



**Een toepassing van shape grammar in het
ontwerpproces van een Montessori lyceum
in Amersfoort**

Afstudeerpresentatie

7 november 2014

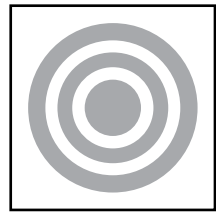
Nina M. Verkerk
studienummer: 1360450

Explorelab 17

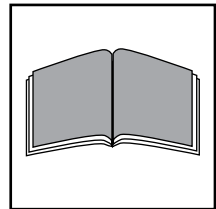
Hoofdmentor
Mentor bouwtechniek
Mentor onderzoek/theorie
Externe geëxamineerde

Ir. R.J. Nottrot
Ir. Y.J. Cuperus
Dr.ir. M.C. Stellingwerff
Ir. D. Vitner

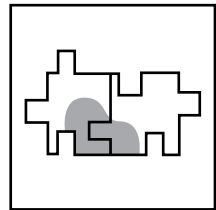
Introductie



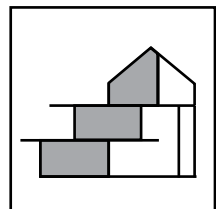
Doel van de opdracht



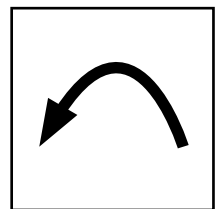
Theoretische achtergrond



Koppeling theorie en ontwerp



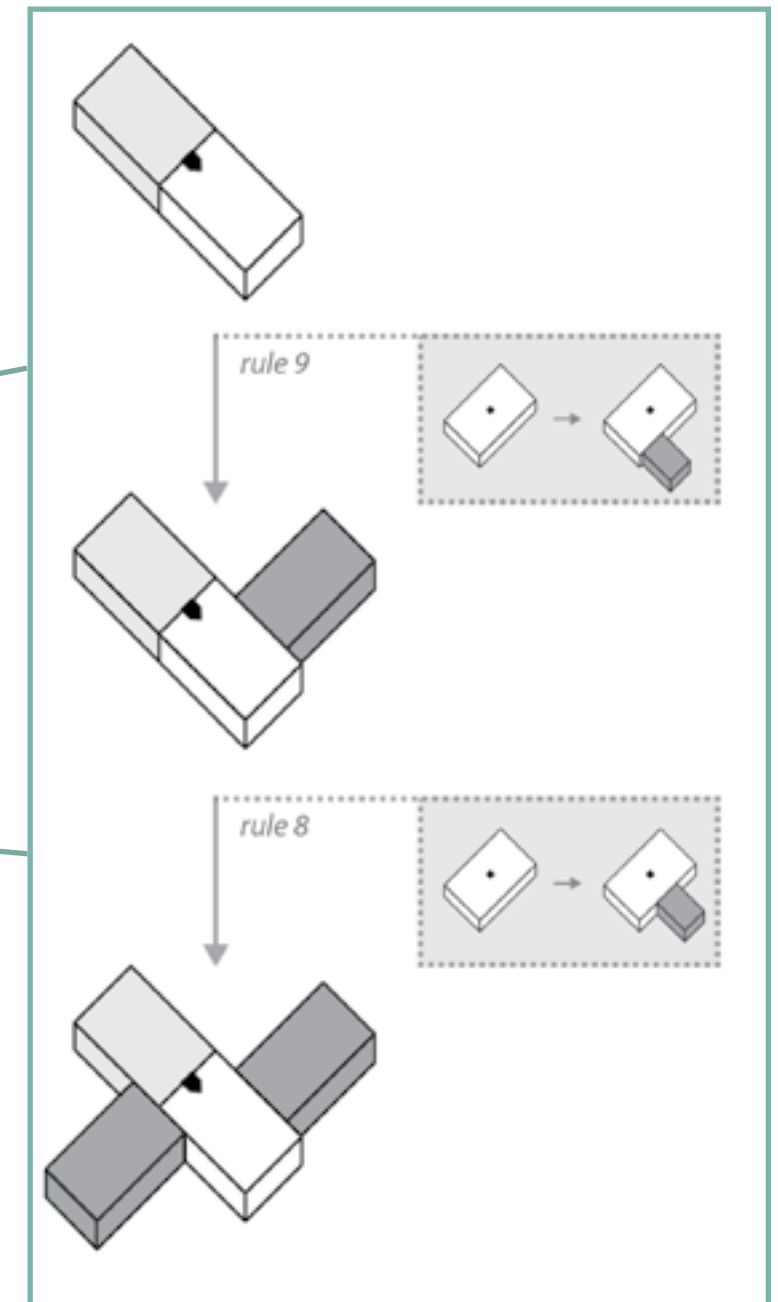
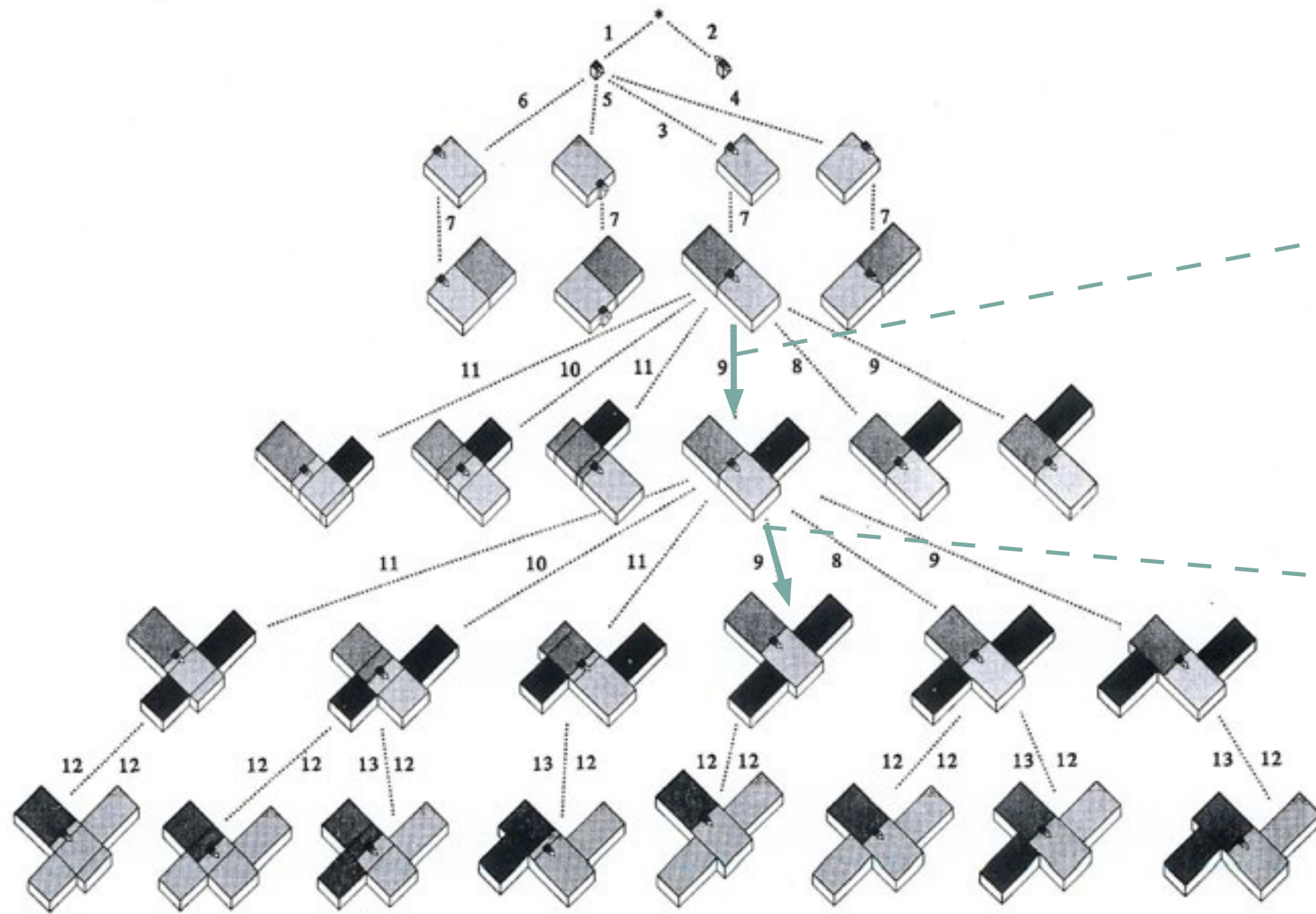
Beschrijving van het architectonisch ontwerp



Terugkoppeling

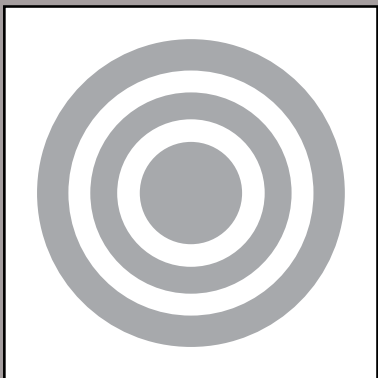


Robie house - Frank Lloyd Wright (1909)



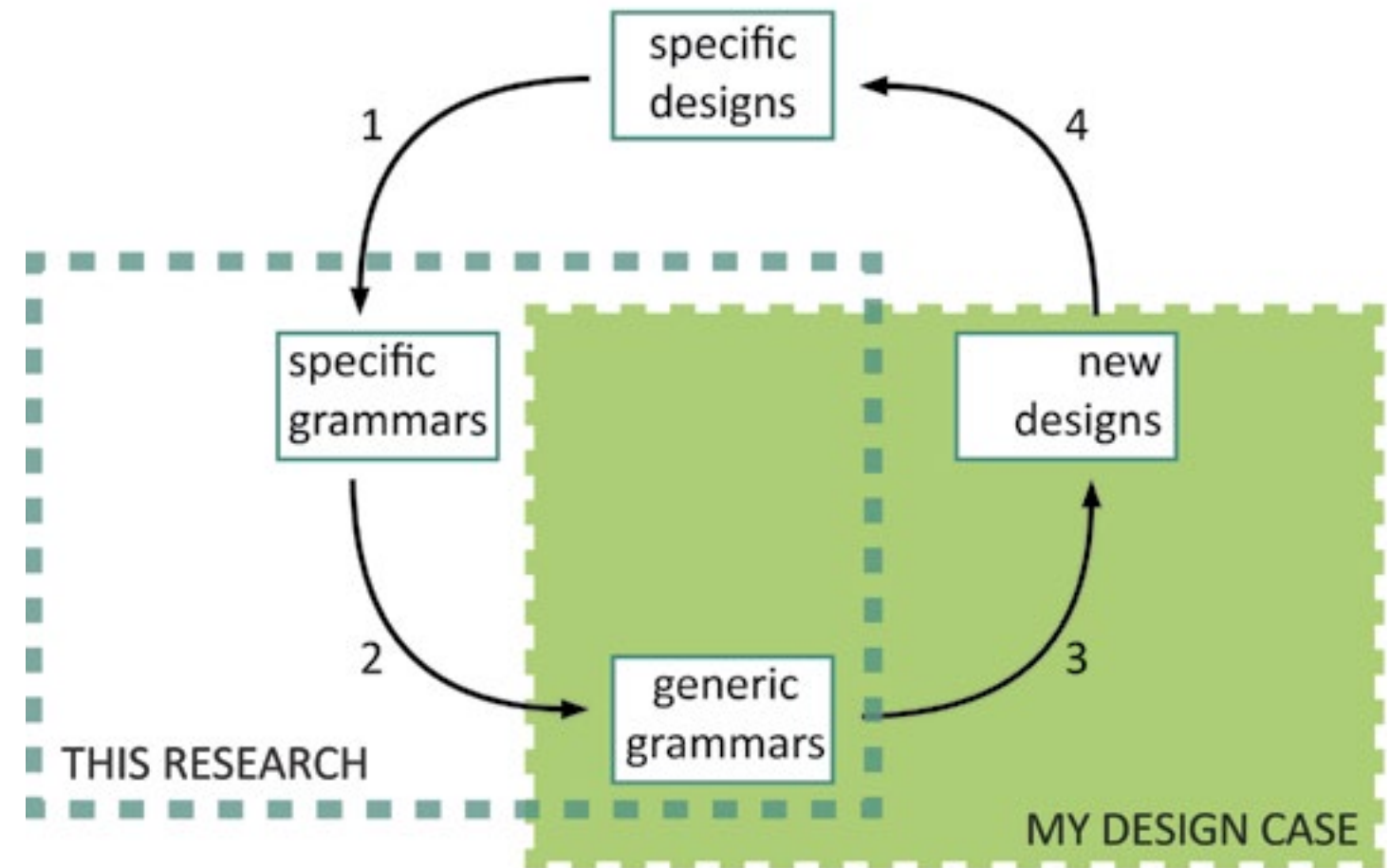
Prairy house grammar - Koning & Eizenberg (1981)

Doel



Doelstelling

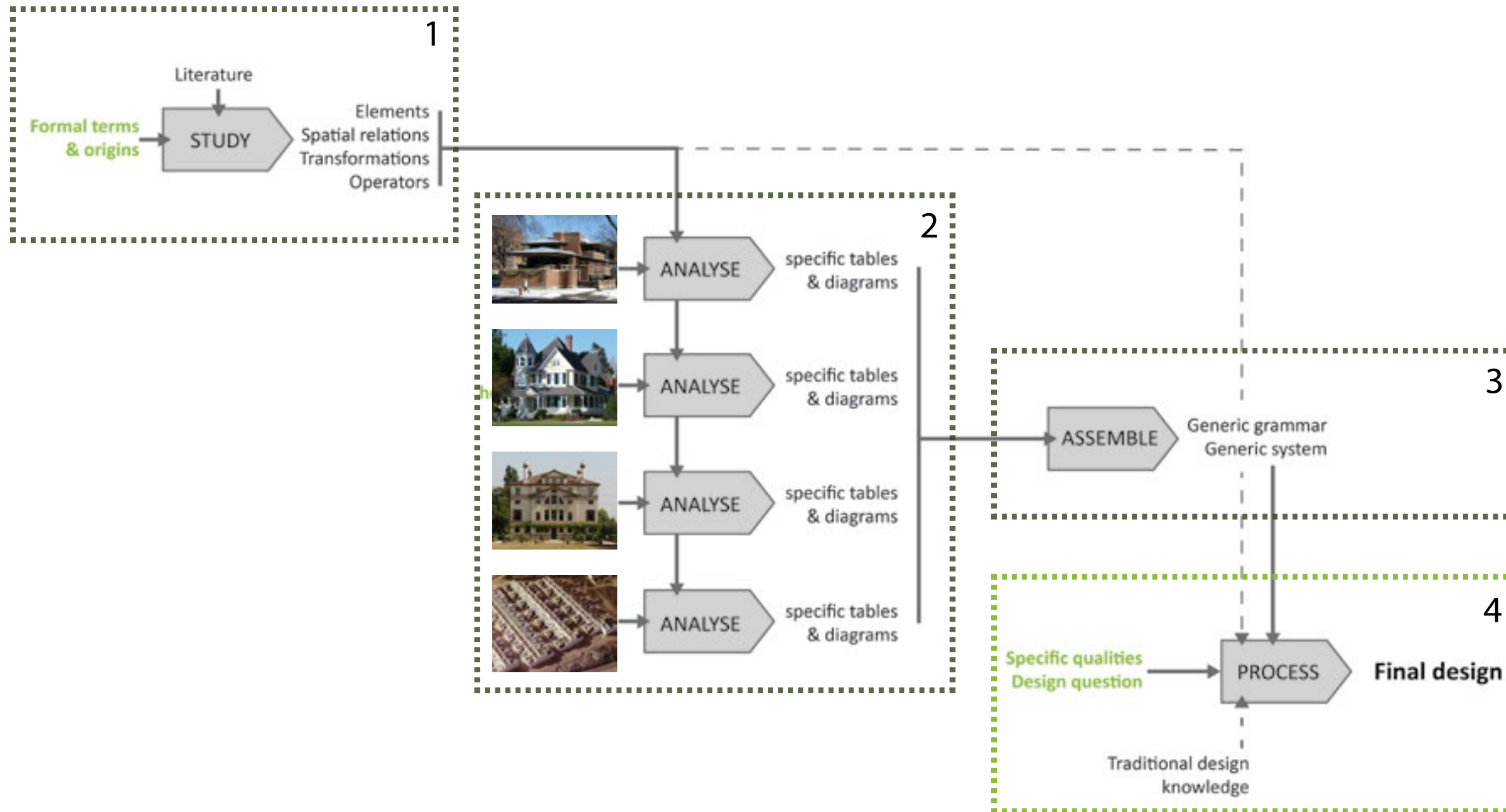
Shape grammar gebruiken in het ontwerpproces **zonder een specifieke stijl te extraheren.**



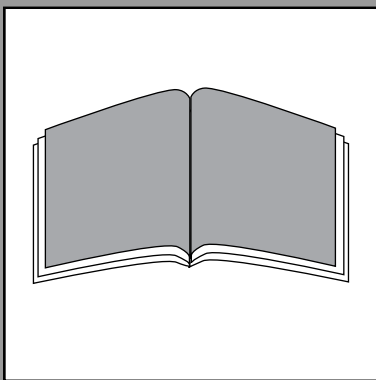
Onderzoeksvraag

In hoeverre kan een generiek begrip en een algemeen systeem van shape grammar toegepast worden in het architectonisch ontwerpproces?

Onderzoeksstructuur



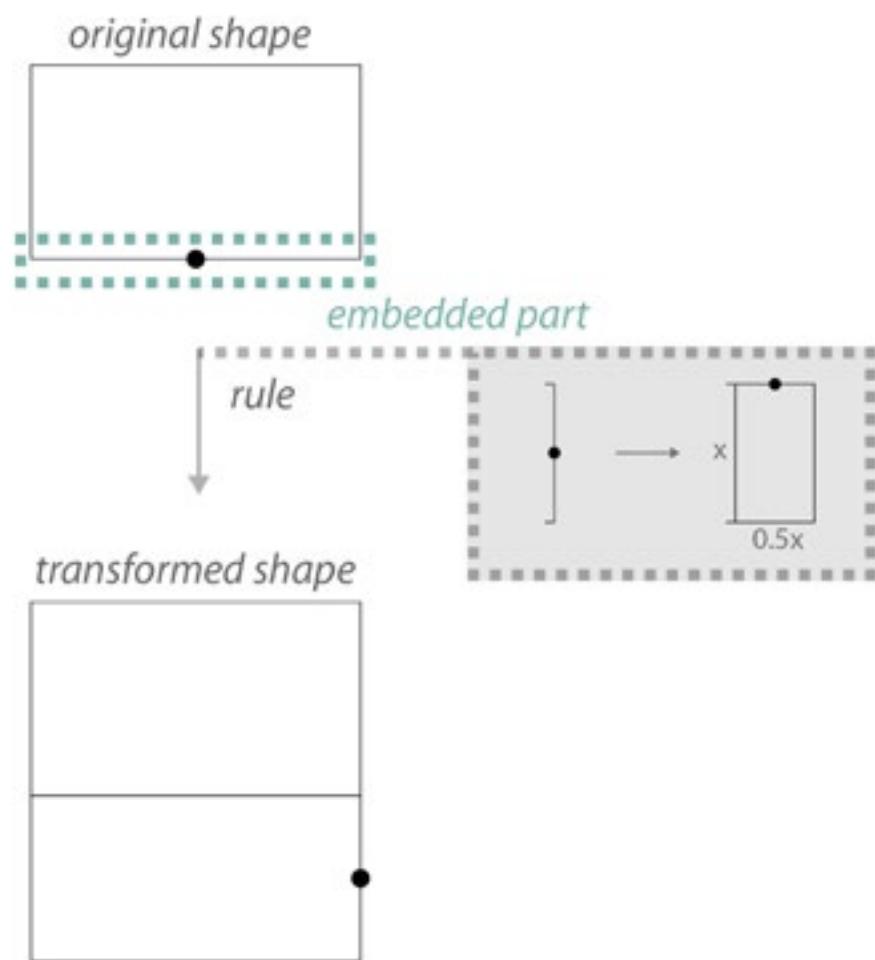
Theorie



1. Een stukje theorie

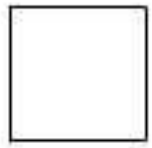
Regels

Transformaties



1. Een stukje theorie

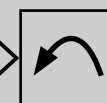
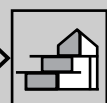
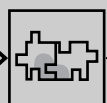
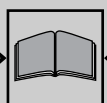
Additie



Transformeren van een grid

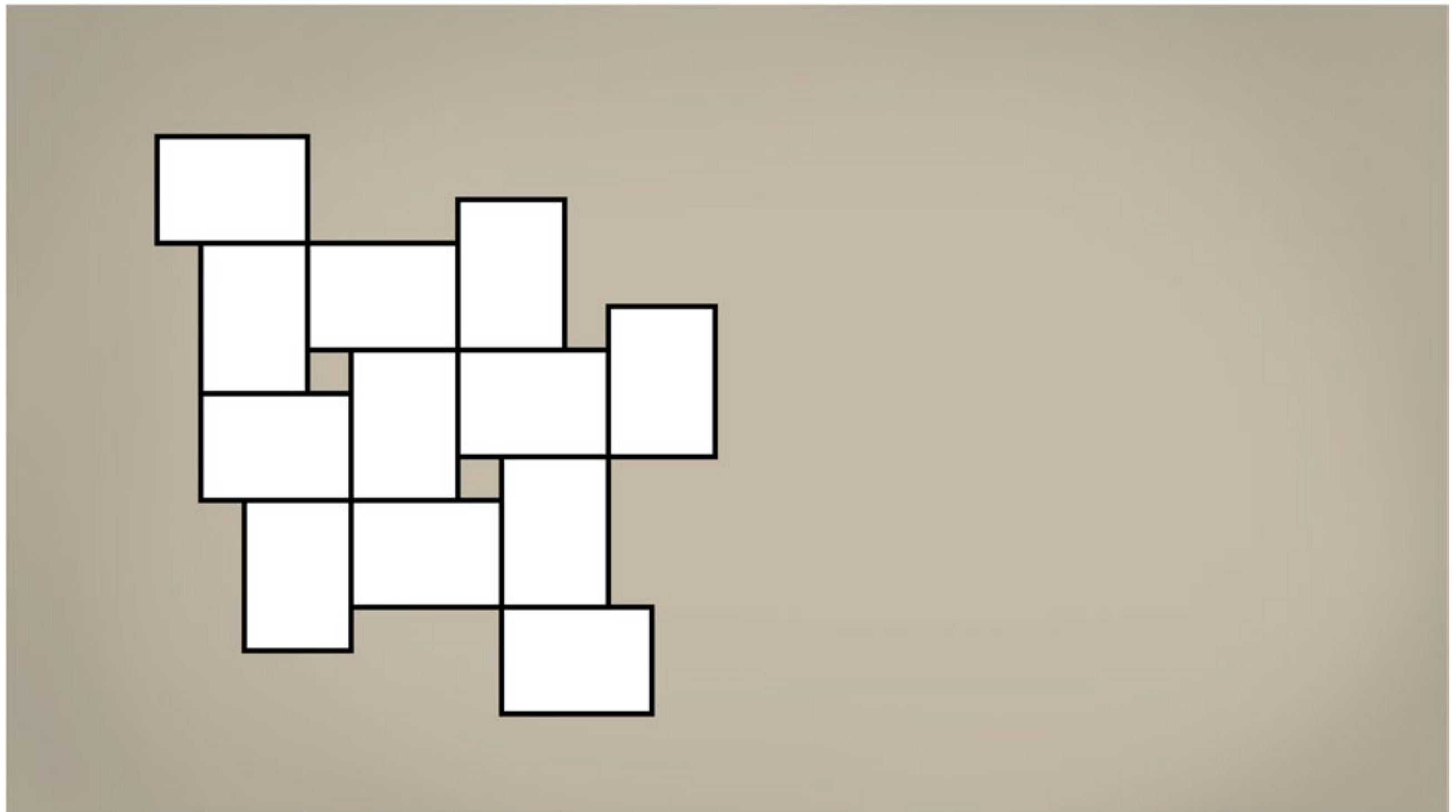
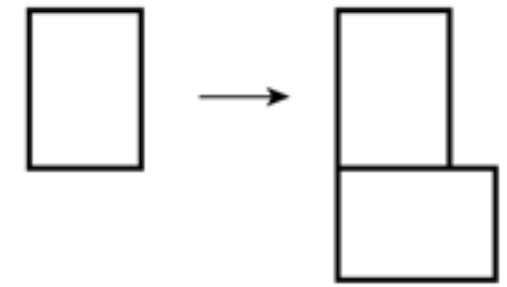


Verdelen van een vlak



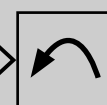
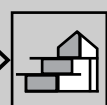
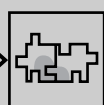
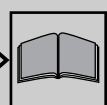
1. Een stukje theorie

toepassing van een voorbeeldregel



3. Conclusies case studies en formele theorie

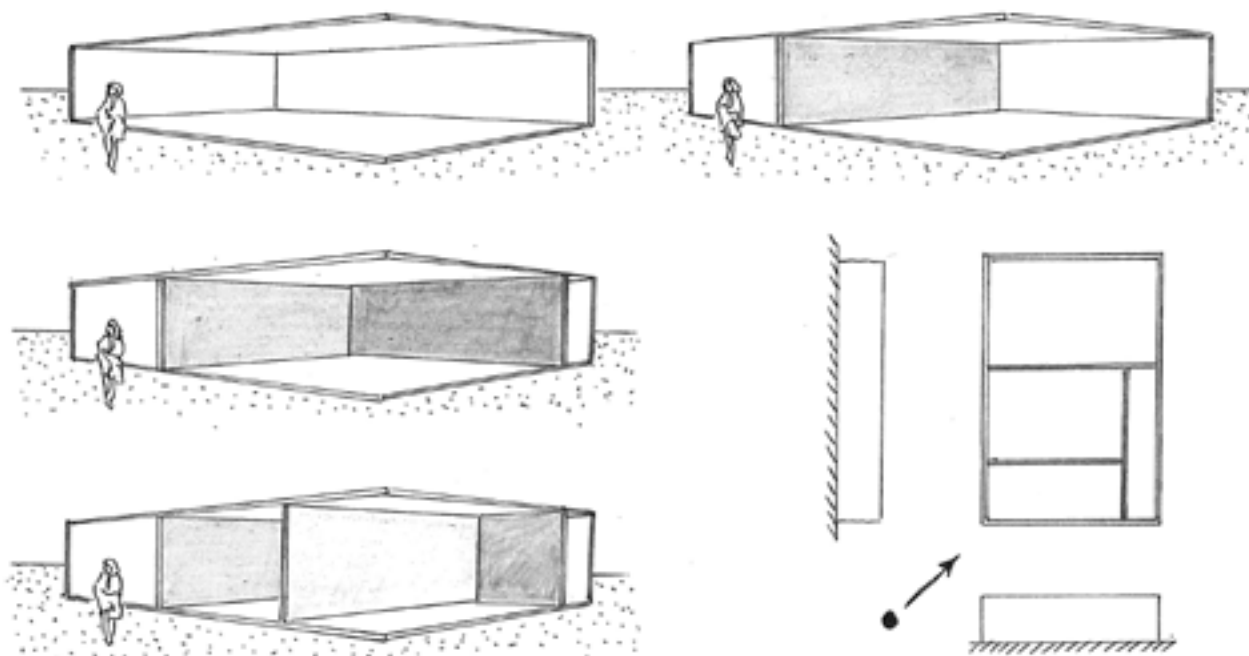
- Shape grammar is geen exacte wetenschap
- Niet alle onderdelen van een ontwerp worden beschreven
↳ alleen onderdelen *specifiek* voor het type gebouw



3. Conclusies case studies en formele theorie

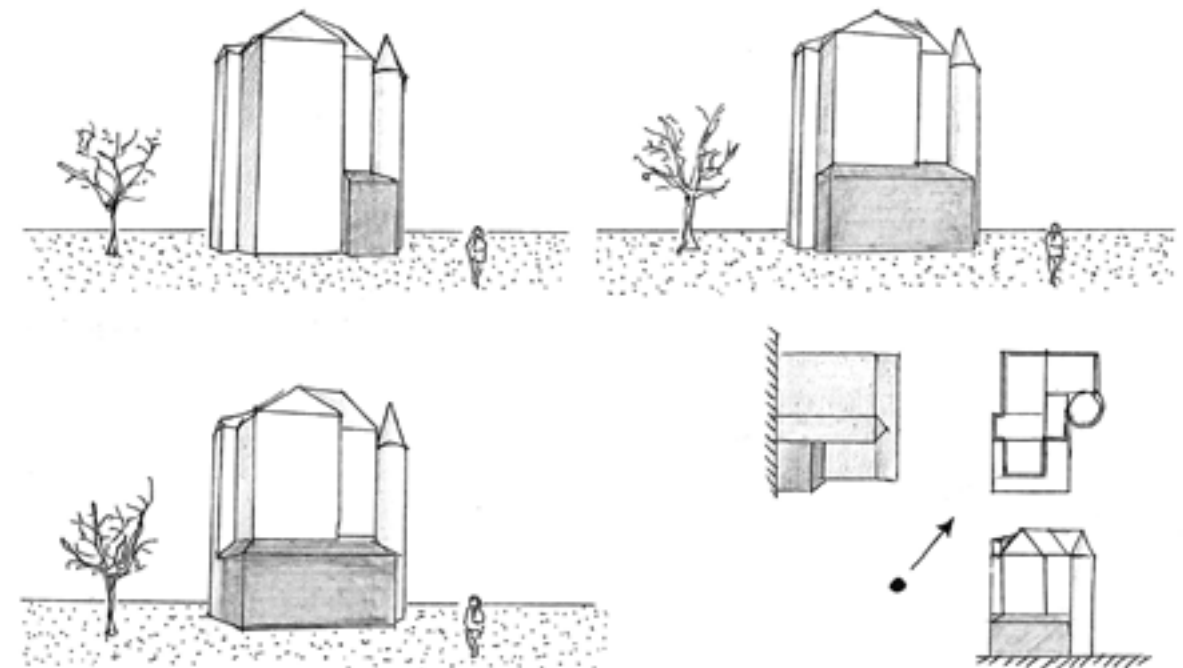
- Shape grammar is geen exacte wetenschap
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Indeling van de woonruimtes



Woningen in Malagueira (Siza), grammatica door J.P. Duarte (2005)

Toevoeging van het portiek



Queen Anne woningen, grammatica door Flemming (1987)

3. Conclusies case studies en formele theorie

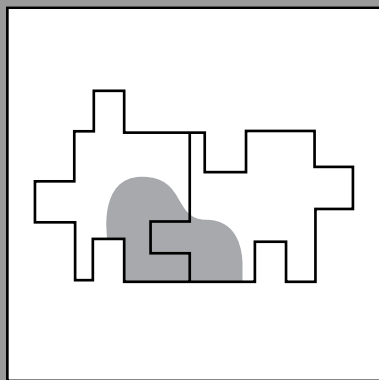
- Shape grammar is geen exacte wetenschap
- Niet alle onderdelen van een ontwerp worden beschreven
↳ alleen onderdelen *specifiek* voor het type gebouw
- Stages en sub stages

1. Basis compositie



2. Specifieke onderdelen

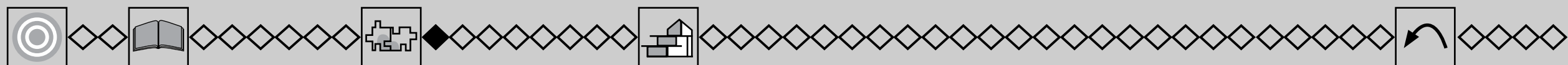
Koppeling theorie en ontwerp



4. Implementatie in het ontwerpproces

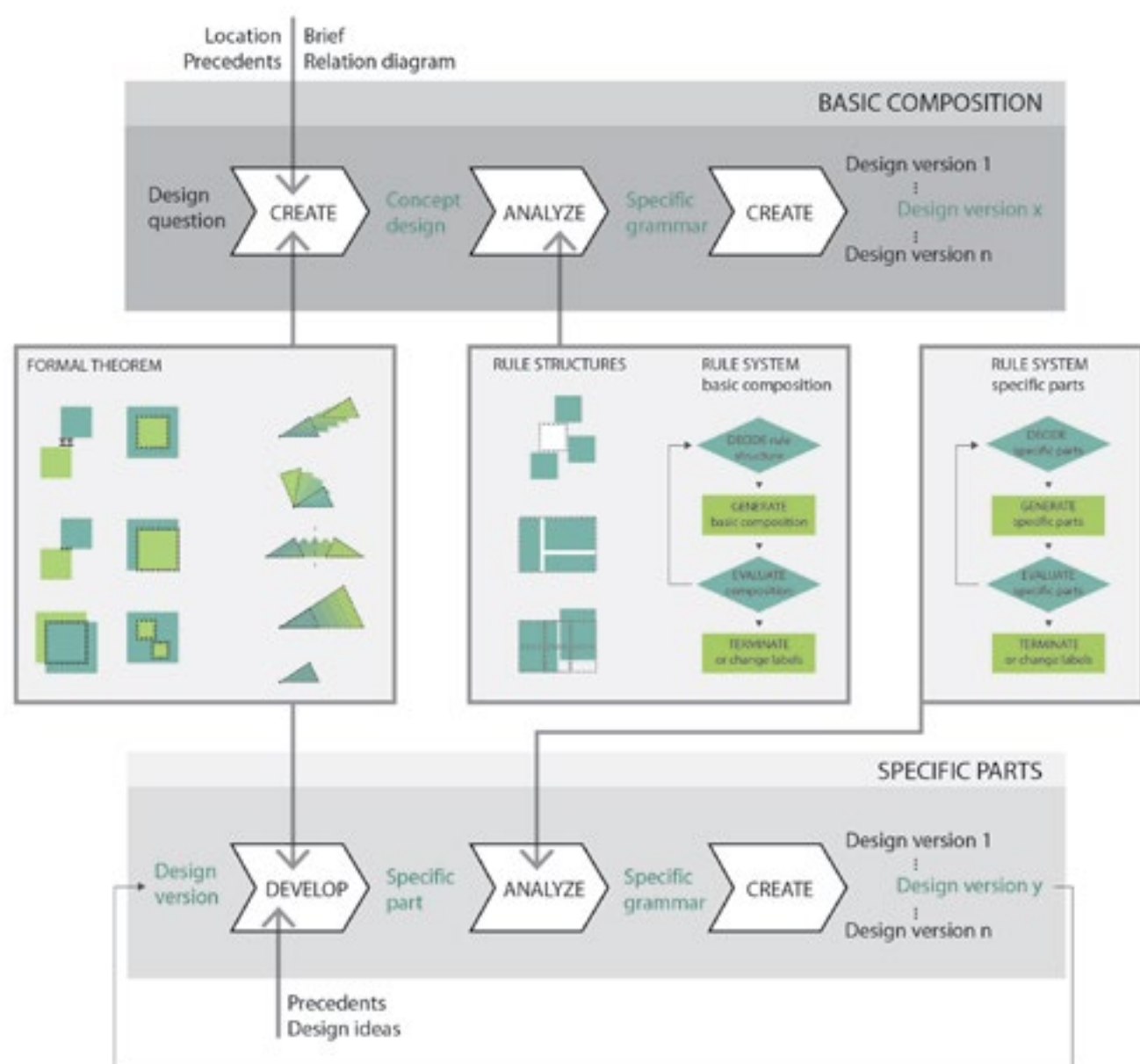
1. Metaniveau (structuur)

2. Inhoudelijk niveau



4. Implementatie in het ontwerpproces

1. Metaniveau (structuur)



Stap 1: kennis opdoen over het onderwerp
resultaat: artikel

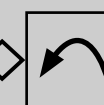
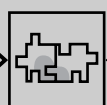
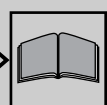
Stap 2: concept ontwerp ontwikkelen
resultaat: tekeningen (2D + 3D), modellen

Stap 3.1: analyseren van het conceptontwerp door middel van grammatica

Stap 3.2: ontwikkelen van een specifieke grammatica
resultaat: specifieke shape grammar

Stap 4: ontwikkelen van het ontwerp op basis van de regels
resultaat: ontwerpvarianten (in dezelfde taal)

Stap 5: ontwikkelen van een aantal specifieke onderdelen



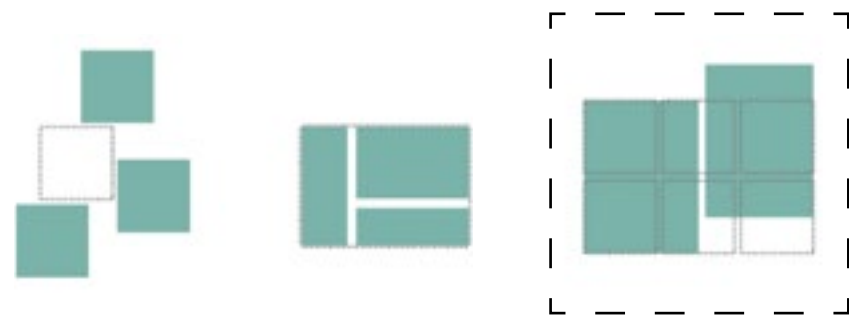
4. Implementatie in het ontwerpproces

2. Inhoudelijk niveau

- Basis compositie

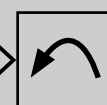
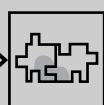
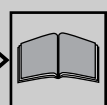


- Doorontwikkelen basis compositie (transformeren van de doorsneden)

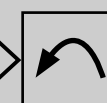
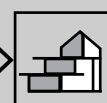
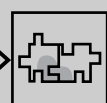
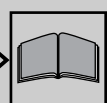
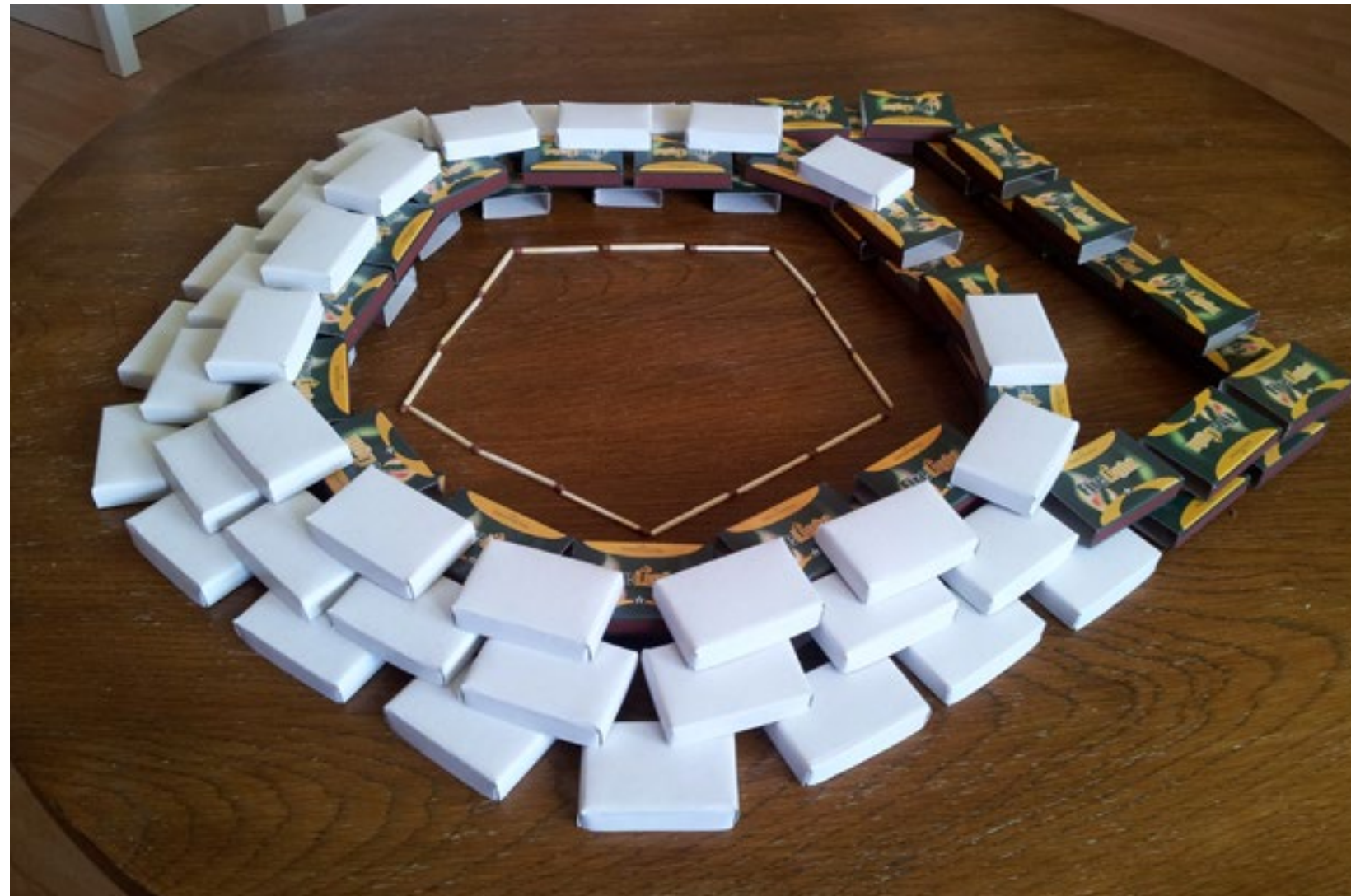


- Specifieke grammatica

Doelen: expliciet maken van de transformaties
consistent ontwerp

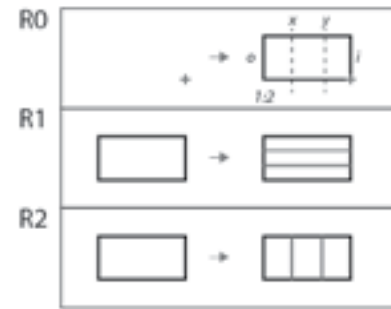


Inhoudelijk - Ontwikkeling van de basis compositie



Inhoudelijk - Ontwikkeling van de doorsneden

fase A
definieer grid

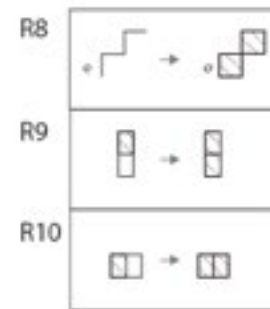


fase C
ontwerpvarianten

aanpassen van het grid



lokalisatie van de buitenruimte



lokalisatie van de klaslokalen

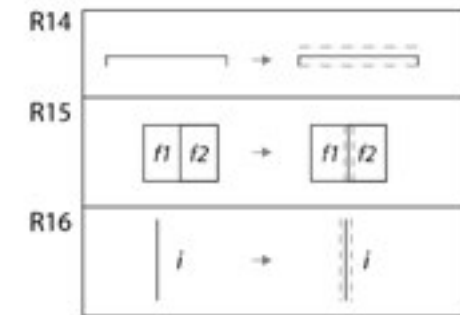


verwijder overbodige lijnen



fase D
constructie en materiaal

introduceer hulplijnen



introduceer labels

- 1a: vloer buiten - buiten
- 1b: vloer binnen - buiten
- 1c: vloer binnen - binnen
- 1d: dak
- 1e: vloer binnen - buiten (omgang)

- 2a: wand buiten - binnen
- 2b: wand binnen - binnen
- 2c: wand binnen - buiten (omgang)
- 2d: wand binnen - buiten (binnenplaats)

definieer vloeren

definieer wanden

fase B
algemene deel

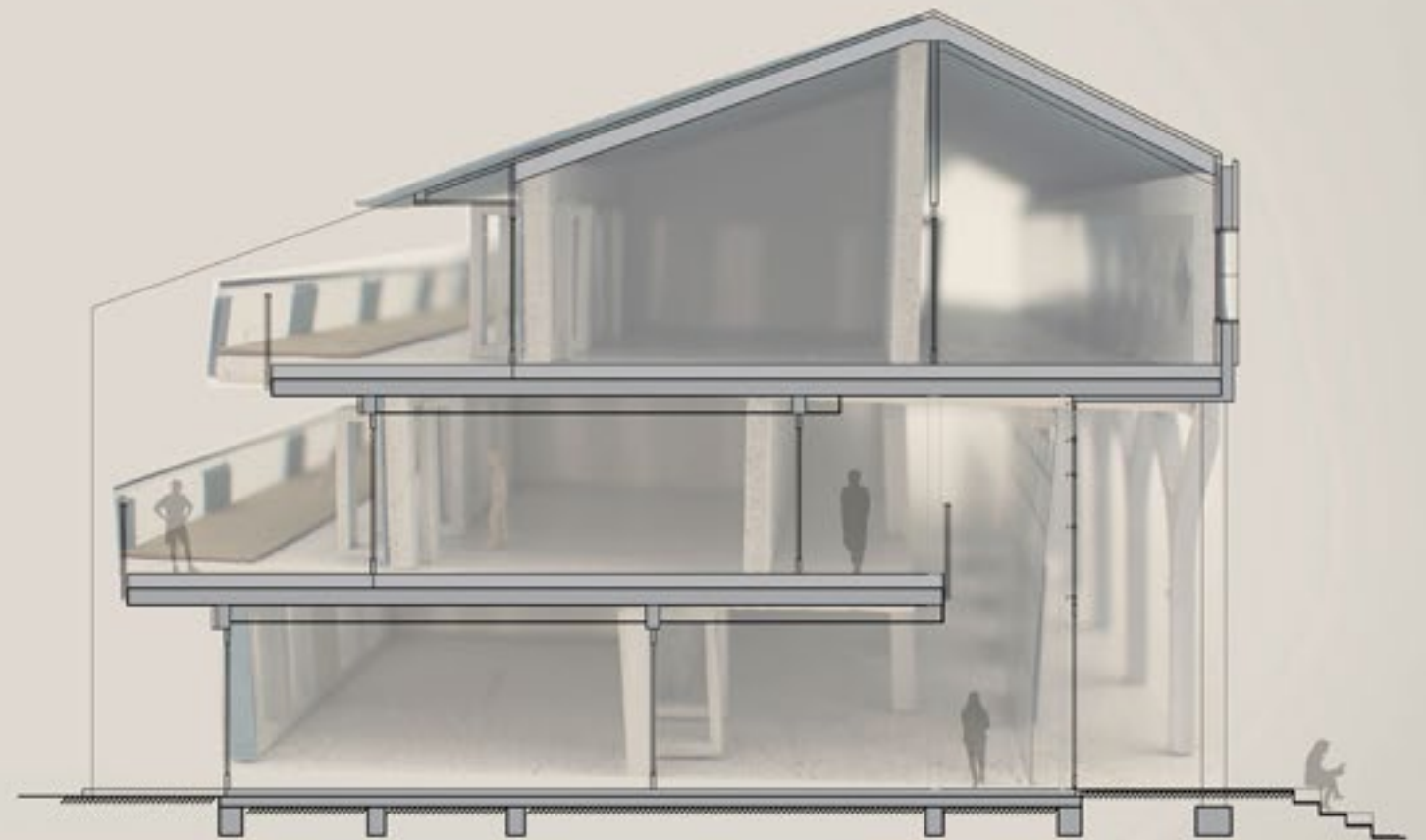
lokalisatie van de gang



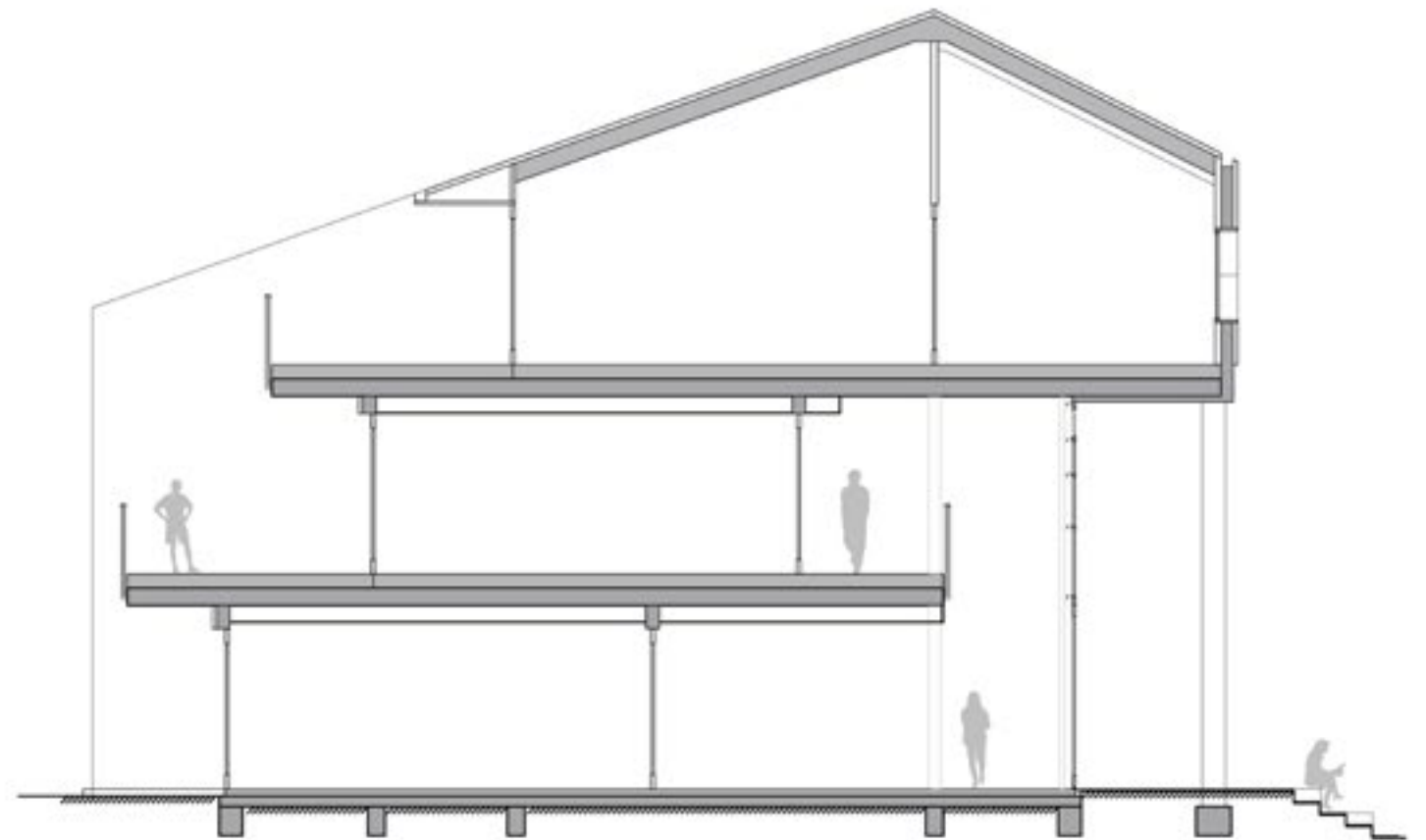
lokalisatie van de ruimte voor werkplekken



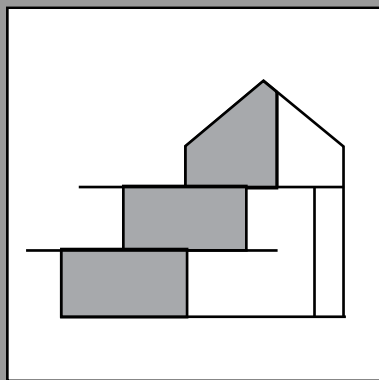
Inhoudelijk - Ontwikkeling van de doorsneden



Inhoudelijk - Ontwikkeling van de doorsneden



Beschrijving van het architectonisch ontwerp



Onderdelen

Concept en kwaliteiten

Locatie

Gebouw

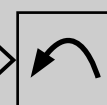
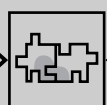
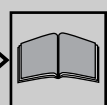
- beeld & compositie
- binnenplaats
- balkons
- dak
- gevel & materiaal
- constructie & stabiliteit

Los volume

- functie & gebruik

Studievleugels

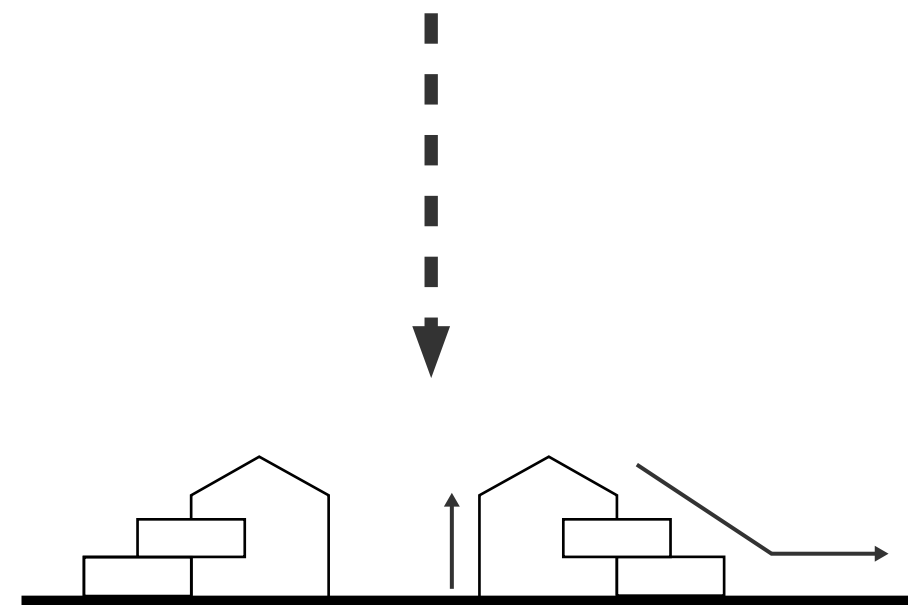
- functie & gebruik
- lokalen
 - *beleving*
 - *klimaat*
- balkons
- gang



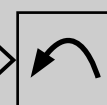
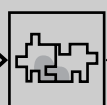
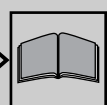
Concept en kwaliteiten

Montessori onderwijs

- individuele interesses
- leren in een sociale context
- school als afspiegeling van de 'echte' wereld (Hertzberger)



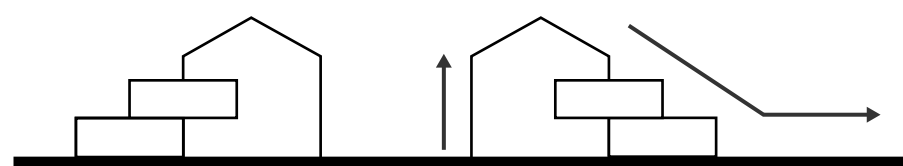
Micromaatschappij



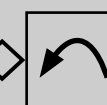
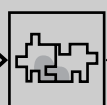
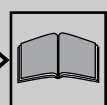
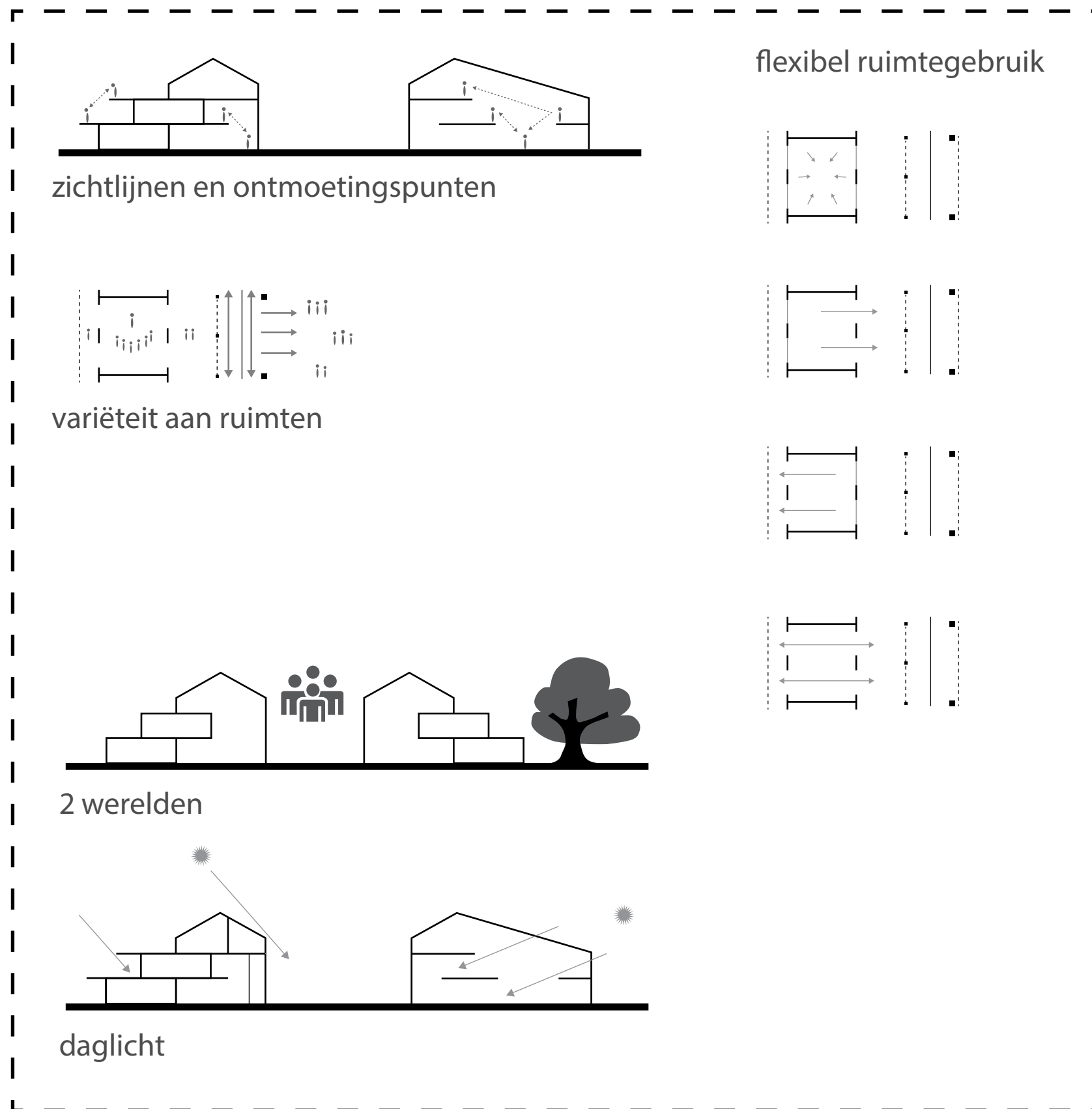
Concept en kwaliteiten

Montessori onderwijs

- individuele interesses
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Micromaatschappij



Ligging

Amersfoort - schothorst



Locatie



Westzijde: grens woonwijk en landelijke



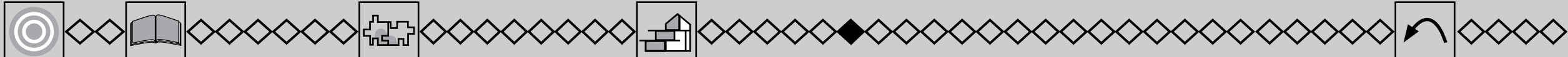
Noordzijde: landelijk groen

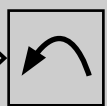
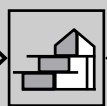
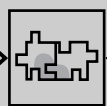
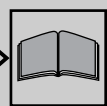


Nabije omgeving: lage woningbouw

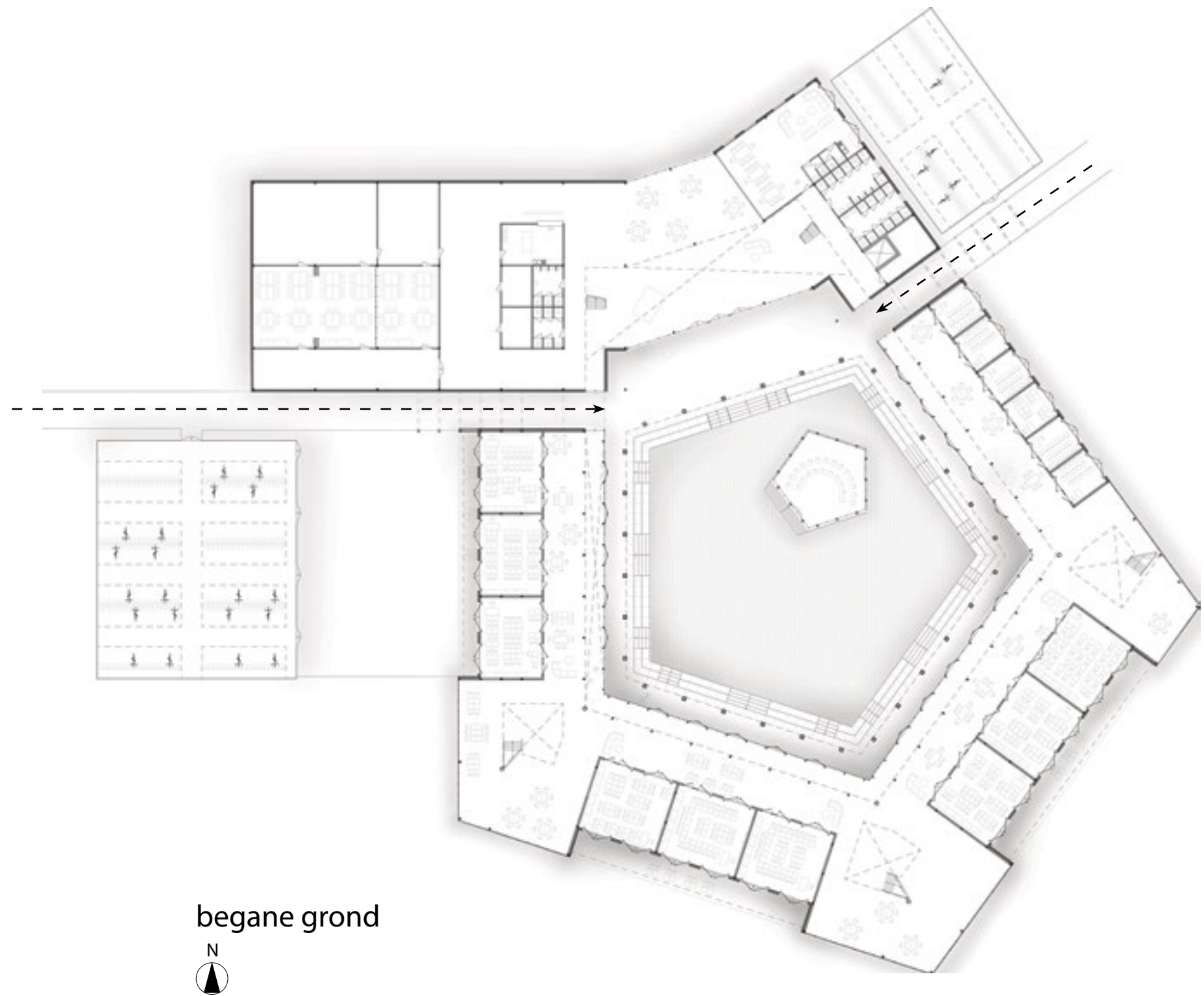
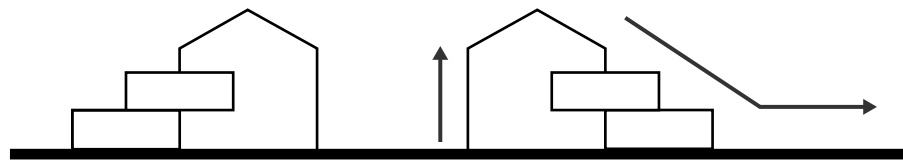


Zuidoostzijde: landelijk groen

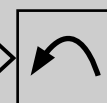
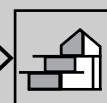
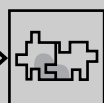
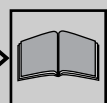




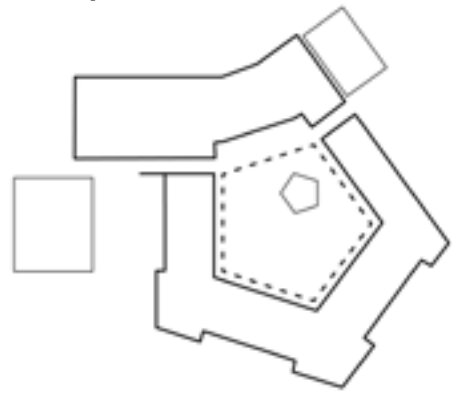
Gebouw



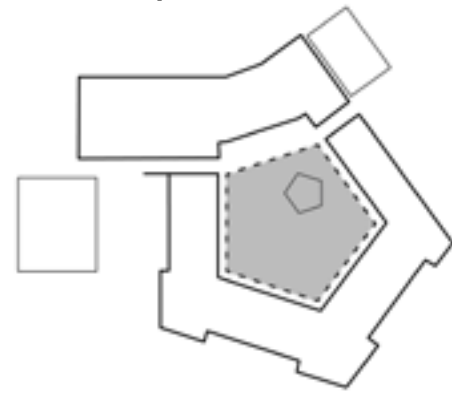
begane grond



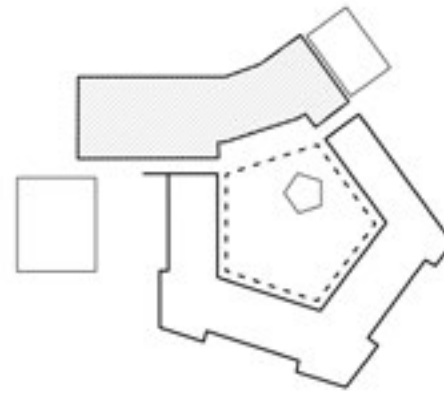
compositie



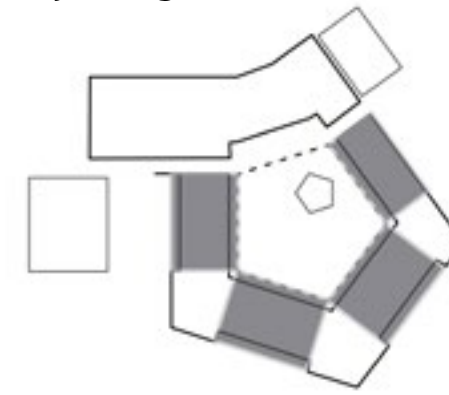
binnenplaats



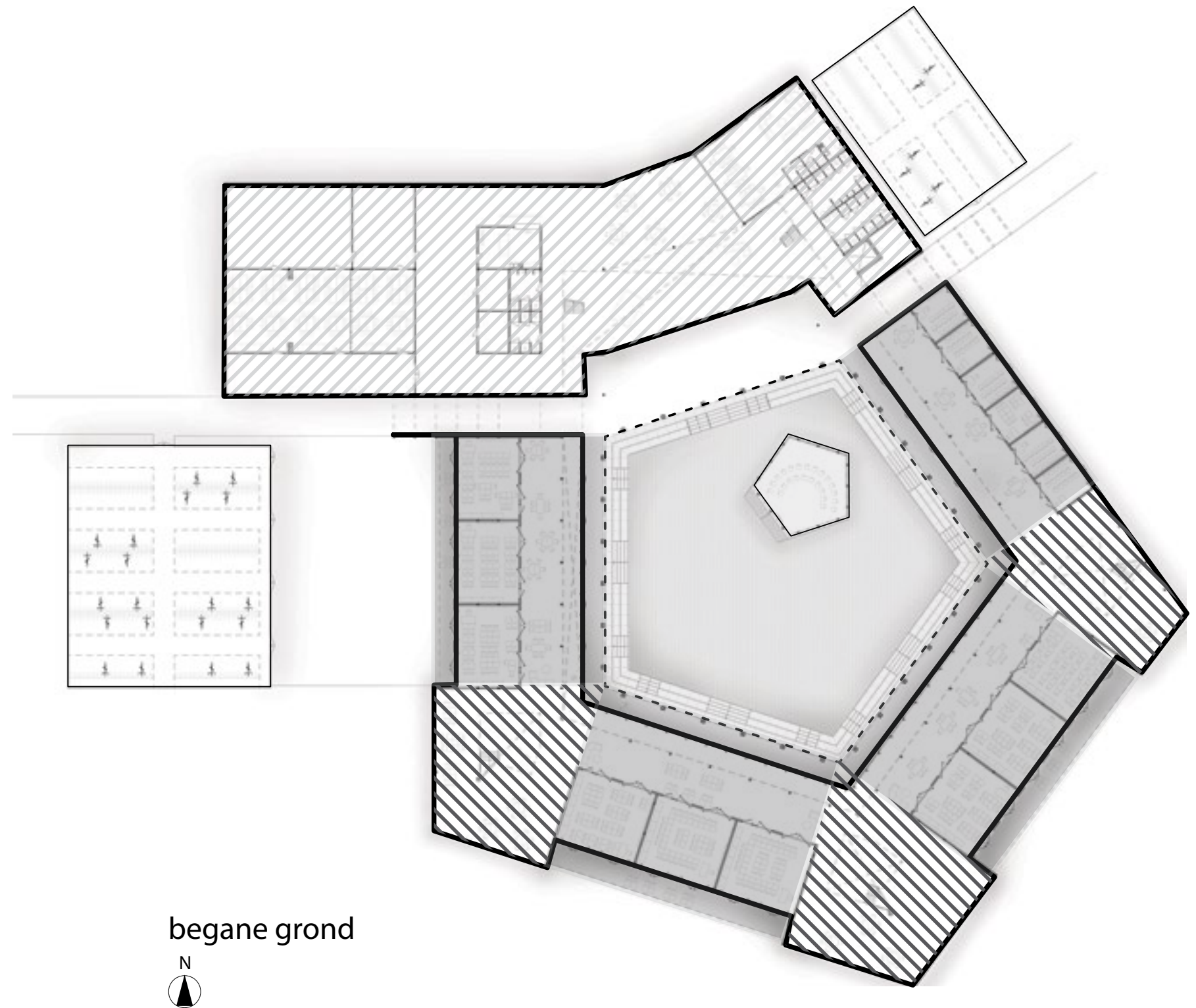
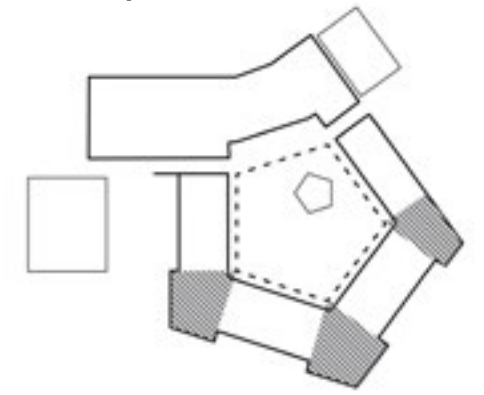
los volume



zijvleugels

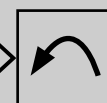
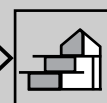
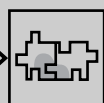
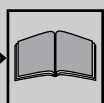


hoekpunten



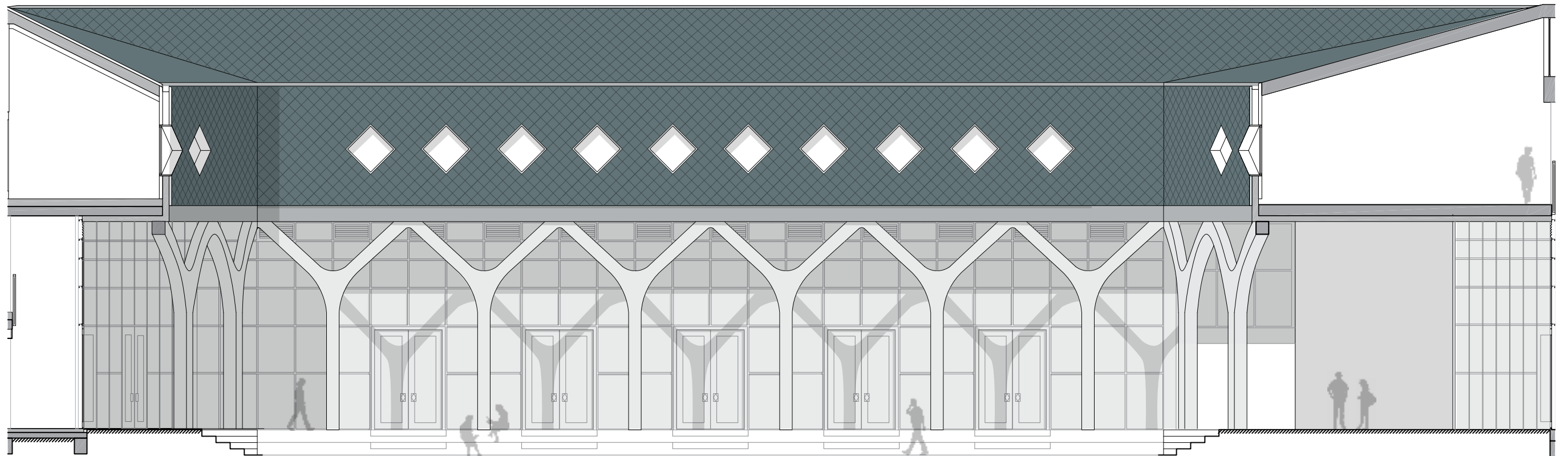
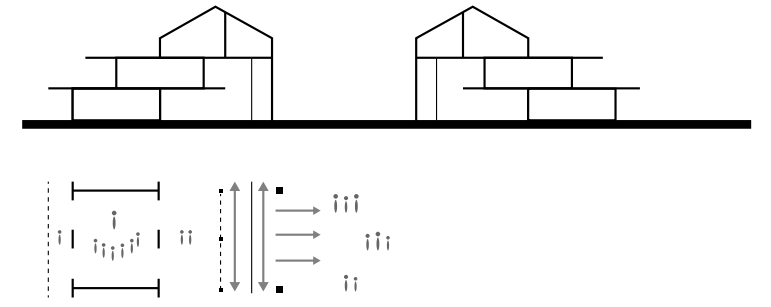
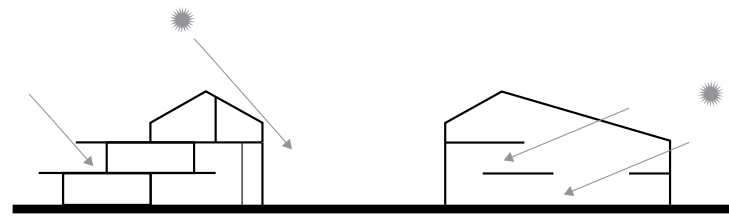
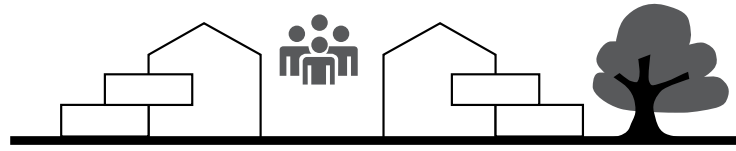
gebouw
compositie

begane grond

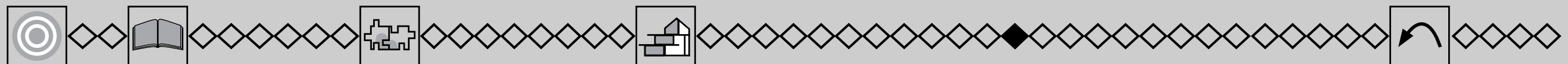


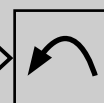
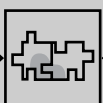
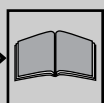
gebouw

Binnenplaats



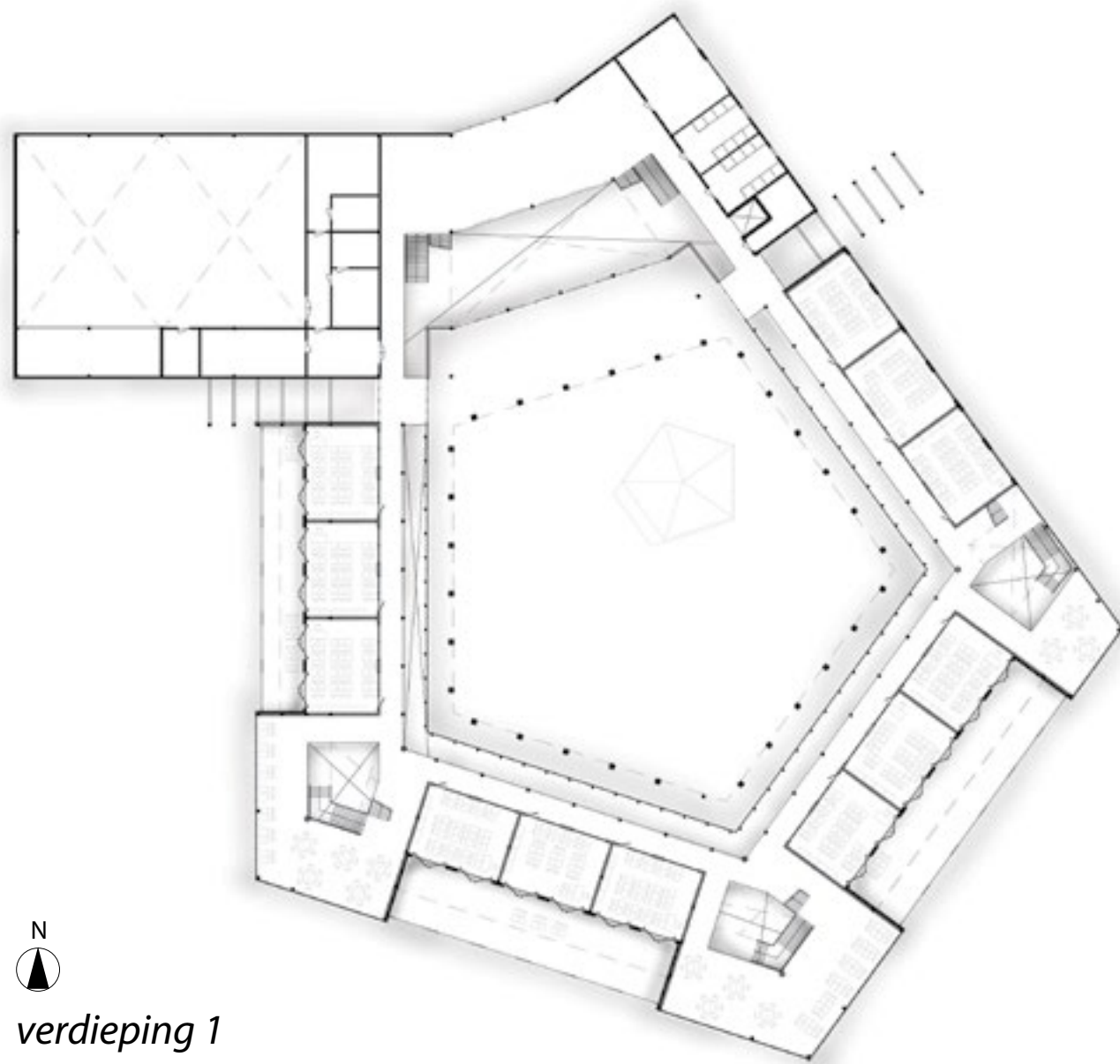
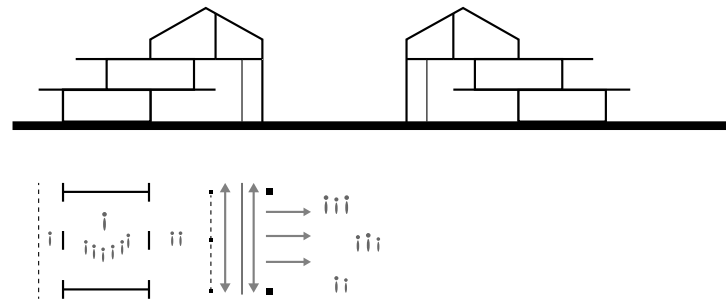
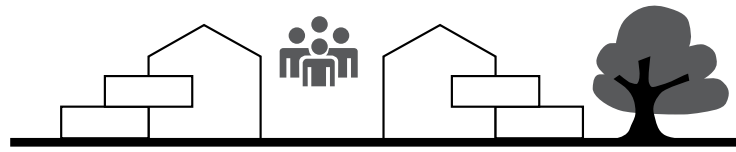
aanzicht binnenplaats



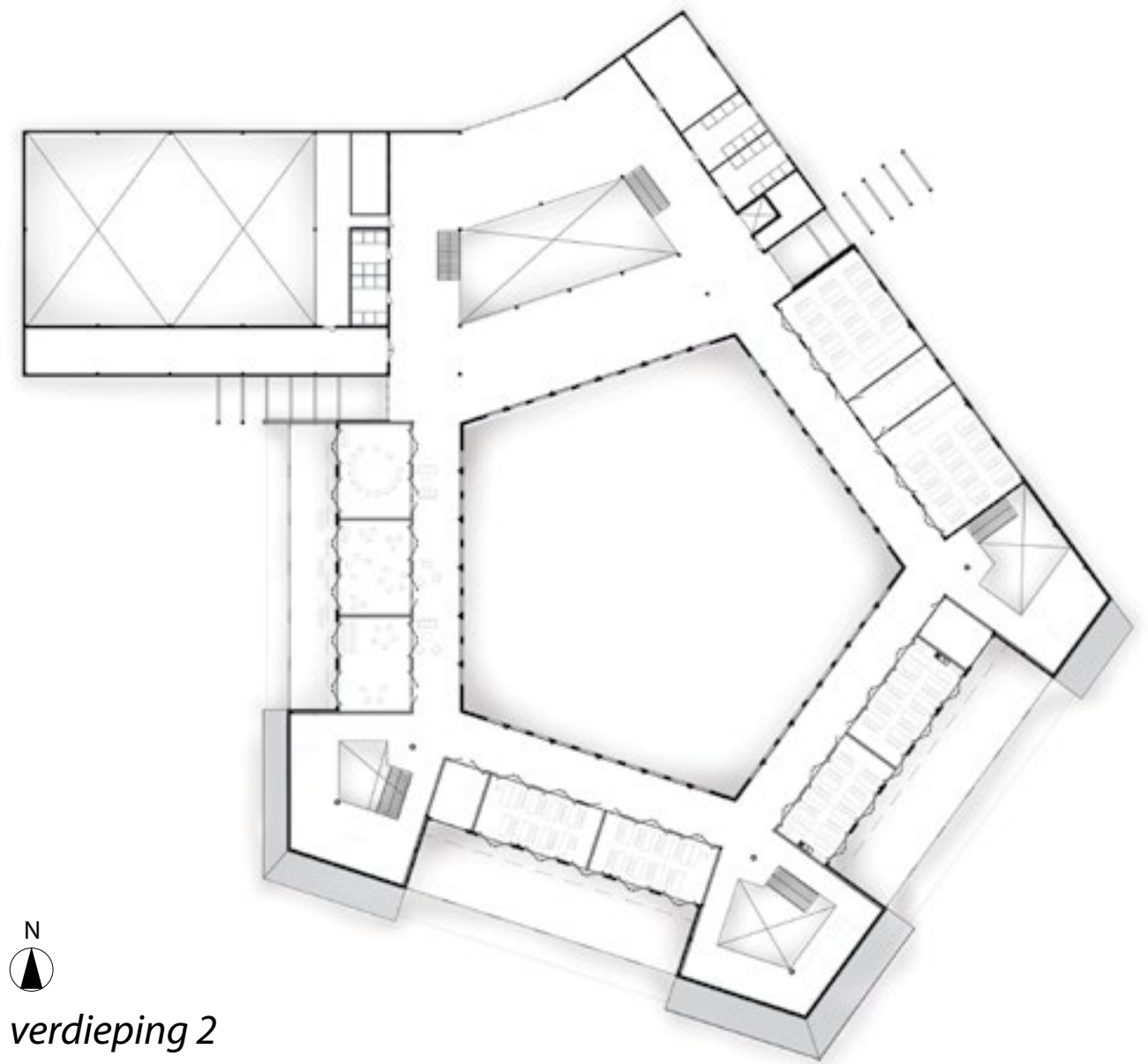


gebouw

Balkons

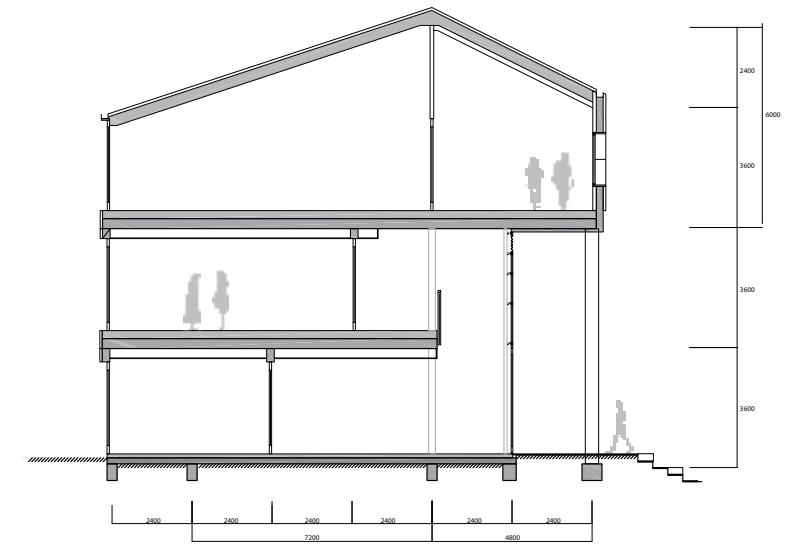
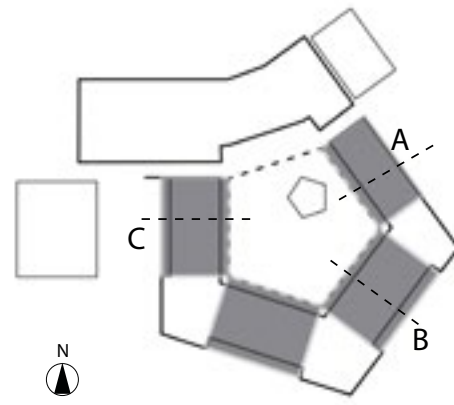
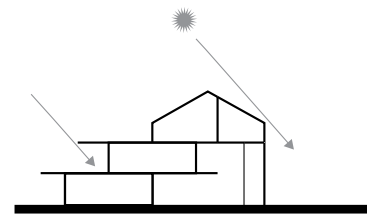


N
verdieping 1

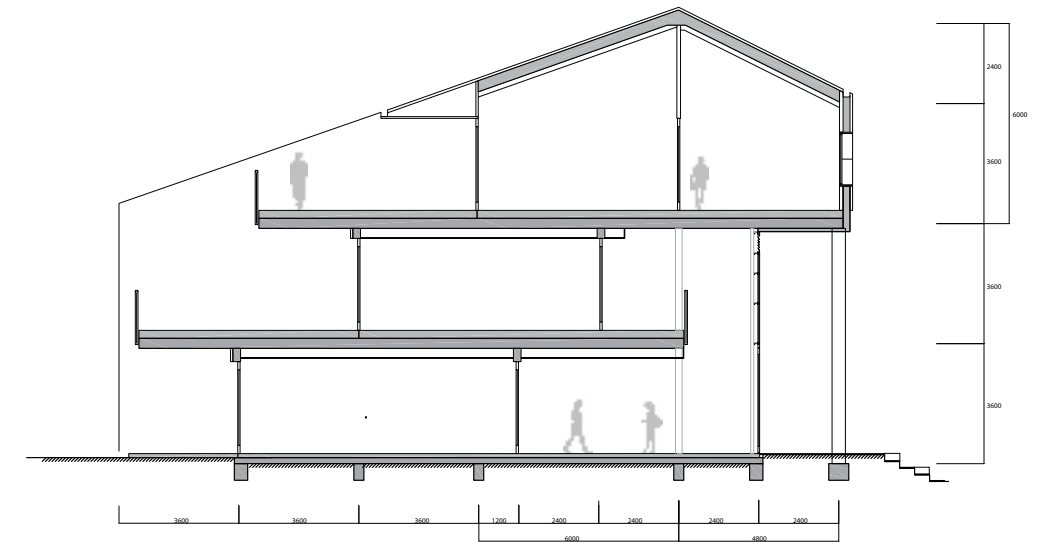


N
verdieping 2

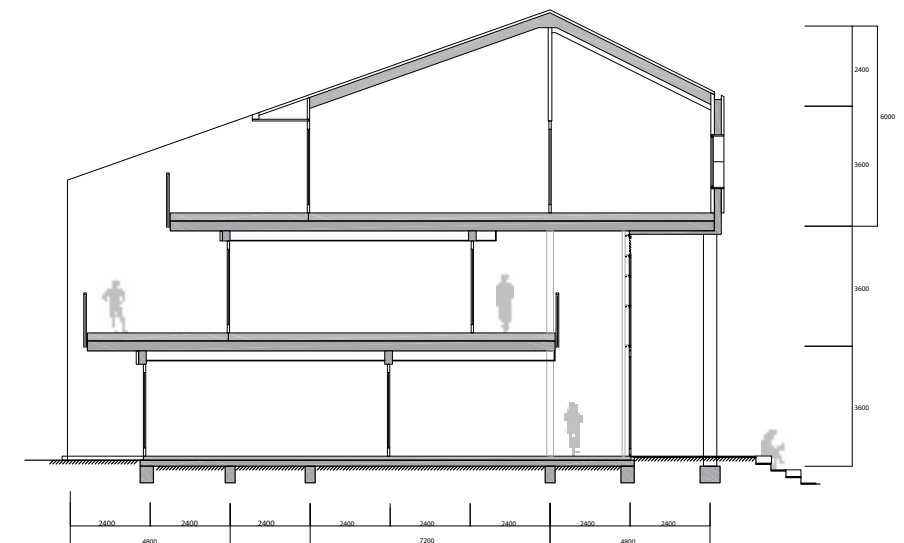
gebouw
Balkons



Doorsnede AA' noordoostzijde klaslokalen



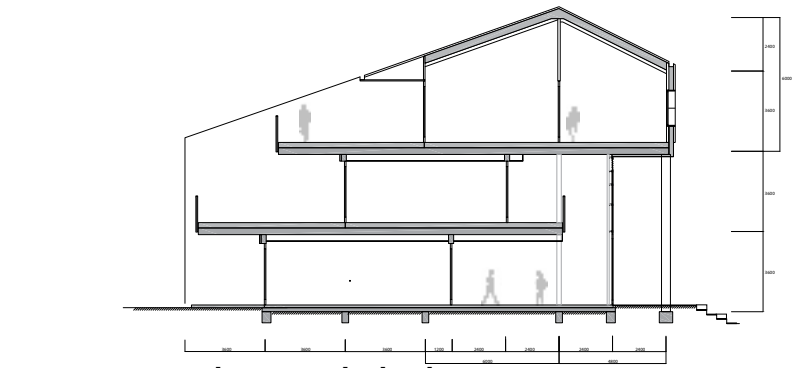
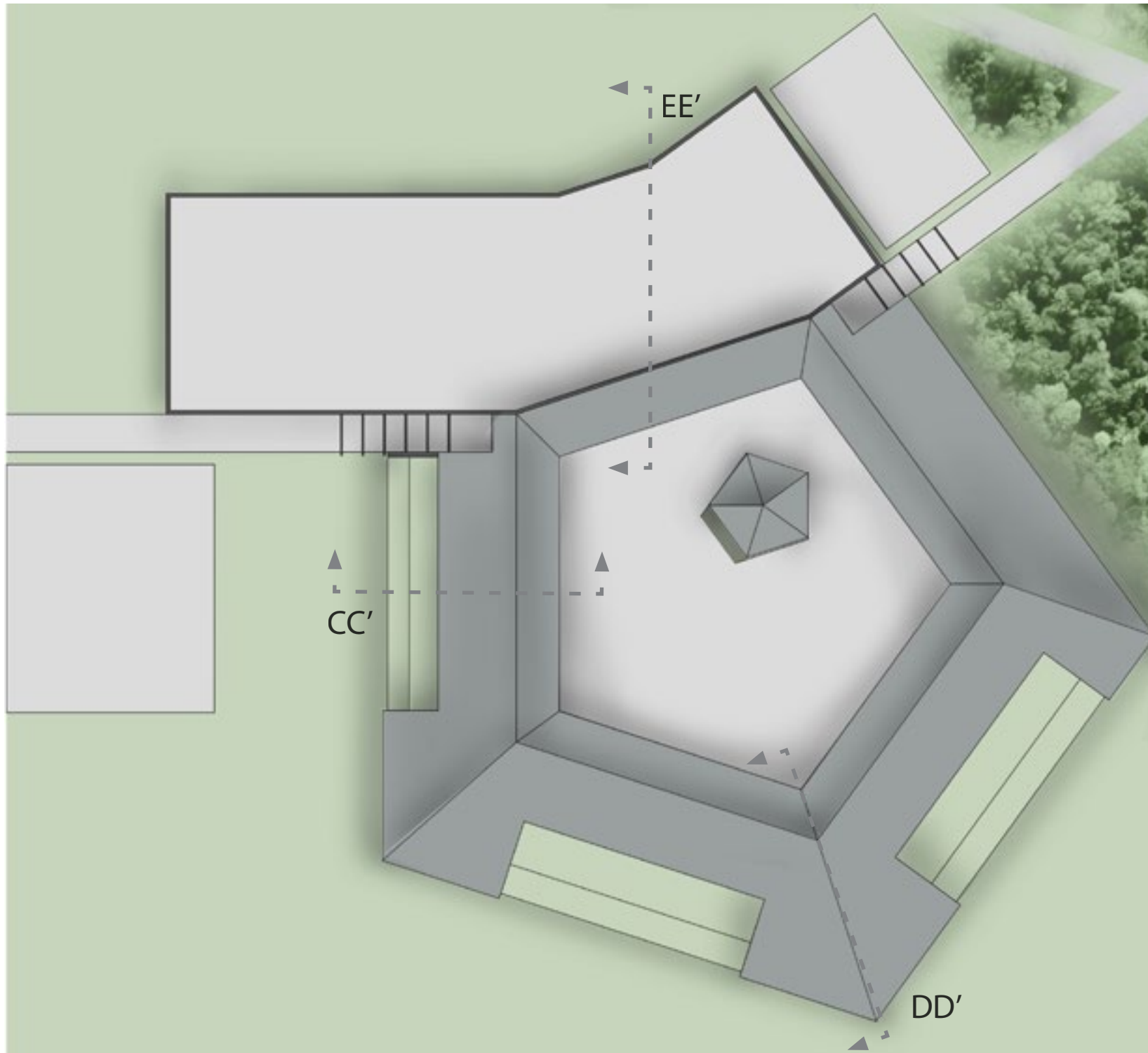
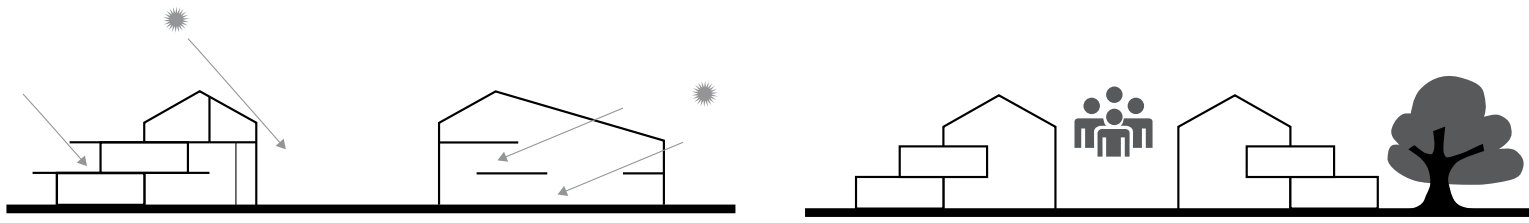
Doorsnede BB' zuidoostzijde klaslokalen



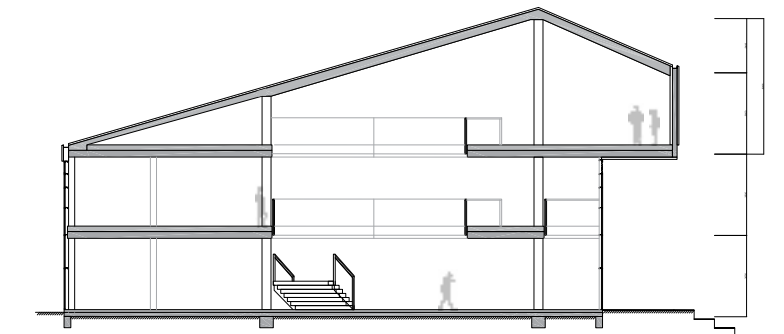
Doorsnede CC' westzijde klaslokalen



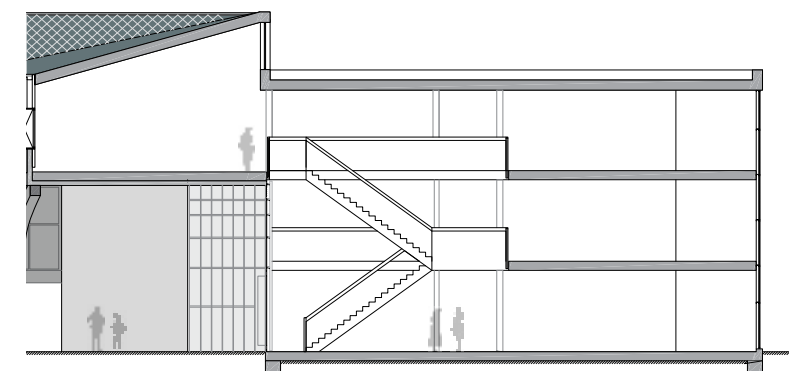
gebouw
Dak



Doorsnede CC' lokalen



Doorsnede DD' hoekpunt



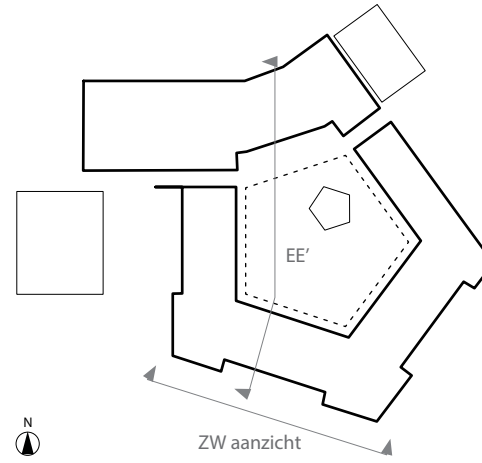
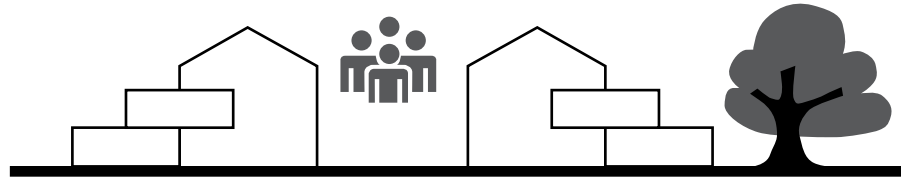
Doorsnede EE' centrale hal

gebouw
Dak

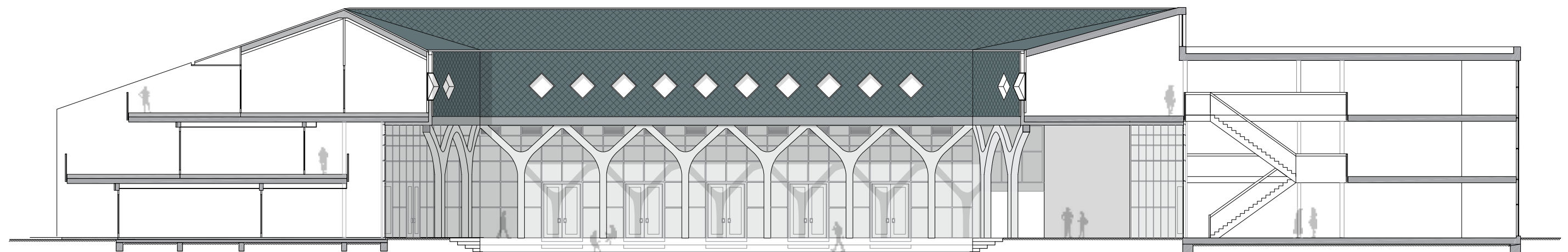


gebouw

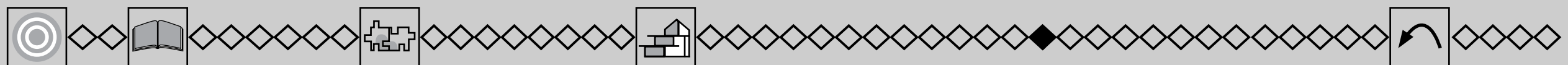
gevel & materiaal



aanzicht zuidwest zijde



aanzicht binnenplaats

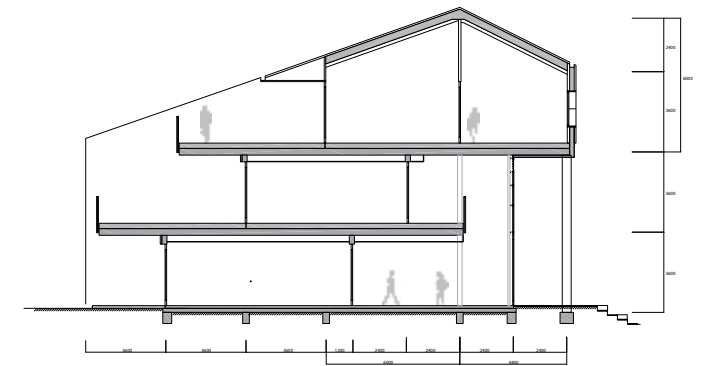
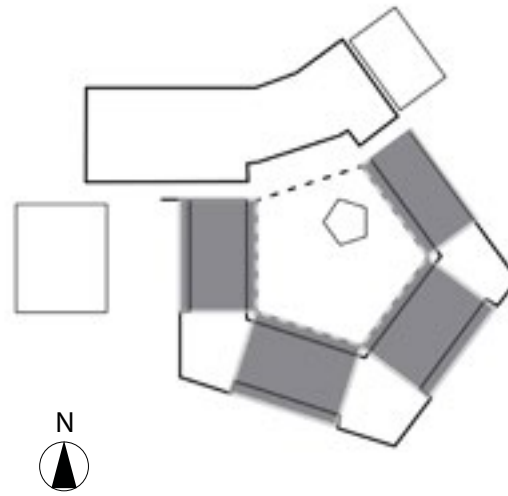


gebouw

gevel & materiaal

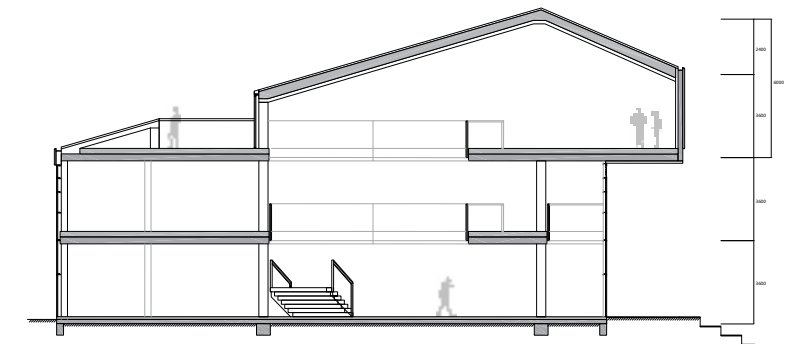
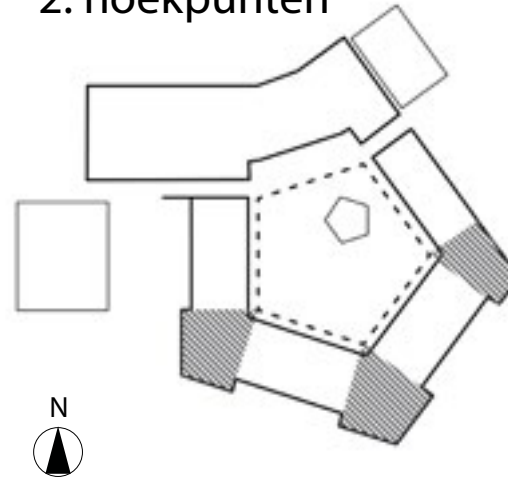
Buitenzijde: verschil tussen de zijvleugels en hoekpunten

1. zijvleugels

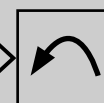
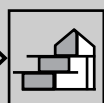
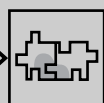
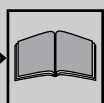


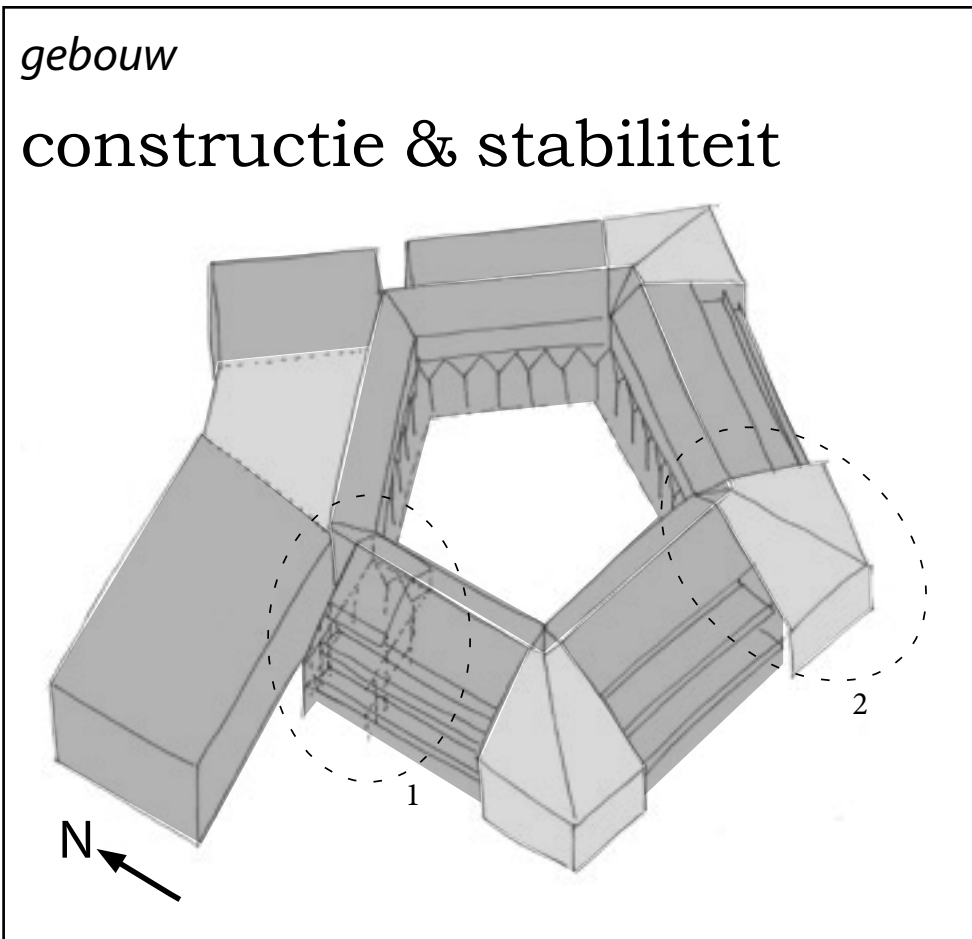
Doorsnede CC' lokalen

2. hoekpunten

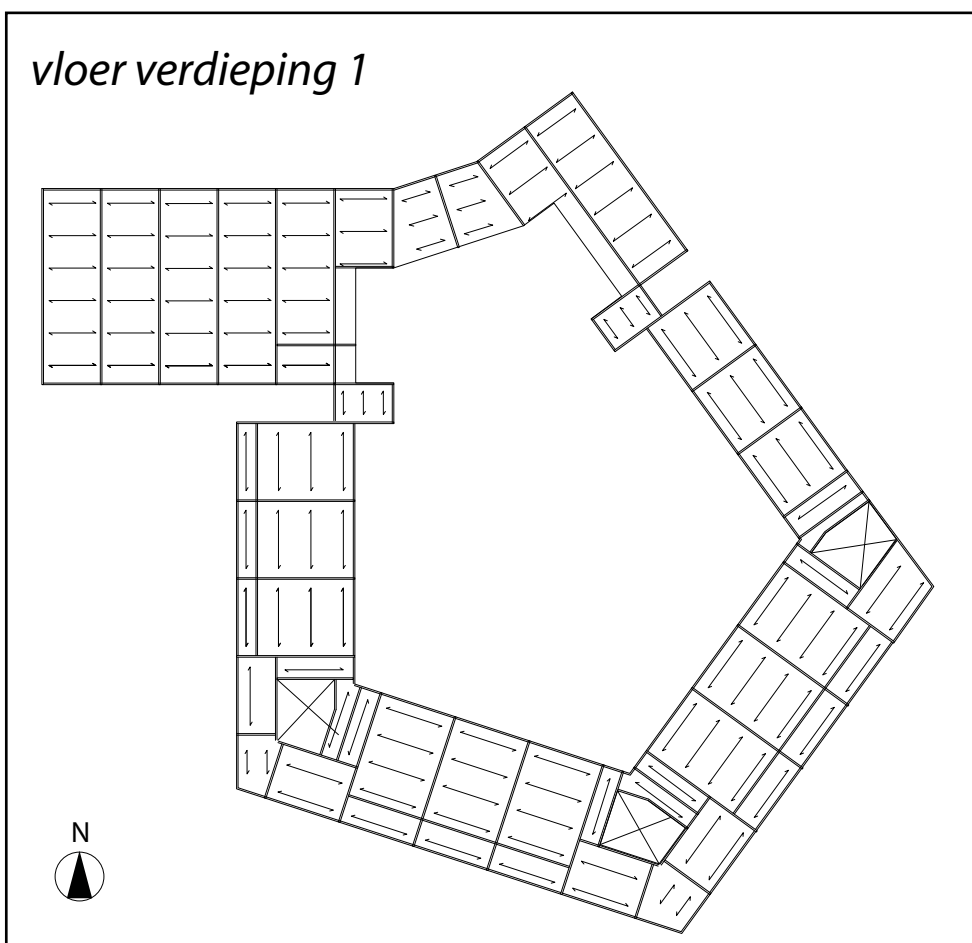
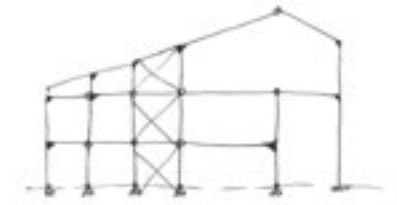
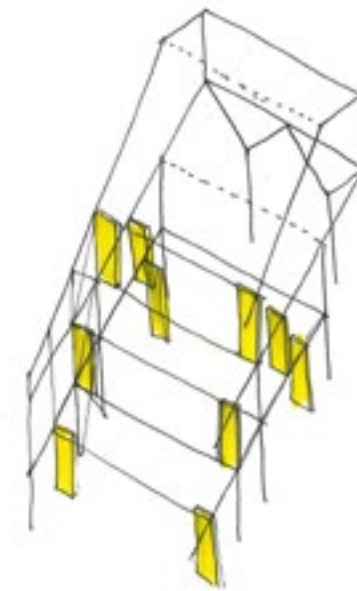
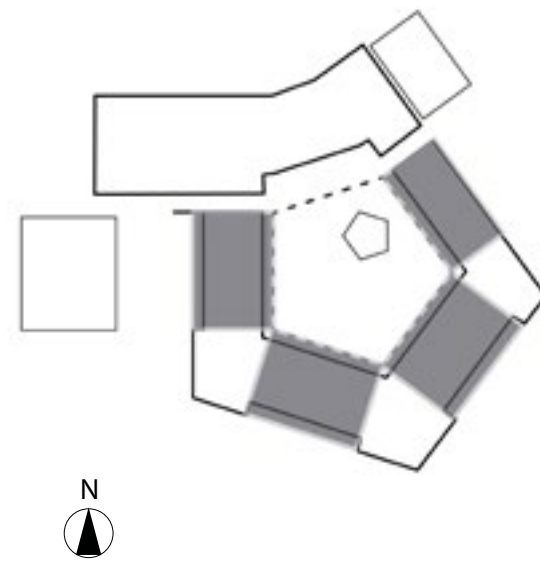


Doorsnede DD' hoekpunt

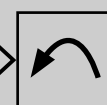
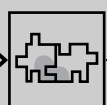
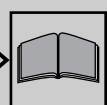
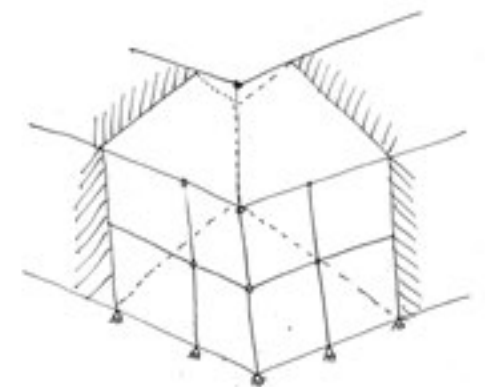
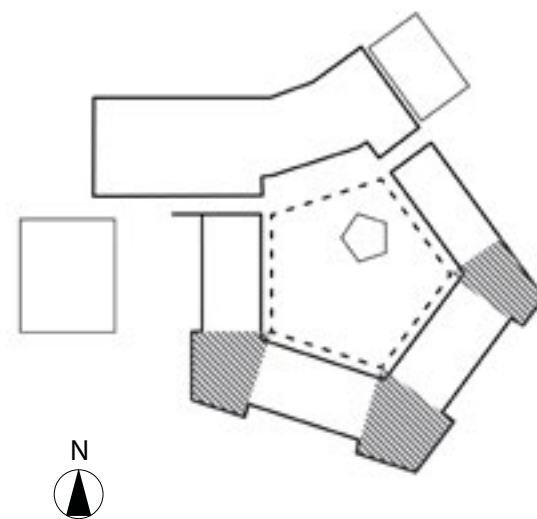




1. zijvleugels



2. hoekpunten



gebouw

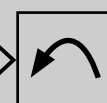
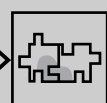
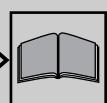
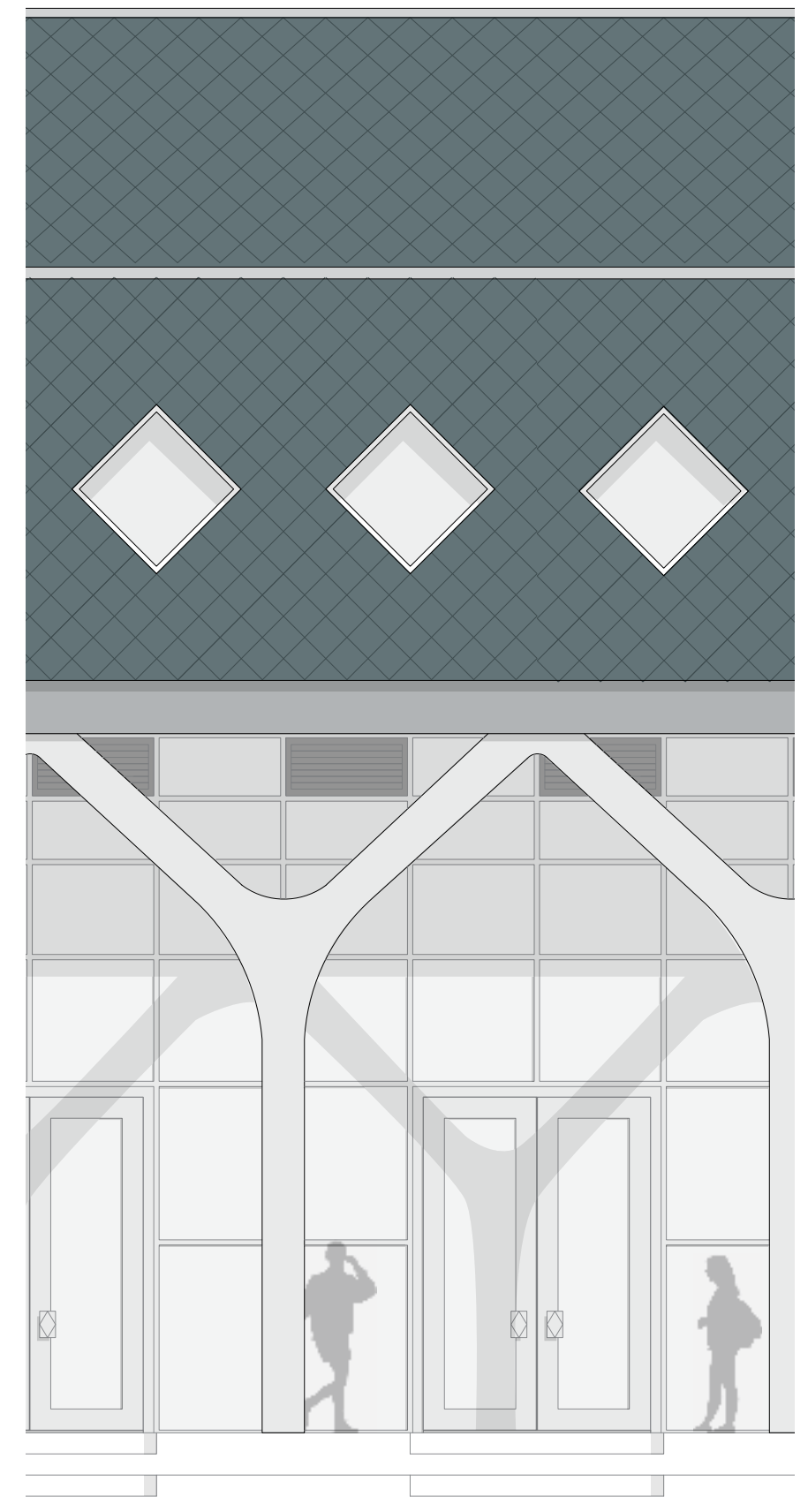
constructie & materiaal

- Alterna ruitlei van Eternit
- Dambordpatroon
- Vezelcementplaat

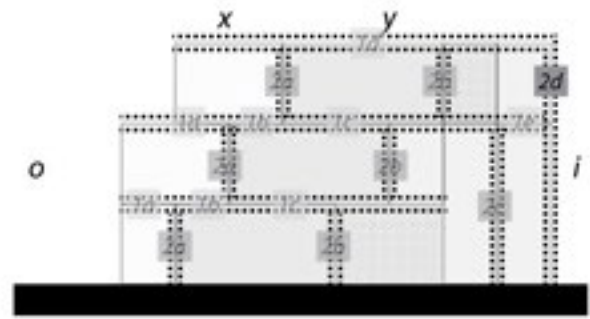
fragment buiten



fragment binnenplaats

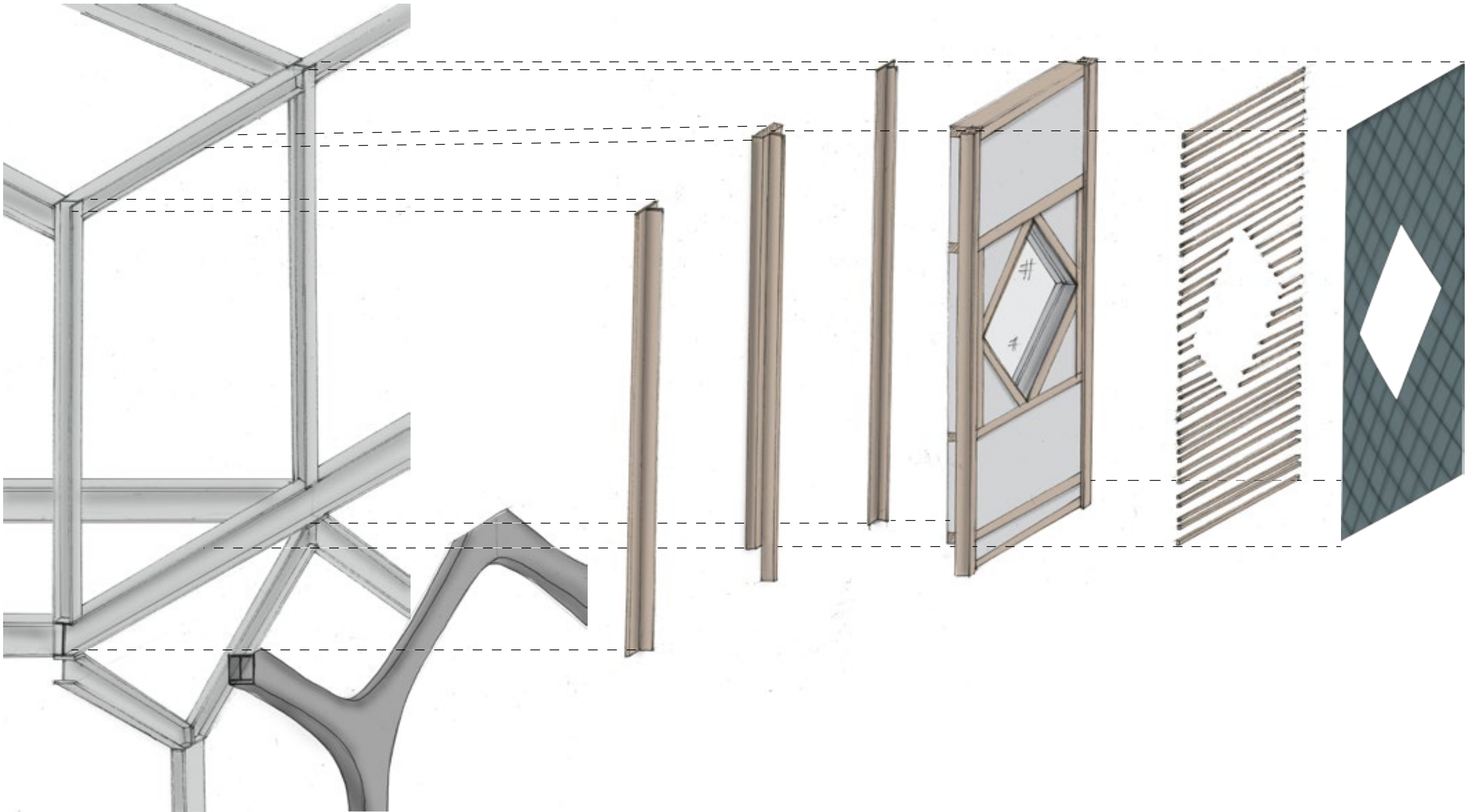


gebouw
constructie & materiaal

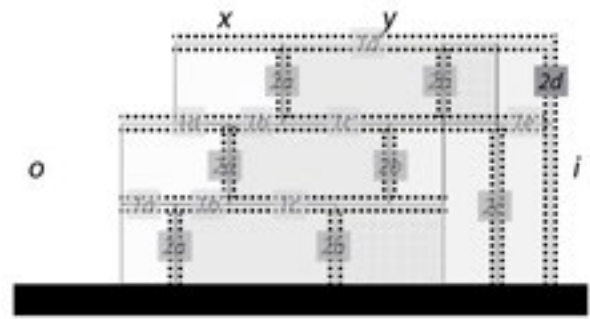


2d: wand: binnen - buiten (binnenplaats)

- Afwerking**
 - Leistenen
 - Substructuur**
 - Stijlen - regels
 - Houten frame
 - Isolatie
 - Draagstructuur**
 - stalen spanten (HEA 200)
- Openingen**
ramen

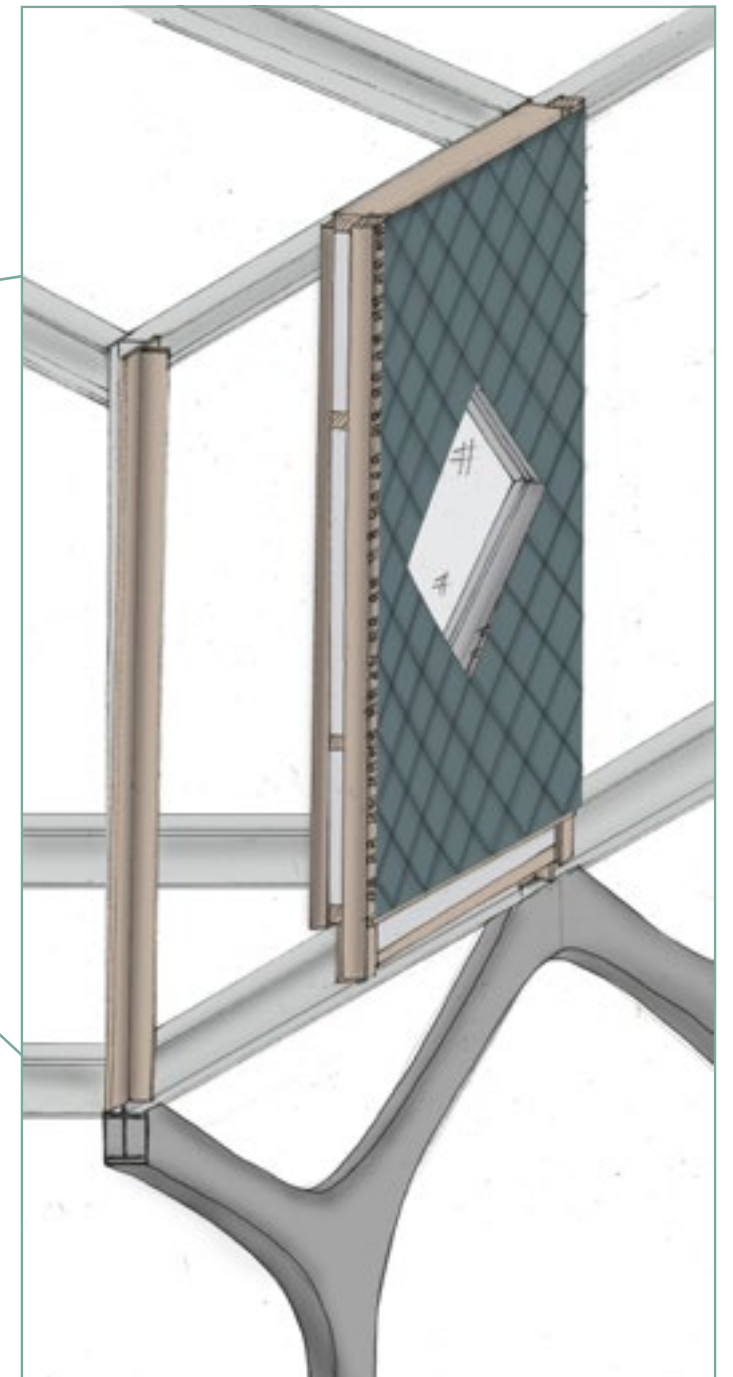
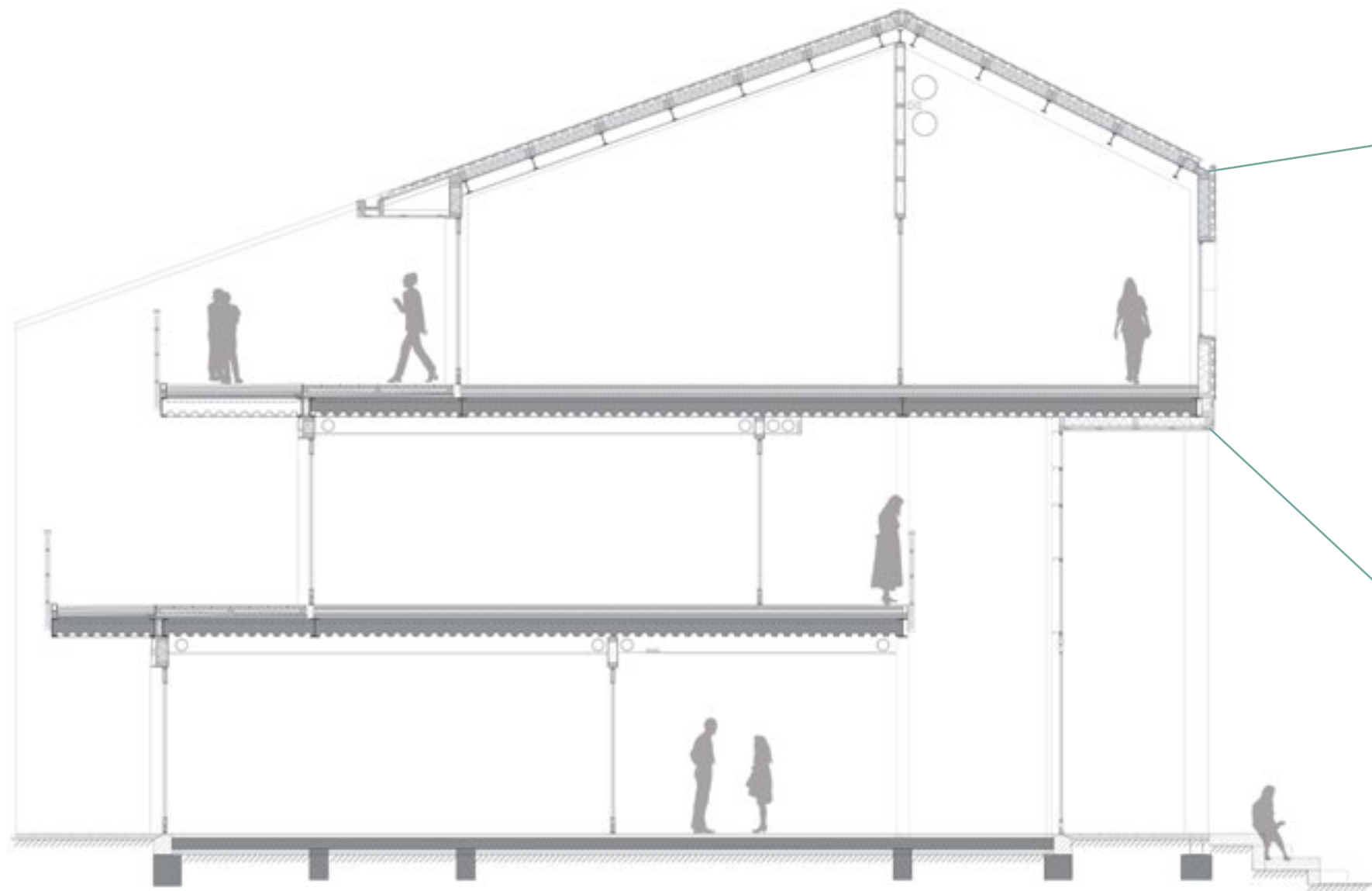


gebouw
gevel & materiaal

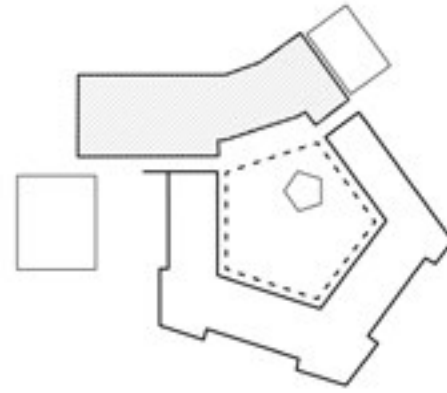


2d: wand: binnen - buiten (binnenplaats)

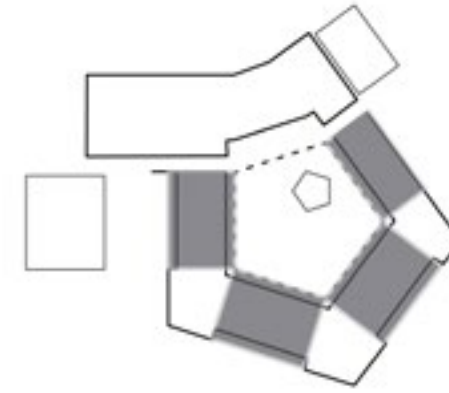
- | | |
|---|---------------------------|
| Afwerking
Leistenen | Openingen
ramen |
| Substructuur
Stijlen - regels
Houten frame
Isolatie | |
| Draagstructuur
stalen spanten (HEA 200) | |



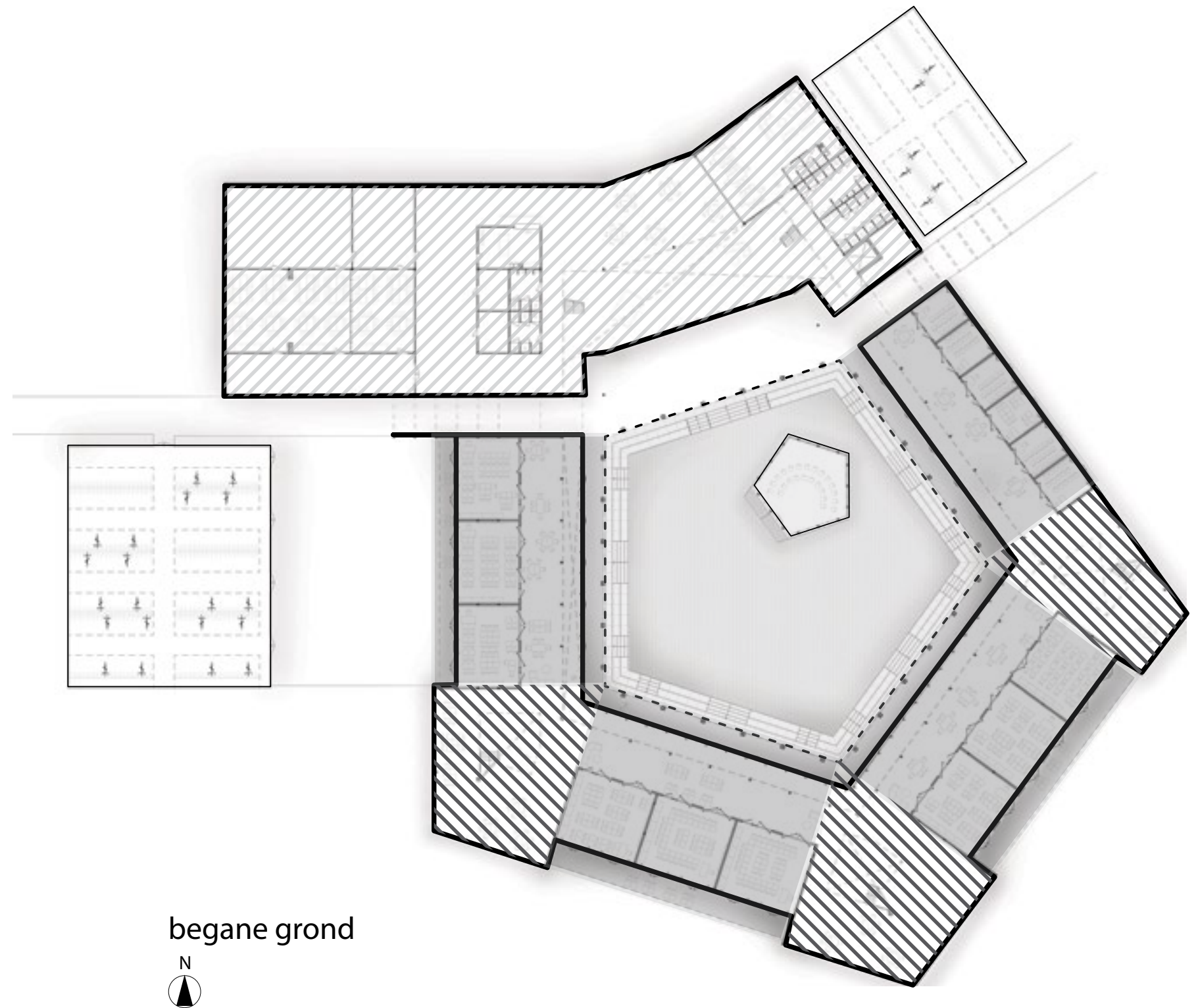
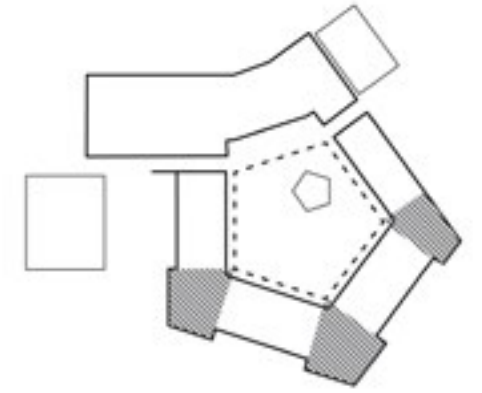
los volume



zijvleugels

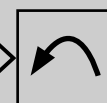
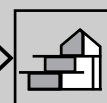
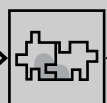
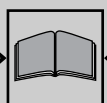


hoekpunten

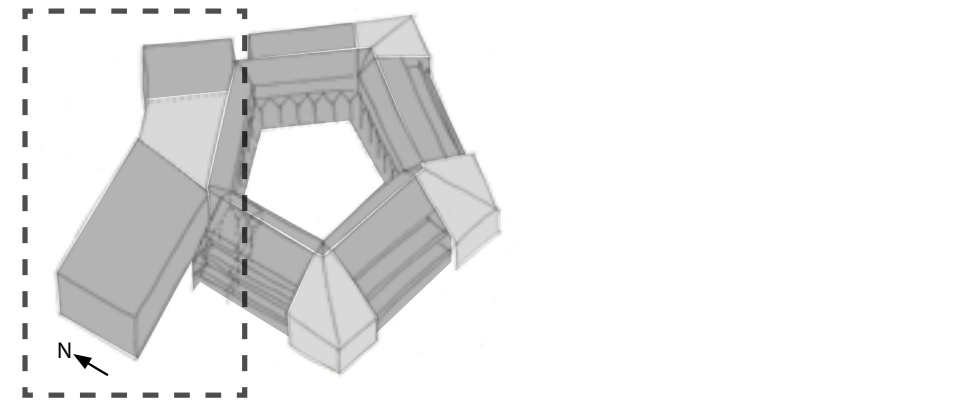


gebouw
compositie

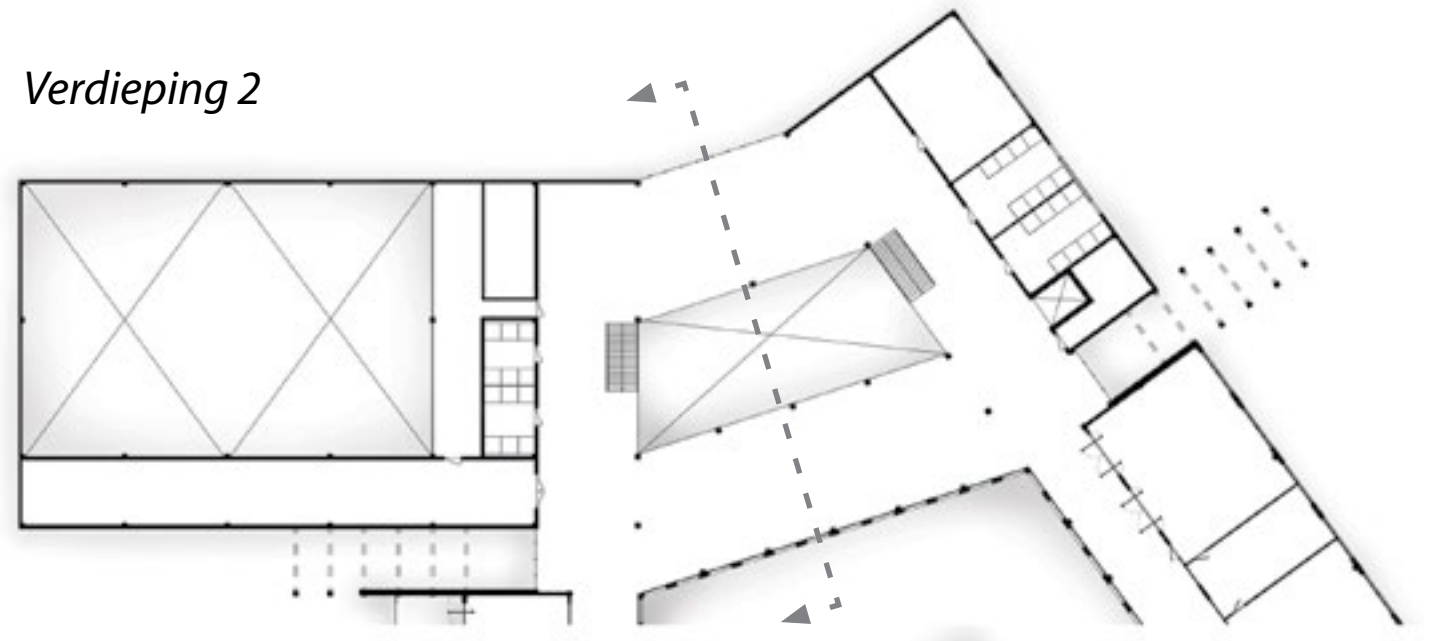
begane grond



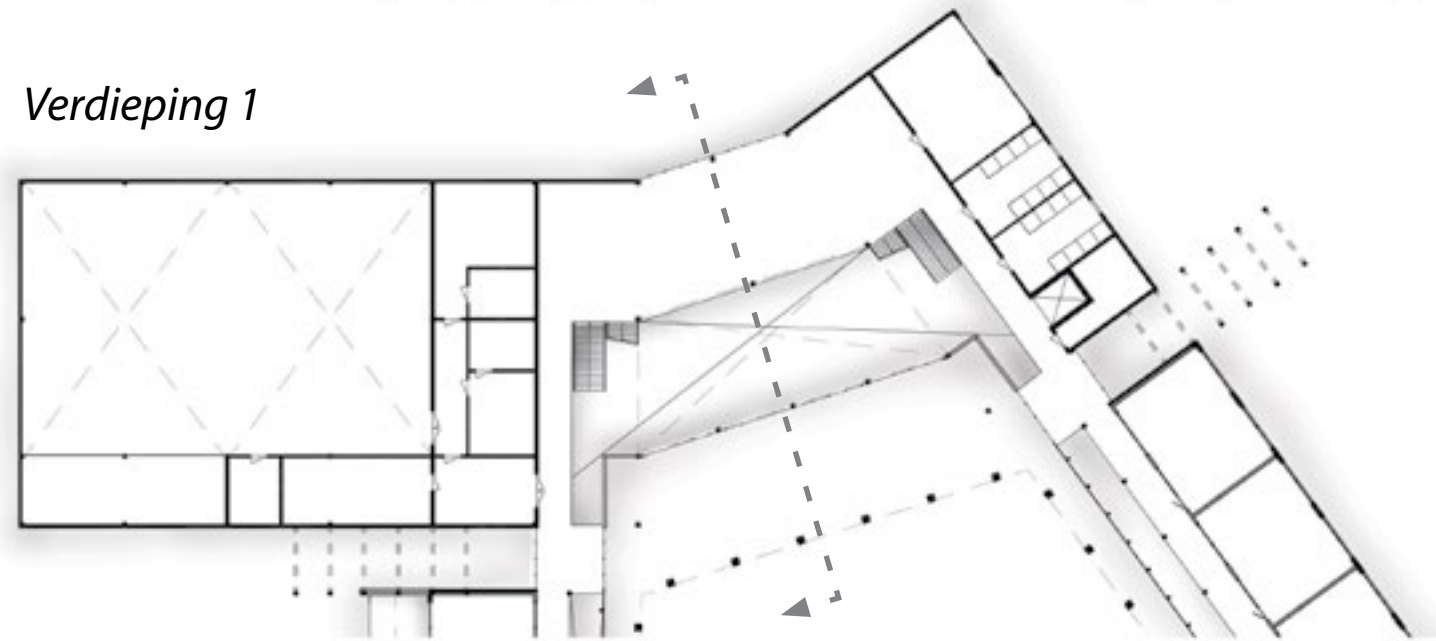
los volume
functie & gebruik



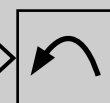
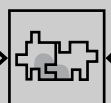
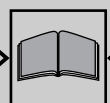
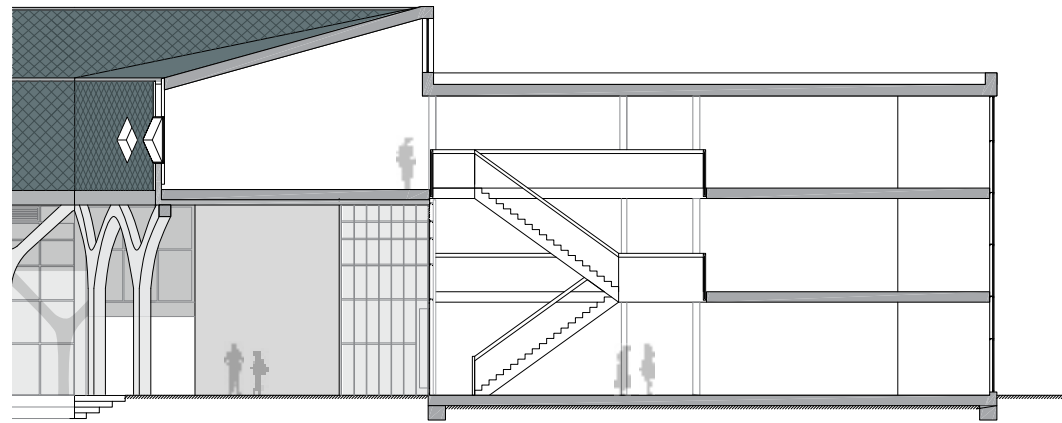
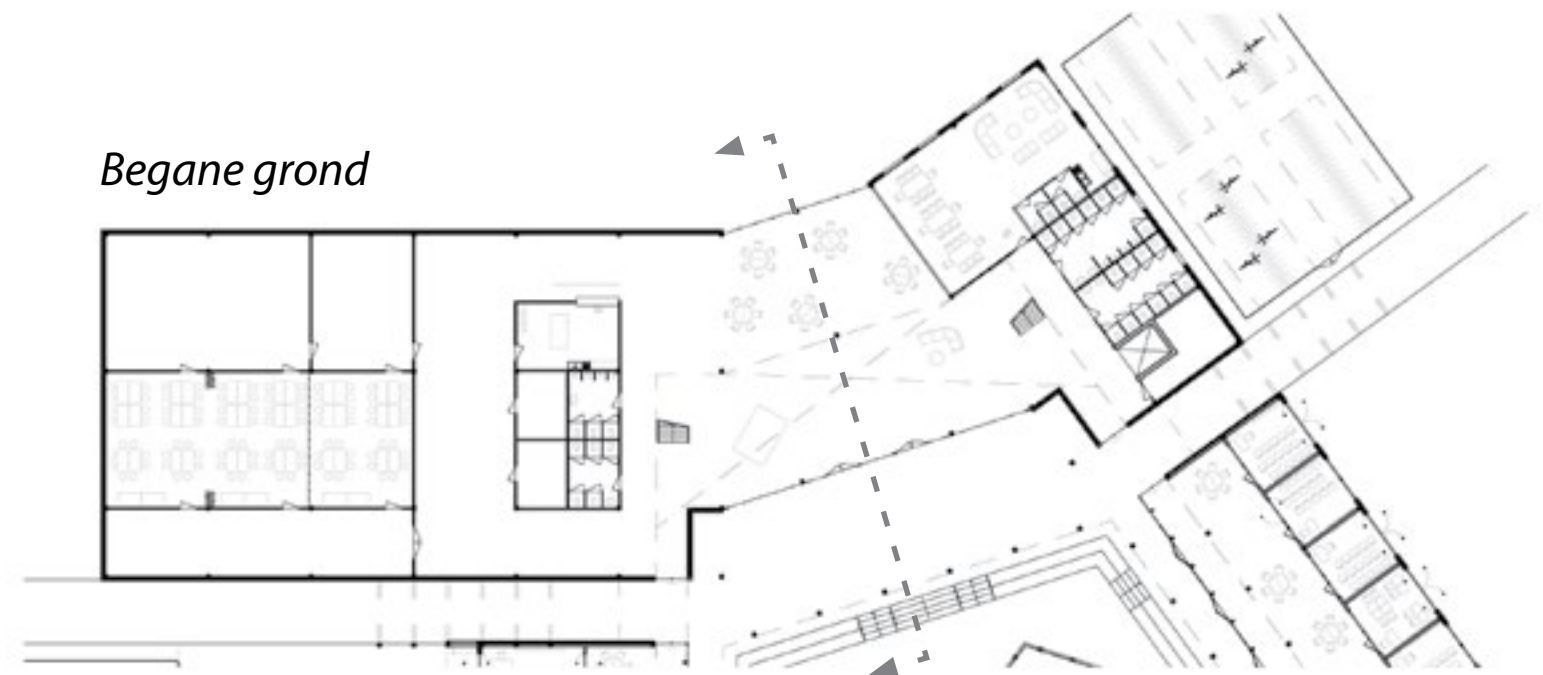
Verdieping 2



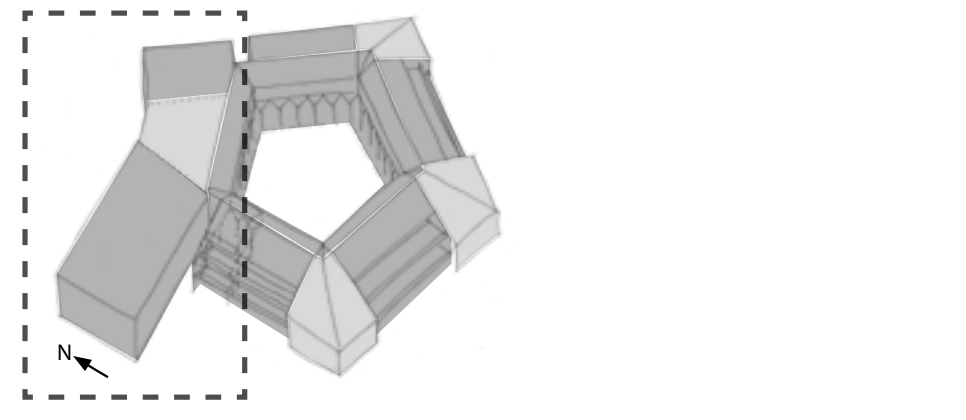
Verdieping 1



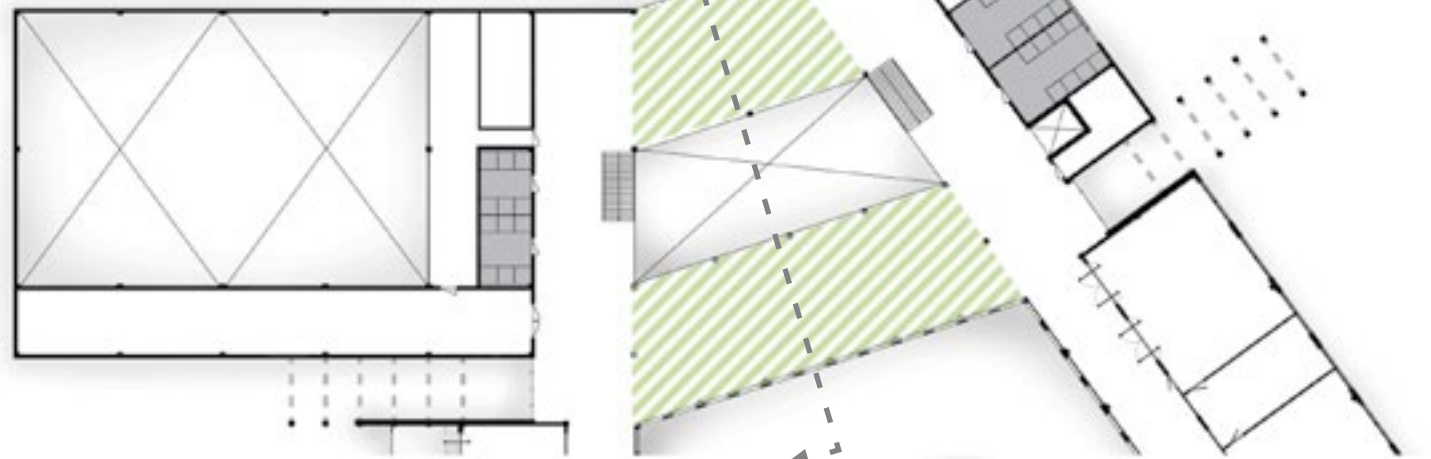
Begane grond



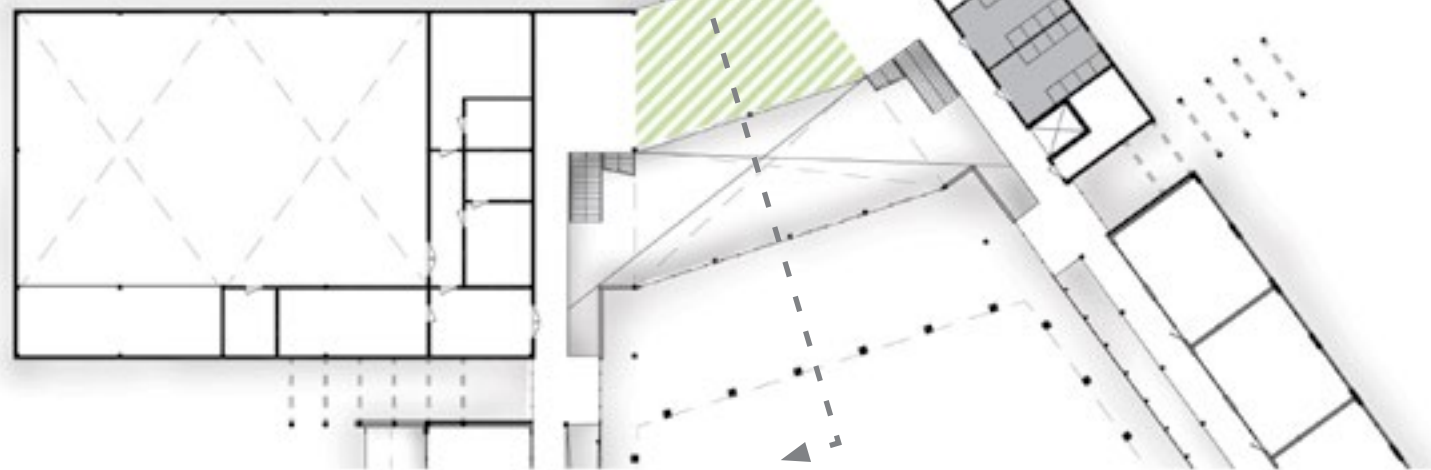
los volume
functie & gebruik



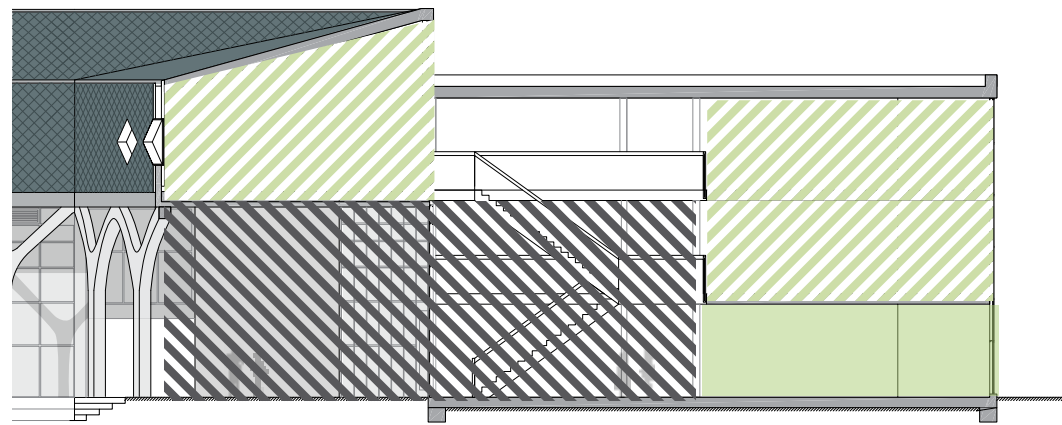
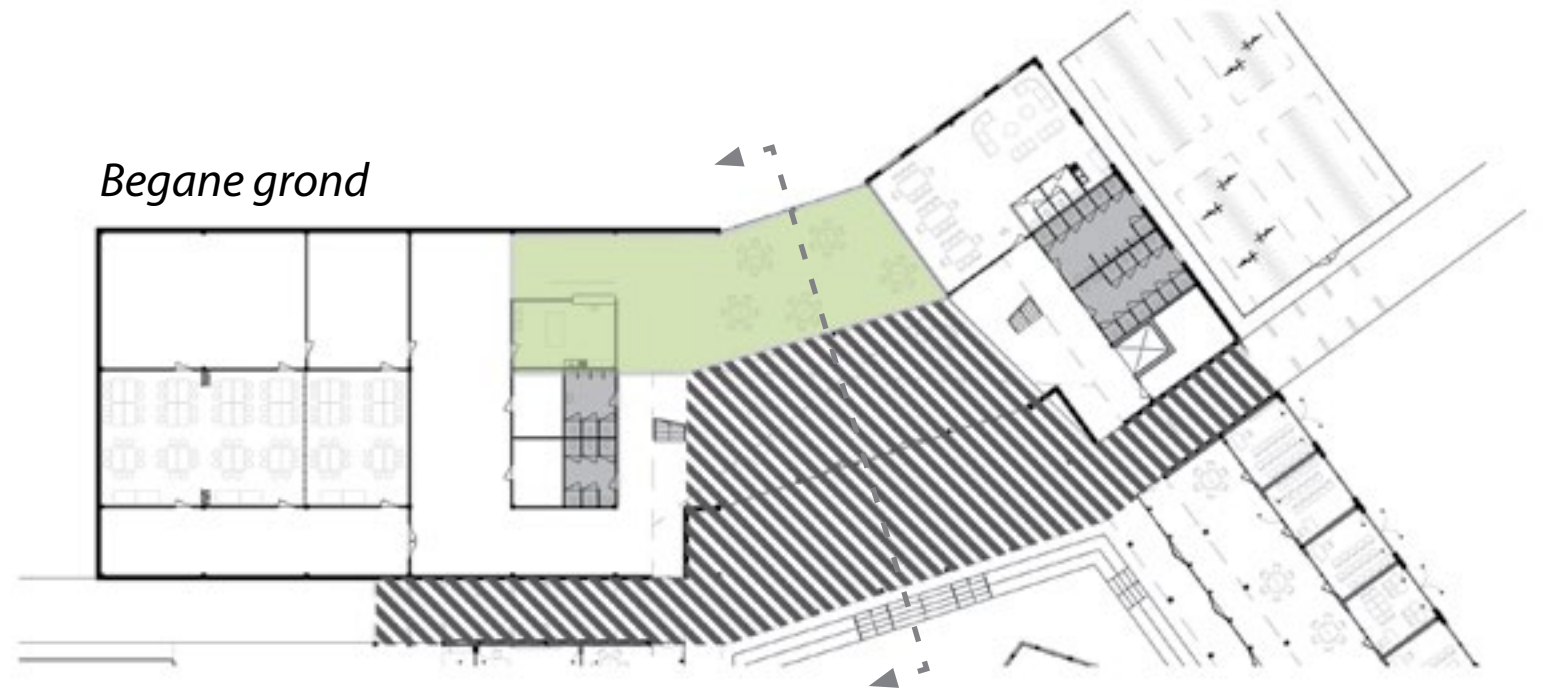
Verdieping 2







Verdieping 1

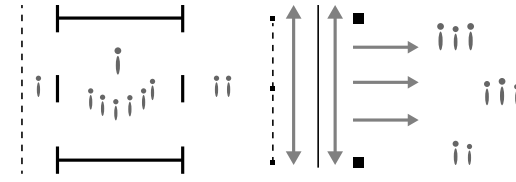
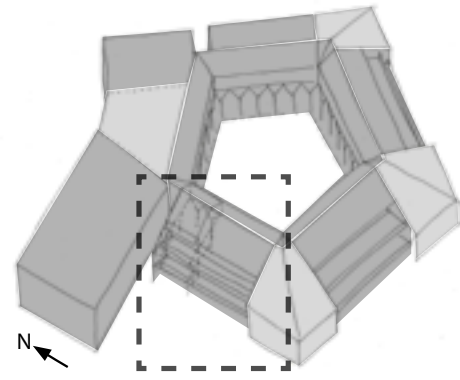


Begane grond

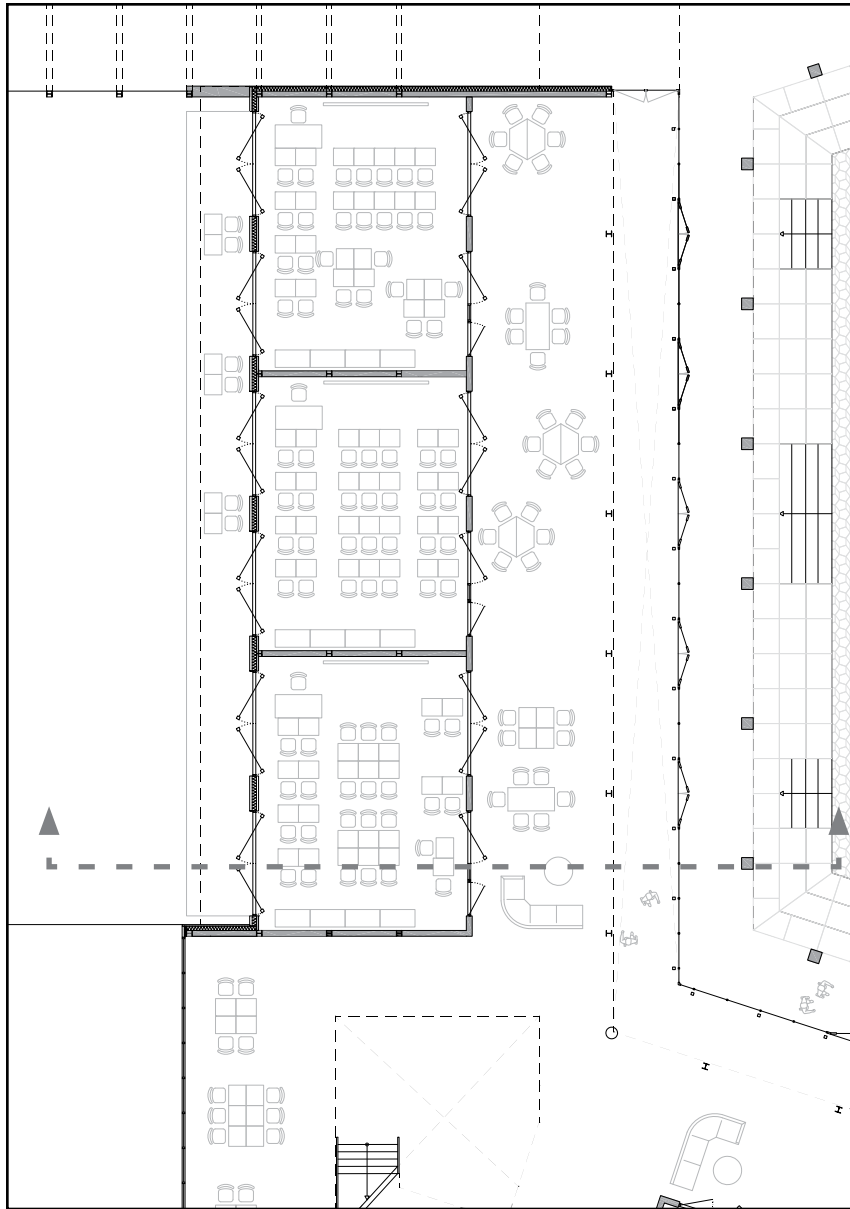
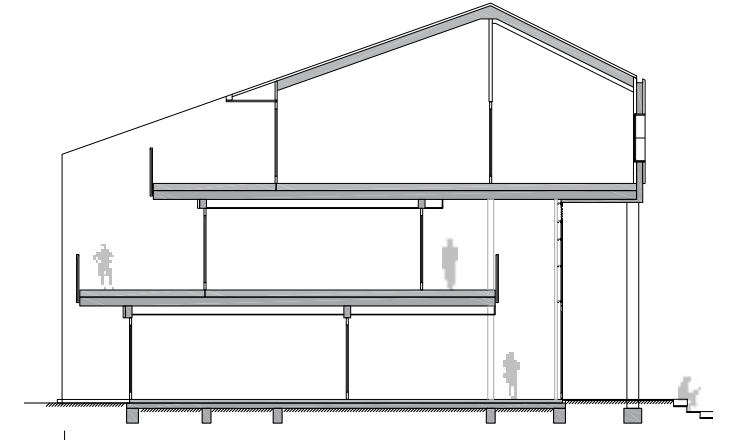


-  Entree zone
-  Toiletten
-  Kantine
-  Studieplekken

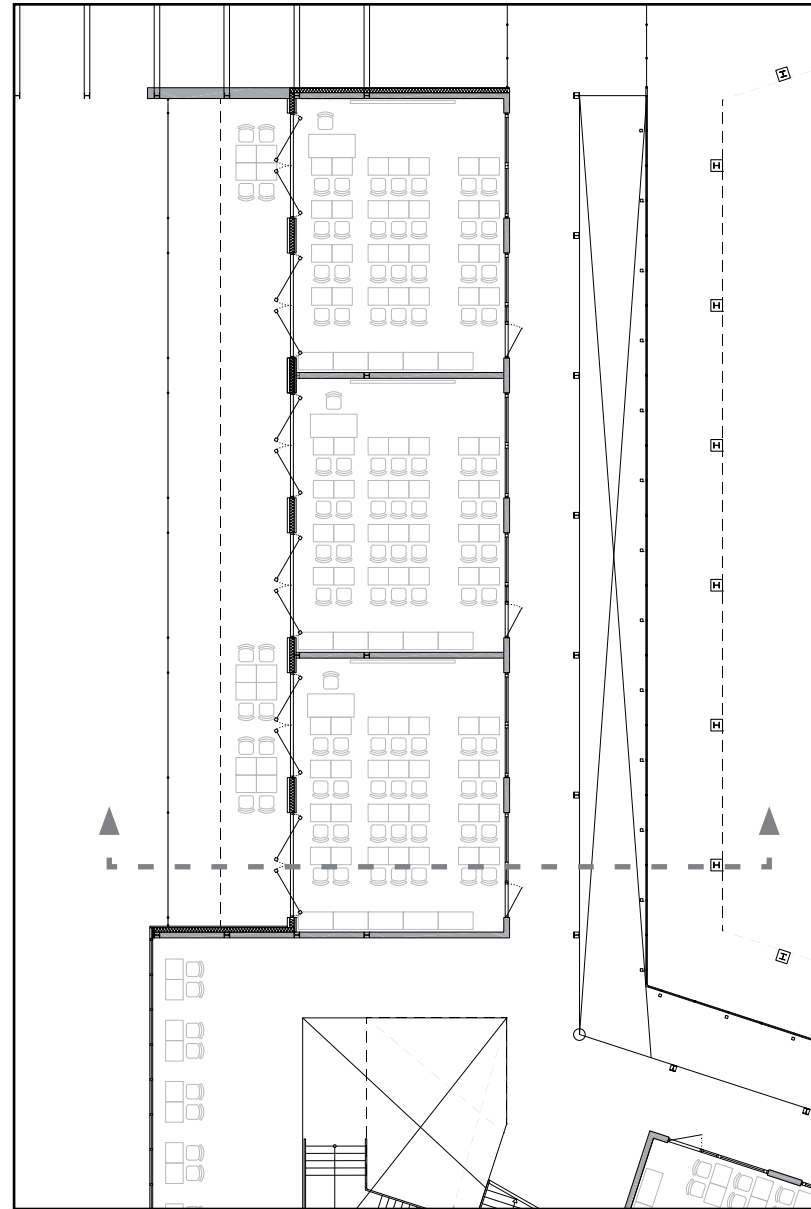
zijvleugels
functie & gebruik



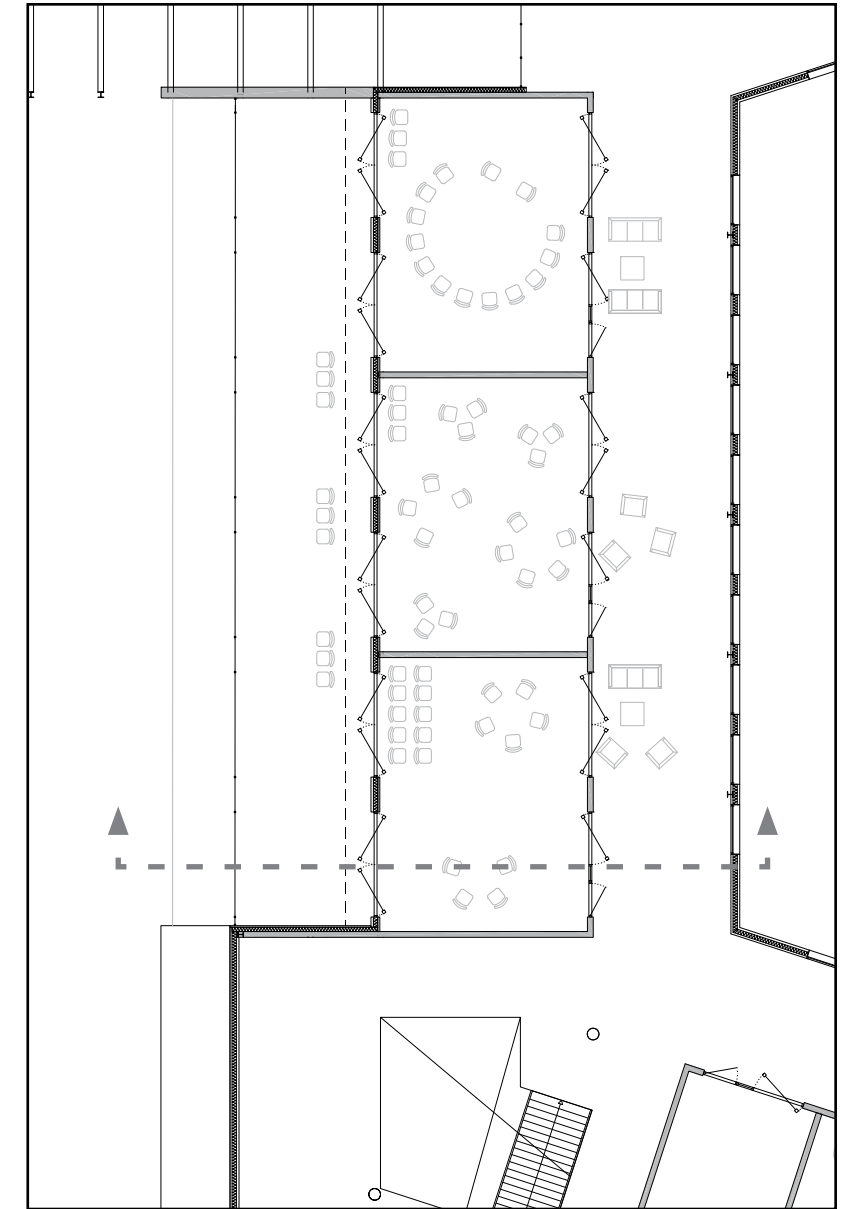
reflectie, klassikaal, samenwerken,
bufferzone, oefenen



Begane grond

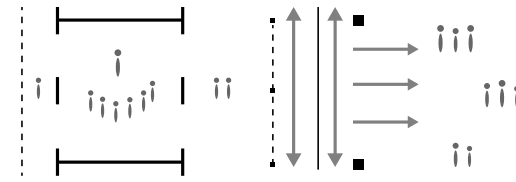
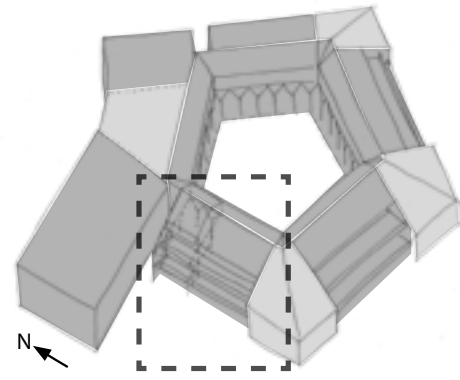


Verdieping 1

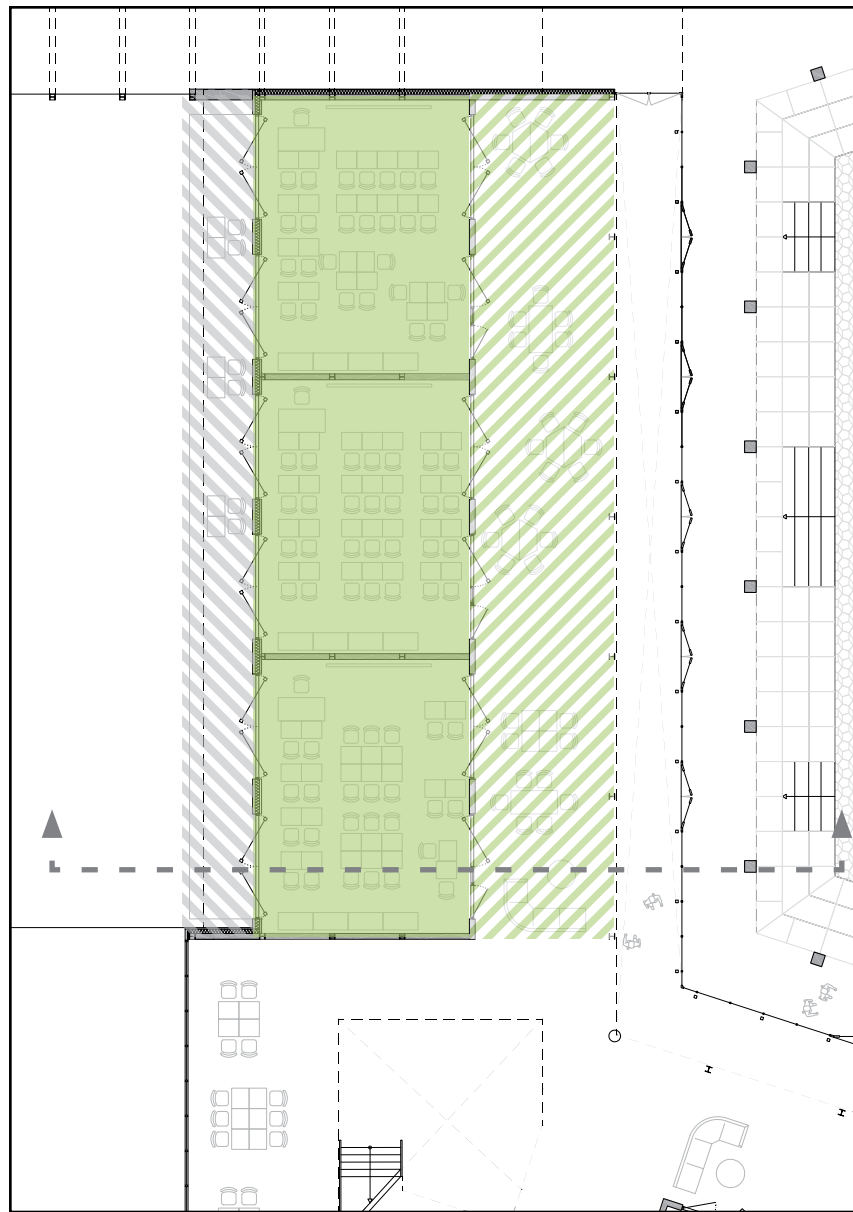
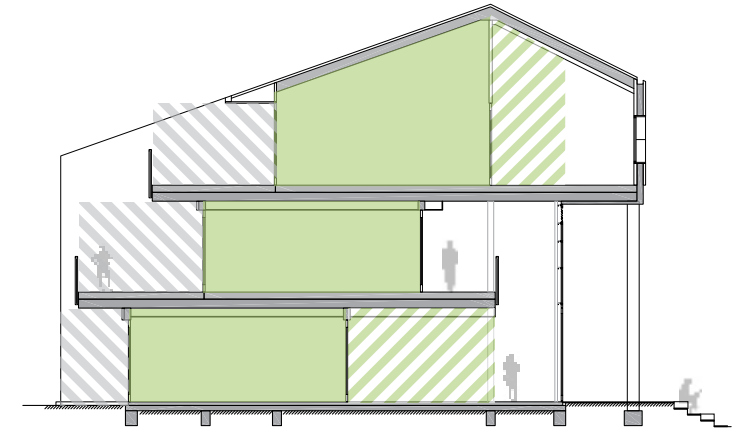


Verdieping 2

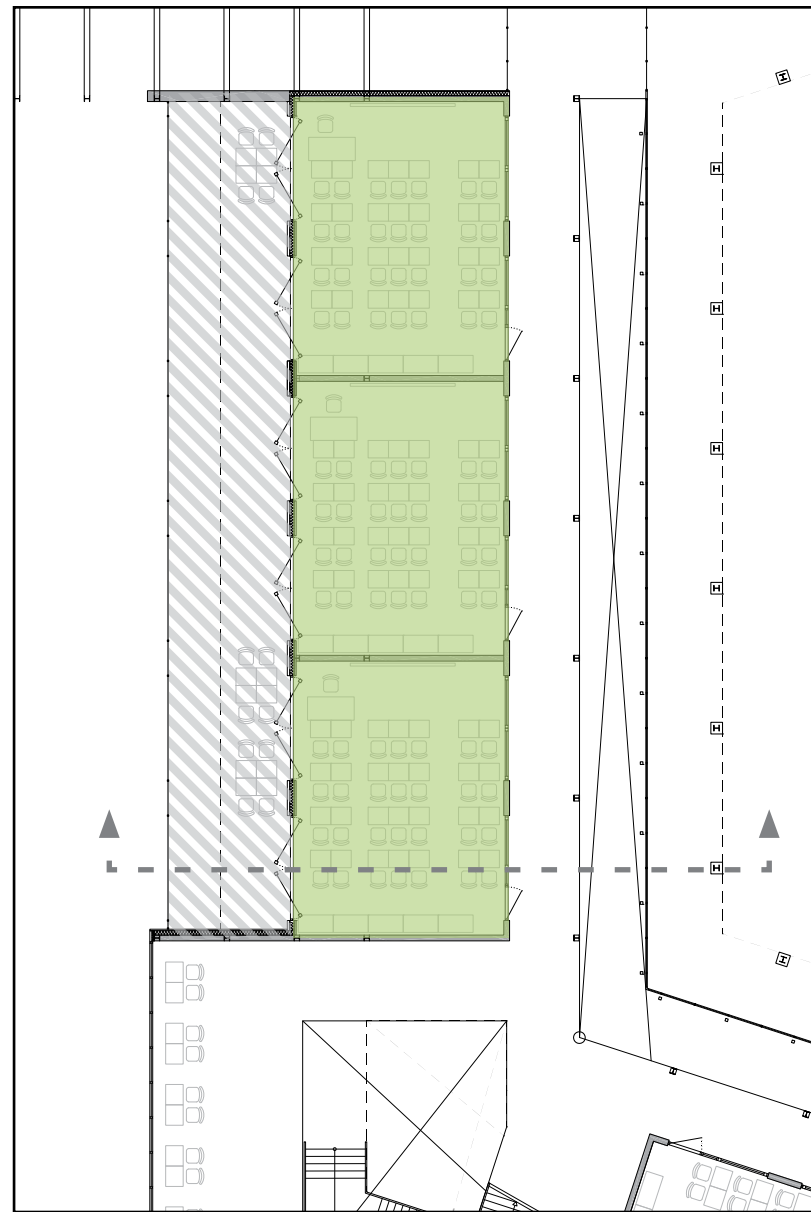
zijvleugels
functie & gebruik



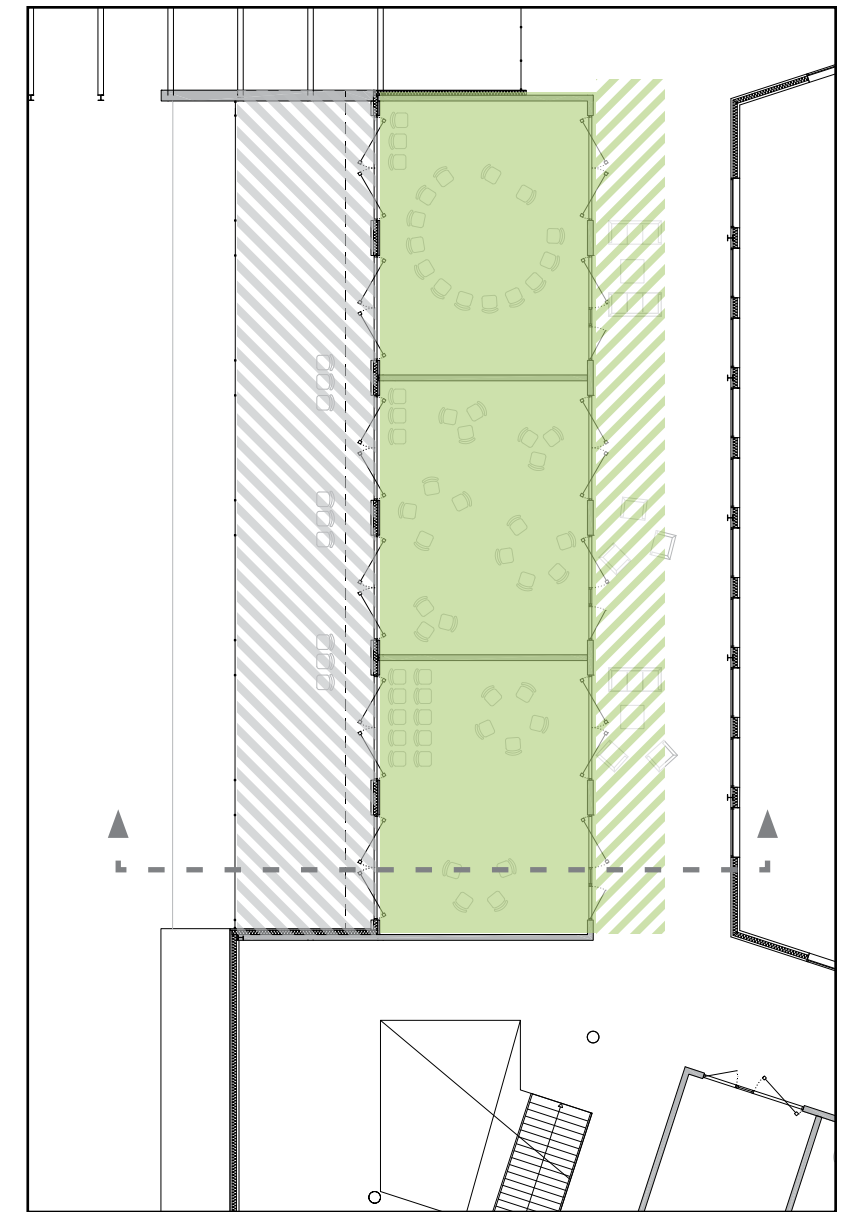
reflectie, klassikaal, samenwerken,
bufferzone, oefenen



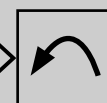
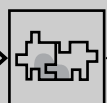
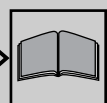
Begane grond



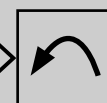
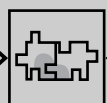
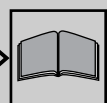
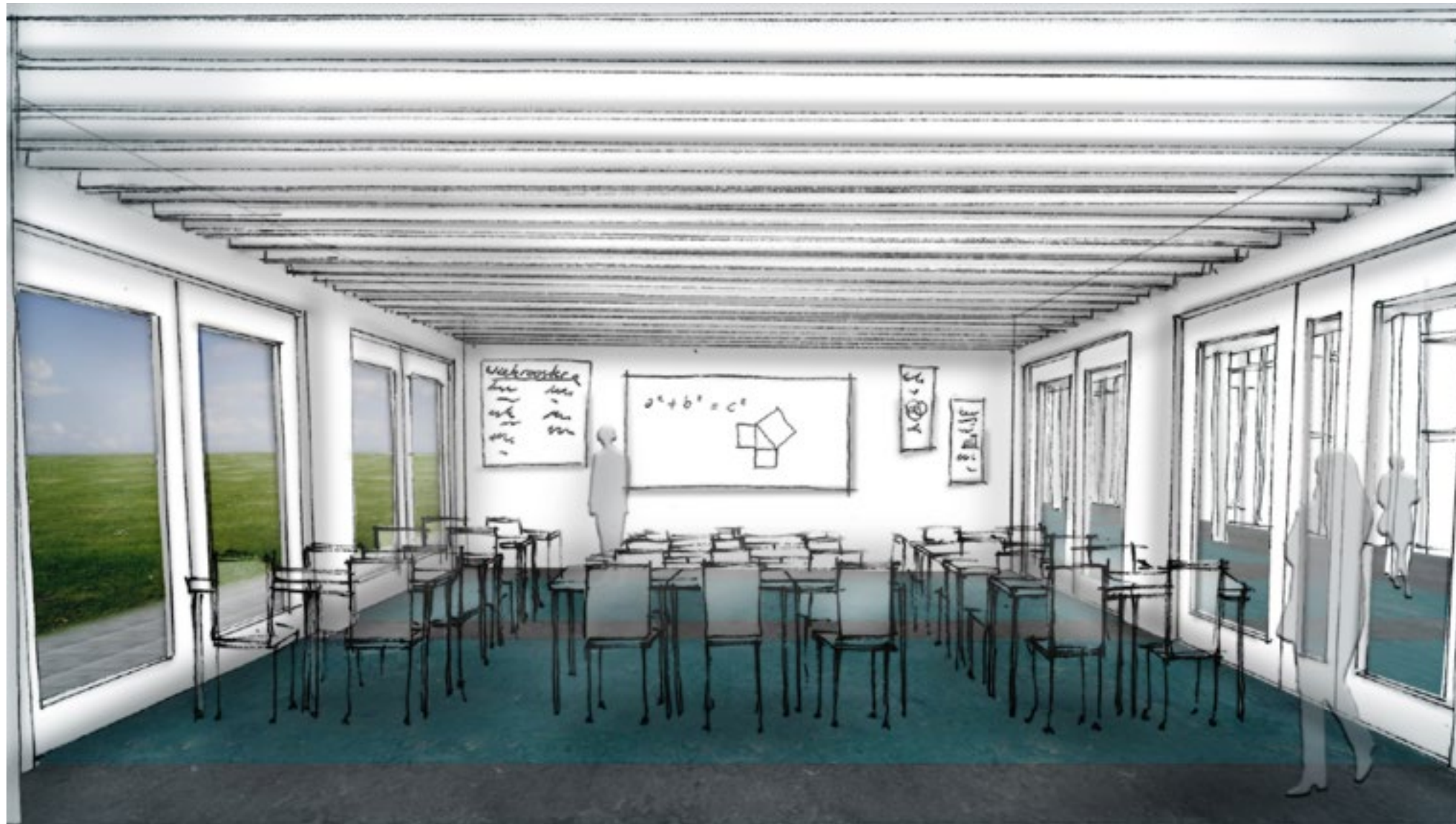
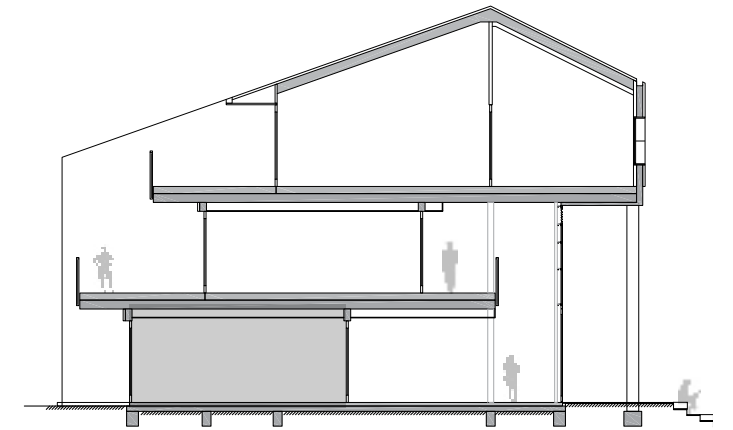
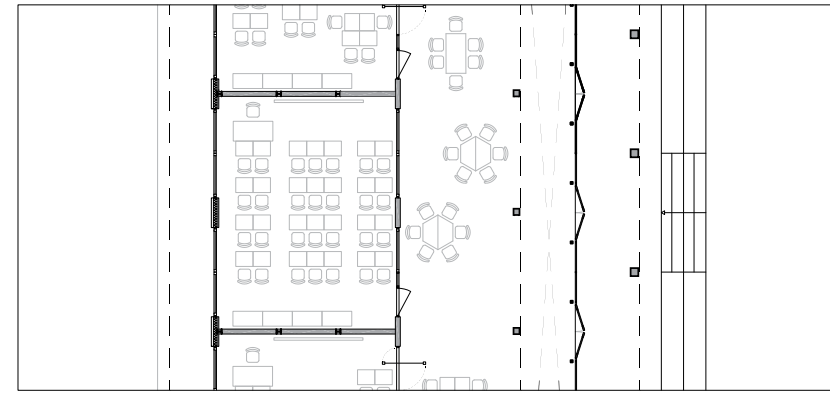
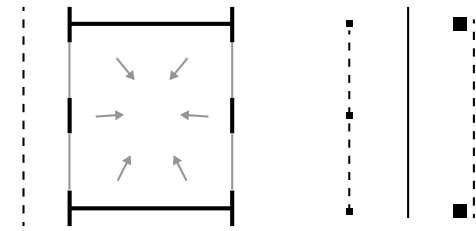
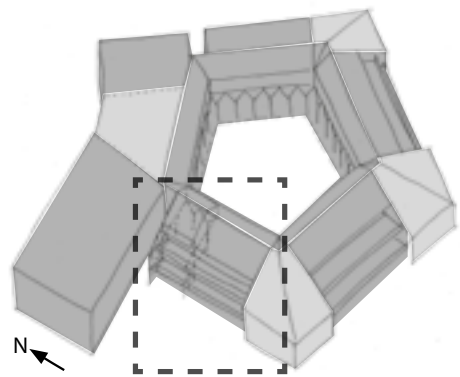
Verdieping 1



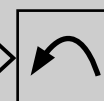
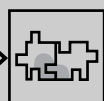
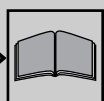
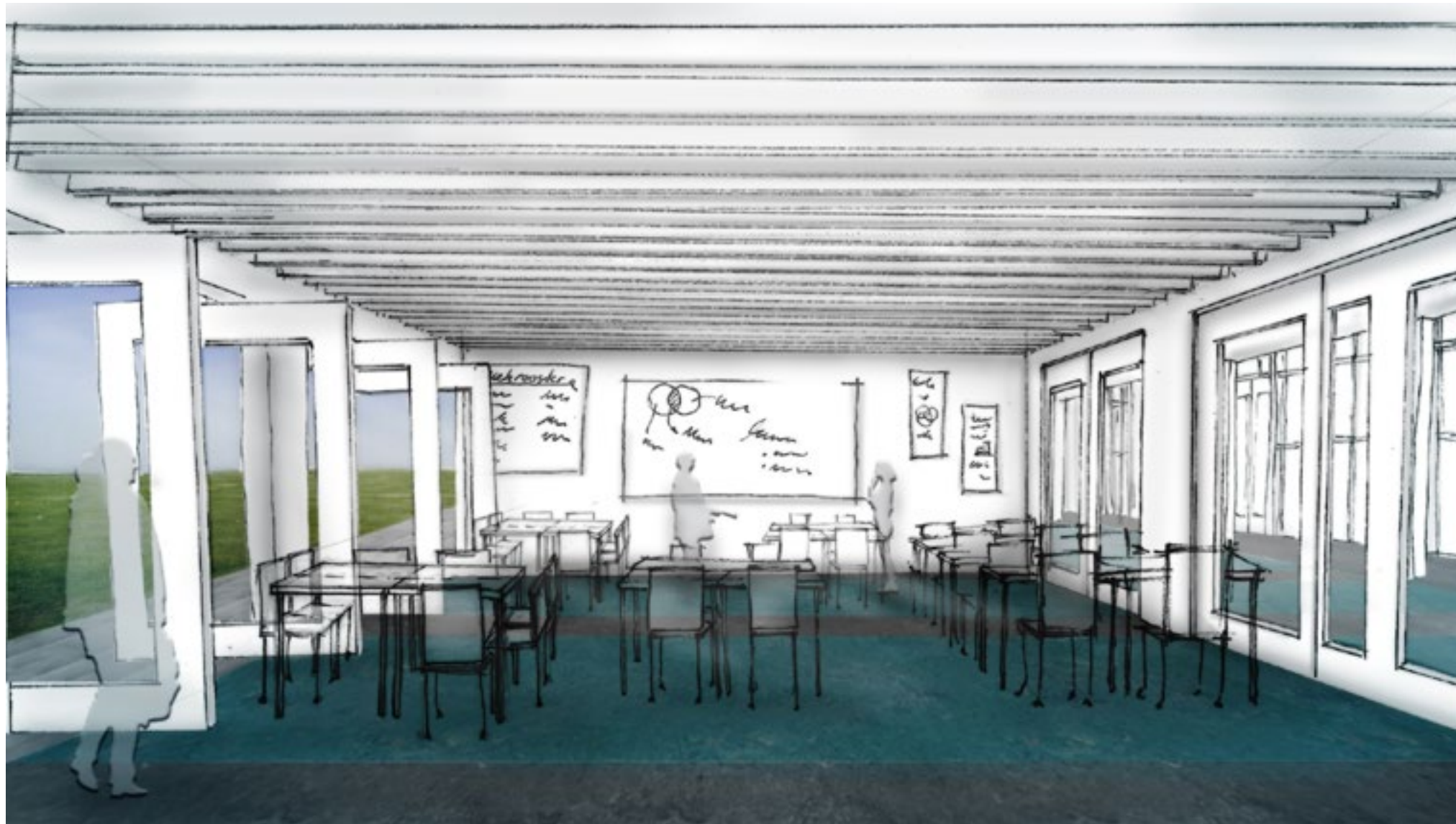
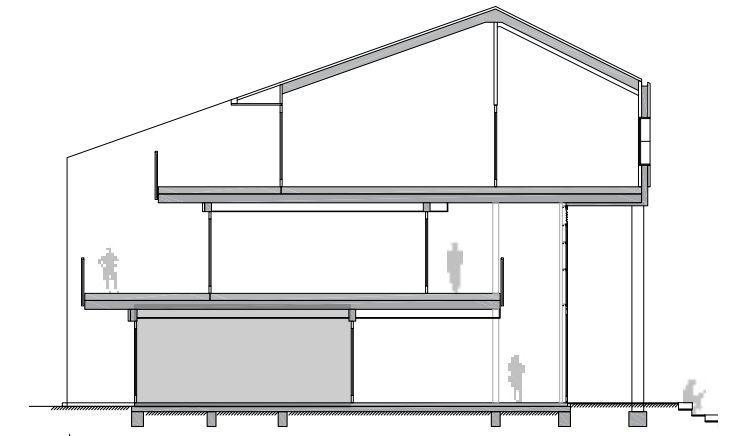
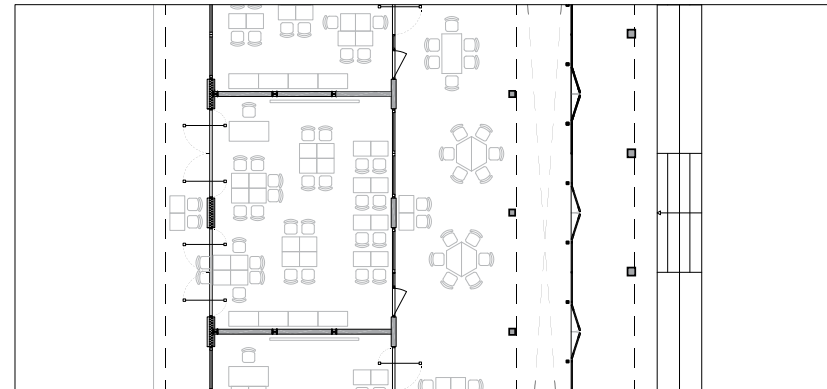
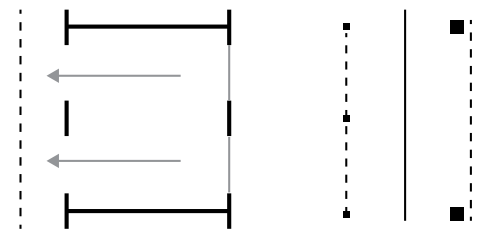
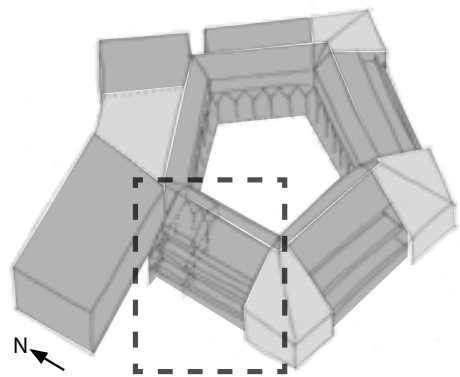
Verdieping 2



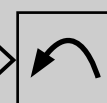
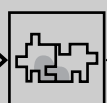
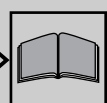
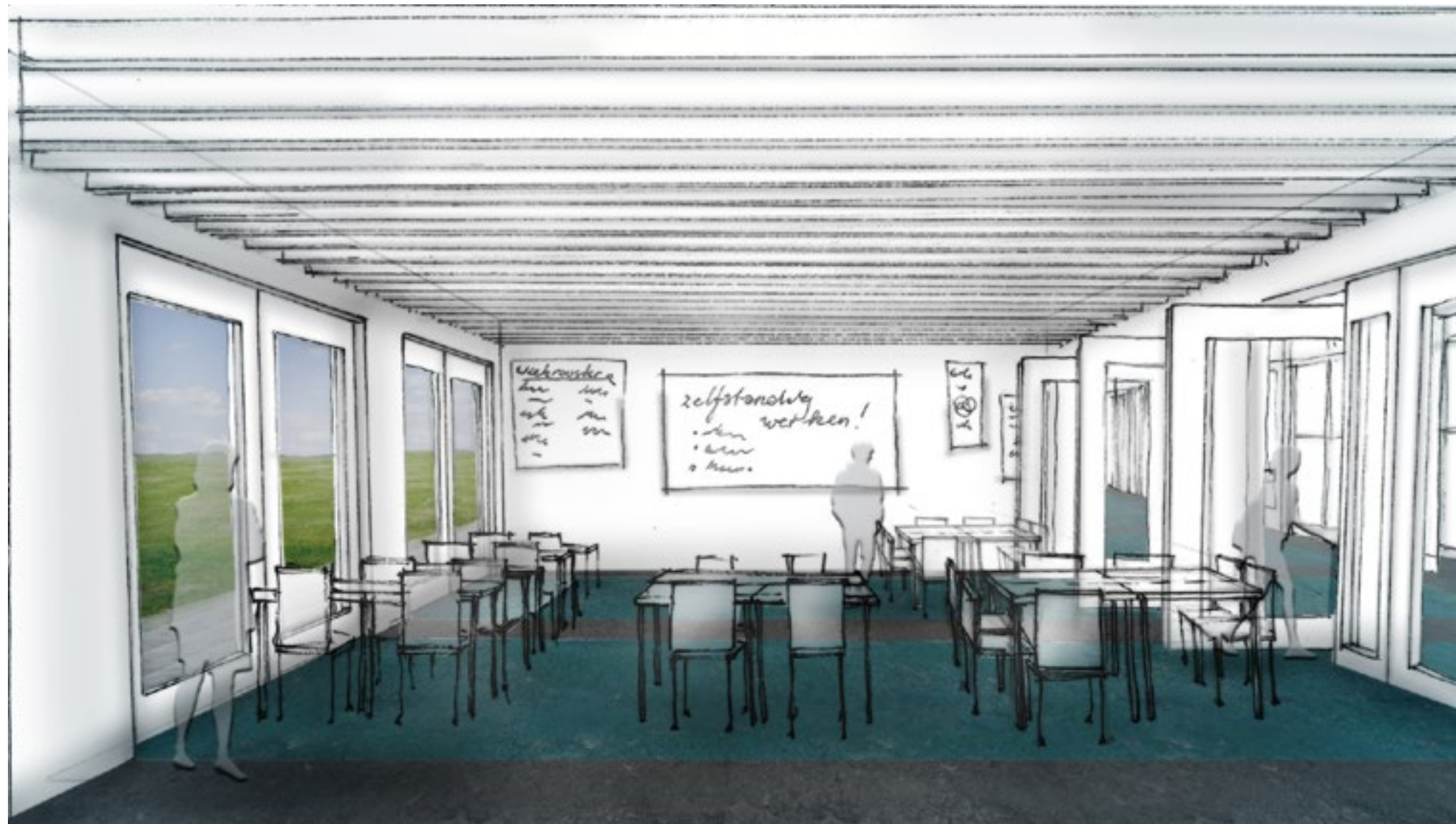
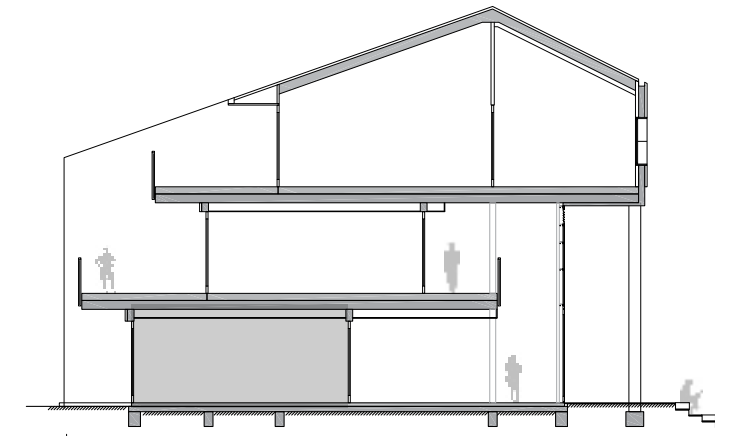
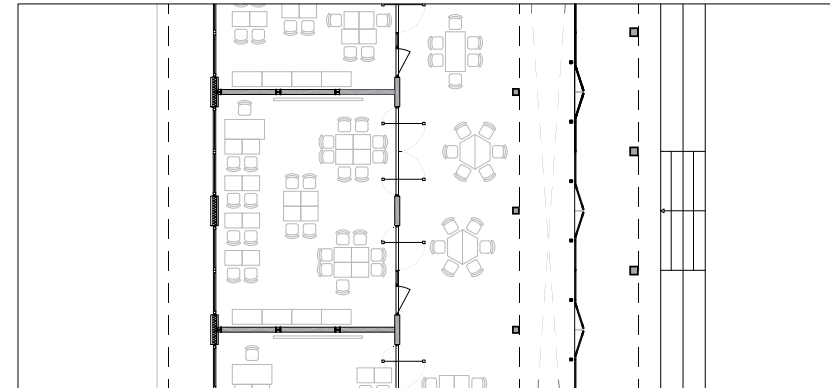
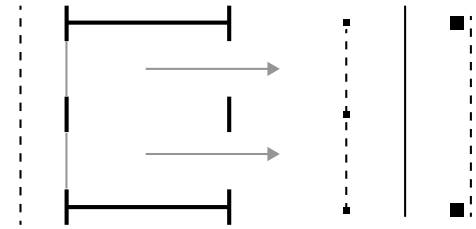
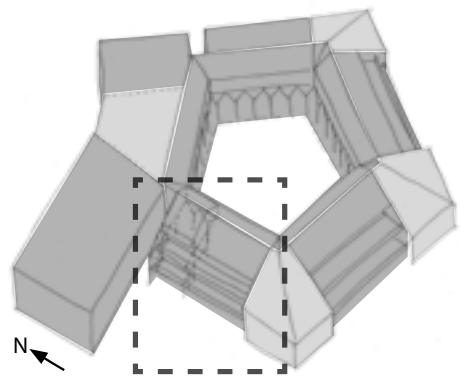
lokalen
functie & gebruik



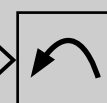
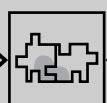
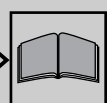
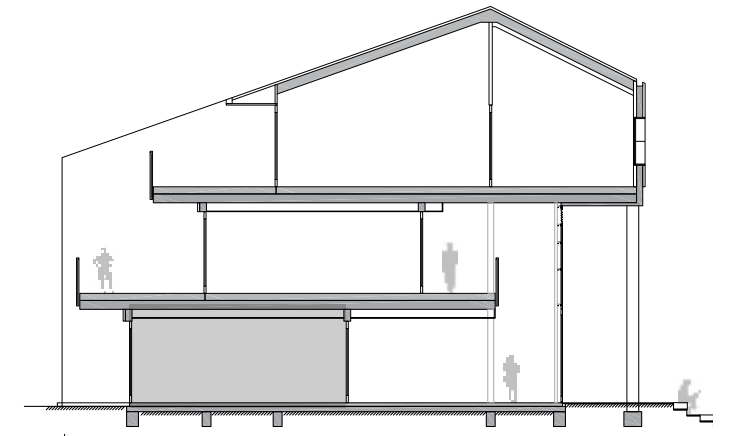
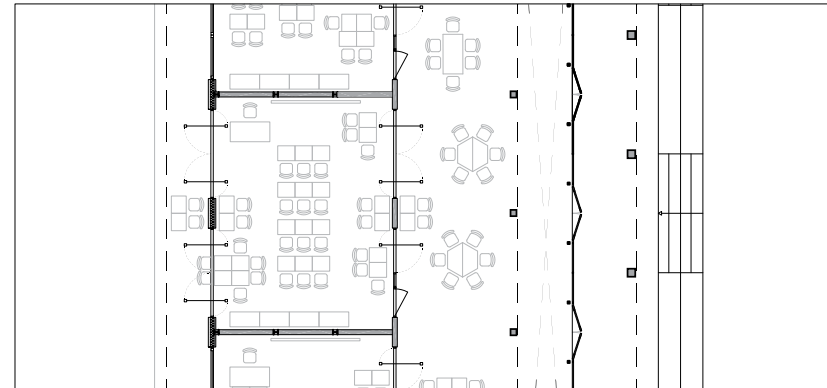
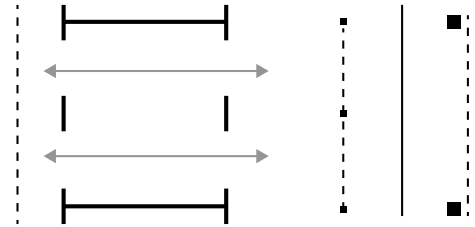
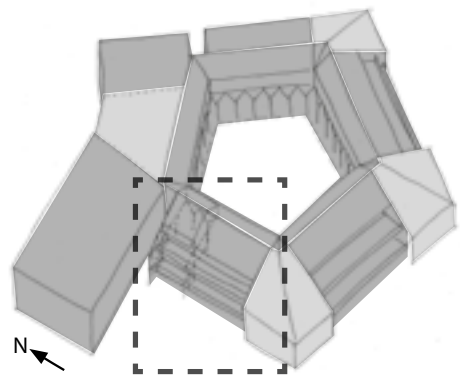
lokalen
functie & gebruik



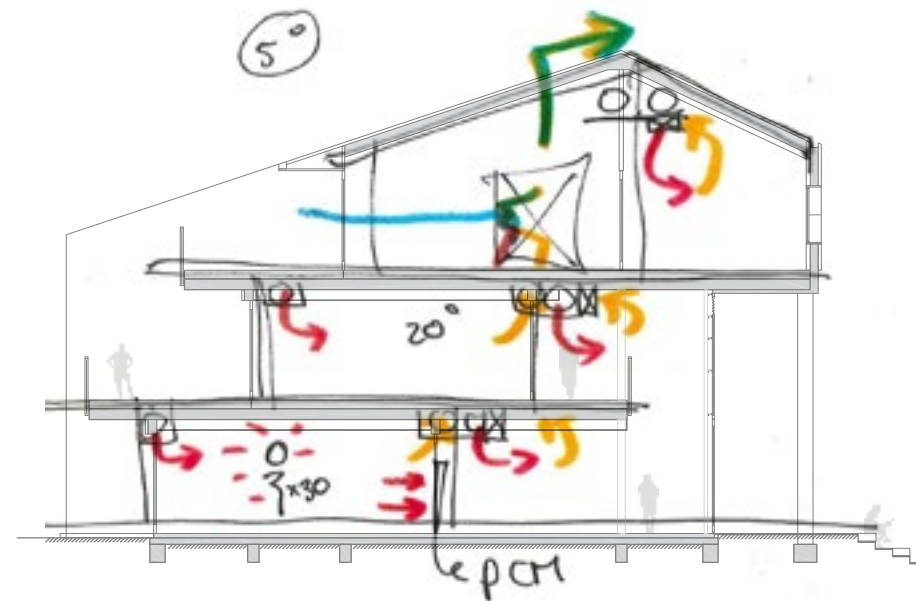
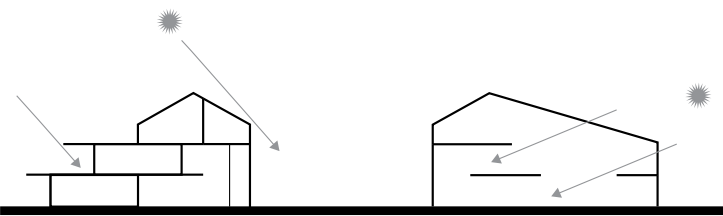
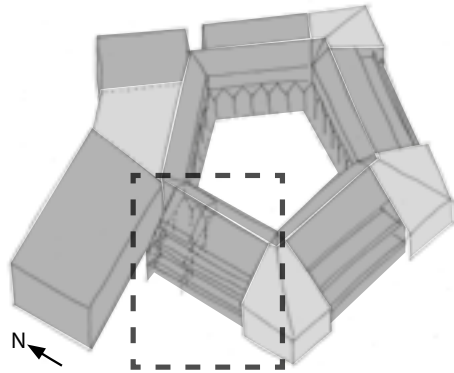
lokalen
functie & gebruik



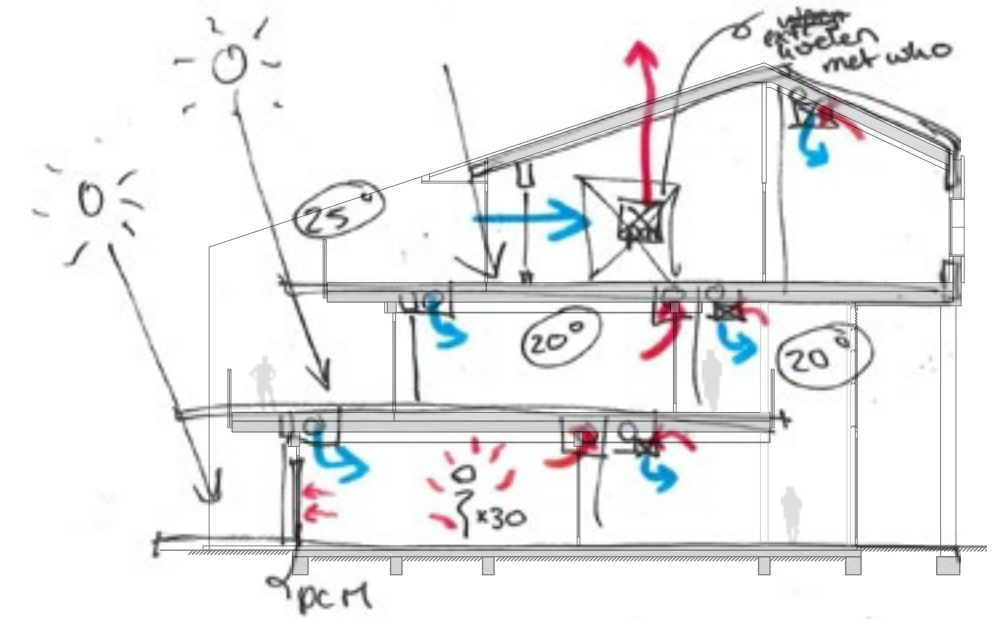
lokalen
functie & gebruik



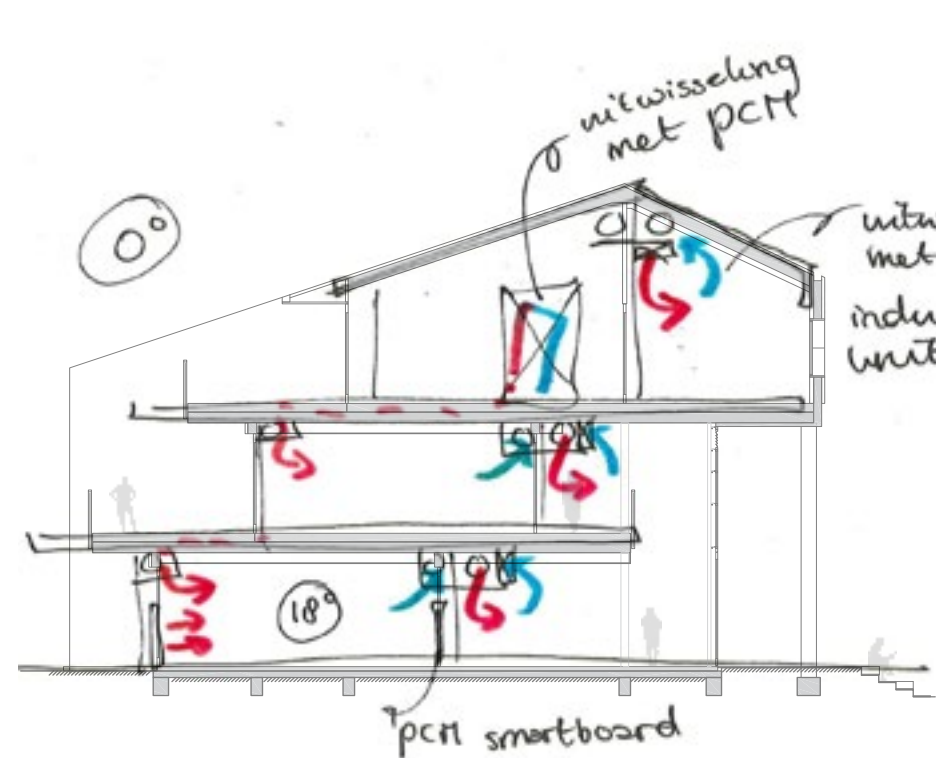
lokalen klimaat



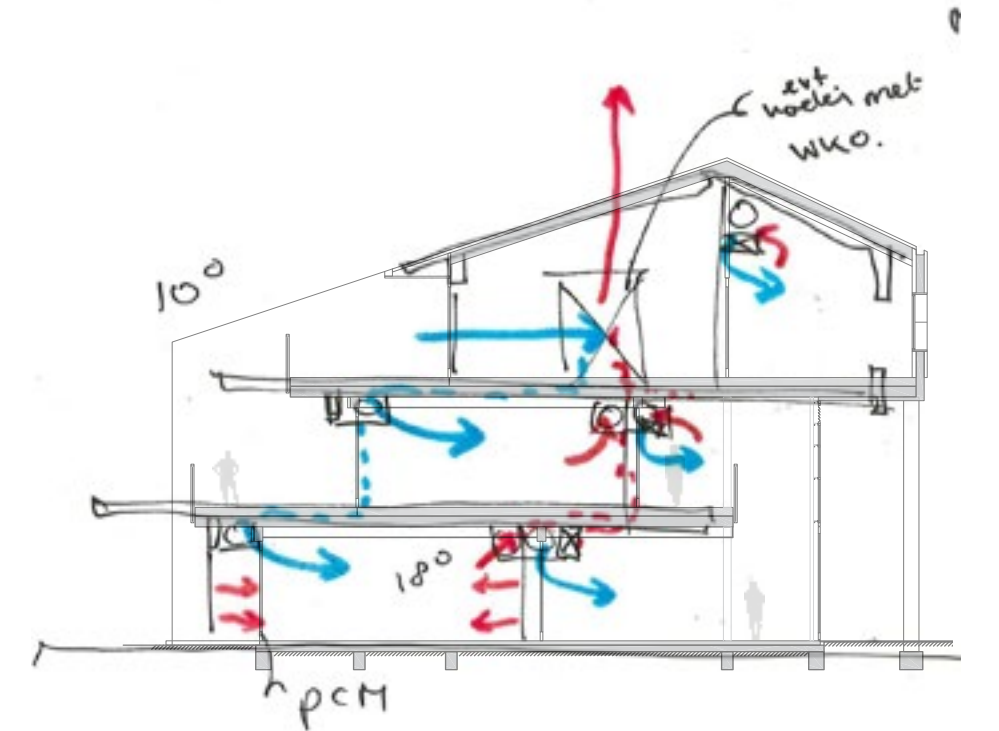
Dag winter



Dag zomer



Nacht winter



Nacht zomer

Uitdaging: koeling en ventilatie

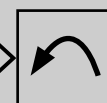
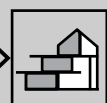
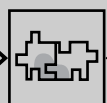
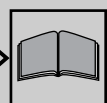
- Warmte/koude opslag
- Luchtbehandelingskast met PCM (Phase change materials)

Lokalen

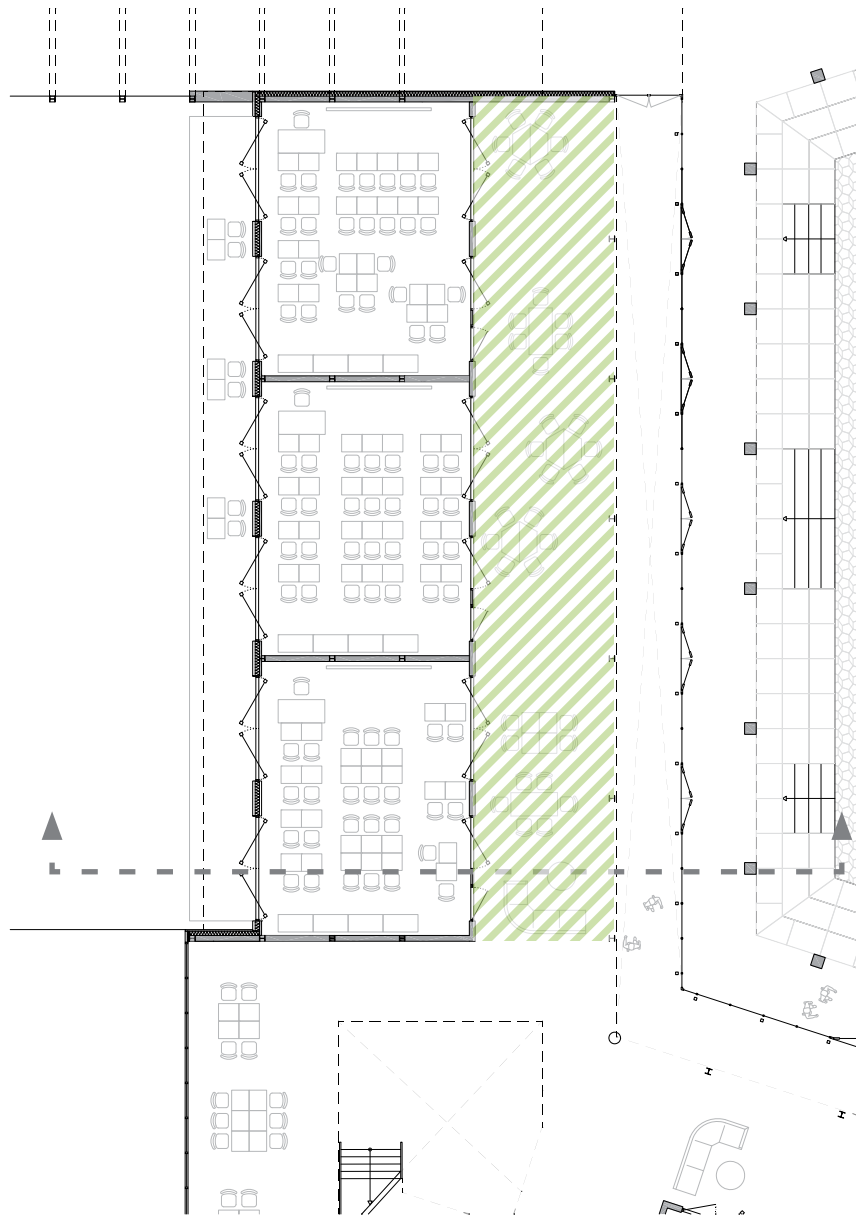
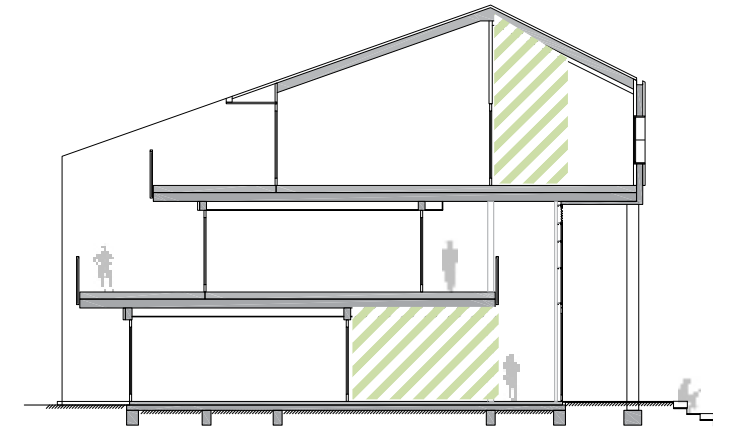
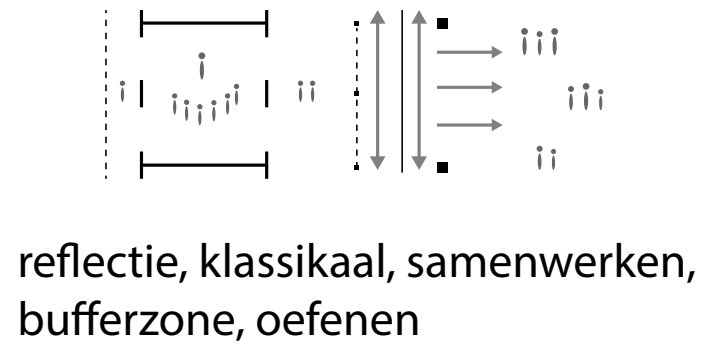
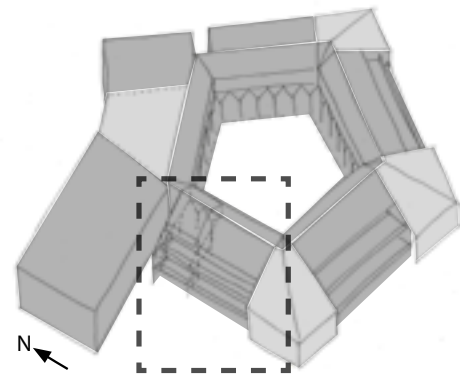
- Overstek
- PCM op wanden

Open ruimtes

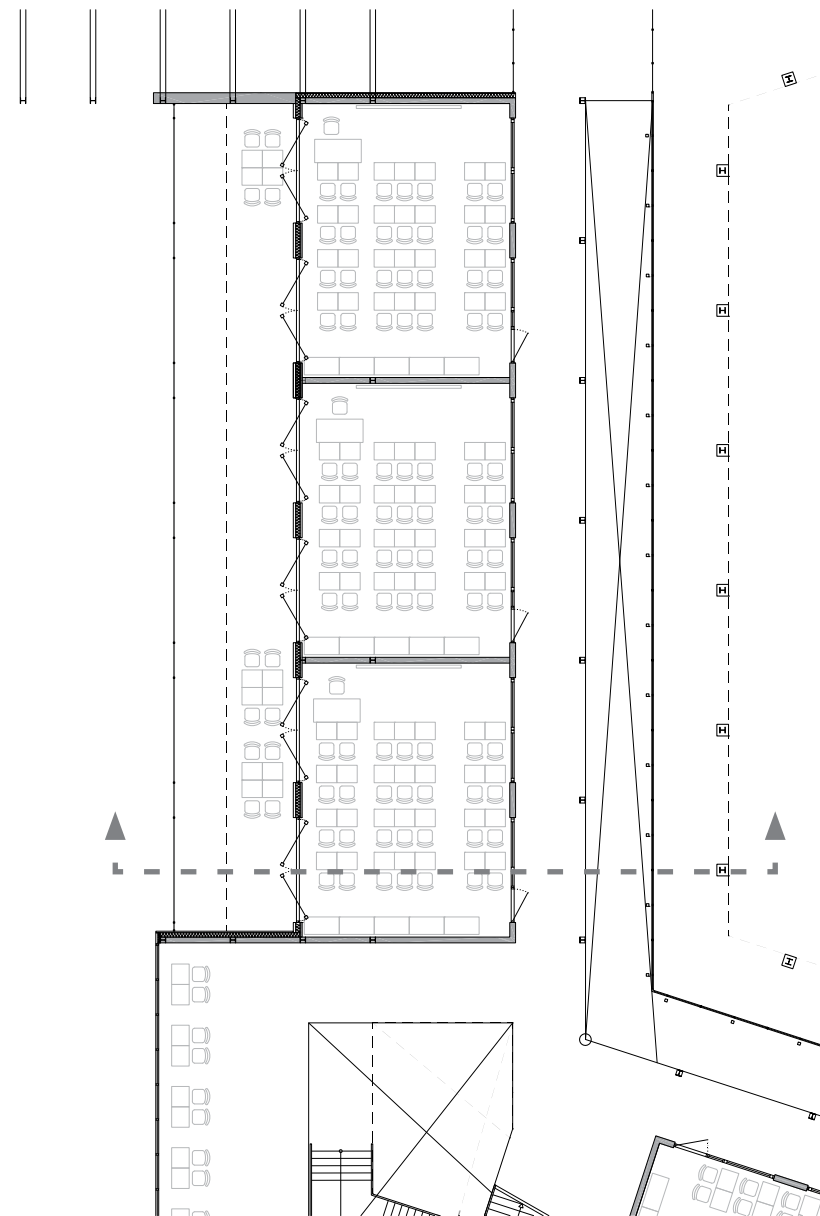
- PCM inductieunits



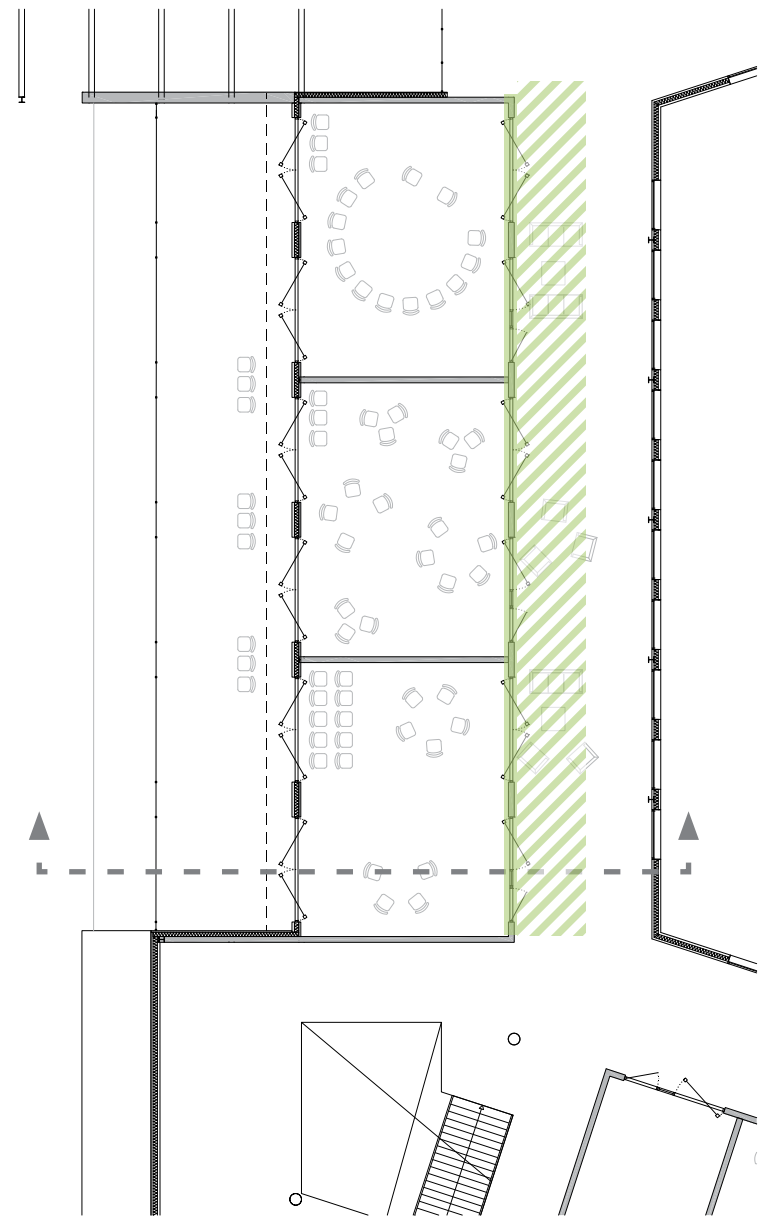
gang
functie & gebruik



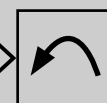
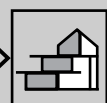
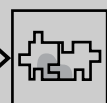
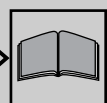
Begane grond

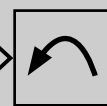
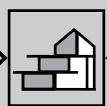
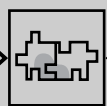
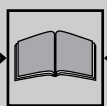


Verdieping 1

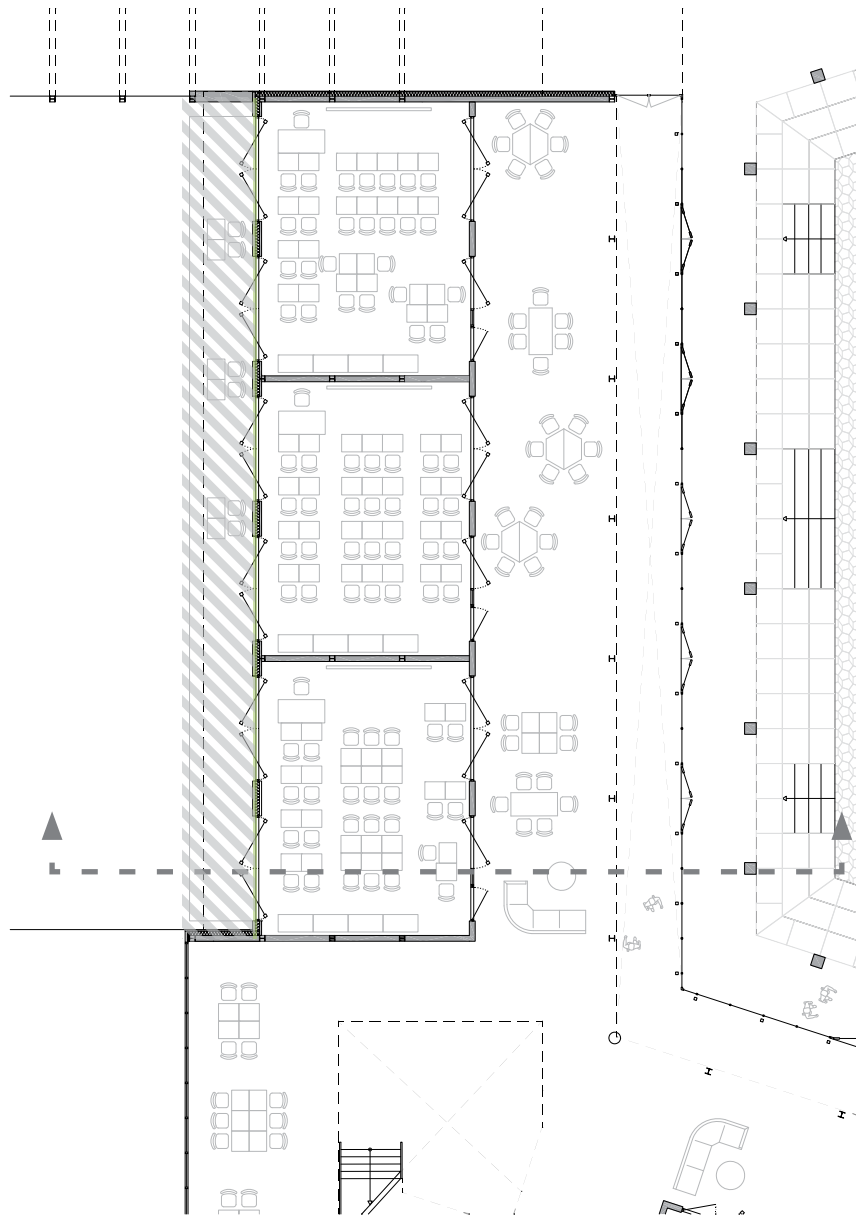
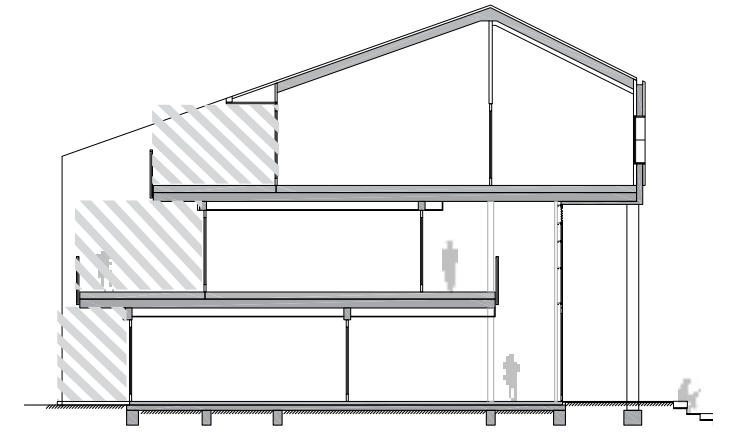
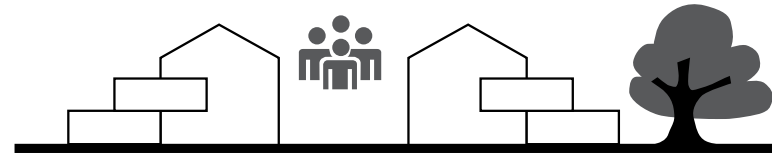
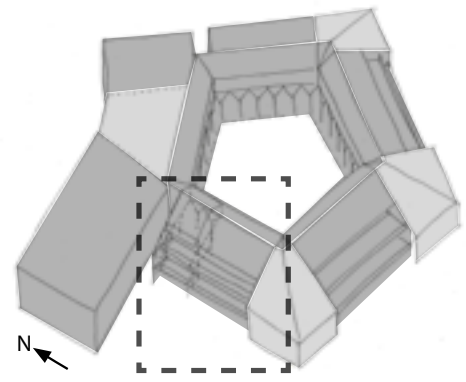


Verdieping 2

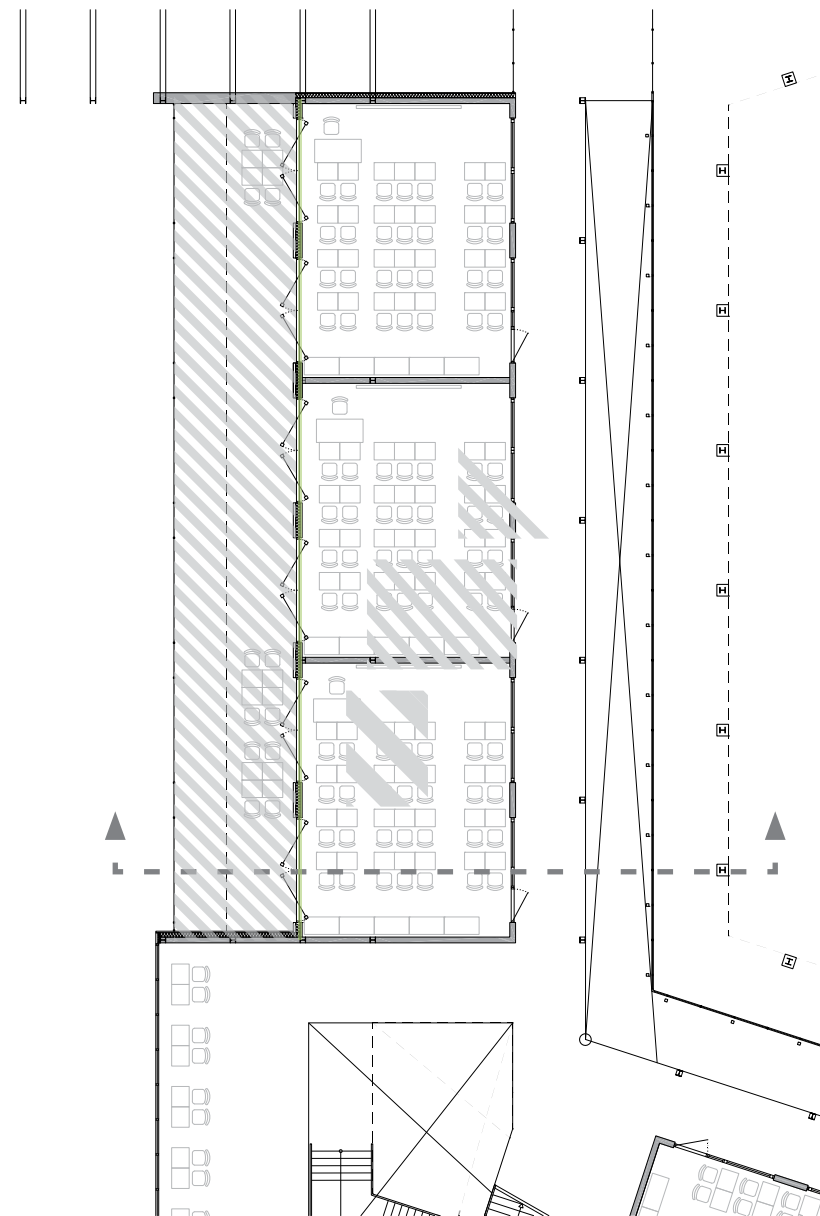




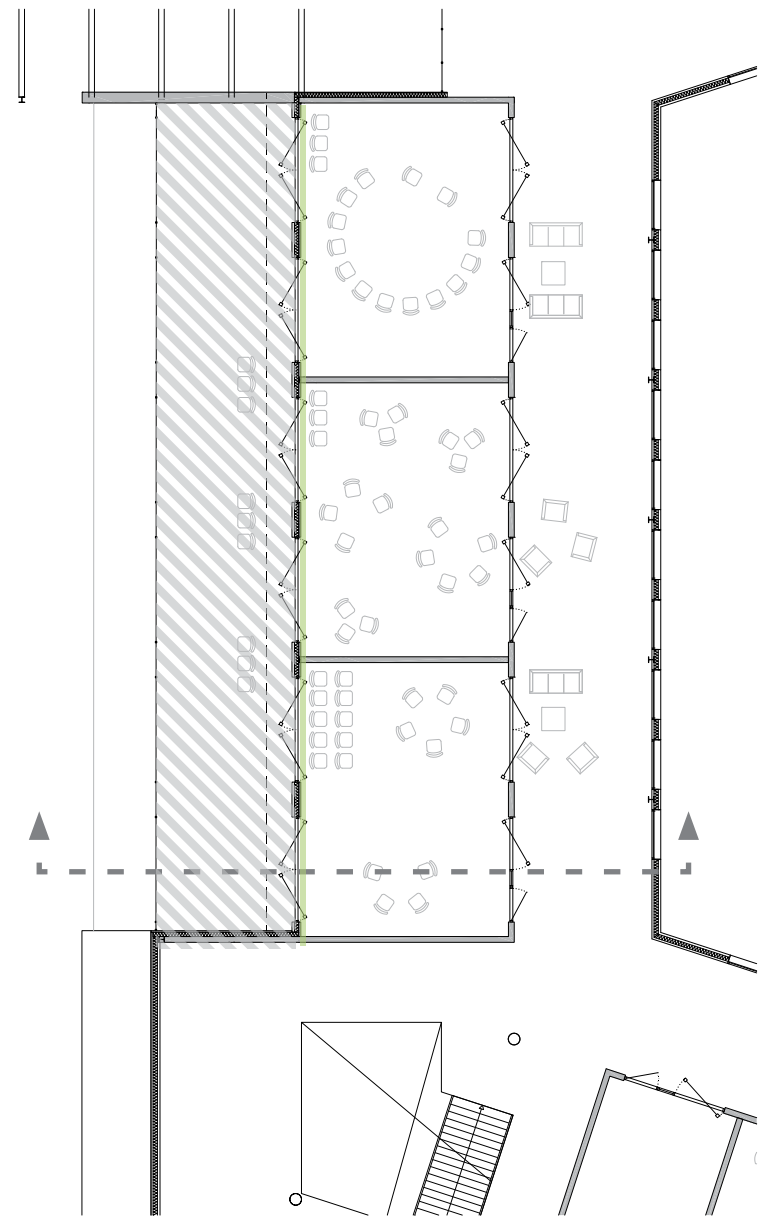
balkons
functie & gebruik



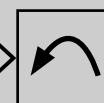
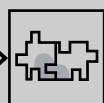
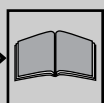
Begane grond



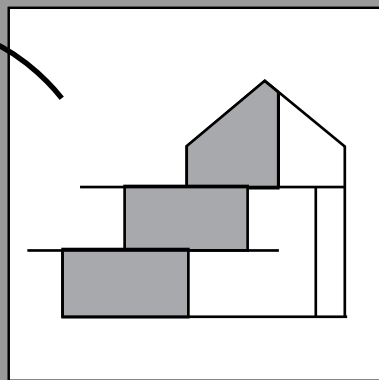
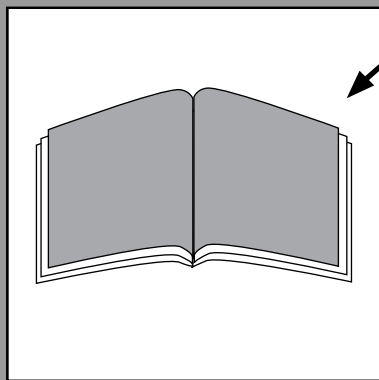
Verdieping 1



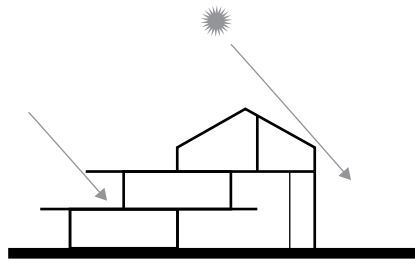
Verdieping 2



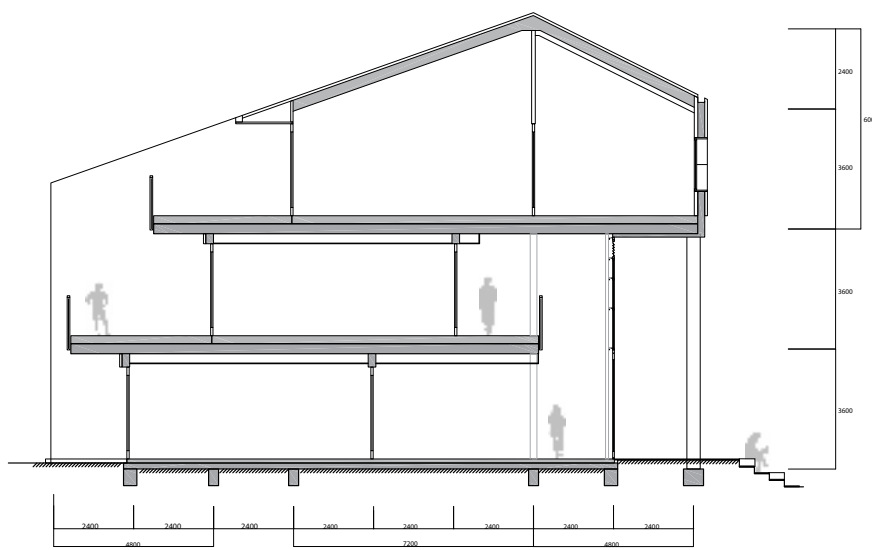
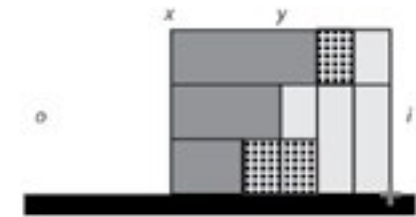
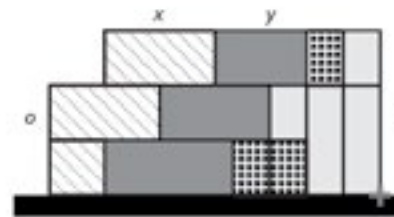
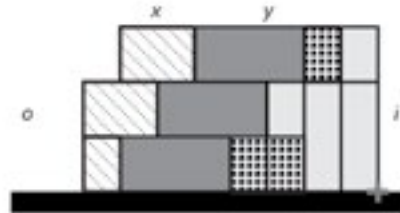
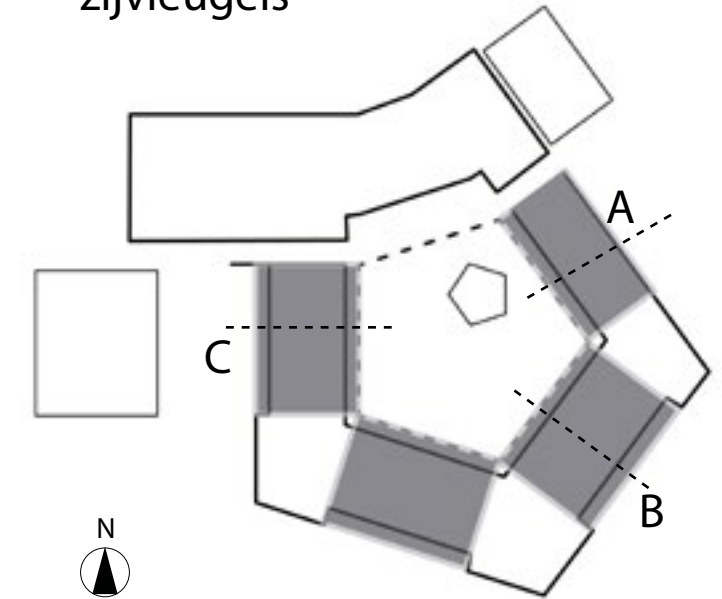
Terugkoppeling



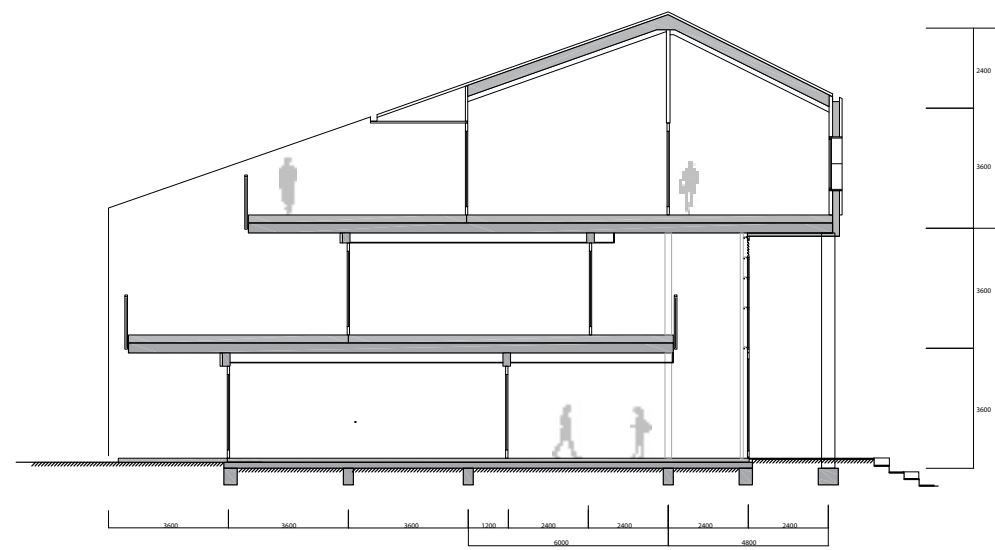
Herhaling van het principe



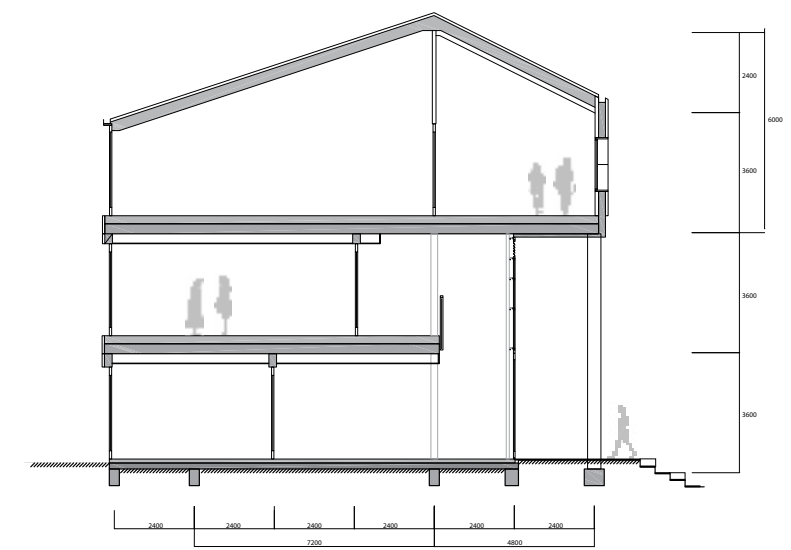
zijvleugels



Doorsnede CC' westzijde klaslokalen

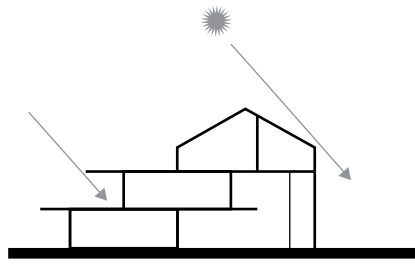


Doorsnede BB' zuidoostzijde klaslokalen

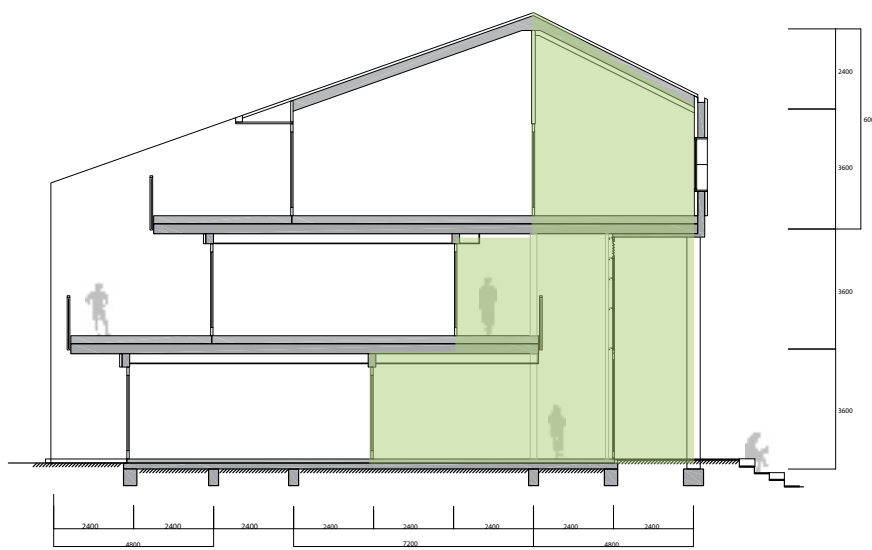
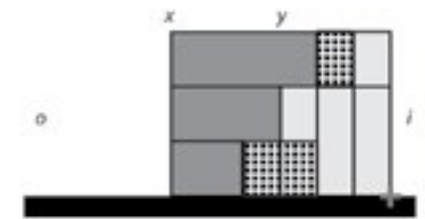
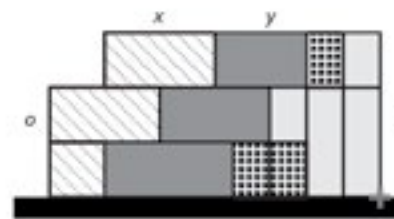
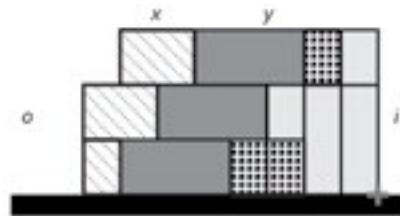
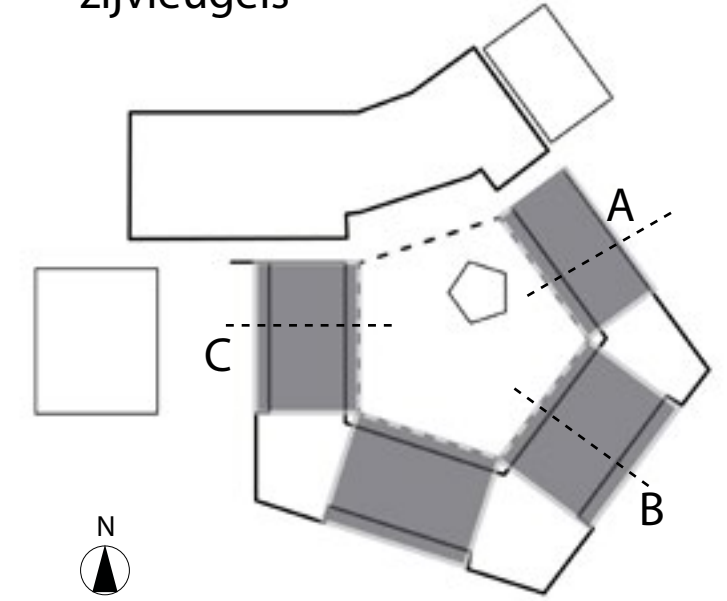


Doorsnede AA' noordoostzijde klaslokalen

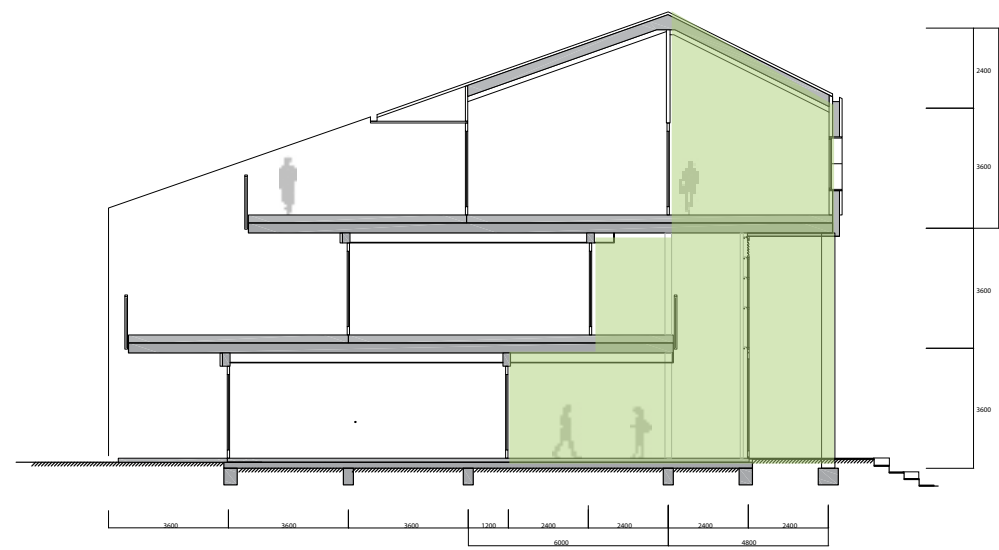
Herhaling van het principe



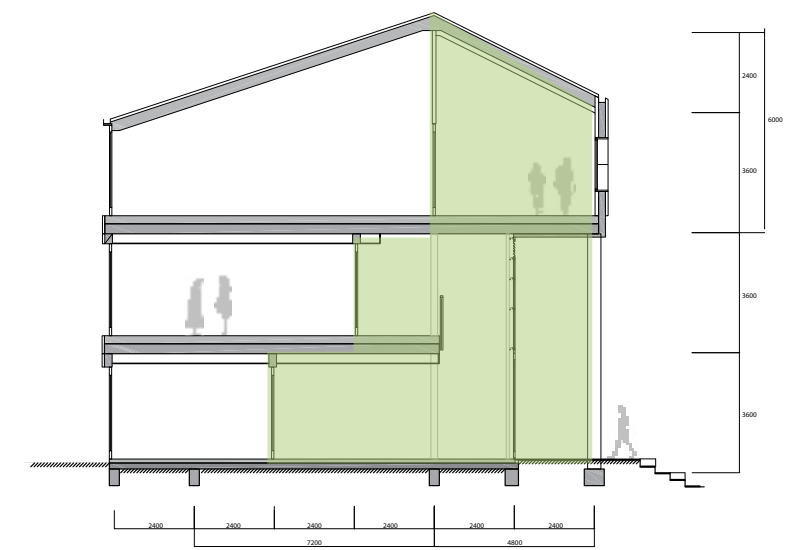
zijvleugels



Doorsnede CC' westzijde klaslokalen



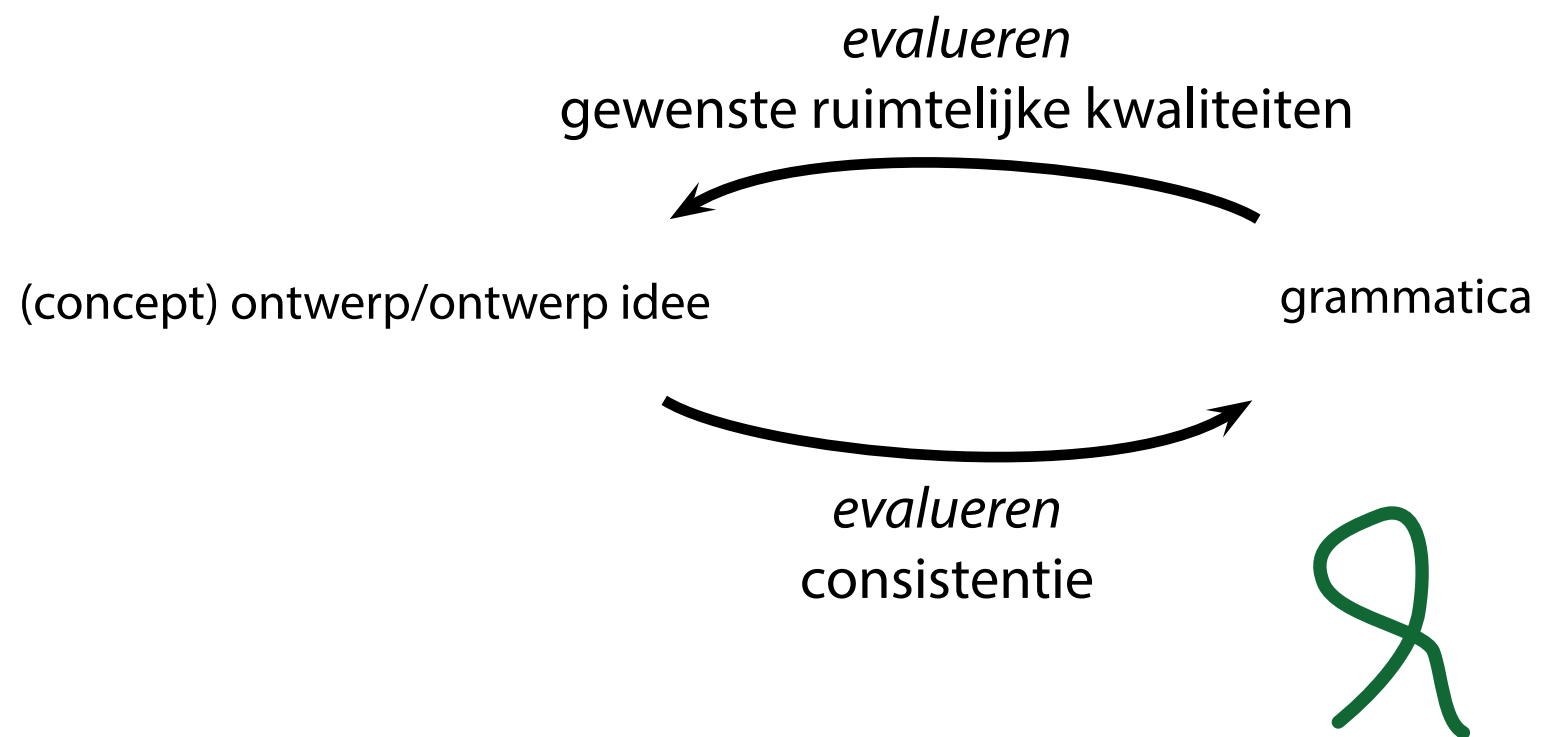
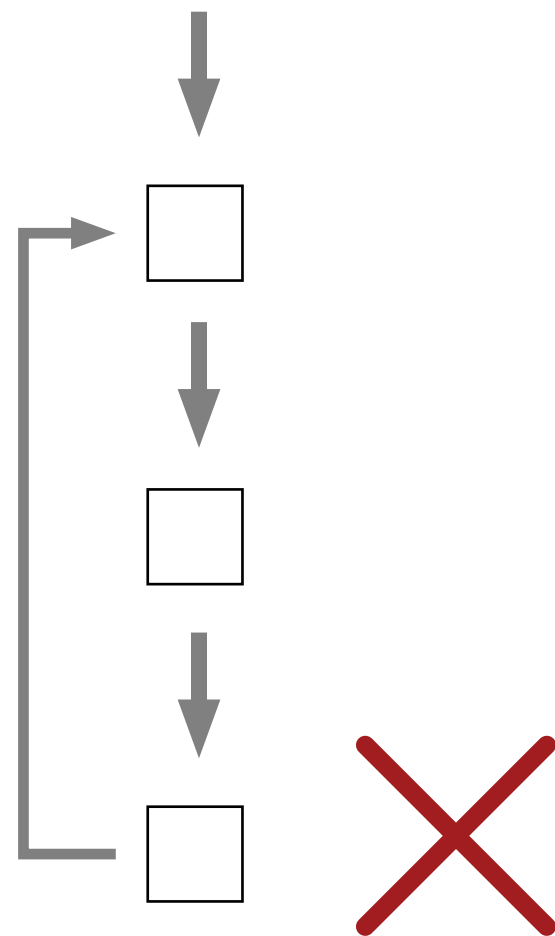
Doorsnede BB' zuidoostzijde klaslokalen



Doorsnede AA' noordoostzijde klaslokalen

Reflectie

1. Metaniveau (structuur)



Reflectie

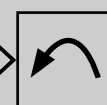
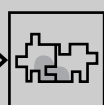
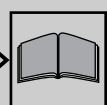
2. Inhoudelijk

Grammatica helpt

- bij het expliciet maken van ontwerpqualiteiten
- bij het maken van consistente (bewuste) ontwerpkeuzes

Risico

- om in een bepaalde schaal te blijven hangen in het ontwerpproces
- starheid *'omdat dat volgens de grammatica klopt...'*



Nog niet genoeg gehad?



Dank u voor uw aandacht