

# SCHOOL RESEARCH

## SURROUNDING AREAS

**Karadurmuşlu**  
Circa 2012: Harem is small town overlooking the rich Plain of Antioch to the east of Antioch (modern Antakya), across the border with Turkey. It is more attractive than most Syrian towns thanks to the locals preference for blue paint over bare concrete.

**A'en Darah**  
The city has been in the hands of many different population groups. You will find a large mosque from the 12th century, a citadel from the 13th century and several madrassas (schools), palaces and Hamanns from the 17th century. The street plan of the city also shows a Greco-Roman influence. The fact that you can see all these different influences in the city has led to Aleppo being on the World Heritage List.

**Tall Rifat**  
Circa 2006: Aleppo was once Syria's largest city and the country's industrial and financial centre

**Aleppo**  
February 2023: The buildings in Harem are destroyed following a magnitude 7.8 earthquake that hit Syria.

**Al-Nayrab**  
Circa 1948: A street in Aleppo, Syria. Although modern, the houses are built in an Arabic-Syrian style and retain features such as harem windows for the seclusion of the Muslim women.

## GREEN AREAS

Legend:  
Grass  
Dry service  
More Green  
Buildings  
Cropland  
Lot  
Olive trees

## SCHOOL SYSTEM

Primary schools ages 6 to 15 (9-year basic phase compulsory)

- Duration: 9 years
- Content: general subjects. For example, Arabic, a foreign language, mathematics and religion
- Purpose of diploma: access to upper secondary education
- Diploma: Basic Education Certificate (primary education + lower secondary education)



BASISONDERWIJS

Community center work originated in the Netherlands at the end of the 19th century, intended as a means for the cultural education of the often unskilled or semi-educated citizens. In the course of the 20th century, community centers were used by various social groups as a means of, among other things, public education, anti-socialism, emancipation and as a means of relaxation.

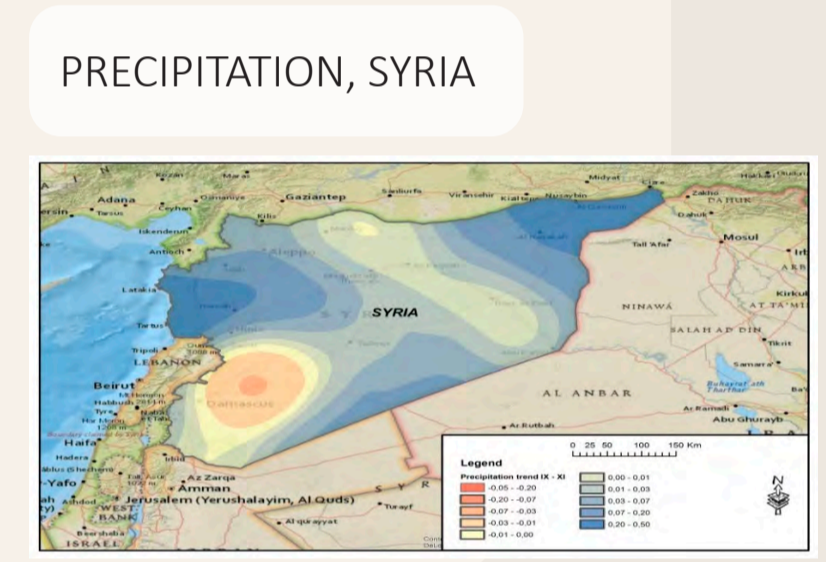
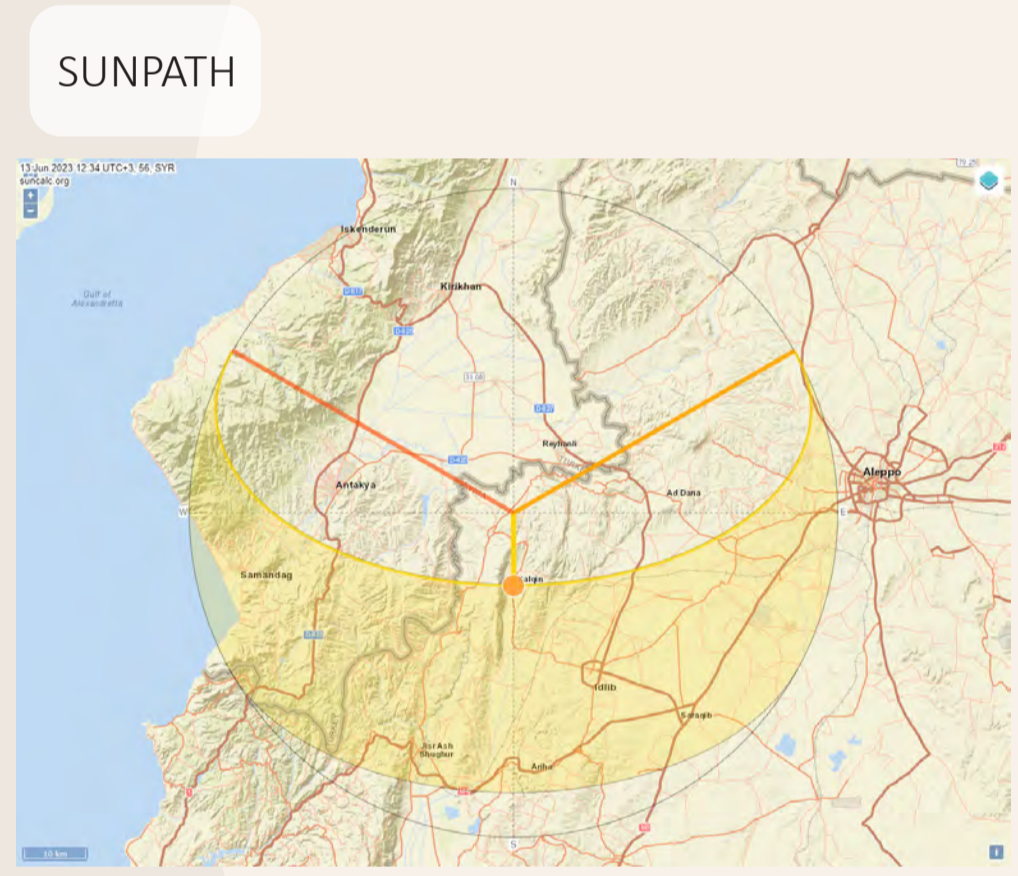
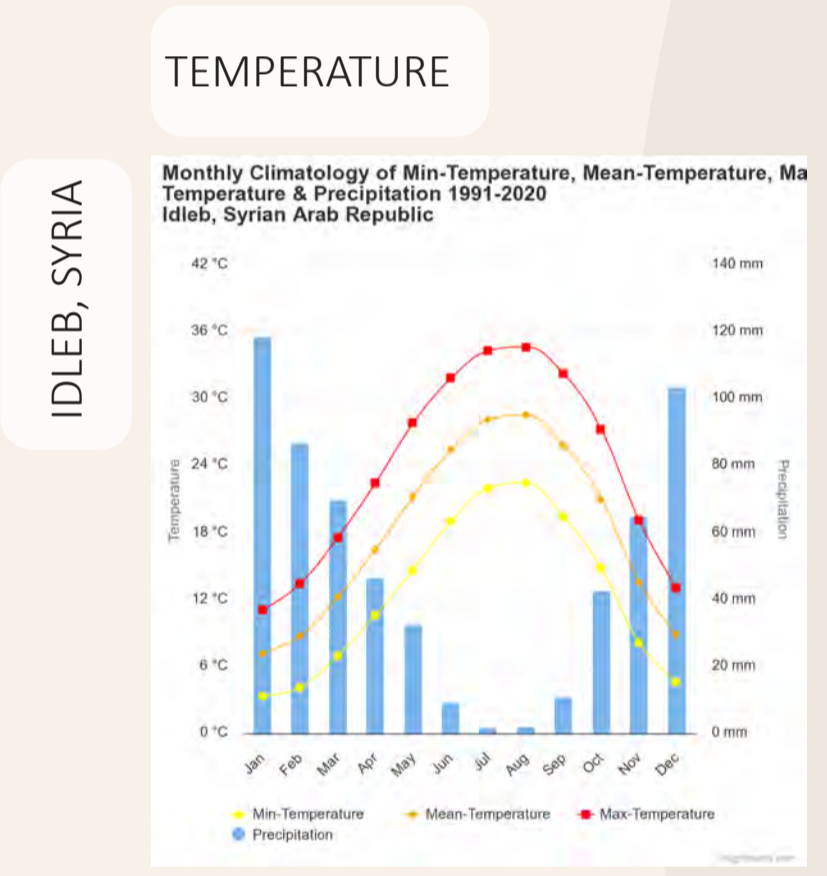
Community center activities (accessible to all ages)

- Cooking, drawing, crafts, sports, homework assistance, games, childcare, help with choosing the upper secondary



BUURTHUIS

## CLIMATE

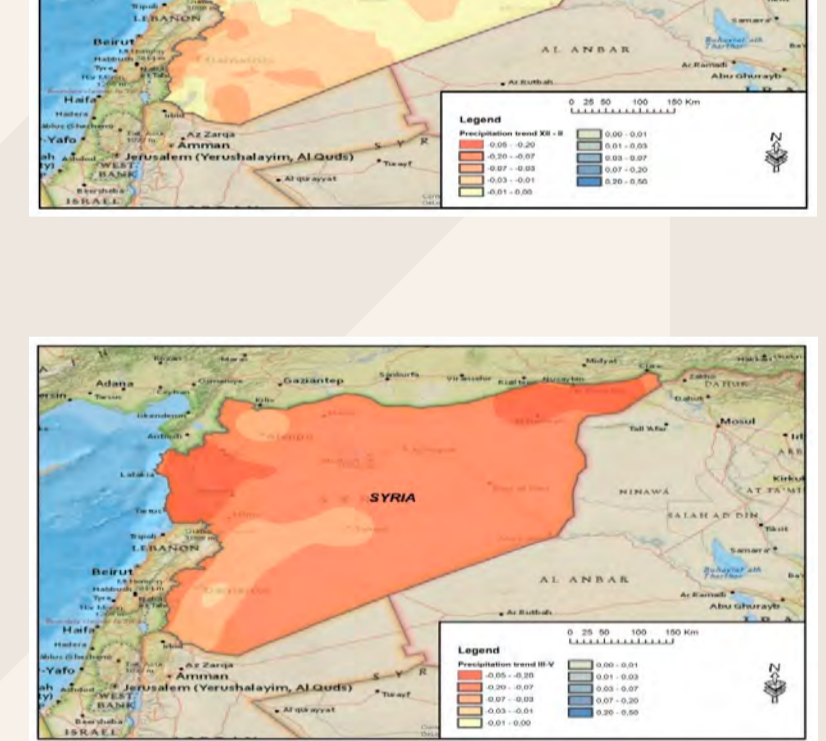
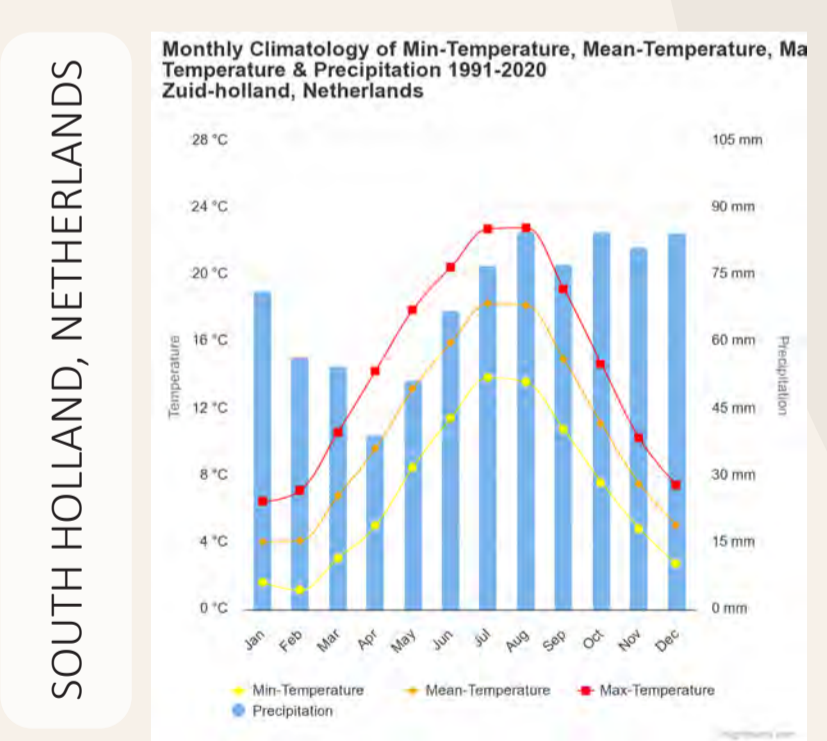


**TEMPERATURE**  
Compared to eachother Idleb and South Holland have similar temperature curves through out the year, although Syria is 3-5°C hotter.

Rain mostly falls in the colder months in Idleb. As the temperature increases the amount of precipitation decreases, and vice versa.

**SUNPATH**  
Syria being located further south than the Netherlands, means that the sun is positioned higher in the sky.

**PRECIPITATION**  
Syria has more negative precipitation than positive, which causes an arid climate



## AVAILABLE BUILDING MATERIALS

**CONSTRUCTION MATERIALS**

**EARTH**  
Abundantly available  
Good thermal insulation in hot, arid areas  
Versatile use in fences, walls, floors, and roofs

**STONE**  
Use of limestone and basalt as building materials  
Transportation and skill requirements can be disadvantages  
Often used in public buildings and homes of the affluent

**WOOD**  
Limited availability  
Necessary for beams and columns  
Preference for mulberry and poplar  
Use of wooden beams as a status symbol  
Other organic materials such as reeds, twigs, grass, and straw used for roof underlayers

**STEEL**  
Strong and durable construction material  
Widely used for beams, columns, and structural elements  
Requires skills and expertise in installation and construction  
Commonly applied in large-scale construction projects and infrastructure projects

**CONCRETE**  
High insulation value  
Heat storage capacity for improved comfort  
Strong, durable, and fireproof  
Frequently used for foundations, floors, walls, and structural elements  
Requires expertise and careful construction techniques

**CHARACTERISTICS AND BENEFITS**

**EARTH**  
Abundant supply on the construction site  
Good thermal insulation in hot, arid areas  
Versatile use

**STONE**  
Strong and durable construction material  
Often used in public buildings and affluent homes

**WOOD**  
Limited availability, primarily for beams and columns  
Preference for mulberry and poplar  
Poplars grown along irrigation ditches are resistant to decay  
Wooden beams as a status symbol  
Other organic materials for roof underlayers

**STEEL**  
Strong and durable construction material  
Widely used for structural elements  
Requires skills and expertise in installation and construction

**CONCRETE**  
High insulation value and heat storage capacity  
Strong, durable, and fireproof  
Versatile use for various construction elements

Clay is a widely used building material in Islamic architecture. Load bearing walls, beams and domes are built with clay. It is an extremely suitable material because of its heat insulating factor. In addition, it is a sustainable material, because clay has few negative environmental consequences.



## BUILDING PHYSICS

### COLORS

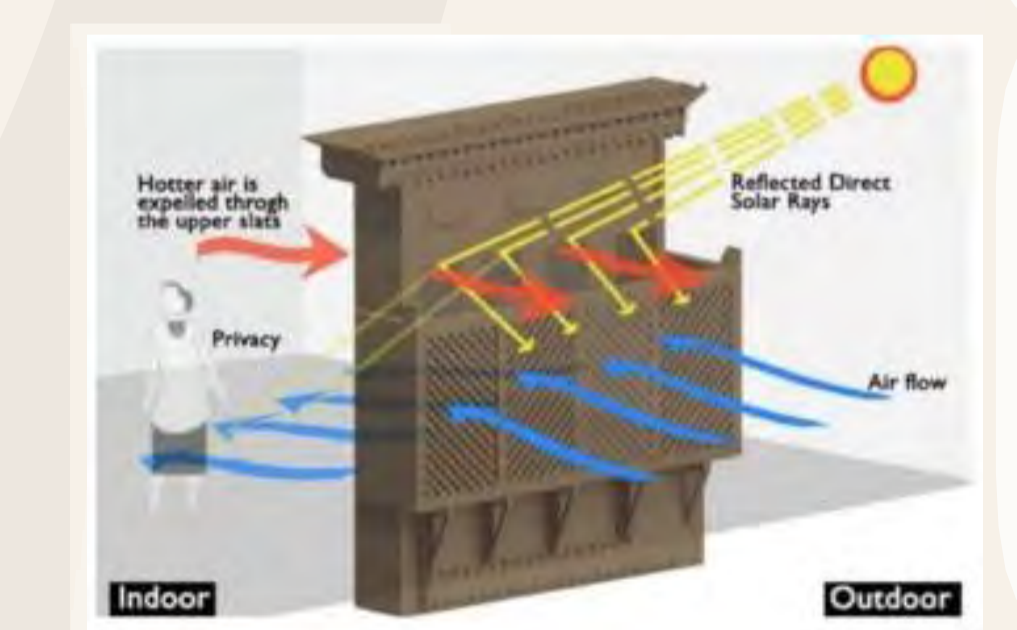


Bright colors can reflect sunlight off a building, while dark colors tend to absorb sunlight. Thus, the predominant use of light-colored building can be viewed as a means of temperature control because of how such materials help prevent the inside of a building from overheating.

### SEHAN



Apart from their aesthetic, courtyards play a role in regulating the temperature in a home. The fountains and pools have a particularly symbolic meaning, but it also helps to cool the air and nourish the plants that provide shade. Moreover, its serene musicality eclipses any aggressive sound from the nearby city.

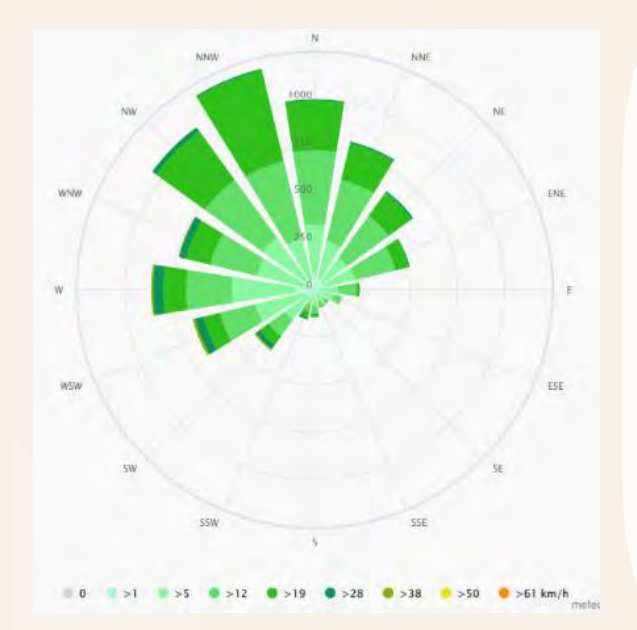
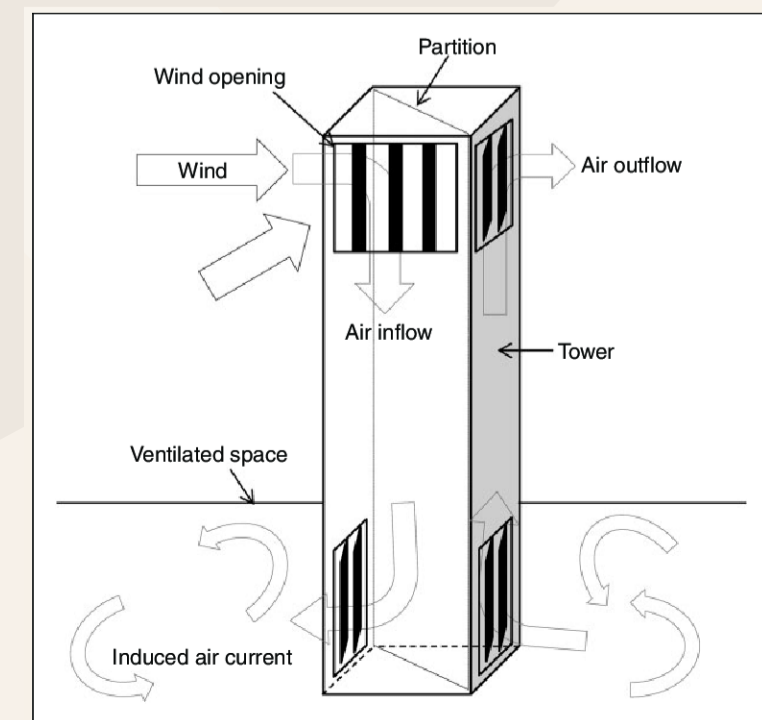


### MASHRABIYA

Traditionally used to catch wind and for passive cooling. At night it absorbs moisture carried on the wind and passing through the interstices. When heated by sunlight it releases the moisture into the air that passes through, thereby increasing humidity within a home and reducing its temperature.

Often found on the second floor, which provides a degree of protection and shade for the lower floor windows of a home.

### MALQAF

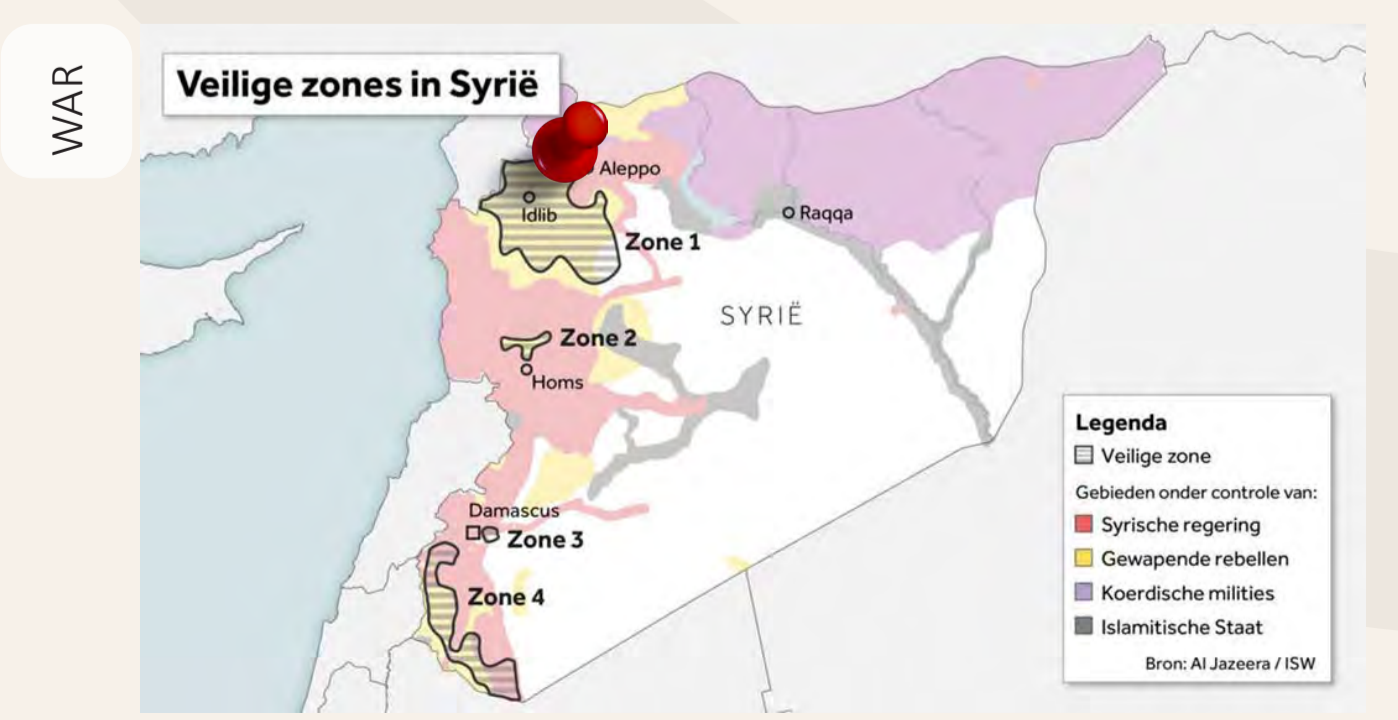
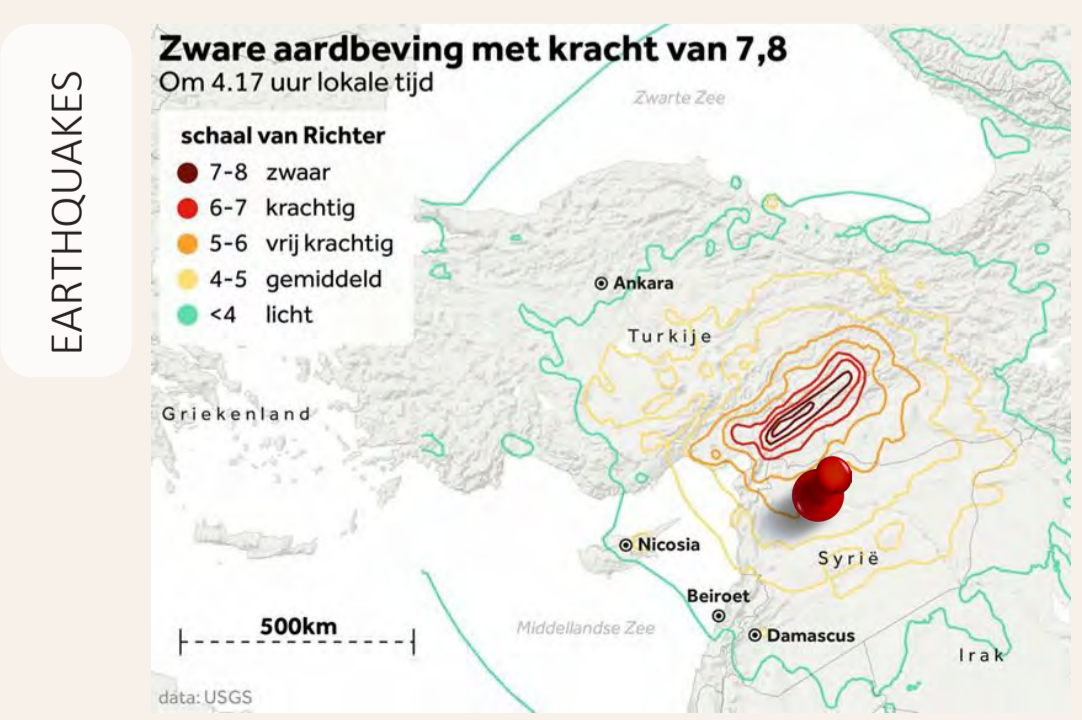


A windcatcher is an early form of architecturally based ventilation that relies on differences in temperature gradients to cool the interiors of different houses.

One-sided and two-sided wind catchers are more popular in regions with single-directional wind flow and are considered as economical and sustainable forms of ventilation. The high flow of uninterrupted wind in a one-sided wind catcher is the major reason for its popularity.

The wind in Syria mainly blows towards the northwest, therefore a two-sided wind catcher is the best option for the school for more efficient airflow circulation and better performance.

## SAFETY



Children's mental health problems	Percentage (%)
Become more aggressive	80
Speech ability and speech impairment	48
Risk of mental disorder	25
Chronic stress and PTSD	71

# SCHOOL VARIANTS

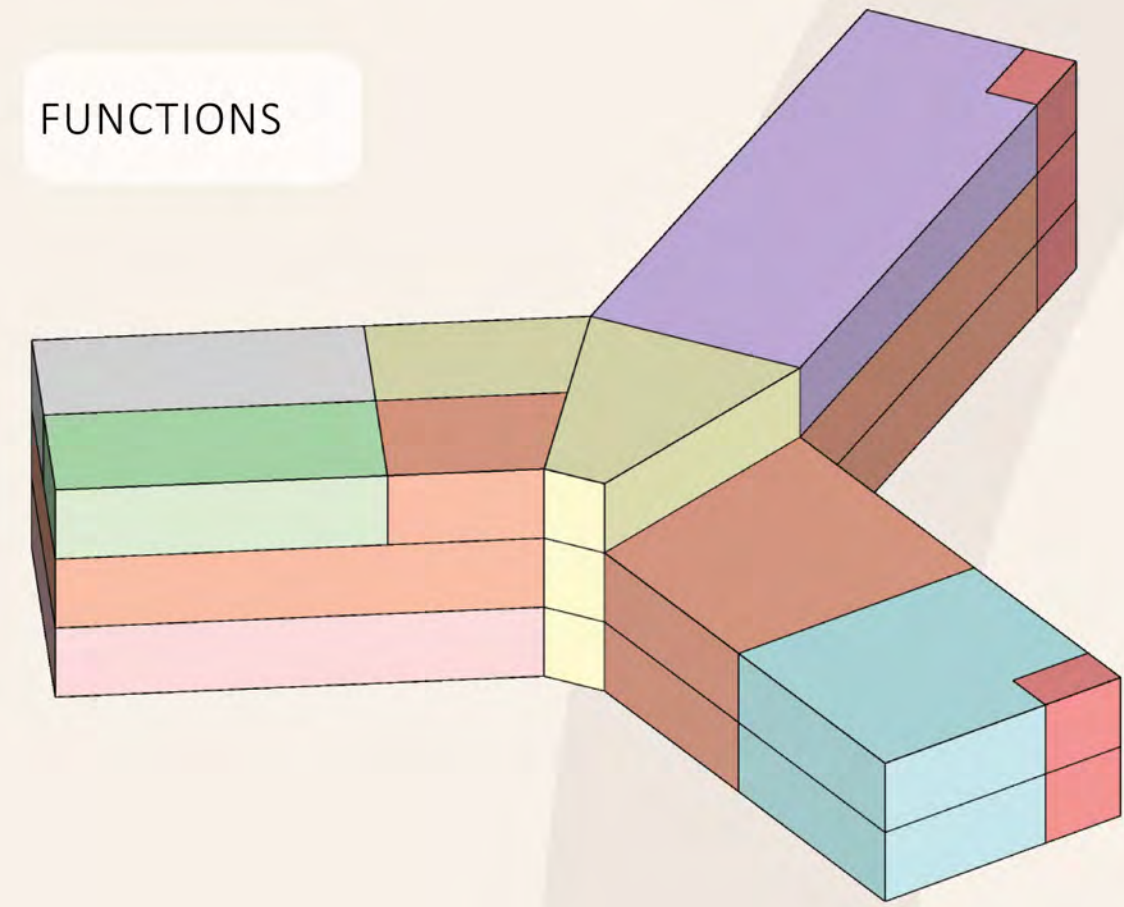
## VARIANT 1

“ Just a peace of art ”

FACADE



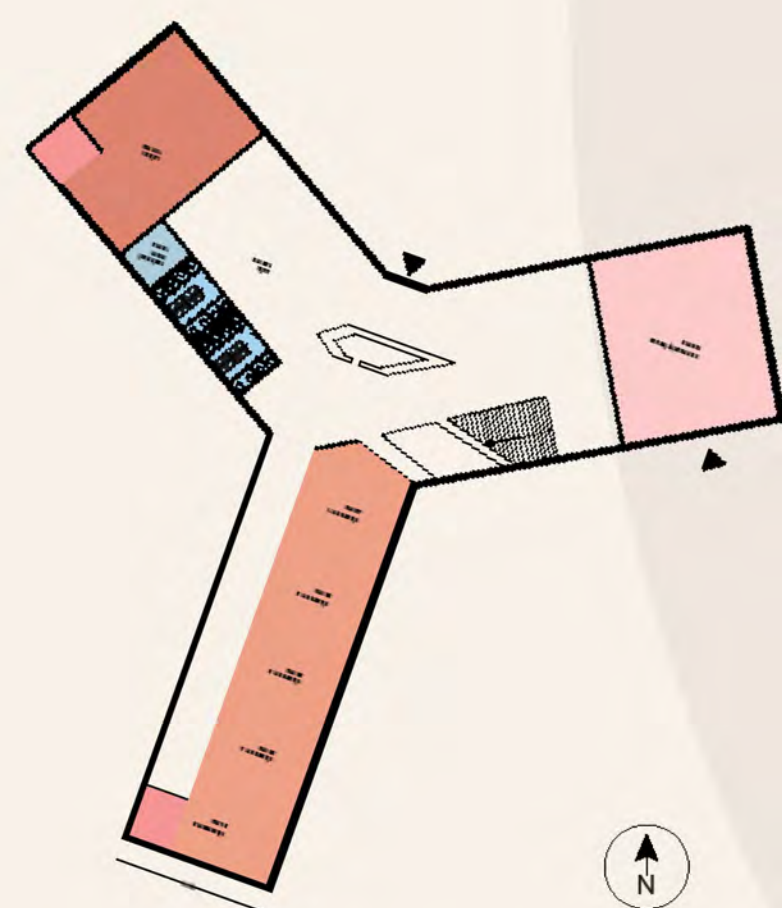
FUNCTIONS



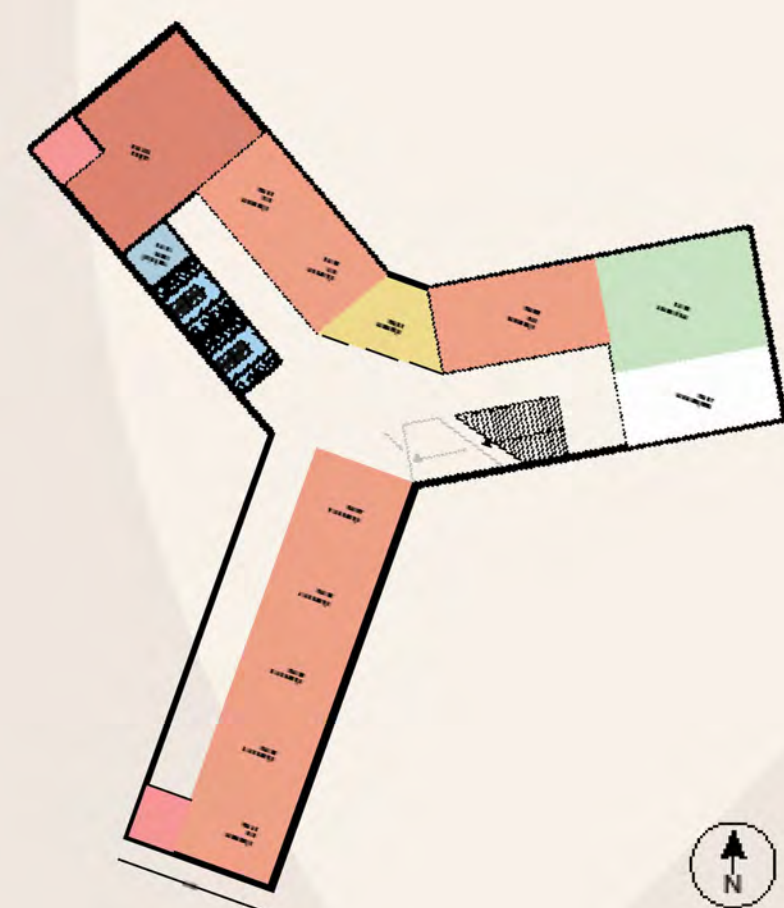
CONCEPT

The concept for the design of an elementary school building with modern architecture and a touch of old-school Syrian architecture aims to create an inspiring learning environment that is both aesthetically appealing and functional. The design features a striking façade with a section angled at 4 or 7 degrees, providing ample shade and enhancing the livability of the building while reducing energy consumption. This fusion of styles combines the simplicity and elegance of modern architecture with the historical characteristics of old-school Syrian architecture.

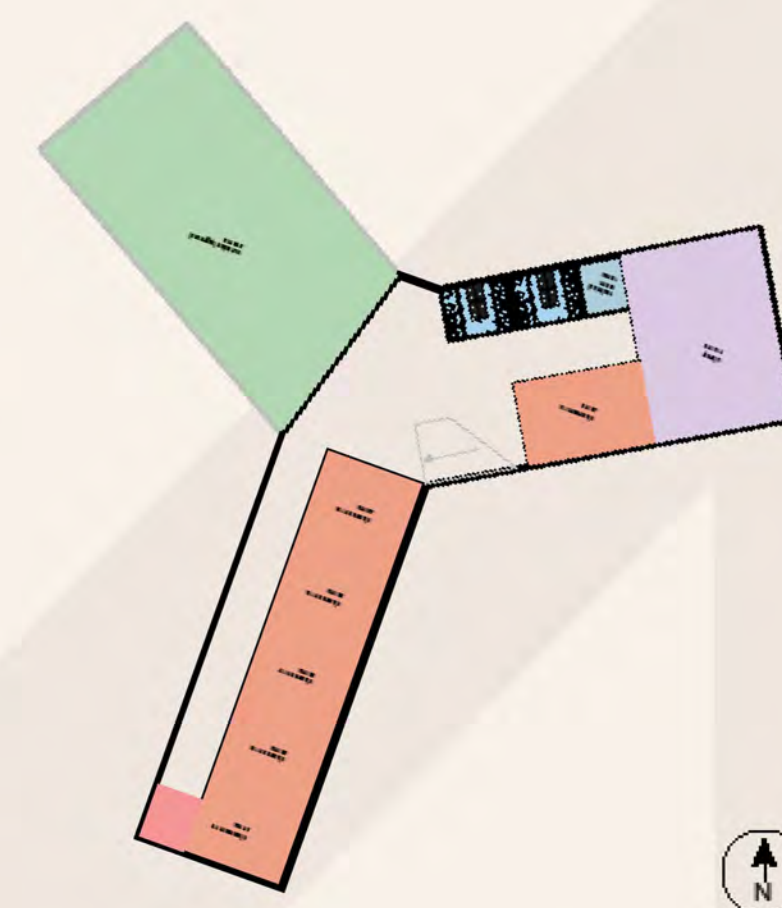
Furthermore, the building has the shape of a peace sign, which adds a beautiful meaning to the structure in combination with its reference to the prison.



GROUND FLOOR



1ST FLOOR



2ND FLOOR

- CLASSROOM
- LARATORIUM
- PRAYER ROOM
- TEACHERS LOUNGE
- LIBRARY
- EMERGENCY STAIRS
- COMMUNITY CENTRE
- RESTROOM
- CONSULTATION ROOM
- TECHNICAL AREA

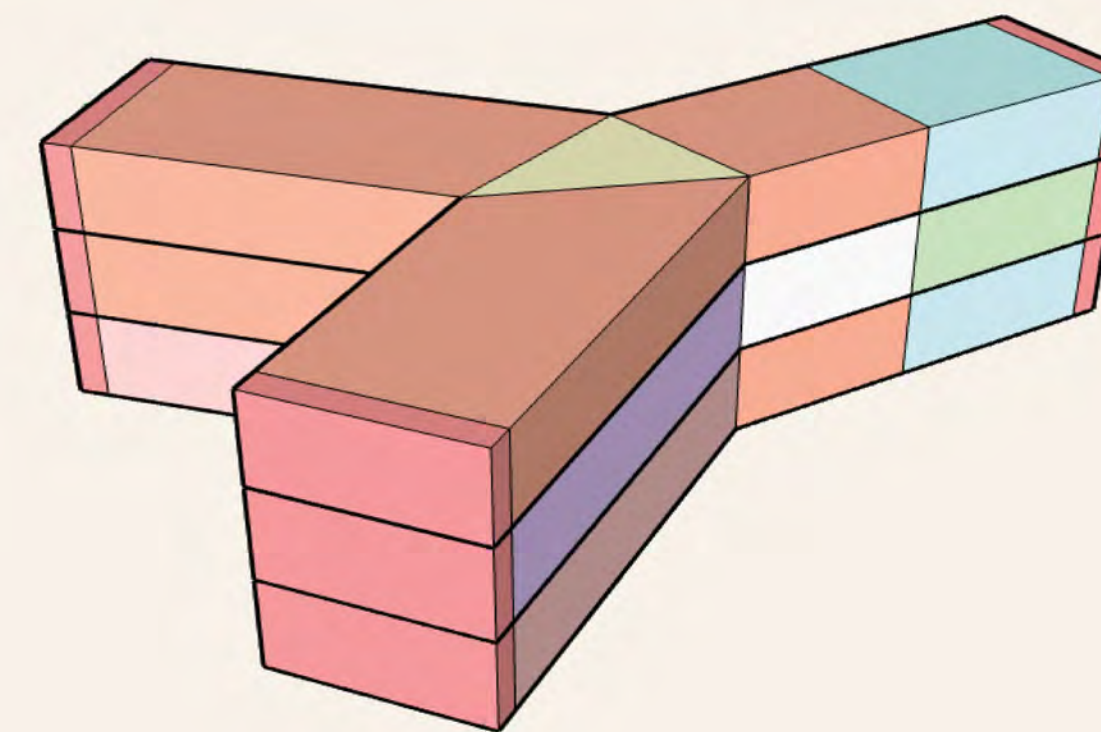
## VARIANT 2

“ Peace of cake ”

FACADE

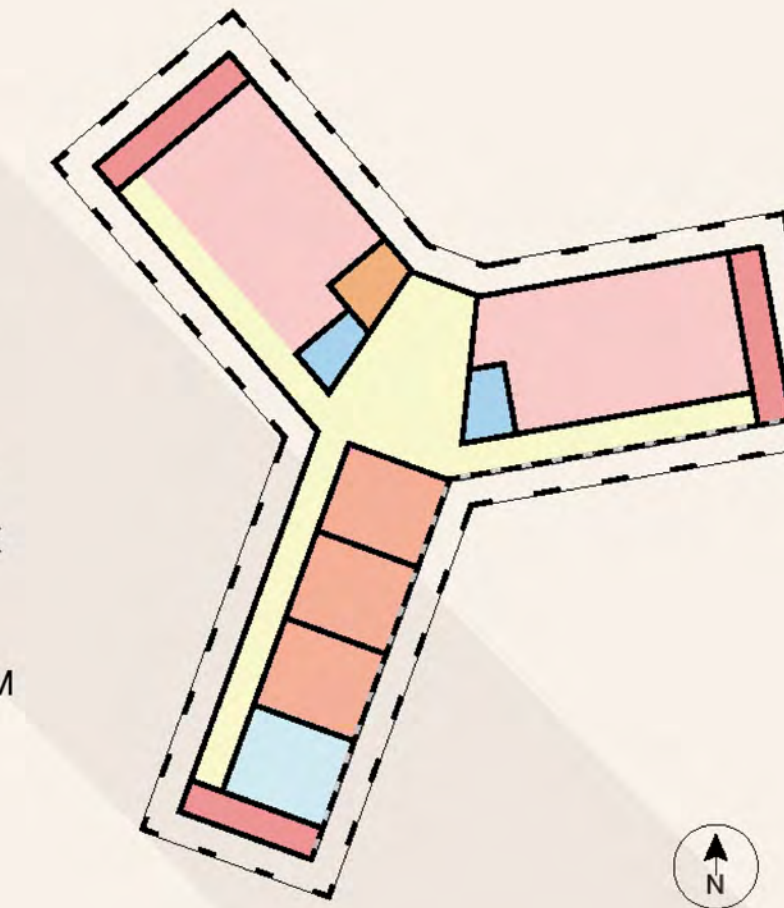


FUNCTIONS

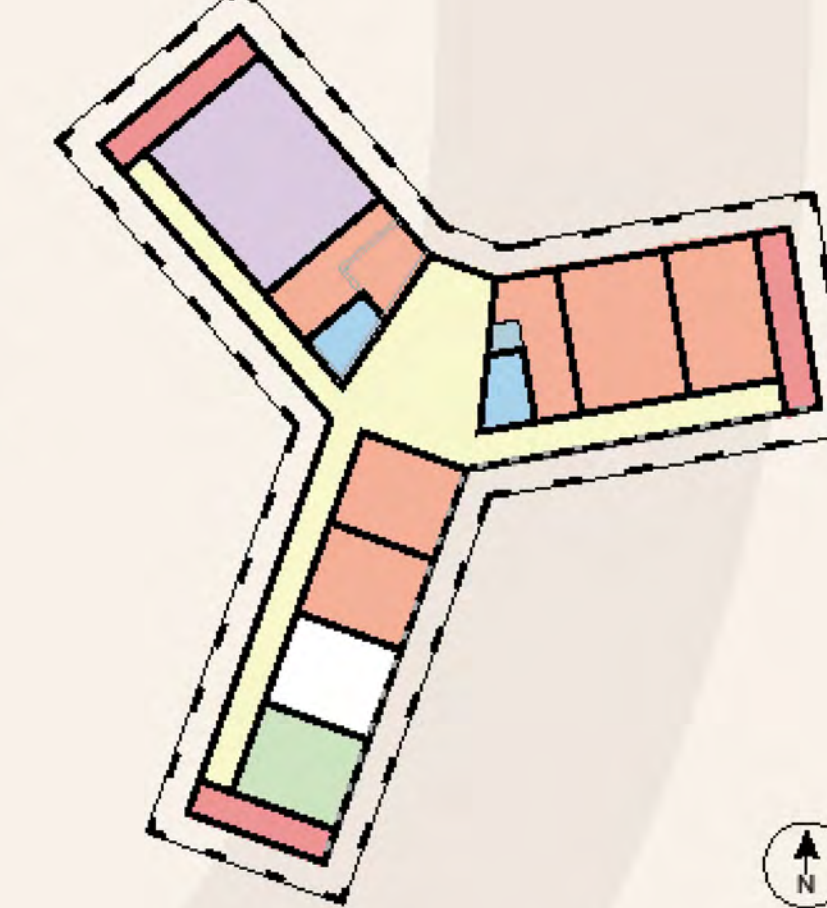


CONCEPT

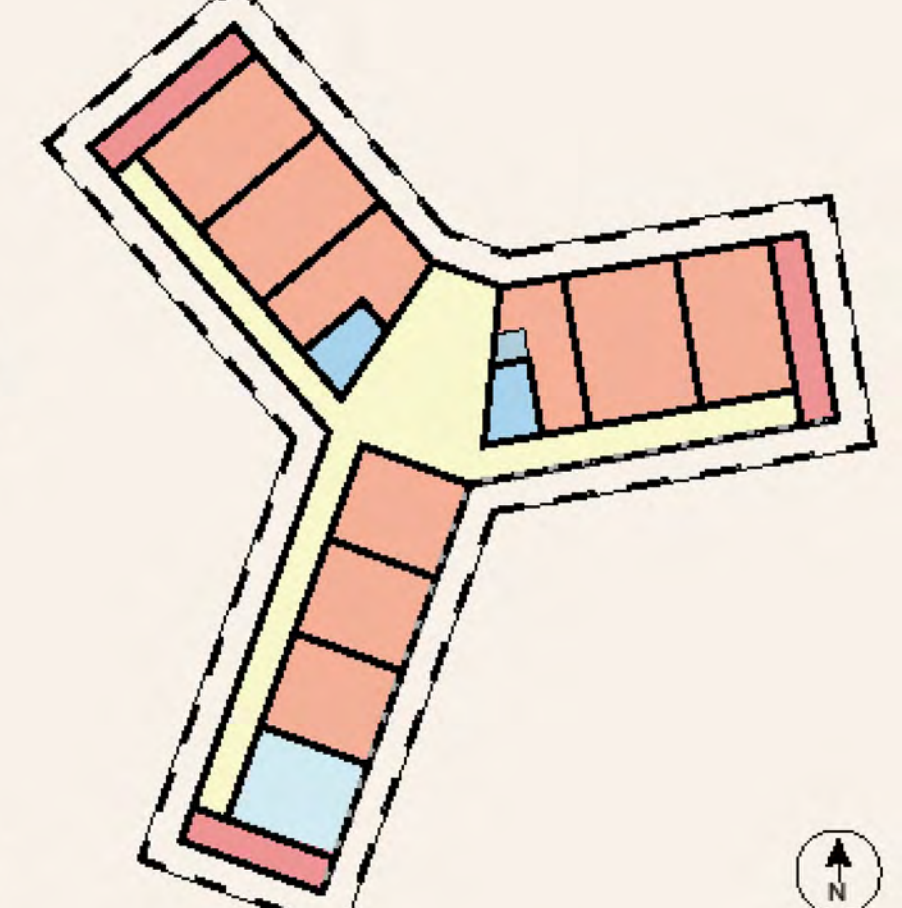
The building has four floors. The ground floor consists of the community center, classrooms and the lab. Because the community center is used after school, it is useful if it is placed on the ground floor. There was also enough space for the classrooms and a lab. The lab is located next to an emergency staircase in case of an emergency during an experiment. The 1st floor is also filled with classrooms. The teachers' room, library and prayer room are placed on the 1st floor so that it is central and is almost the same distance for everyone. The third floor is filled with classrooms. There also is a cellar. This is in case of an emergency



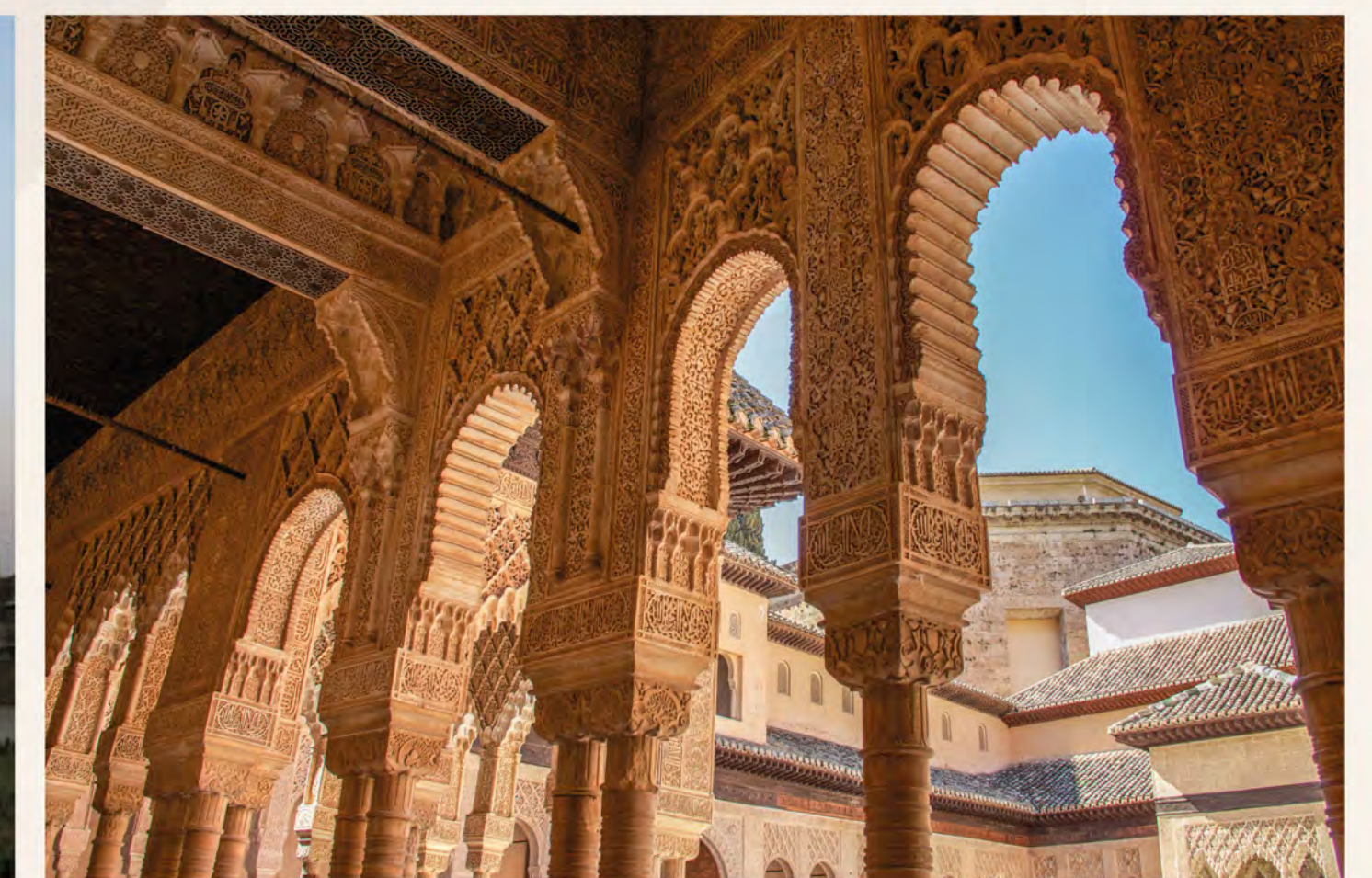
GROUND FLOOR



1ST FLOOR



2ND FLOOR



# SCHOOL VARIANTS

## TECHNOLOGY & CONSTRUCTION

CONCEPT



For our design variation, we are utilizing the construction method called "cast-in-place construction" or "cast-in-situ construction." In this approach, structural elements such as columns, floors, and beams are formed by pouring concrete into molds on-site and allowing it to set and harden. To reduce the weight of the floors, hollow concrete blocks are incorporated between the reinforcements. The entire floor is then fully poured with concrete. By using hollow concrete blocks, the construction bears less weight and transfers fewer loads to the columns and beams. However, it is still crucial to have some solid load-bearing walls to ensure the stability of the building.



### LEEMSTEEN

- Sustainability and low maintenance
- Good thermal insulation
- Natural moisture regulation
- Good sound insulation
- Renewable and locally available



### HOLLOW CONCRETE BLOCKS

- Sustainability and low maintenance
- Good thermal insulation
- Natural moisture regulation
- Good sound insulation
- Renewable and locally available



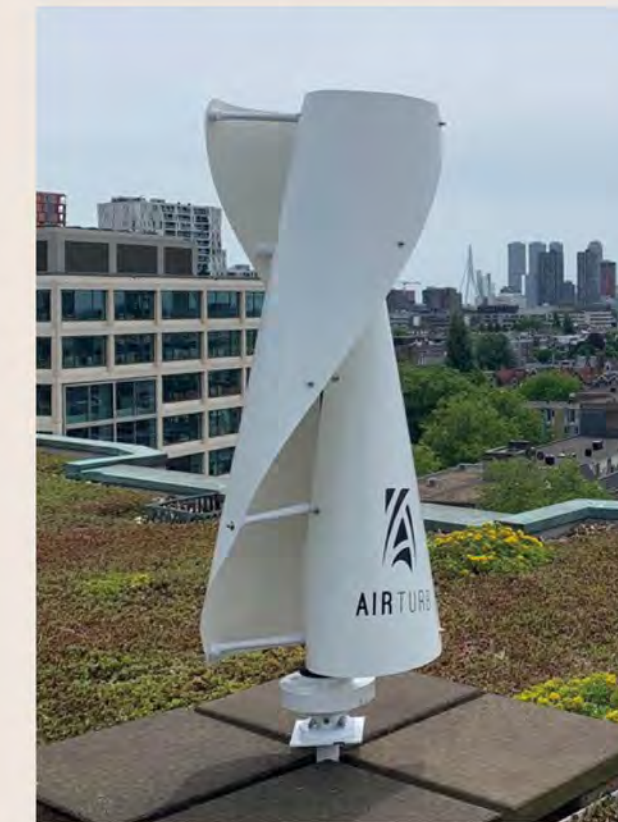
### SHEEP WOOL INSULATION

- Sustainability and low maintenance
- Good thermal insulation
- Natural moisture regulation
- Good sound insulation
- Renewable and locally available

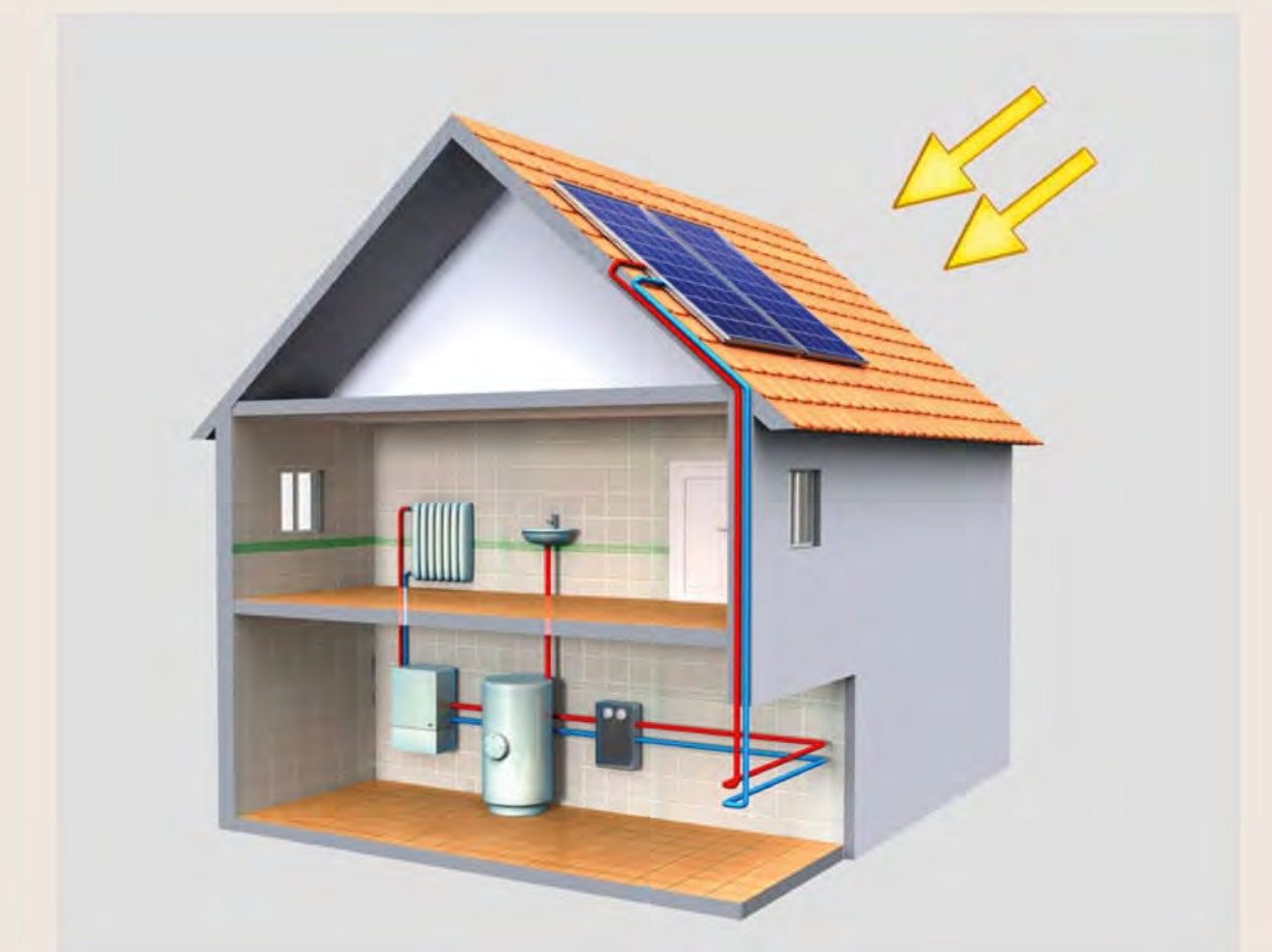
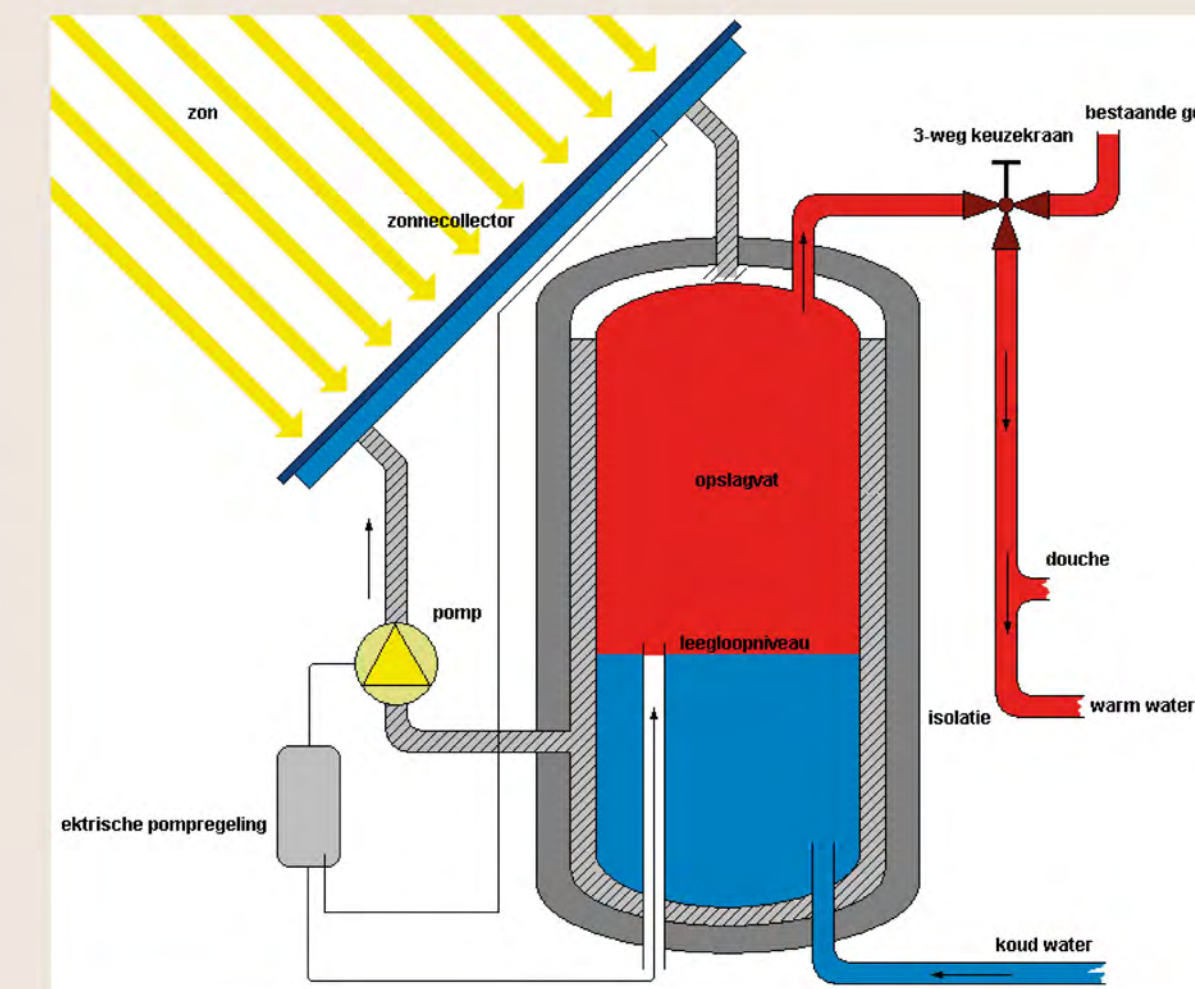
## HARRIS PROFILE

	-2	-1	1	2		-2	-1	1	2
Just a peace of art (variant 1)					Peace of cake (variant 2)				
Aesthetic			█	█	Aesthetic			█	█
Logical layout			█	█	Logical layout			█	█
All areas are present			█	█	All areas are present			█	█
Escape routes are available		█			Escape routes are available		█		
Analyses take into consideration		█			Analyses take into consideration		█		

### WIND TURBINE



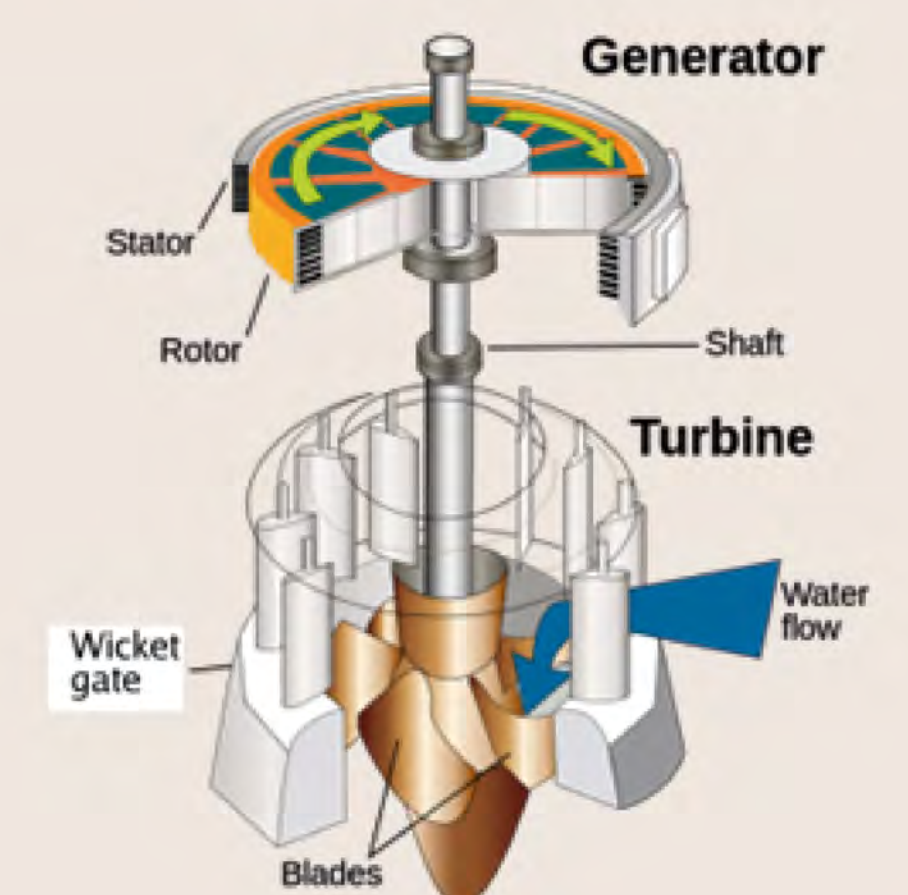
### SOLAR WATER HEATER



### UV PANELS

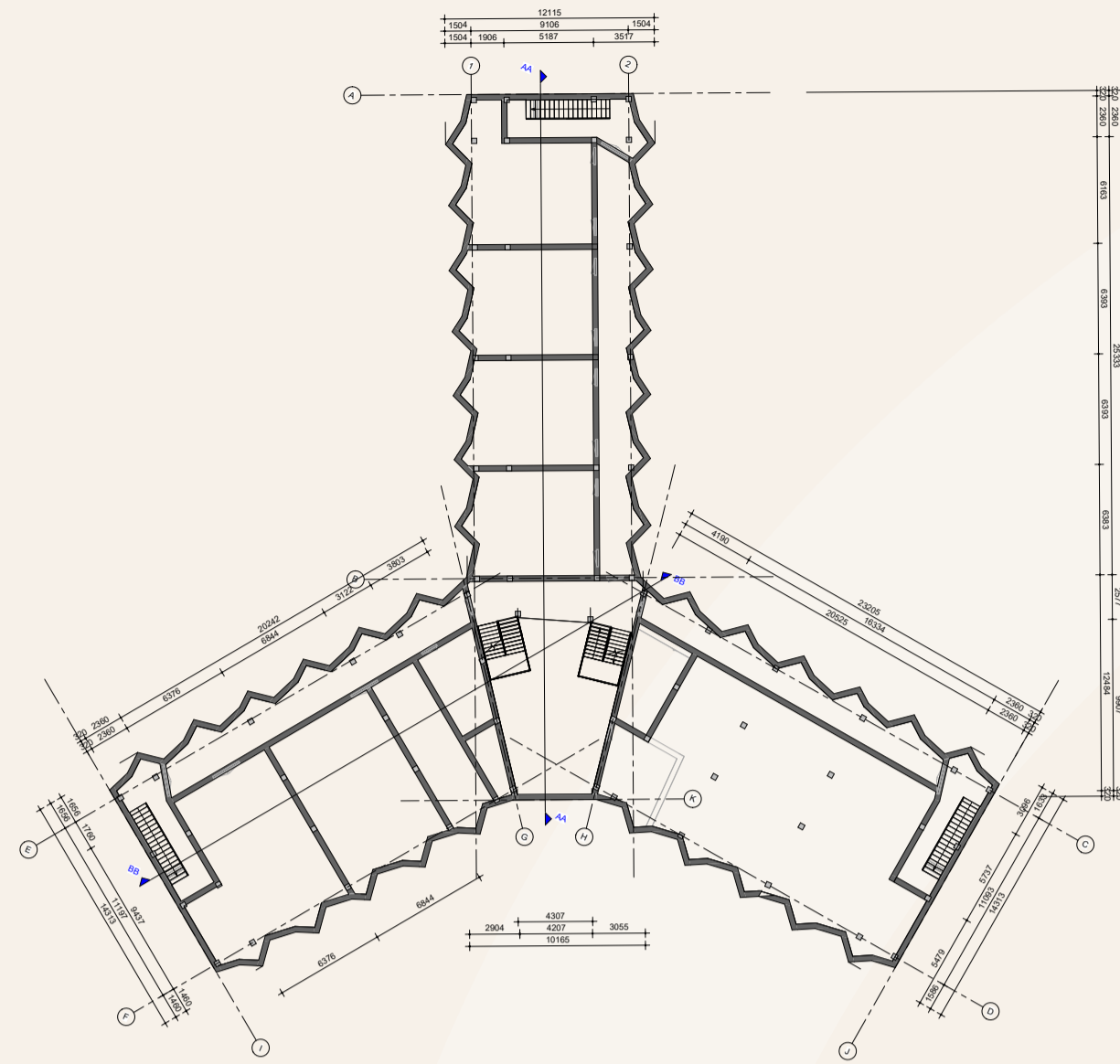


### WATER TURBINE

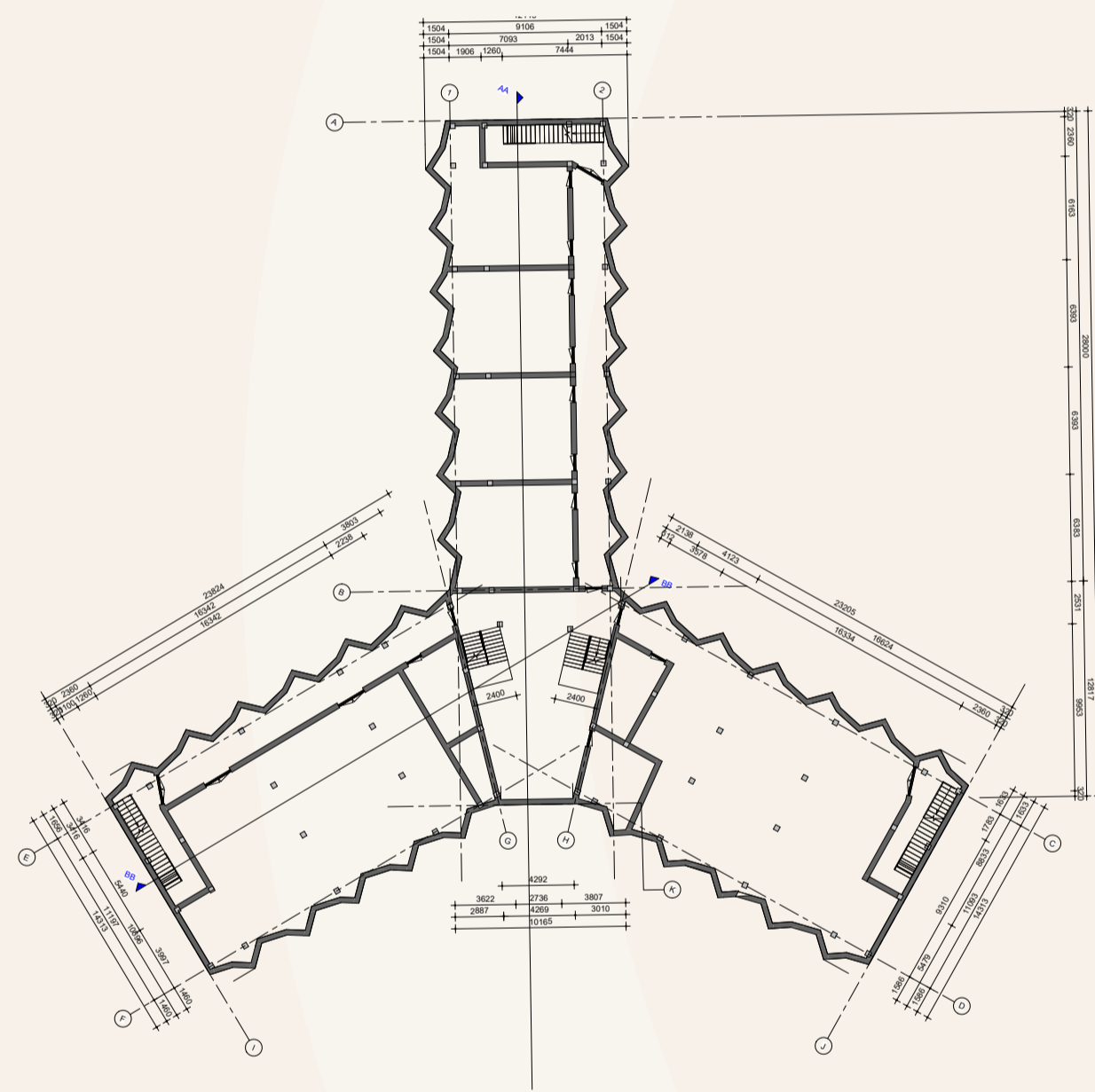


# FINAL DESIGN

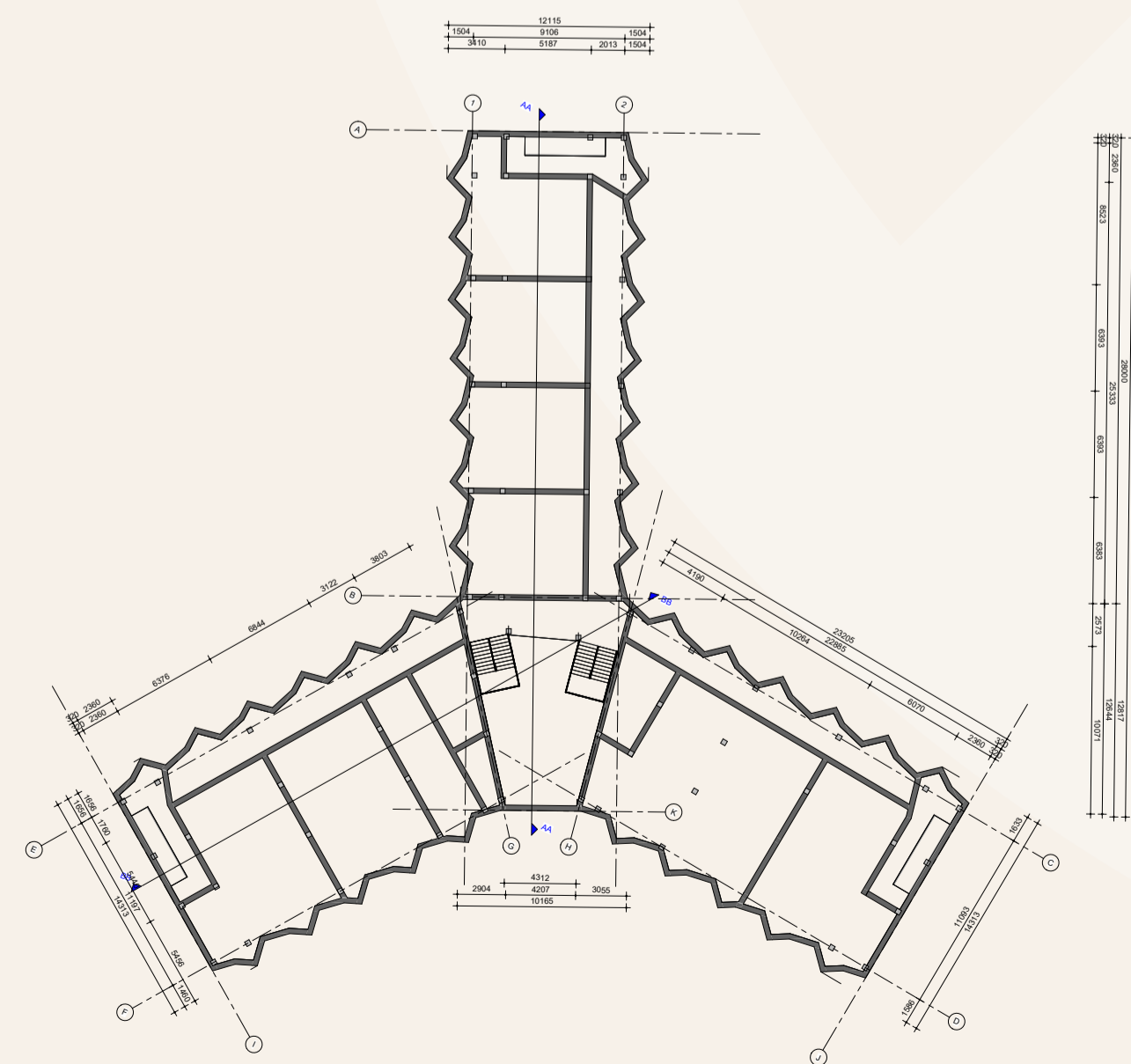
## FLOORPLANS



GROUND FLOOR 1:400



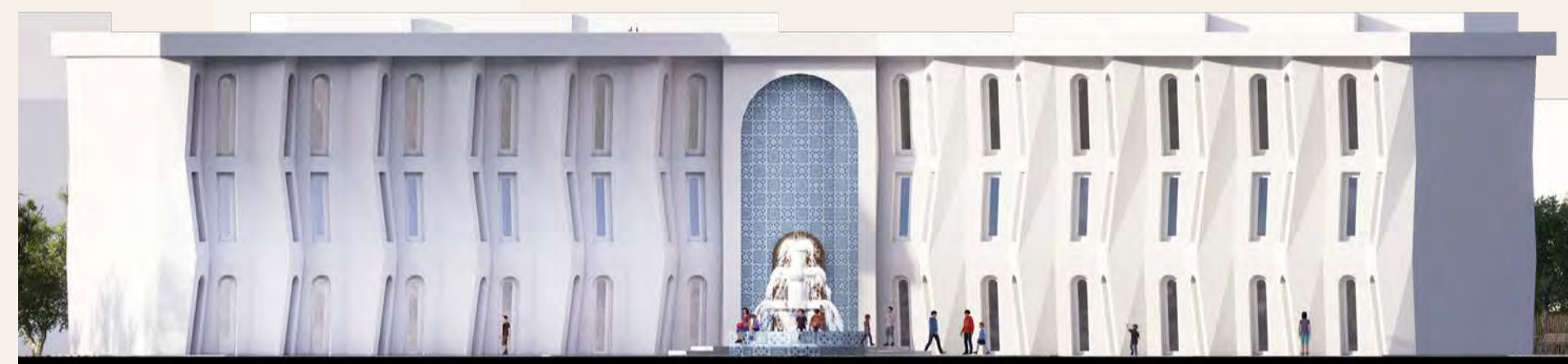
FIRST FLOOR 1:400



SECOND FLOOR 1:400



## VIEWS

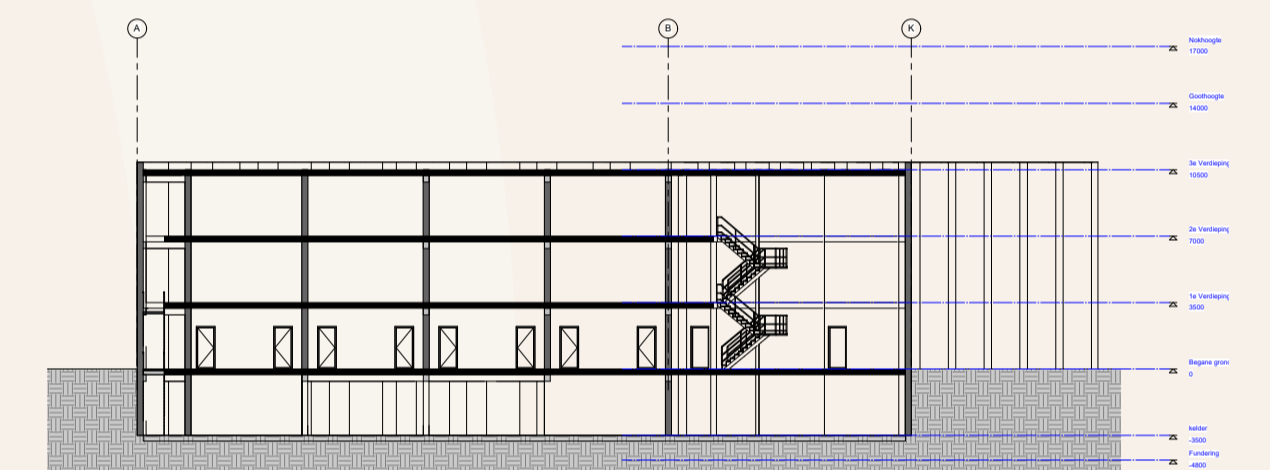


FRONT SIDE 1:200

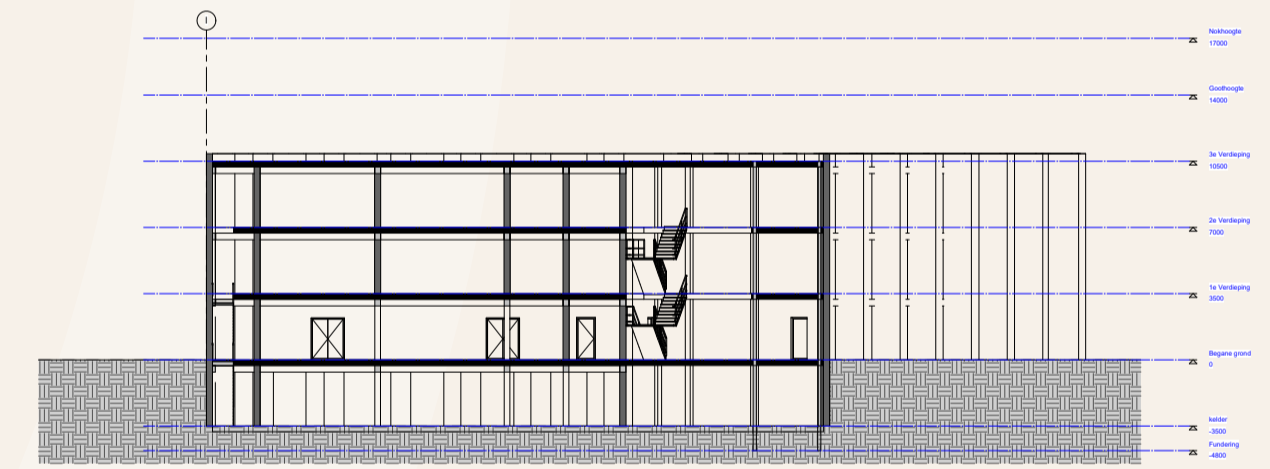


RIGHT SIDE 1:200

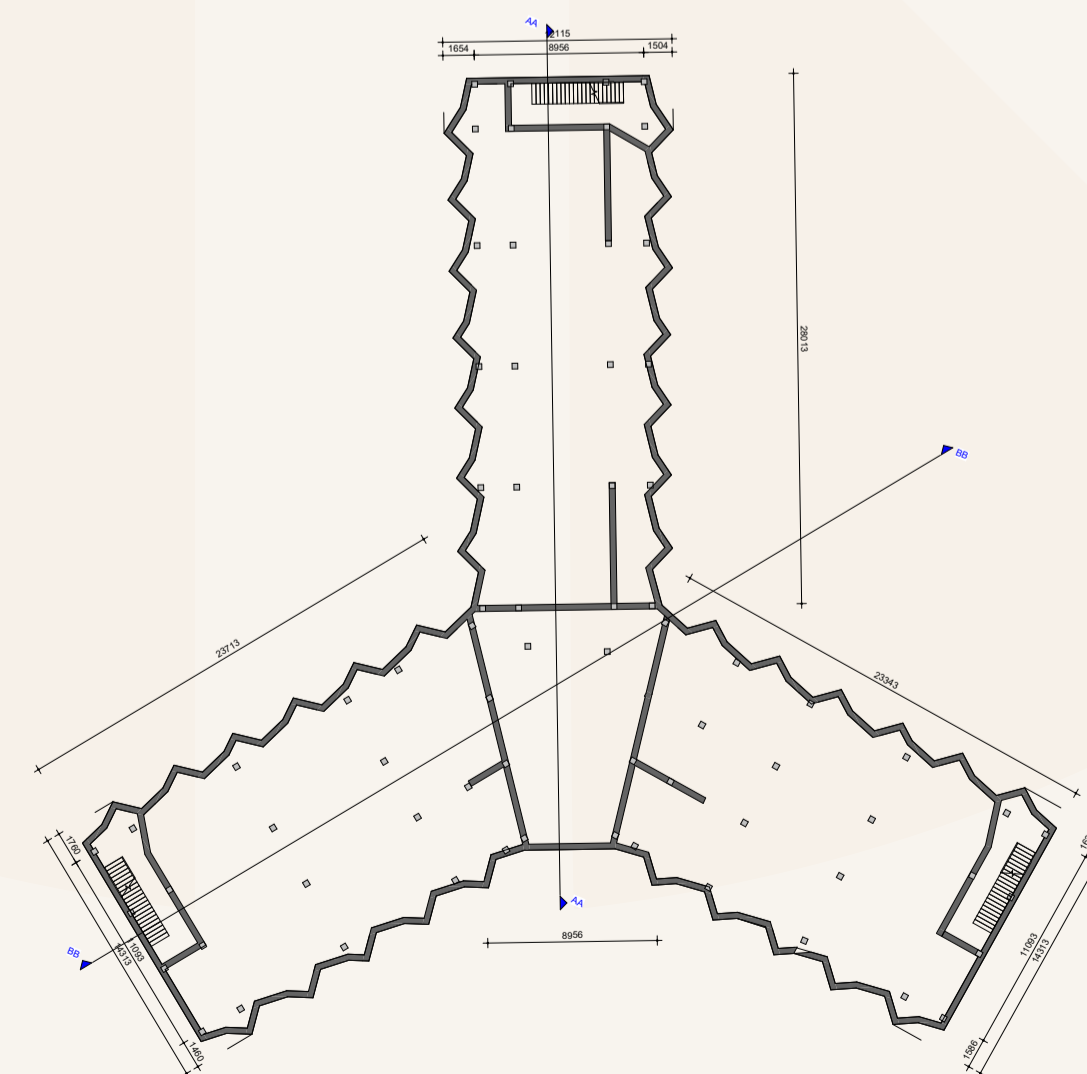
## SECTIONS



AA 1:400



BB 1:400



BASEMENT 1:400

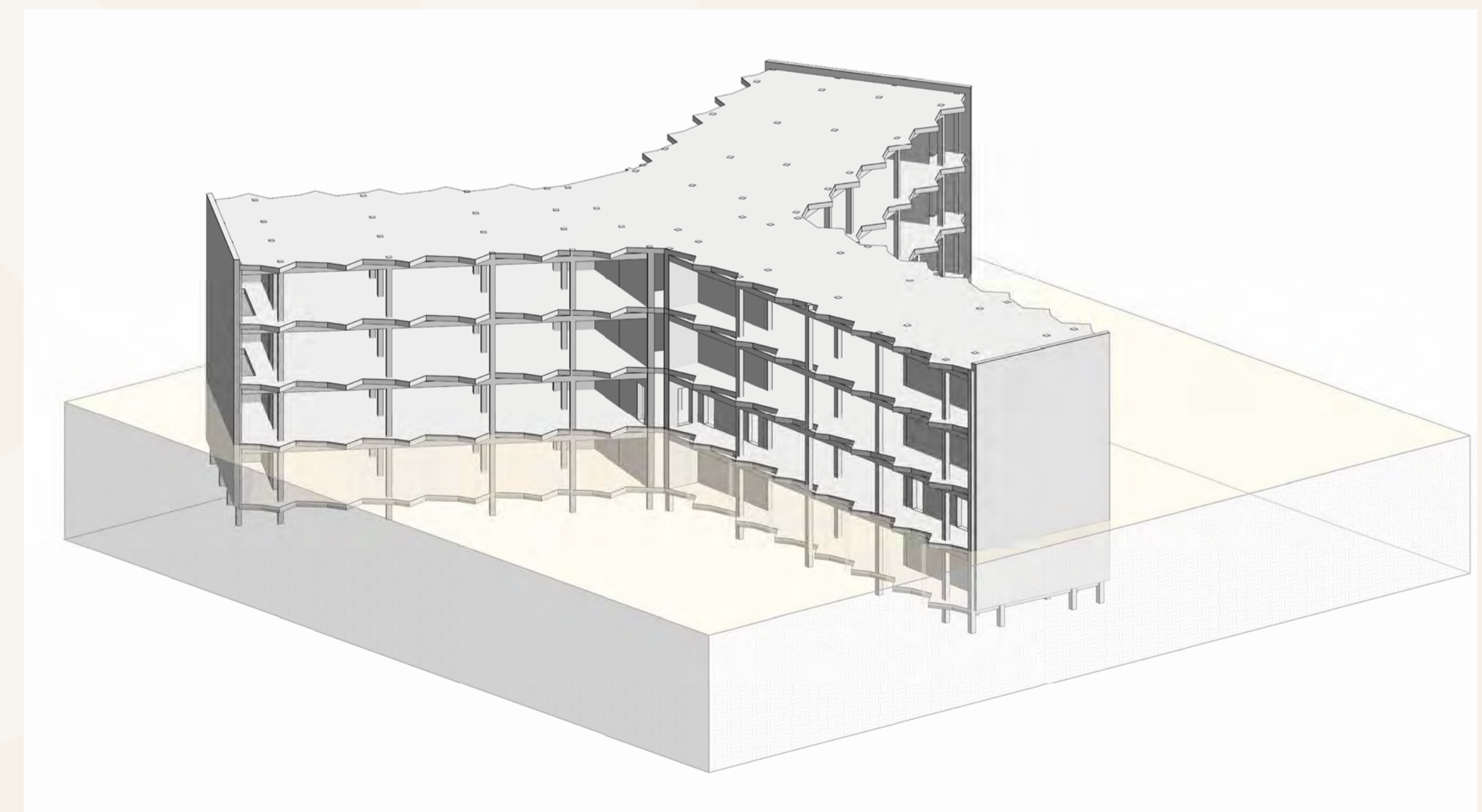
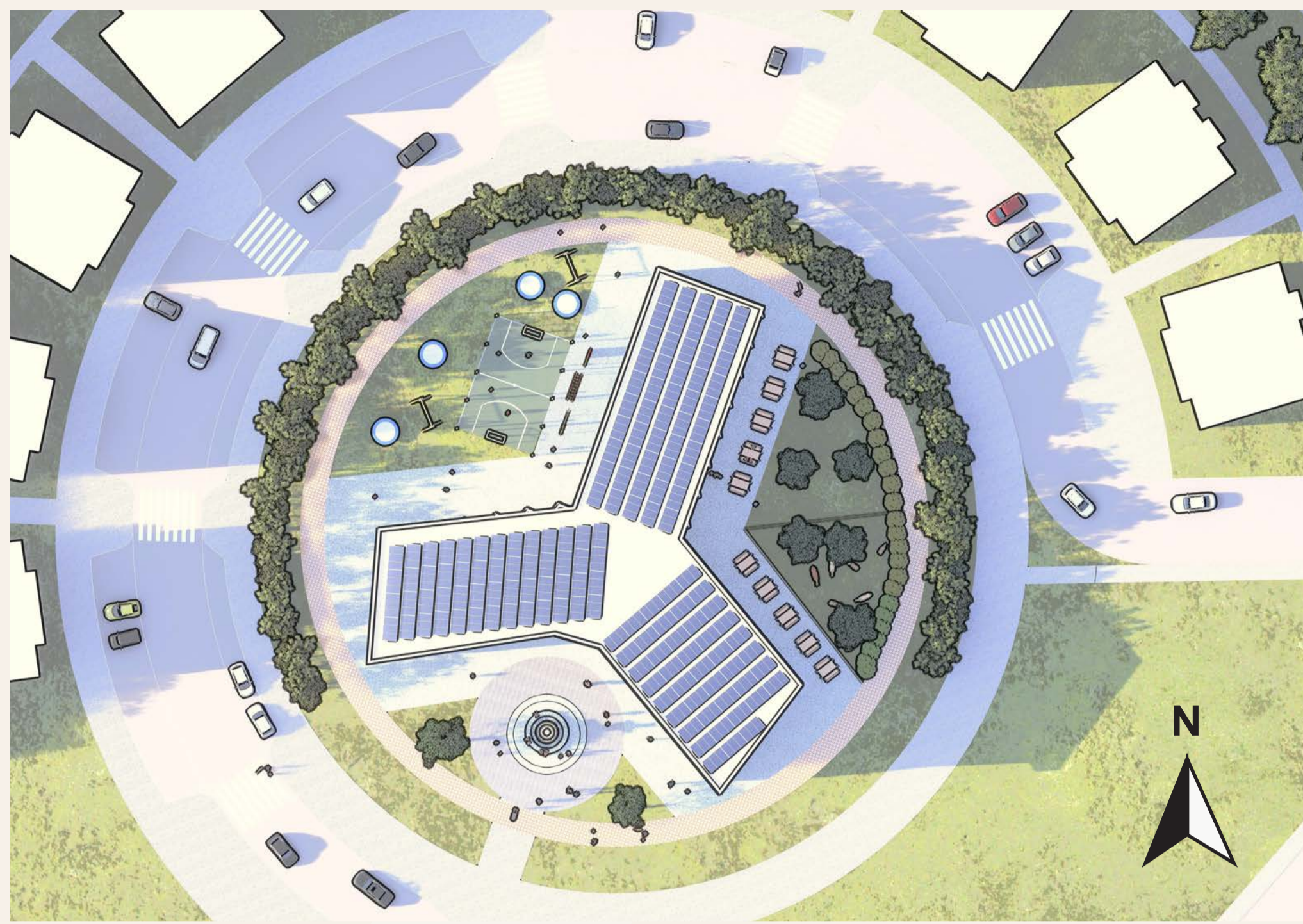


IMAGE OF THE CONSTRUCTION



SITUATION 1:500

## CONSTRUCTION

### BEAMS WITH THE RULES OF THUMB

#### Roof

Roof beam:  $1/12,5 \times \text{length} \rightarrow 480 \text{ mm}$   
 Width:  $1/2 \times \text{width} \rightarrow 240 \text{ mm}$

#### Floor

Floor beam:  $1/14,5 \times \text{Length} \rightarrow 420 \text{ mm}$   
 Width:  $1/2 \times \text{Height} \rightarrow 210 \text{ mm}$

### CULUMS WITH THE RULES OF THUMB

Floor elevation height is 3500 mm  
 Culum:  $1/12 \times \text{Length Floor} \rightarrow 295 \text{ mm}$

### FLOORS WITH THE RULES OF THUMB

Floorthickness:  $1/28 \times \text{Length} \rightarrow 215 \text{ mm}$ .  
 (The Cellarfloor will be 250 - 300 mm incl. reinforcement, Wallthickness min. 120 mm)



BEAMS  
 STABILITY WALLS  
 CULUMS



## DAYLIGHT

In an educational function, an equivalent daylight area (Ae) of at least 5% of the occupied area or at least 0.5 m2 must be present.  
 For daylight calculations, the largest room of each wing is tested for each floor.

	Opp VG	Left wingM	id wingR	ight wing
<b>Ground floor</b>				
Ad (Opp window x number)	0,8 x 10 = 8	0,8 x 4 = 3,2	0,8 x 20 = 16	
Ae	5,50 (3,2%) 8,6 (5%)	2,20 (4,4%) 2,5 (5%)	11,01 (5,5%)	
<b>First floor</b>				
Opp VG	70	50	176	
Ad (Opp window x number)	0,62 x 4 = 2,48	0,62 x 4 = 2,48	0,62 x 8 = 4,96	
Ae	1,71 (2,4%) 8,6 (5%)	1,71 (3,4%) 2,5 (5%)	3,41 (1,9%) 8,8 (5%)	
<b>Second floor</b>				
Opp VG	70	50	105	
Ad (Opp window x number)	0,8 x 4 = 3,20	0,8 x 4 = 3,2	0,8 x 11 = 8,8	
Ae	2,20 (3,1%) 3,5 (5%)	2,20 (4,4%) 2,5 (5%)	6,05 (5,7%)	

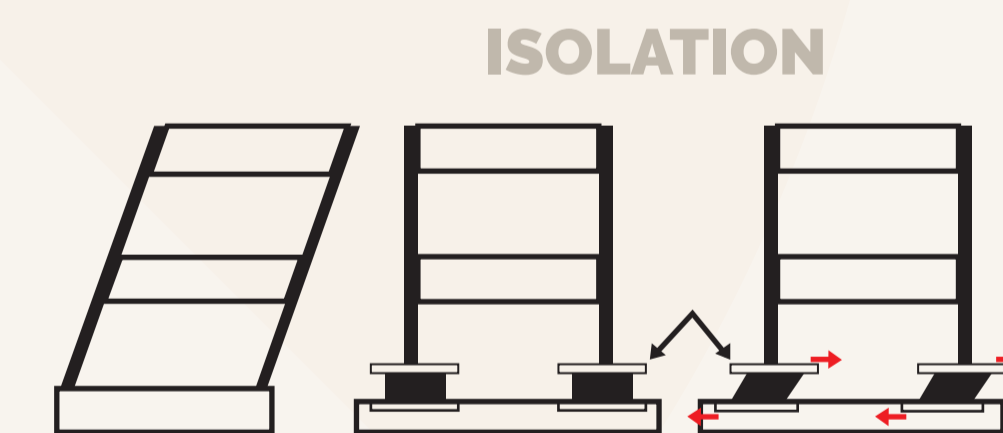
First test: **red does not meet** & **green is minimum requirement**  
 Ae



## BASE ISOLATION

Dampers are placed between foundation and building, which absorb the forces of earthquakes. In this way, the foundation moves smoothly with the quake, while the building remains in place. The dampers consist of steel, rubber and lead.

Because of the extra solid foundation and shock absorbers under the floor, extra space for underground construction must be taken into account. The base isolation is 15 cm and the beams will be 20% thicker, so they will have dimensions of 510 x 255 mm.



## VENTILATION

Ventilation system D is chosen for the following reasons:

1. High-quality air: It provides excellent indoor air quality by filtering fresh outside air and removing polluted air.
  2. Energy efficiency: With heat recovery technology, it recovers heat from the extracted air to preheat the incoming fresh air, reducing heating costs.
  3. Low noise: The system is typically designed with the fan located outside, ensuring a quiet and comfortable indoor environment.
  4. Flexibility: It can be tailored to meet the specific ventilation needs of different spaces, allowing for controlled and personalized airflow.
- Prevention of condensation and moisture issues: By controlling ventilation and humidity levels, ventilation system D helps prevent condensation and moisture problems in buildings.



## DETAIL 1:10

