a perfect fit

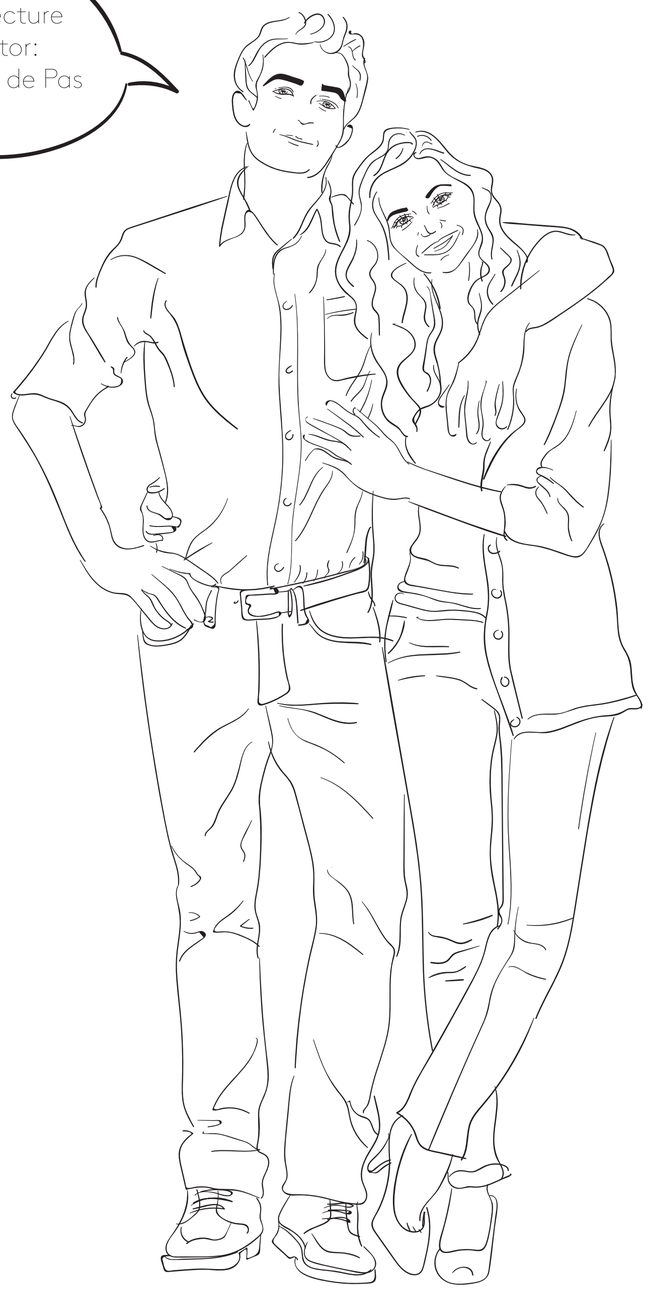
creating supportive housing for the autistic

Building Technology mentor: Pierre Jennen

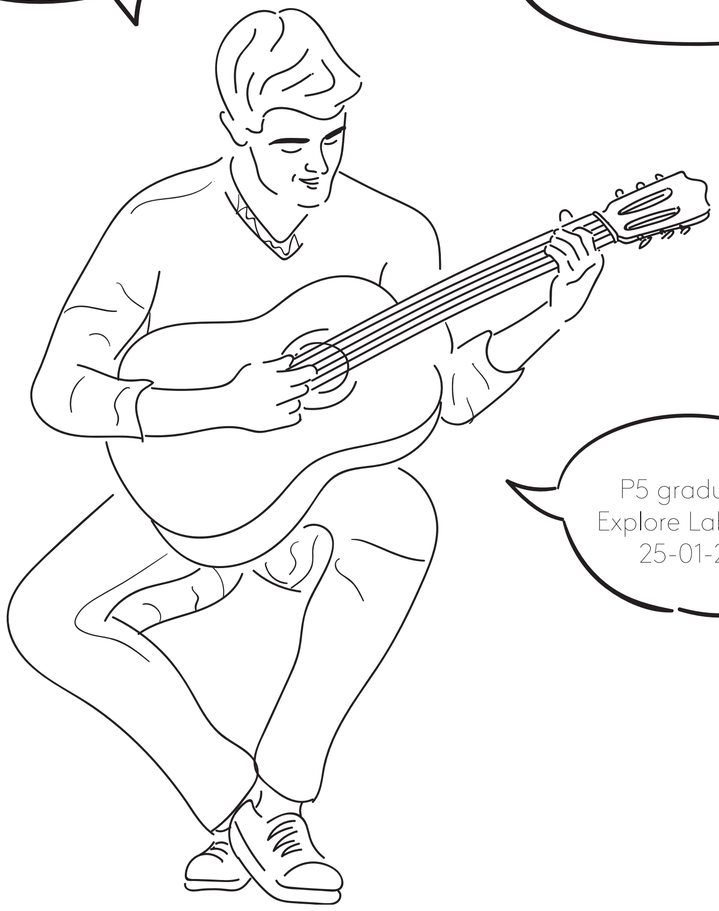
Architecture mentor: Roel van de Pas

Research mentor: Luc Willekens

Delegate of the Board of Examinors: Daan Vitner

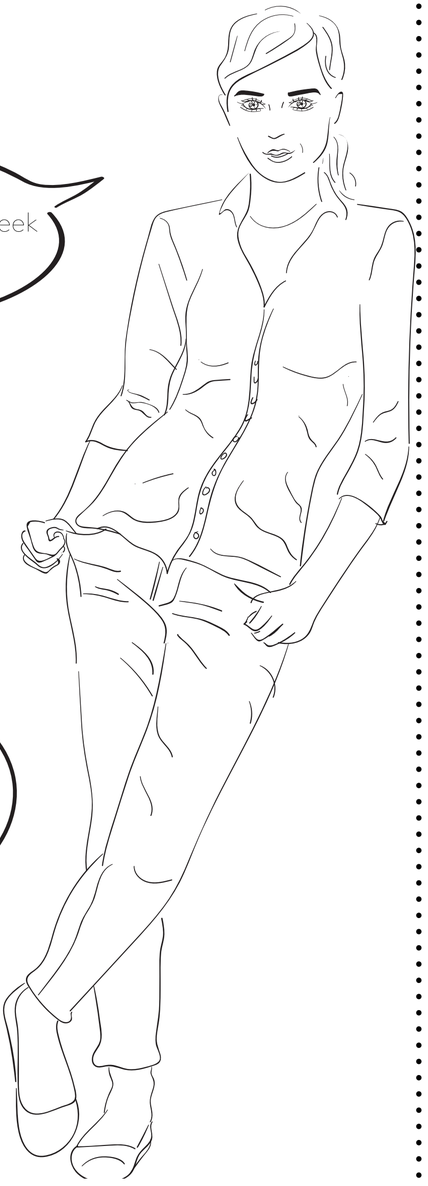


faculty of Architecture and the Built Environment



Laura Francisca van Beek
4246462

P5 graduation
Explore Lab studio
25-01-2019



fascination
theoretic frame
problem statement
research
results
location
design
questions

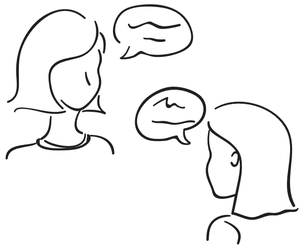
Laura van Beek
the older sister

Anne van Beek
8 minutes younger
has Autism Spectrum
Disorder

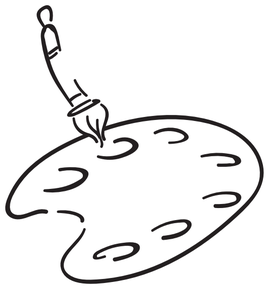
fascination

what does autism mean for Anne?

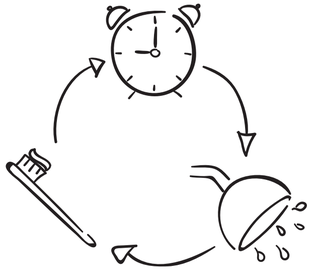
very sensitive to noise



is very social



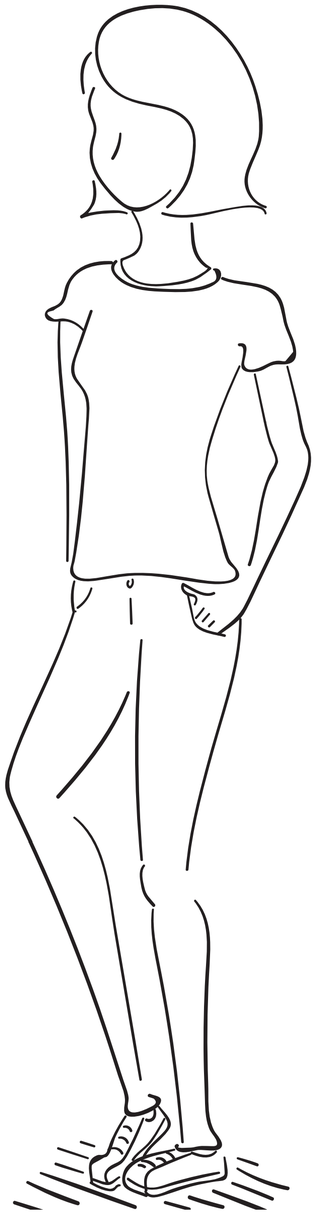
extremely creative



loves order and routine

shuts down when being overwhelmed or over demanded

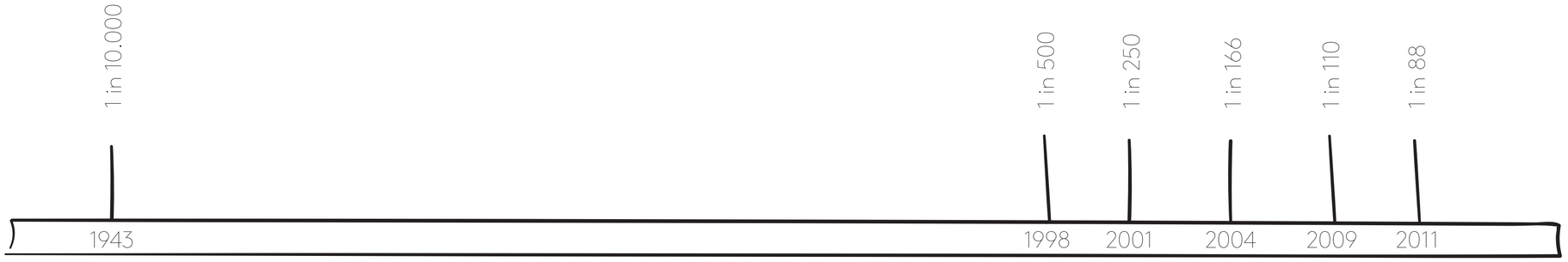
gets uncomfortable in (very) large crowds



theoretic frame

the autism spectrum

autism prevalence



Leo Kanner diagnoses first case of autism

Lancet article links autism to vaccines, later retracted

78% increase

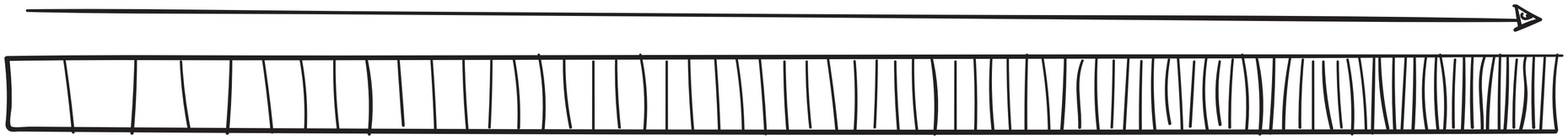
why is this increasing?
> society has increasingly become more demanding and complex
> diagnostics now include also:
- x PDD-NOS (Pervasive Developmental Disorder - Not Otherwise Specified)
- x Asperger's Syndrome

the autism spectrum

common perception

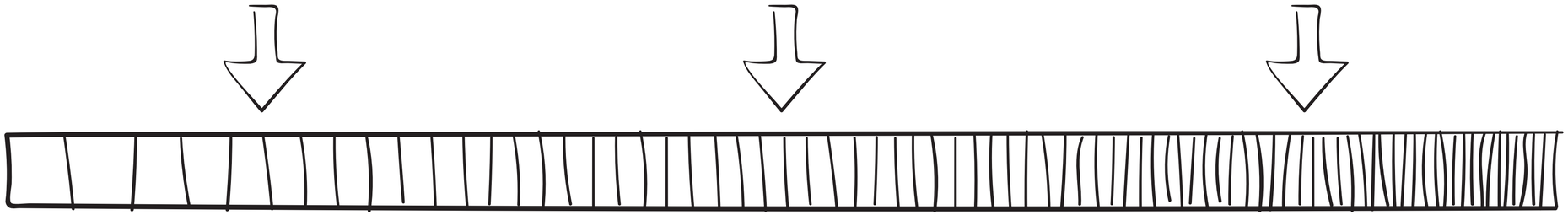
a "little" autistic

"very" autistic



the autism spectrum

where would Anne fit?



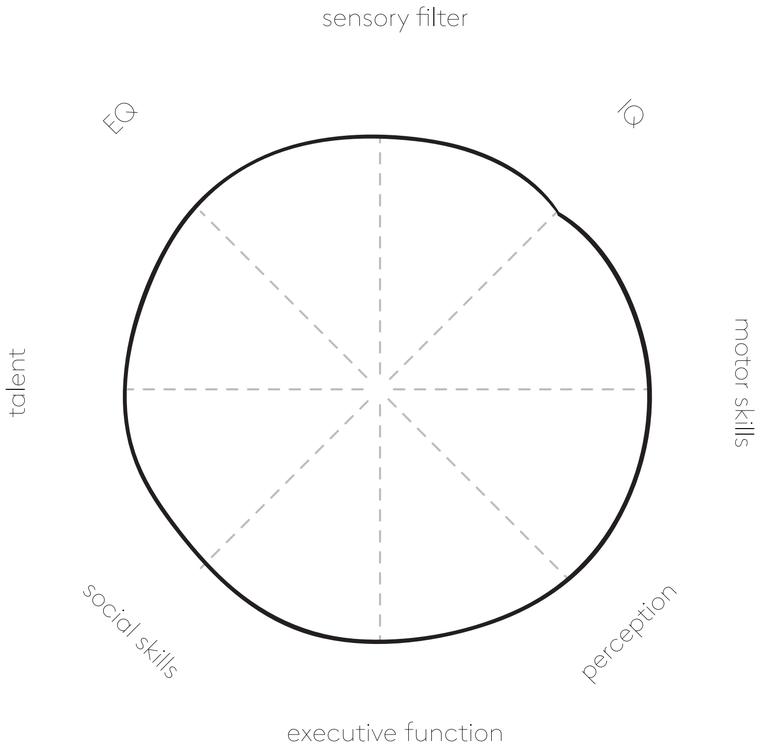
she is quite socially skilled, so she can't be THAT autistic

hmm, but she doesn't like unexpected events

and she is very sensitive to noise, she is very SCARED of fireworks

She is very creative and good at telling about WW2 and remembering details

new model proposal: the 'spiderweb'



the autism spectrum

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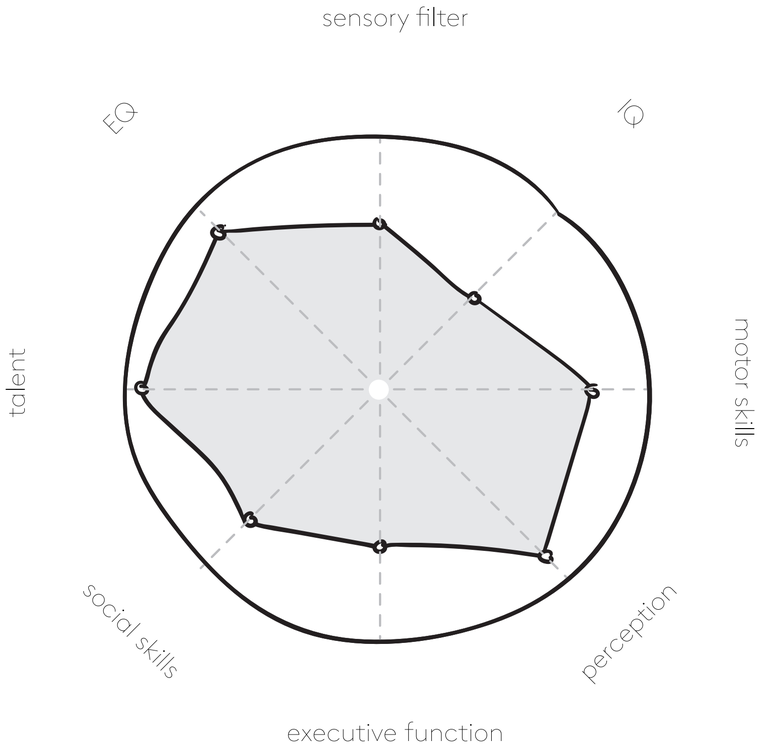
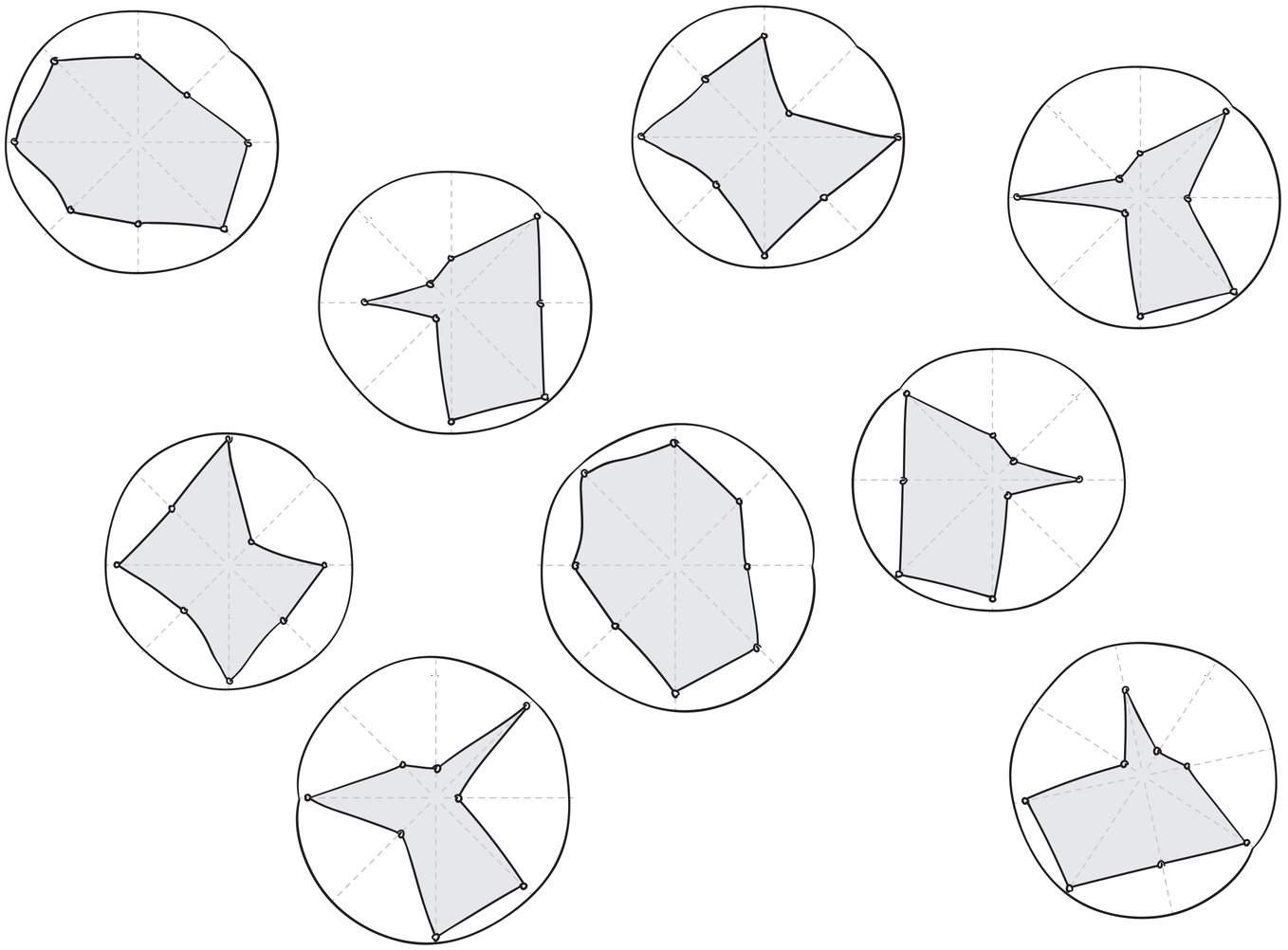


the autism spectrum

a big variety of individuals

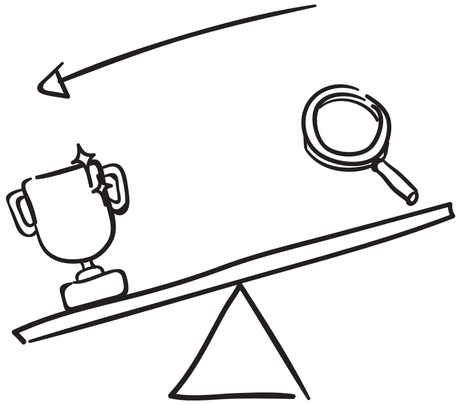


how to create housing for such a wide range of individuals

my own position/perspective

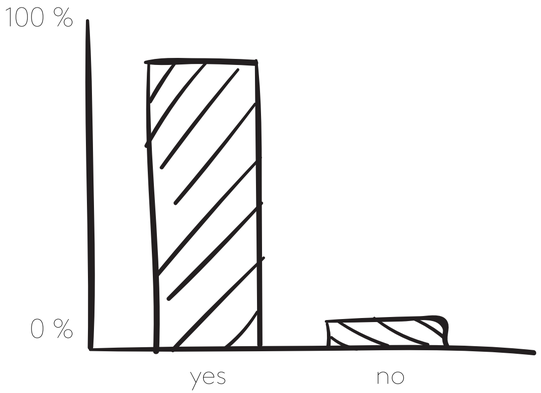
focus on individuals who are balancing on the verge of independence:

> not independent enough to buy/rent a "normal" house
> too independent for full tutoring



up to 95% of the people with autism have "any unusual sensory experiences"

Ahrentzen, Steele & Dorgan, 2013



problem statement

wishes for housing situations

"do you wish for another housing situation?"

	adults > 18
yes	41%
maybe	29%
no	24%
unknown	6%
total	100% n = 830

Nederlande Vereniging voor Autisme, questionnaire report, 2013

"what kind of housing situation are you searching for?"

	adults > 18
independent with very little tutoring	43%
independent without care or support	22%
other	35%
total	100% n = 864

Nederlande Vereniging voor Autisme, questionnaire report, 2013

problem statement

special schools are well equipped

www.therapyinsider.com

www.inhabitat.com

www.afternic.com

www.tritecre.com

problem statement

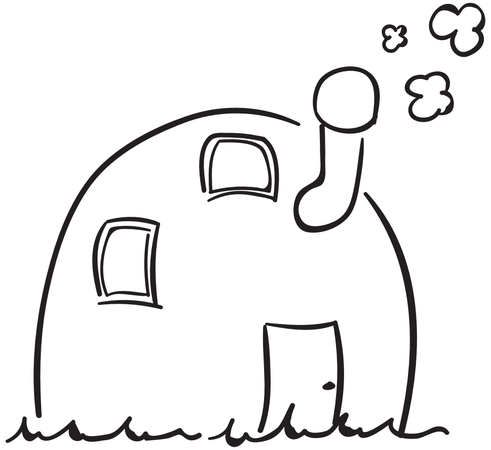
but housing seems to stay behind

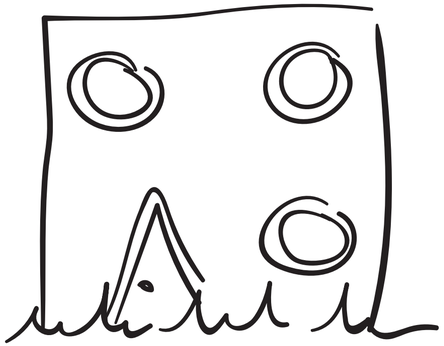
practical linoleum flooring

still an institutional-like feeling, instead of home-like

problem statement

how it should be





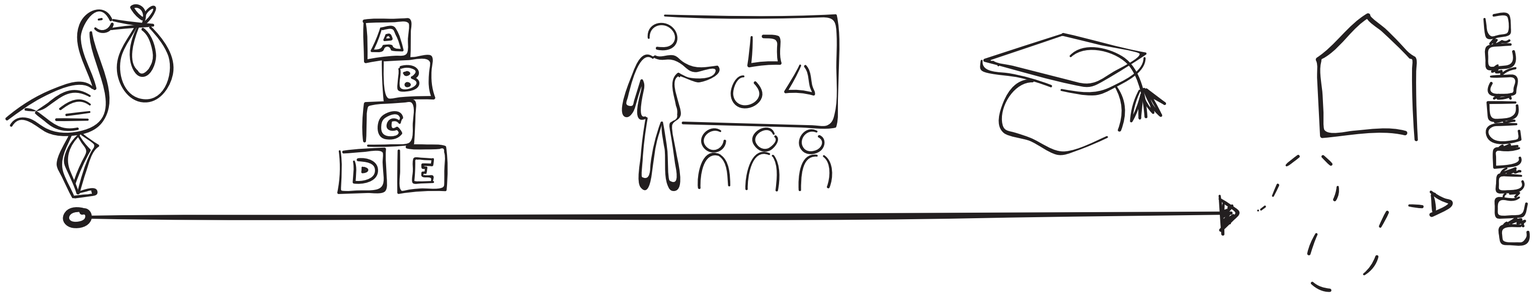
recognisable

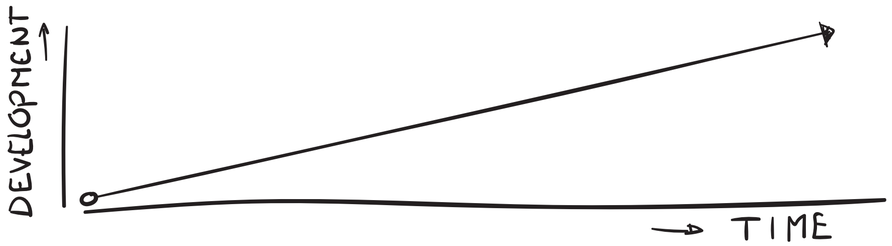
cosy and home-like (“gezellig”)

supportive

problem statement

why should it be like that?





neurotypical person

autistic person

research

research questions

Which architectural elements can increase the well-being of people with autism within their home environment?

In what manner can sensory architecture come into play?

Which measures considering privacy have to be taken?

In which way should social interaction be supported?

How should the balance be found between generalism and personalisation?

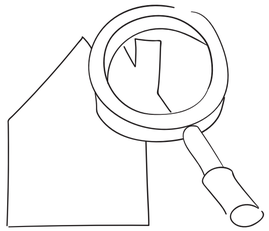
How can the connecting outdoor space make a contribution?

Goal
to set up guidelines for architects who are designing houses for people with autism

Scope
- x location: Leiden
- x target group: focus on individuals who are balancing on the verge of independence
- x housing type: individual apartments with a communal support point

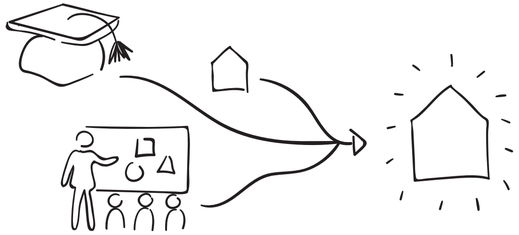
research method

literature study



typological study

questionnaire & interviews



questionnaire

6 residents

x currently living in either group housing (waiting for independent housing) or already in a studio apartment.

interviews

2 tutors

x tutors in group housing, will move with the residents to the new apartment building

1 resident

x moving to an individual apartment with partial tutoring.

results

problems - categories and themes

spatial

layout

wayfinding

furnishings

personalisation

sensory

sound

sight

touch

smell

garden

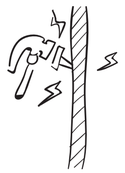
social

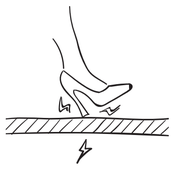
privacy

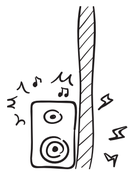
interaction

results

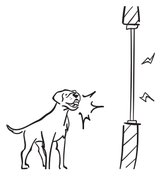
problems

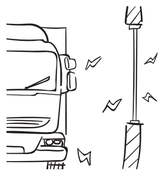

contact noise

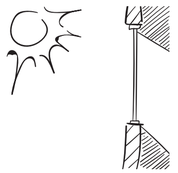

impact noise

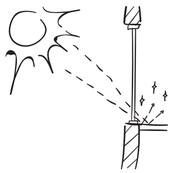

loud music

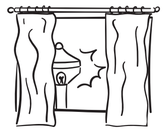
electrical appliances

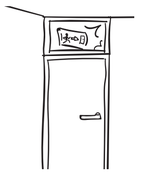

barking dogs


noisy traffic


bright sunlight


glare and reflection

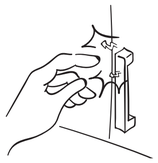

street lantern light

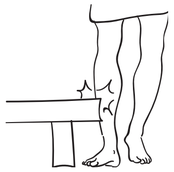

emergency exit light

red increases stress

blue enlarges a space

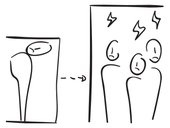
high thresholds

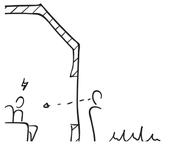

shock by metal objects


sharp edges

temperature sensitive

kitchen smells

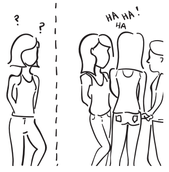

too little private space


passersby looking in

feelings of unsafety

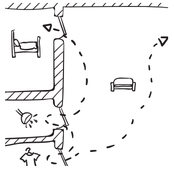
unable to conversate

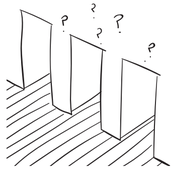
misinterpre-ting things

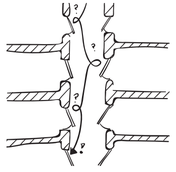

social exclusion

space seems larger

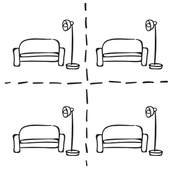
current room too small

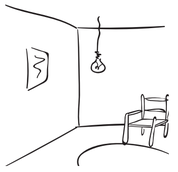

unlogical routine space

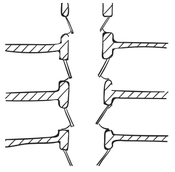

too many hallways


too many doors

layout not memorable


generic furnishings

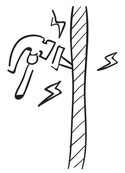

bare furnishings


institution-like feeling

obliged regulations

results

problems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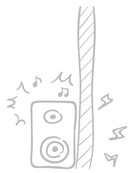
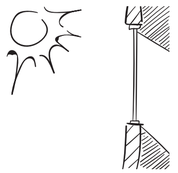

loud music

electrical appliances

barking dogs

noisy traffic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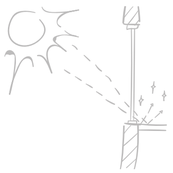
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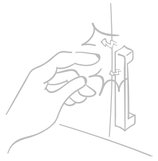
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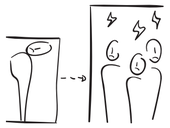
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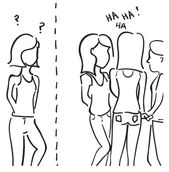
unable to conversate

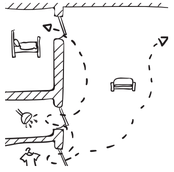
misinterpre-ting things



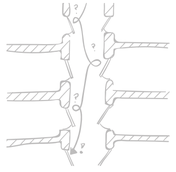
social exclusion

space seems larger

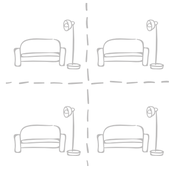
current room too small


unlogical routine space

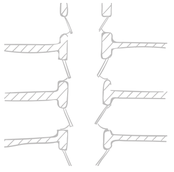
too many hallways


too many doors

layout not memorable


generic furnishings

bare furnishings


institution-like feeling

obliged regulations

results

solutions - categories and themes

SUPPORT

INDEPENDENCE

routine

comfort

confidence

SENSORY

sound

sight

texture

smell

garden

SPATIAL

layout

wayfinding

furnishing

personalisation

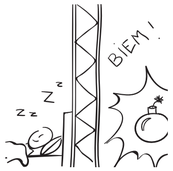
SOCIAL

privacy

interaction

results

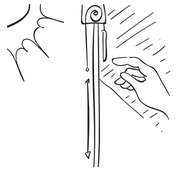
solutions



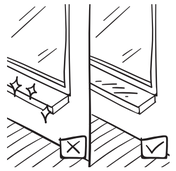
outstanding insulation

location consideration

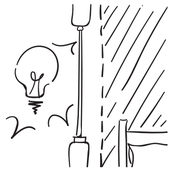
insulated cabins



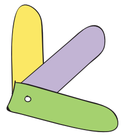
sunshading



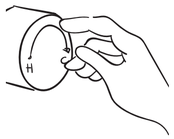
matte finishes



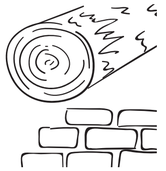
darkness



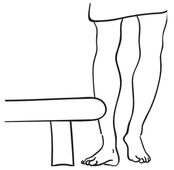
use of soft pastels



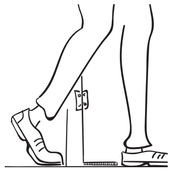
temperature control



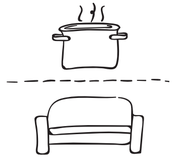
non-metal materials



round corners

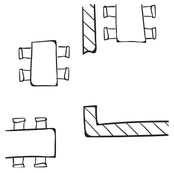


no thresholds

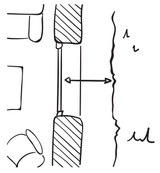


kitchen separate

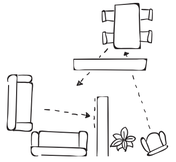
air-purifying plants



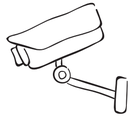
several privacy levels



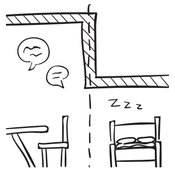
deep niches of windows



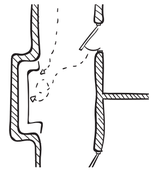
space dividers



offer safety measures

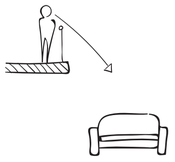


ceiling height influence

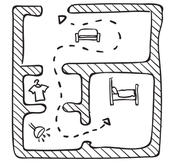


informal seating

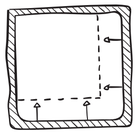
previewing 1



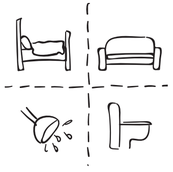
previewing 2



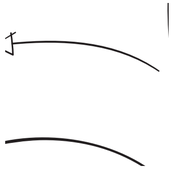
routine expectations



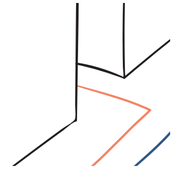
avoid too large spaces



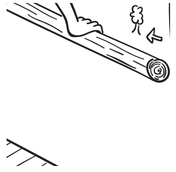
different functions



curvilinear walls



coloured flooring



textured railings

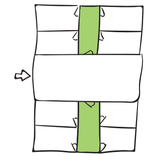
functions vs. textures

homey furnishings

comforting furniture

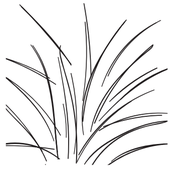
front door decoration

colour picking



shorter hallways

bamboo knocks softly



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cool colours give peace

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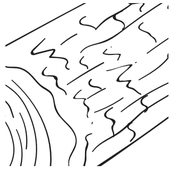

rough bark

fragrant plants

fragrant herbs

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results

solutions

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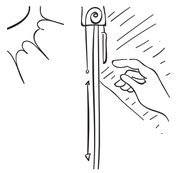

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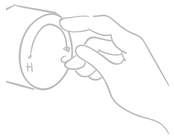
darkness

use of soft pastels



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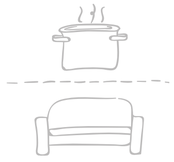
no thresholds



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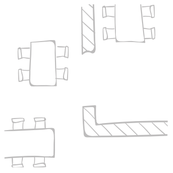

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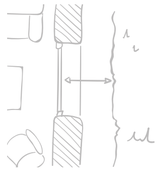

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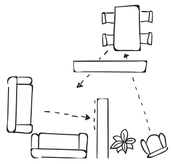

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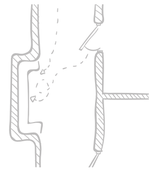

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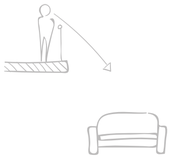

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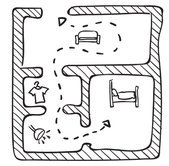

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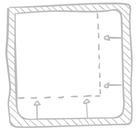

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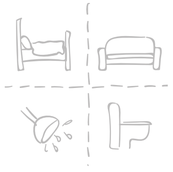

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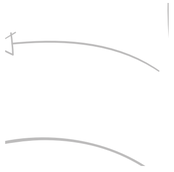

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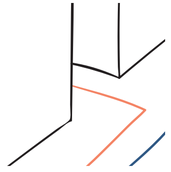

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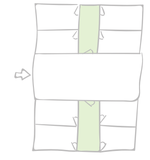

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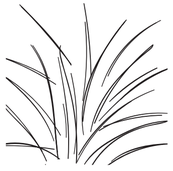

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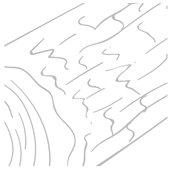


rough bark

fragrant plants

fragrant herbs

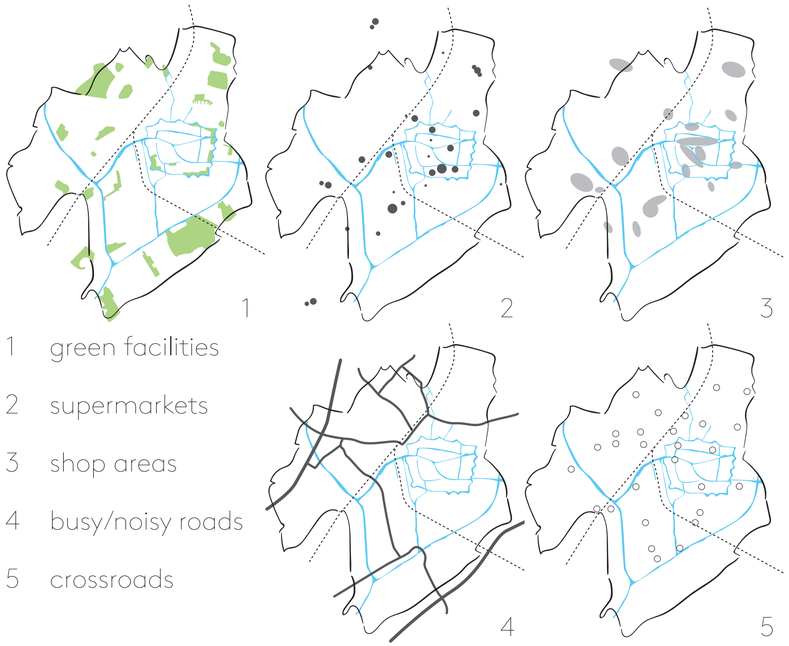
edible plants

- x decrease sensory load concerning sound, sight, touch and smell ;
- x develop a spatial layout which creates expectations for action ;
- x maximise familiarity and clarity ;
- x create "islands" of privacy throughout building, apartment, and outdoor area ;
- x allow opportunities for social interaction - both accidential and planned ;
  > include a way of previewing for mental preparation
- x ensure accessibility and inclusion in the surrounding neighbourhood ;
- x allow for a high level of personalisation to enhance identity ;
- x provide control of services like heating and sunshading ;
- x be always alert on the balance between their world and the outdoor world ;

location

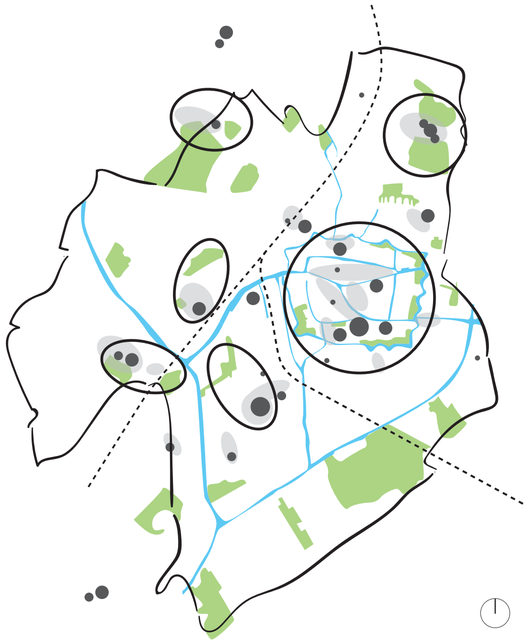
location choice

method of analysis

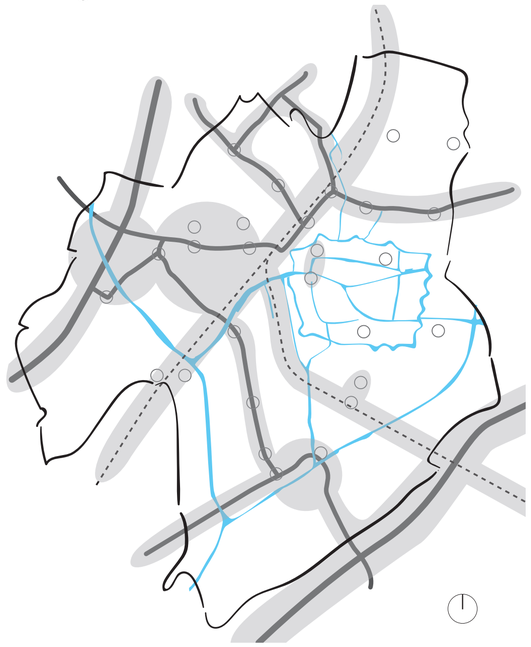


1 green facilities
2 supermarkets
3 shop areas
4 busy/noisy roads
5 crossroads

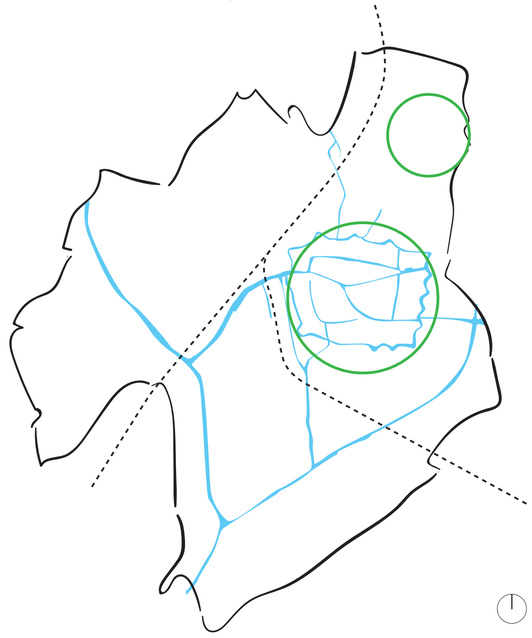
positive factors combined



negative factors combined



remaining area's

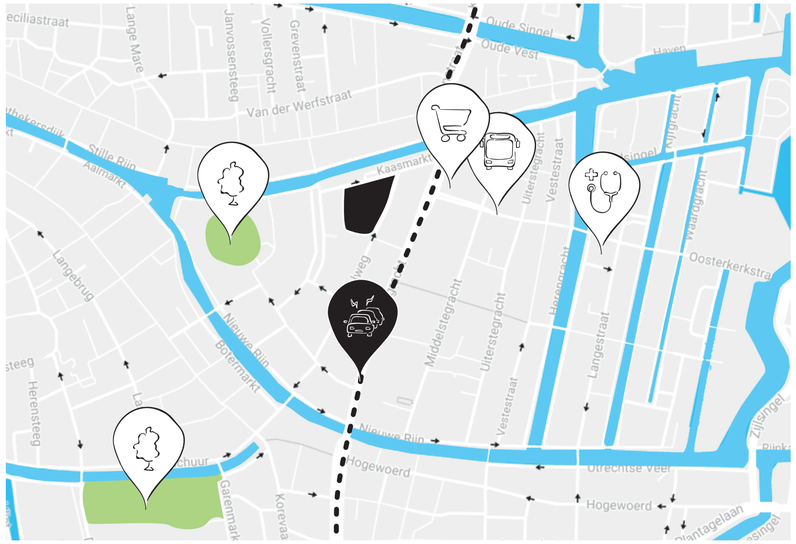


location choice

Kaasmarkt, Leiden

Kaasmarkt, Centrum

Walk	17	min
Bicycle	5	min
Car	6	min
Public Transport	11	min



\+ Located within city centre
\+ Supermarket is nearby
\+ Bus stop down the street
\+ Train station quite closeby
\+ Not directly next to noisy roads
\+ General practicioner closeby

\- City centre can be crowded with people

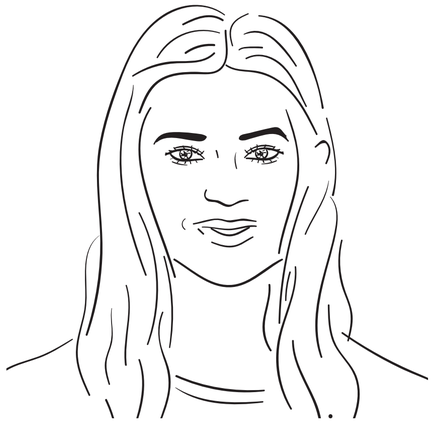
sound light colour texture smell privacy interaction wayfinding layout personalisation nature comfort routine confidence

current state

sound light colour texture smell privacy interaction wayfinding layout personalisation nature comfort routine confidence

design

To create a housing building which will ensure a living environment that increases the well-being and independency of people with autism.



Hi! My name is Julia.

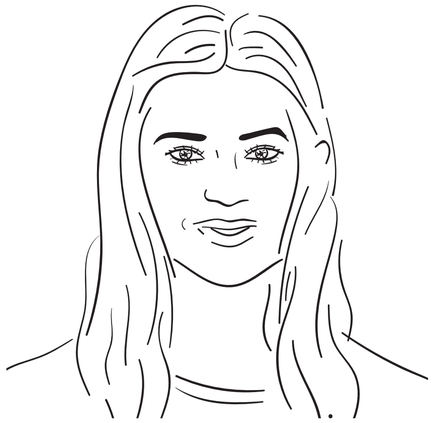
Good afternoon, my name is Nick.

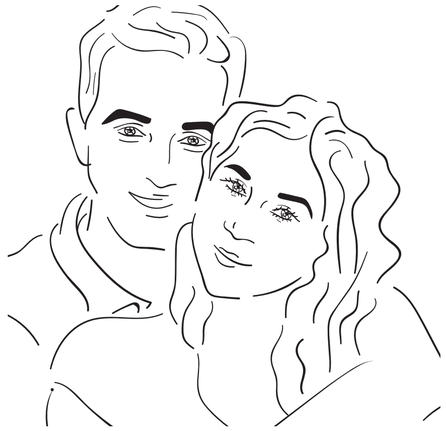
... and I am Lily, hi!

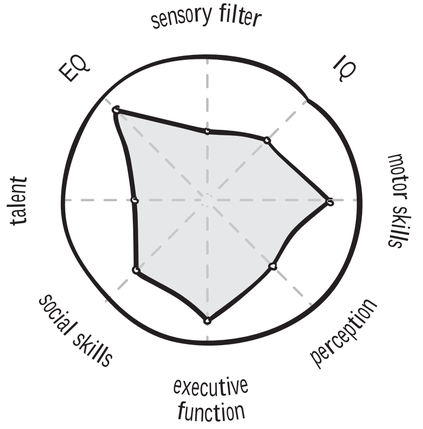
Hey! I am Emma, fun to see you here!

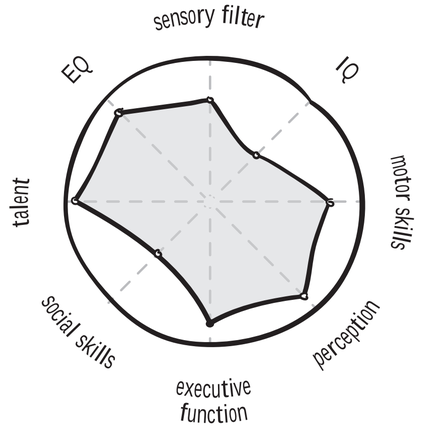
Hello. I am Lucas, nice to meet you.

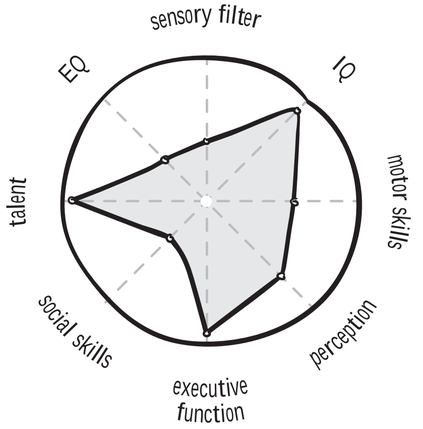
corresponding profiles - the spiderweb returns











guiding themes

- decrease sensory load;
- develop a spatial layout which creates expectations for action ;
- maximise familiarity and clarity ;
- create "islands" of privacy throughout building, apartment, and outdoor area ;
- allow opportunities for social interaction
- ensure accessibility and inclusion in the surrounding neighbourhood ;
- allow for a high level of personalisation to enhance identity ;
- provide control of services like sunshading ;

sound

light

colour

texture

smell

privacy

interaction

wayfinding

layout

personalisation

nature

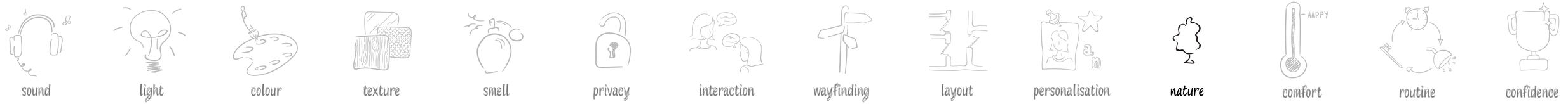
comfort

routine

confidence

guiding themes

- x decrease sensory load;
- x develop a spatial layout which creates expectations for action ;
- x maximise familiarity and clarity ;
- x create "islands" of privacy throughout building, apartment, and outdoor area ;
- x allow opportunities for social interaction
- x ensure accessibility and inclusion in the surrounding neighbourhood ;
- x allow for a high level of personalisation to enhance identity ;
- x provide control of services like sunshading ;
- x architecture should work with nature.

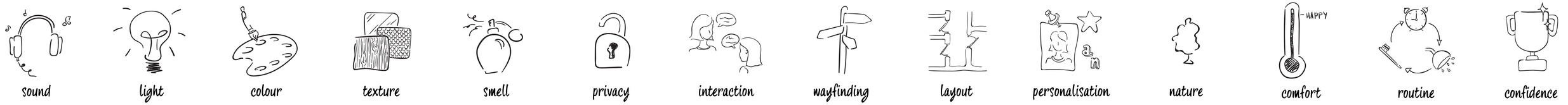


program of requirements

as stated during research

- x 15 - 20 apartment units of different sizes, for different needs
- x ± 60 - 100 m^2 per apartment
- x centrally located common room for meeting and eating

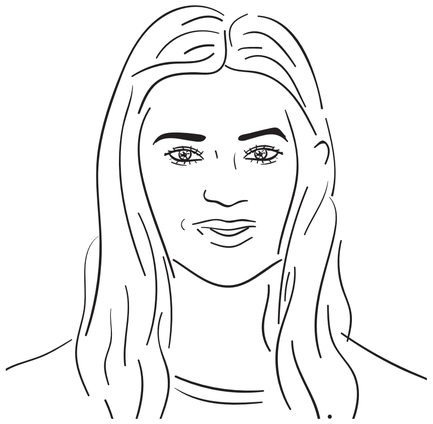
- x create a sensory private garden
- x create a surrounding green area of which the neighbourhood can benefit as well
- x provide flexibile choice in apartment layout
- x to add a public function like a lunch room or coffee bar which will be run by (some of the) residents



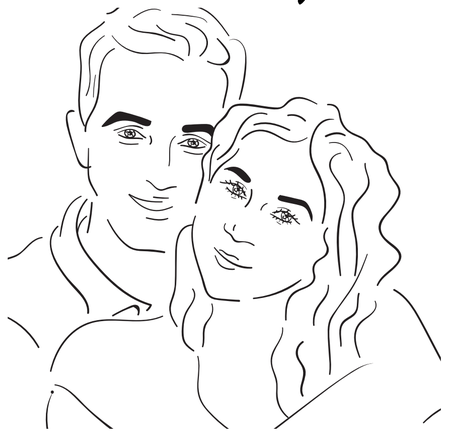
the Dutch little courtyard - 'het hofje'

- x tranquil places located centrally in the city
- x not only the buildings are important, emphasis also lies on the (green) courtyard
- x creates a feeling of privacy in a busy city
- x increases feeling of collectivity and "togetherness"

Julia



Nick and Lily



Emma

Lucas

Let's tell you about the building!

sound

light

colour

texture

smell

privacy

interaction

wayfinding

layout

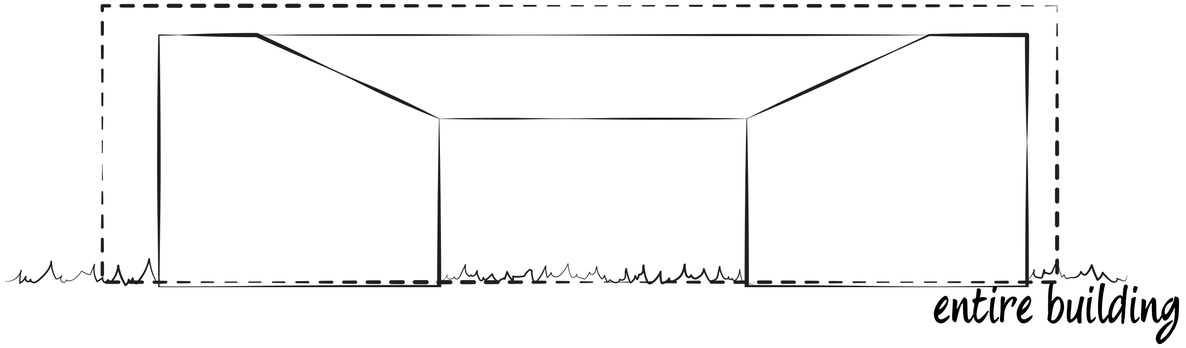
personalisation

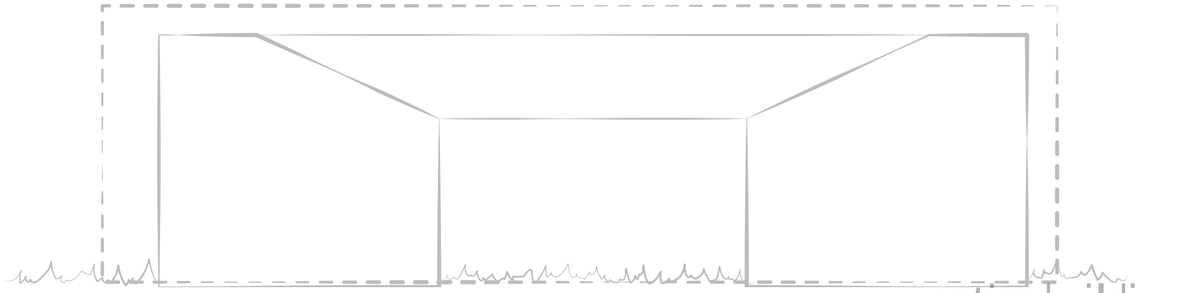
nature

comfort

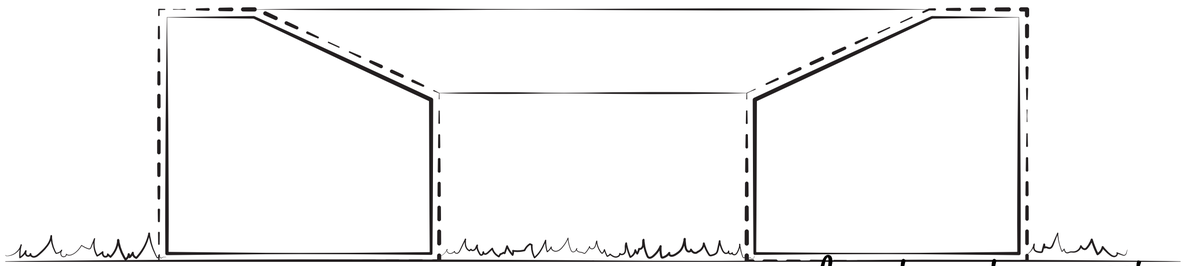
routine

confidence

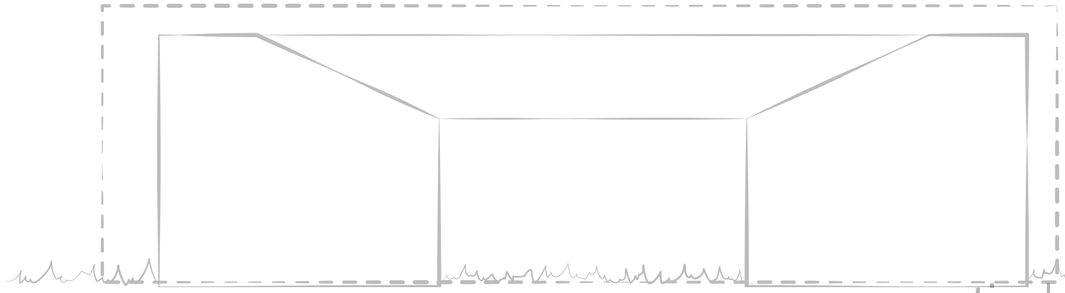

entire building



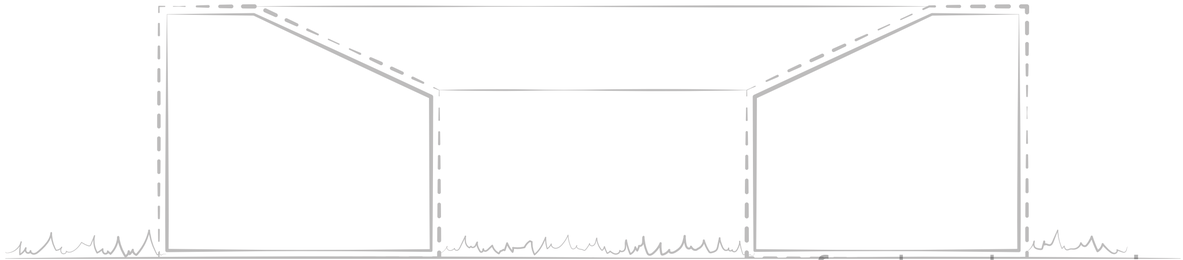
entire building



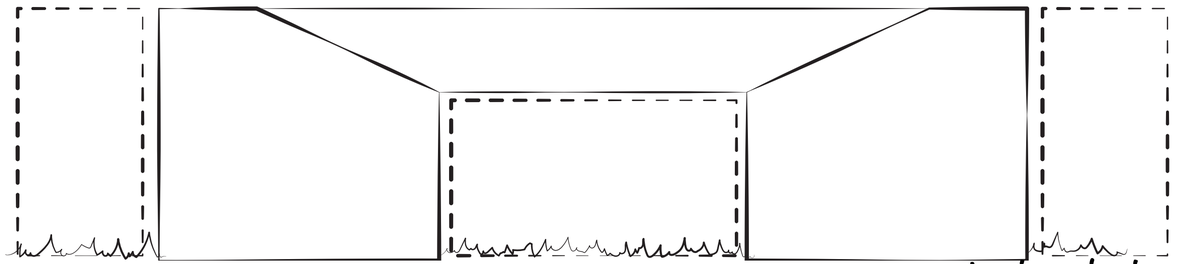
facade and expression



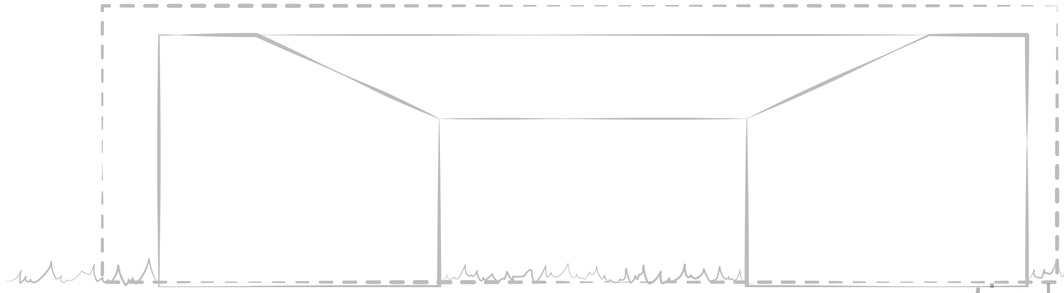
entire building



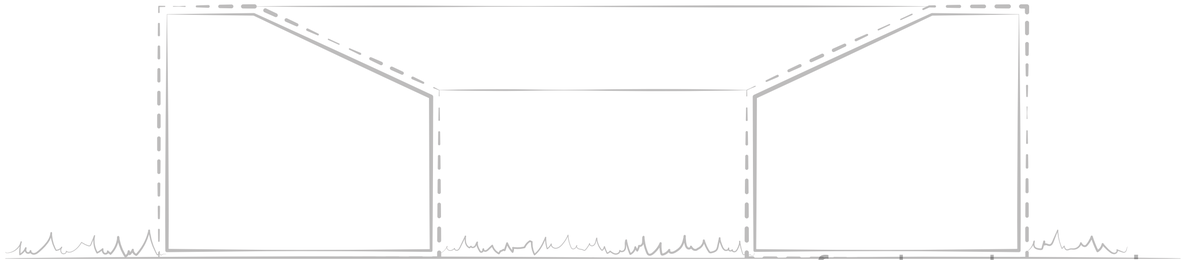
facade and expression



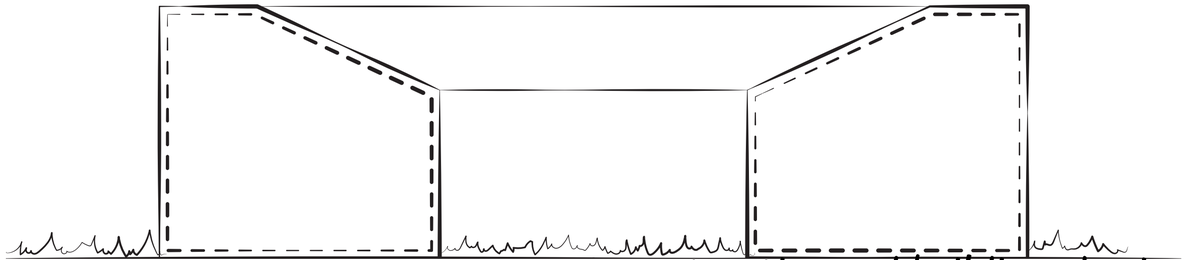
exterior design



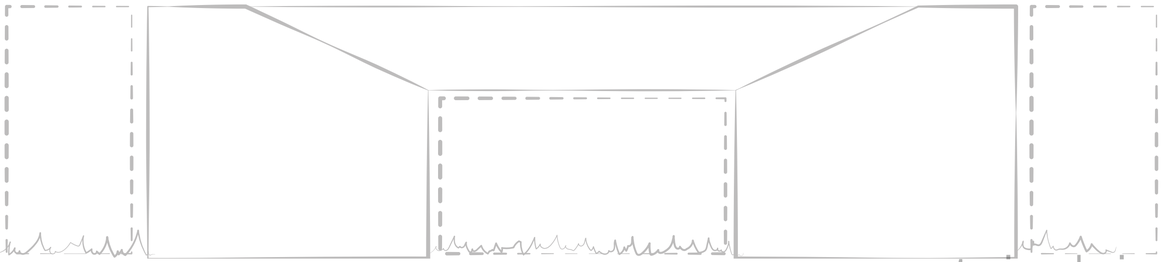
entire building



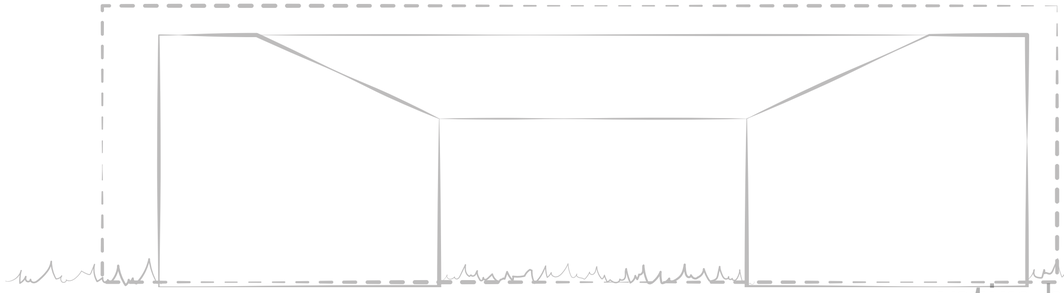
facade and expression



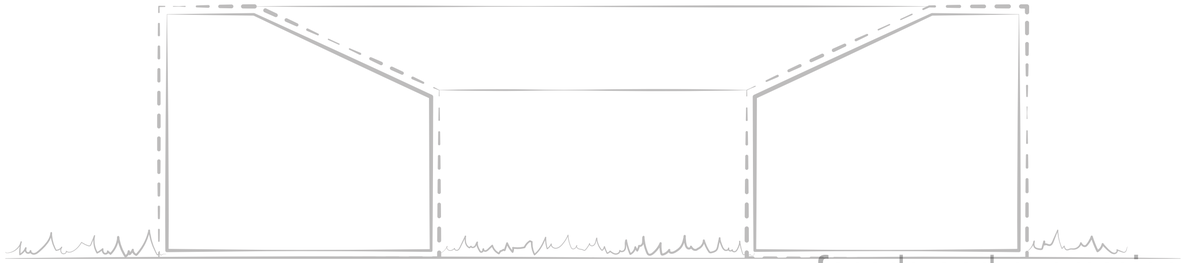
construction and building physics



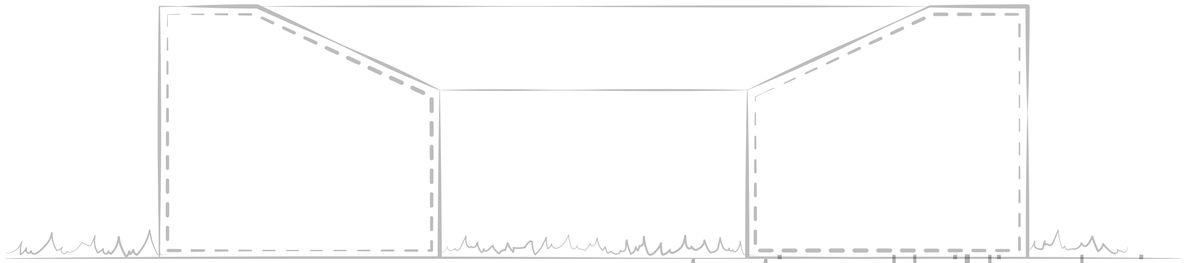
exterior design



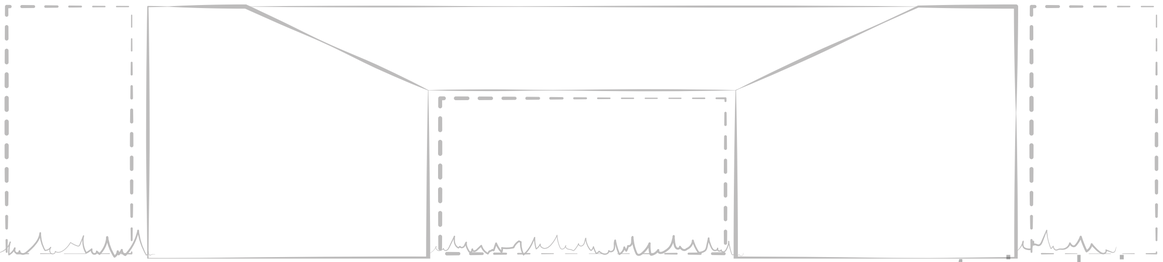
entire building



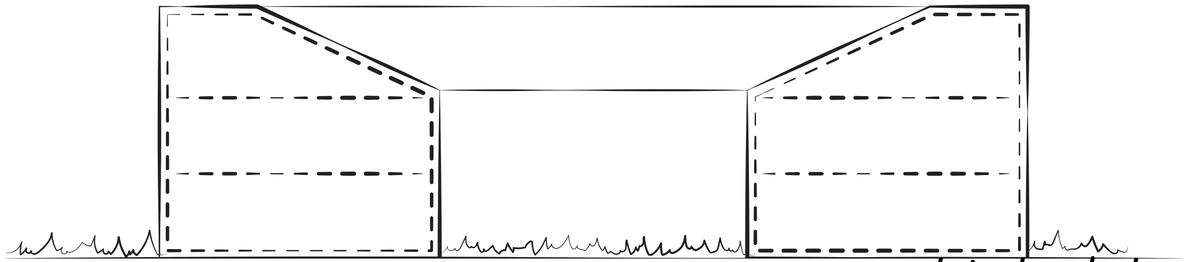
facade and expression



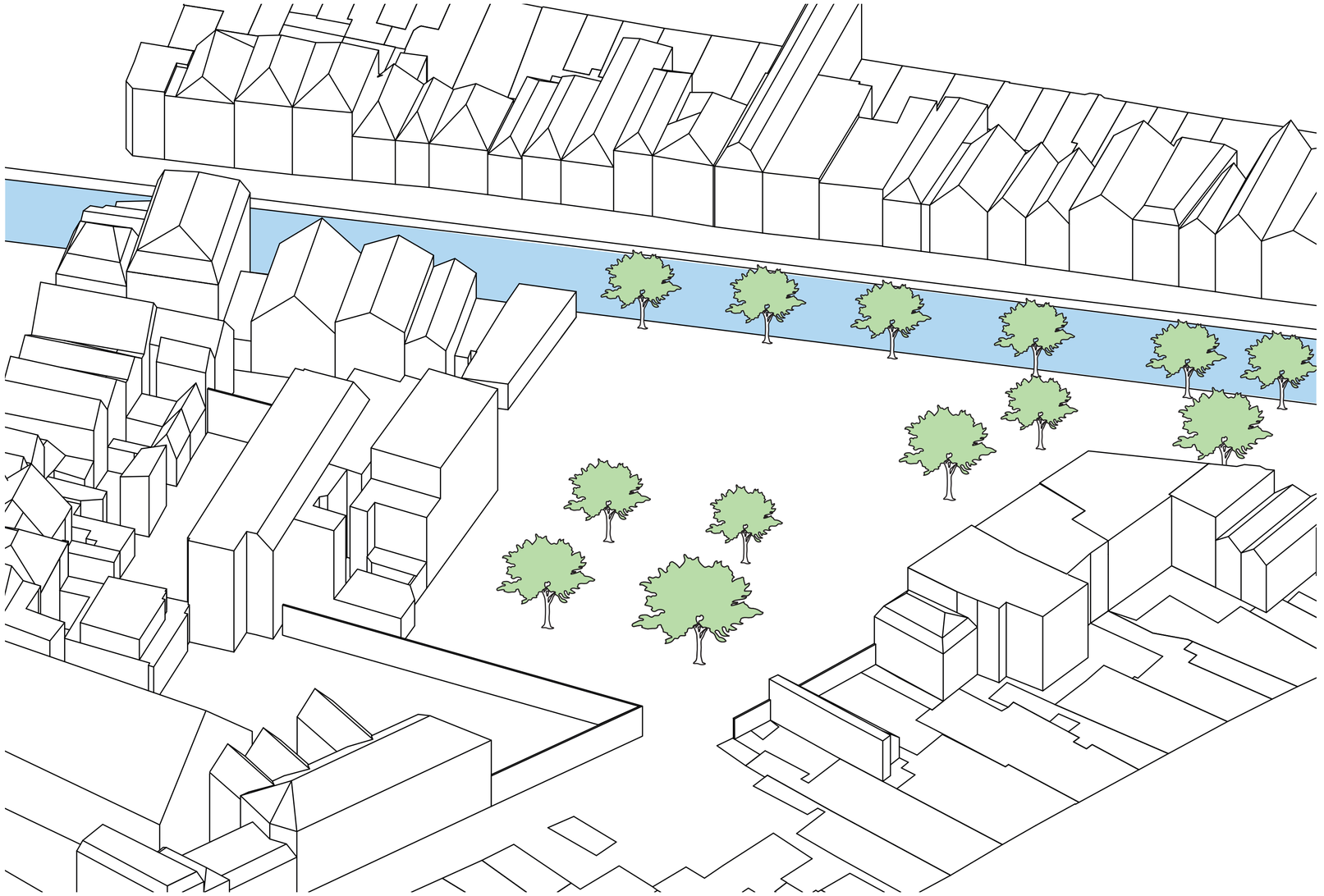
construction and building physics



exterior design



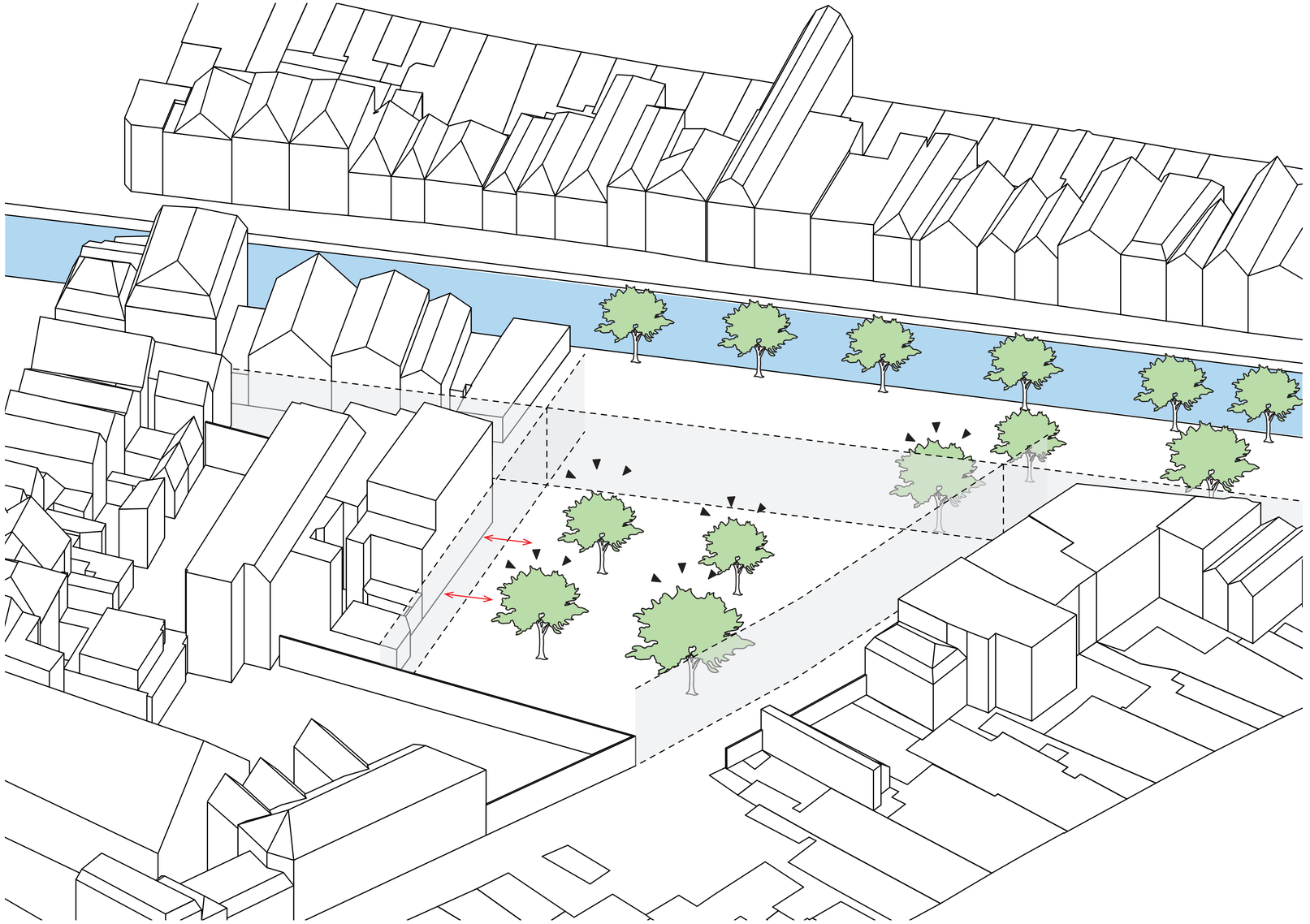
interior design



this is the plot, with contains multiple sycamore trees.

urban fit

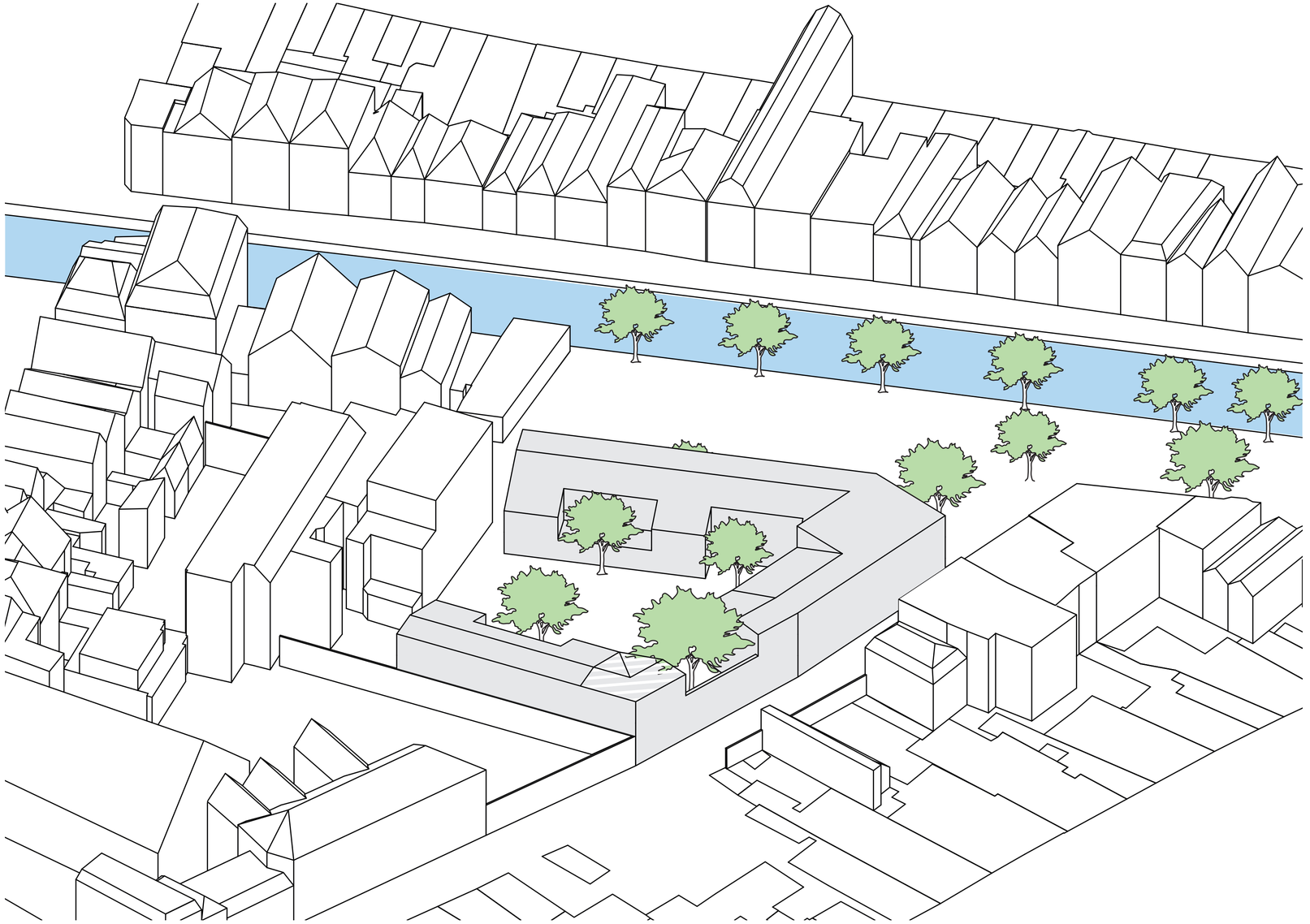
those trees were very important ...



... as well as finishing existing lines ...

... and don't forget the connection with the school building!

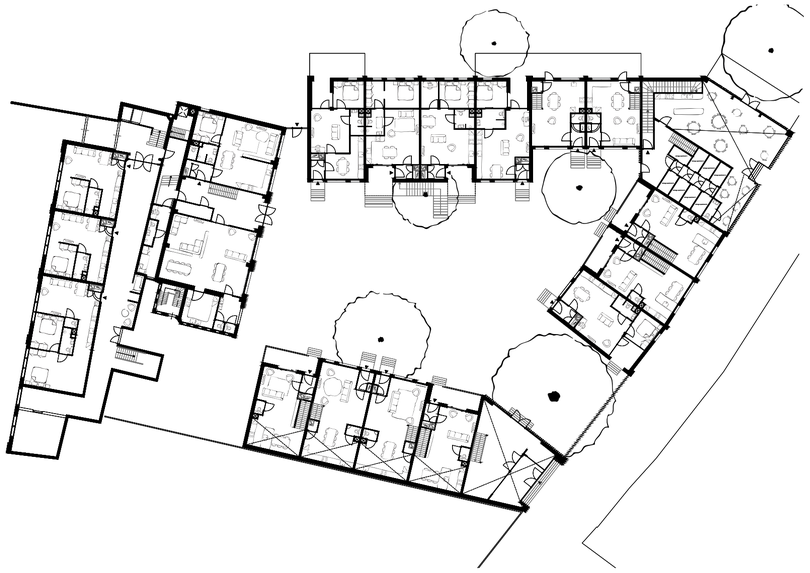
sound | light | colour | texture | smell | **privacy** | **interaction** | wayfinding | layout | personalisation | **nature** | comfort | routine | confidence



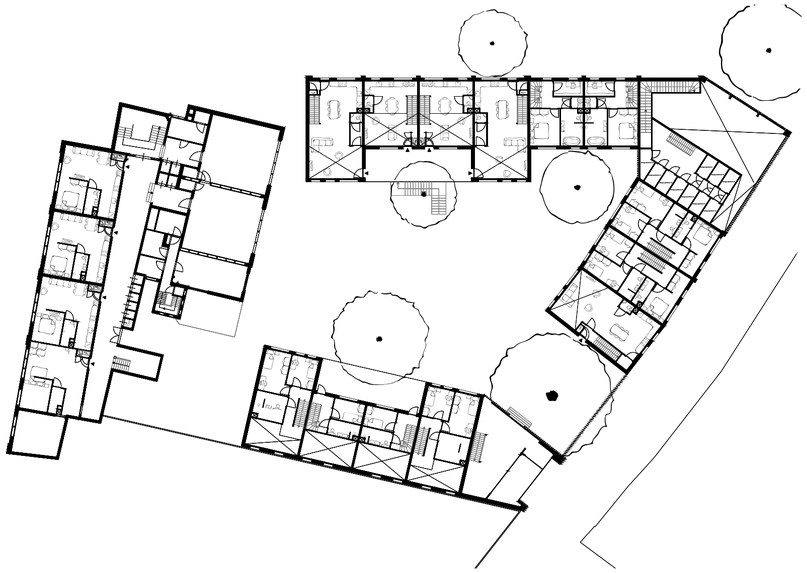
and this is the result!

The building consists of three building layers on the city side, while the courtyard side has only two, so it doesn't seem as intimidating

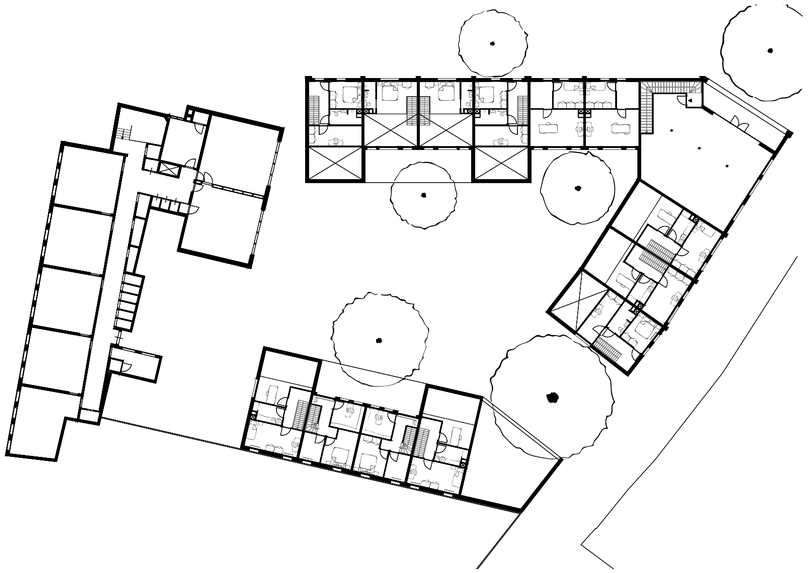
general overview



ground floor



first floor



second floor

sound

light

colour

texture

smell

privacy

interaction

wayfinding

layout

personalisation

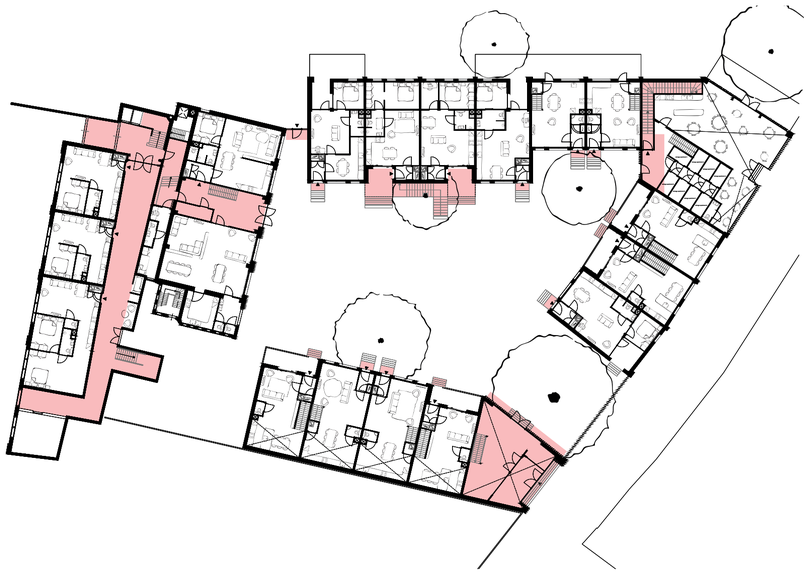
nature

comfort

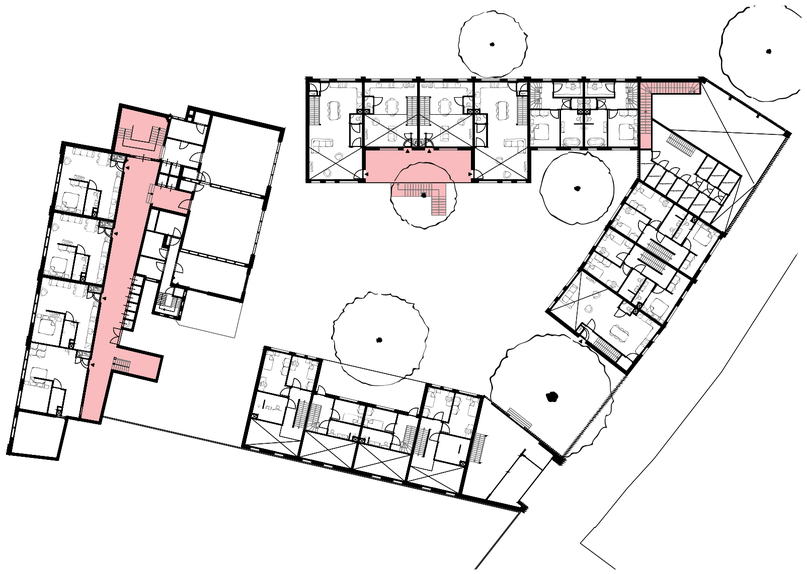
routine

confidence

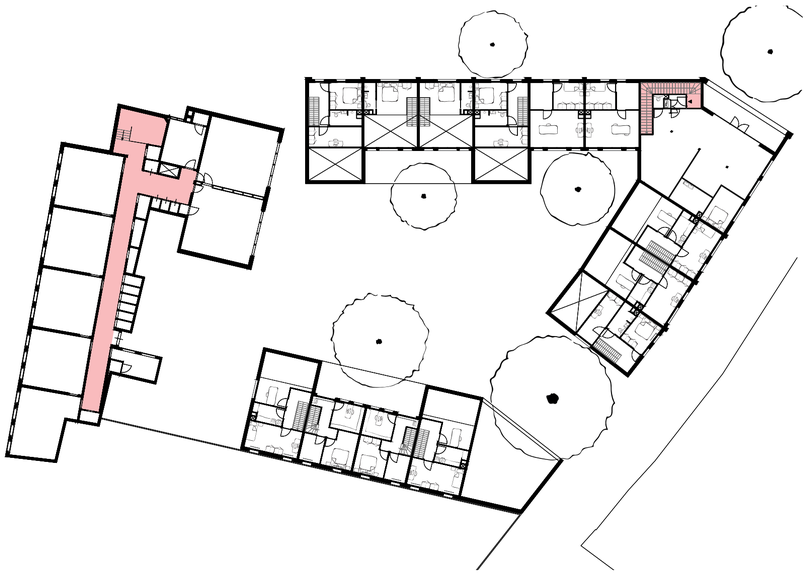
circulation overview



ground floor



first floor



second floor

sound light colour texture smell **privacy** interaction **wayfinding** layout personalisation nature comfort routine confidence

function overview

and purple indicates the common areas!

yellow = 1 bedroom apartments
orange = 2+ bedroom apartments

ground floor

first floor

second floor

sound light colour texture smell privacy **interaction** wayfinding **layout** **personalisation** nature comfort routine confidence

dwelling types overview

we can really personalise our floorplans!

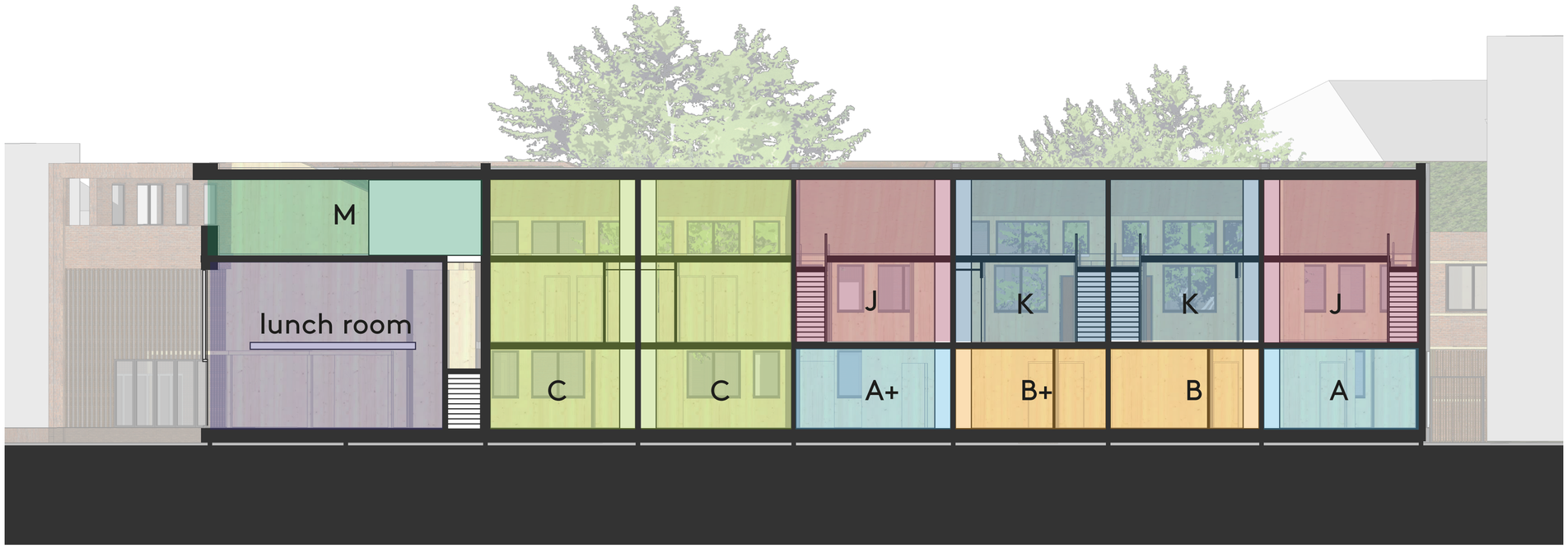
ground floor

first floor

second floor

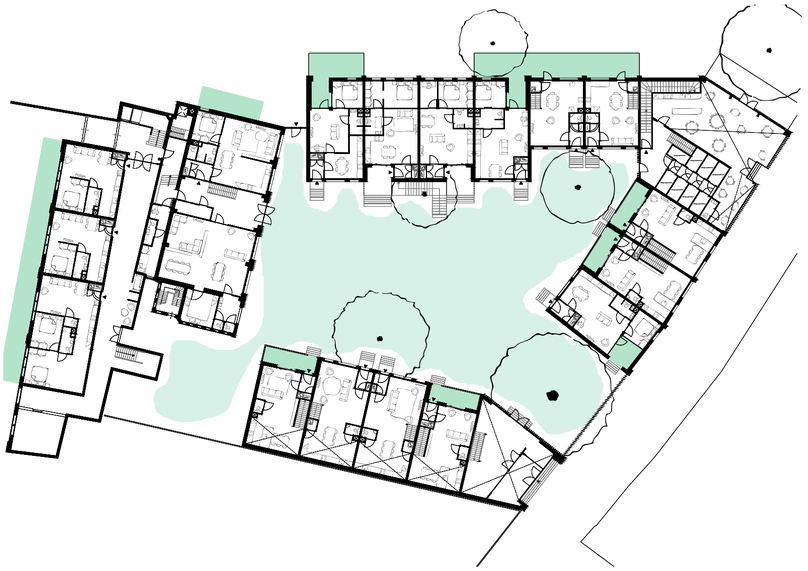
sound light colour texture smell **privacy** interaction wayfinding **layout** **personalisation** **nature** **comfort** **routine** confidence

dwelling types overview

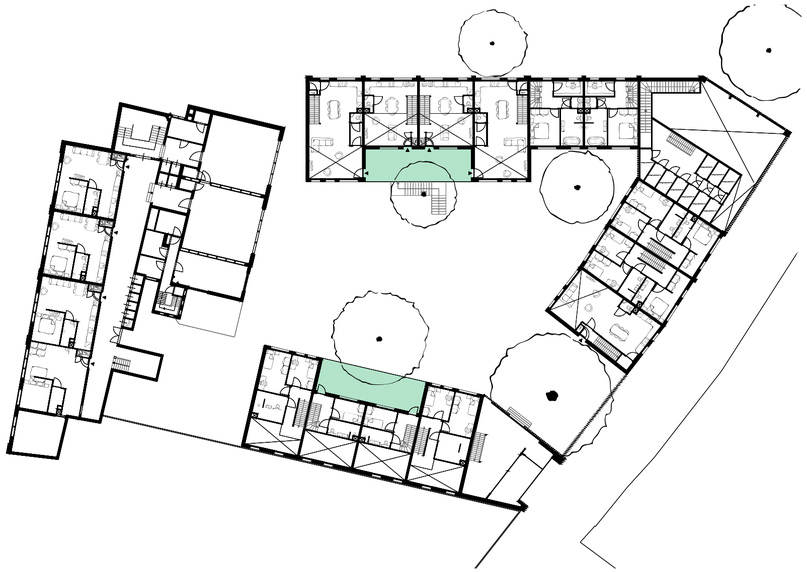


sound light colour texture smell privacy interaction wayfinding layout personalisation nature comfort routine confidence

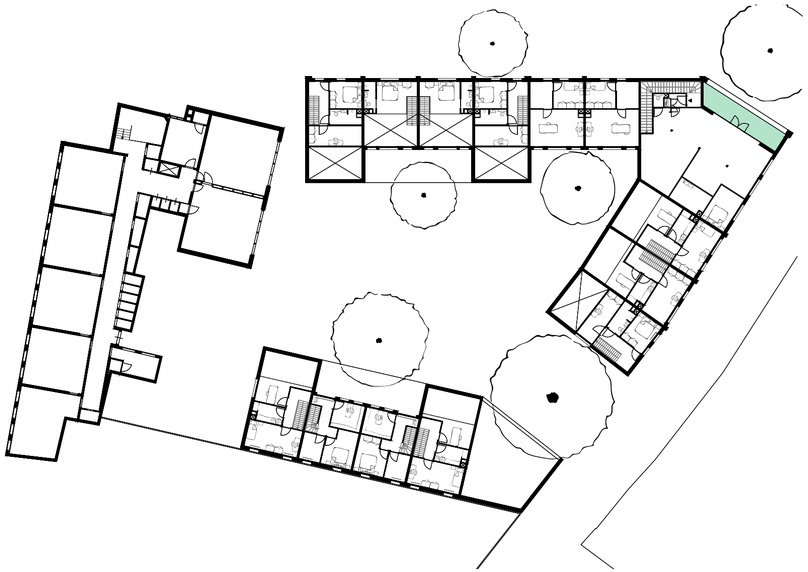
exterior overview



ground floor



first floor



second floor

sound light colour texture smell **privacy** **interaction** wayfinding layout personalisation **nature** comfort routine confidence

I'm going to tell some more about the facade and building's expression

context

sound light colour texture smell privacy interaction wayfinding layout personalisation nature comfort routine confidence

context

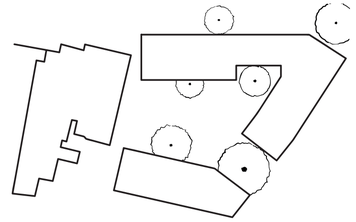
the building has facades facing the city, as well as facing the courtyard

each of these facades have their own expression

sound light colour texture smell privacy interaction wayfinding layout personalisation nature comfort routine confidence

north facade

this is one of the facades facing the city

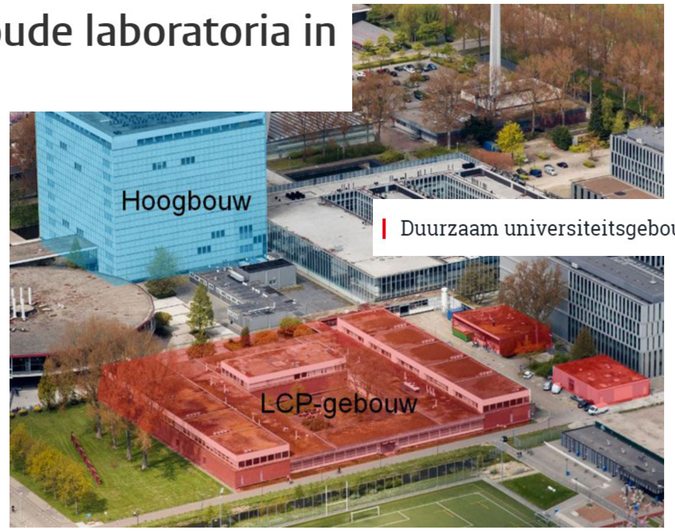


sound | light | colour | texture | smell | privacy | interaction | wayfinding | layout | personalisation | nature | comfort | routine | confidence

north facade

sound light colour texture smell privacy interaction wayfinding layout personalisation nature comfort routine confidence

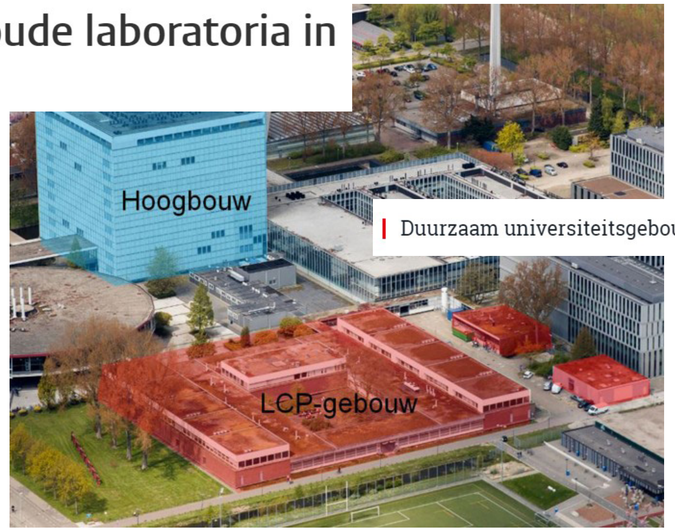
Duurzame sloop oude laboratoria in beeld



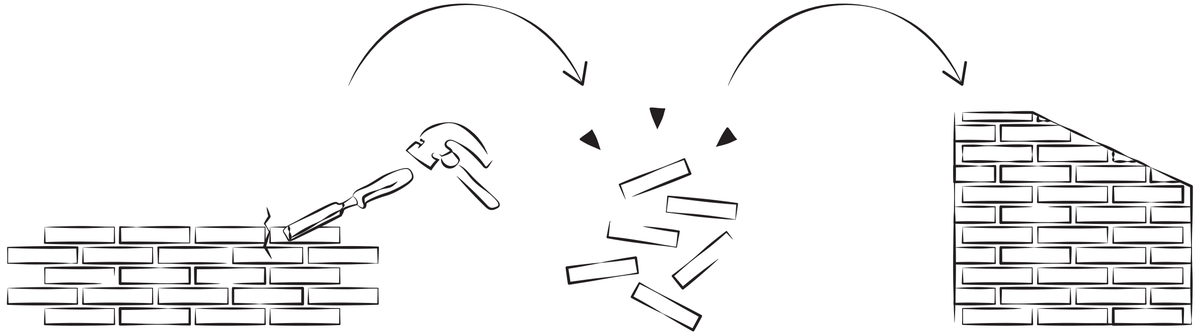
Duurzaam universiteitsgebouwen slopen

north facade

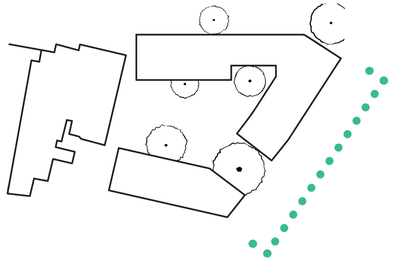
Duurzame sloop oude laboratoria in beeld



Duurzaam universiteitsgebouwen slopen

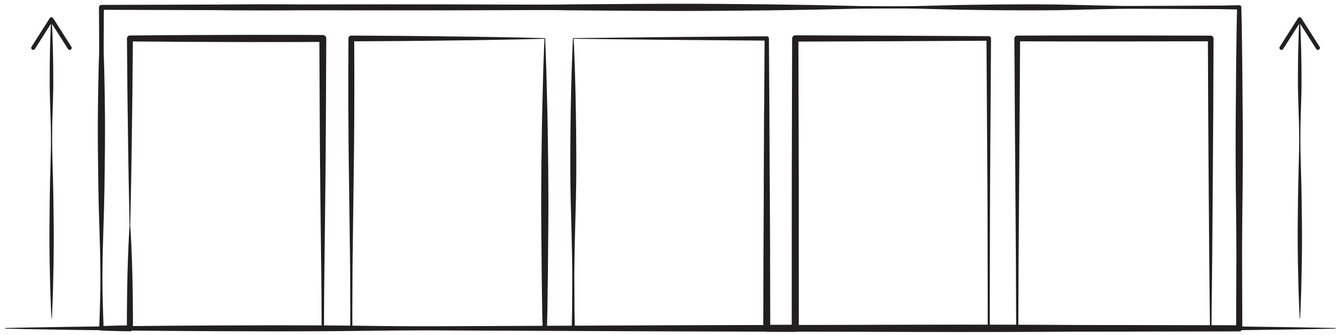


east facade



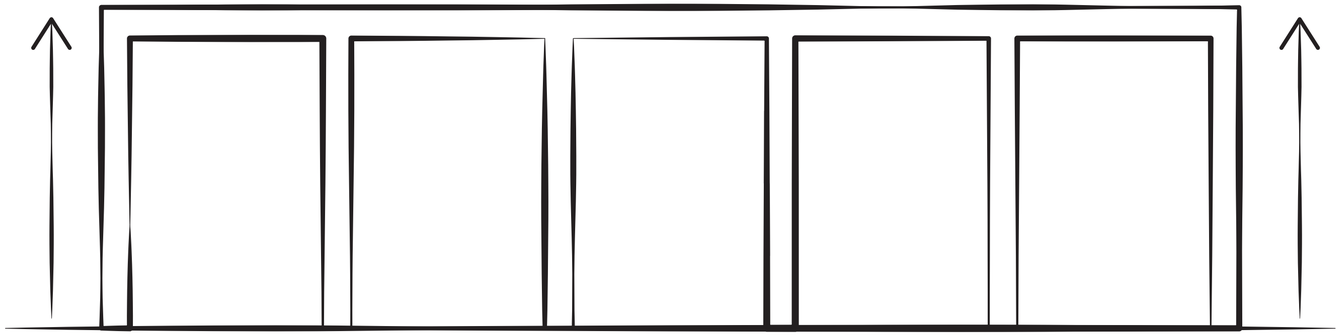
sound light colour texture smell privacy interaction wayfinding layout personalisation nature comfort routine confidence

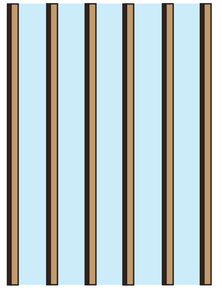
east facade

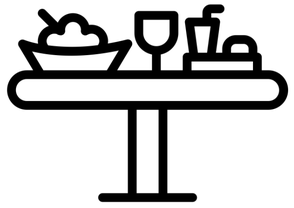


sound light colour texture smell privacy interaction wayfinding layout personalisation nature comfort routine confidence

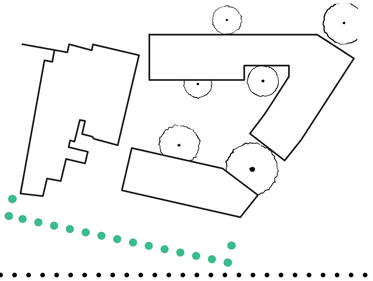
east facade





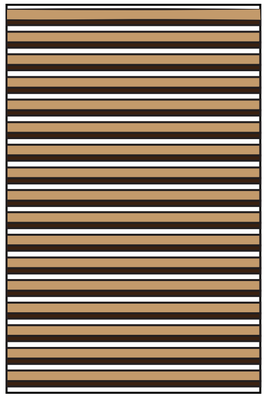


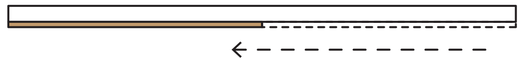
south facade

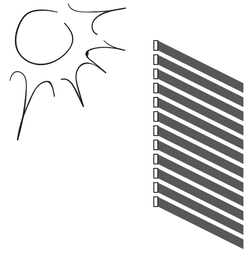


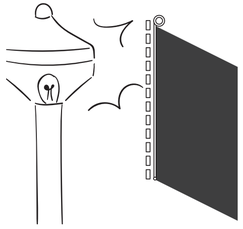
sound | **light** | colour | texture | smell | privacy | interaction | wayfinding | layout | **personalisation** | nature | comfort | routine | confidence

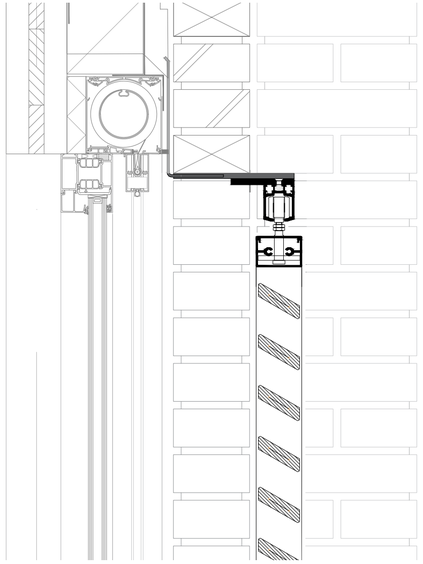
south facade

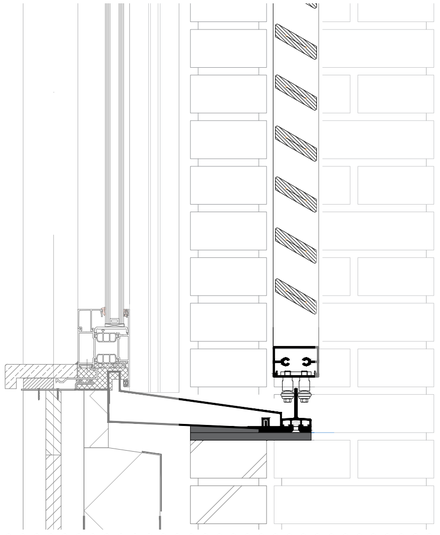


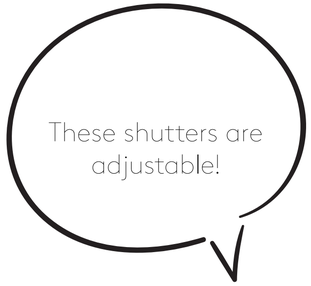




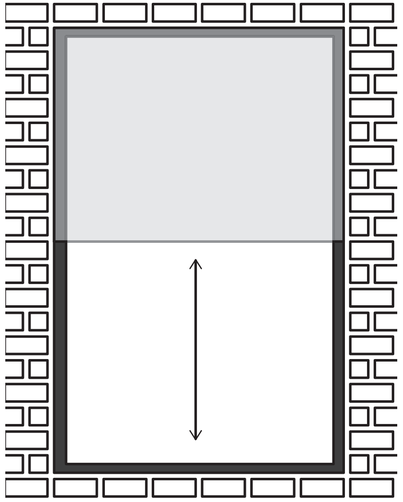


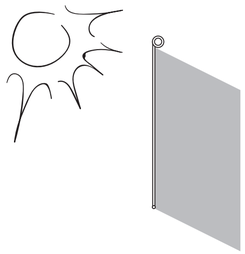


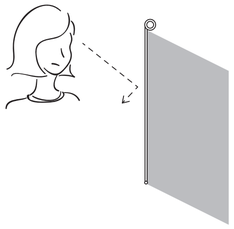


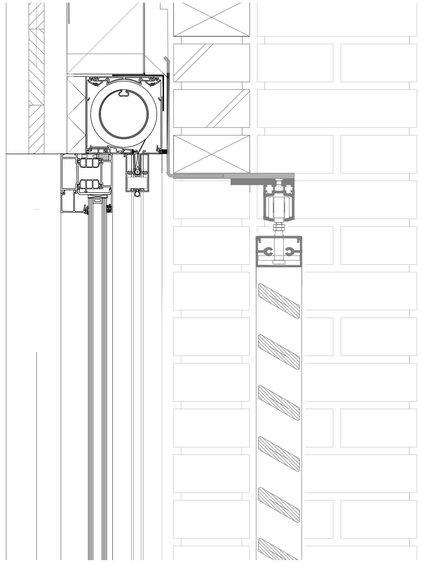


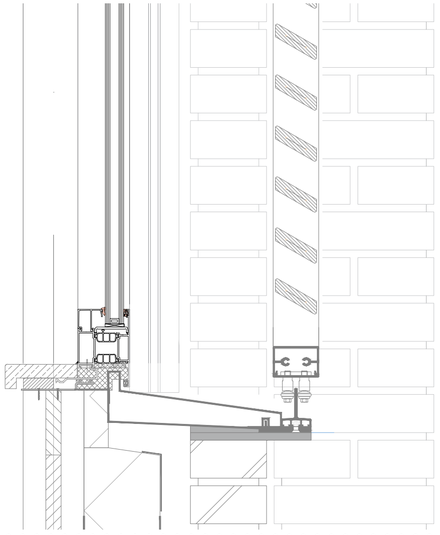
south facade



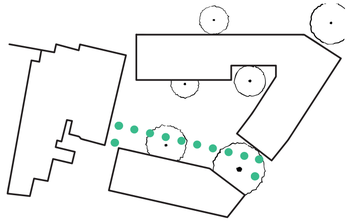








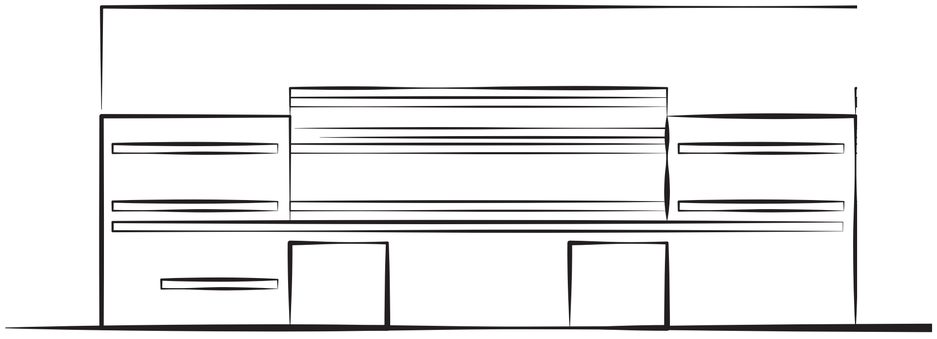
north facade courtyard



sound light colour texture smell privacy interaction wayfinding layout personalisation nature comfort routine confidence

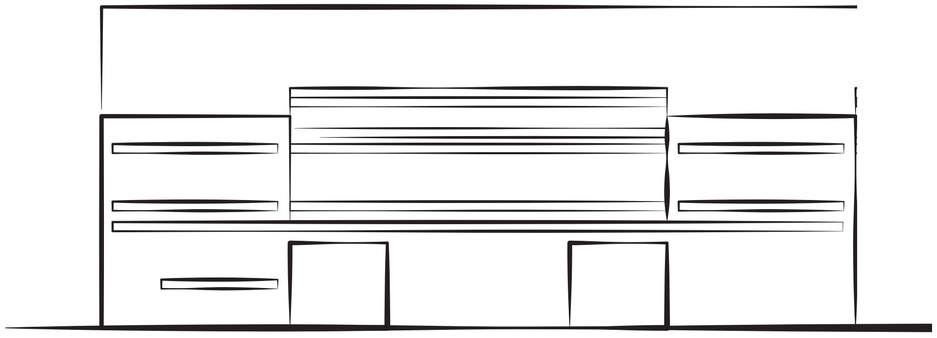
north facade courtyard

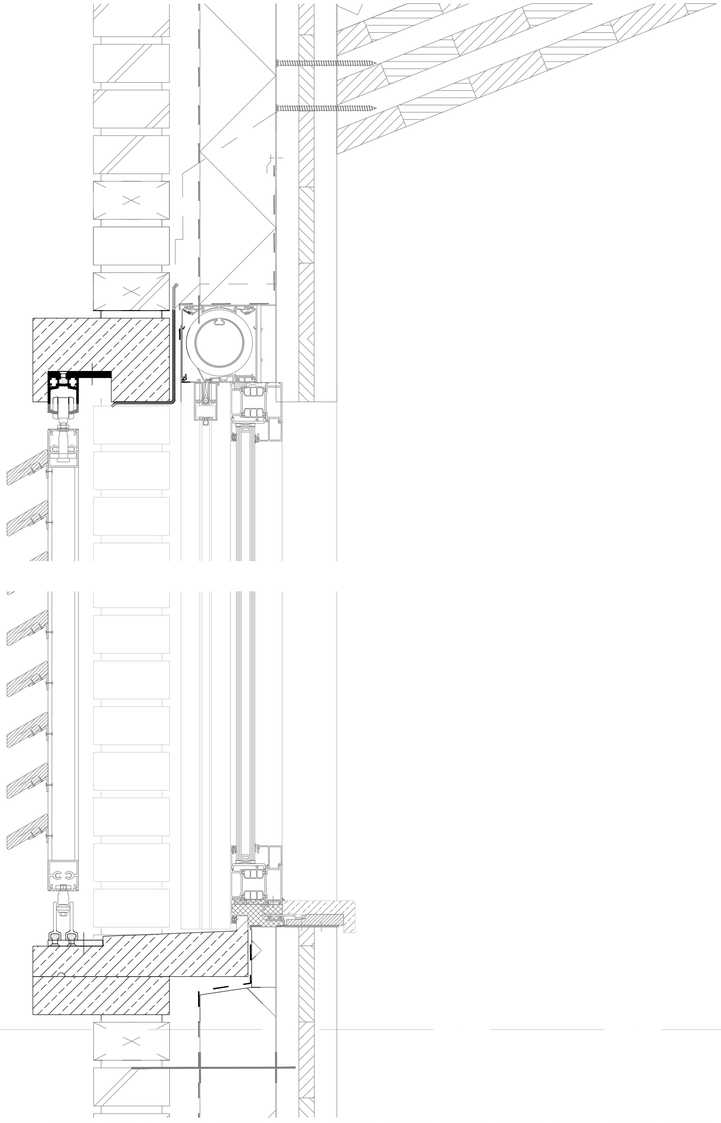
the building mimics the horizontal bands that show in the school's fcadde



sound light colour texture smell privacy interaction wayfinding layout personalisation nature comfort routine confidence

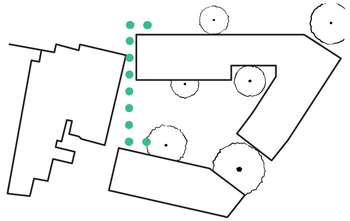
north facade courtyard





sound light colour texture smell privacy interaction wayfinding layout personalisation nature comfort routine confidence

south-west facade courtyard



sound

light

colour

texture

smell

privacy

interaction

wayfinding

layout

personalisation

nature

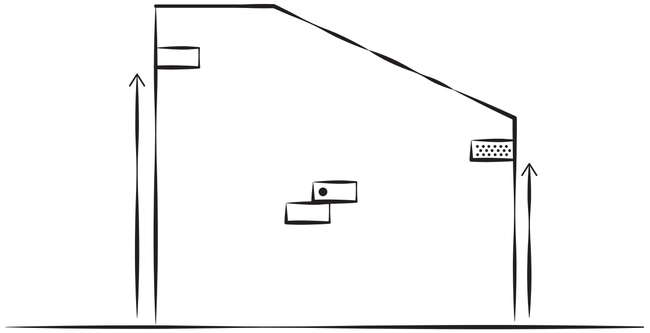
comfort

routine

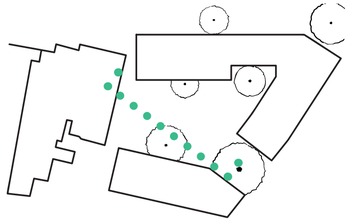
confidence

south-west facade courtyard

special bricks for some happy little birds, bees, and butterflies

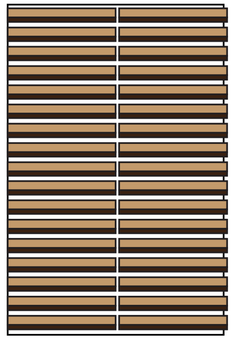


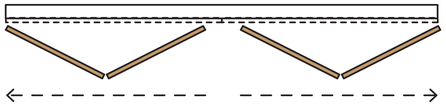
north facade courtyard

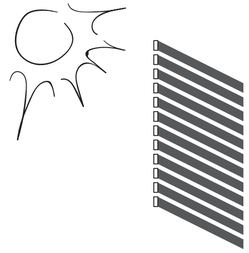


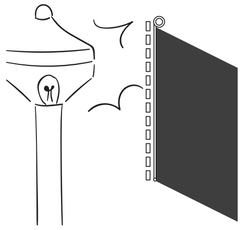
sound light colour texture smell privacy interaction wayfinding layout personalisation nature comfort routine confidence

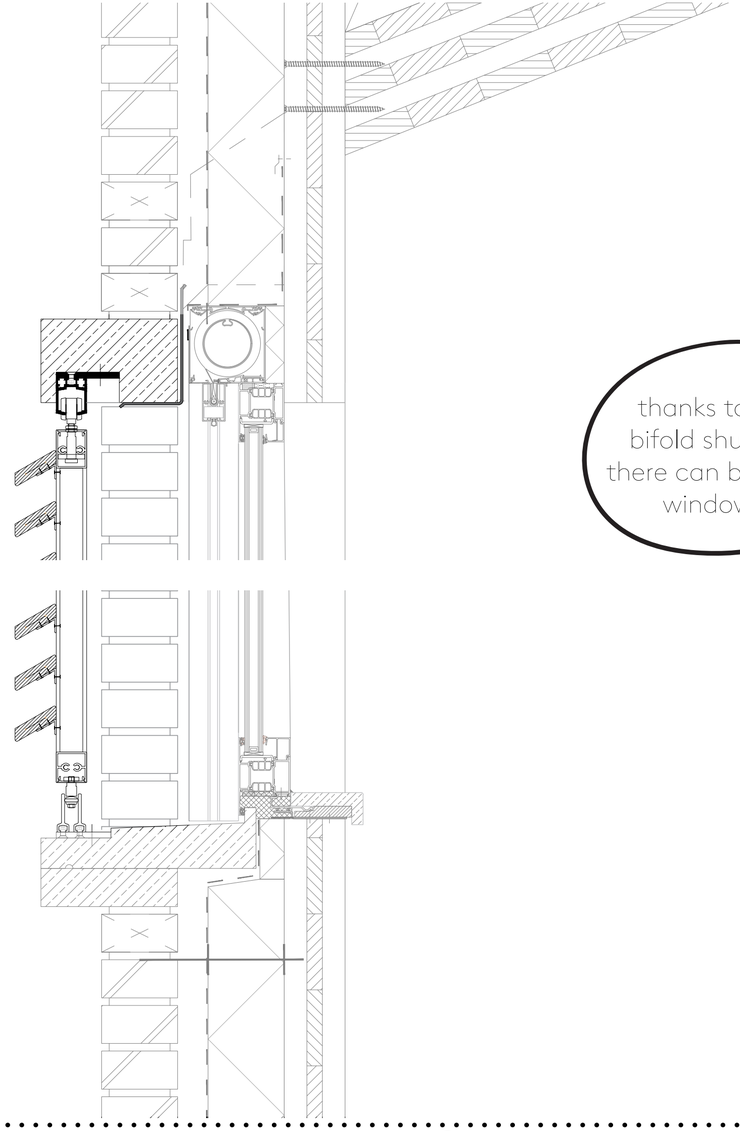
north facade courtyard









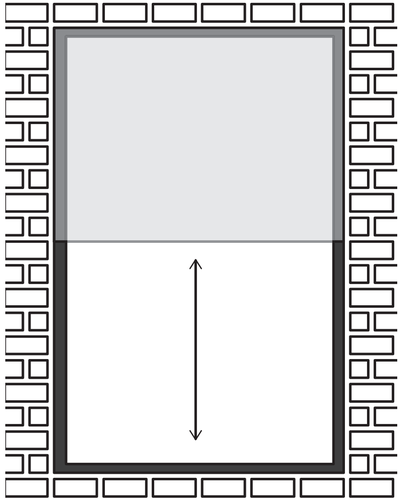


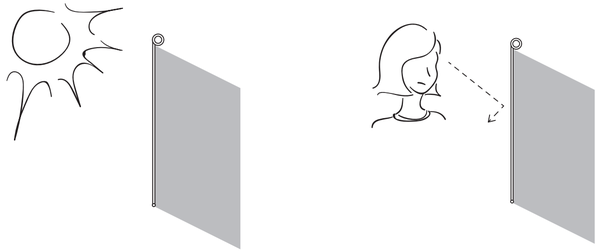
thanks to the bifold shutters, there can be more windows!

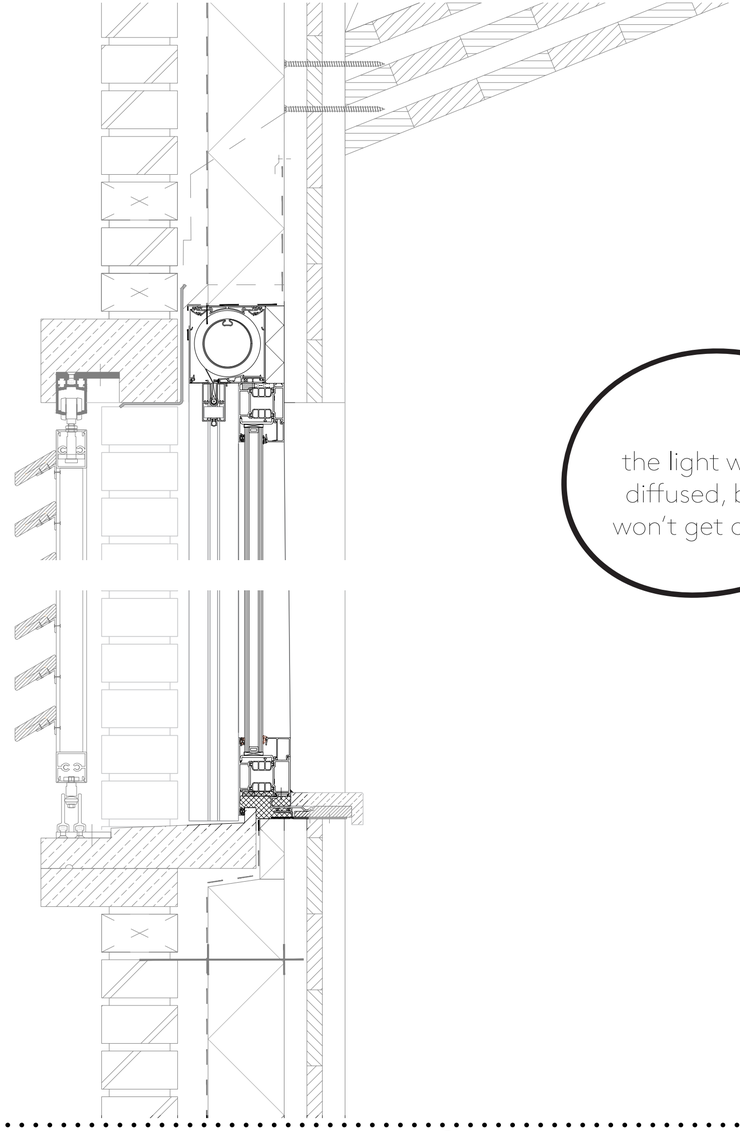
sound | **light** | colour | texture | smell | **privacy** | **interaction** | wayfinding | layout | **personalisation** | nature | **comfort** | routine | confidence

north facade courtyard

if the sun is too bright, we can just roll the screen down!







the light will be diffused, but it won't get darker.

sound | **light** | colour | texture | smell | **privacy** | interaction | wayfinding | layout | **personalisation** | nature | **comfort** | routine | confidence

We would like to tell you about the exterior design!

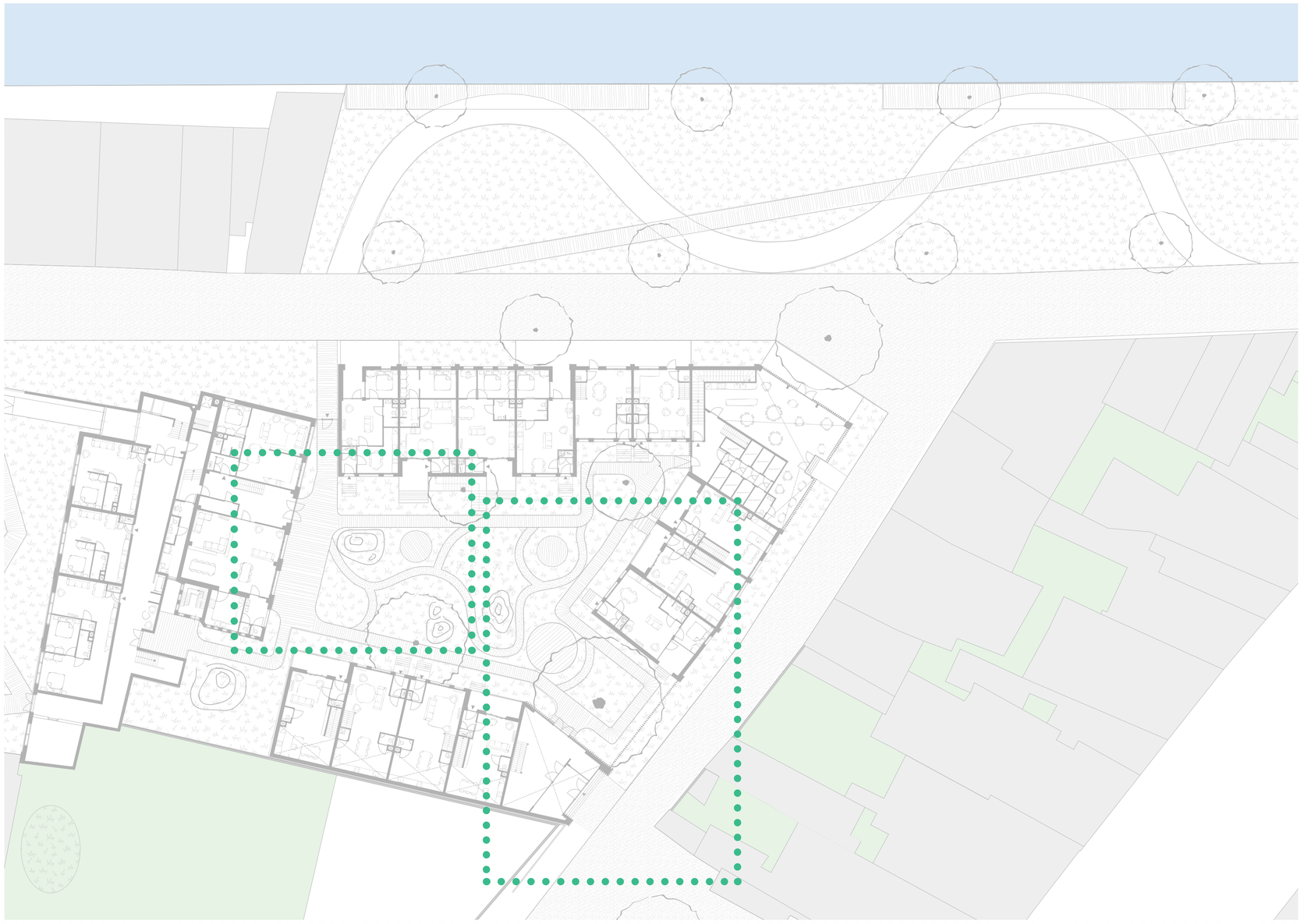
exterior design

Laura has added a small park at the riverfront ...

... and a sensory garden in the courtyard!

sound | light | colour | texture | smell | privacy | interaction | wayfinding | layout | personalisation | nature | comfort | routine | confidence

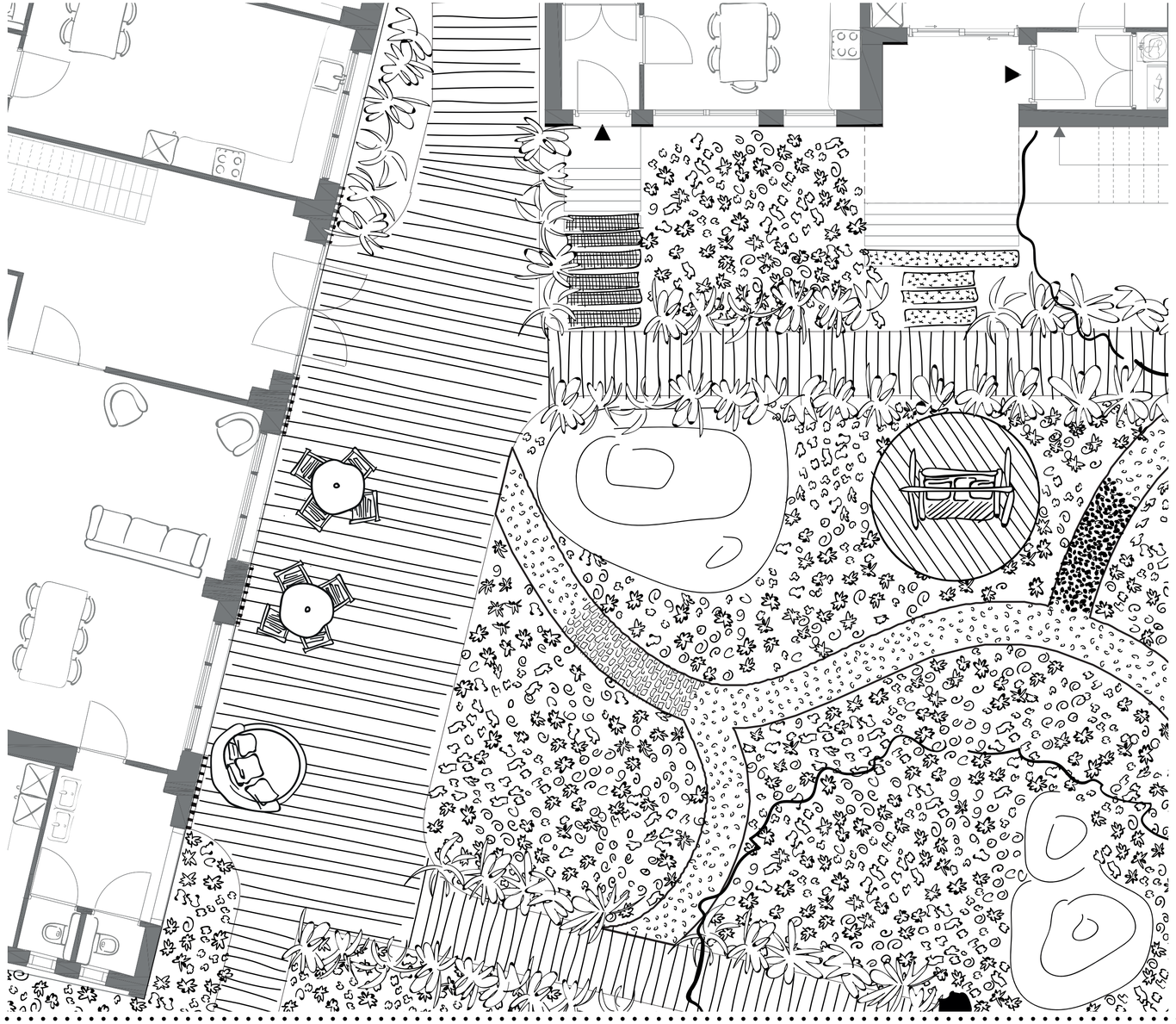
exterior design



Let's tell you more about these sections.

sound · light · colour · texture · smell · privacy · interaction · wayfinding · layout · personalisation · nature · comfort · routine · confidence

exterior design

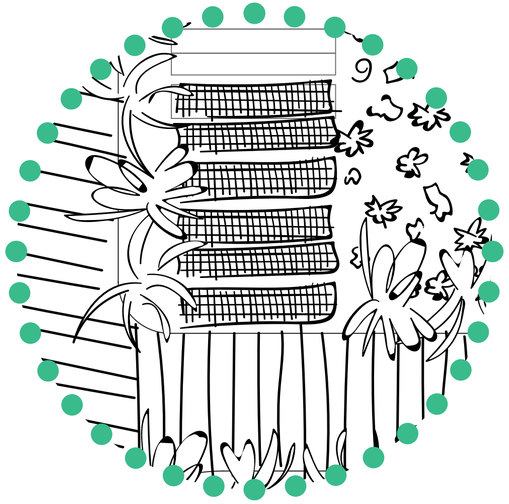


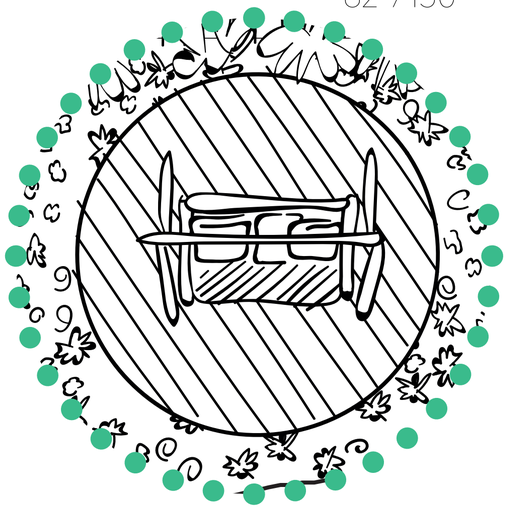
There are several places to sit and chat ...

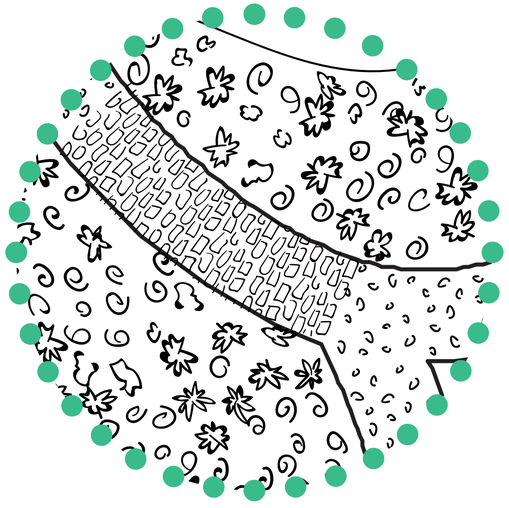
... and passersby can enjoy it as well, since the courtyard is open during the daytime!

sound | light | colour | texture | smell | privacy | interaction | wayfinding | layout | personalisation | nature | comfort | routine | confidence

exterior design





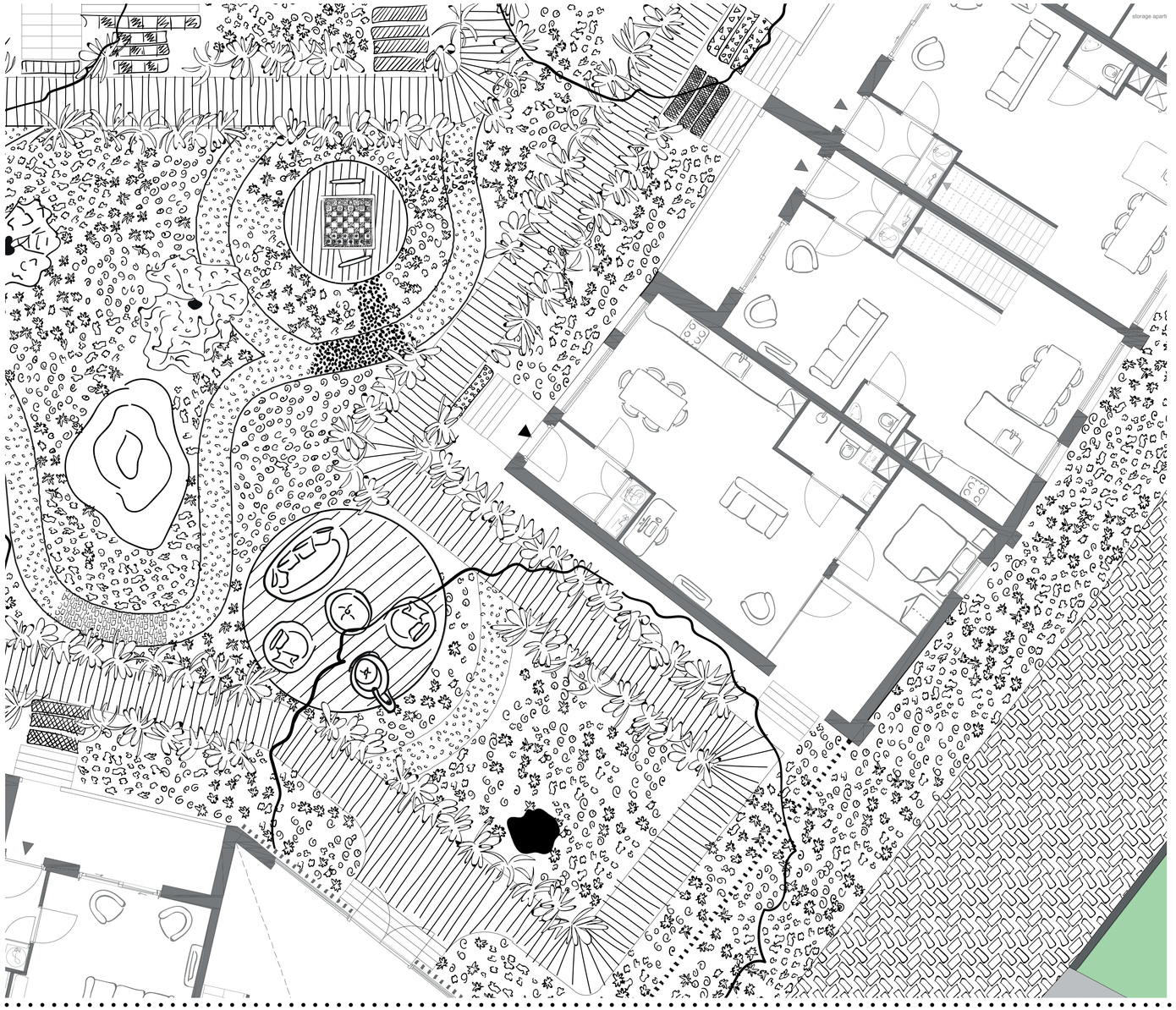


and the textural paths are really nice to walk on! Plus the planted herbs inbetween give off their scent.

personalised stepping stones enhance the personality of our dwellings!

sound | light | colour | **texture** | smell | privacy | **interaction** | wayfinding | layout | personalisation | **nature** | comfort | routine | confidence

exterior design



sound

light

colour

texture

smell

privacy

interaction

wayfinding

layout

personalisation

nature

HAPPY

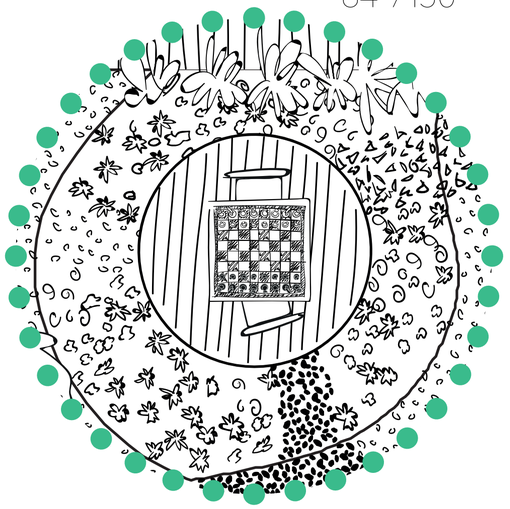
comfort

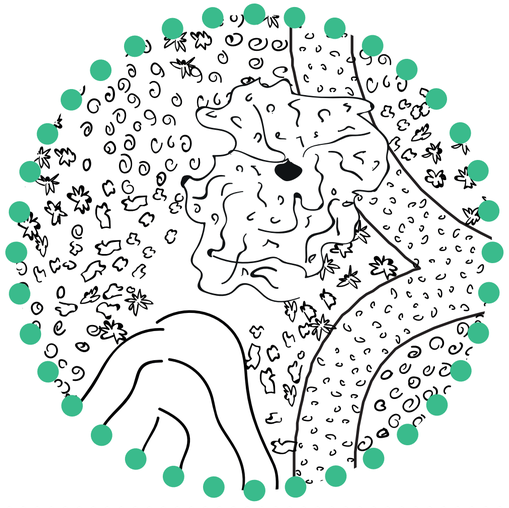
routine

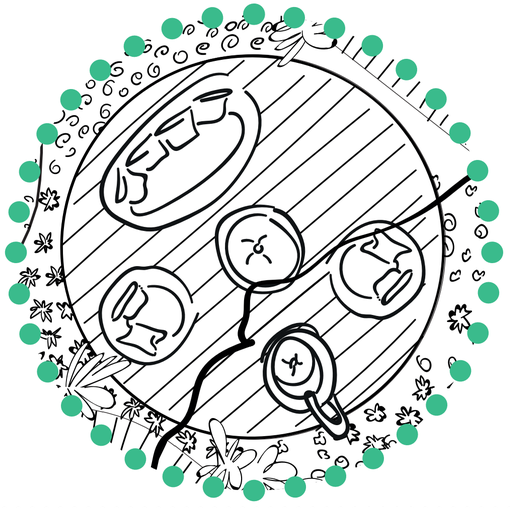
confidence

exterior design

small hills with overhanging trees add to private places







sound · light · colour · texture · smell · **privacy** · **interaction** · wayfinding · layout · personalisation · **nature** · **comfort** · routine · confidence

sound light colour texture smell privacy interaction wayfinding layout personalisation nature comfort routine confidence

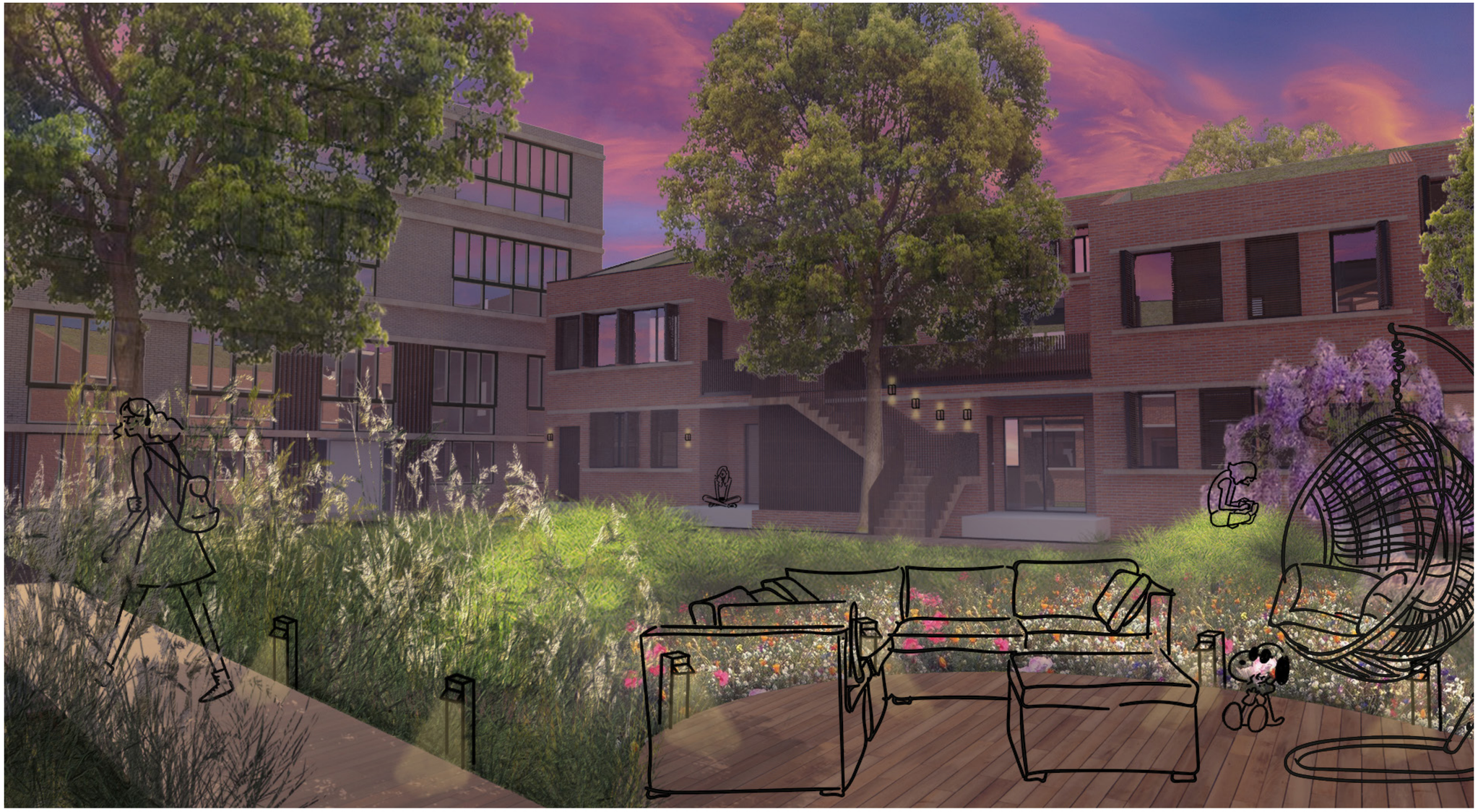
exterior design

and the herb garden can be used for the common room

Fragrant plants like lilies and freesia's give off their scents.

sound · light · colour · texture · smell · privacy · interaction · wayfinding · layout · personalisation · nature · comfort · routine · confidence

exterior design



sound

light

colour

texture

smell

privacy

interaction

wayfinding

layout

personalisation

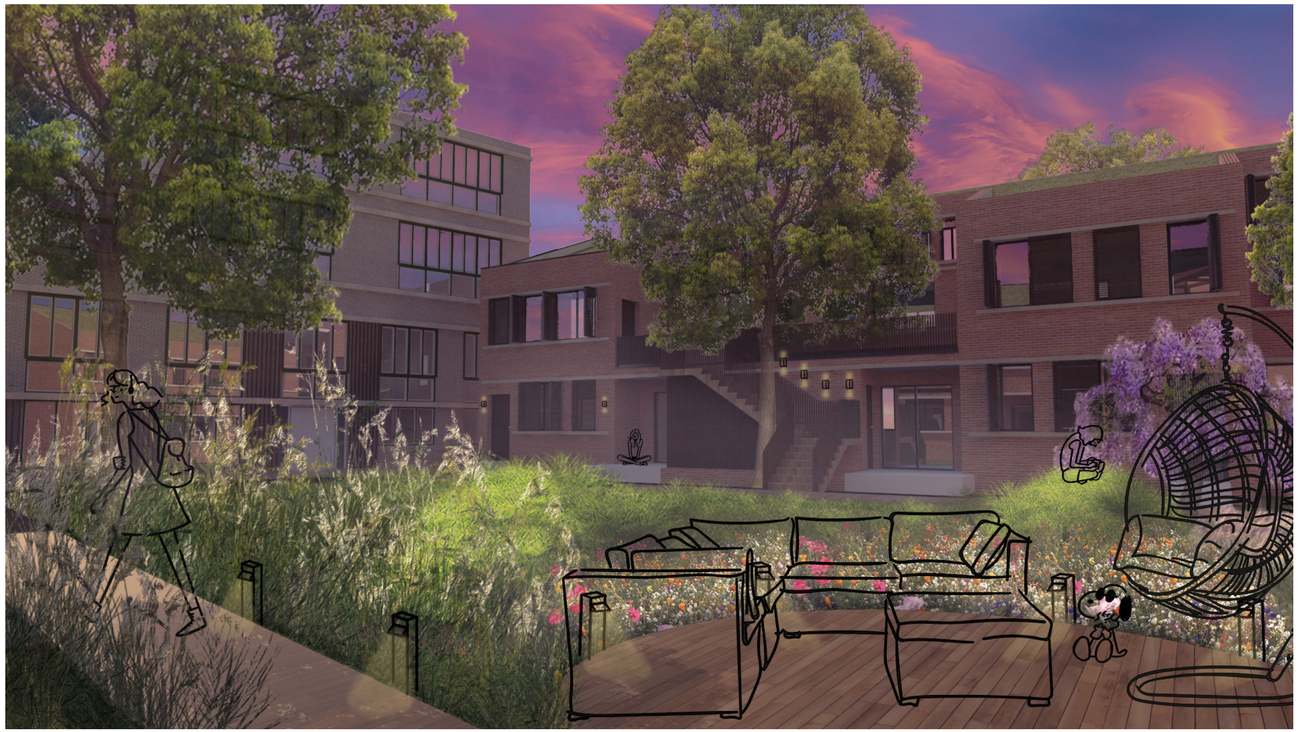
nature

comfort

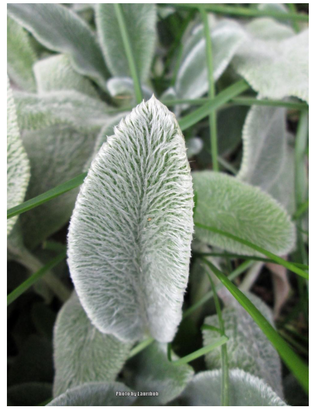
routine

confidence

exterior design



a wisteria tree is very colourful, fragrant and has cascading petals



the leaves of lambs ear are very soft ...

... while succulents are smooth to the touch.

sound

light

colour

texture

smell

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interaction

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comfort

routine

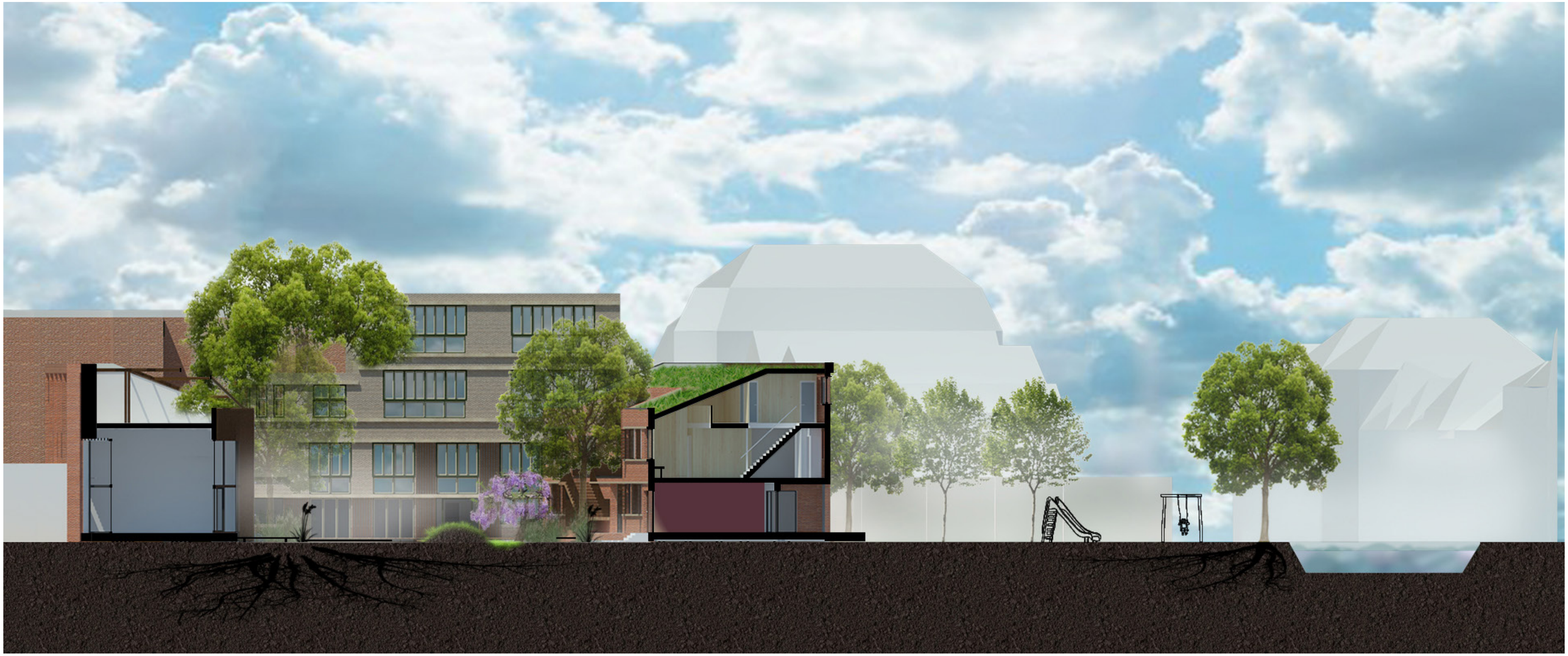
confidence

sound light colour texture smell privacy interaction wayfinding layout personalisation nature comfort routine confidence

exterior design

a playground will be added ...

... as well as urban seating to enjoy the weather and each other!



sound

light

colour

texture

smell

privacy

interaction

wayfinding

layout

personalisation

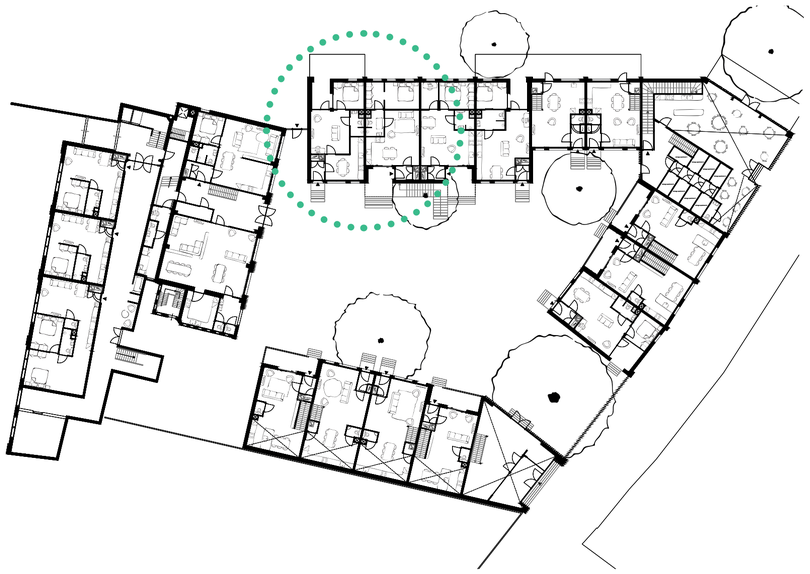
nature

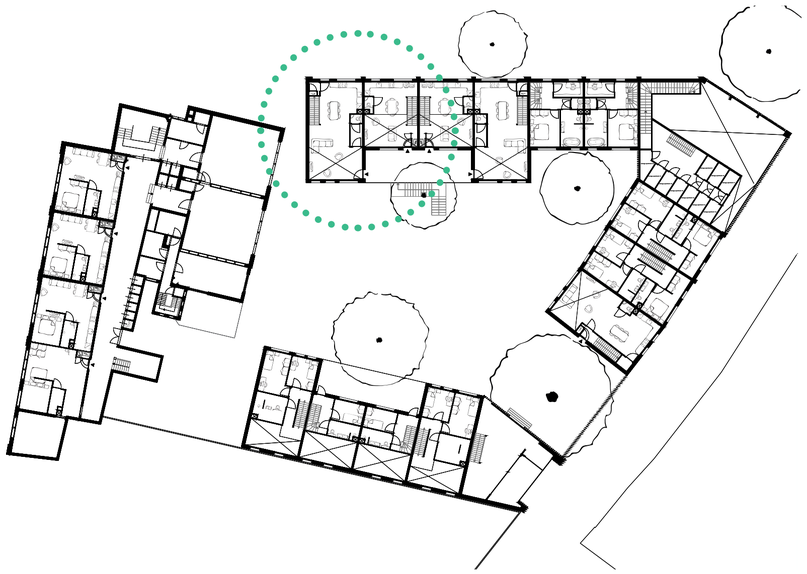
comfort

routine

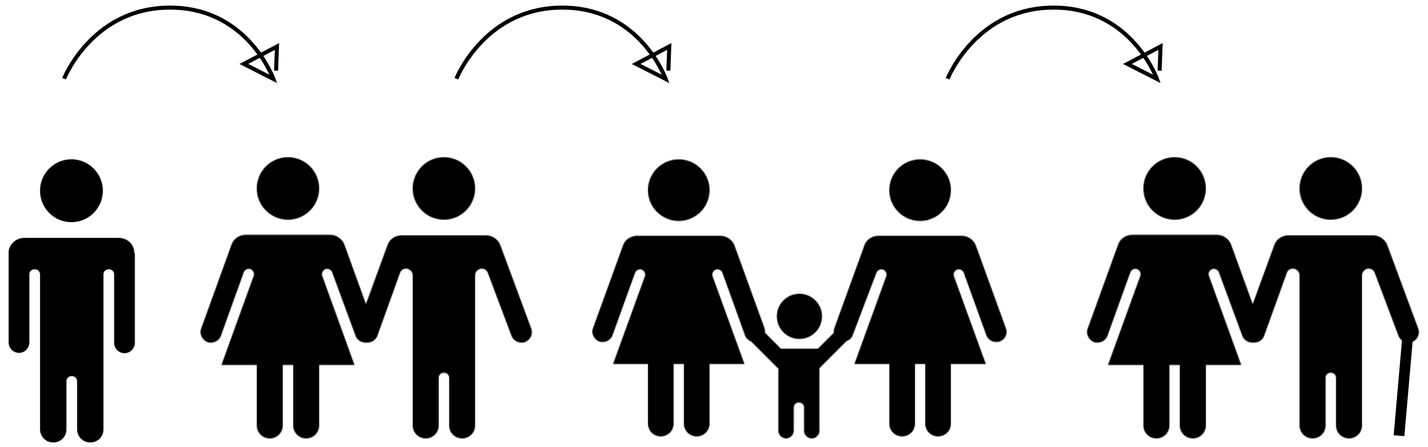
confidence

Let's have a closer look at the building's construction!



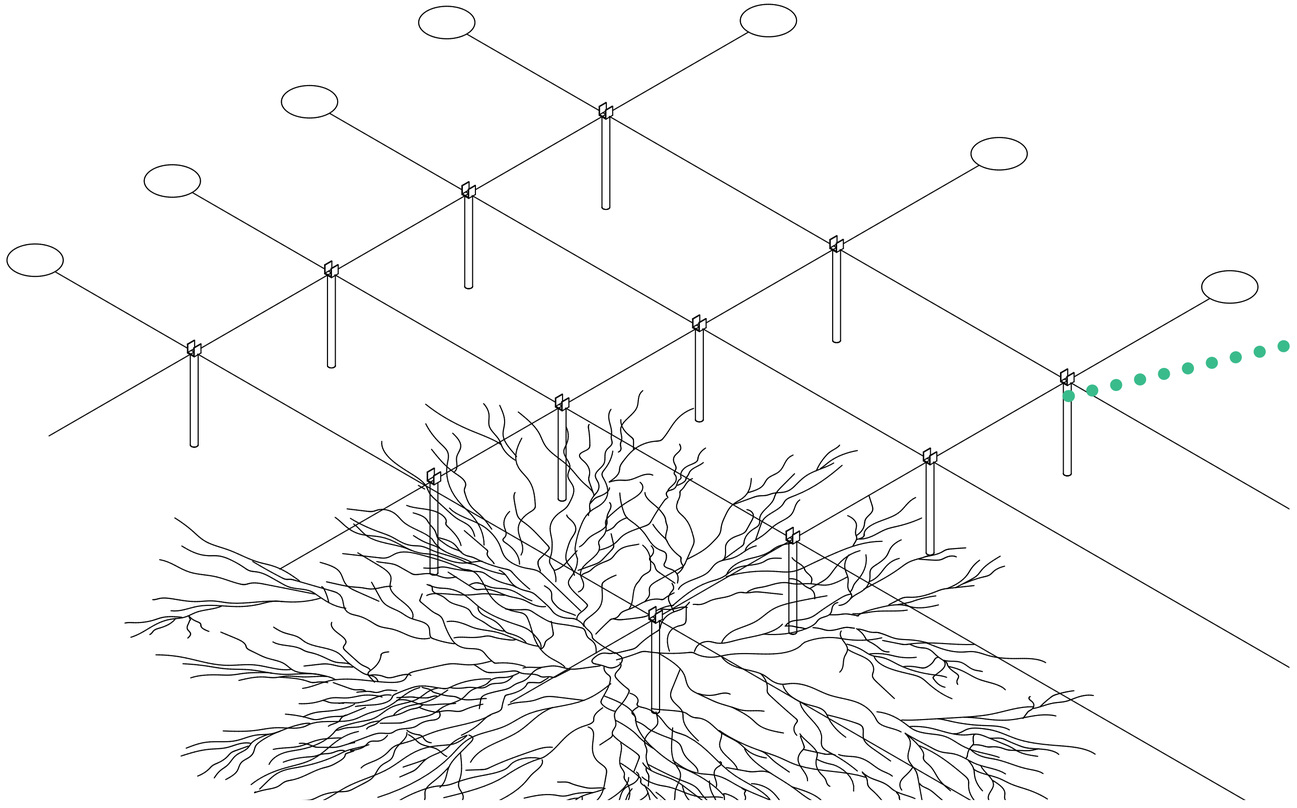


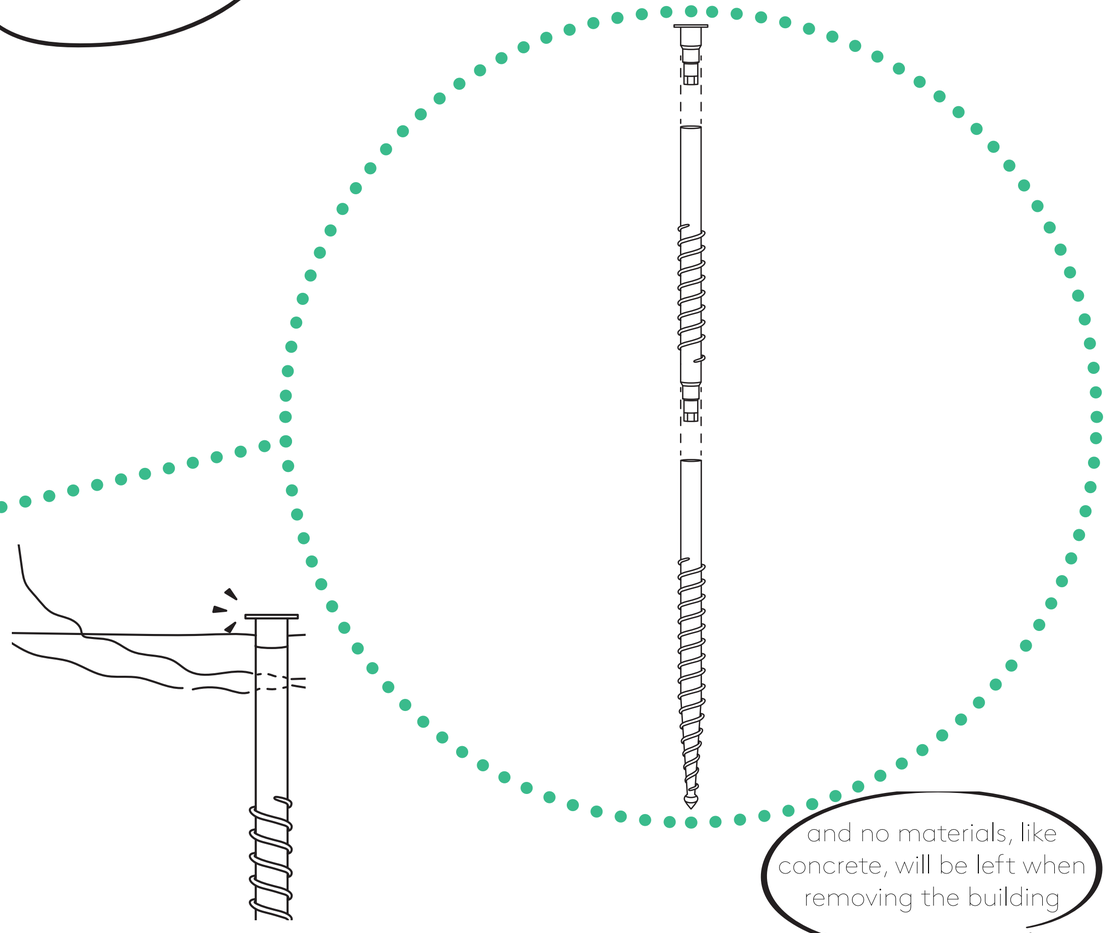
sound light colour texture smell privacy interaction wayfinding layout personalisation nature comfort routine confidence



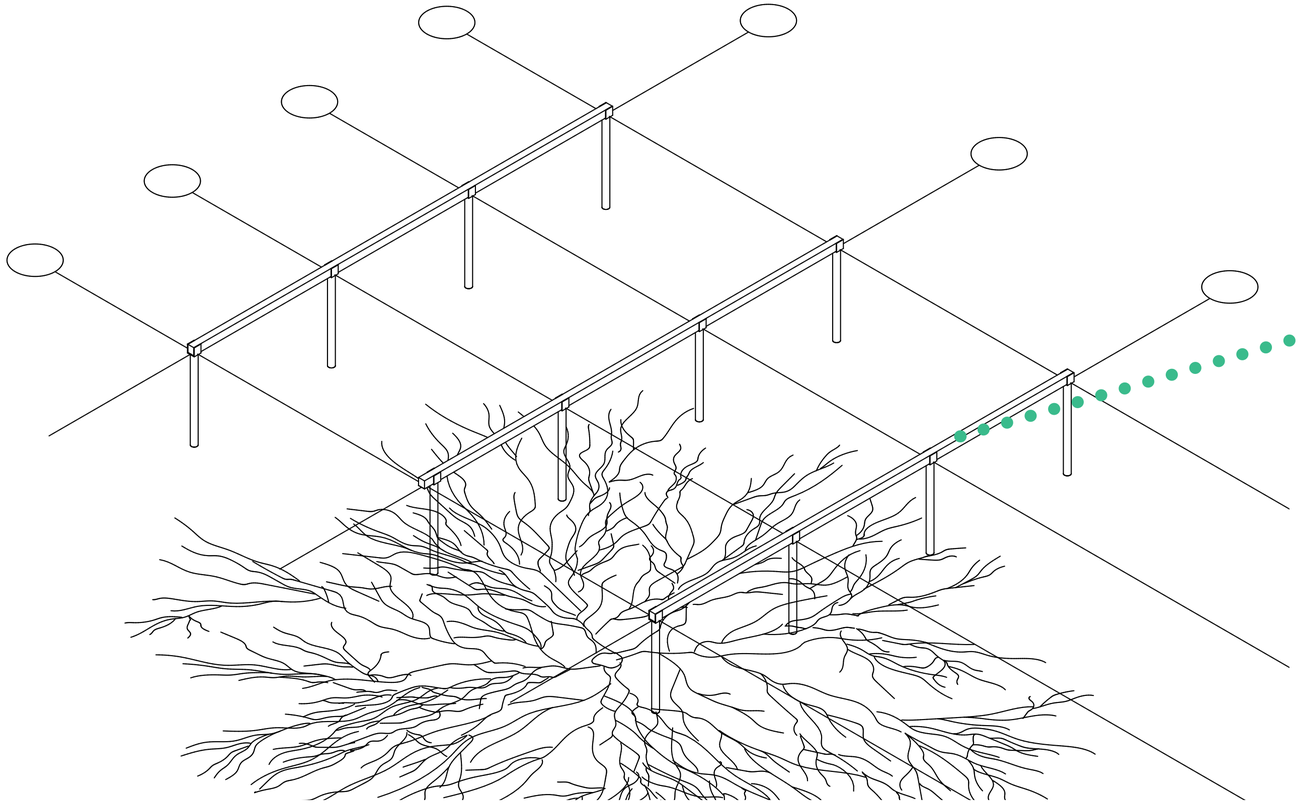
construction

helical screw piles disturb the ground as little as possible





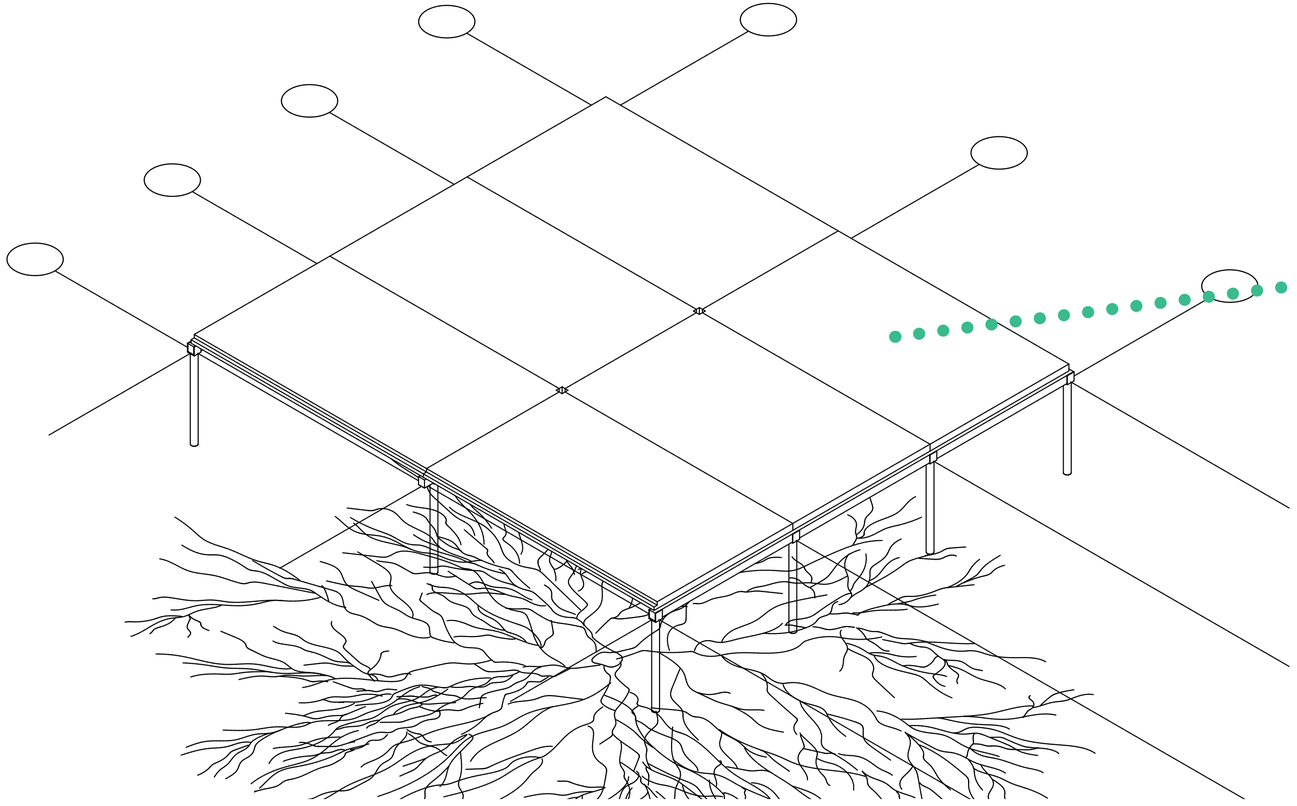
and no materials, like concrete, will be left when removing the building

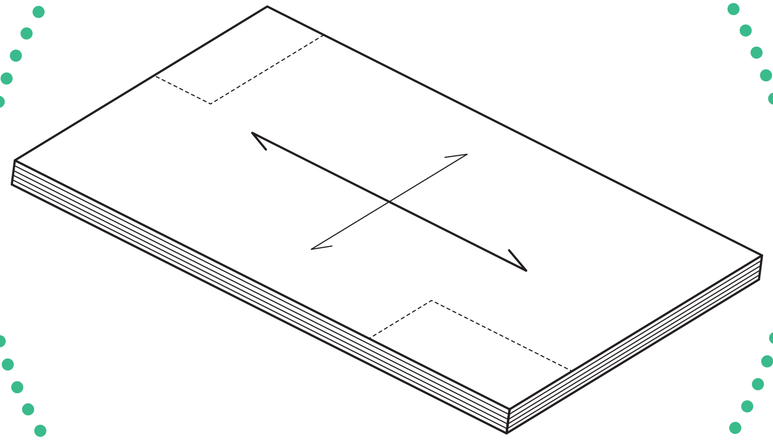


sound light colour texture smell privacy interaction wayfinding layout personalisation nature comfort routine confidence

construction

CLT is an easy, quick, and lightweight building method.

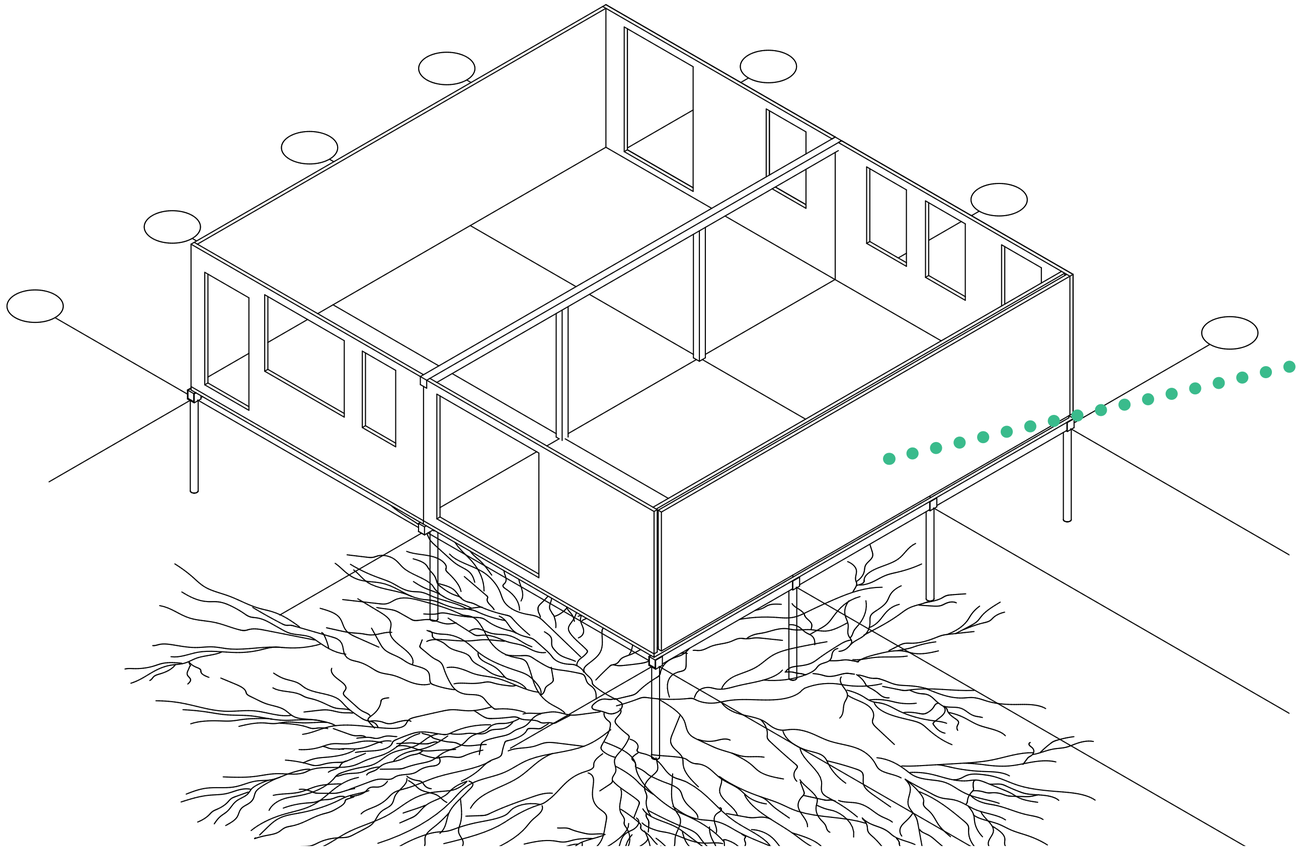


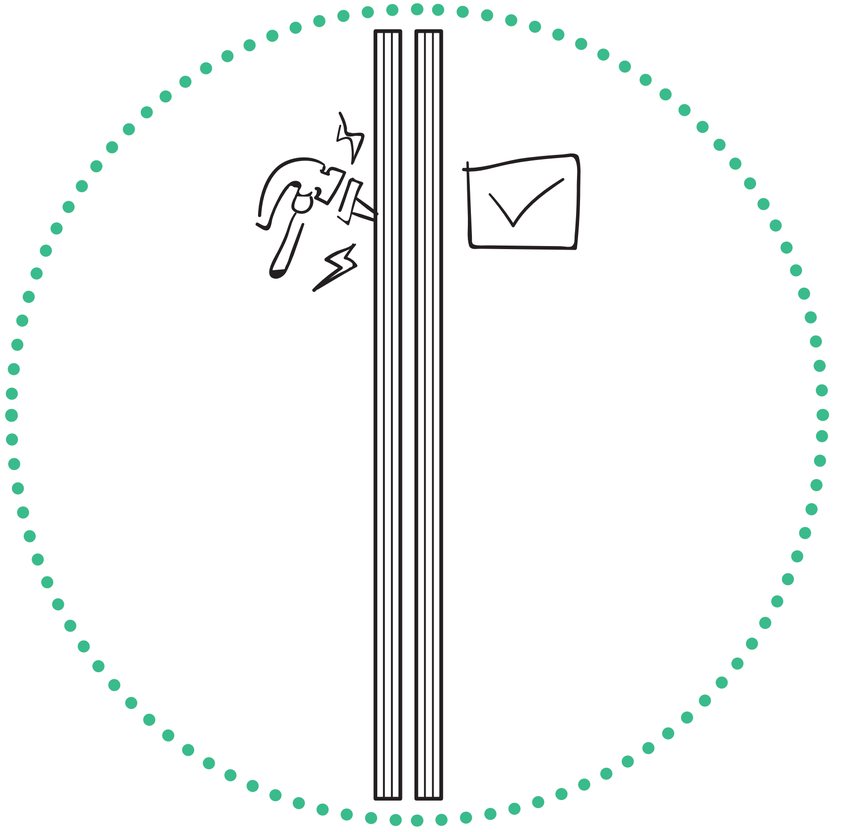


it provides a high amount of flexibility

sound light colour texture smell privacy interaction wayfinding layout personalisation nature comfort routine confidence

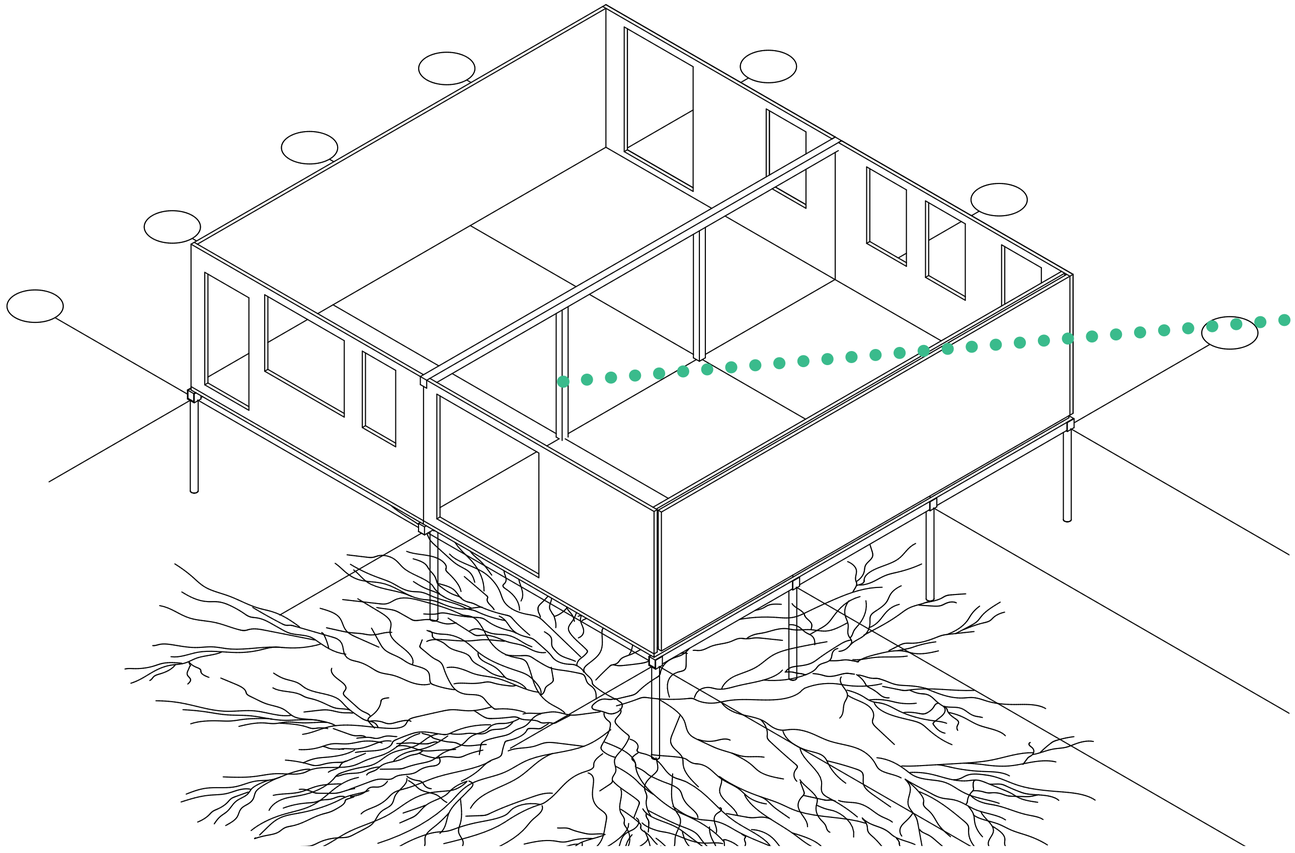
construction

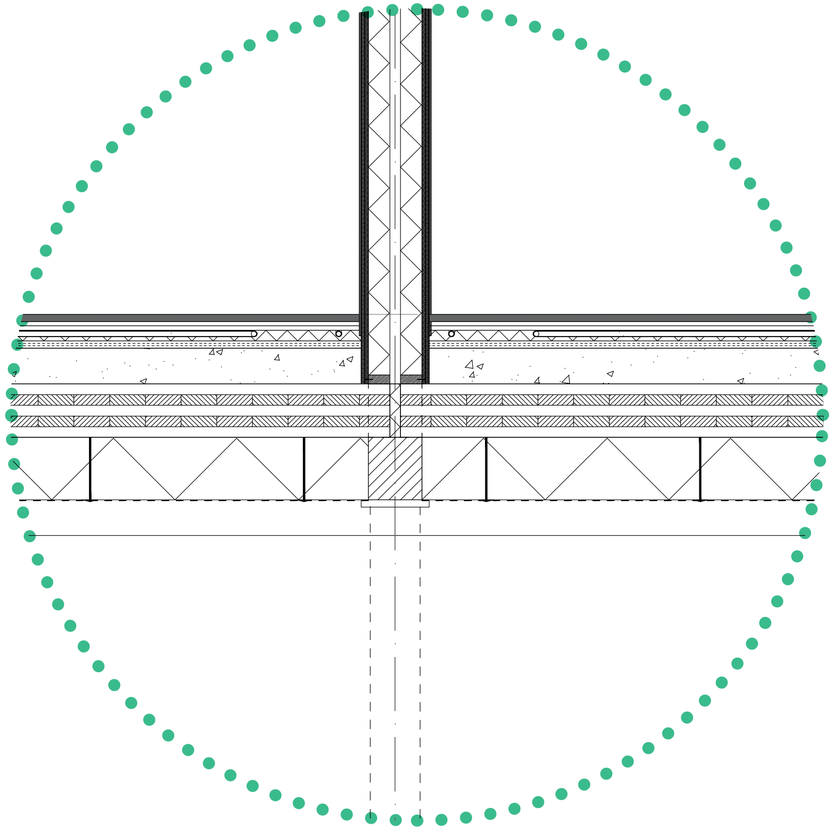




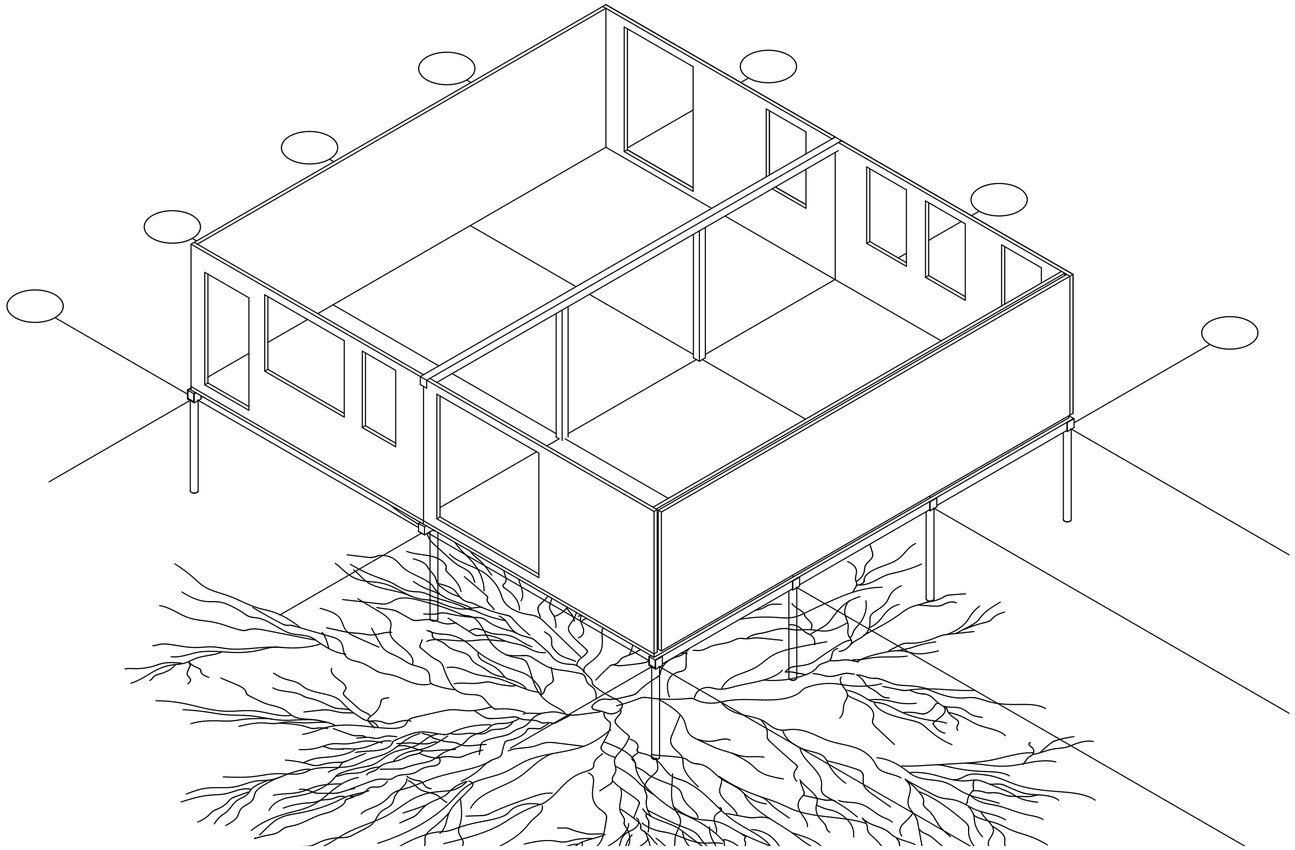
construction

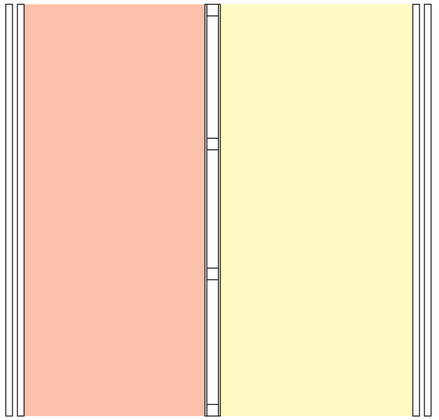
here, columns make up for the dividing wall...

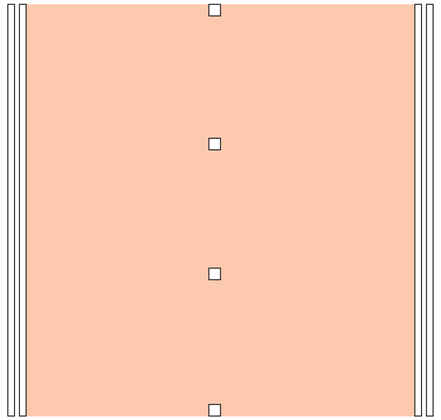




which provides the option to expand the dwellings...

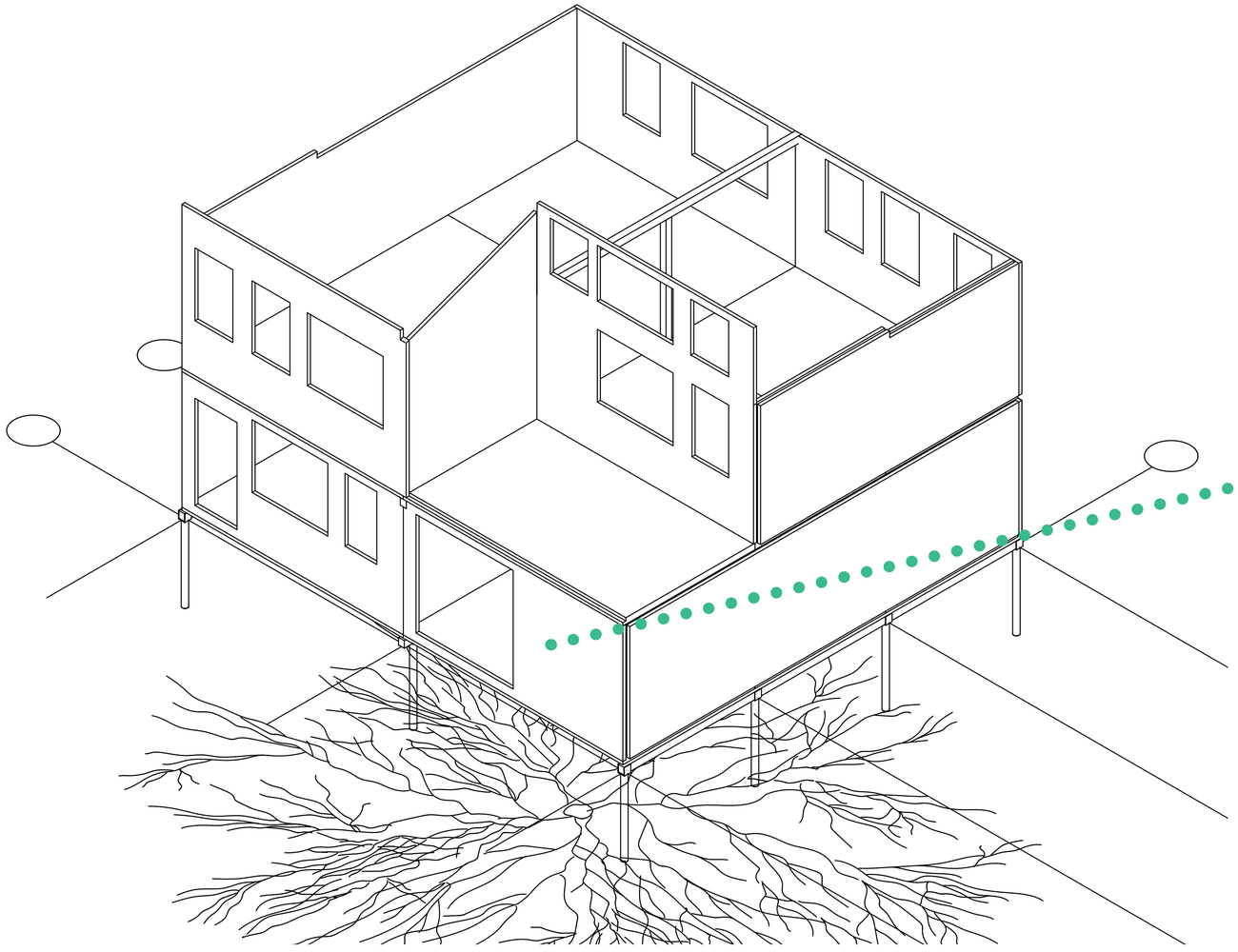


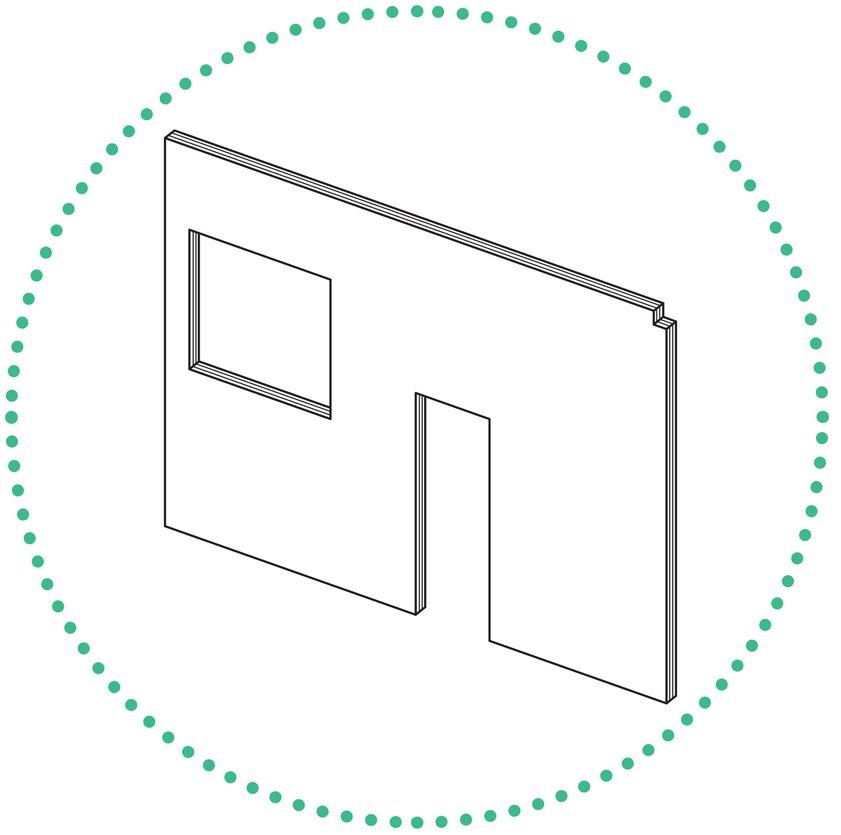




... in the case of changing needs! Maybe it can develop to a group home.

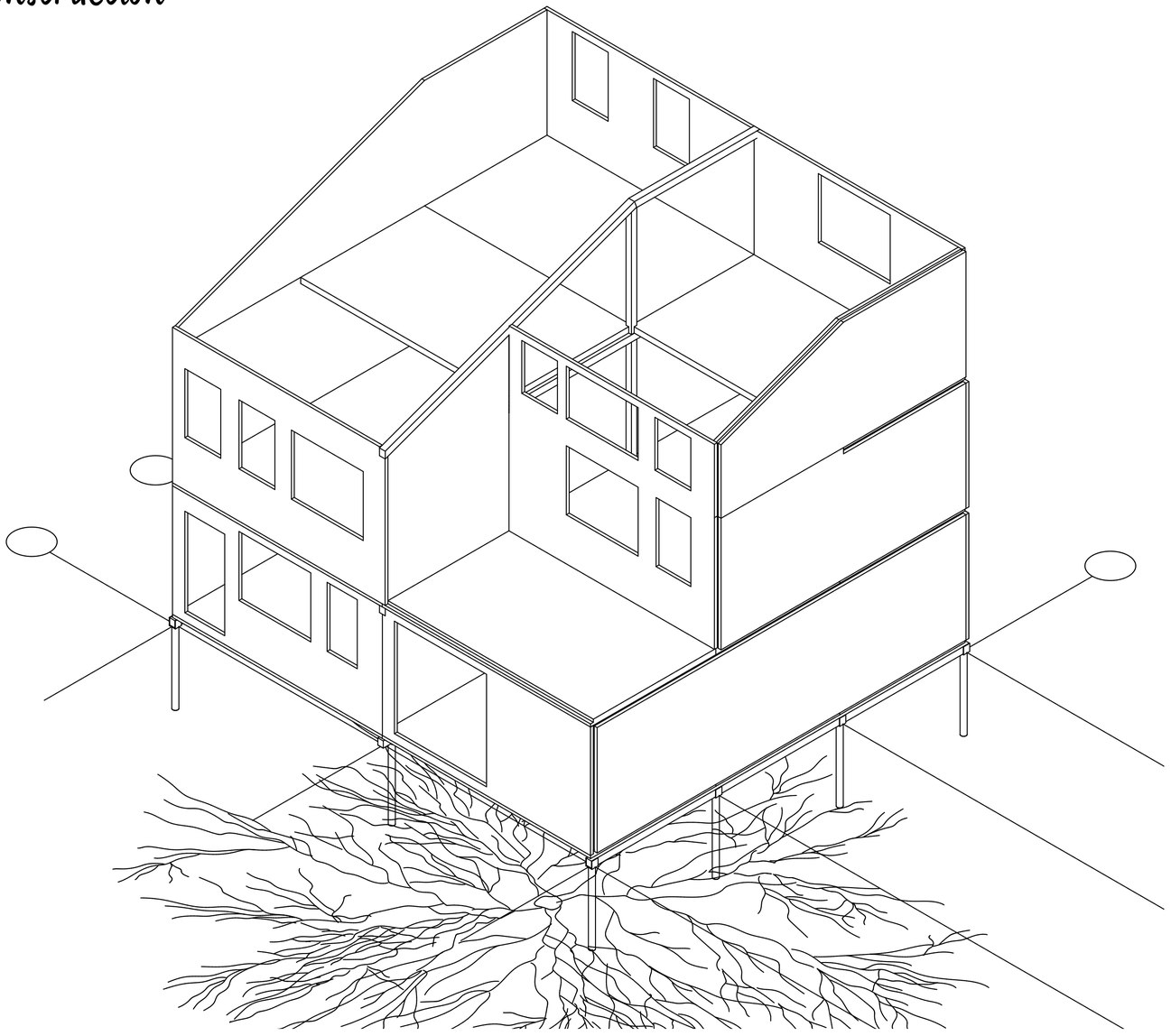
construction





sound | light | colour | texture | smell | privacy | interaction | wayfinding | layout | **personalisation** | **nature** | comfort | routine | confidence

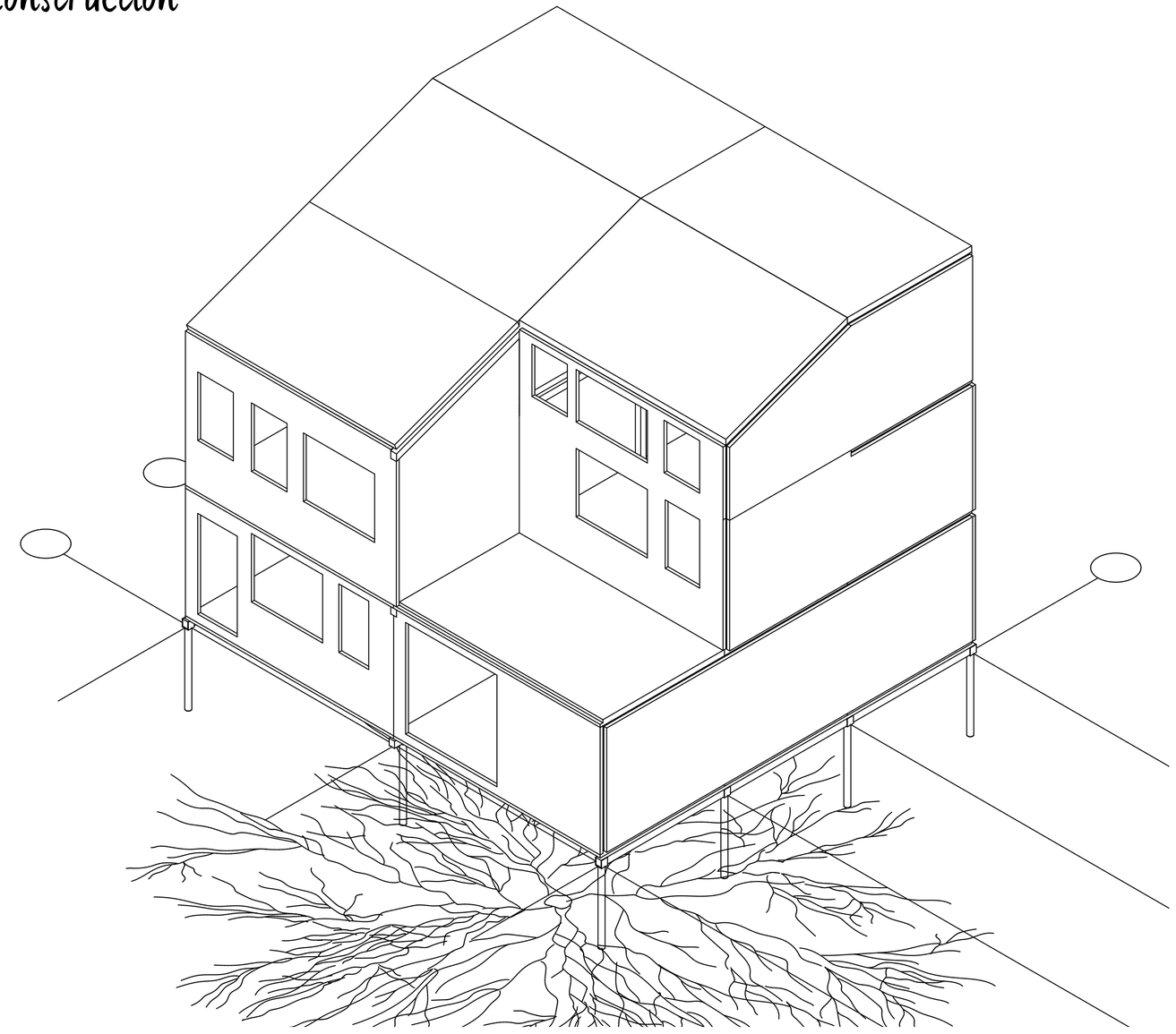
construction

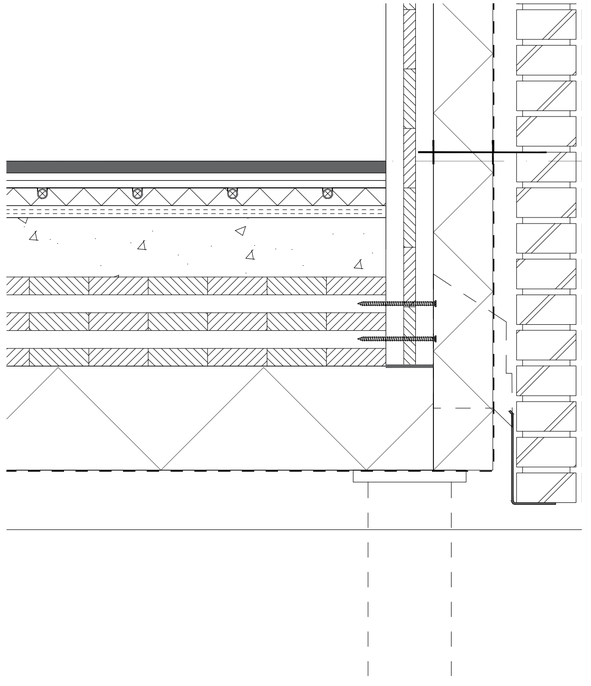


CLT provides also an esthetic aspect, since it can be applied unfinished.

CLT type A (sight)
small knots with a max. size of 40 mm

construction



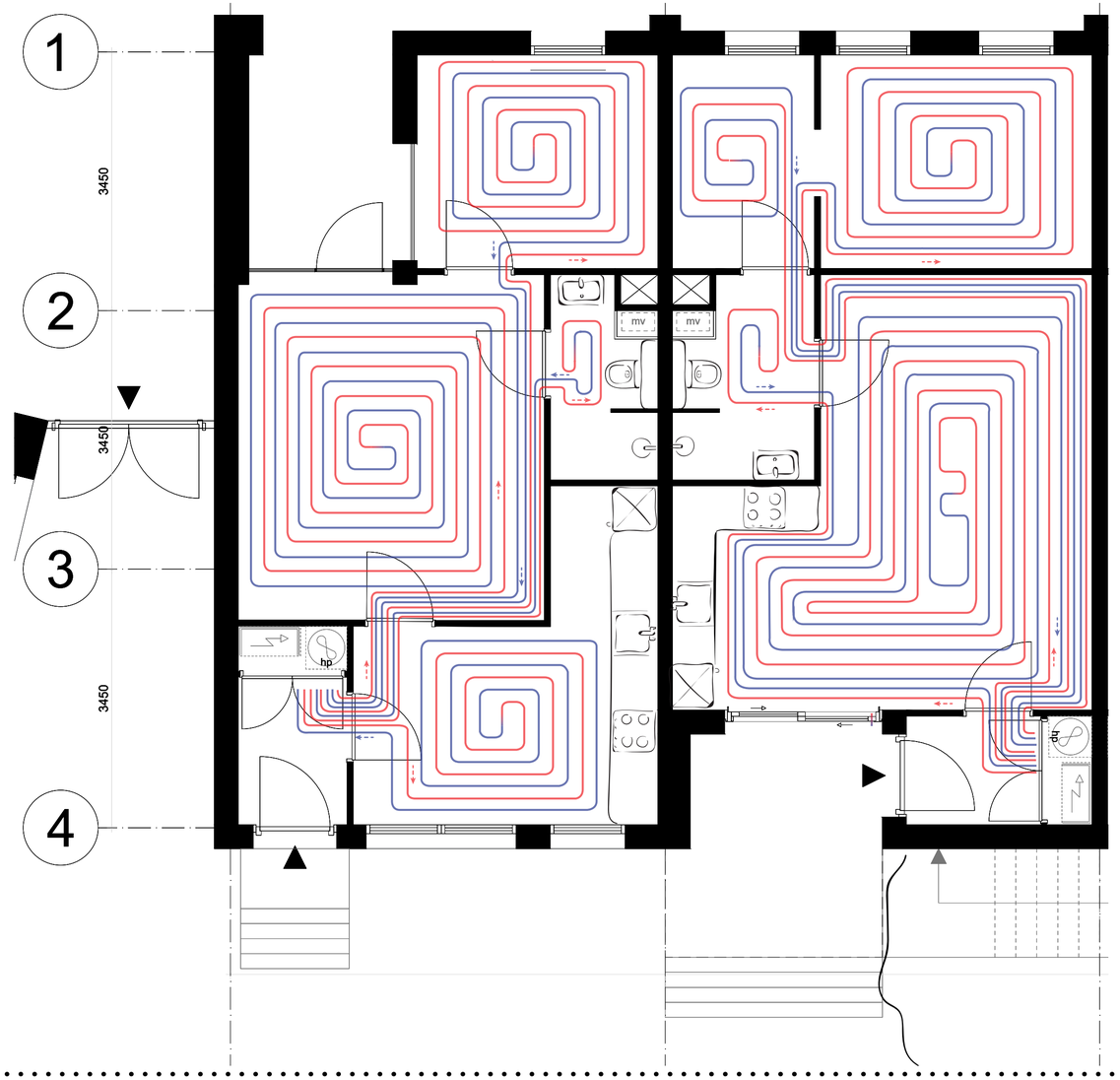


Look, the building actually kind of 'floats' above the ground!

the soil is disturbed as minimal as possible...!

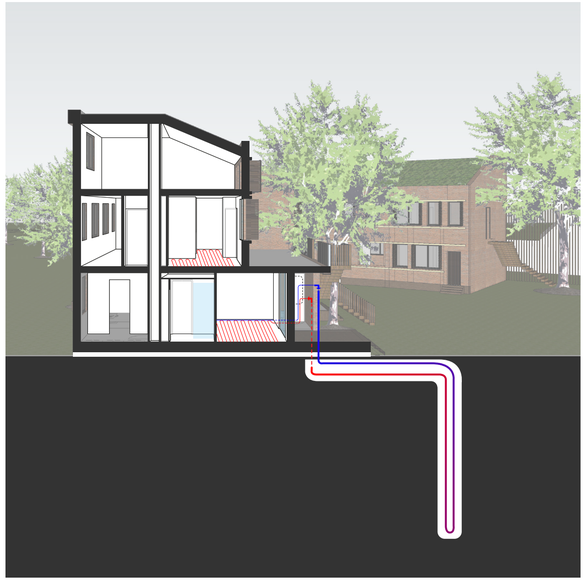
sound light colour texture smell privacy interaction wayfinding layout personalisation nature comfort routine confidence

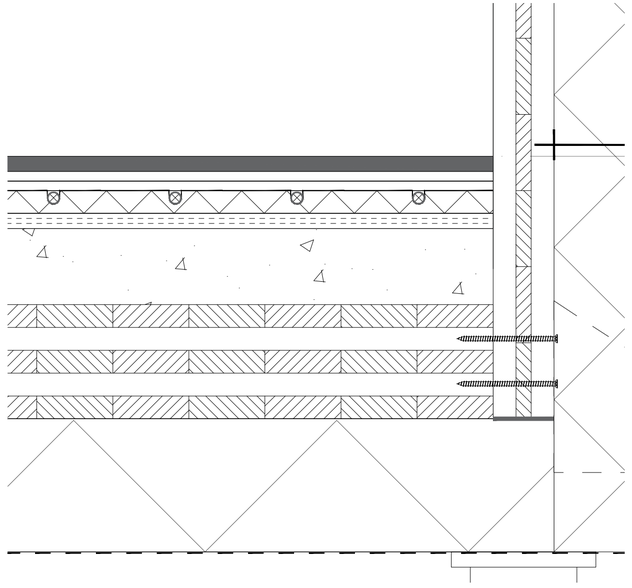
heating and cooling



low-temperature underfloor heating is applied...

in combination with a heat-pump and a vertical collector

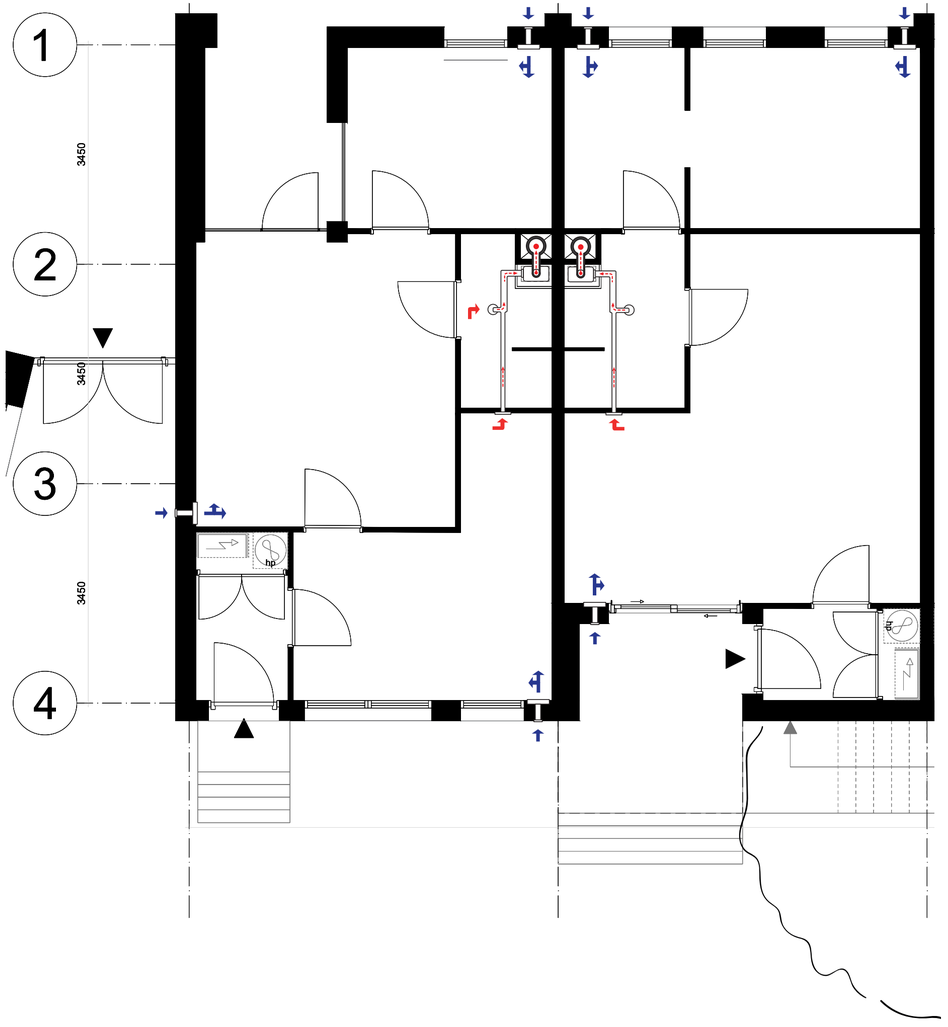




the snailhouse configuration provides an even distribution of heating and cooling

sound light colour texture smell privacy interaction wayfinding layout personalisation nature comfort routine confidence

ventilation



fresh-r systems are applied in every room...

these provide fresh air while also warming it up a bit to prevent heat-loss

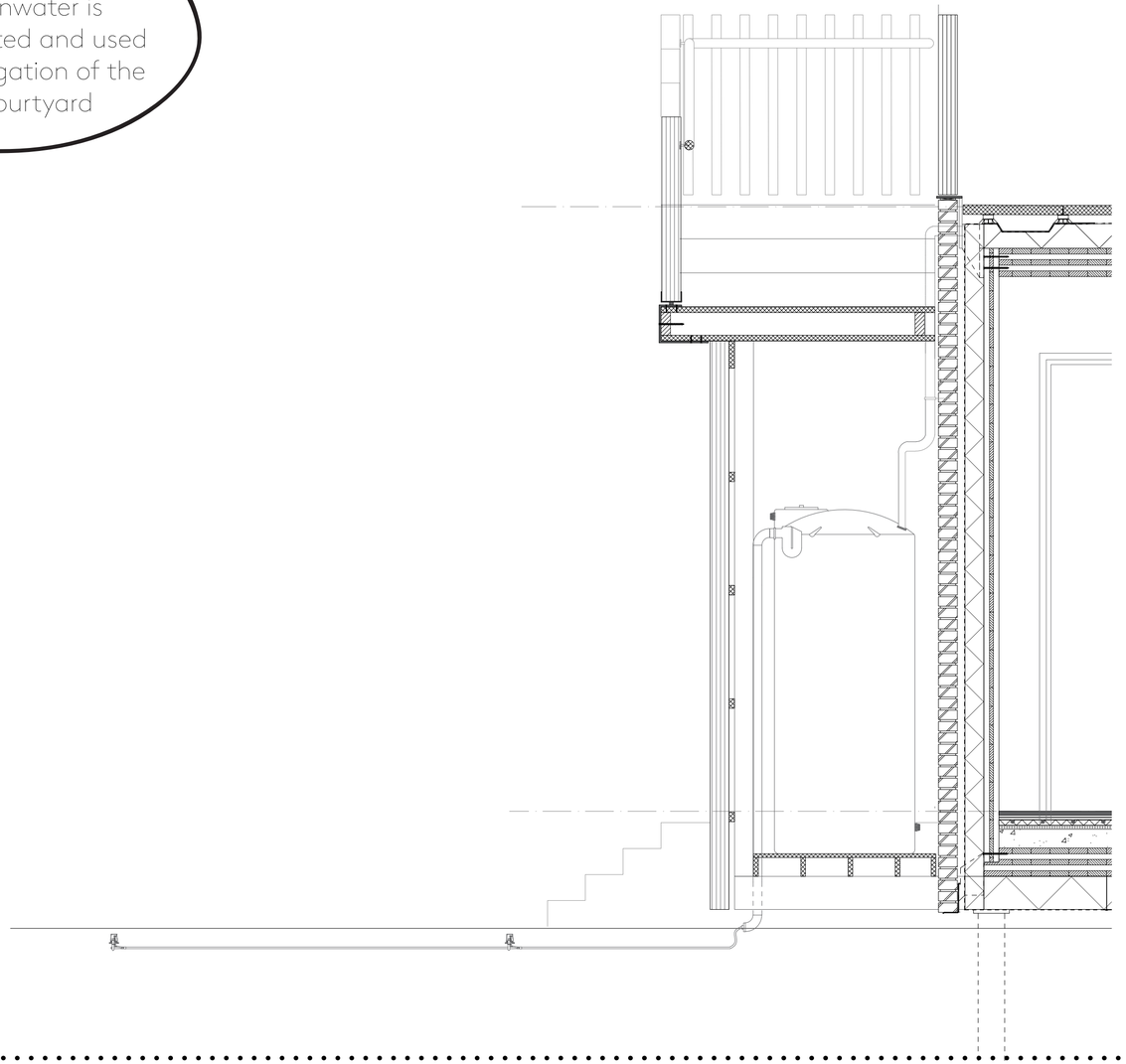
Mechanical ventilation is applied in the wet areas and near the kitchen for the output.

and we don't have problems with incoming noise like when there would be a vent.

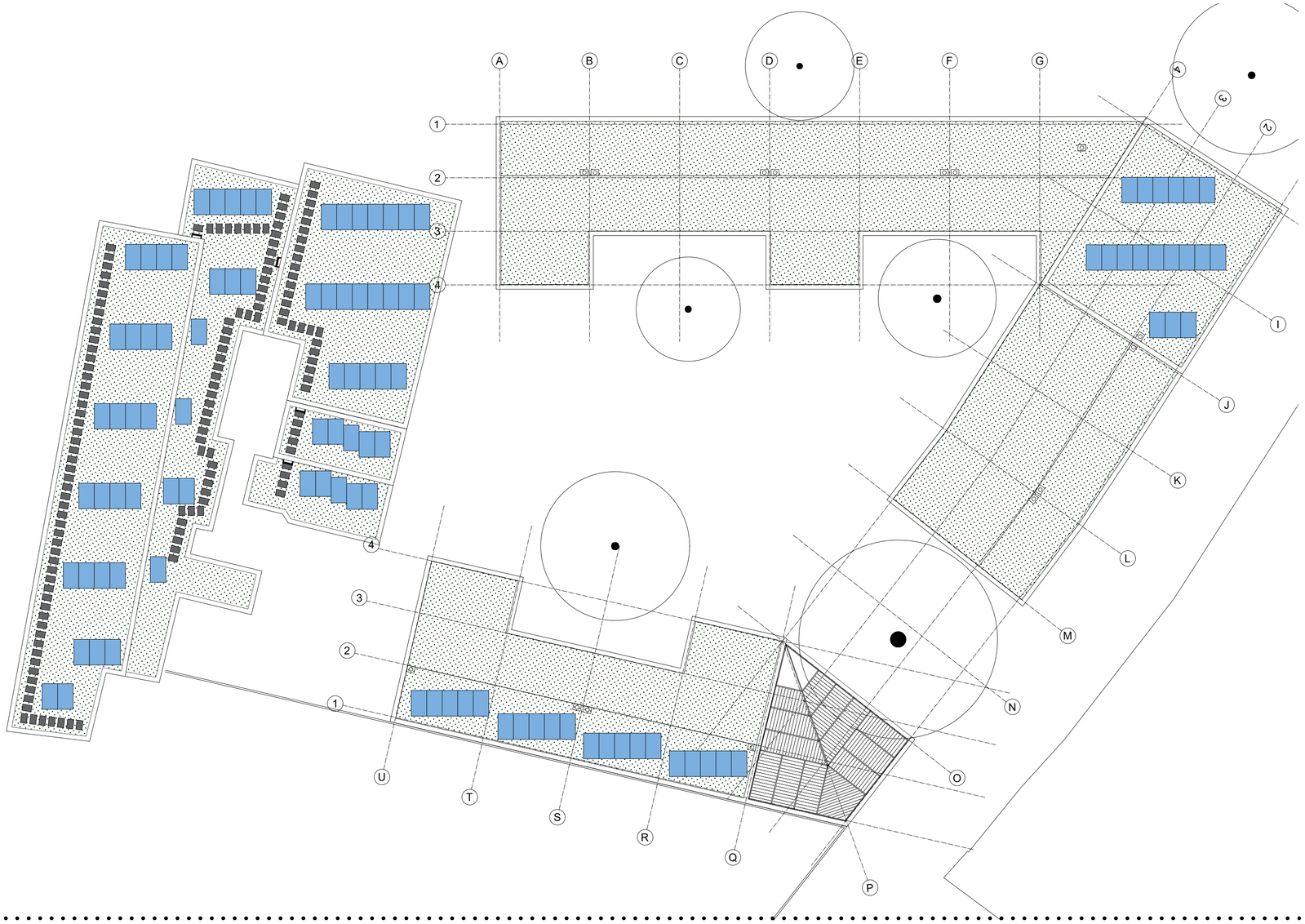
sound | light | colour | texture | smell | privacy | interaction | wayfinding | layout | personalisation | nature | comfort | routine | confidence

water management

rainwater is collected and used for irrigation of the courtyard

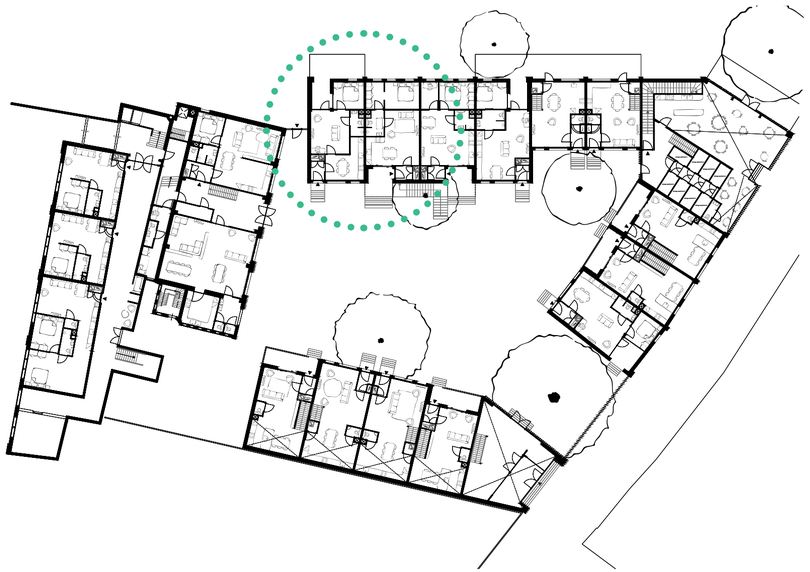


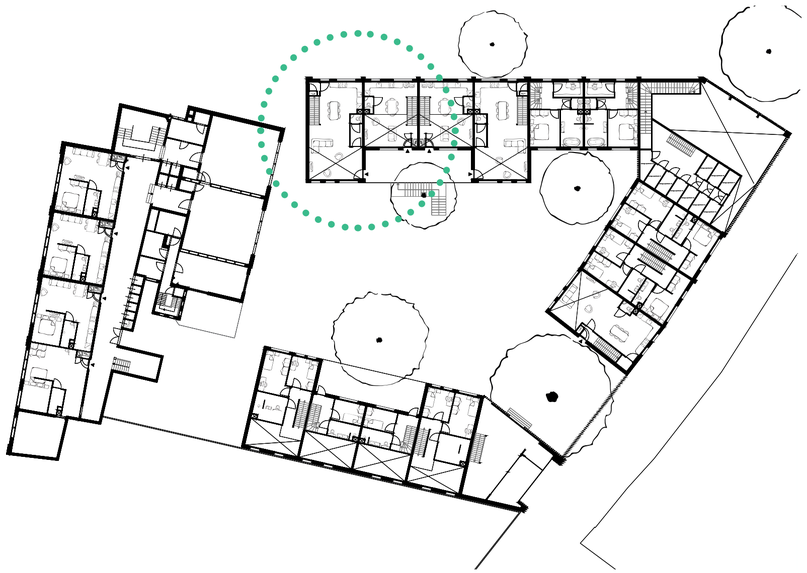
solar energy

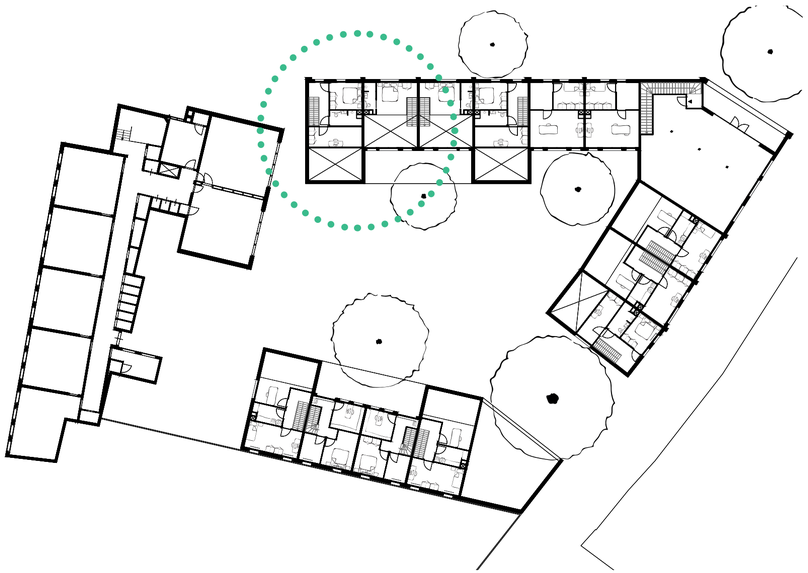


sound
light
colour
texture
smell
privacy
interaction
wayfinding
layout
personalisation
nature
comfort
routine
confidence

And now it's time to talk about the interior!



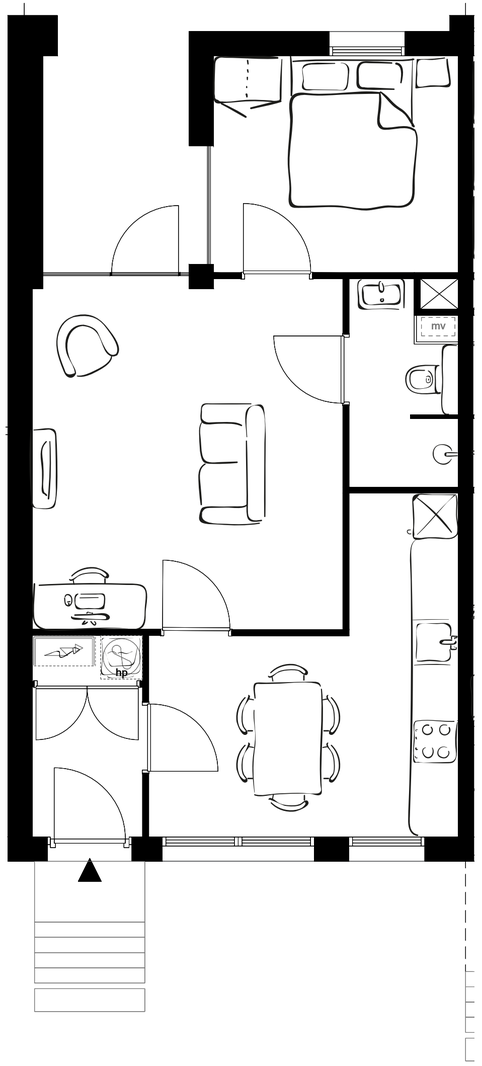




interior design

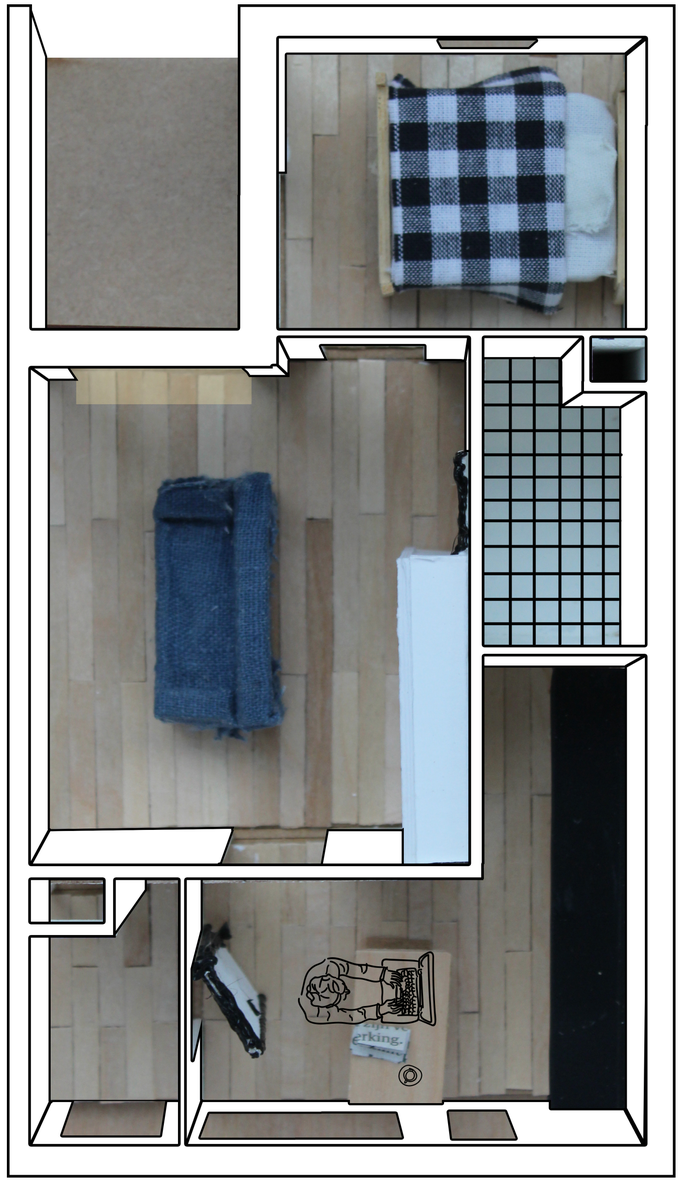
Lucas

I dislike clutter, so I want every room to be seperated.

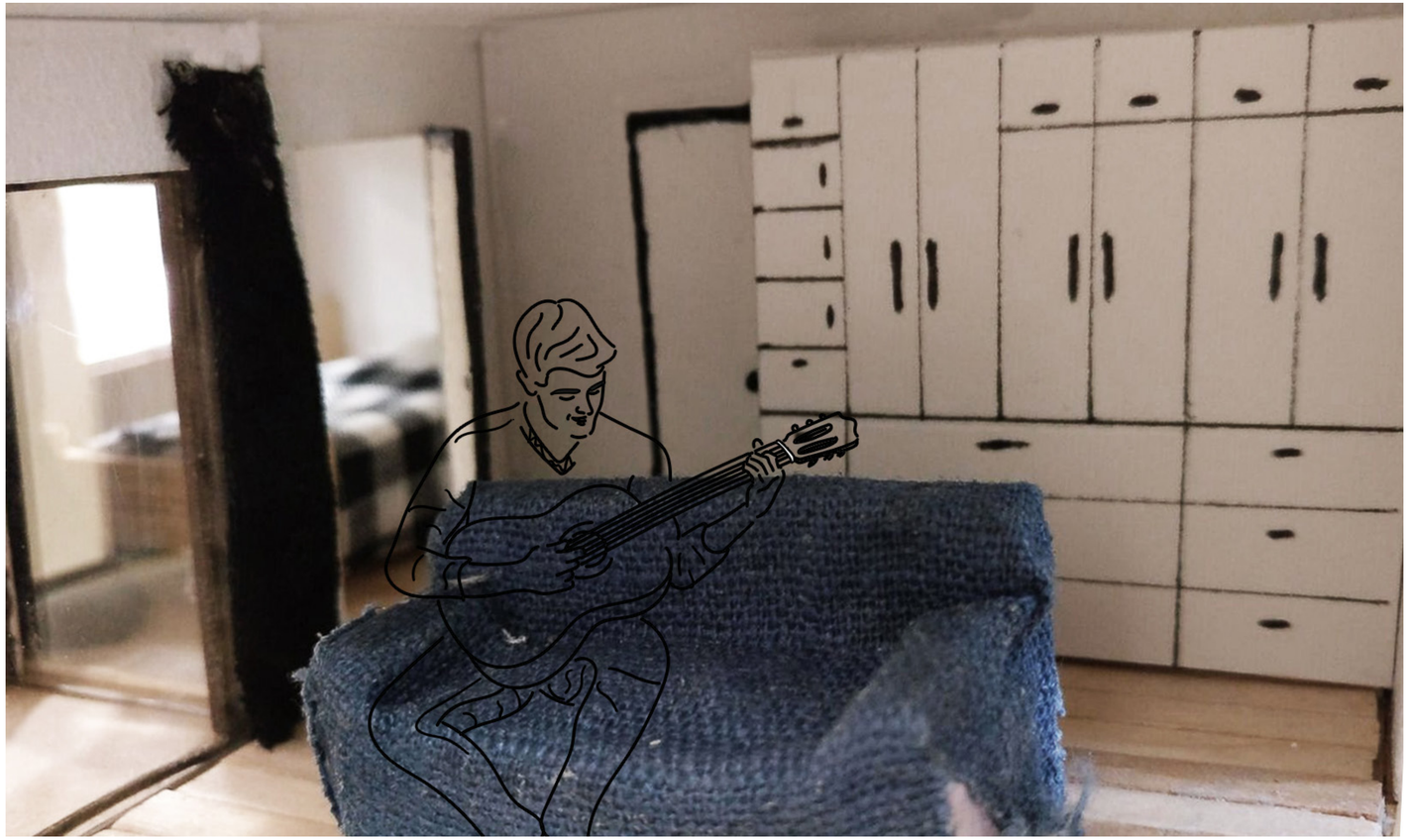


sound light colour texture smell privacy interaction wayfinding **layout** **personalisation** nature **comfort** **routine** **confidence**

interior design



sound light colour texture smell privacy interaction wayfinding layout personalisation nature comfort routine confidence



sound light colour texture smell privacy interaction wayfinding layout personalisation nature comfort routine confidence

sound

light

colour

texture

smell

privacy

interaction

wayfinding

layout

personalisation

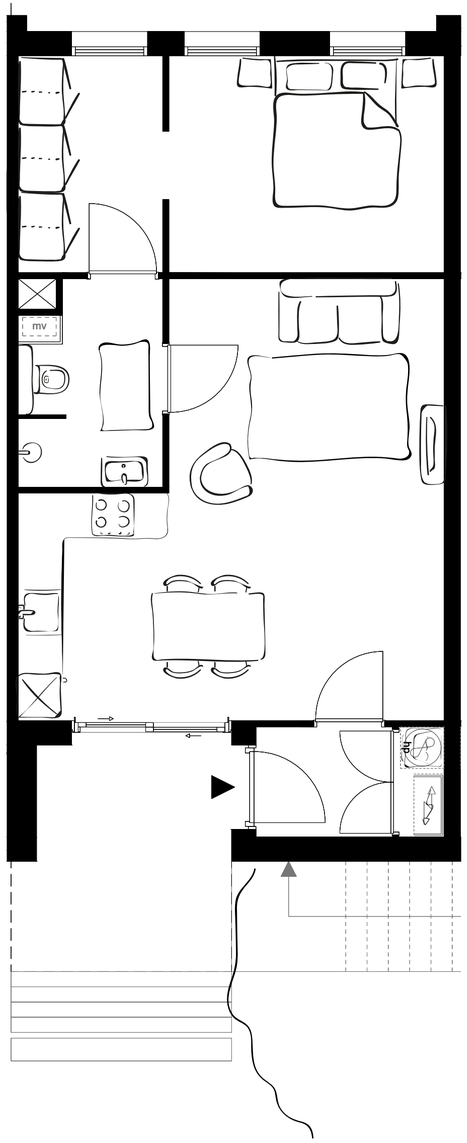
nature

HAPPY

comfort

routine

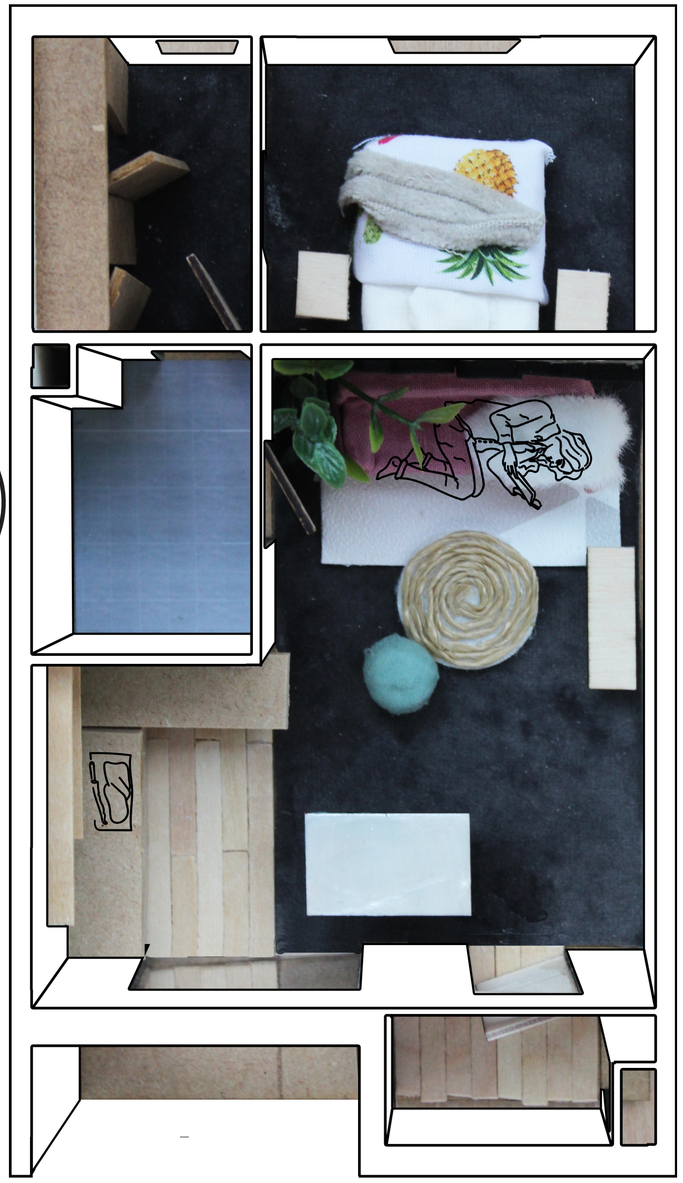
confidence


mv
dn

Julia

I find it difficult to follow routine, so I need a bit help with that!
I need to go through the bathroom to get to the bedroom...
... so that reminds me of showering and brushing my teeth!

interior design



sound light colour texture smell privacy interaction wayfinding layout personalisation nature comfort routine confidence

sound light colour texture smell privacy interaction wayfinding layout personalisation nature HAPPY comfort routine confidence

sound

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layout

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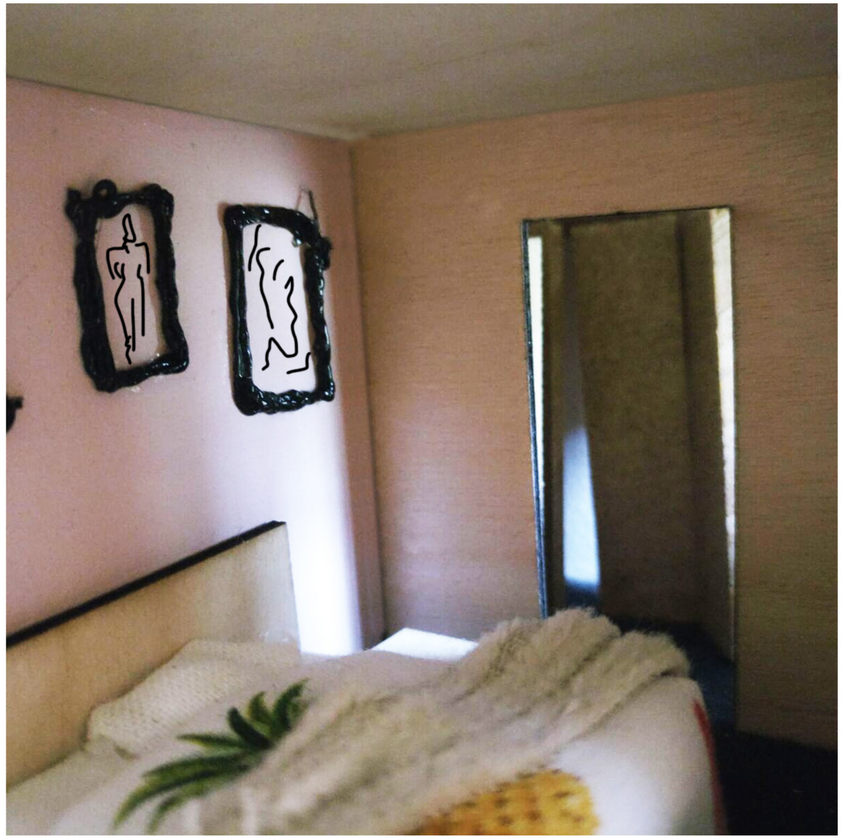
nature

comfort

routine

confidence



sound

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texture

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personalisation

nature

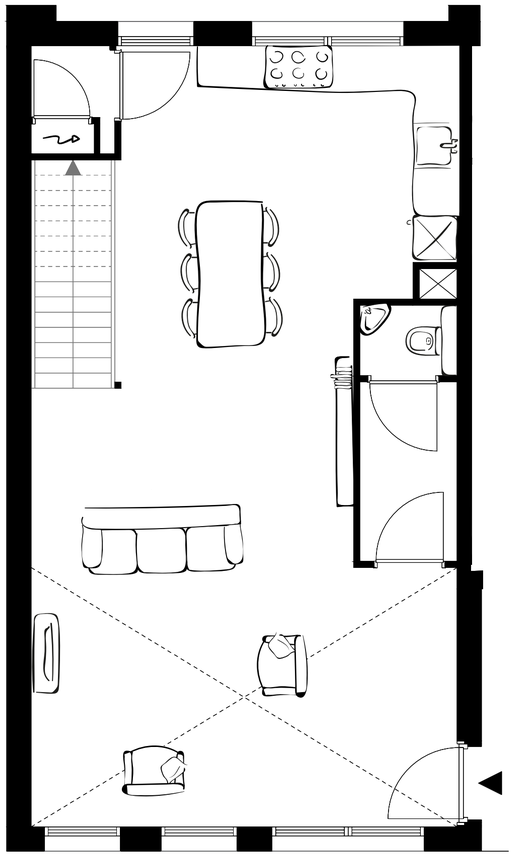
comfort

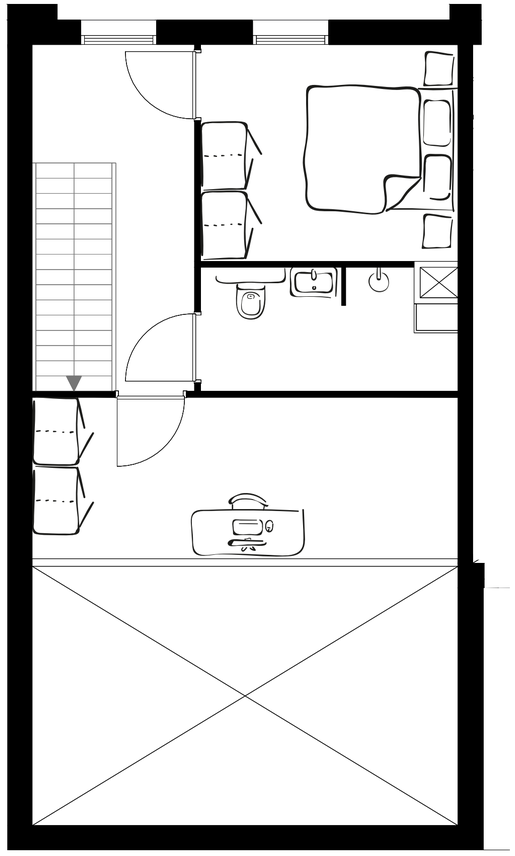
routine

confidence

interior design

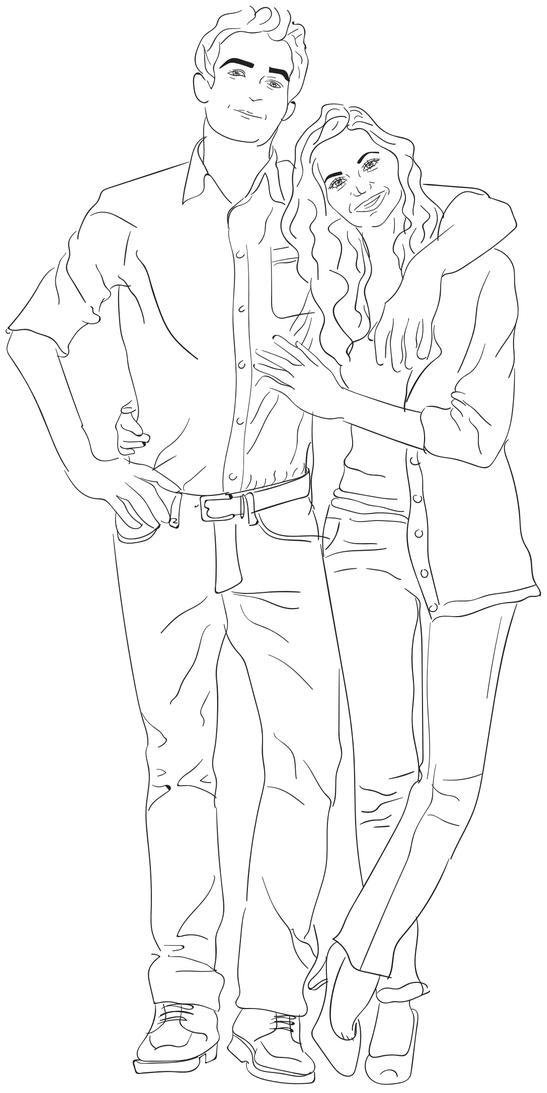
Nick and Lily





sound | light | colour | texture | smell | privacy | interaction | wayfinding | **layout** | **personalisation** | nature | comfort | routine | confidence

interior design



sound

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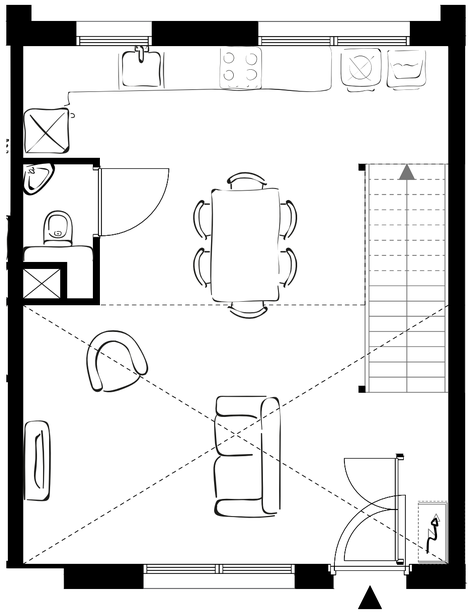
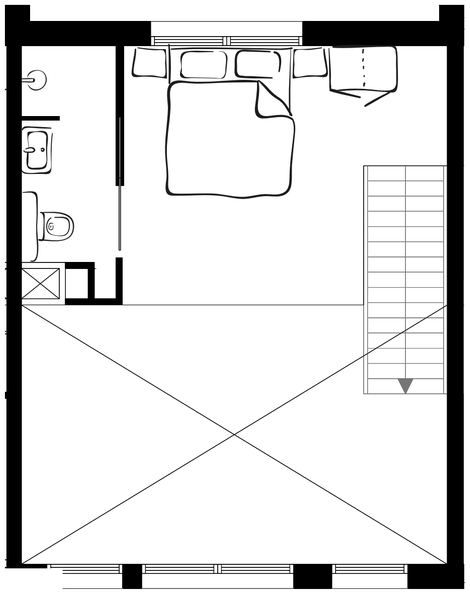
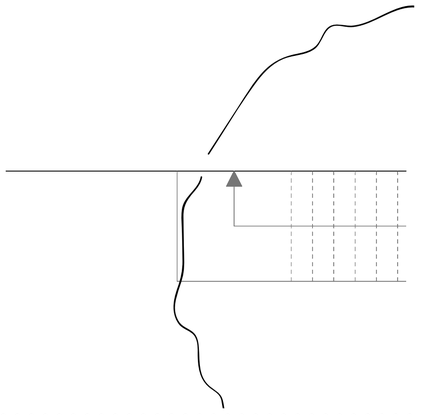
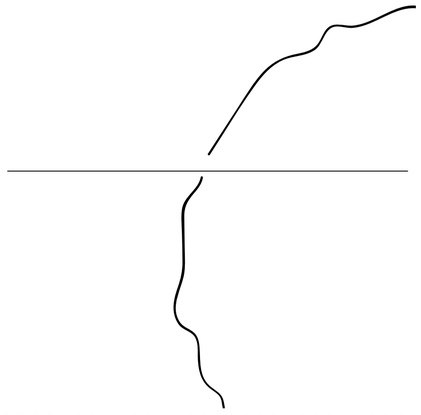








Emma

sound

light

colour

texture

smell

privacy

interaction

wayfinding

layout

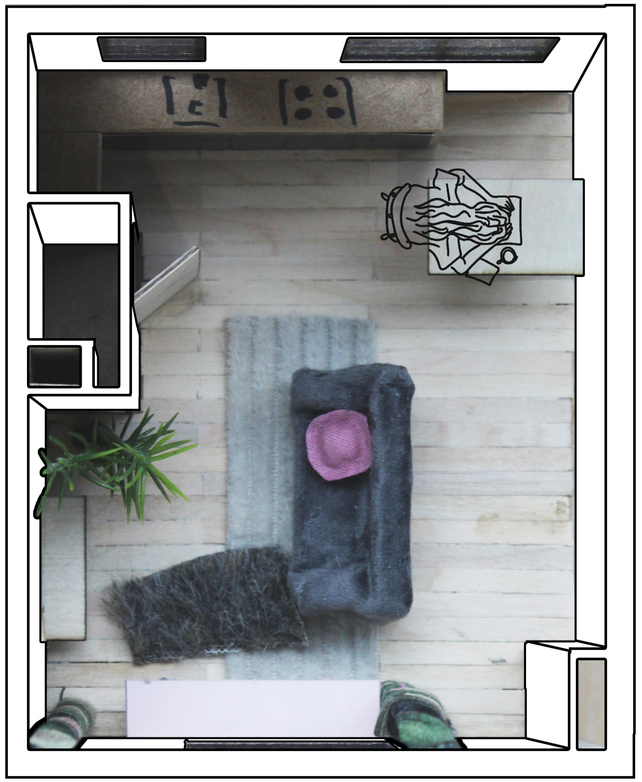
personalisation

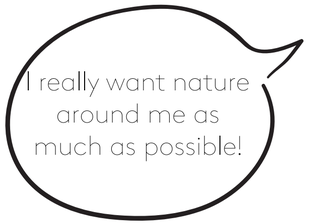
nature

comfort

routine

confidence





sound

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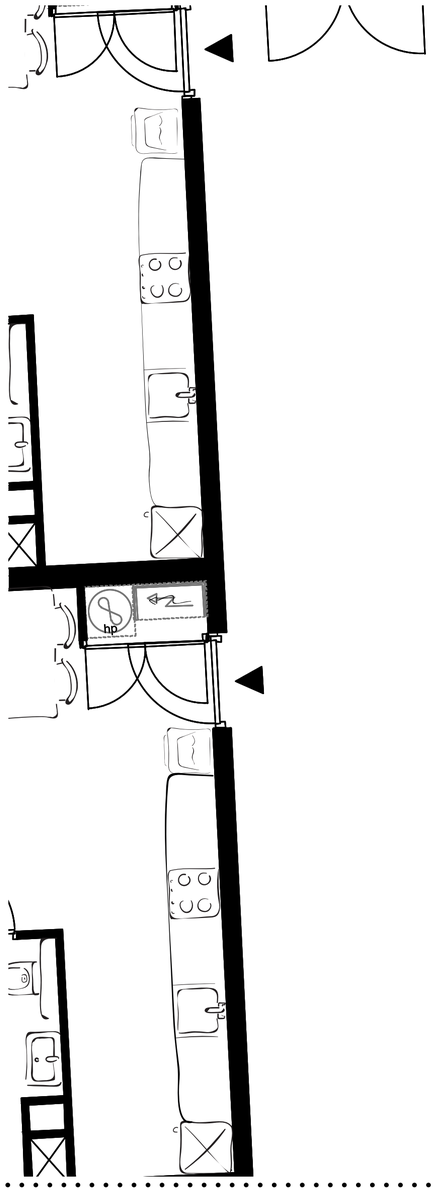
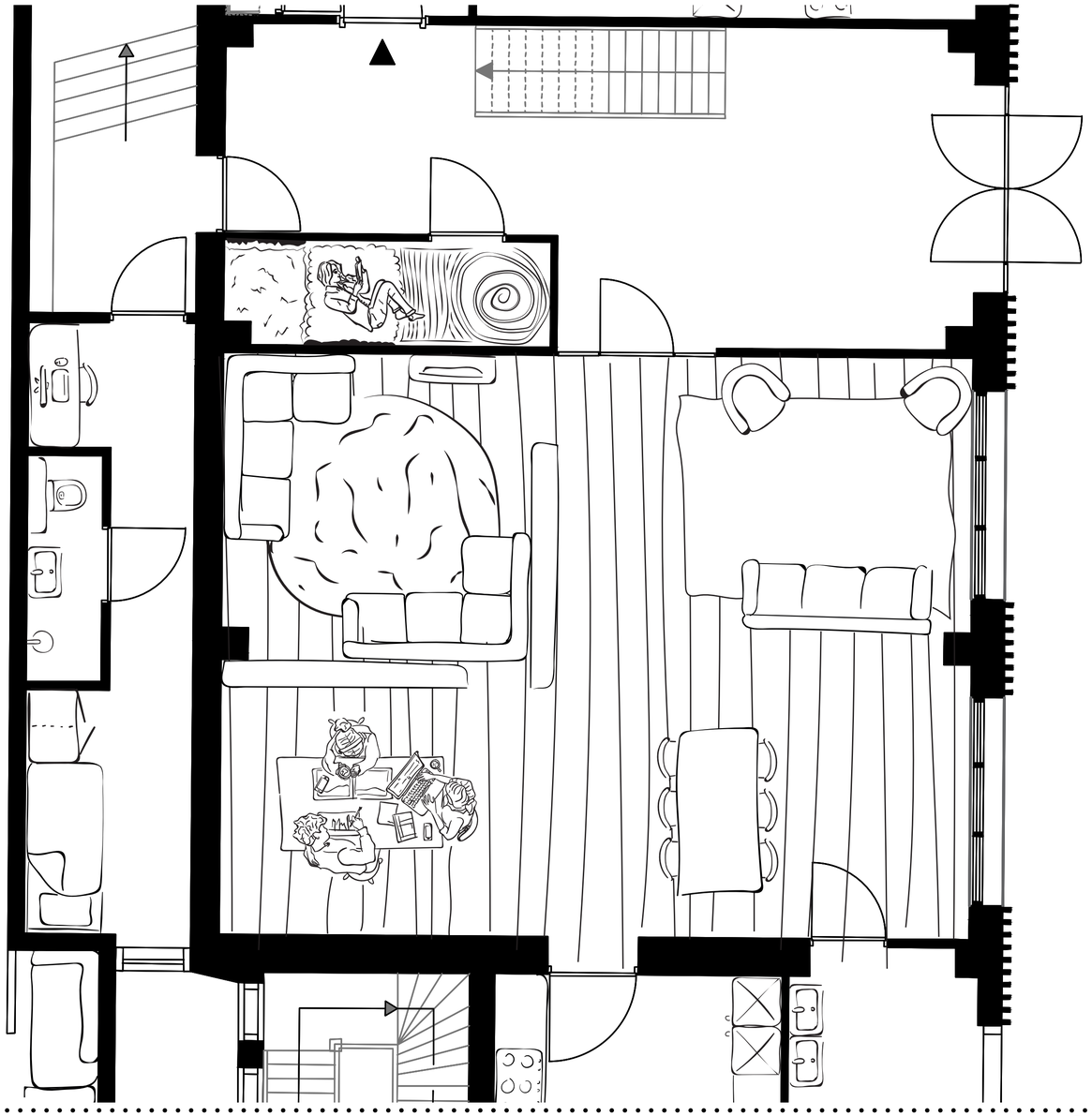
sound light colour texture smell privacy **interaction** **wayfinding** layout personalisation nature comfort routine confidence





a texture room enables us to relax a little bit!

and the common room provides different levels of interaction and privacy!

sound

light

colour

texture

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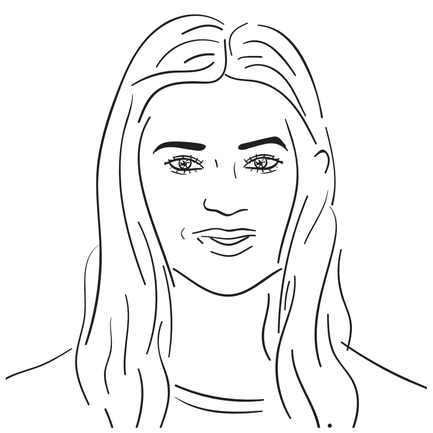

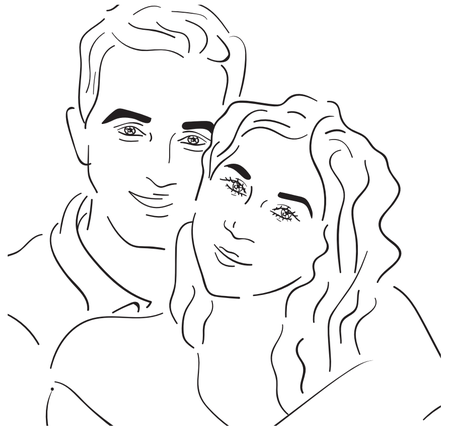

Thank you!!