

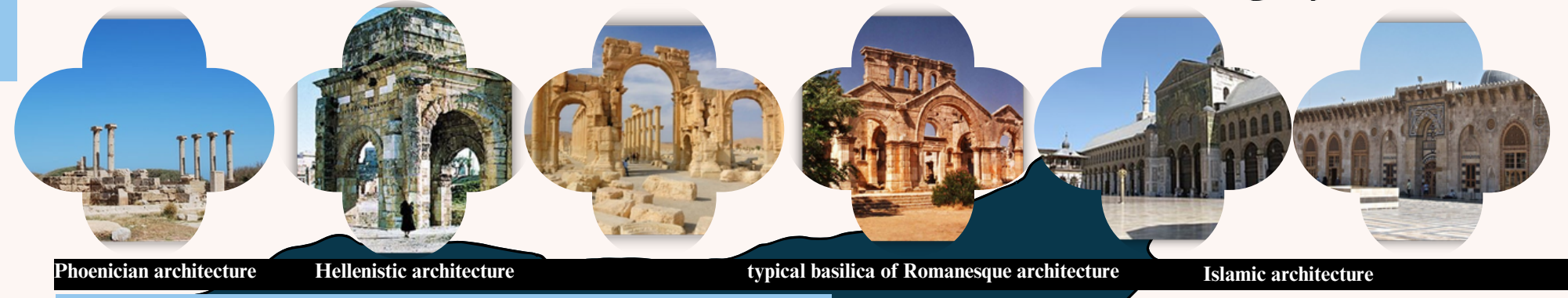
Introduction

The project for the client is a construction of a school building in the north of idlib in syria specifically designed to meet the needs and desires for local residents and children. The building is designed for children from six to 12, where the school building can take on a versatile function for education but also other activities. Thus, the design and planning of this building has been carefully done to properly meet the needs for the community and construction.

SRYI

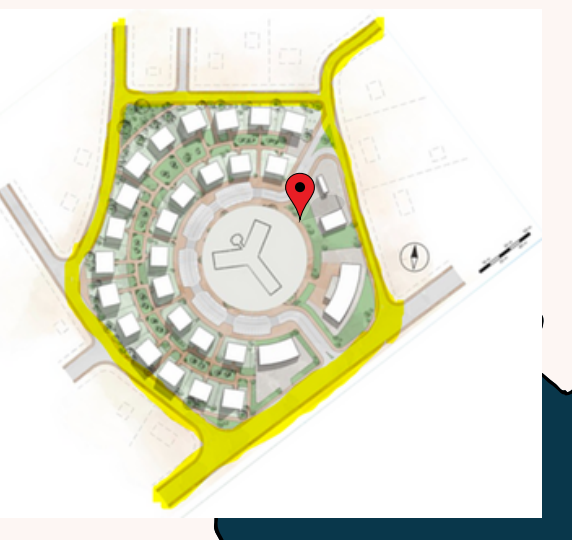
Traditional architecture

North-west Syria



Phoenician architecture Hellenistic architecture typical basilica of Romanesque architecture Islamic architecture

Map



Demographics

23 million inhabitants spread across the country

60% of the entire population lives in western and north-western Syria
4.5 million inhabitants
Northwest Syria is home to 2.9 million IDPs

1.9 million staying in camps

Needs the Refugees and population

Housing
In Syria, people had to flee the war in their country, leaving everything behind and being forced to leave for a safer area. Adding to this, the earthquake in northern Syria contributed to the destruction of buildings, leaving even more people without a roof over their heads. (Al-Ameen, 2021)

Education
The vast majority of Syrian refugees are still children and have no access to education. The war destroyed many school buildings and teachers fled, making teaching almost impossible. (Al-Ameen, 2021)

Healthy nutrition
It is estimated that some 6.5 million Syrians live in food poverty. (Al-Ameen, 2021)

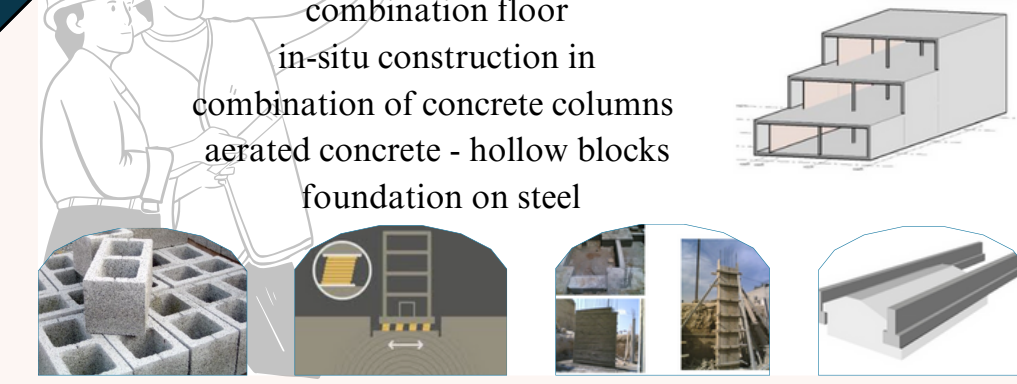
Security
The war has compromised the privacy, security and well-being of Syrians. An urgent need for security is needed where people can process their traumas and prepare for a new life. (Al-Ameen, 2021)

Water supply and hygiene
Due to disrupted infrastructure, clean drinking water is scarce. Hygiene facilities are necessary for people's well-being, mental state and physical condition. (Al-Ameen, 2021)

Clothing
People in Syria have left headlong and had to leave everything behind. They have fled without clothing or other non-food items. (Al-Ameen, 2021)

Health care
Healthcare in Syria has taken a huge hit because of the war, but also because of COVID-19. The war has only increased the need for care, while access to healthcare has decreased.

Construction



Landscape And Vegetation

Syria is on average 514m above sea level. (Syria: country data and statistics, s.d.)
Syria can be divided into two regions with the Syrian desert on the eastern side in which desert landscape alternates with steppes. The Syrian desert is 600-900m above sea level. To the west, Syria is fertile thanks to the Mediterranean sea (Kästle, s.d.-b).

Average Age

24 23

45% 0 - 19 y/o 50% 20 - 65 y/o 5% 65 - + y/o

Health

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Due to disrupted infrastructure, clean drinking water is scarce. Hygiene facilities are necessary for people's well-being, mental state and physical condition. (Al-Ameen, 2021)

refugees

The largest group of refugees is mainly from Syria.

Waar komen de asielzoekers vandaan?

Opvang in de regio

Material	Quantity	Unit	Material	Quantity	Unit
Concrete	1000	m³	Steel	100	kg
Bricks	5000	1000's	Wood	50	m³
... (more rows)

Foundation

In this, using a foundation on steel is many times more efficient, as it relies less on heavy machinery and more can be installed manually.

Materials In Syria

concrete reuse
reuse of concrete to make the building more sustainable in concrete use. This is in collaboration with the Strukton-developed Di Maio C2CA, from concrete rubble waste from buildings. This is in collaboration with the Strukton-developed Di Maio C2CA

pile construction
sand-lime brick, sandstone middle and east aerated concrete

cast construction
wall formwork and concrete

assembly construction
concrete

mud and straw
steel frame construction

timber frame construction

Earthquakes

Northwestern Syria is near the East Anatolian Fault, which is where the Anatolian plate and the Arabian plate slide past each other. But northwestern Syria is most likely to experience an earthquake. (NU.co.uk, 2023)

Religion

Faith is central in Syria. Muslims are required to pray five times a day, this also applies during school hours. For Muslims, praying is mandatory after reaching puberty, often happening at earlier ages.

The presence of a prayer room (Musalla) is crucial for the target group, simply because praying is compulsory. The prayer room should preferably be a private space so that one cannot be disturbed during prayer.

Islam 87%
Sunni 74%
Alawi, Ismaili en Shia 13%
Christendom 10%
Druzen 3%

Economy In Syria

Economy shrunk by 35%, the Syrian pound, worth as much as 1/6 of its former value.

Due to the war, economic sanctions have been imposed on Syria by various countries around the world in the form of restricting imports and exports

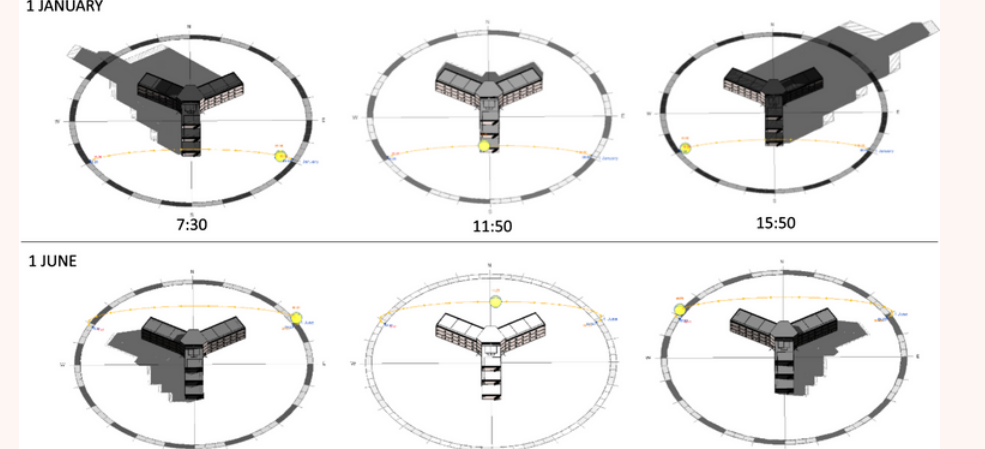
Syria's current unemployment rate is 9.6%.

17% of the Syrian population worked in the agricultural sector and provided 21% of the Gross Domestic Product. Grapes, olives, wheat and citrus.

The oil sector accounts for 40% of export earnings and provides 22% of Gross Domestic Product.

Syrian industrial products include cement, marble, steel, salt and phosphate, these products are used for domestic purposes.

Solar study



Climate

Syria has a typical Mediterranean climate on the west coast with hot dry summers and mild wet winters. More inland, it has a desert climate with cold winters and very hot dry summers. (Syria climate: average weather, temperature, rain - Climates to Travel, s.d.)

temperatures
In the summer months, the average temperature is between 26 and 31 degrees Celsius. In the colder winter months, the average temperature is between 7 and 10 degrees Celsius. (World Bank Climate Change Knowledge Portal, s.d.)

Precipitation
Average precipitation in Syria is between 450-750 mm per year. As shown in Table 5 opposite, the summer months are very dry and precipitation is scarce. The wettest months are during winter, when December, January and February see an average monthly rainfall of 50-55 mm.

Maand	Minimum	Vrijmaximum	Gemiddeld	Maand	millimeter	Inches	Dagen	Maand	Gemiddeld	Total
Januari	7.7	16.4	12.1	Januari	150	5.9	11	Januari	4.5	335
Februari	8.6	17.3	12.9	Februari	110	4.3	9	Februari	5.5	350
Maart	10.6	19.4	15	Maart	95	3.7	8	Maart	6.5	300
april	13.1	22.2	17.7	april	45	1.8	6	april	7.5	225
Kunnen	16.6	25.4	21	Kunnen	25	1	3	Kunnen	9.5	200
juni	20.2	28.3	24.3	juni	5	0.2	1	juni	10.5	200
juli	23	30	26.5	juli	0	0	0	juli	10.5	225
augustus	24.1	31	27.5	augustus	0	0	0	augustus	10	315
september	21.7	30.1	25.9	september	10	0.4	1	september	9.5	290
oktober	17.8	28	22.9	oktober	70	2.8	5	oktober	8	250
november	12.8	23.3	18	november	160	6.3	6	november	6.5	190
December	9.2	18.2	13.7	December	160	6.3	10	December	5	150
Jaar	15.5	24.2	19.8	Jaar	770	30.3	60	Jaar	7.8	2850

Education

Compulsory education for children aged 7 to 15 years, according to primary education.
Secondary education, this is grade 7 to grade 9.
From grade 10 to grade 12, students are prepared for their subsequent studies.

2% were public schools. 98% run by the government 7,000 have been destroyed

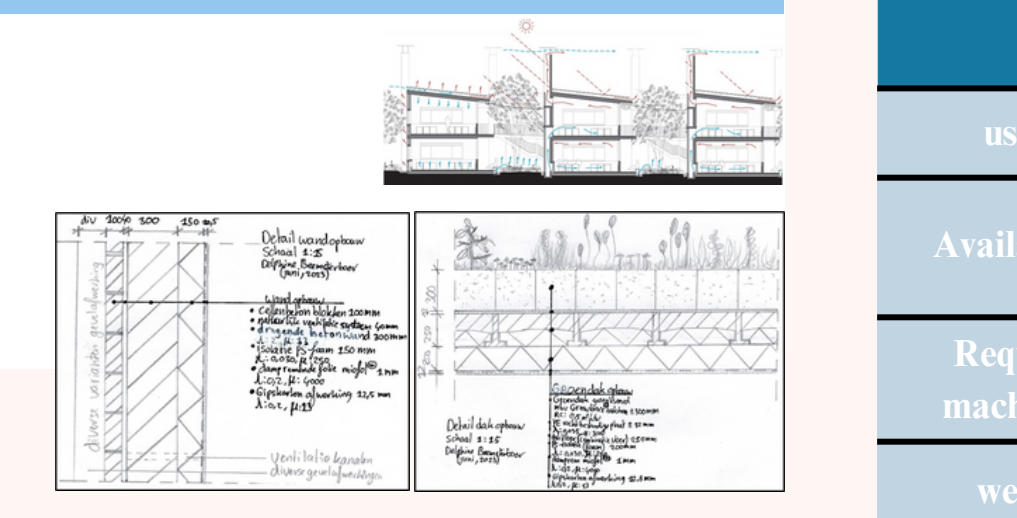
2.1 million children cannot receive an education, this is 44%, 23% of children aged 5-11 yrs.

Green facilities

solar chimneys
This method of ventilation as well as cooling has its origins in Iranian architecture.

Self-sufficiency and energy efficiency. A green roof and using solar energy and implementing natural ventilation contribute to a more sustainable and environmentally friendly school environment.

Purpose of school building



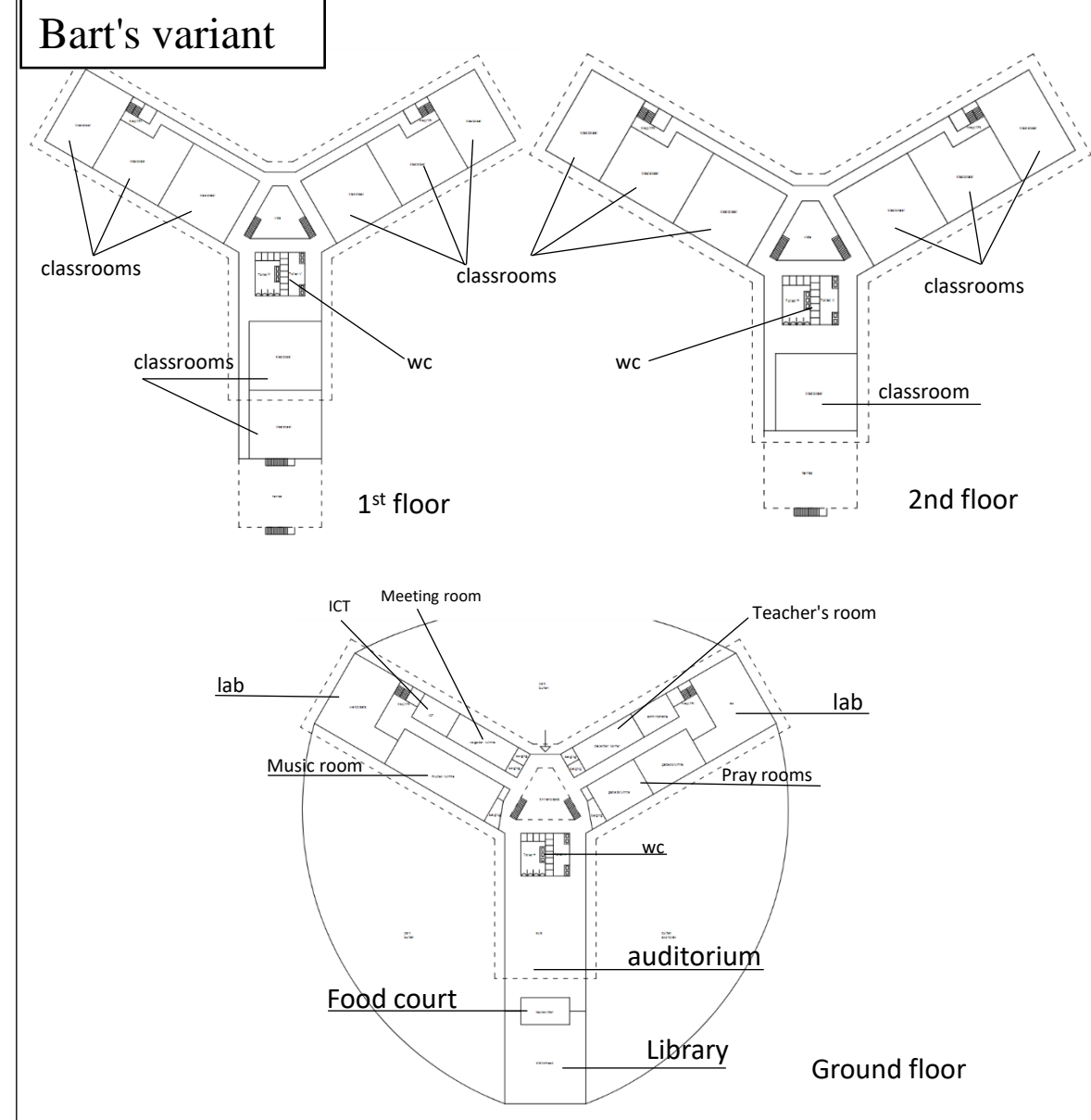
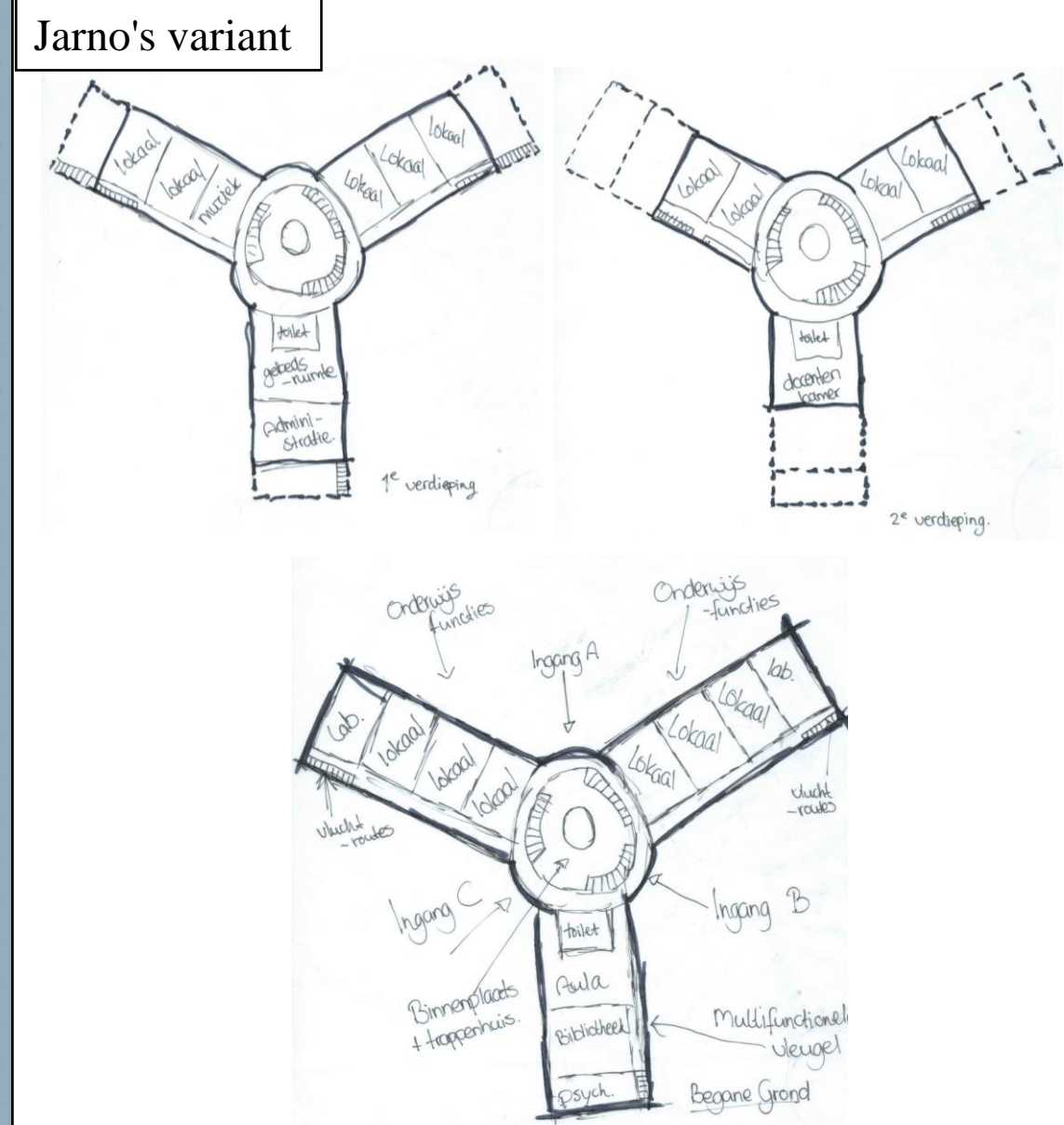
Purpose of school building

- building shell**
load-bearing walls by means of wall formwork combined with concrete columns
floor is a combination floor
foundation is on steel measures to prevent pancake effect
- sustainability**
Minimising logistical supply and disposal to reduce risks
Promoting reuse of concrete from concrete debris from the surrounding area
- aesthetic contribution to the environment**
recognisable plinth design has 'peace' sign
use of local materials for harmony
greening: green roof, with national plants, semi-open dome
- technical specifications**
lift shaft for stability core in design
earthquake-resistant construction
good insulation values for roof, walls and windows
create own shade: balconies, overhang, hanging plants
light colour for albedo value
solar panels
hygroscopic for comfortable indoor climate
- spatial layout**
Three inner courtyards courtyard
15 spacious classrooms of 100m² and maximum occupancy of 40 students
courtyard with greenery and a fountain
multifunctional outdoor playground
men's and women's toilets, a library, two laboratories, an auditorium with food facilities, a prayer room, a music room, administration rooms, a teaching room and a psycho-social room

Construction methods

	Concrete	Wood	Steel	Mud/straw	Stacking	in-situ concrete
usage	Columns, walls, floors and roofs	Columns, beams and roofs	Columns and beams	Walls and roof	walls	Walls and floors
Availability	Nearby, 30 companies supply the cement.	Significantly low, depends on preparation and tight time planning	Loss of steel available near the border of Syria and Turkey, for metal structures there are 30 companies available to supply it.	Available throughout, but used to be applied more regularly.	Stacking is a common construction method in Syria and Turkey. Only two companies have made themselves available for it.	15 companies to supply the cement and 23 companies to supply the formwork.
Required machinery	Heavy-duty cranes	Light cranes	Heavy-duty cranes	Light equipment	Light cranes	Heavy-duty cranes and concrete pump
weight	heavy	Average	heavy	Light	light	Heavy
Preparation time	Longer than normal	Medium to long	long	Few	Few	Long
sustainability	yes	yes	Yes/no (there is yes high reuse possible)	yes	yes	yes
labour costs	Average	average	High	Average	High	average
cost	Significantly low, depends on preparation and tight time planning	Expensive to import	high	low	low	Average
time	short	average	average	long	long	fast
Stability with seismic vibrations	average	Poor, except when working with bamboo	high	Low to medium	Average, depends on knowledge of stacking	High, due to monolithic connection

DESIGN VARIANTS



- Strengths:**
- Dome above the courtyard
 - Distinguishing the base from the central section and crown
 - Gradually descending with general green gardens
 - Creating a multifunctional wing
 - 3 entrances

- Strengths:**
- Library at the end of the wing with a separate entrance
 - Staircases at the end of the wings
 - Gradually descending with general green gardens
 - Steel dome above the courtyard
 - Good space layout with minimal space loss
 - Handicap-friendly

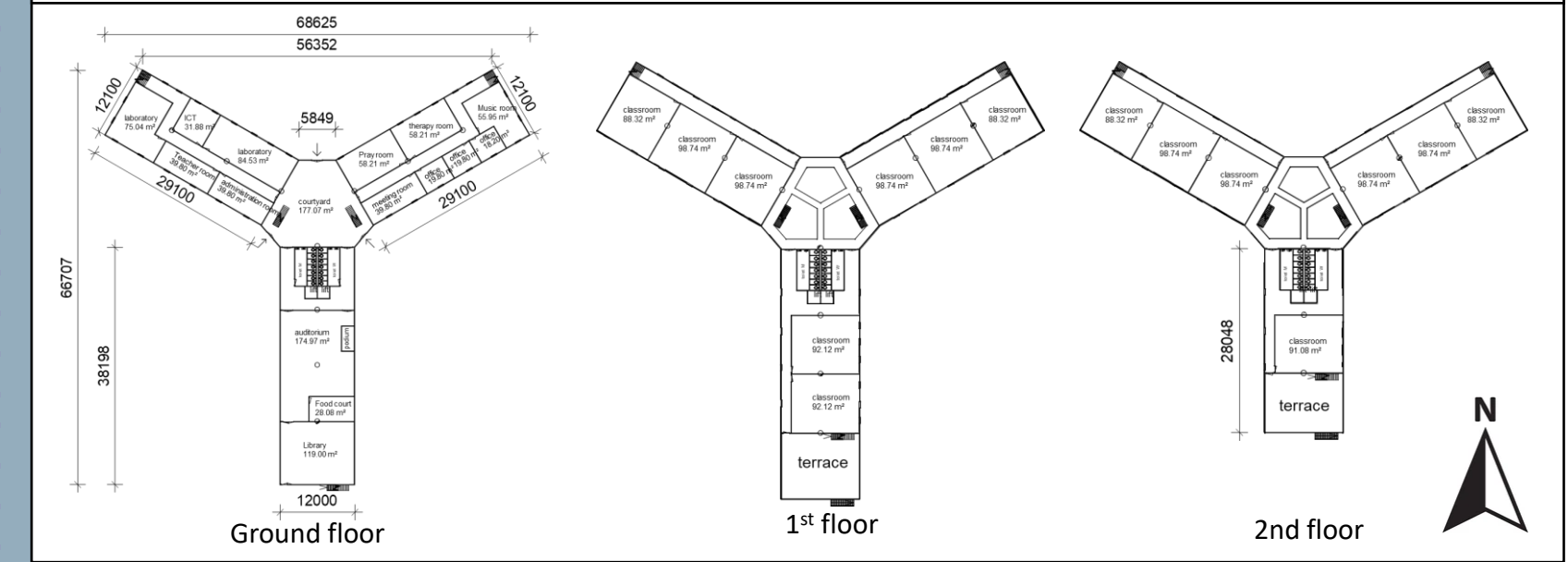
Jarno van Nieuwenhuize	-2	-1	1	2
Practicality			■	■
Efficient use of space			■	■
Orientation			■	■
Insolation			■	■
Escape			■	■
Uniqueness			■	■
Disability friendliness			■	■
Multifunction			■	■
Program requirements			■	■
Total			10	

Bart van der Hoeven	-2	-1	1	2
Practicality			■	■
Efficient use of space			■	■
Orientation			■	■
Insolation			■	■
Escape			■	■
Uniqueness			■	■
Disability friendliness			■	■
Multifunction			■	■
Program requirements			■	■
Total			11	

FINAL DESIGN

For the creation of the final design, we incorporated all the strengths of each design. We used Bart's floor plans as a basis because they were already developed in AutoCAD. This allowed us to easily determine if all the modifications are possible.

- Central elevators applied
- Staircases placed at the end of the wing with escape options
- A bridge applied in the atrium in the shape of a peace sign
- 3 entrances created
- Multifunctional wing created
- Columns used as supporting structures (additional information from engineering and implementation)
- Classrooms located on the north side to create shade



MULTIFUNCTIONAL BUILDING

The school has more than one function than just education. There is one library that can be used not just for students but also for people outside. Prayer room available for everybody who needs it. Classrooms can be used as meeting rooms outside school hours. And there is also a park and a playing field that can be used for students, teachers and citizens around the area.



Sportkooien | Sportarena's | Stedon Openbare Inrichting. (2022, 14 november). Stedon. <https://www.stedon.nl/stedelijke-producten/sport-spel/sportkooien/sport-arena-02/>

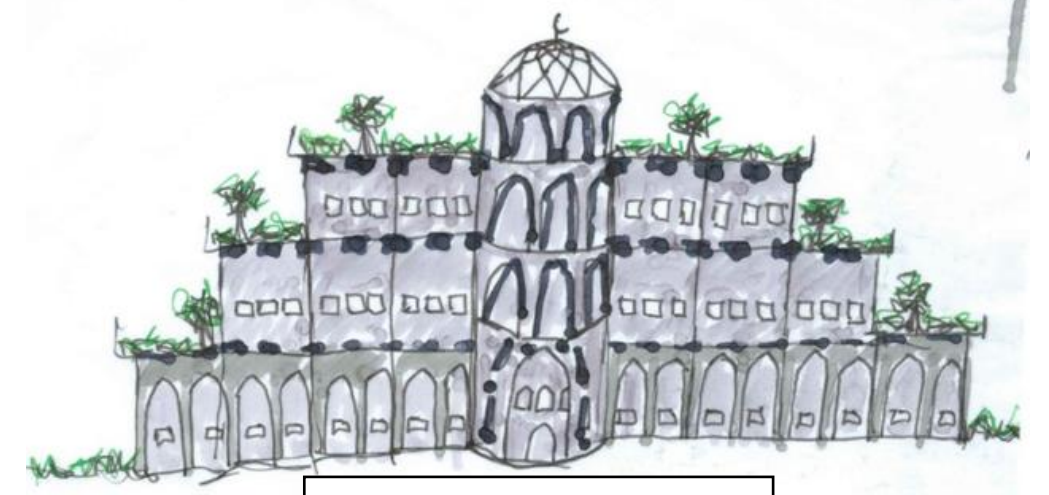
REFERENCES

We use this building as reference for the balconies in our building. They are perfect to take a break outside and it is possible to use them also as roof garden that contributes to biodiversity in the neighborhood.

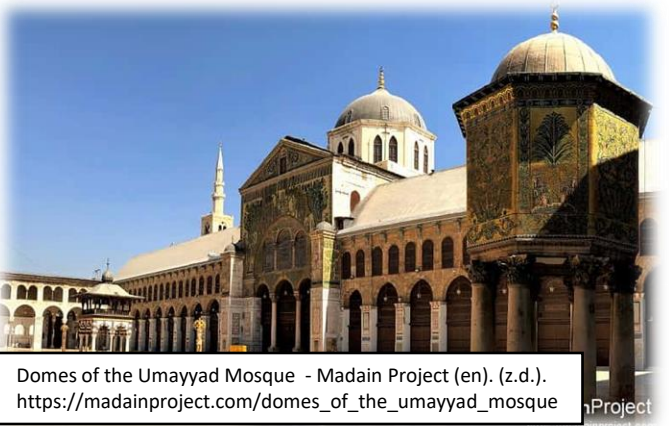
Also, we have taken inspiration from buildings like "The Umayyad Mosque" to design our dome, making the school closer to the culture.



Drie gebouwen met een zee van terrassen door Arous en Gelauff. Architectenweb. Muis, R. (z.d.). <https://architectenweb.nl/nieuws/artikel.aspx?ID=46909>

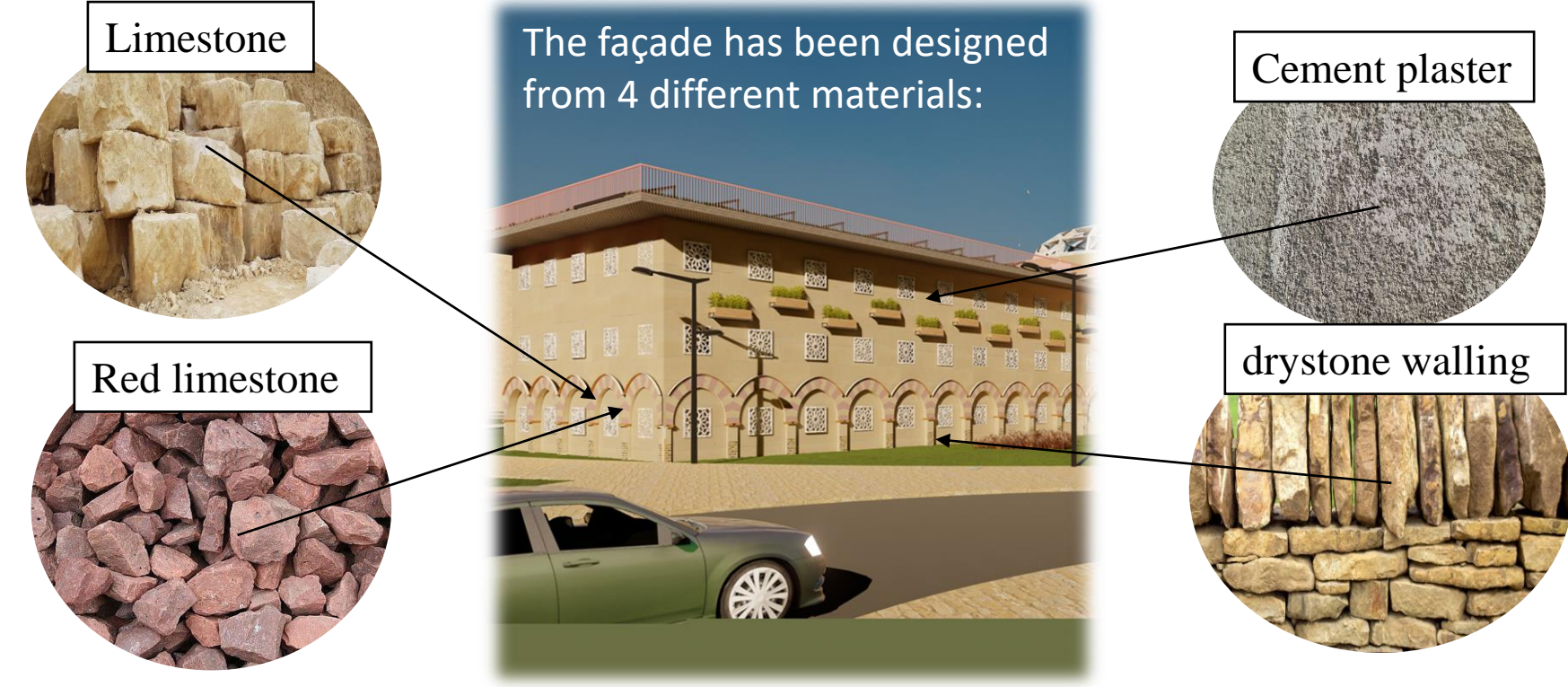


Jarno's school design.

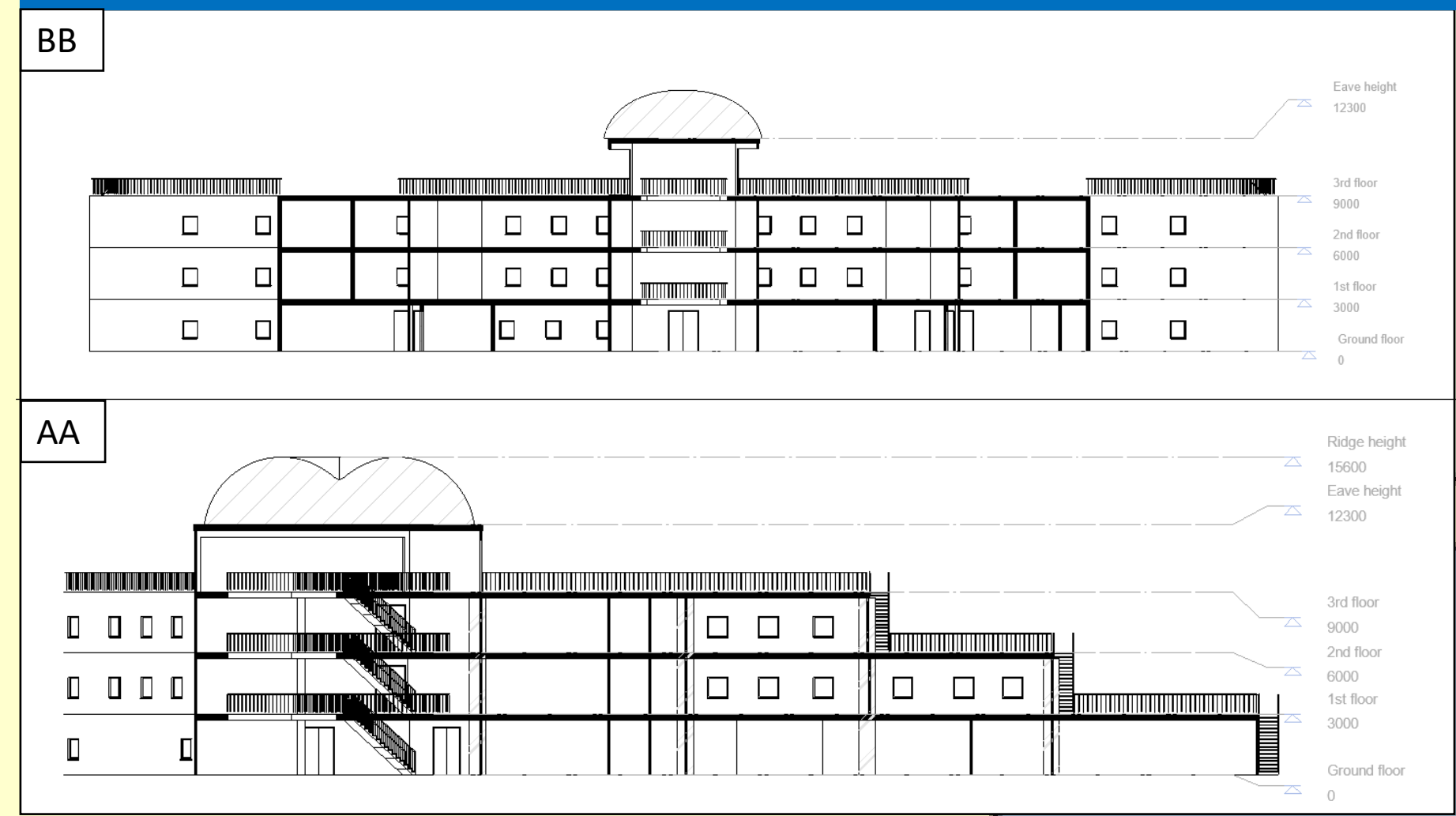


Domes of the Umayyad Mosque - Madain Project (en). [s.d.]. https://madainproject.com/domes_of_the_umayyad_mosque

MATERIALIZATION



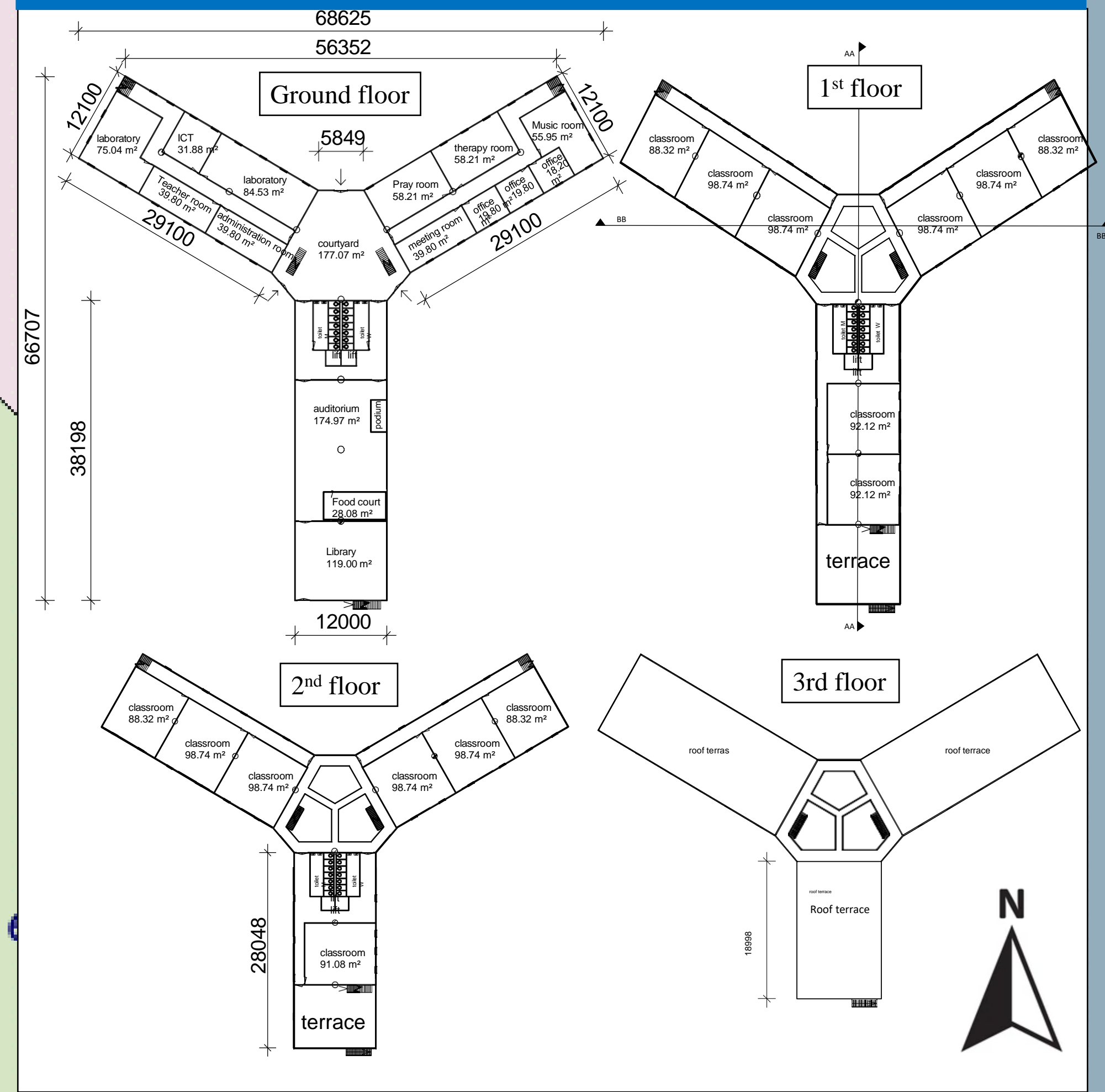
CROSS-SECTIONS



SITUATION



FLOOR PLANS



RENDERS

