

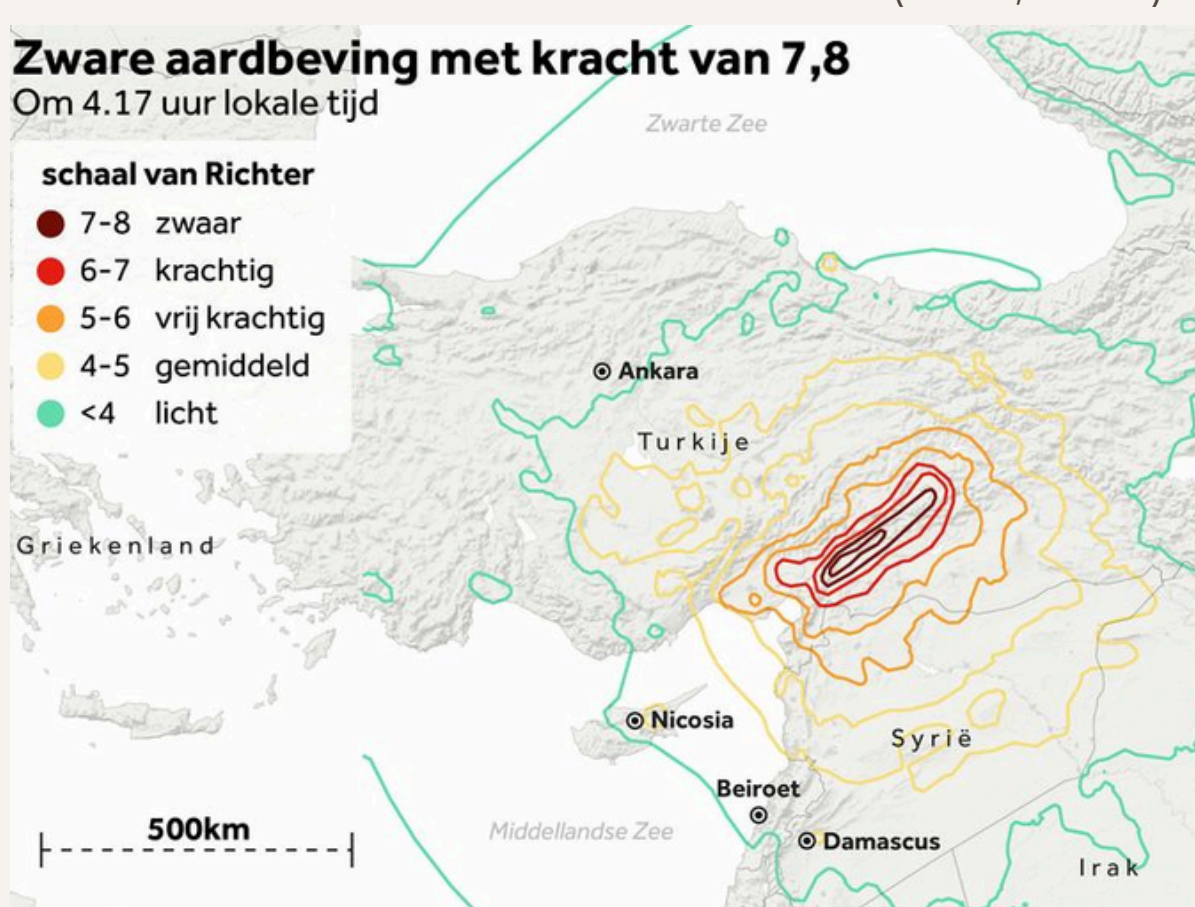
RESEARCH

Environment



Safety

Earthquakes

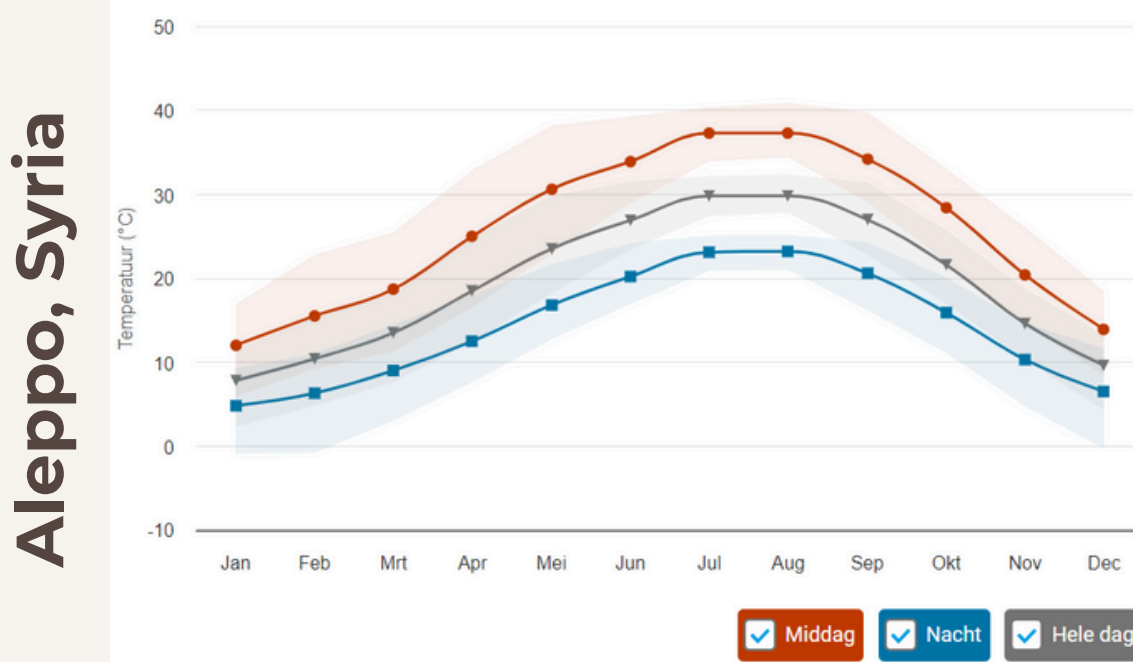


Mental health childern in Syria:

Millions of children in Syria have been traumatized by wars and earthquakes. They have lost many loved ones and seen violence. This has caused the mental health of these children to deteriorate significantly.

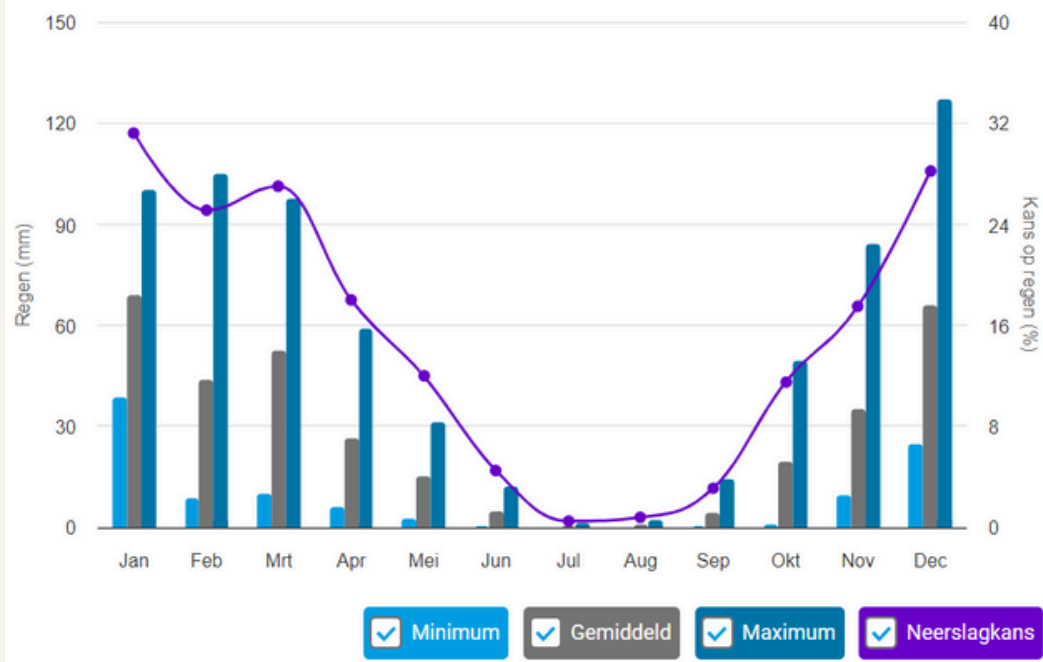
Climate

Temperature



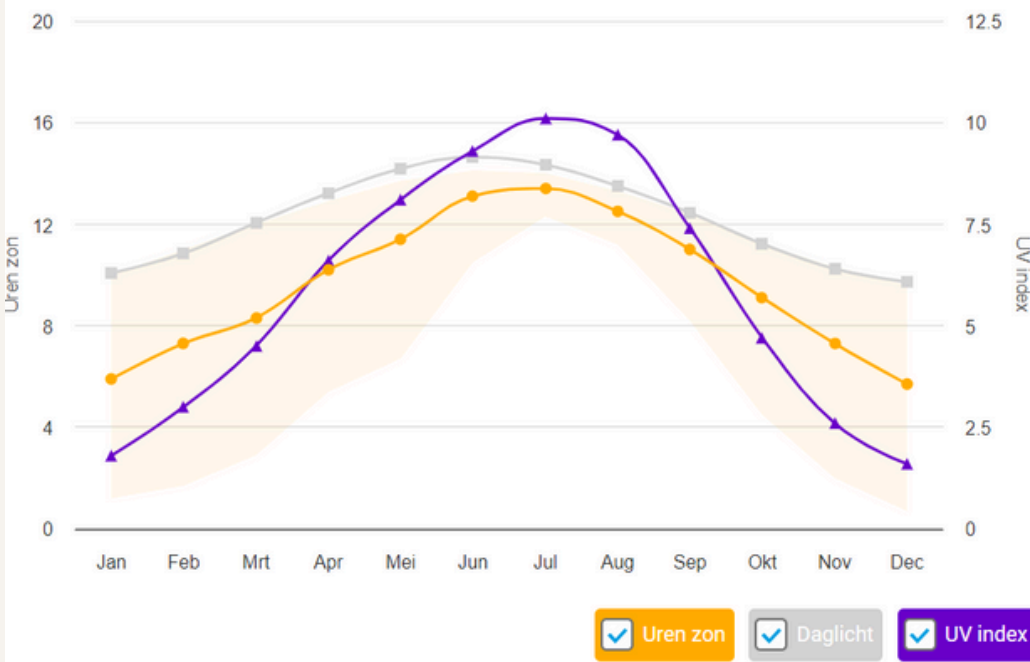
Northern Syria has a Steppe climate, which means there are dry and hot summers with temperatures reaching up to 40°C, and mild winters with temperatures dropping down to 5°C.

Rainfall



Northern Syria experiences virtually no rain at all during the summer months. In the winter months, however, only around 20 to 120 millimeters of rain falls during the winter months.

Sun



There is an abundance of sunlight, especially in the summer months where days can have up to 12 hours of sunlight

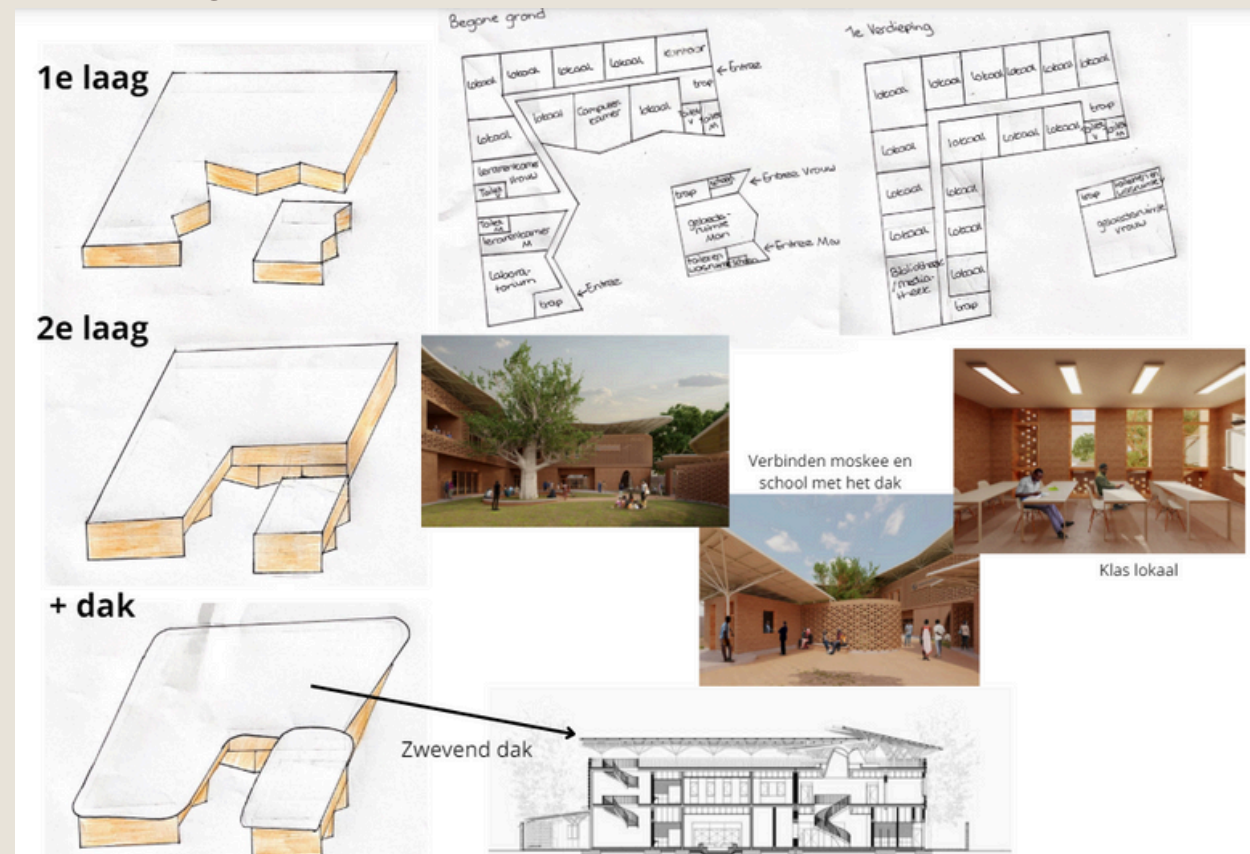
Group 5

Airey



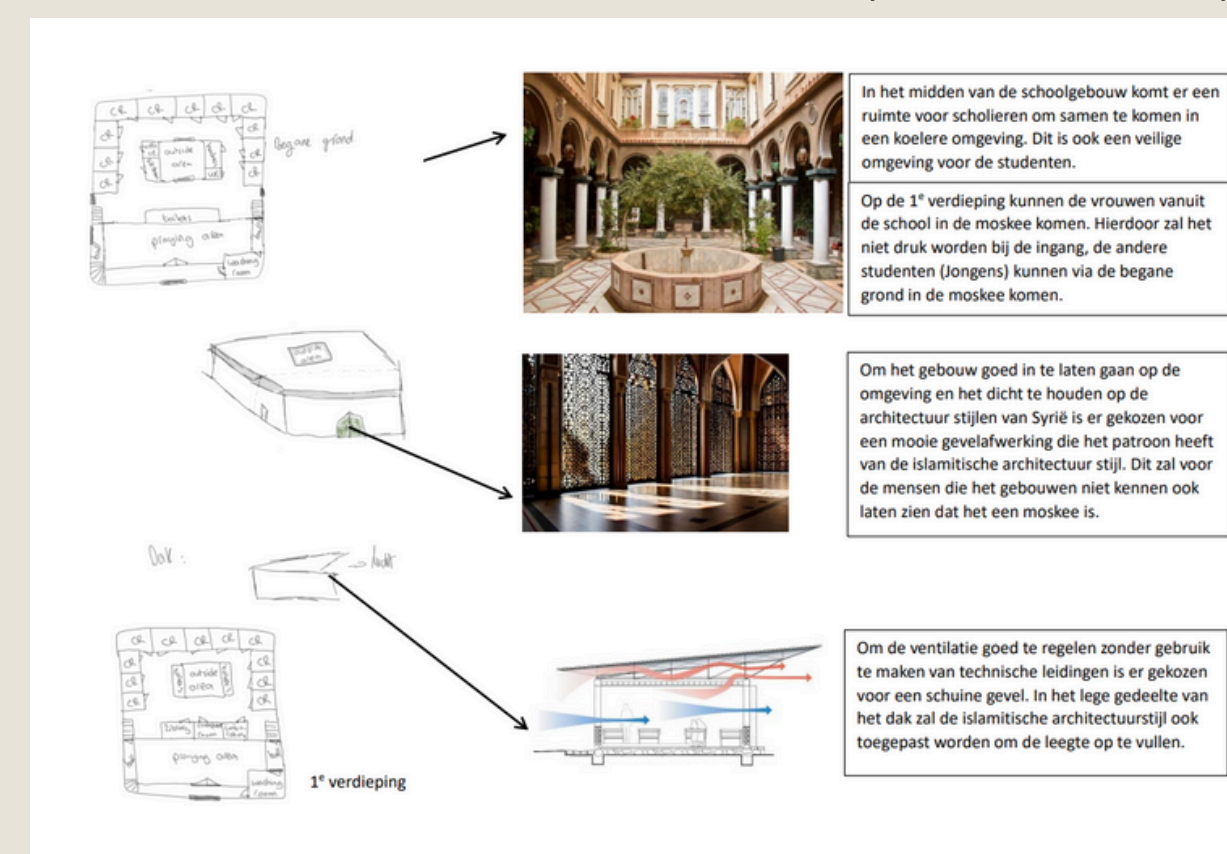
	-2	-1	+1	+2
Aesthetics				
Functionality				
Social cohesion				
Fireproof				
Entrance				
Space efficient				
Environment				

Hurriya



	-2	-1	+1	+2
Aesthetics				
Functionality				
Social cohesion				
Fireproof				
Entrance				
Space efficient				
Environment				

Al Shams Madrassa



	-2	-1	+1	+2
Aesthetics				
Functionality				
Social cohesion				
Fireproof				
Entrance				
Space efficient				
Environment				

Program requirements

Schoolbuilding	amount	m2	total
Classroom	22	40	880
Toilets	30	1,08	108
Toilets teachers	2	7,5	15
Directors office	1	18	18
Library/ media library	1	100	100
Computer room	1	129	129
Laboratory	1	100	100
Kitchen teachers	1	24	24
Function net surface			1374
Tare (30%)			
Gross			1.786,20

Moskee	amount	m2	total
Prayer room	2	145	290
Sanitary room	2	25	50
Toilets	2	3,25	6,5
Shoes storage	2	10	20
Function net surface			366,5

Criteria points Harris Profile

- Aesthetics:** How does the appearance of the school/mosque look.
- Functionality:** How great is the layout of the school/mosque for the students/visitors
- Social cohesion:** Are there any social cohesion inside or nearby the school/mosque.
- Fireproof:** Has the fireproof been taken account to in the designs.
- Entrance:** Are there enough acceses for the students and are there 2 entrances in the mosque.
- Space efficient:** Has the space been well distributed so that there will not be any waste.
- Environment:** How well does the school/mosque blend in with the environment.

The chosen design

As a conclusion of the Harris Profile the decision has been made to continue with concept 2: Al Hurriya. This one scores the most points and is also the only design that has a great social cohesion. For the people in Syria this is very important because of the many trauma's that they must have. They are in need of a safe school/mosque where they can come together. Between de mosque and the school there is a place where those people could come together. The entrance is also very well situated in concept 2, the entrance of concept 1 has also a great entrance but there are too many openings, therefore it is not safe for the children. So because of all these reasons we chose concept 2.

Mosque system

For a mosque it is important that the women and men have a seperate praying place and enterance. To prepare for the prayer people need to make Wudu. This is an abluation that muslims do for their religion.



(Unknown, Architecture from Syria | ArchDaily, 2023)

School system

In Syria, children aged 6 to 15 are required to follow 9 years of primary school. Children graduate with a central national exam: Basic Education Certificate.



(Unknown, Tweede kans op onderwijs voor kinderen in Syrië, 2019)

Construction methodology

	Stack Construction				Casting Construction			
	-2	-1	+1	+2	-2	-1	+1	+2
Flexibility								
Construction time								
Strength								
Costs								
Transport and logistics								
Insulation								
Expertise								

Building materials



Reference: Goethe-Institut Dakar (Kéré | Work, z.d.-c)

Stacking aerated concrete

Stacking aerated concrete It is lightweight and therefore easy to handle, simplifies transport and installation, less load on the foundation and support of the structure. Aerated concrete has good insulating properties, which saves on energy costs, and ensures a stable indoor climate.

The structure of aerated concrete also provides good sound insulation, which is useful for a school. It's non-combustible thus giving it good fire resistance, which helps to improve safety. It also has a long lifespan

Aerated concrete is easy to get in Turkiye. Since that's not too far away from northern Syria, we can get aerated concrete from there. Aerated concrete is not much cheaper or more expensive than normal concrete, so we don't have to worry about much higher costs. (ConversieWebsite, 2023)

Clay facade finishing

Clay gives a warm and natural look to buildings. It has a good quality that fits well with both traditional and modern architecture. Clay is vapour-permeable, meaning it can transport moisture from inside the building to the outside without allowing water to penetrate from outside. This helps to improve the indoor climate and reduce moisture problems.

Although clay itself is not extremely insulating, when combined with other materials it can help to improve thermal mass. This helps to keep indoor temperatures more stable and can reduce energy costs. Clay has good acoustic properties and can help dampen noise from outside, contributing to a quieter indoor environment.

Clay can be found locally, which is useful for saving costs on transport. It's fully recyclable and can be reused at the end of a building's life or safely returned to nature without harmful effects. (Voordelen van Bouwen met Klei, 2020)

Criteria points Harris Profile

Flexibility: Is the method flexible enough to make adjustments

Construction time: How long are you building on site with the method

Strength: How strong is the constrction of the method

Costs: How much will the method cost in terms of material and equipment

Transport and logistics: Is it easy to transport and with as few trucks as possible

Insulation: How good is the thermal and sound insulation

Expertise: How much expertise is needed to build this method

Conclusion: Using this method of comparison, it can be seen that stack construction is better to use. This picks up the best points on the main criteria.

Acoustics

School:

For the school, good acoustics are essential. There should not be too much echo in a classroom, as it can be distracting for both teachers and students. To create the perfect learning environment, a dropped ceiling with acoustic panels is used. These panels are installed in clusters rather than covering the entire ceiling, allowing sunlight to shine into the building.

Water installation and heating solutions

Water installation:

For the water installation, a water pump is used to ensure the school has an adequate supply of drinking water and the mosque has enough water for ablution. This water pump operates on electricity generated by solar panels. For more details on the solar panels, refer to the "Installation" section.

Water Heating:

Given that prayers occur throughout the day and night, hot water is essential in the mosque. It is also important to have hot water during the day at the school. Therefore, a solar water heater is used, which is a commonly employed sustainable solution in Syria. The system works by heating water through a flat plate collector and storing it in a water tank (see adjacent image). To ensure sufficient water storage for both the school and mosque, multiple boilers can be interconnected.

Daylight

In Northern Syria, there is abundant sunlight during the day, with up to 12 hours of sunlight (refer to the text in poster 1). To take advantage of this, mashrabiya screens are used. A mashrabiya is a wall, door, or window frame with multiple small openings that allow daylight to enter the building.



Gallery of Mashrabiya Mosque / NUDES - Nuru Karim - 2 Image 2 of 16 from gallery of Mashrabiya Mosque / NUDES - Nuru Karim. Photograph by Sameer Chawda ArchDaily (Caballero, 2024)

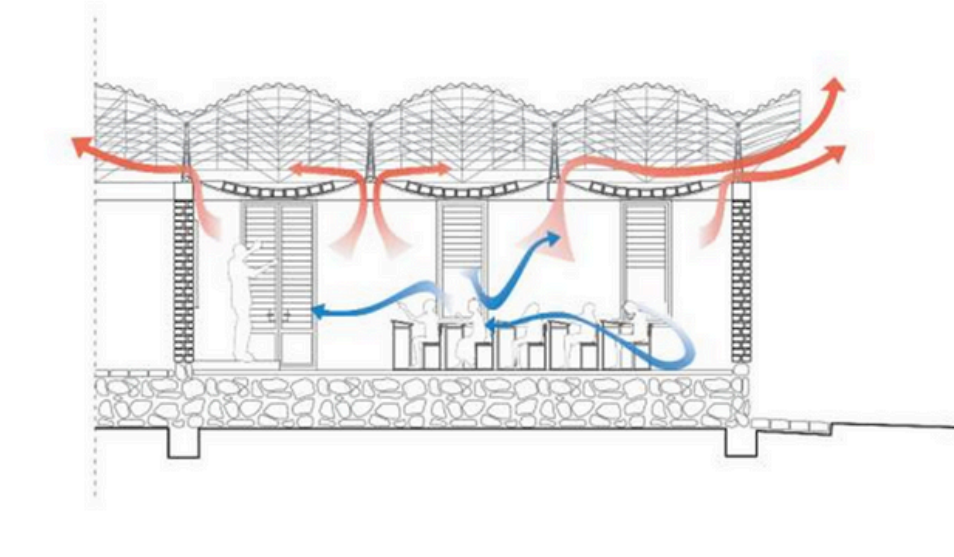
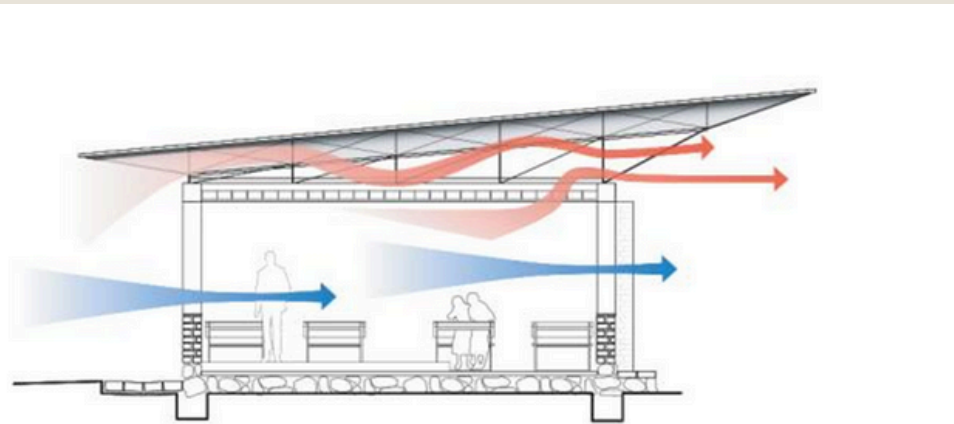
Additionally, the roof is elevated, allowing sunlight to penetrate between the facade and the roof. To prevent excessive sunlight from causing overheating, the roof extends slightly to provide sufficient shade. This extended roof also provides shade on the schoolyard, offering protection for the children when they are outside.



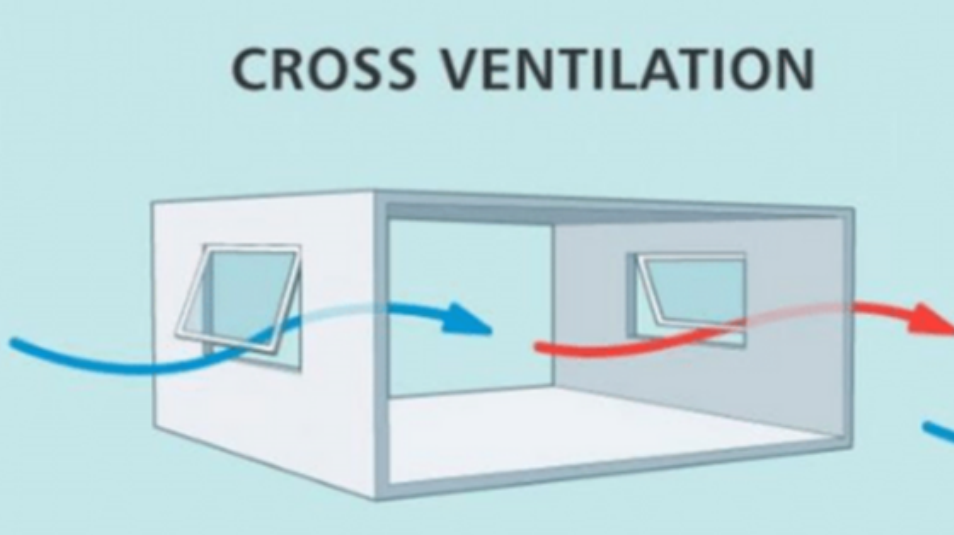
(Unknown, 2024)

Mosque:

For the mosque, it is important that the acoustics are low, as echo plays a crucial role in the prayers. Concrete naturally absorbs a sufficient amount of sound, so no additional acoustic measures are needed.



(Kéré | Work, z.d.-b)



(Figure 85: Cross Ventilation Direction, z.d.)

Ventilation

Raised roof

The roof utilizes a construction that creates natural ventilation. This roof is designed to allow fresh air to circulate through the building, facilitating airflow in and out of the structure. Given that the wind direction in Northern Syria is from the north, the building is oriented towards the south to ensure optimal ventilation.

Airflow

Windows and doors play a crucial role in ventilation. Through cross ventilation, a significant amount of wind can enter the building, allowing it to cool down quickly. Additionally, facades with holes are used. These holes allow a constant breeze to flow through the building, entering on one side and exiting on the other.

Logistics

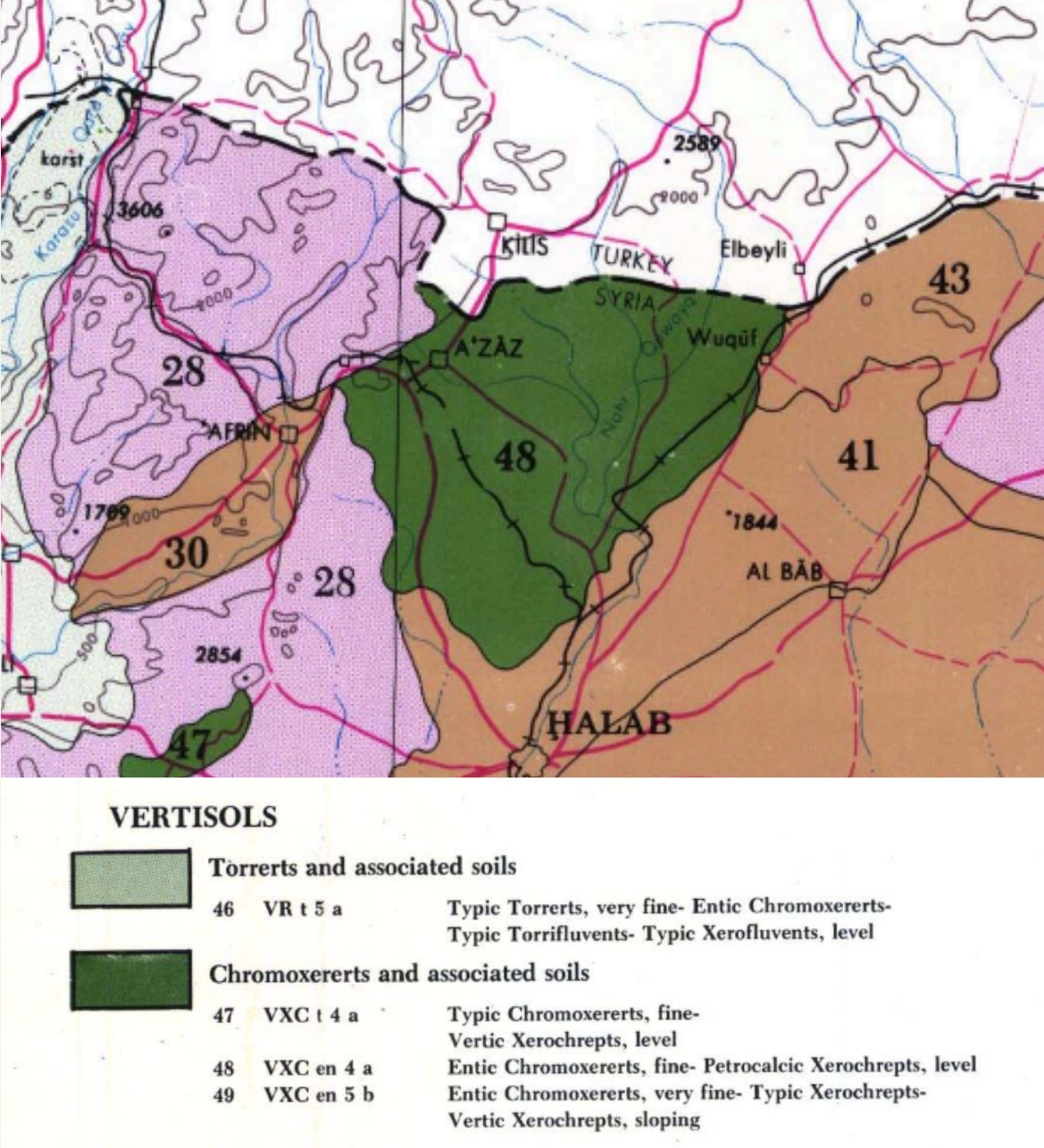


Clay facade finishing
Clay is a local product in this area. We can find it in 10 km around our location.

polycarbonate sheet

(PeterHermesFurian, 2014)

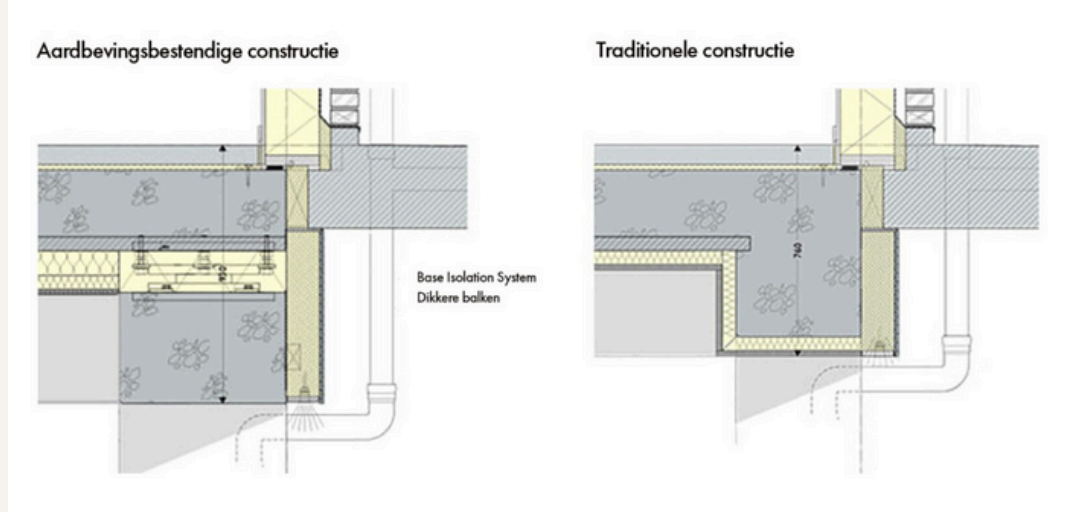
Construction foundation



(Soil Map Of Syria & Lebanon, z.d.)

We are building in area 48. The legend of the picture shows that the ground where we are to build belongs to chromoxererts. Chromoxererts in turn falls under vertisols. Vertisols are soils made of clay. This makes it difficult to work with, because The soil is very poorly permeable. Xererts are the Vertisols of Mediterranean climates, characterised by cool, wet winters and hot, dry summers. They have cracks that regularly close and reopen each year. Because these soils become dry every summer and moist in winter, damage to structures and roads is very significant. The native vegetation consists mainly of grasses and herbs. Because of this, it seems convenient to drill the piles. This ensures that the vibrations from piling on the dry soil are best avoided. (Vertisols, z.d.)

Earthquake resistance



We will use the Base Isolation system. In this system, dampers are used between the foundation and the building. These dampers ensure that the foundation moves with the earthquake without any problems, while the building itself stays in place. (10 Tips Voor een Aardbevingsbestendig Gebouw | Architect | KAW, 2022)

Installations

To provide the school with electricity, solar panels will be installed on the roof of the school building.

These not only provide electricity, but are also connected to the water pump. The violence in Syria 11 years ago severely damaged the water systems, leaving many Syrians without clean water.

In parts of Syria there is also only 1 hour of electricity per day, which means that the water supply cannot function. By connecting the water pump to the solar panels, energy is continuously generated, so that the water can be cleaned.

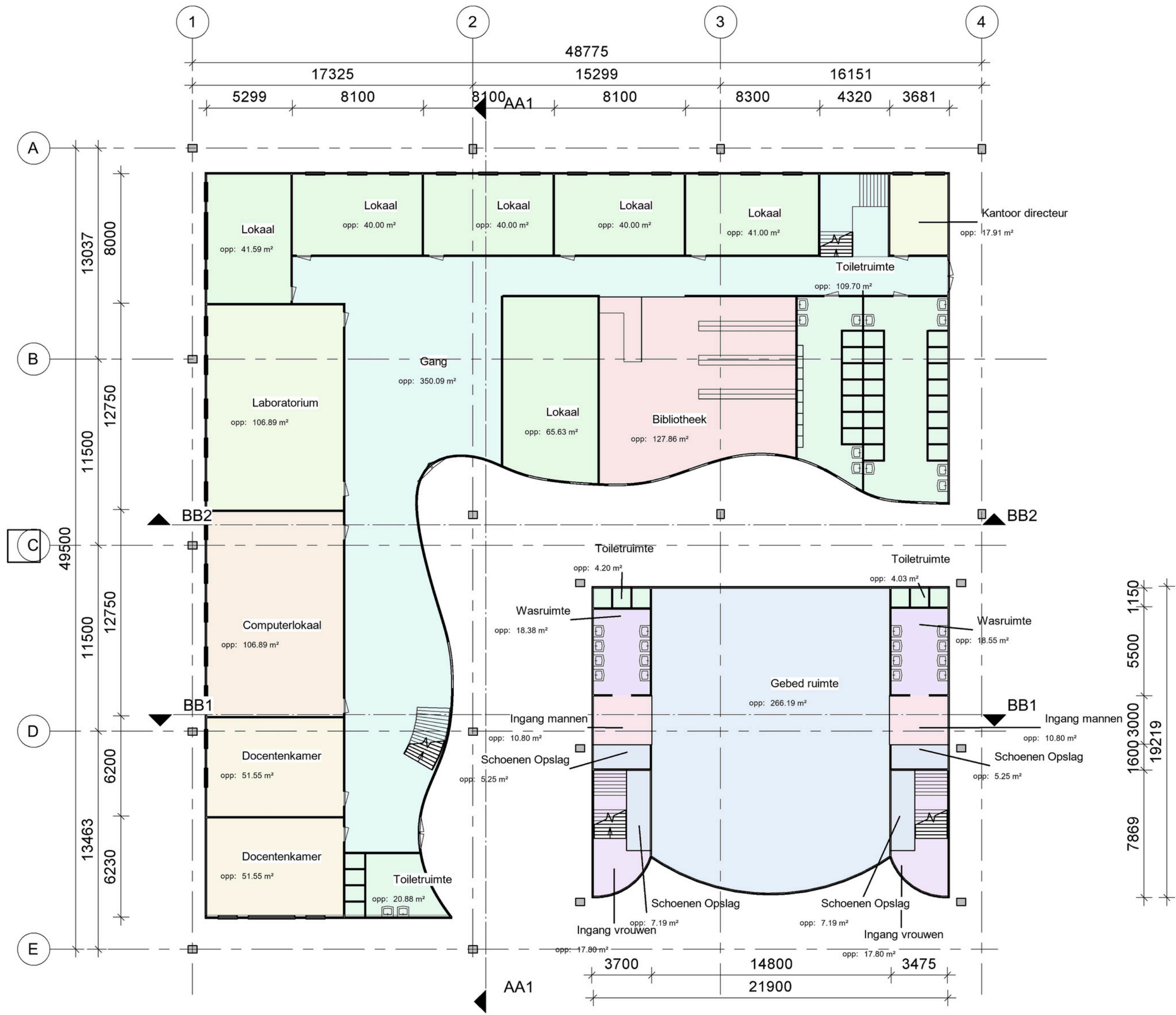


(Thwaites, z.d.)

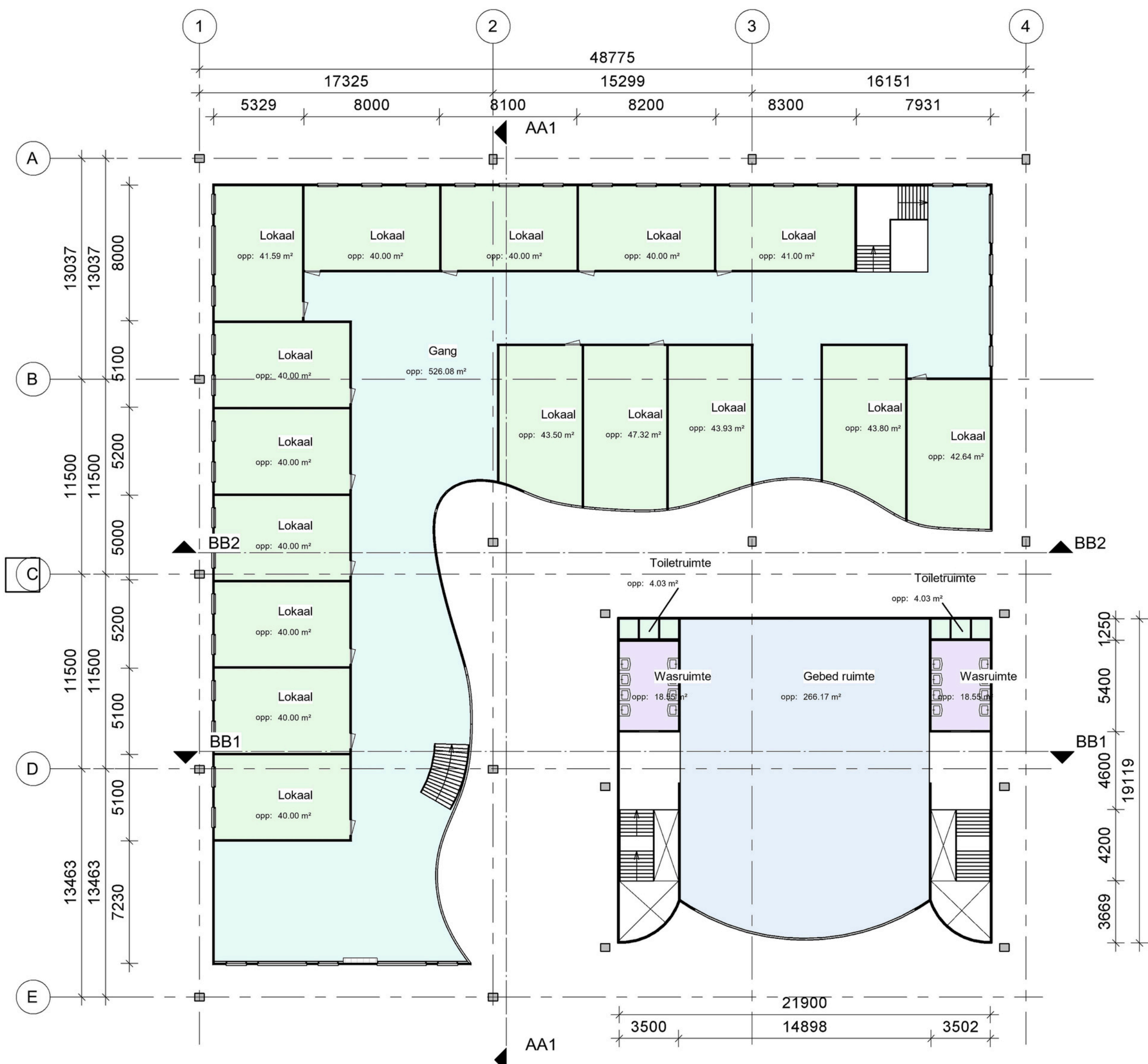


(Macy, 2022)

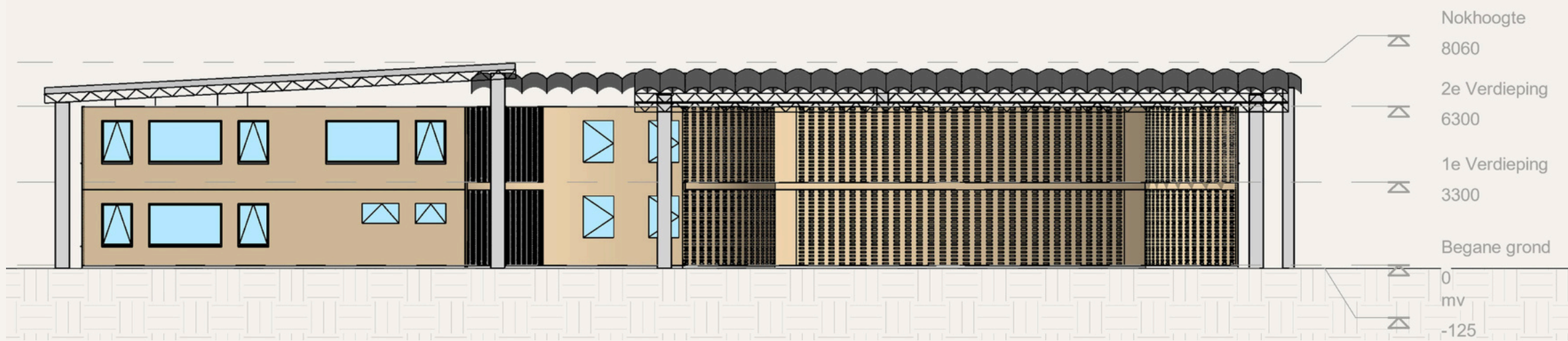
Ground floor 1:200



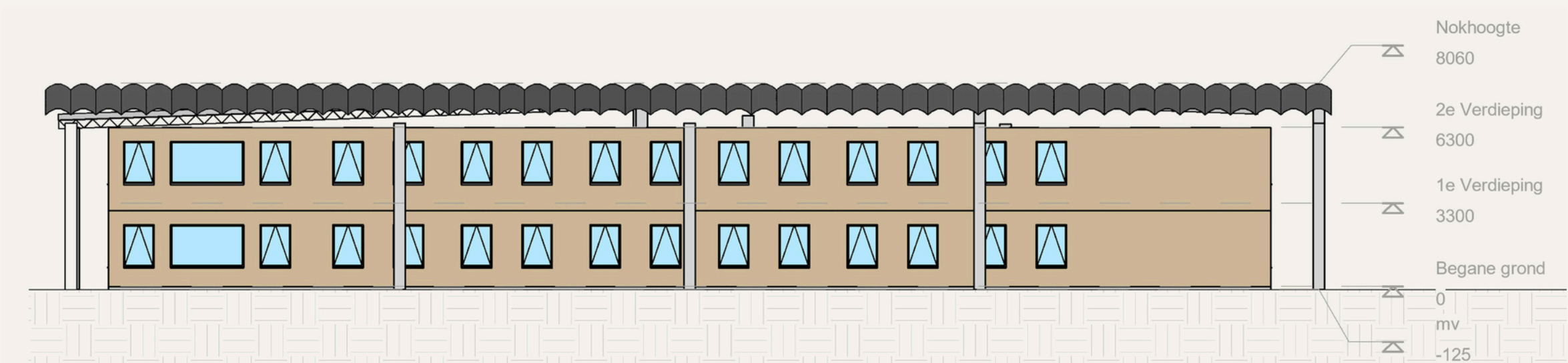
1st floor 1:200



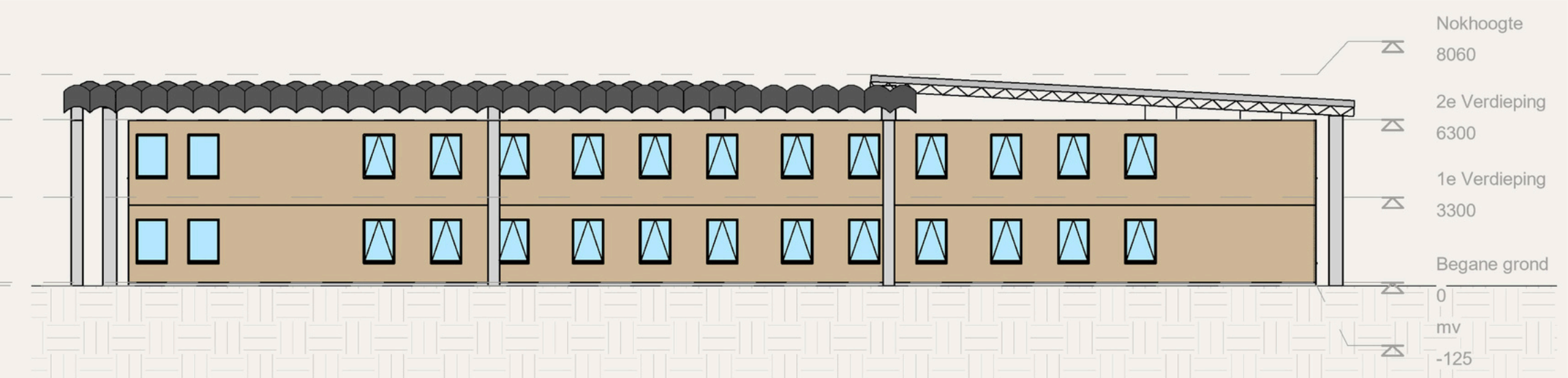
Front view 1:200



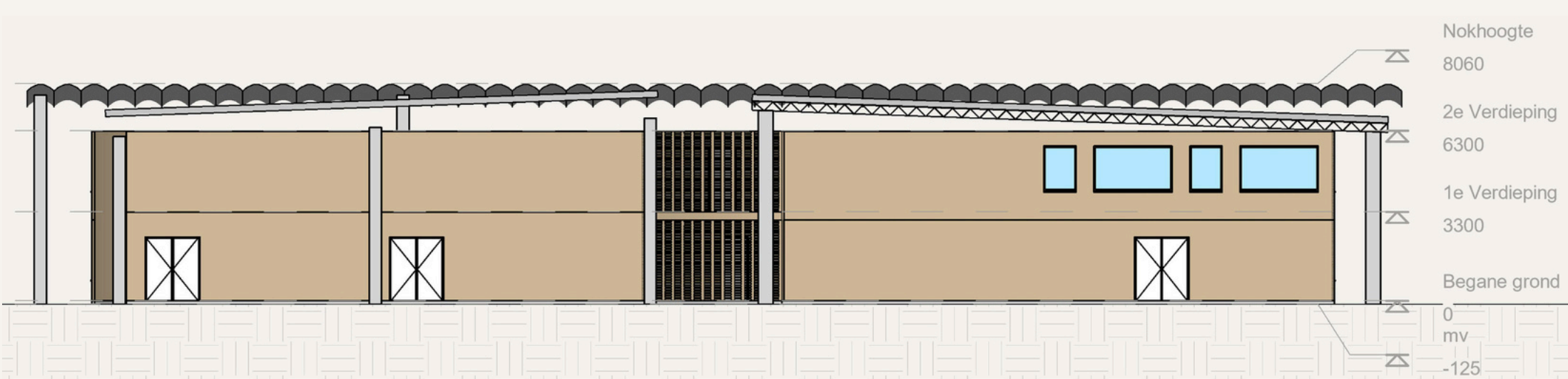
Left view 1:200



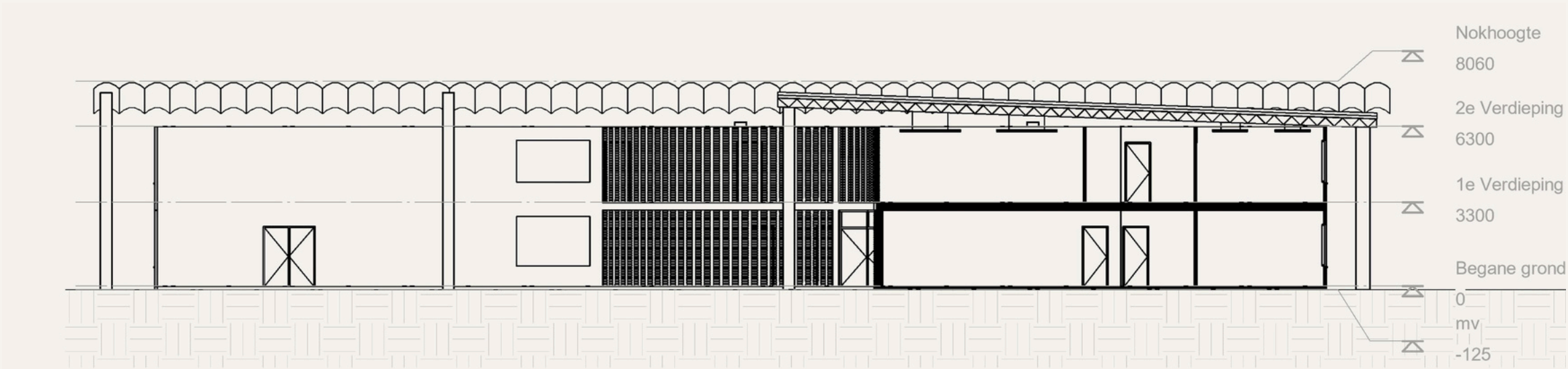
Rear view 1:200



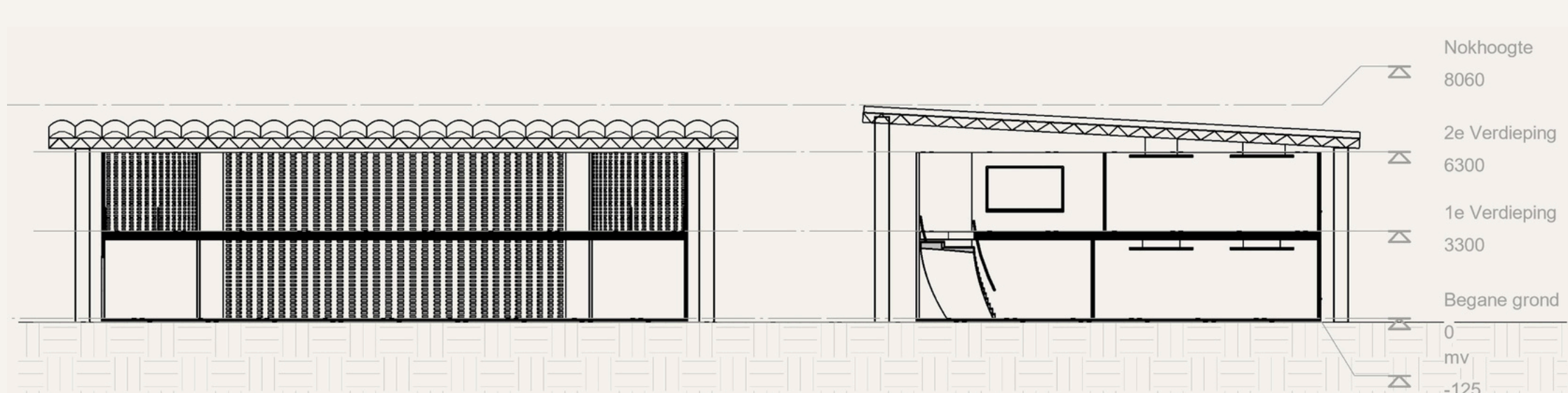
Right view 1:200



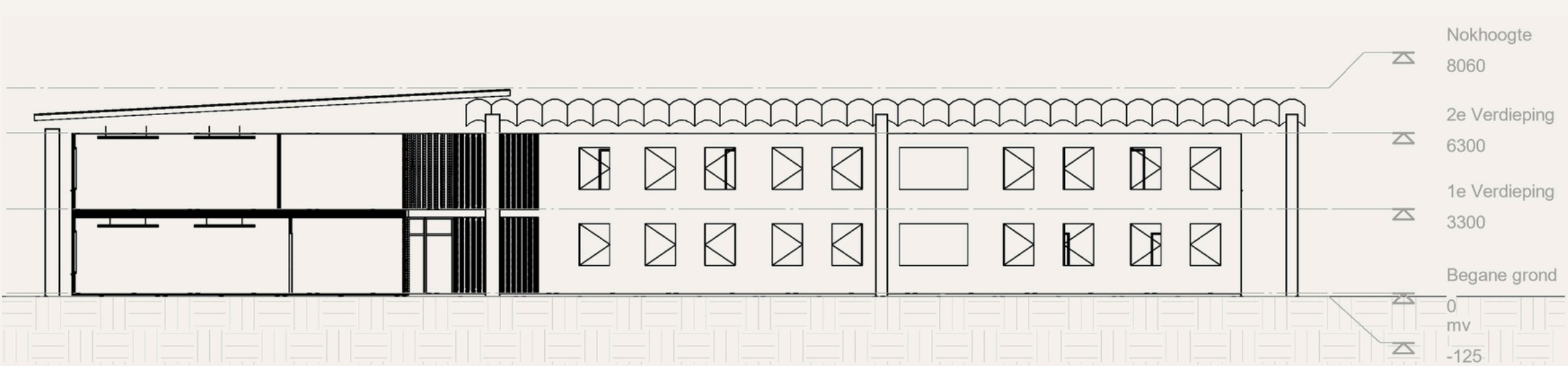
Section AA1 1:200



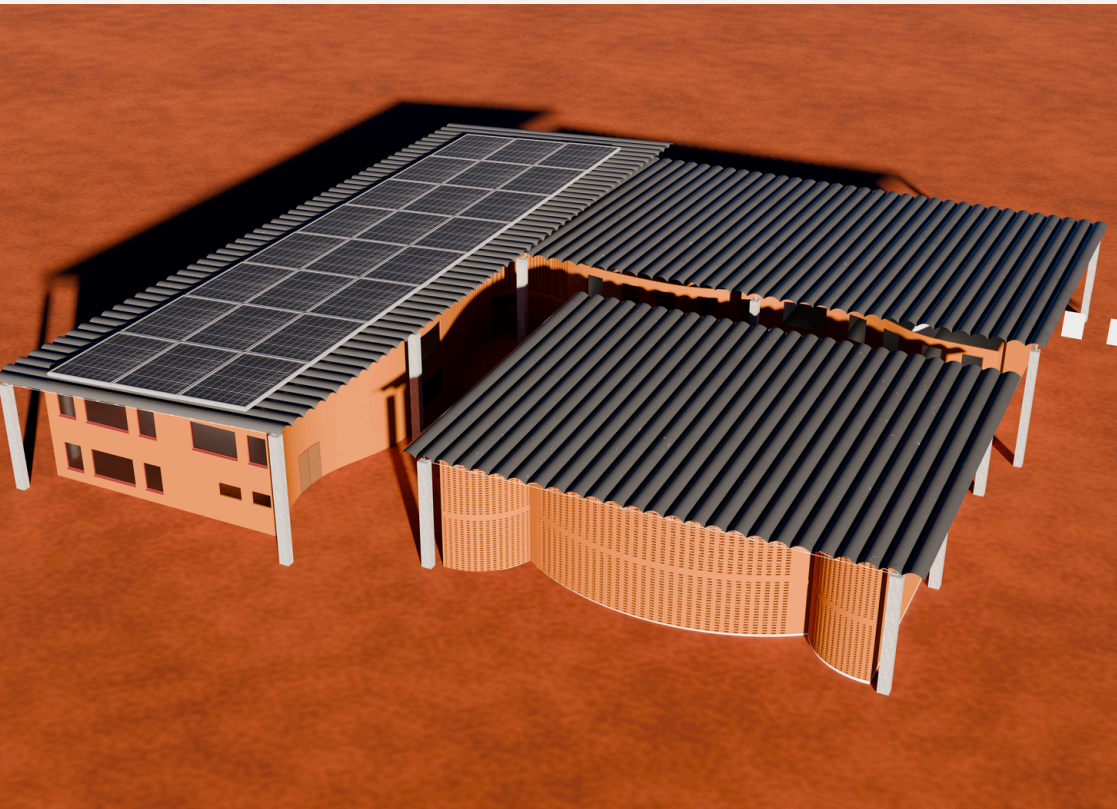
Section BB1 1:200



Section BB2 1:200



Renders



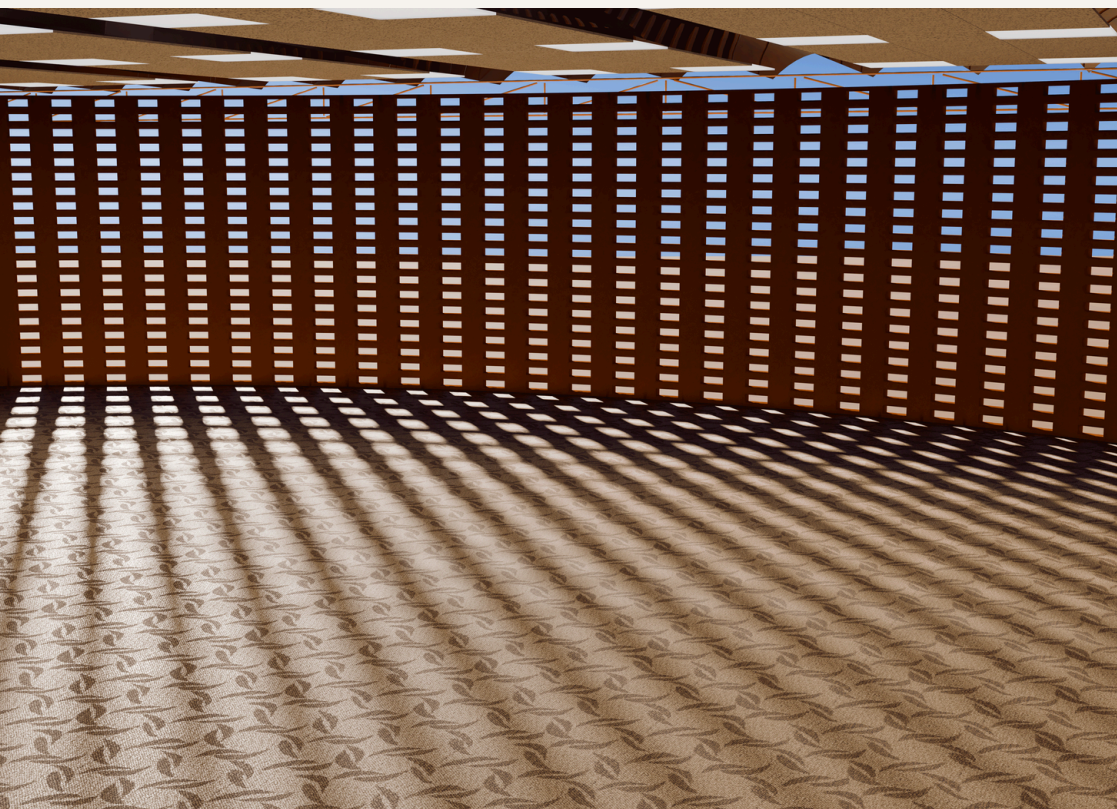
Render 1



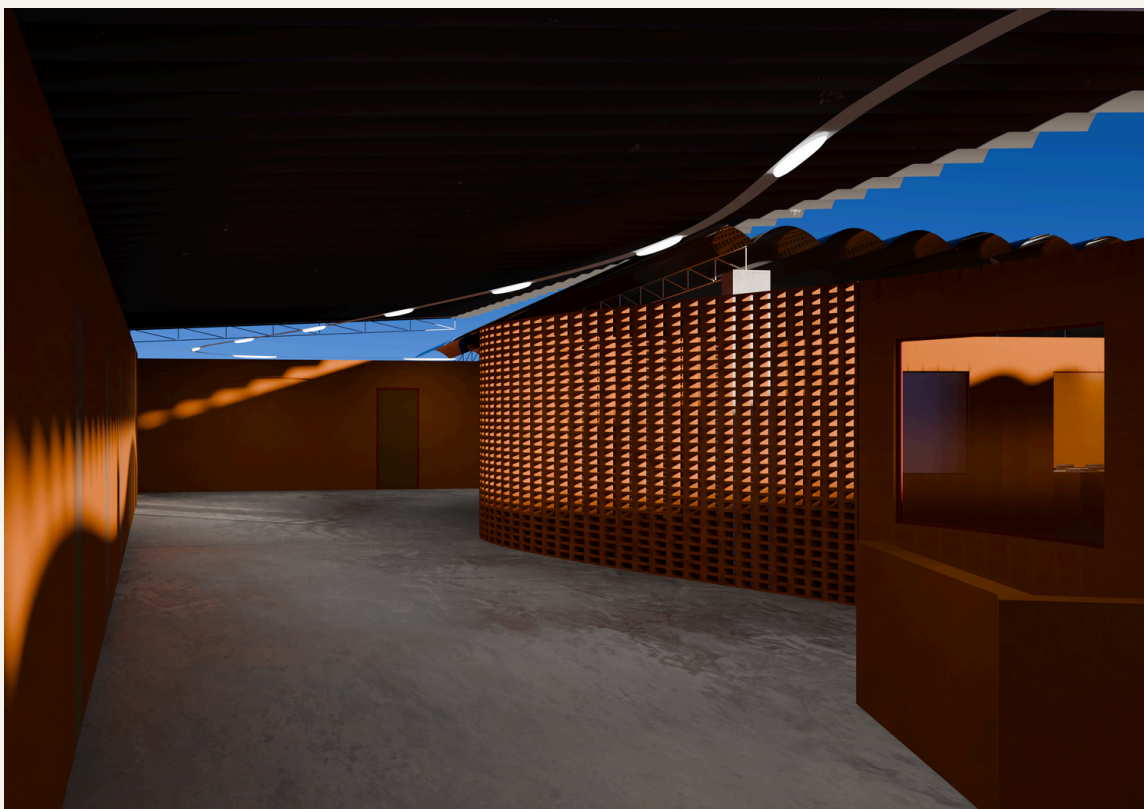
Render 2



Render 3



Render 4

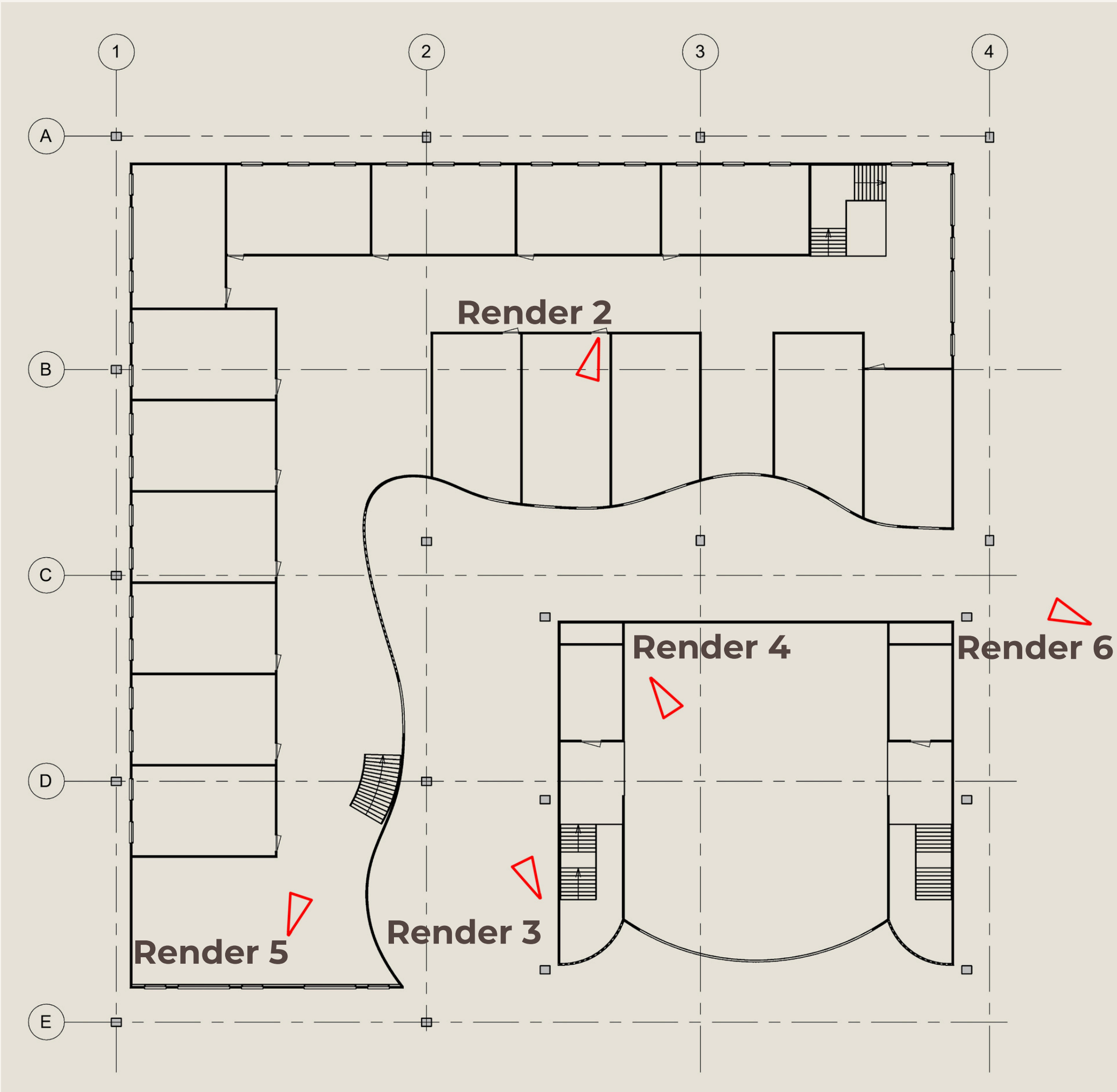


Render 5

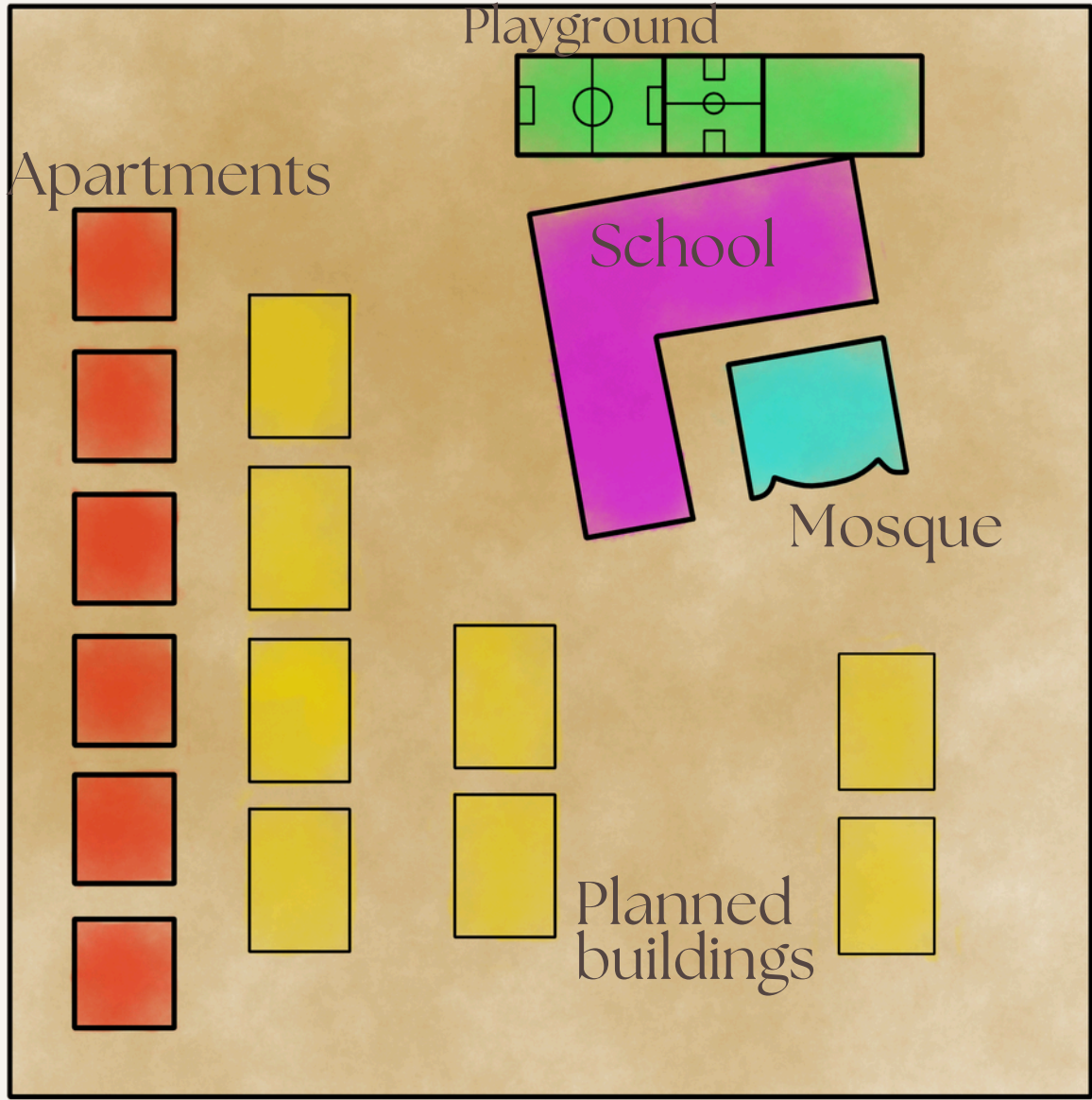


Render 6

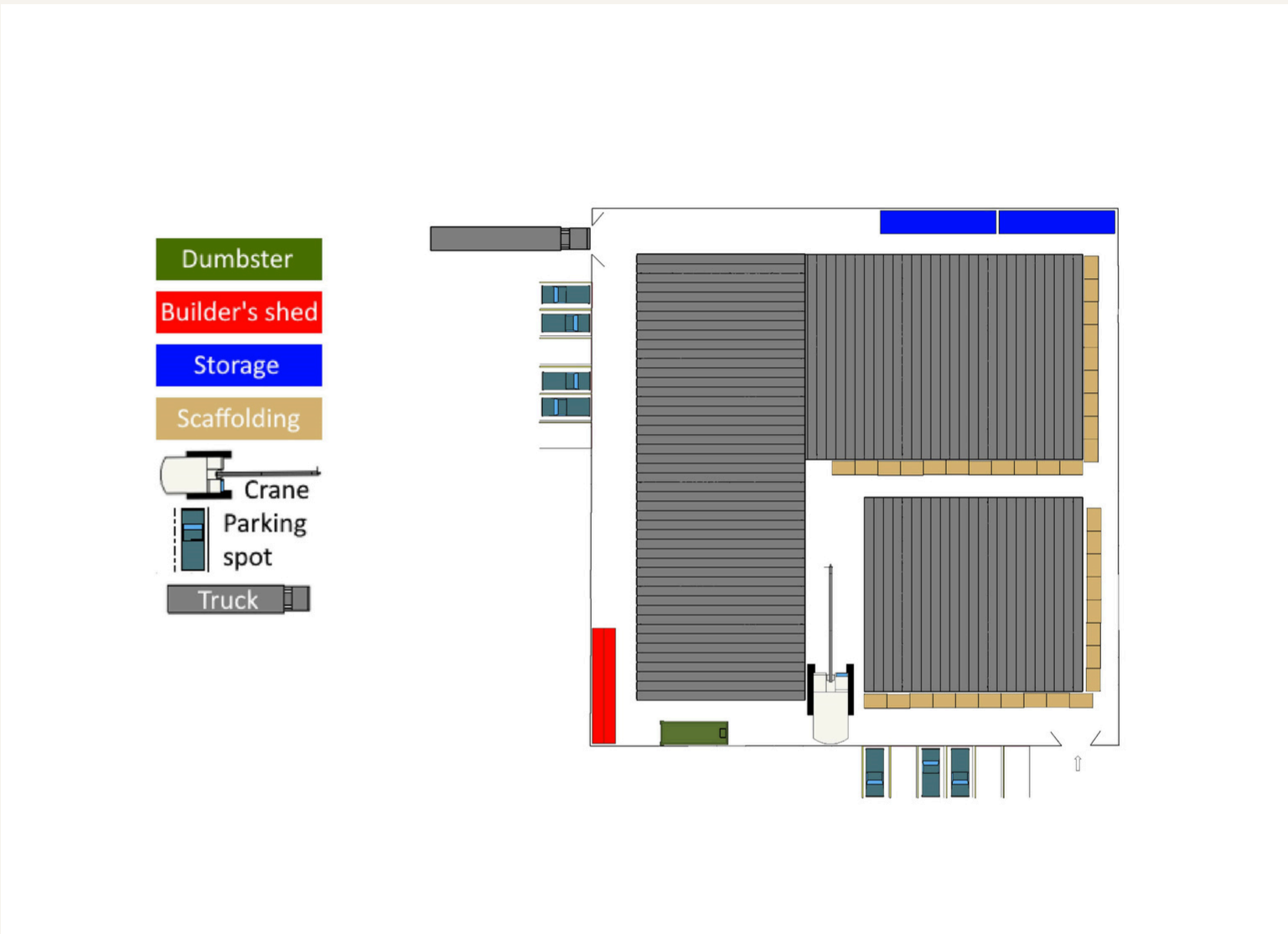
Render locations



Area drawing 1:1000



Construction site 1:500



Construction model

Beam Selection

School:

- Beam Length: 114.5 • 12000 - 828
- Beam Width: 12 • 828 - 414
- Dimensions: 828 mm (length) x 414 mm (width)

Mosque:

- Beam Length: 114.5 • 14900 - 1028
- Beam Width: 12 • 1028 - 514
- Dimensions: 1028 mm (length) x 514 mm (width)

Conclusion:

- For the School we are using the beam with dimensions of 828 mm x 414 mm.
- For the mosque we are using the beam with dimensions of 1028 mm x 514 mm.

beton	ter plaatse gestort betonnen vloerliggers	enkel veld:	1/10 x lengte	breedte = 1/2 à 1/3 x hoogte
	voorgespannen betonnen vloerliggers	doorgaand:	1/14,5 x lengte	
		enkel veld:	1/20 x lengte	breedte = 1/2à 1/3 x hoogte

(TU delft, 2013)

Coloumn selection

The height of roof is 7.8 meters

- Coloumn side: 7.8 / 15 = 0.52 - 520mm

Conclusion:

For the School and the mosque we are using coloumnns with dimensions of 520x520mm.

Kolommen (l = lengte per verdieping)		
1 bouwlaag	l ≤ 8 m	Breedte = $l/12$ à $l/15$
Meerdere bouwlagen	l ≤ 4 m	Breedte = $l/10$ à $l/12$

(TU delft, 2013)

Load bearing walls and coloumnns

