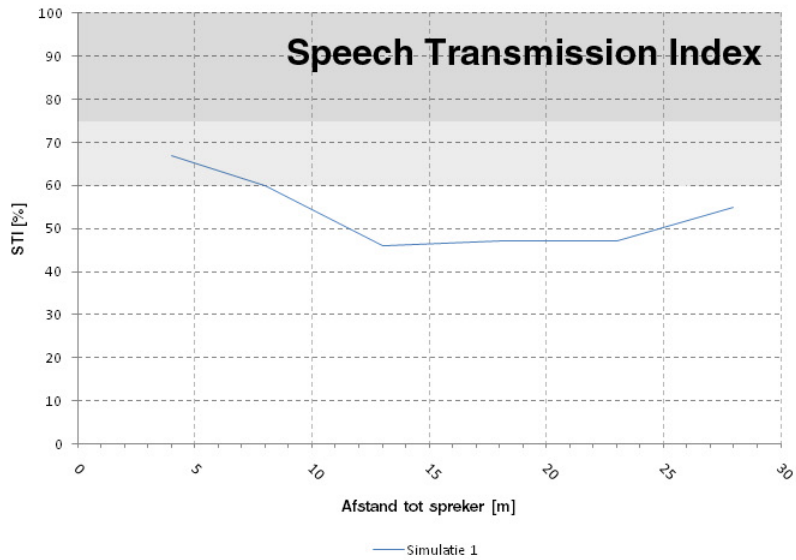
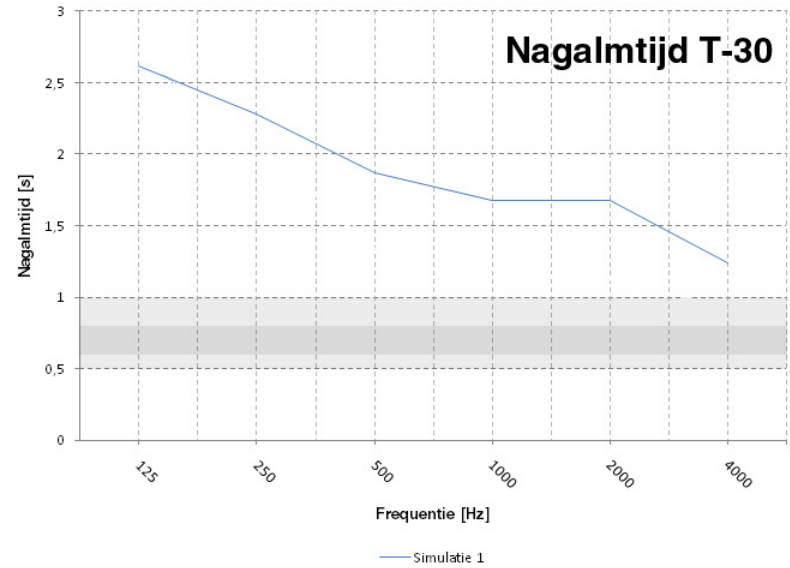
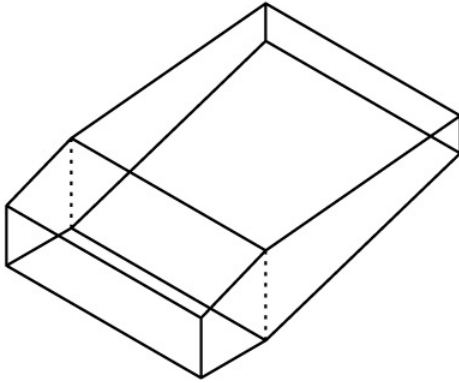
**Fase 3:** indien nodig extra akoestische maatregelen toevoegen.





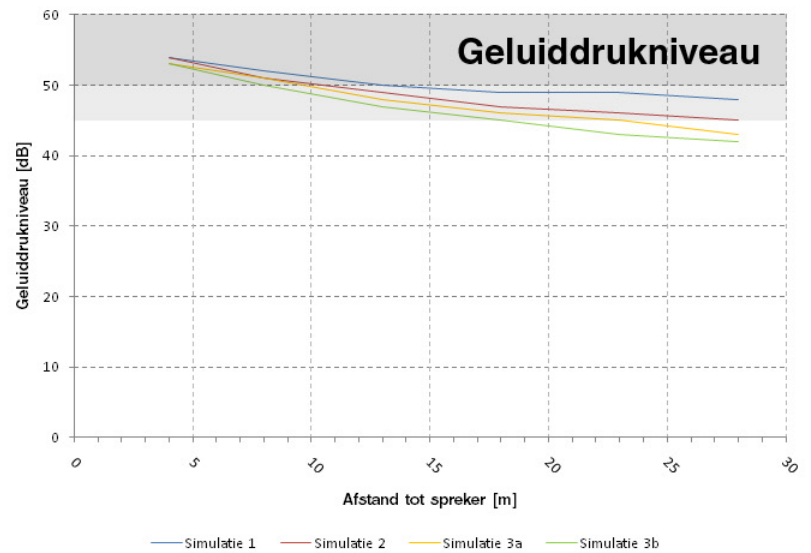
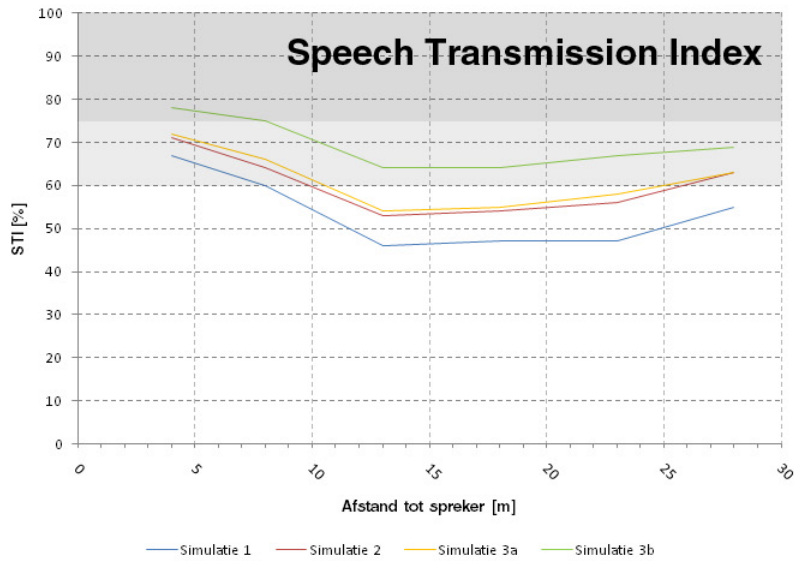
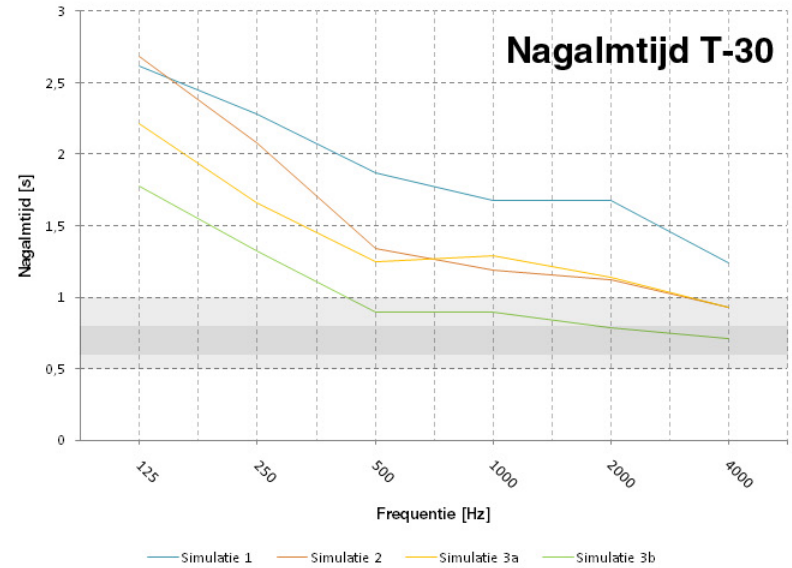
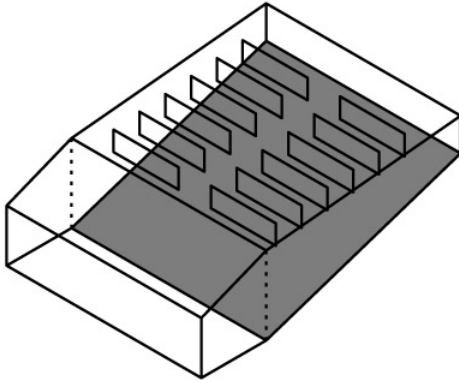
# Ontwerp

## Fase 1: basisruimte



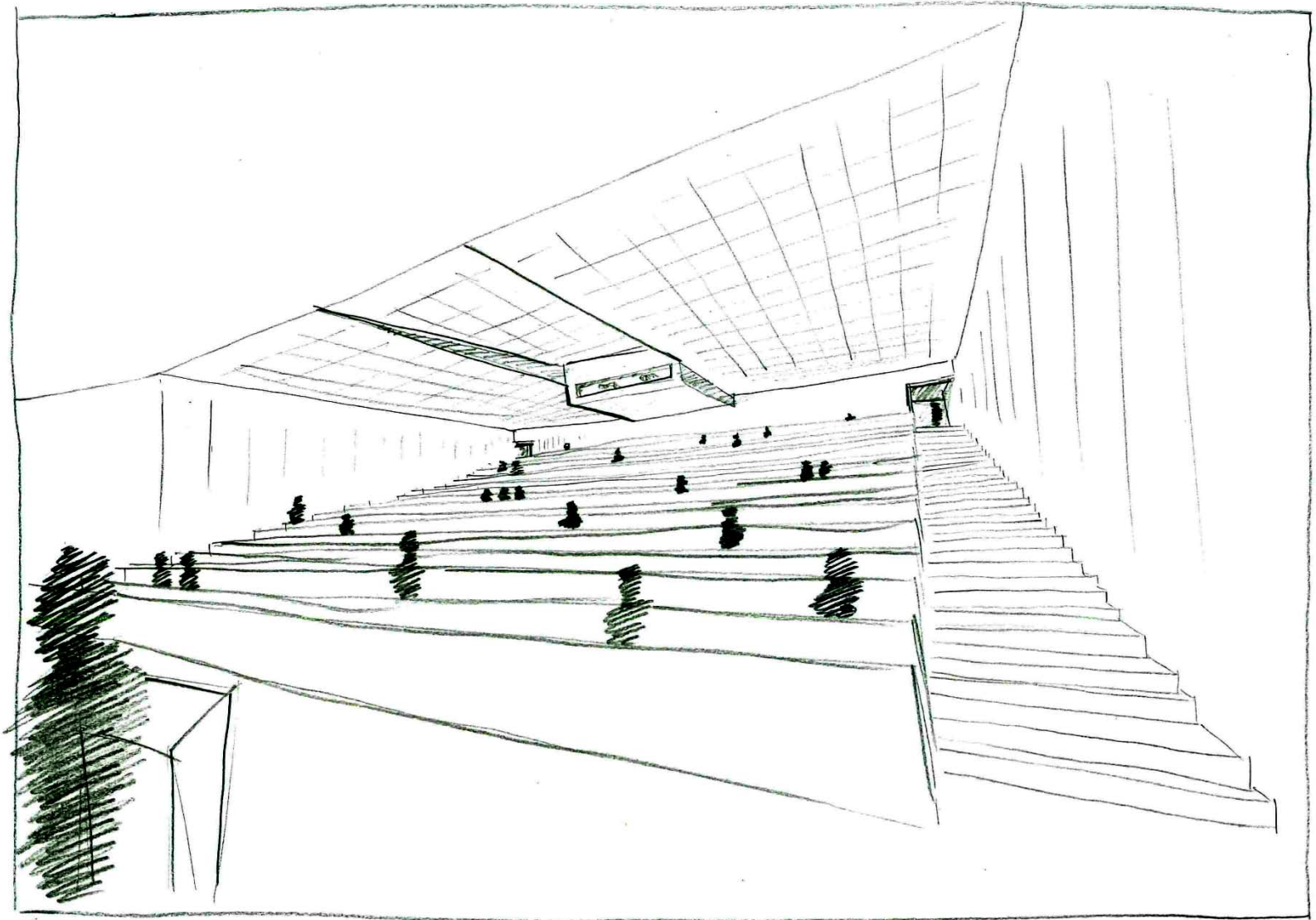
# Ontwerp

Fase 3: eindresultaat



# Ontwerp

## Auditorium



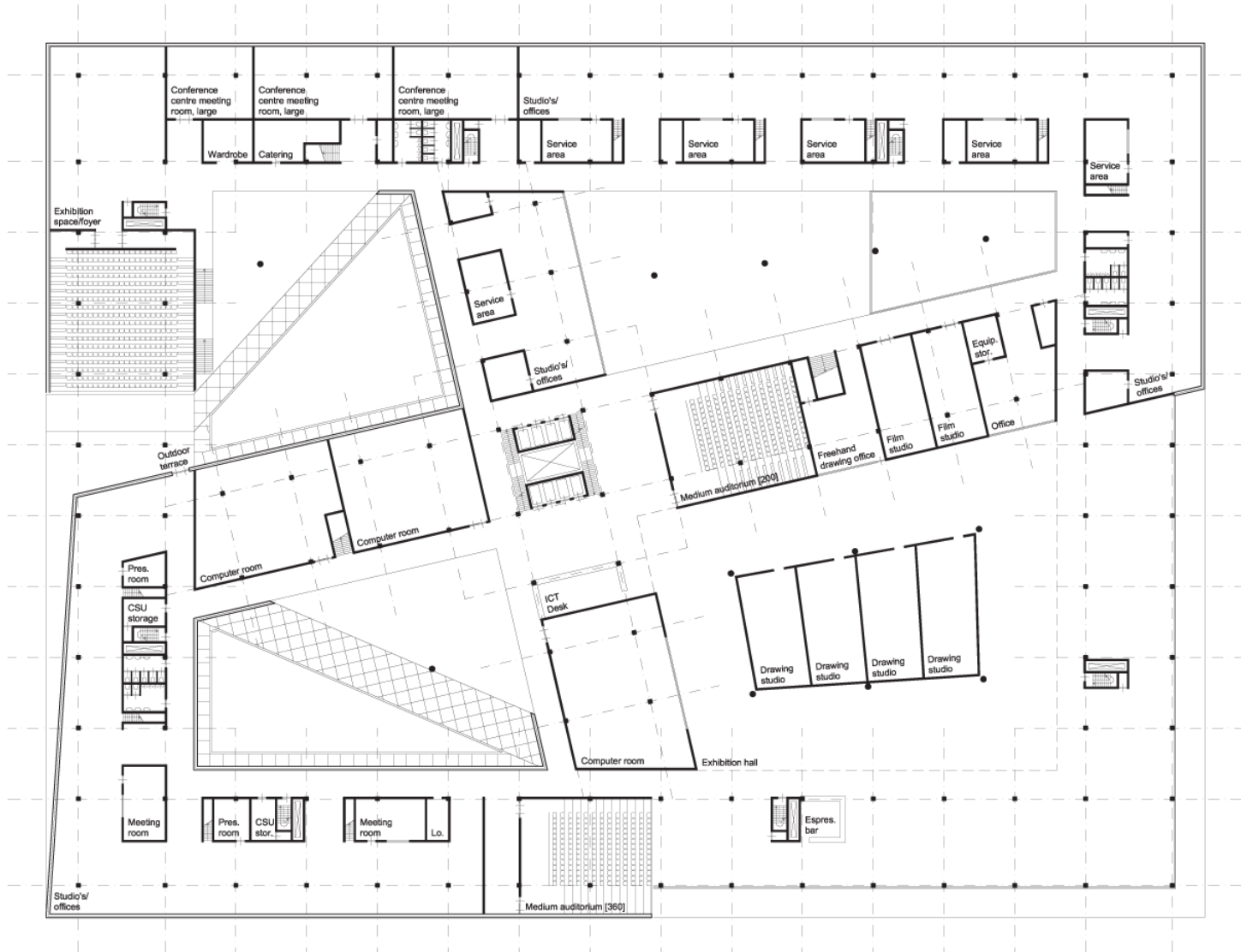
# Ontwerp Auditorium





# Ontwerp

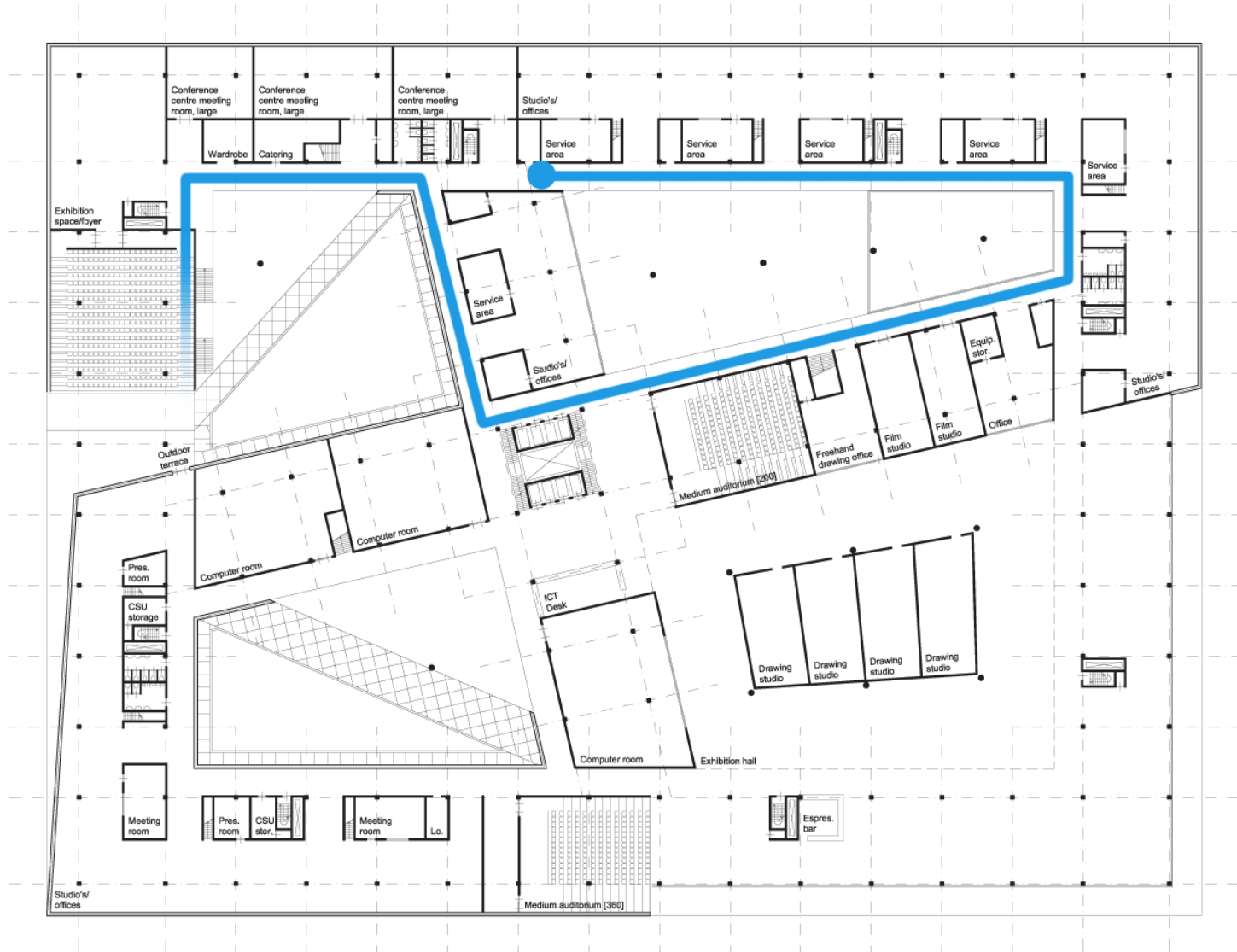
## 01. Tweede verdieping





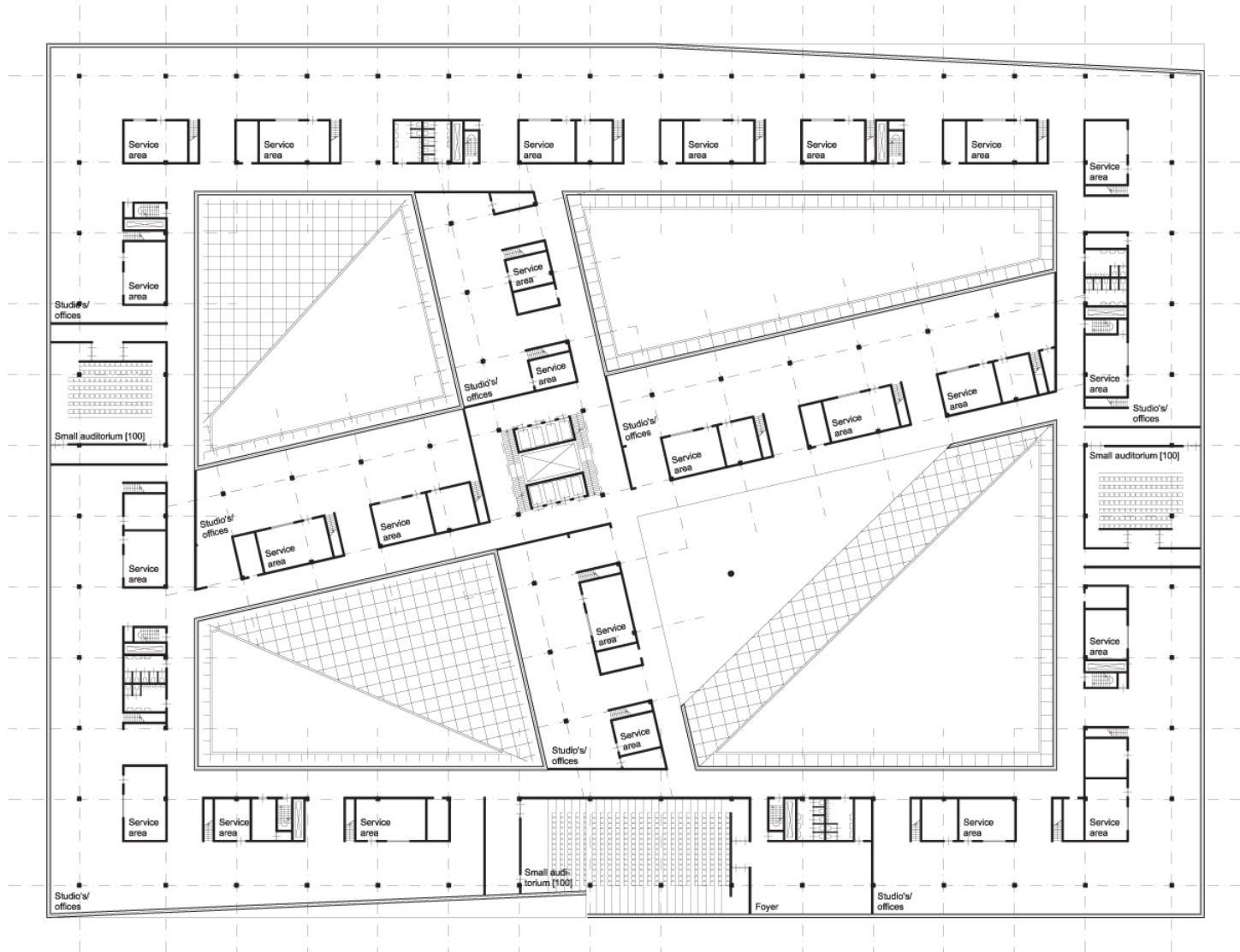
# Ontwerp

## 01. Tweede verdieping



# Ontwerp

## 02. Vierde verdieping



# Ontwerp

## 02. Vierde verdieping







# Ontwerp

## Verkeersruimte





# Ontwerp

## 02. Vierde verdieping



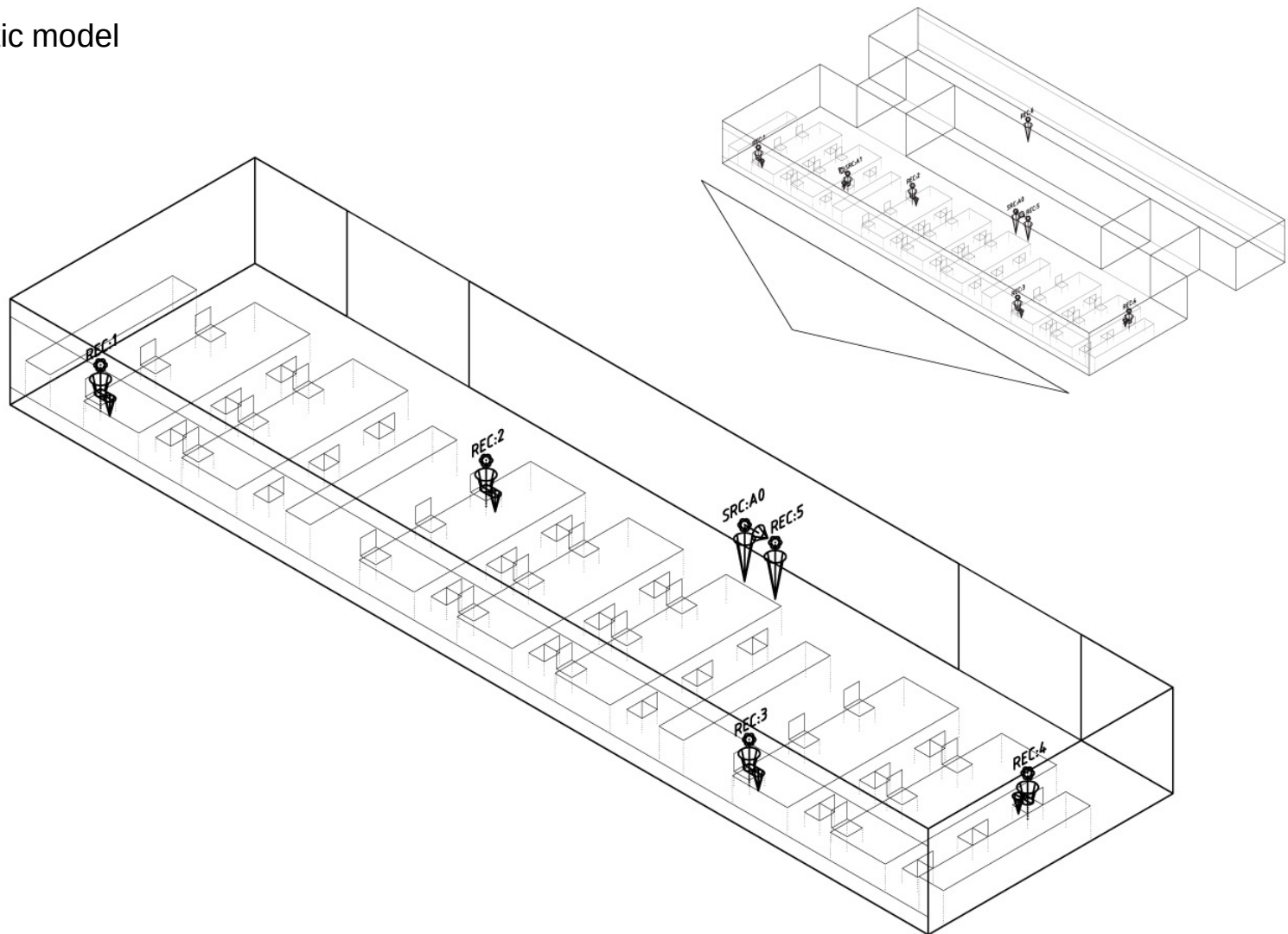
# Ontwerp

## 02. Vierde verdieping



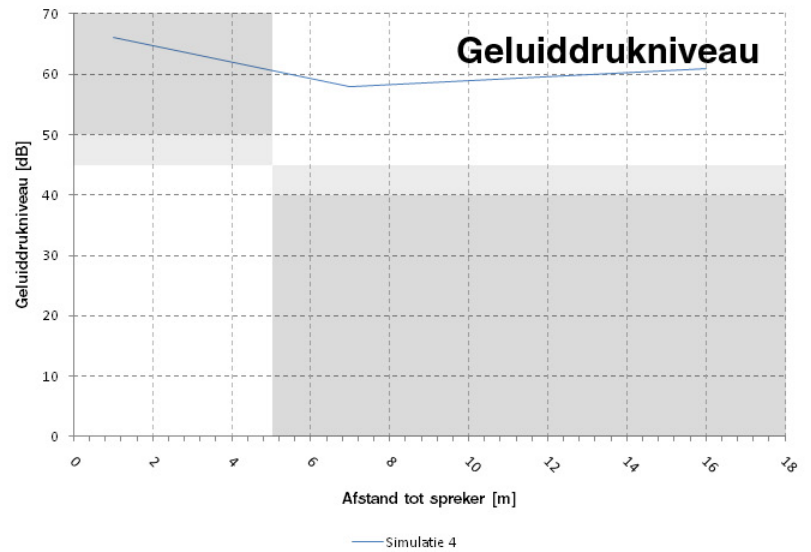
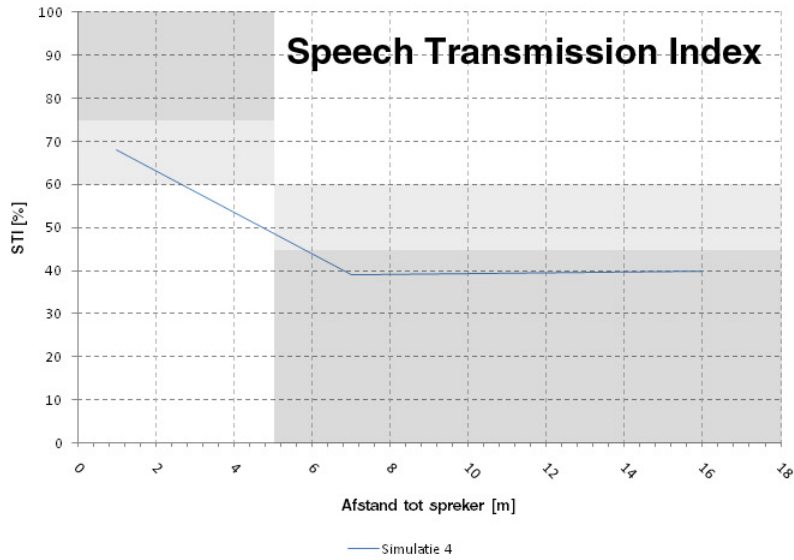
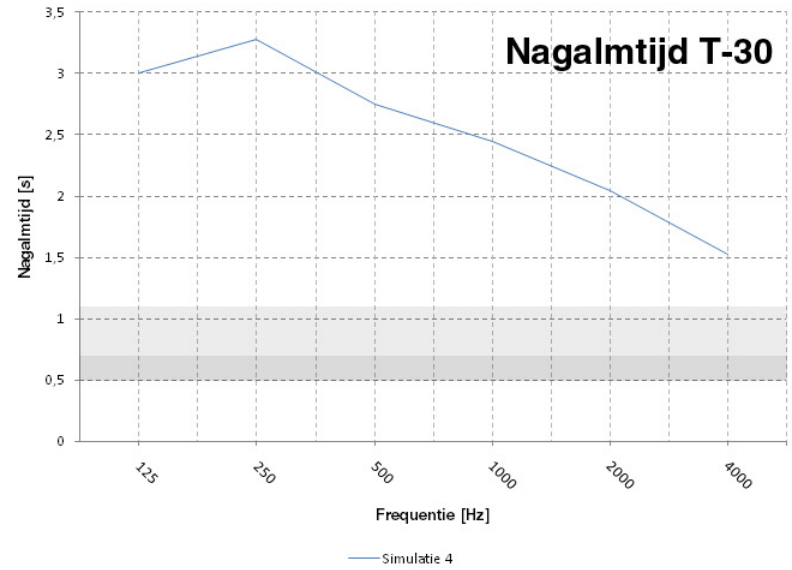
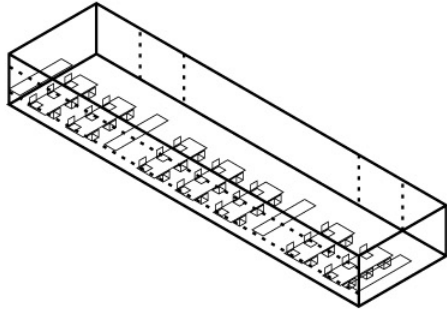
# Ontwerp

## CATT-Acoustic model



# Ontwerp

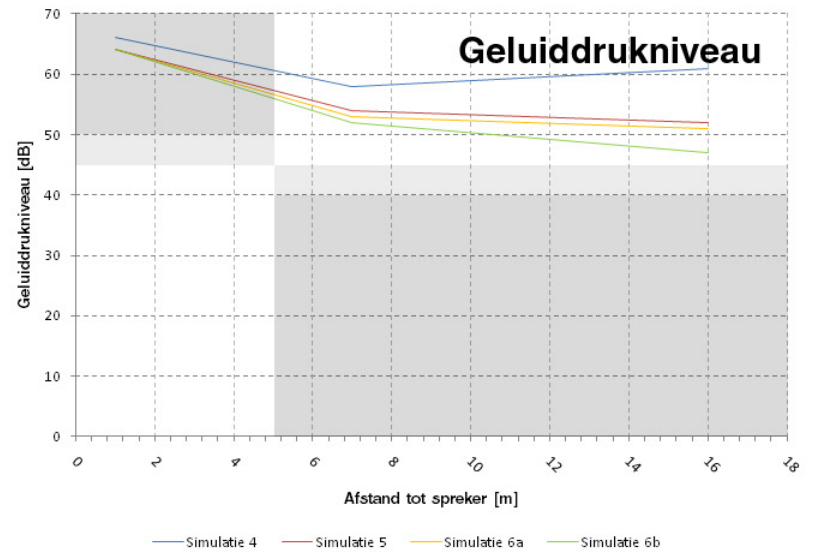
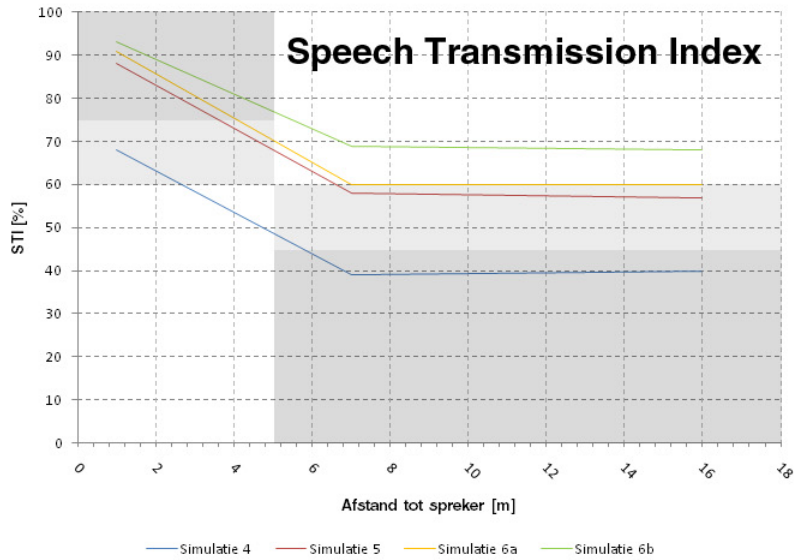
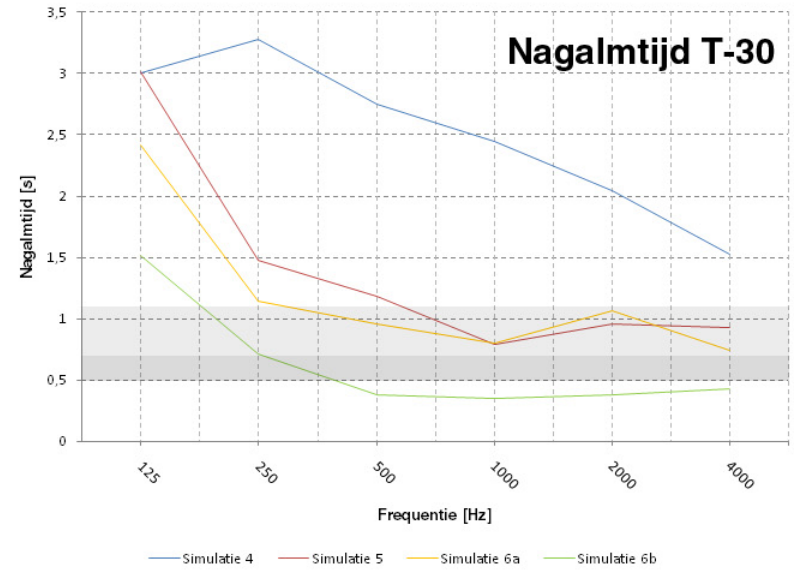
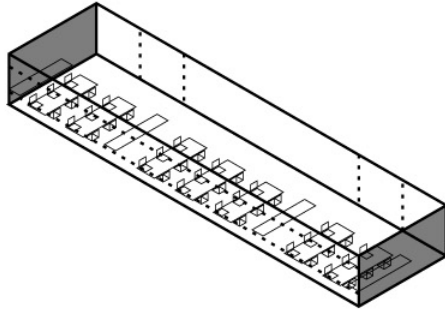
## Fase 1: basisruimte





# Ontwerp

## Fase 3: eindresultaat



















# Ontwerp

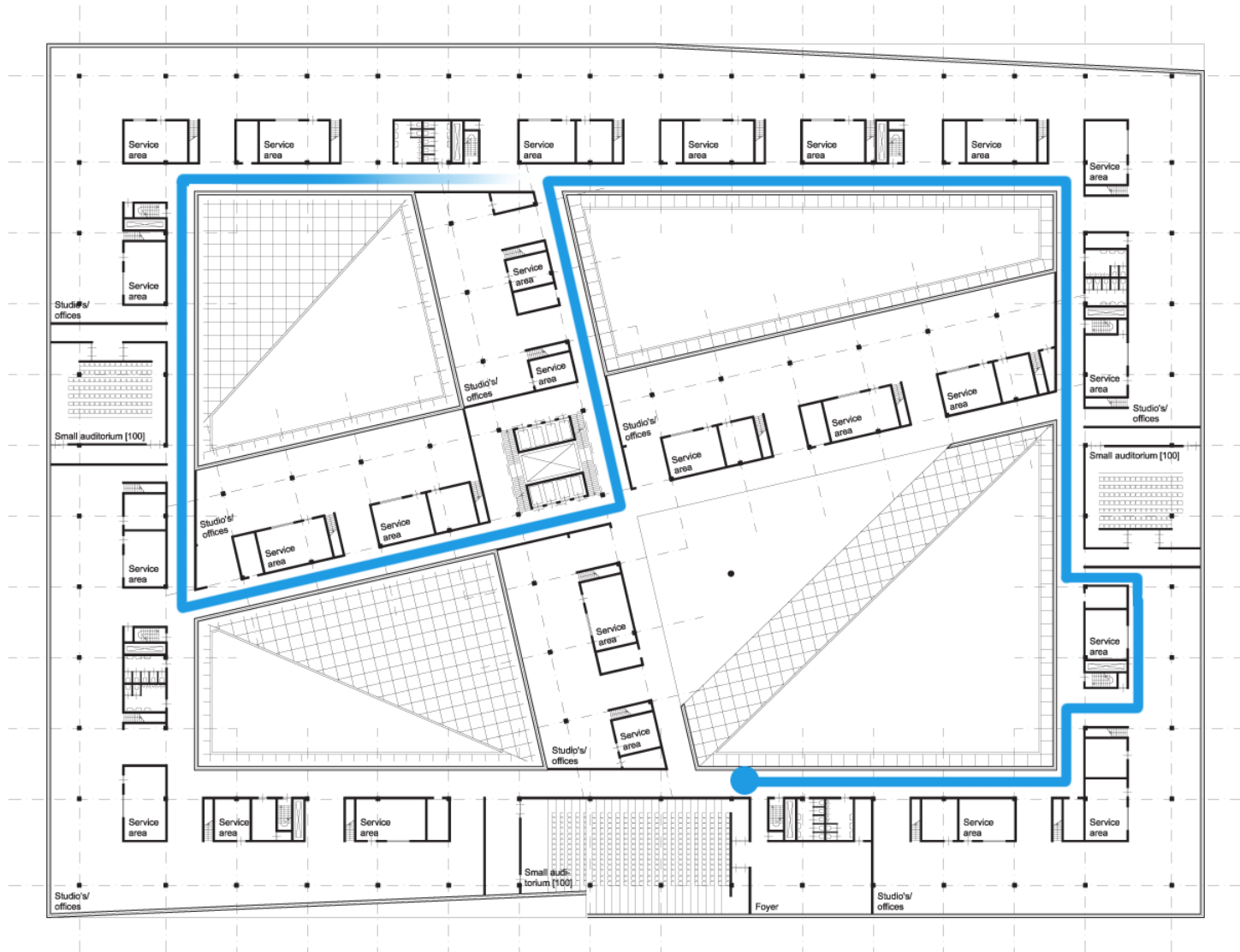
## 02. Vierde verdieping





# Ontwerp

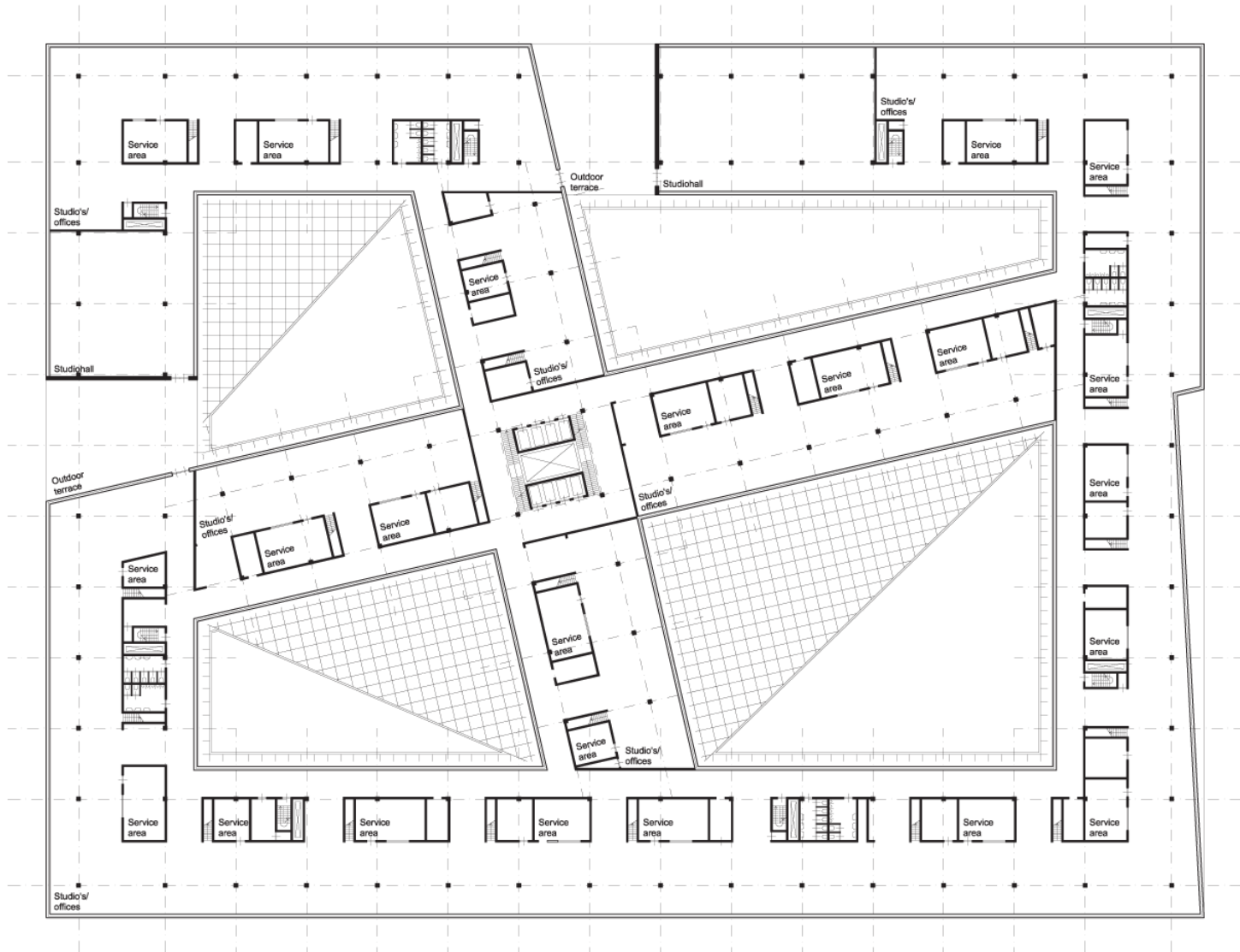
## 02. Vierde verdieping





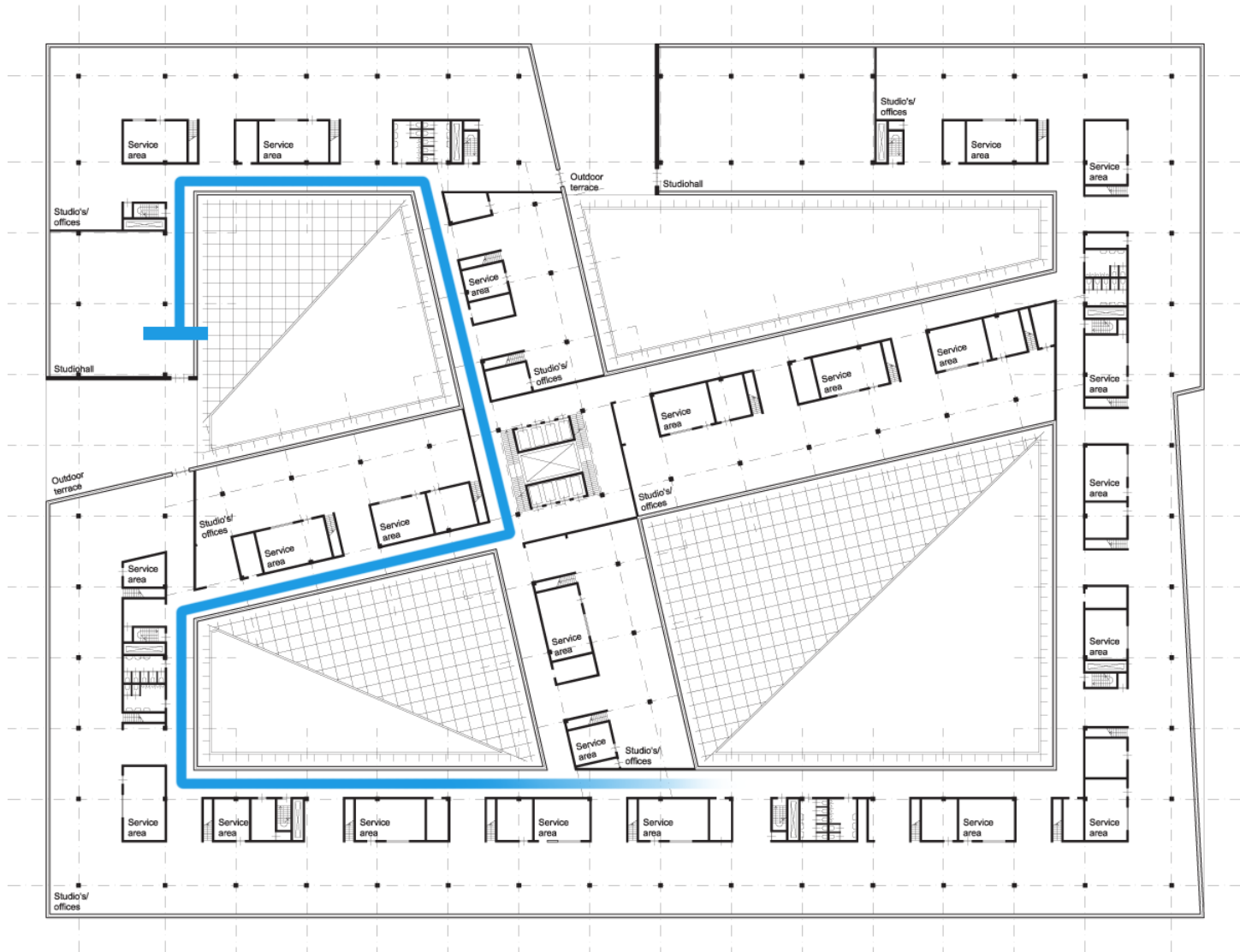
# Ontwerp

## 03.Zesde verdieping



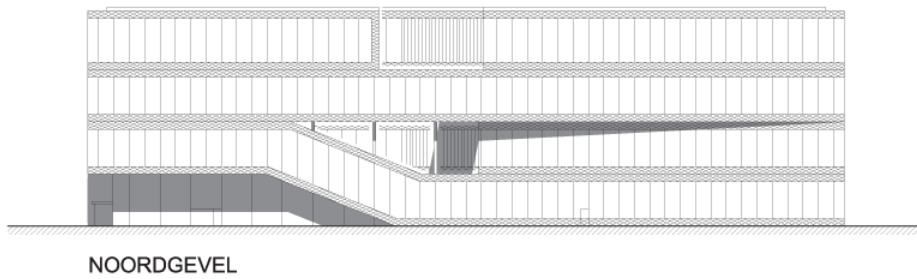
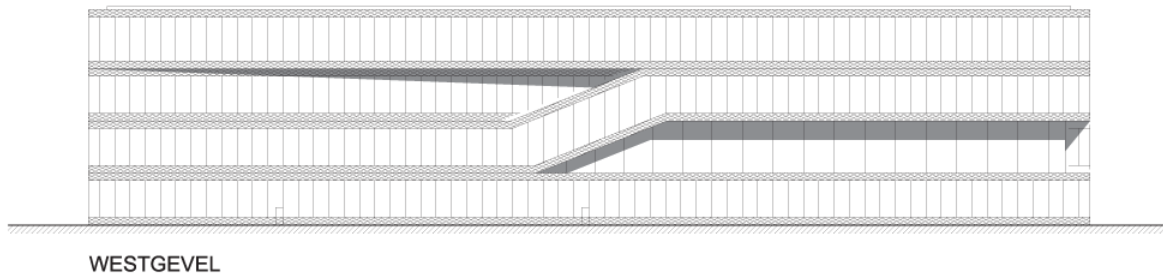
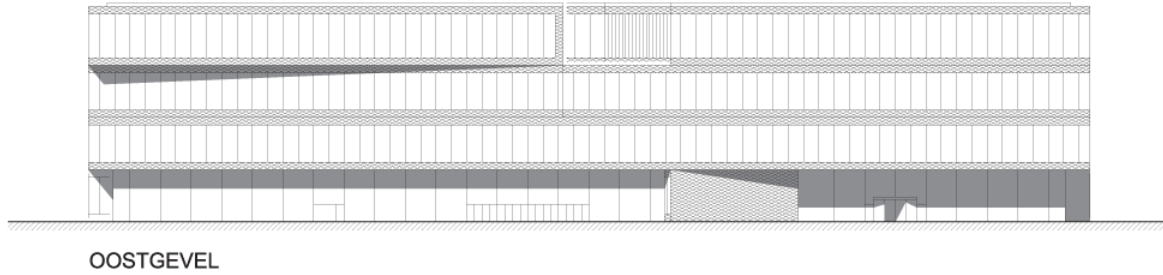
# Ontwerp

## 03.Zesde verdieping



# Ontwerp

## Gevels



# Ontwerp

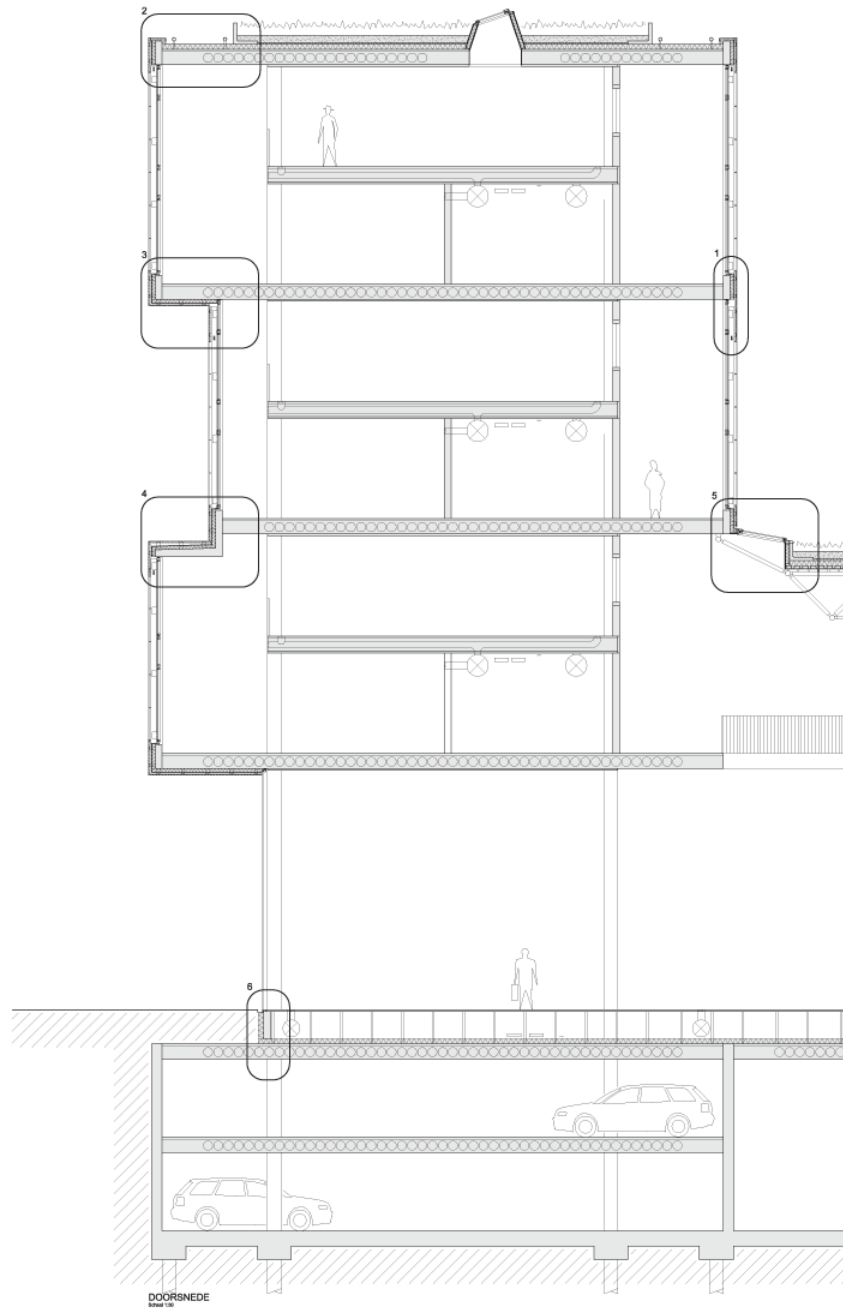
## Gevel





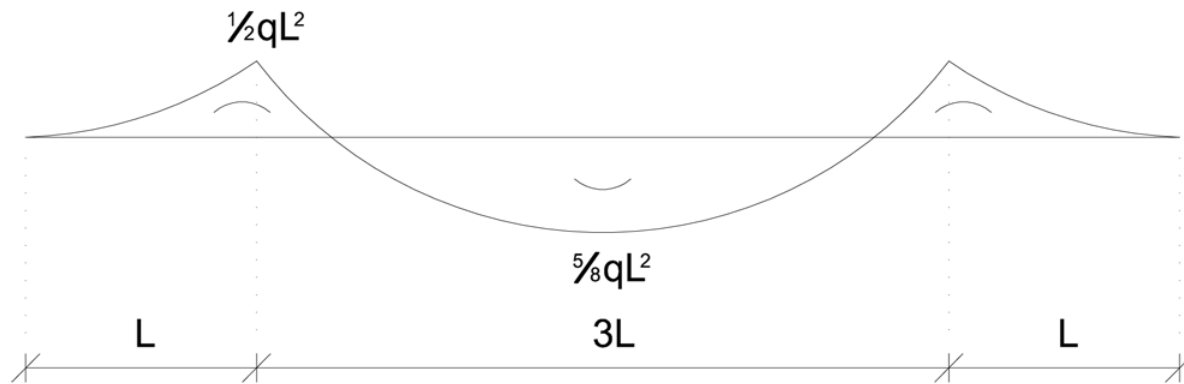
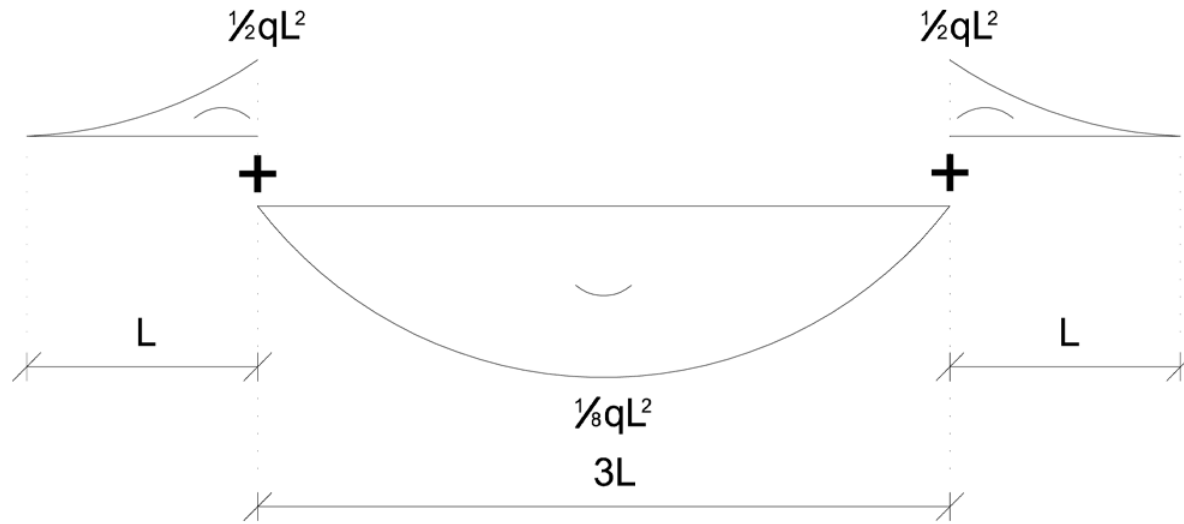
# Ontwerp

## Doorsnede fragment



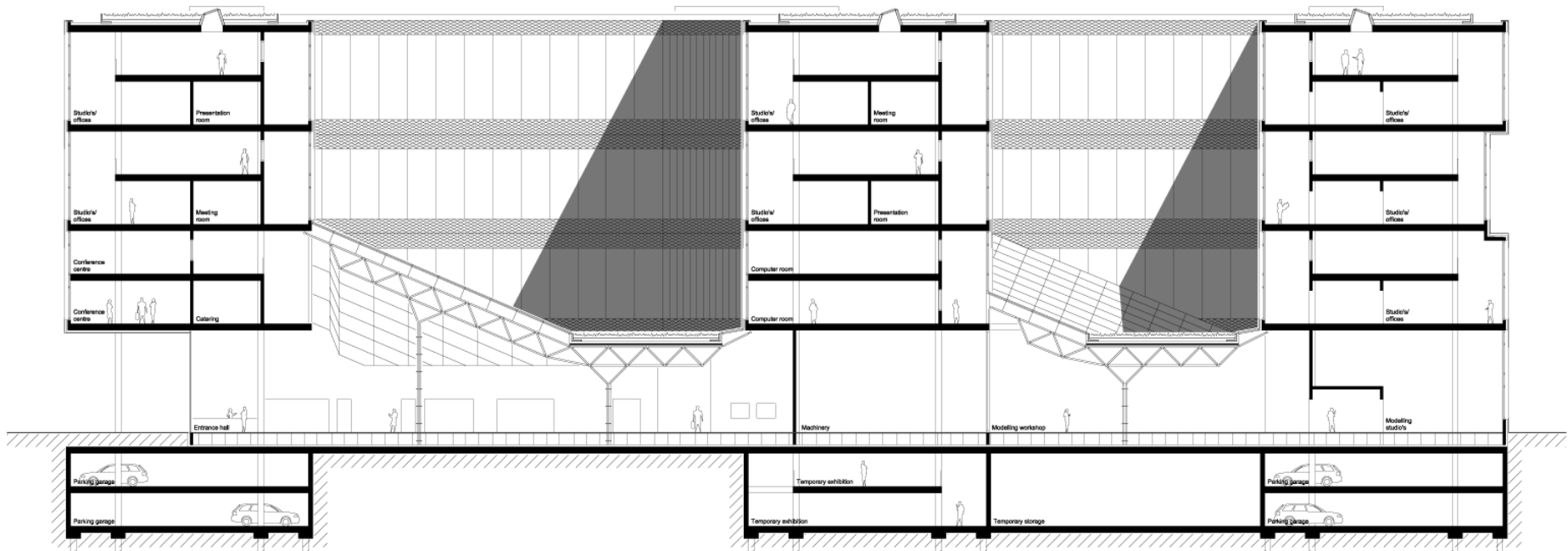
# Ontwerp

## Momentlijn vloer



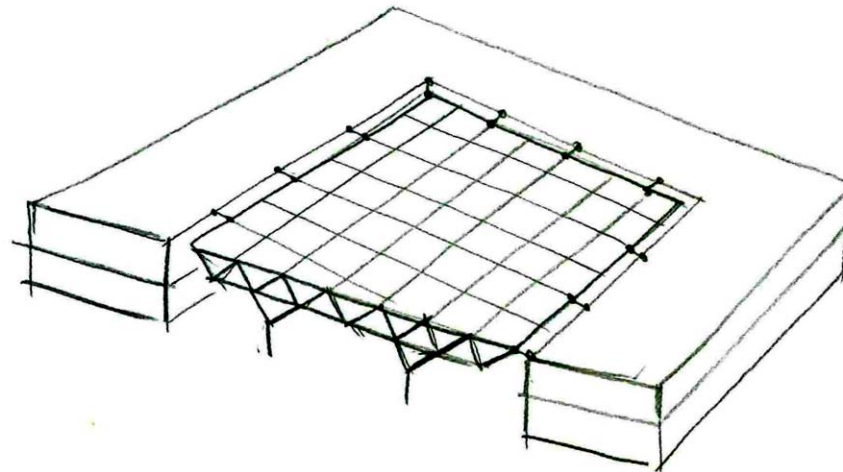
# Ontwerp

## Doorsnede



# Ontwerp

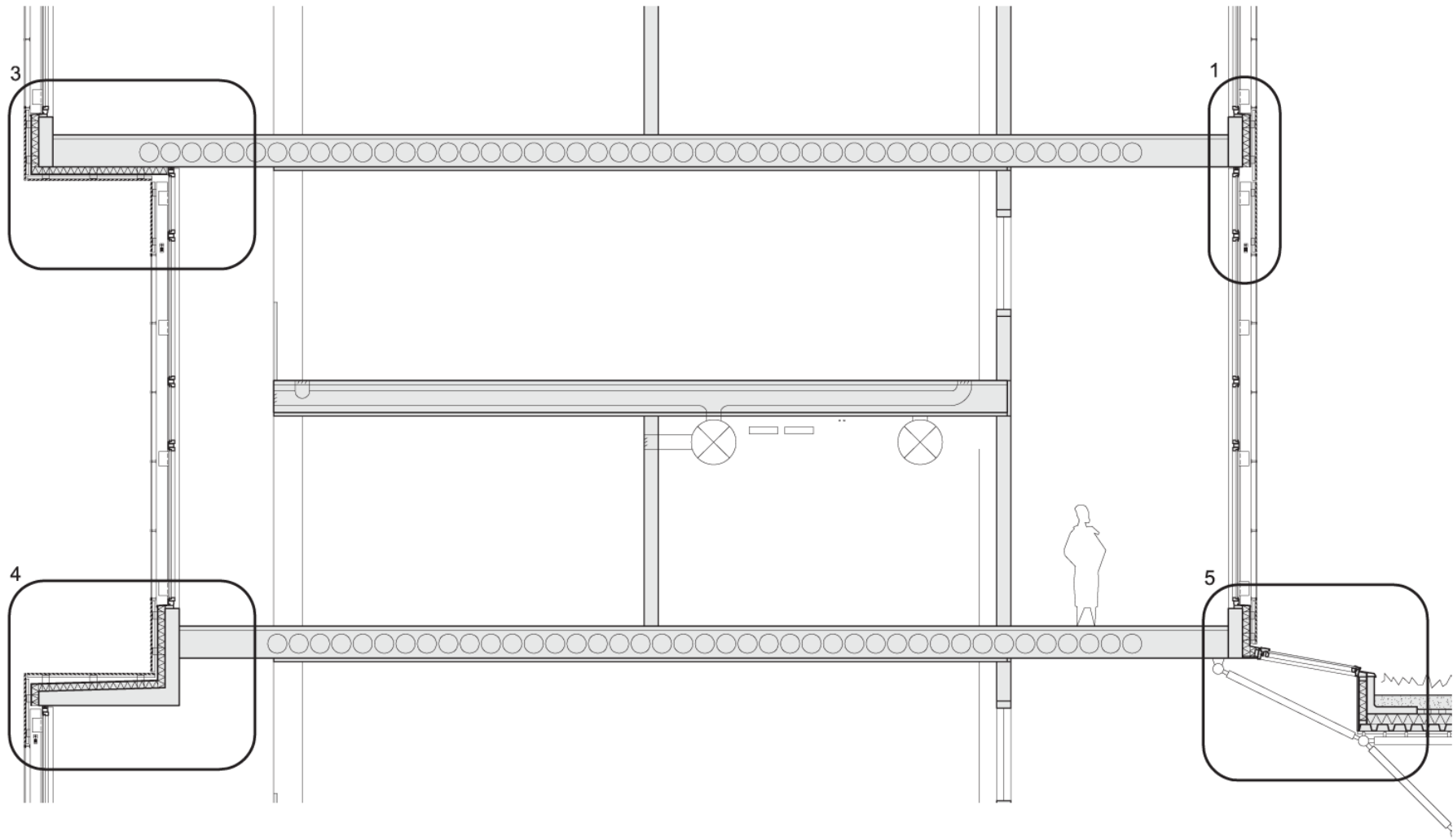
Principe draagstructuur atria





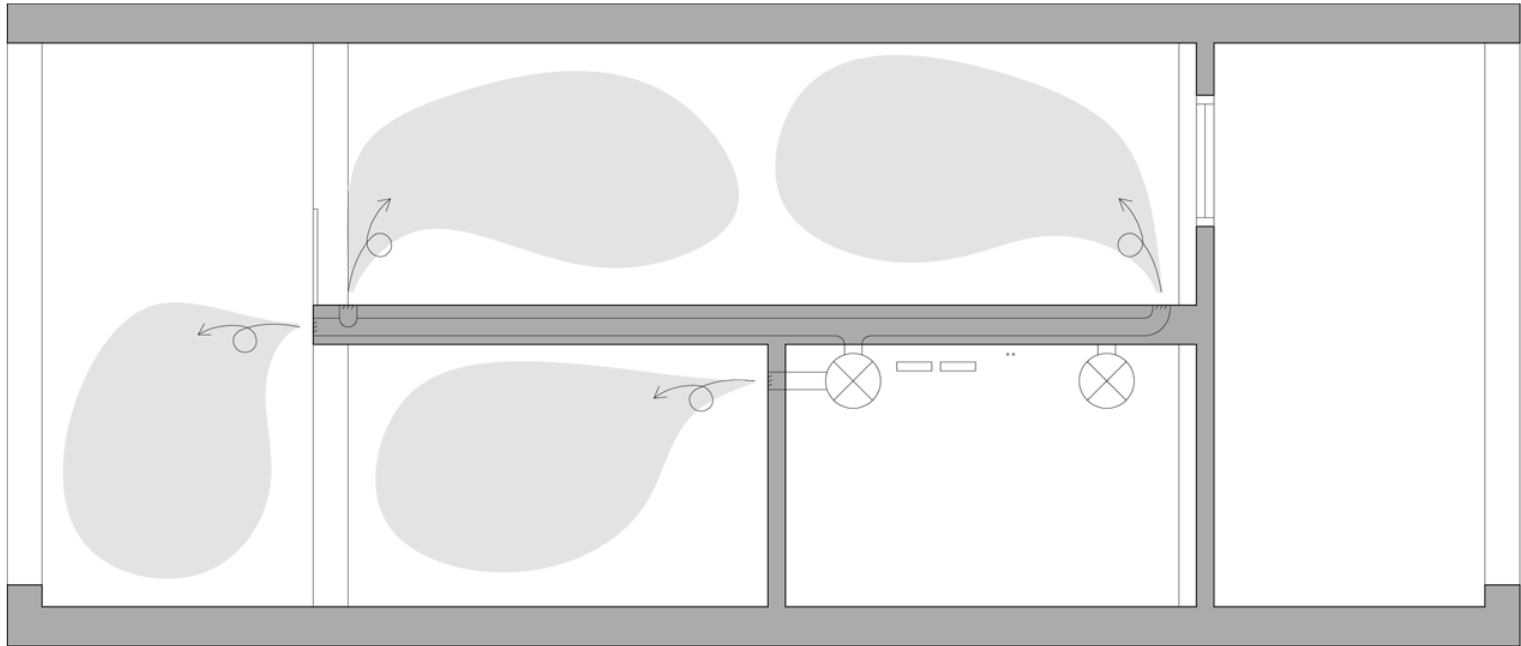
# Ontwerp

## Modulefragment van de doorsnede



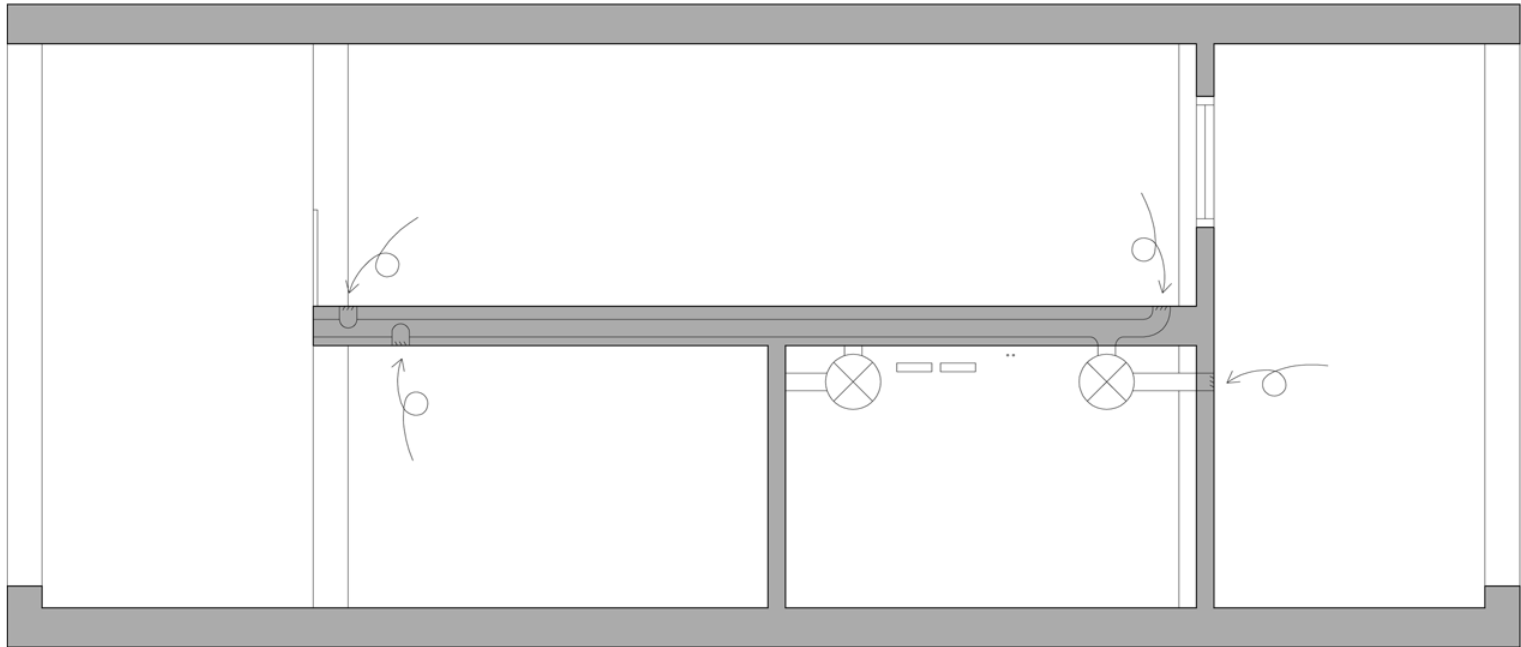
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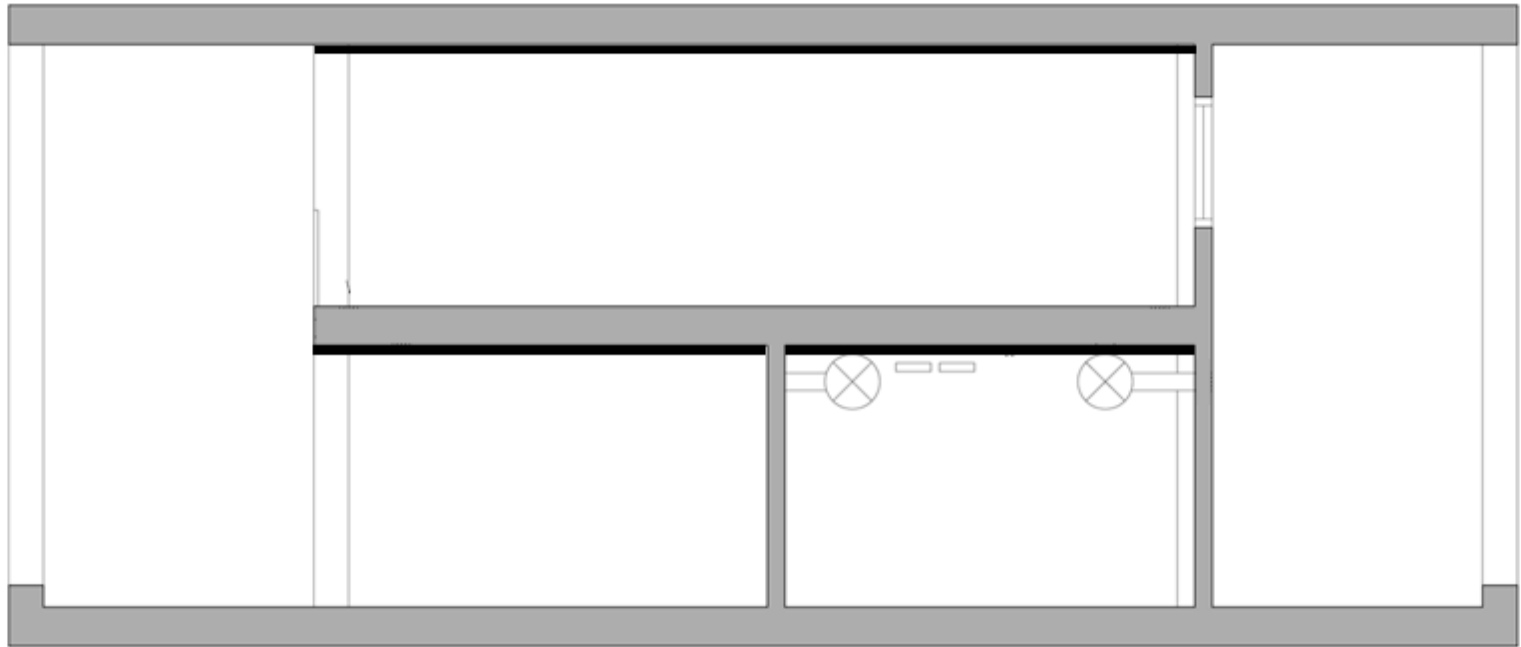
## Mechanische ventilatie



# Ontwerp

## Mechanische ventilatie

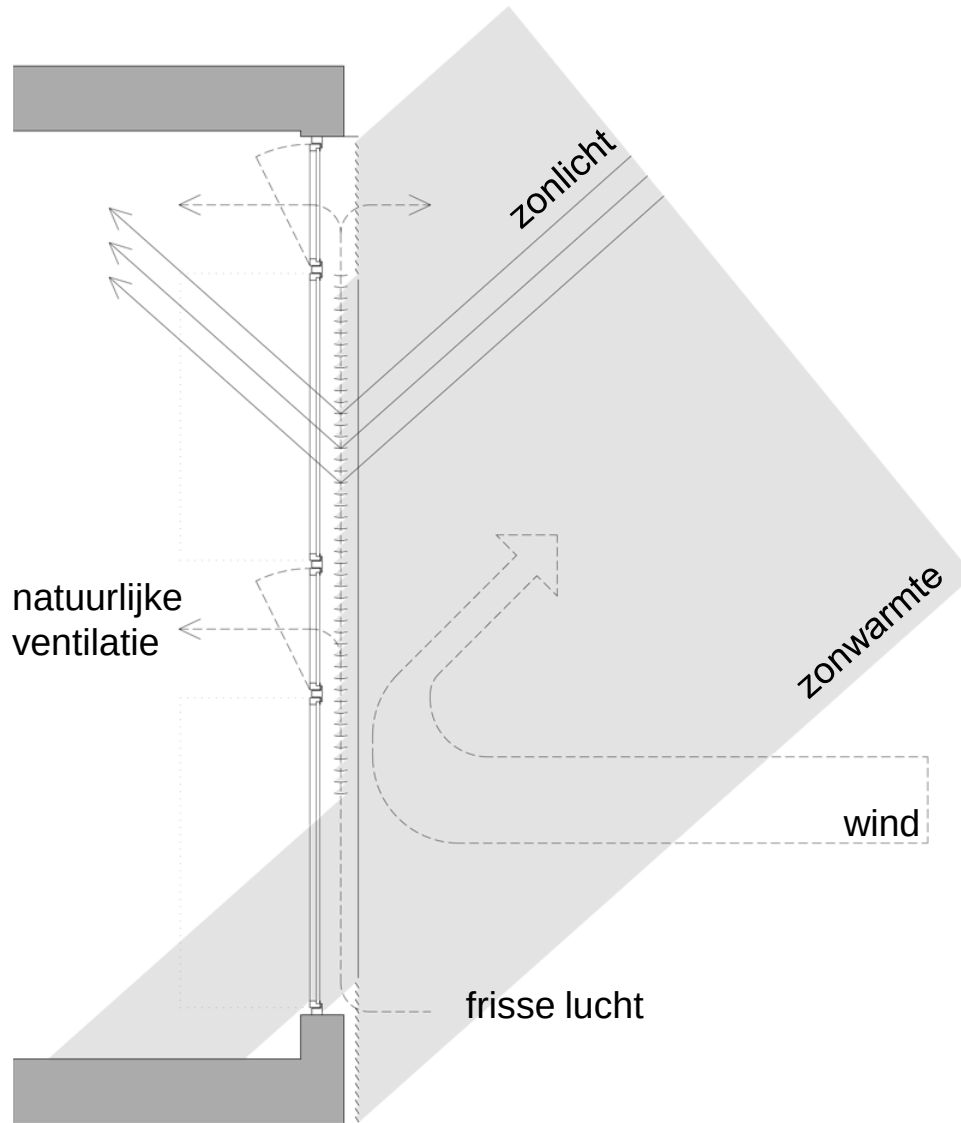






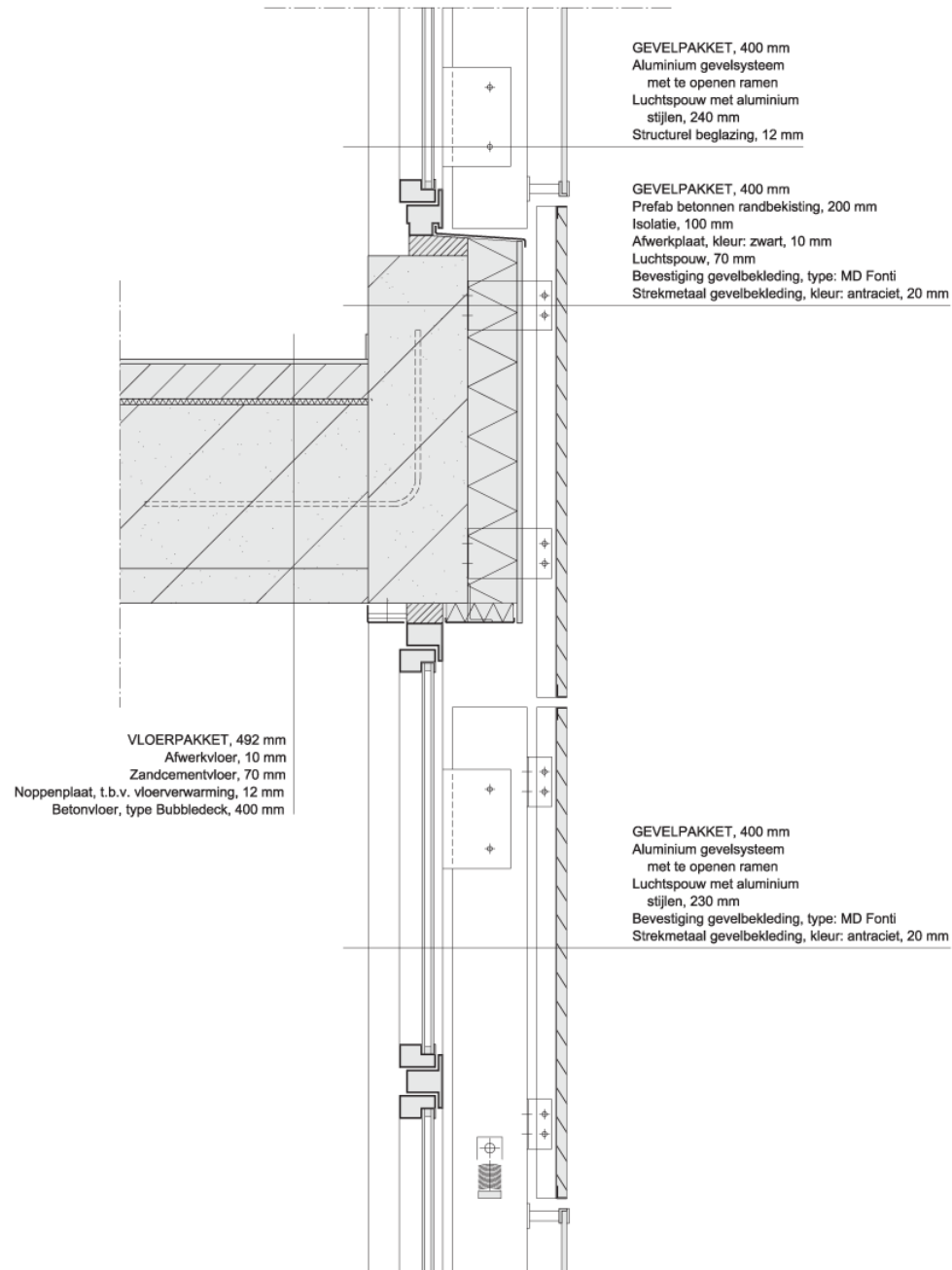
# Ontwerp

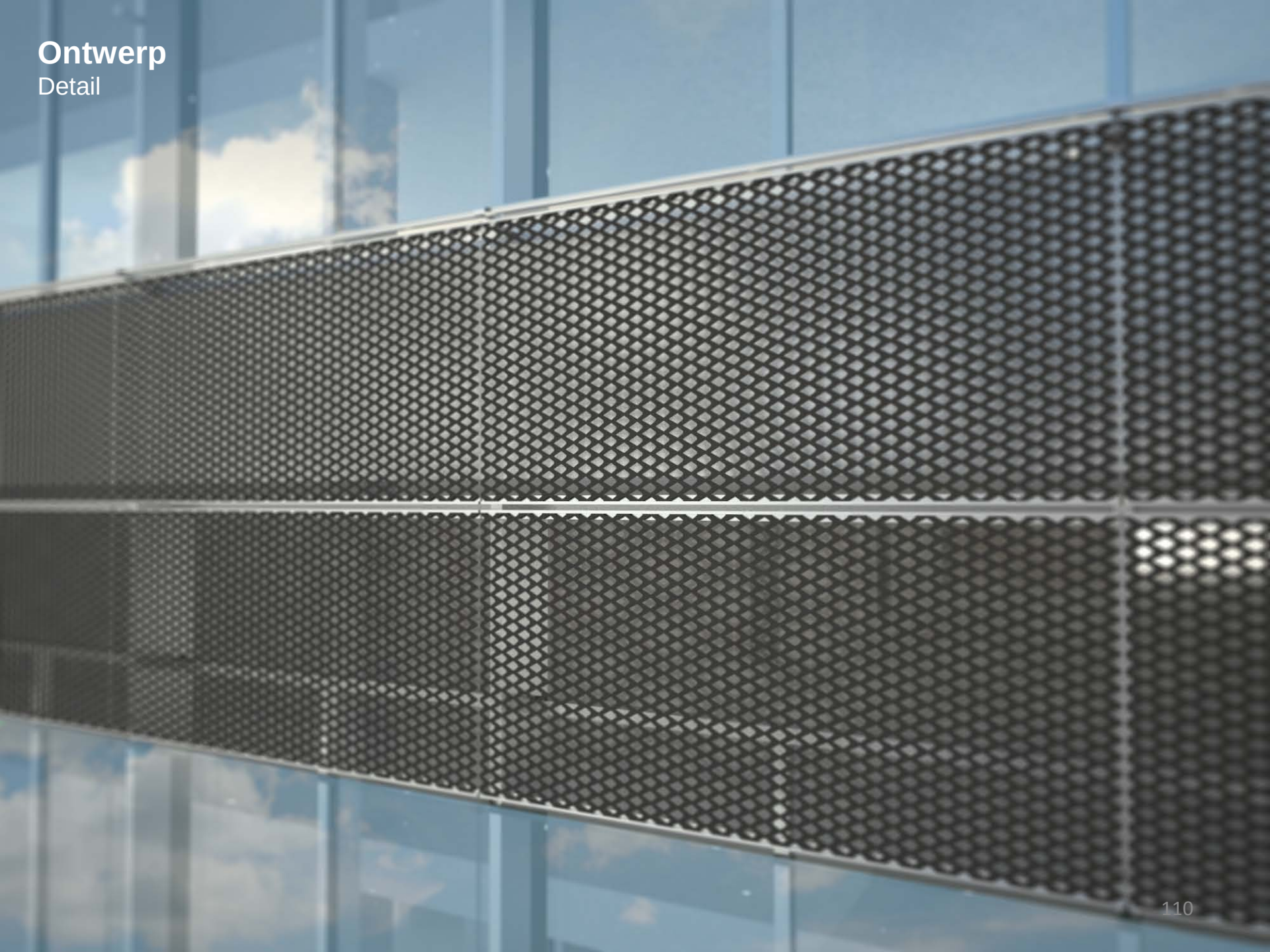
Principe gevel



# Ontwerp

## Kritieke detail









**VRAGEN** EN/OF **OPMERKINGEN**