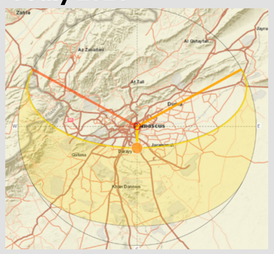
CASE HARASTA-DAMASCUS, SYRIA

ARCHITECTURAL TIMELINE

SOLAR STUDY

1 January 2025

1 July 2025

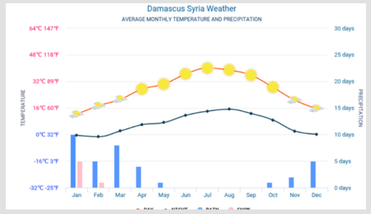


(SunCalc Sun Position- Und Sun Phases Calculator, z.d.)

Sunrise: Just like in the Netherlands, the sun rises in the east and in the winter months it gets light later and the sun sets earlier and in the summer months it stays light longer.

Summer period: in the summer it is very dry and there is very little rain. During the day it can get as high as 38 degrees. In the evening it usually cools down to about 16 degrees.

Winter period: In the winter there is a lot of rain and there is even a chance of snow. In the winter it usually does not get warmer than 16 degrees, in the evening it usually cools down to 0 degrees.



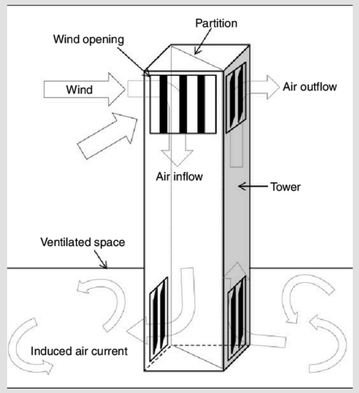
(hikersbay.com, z.d.)

DEMOGRAPHIC

TECHNICAL

Ventilation - windcatcher

(Ultraflex Control Systems)



For ventilation in the building, wind catchers are used, this is ventilation system A and is more often used in Syria

Water - collection system

(VentureWell. (z.j.). Rainwater harvesting)

A part of the roof, measuring 270 m², is used for rainwater collection. With 218 liters per m² per year, this collects around 58,860 liters of water per year.

The roof - solar panels & sedum roof

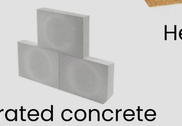
We propose using drought-resistant plants. They require little water, withstand heat, and provide natural shade and cooling.

(ICB Projects. (2020). Bio solar green roof system)

A part of the roof is covered with 540 m² of solar panels, producing about 190,000 to 220,000 kWh per year this is enough to make the builiding energy neutral

MATERIALS

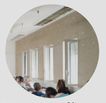
Hemp



Aerated concrete

Lime plaster

Concrete



Wood fiber

(Kaart van het Midden-Oosten, z.d.)

PROGRAM OF REQUIREMENTS

AREAS	QUANTITY	AREA BY UNIT (M^2)	TOTAL (M^2)
CLASSROOMS	48	32	1536
PRINCIPAL	2	20	40
TEACHERS ROOM WITH TOILETS	4	32	128
SMALL SERVICE ROOM	2	20	40
ADMINISTRATION OFFICE	4	15	60
PSYCHOLOGICAL CONSULTATION ROOM	2	9	18
CANTEEN	1	100	100
INSIDE & OUDSIDE TERRACES	1	250	250
TOILETS	60	2,2	132
LABORATORY	2	60	120
CENTRAL LIBARY	1	120	120
MULTI-USE SPACE	1	150	150
PRAYER ROOM	1	30	30
TECHNICAL ROOM	1	10	10
PLAYGROUND	2	100	200
MEDICAL ROOM	2	12	24
NET TOTAL AREA			2958
TARE MARGIN OF 33%			976,14
GROSS TOTAL AREA			3934,14

CONCLUSIONS

Green Roof:
- there is little greenery in the area surrounding the building, we want to increase biodiversity with a green roof.

Solar panels:
- The abundant sunshine and limited cloud cover are perfect for solar panels. By placing them elevated on the roof, shade is created for the green roof.

Windcatcher:
- For ventilation, windcatchers are used, a traditional method in Syria. They profide natural airflow.

Water collection:
- A water collection system is installed to collect rainwater. This water can be reused, which partly compensates for water shortages

Weather:
- Due to the drought in the summer, we have chosen to use succulents on the roof.

Design:
- The design was based on the local architecture, in which arches and courtyards are common. These elements are integrated into the new design.

Cast construction:
- A cast construction was chosen, a fast and widely used construction method in Syria about which a lot of knowledge is available.

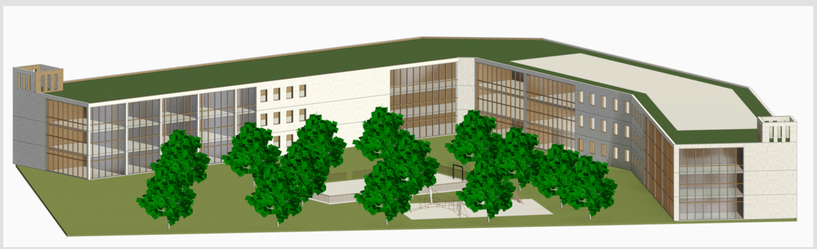
Cellular concrete:
- Cellular concrete is used for the interior and exterior walls, in which rubble from the old building is processed. This reduces the use of new material by approximately 50%.

Medical care:
- Medical care is included in the building, in response to the unhealthy living conditions in Syria. This contributes to a safe, healthy environment and offers children better development opportunities.

CASE HARASTA-DAMASCUS, SYRIA

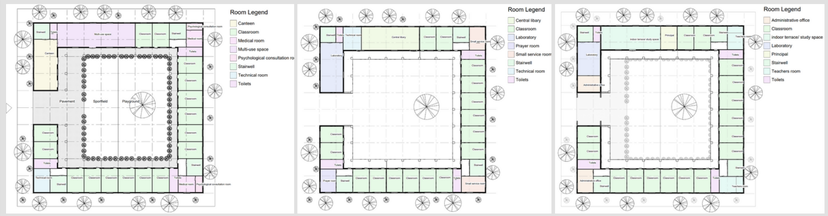
DESIGN 1

GROUND FLOOR 1ST FLOOR 2ND FLOOR

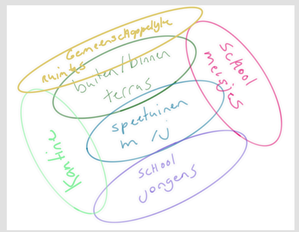


3D VIEW

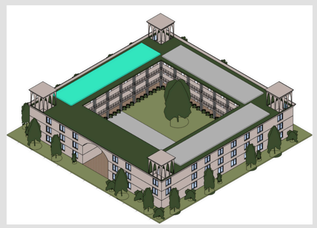
DESIGN 2



GROUND FLOOR 1ST FLOOR 2ND FLOOR



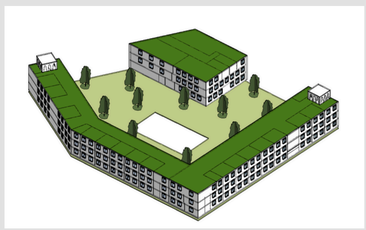
BUBBLE DIAGRAM



3D VIEW

DESIGN 3

GROUND FLOOR 1ST FLOOR 2ND FLOOR



3D VIEW

DESIGN 1 - REFERENCE PROJECT

Moadamiya School

(Moadamiya School, z.d.)

DESIGN 2 - REFERENCE PROJECT

Maktab Anbar former training complex in Damascus.

(Archnet > Site > Maktab Anbar, z.d.)

DESIGN 3 - REFERENCE PROJECT

Lycée Charles de Gaulle, Damascus, Syria

(Lycée Charles de Gaulle | Transsolar | KlimaEngineering, z.d.-b)

DESIGN 1 - HARRIS PROFILE

Variant 1	-	--	+	++
Duurzame energiegebruik			■	■
Bouwbaarheid			■	
Architectonische kwaliteit			■	
Flexibiliteit in gebruik en indeling			■	
Functioneel ontwerp			■	■
Culturele geschiktheid		■		
veilige vluchtroutes en open ruimtes			■	

DESIGN 2 - HARRIS PROFILE

Variant 2	-	--	+	++
Duurzame energiegebruik			■	■
Bouwbaarheid			■	
Architectonische kwaliteit			■	■
Flexibiliteit in gebruik en indeling			■	
Functioneel ontwerp		■		
Culturele geschiktheid		■		
veilige vluchtroutes en open ruimtes			■	

DESIGN 3 - HARRIS PROFILE

Variant 3	-	--	+	++
Duurzame energiegebruik			■	■
Bouwbaarheid			■	
Architectonische kwaliteit			■	
Flexibiliteit in gebruik en indeling		■		
Functioneel ontwerp			■	■
Culturele geschiktheid			■	
veilige vluchtroutes en open ruimtes		■		

CASE HARASTA-DAMASCUS, SYRIA

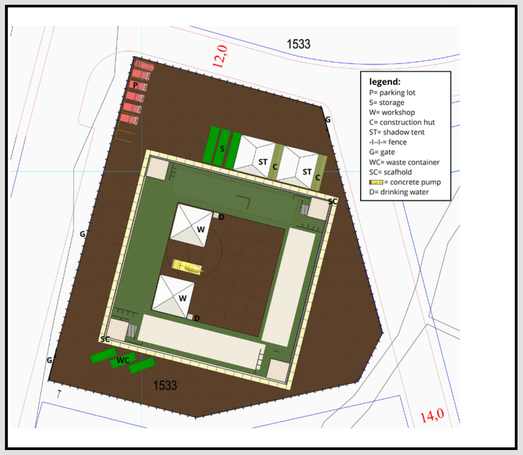
PAD FOUNDATION

- It requires little material
- constructed manually
- saves costs and resources.
- extra stability during earthquakes

(Betondingen, z.d.)

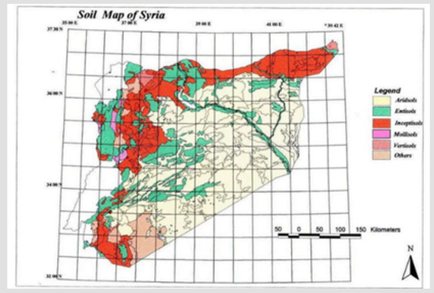
CONSTRUCTION SITE

(Revit, 2025)



- concrete pump in the middle
- seperated waste container and construction hut
- workshops in shadow
- three gates

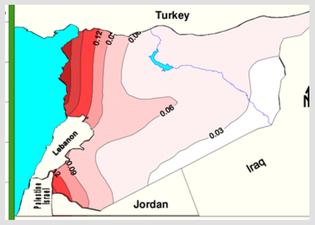
NO USE OF PILES



European Soil Data Centre. (2022). Soil map of Syria

The soil here is shallow and rocky (C1 – Lithosols and Eutric Regosols with colluvial soils), so deep foundations aren't needed. A pad foundation is enough and commonly used locally

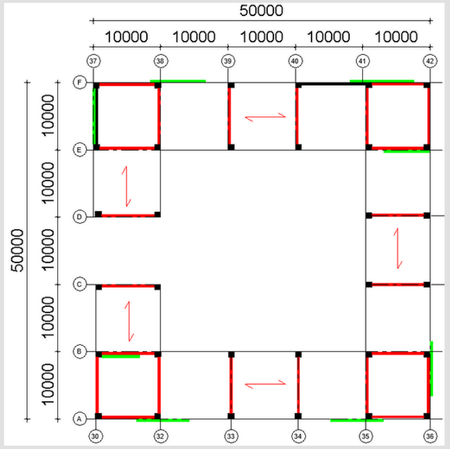
NO EARTHQUAKE RISK AREA



El-Sayed, H. M., Zaineh, H. E., Dojcinovski, D., & Mihailov, V. (2013)

The map shows that Harasta is outside the high-risk zone, with a PGA value below 0.2g. As a result, seismic isolation devices such as LRBs are not required, and a pad foundation is considered sufficient for this location.

STRUCTURAL PLAN



Autodesk, Inc. (2025). Revit [Software]

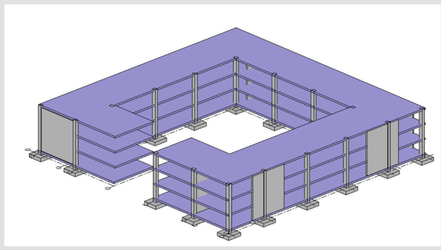
- column
- Beam
- stability wall

Use of columns and beams

While the walls are non-load-bearing, the green walls serve as stability elements. This allowes improved earthquake resistance. And using columns provides more flexibility

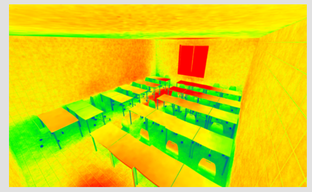
(brightspaec, 2025)

3D LOAD-BEARING STRUCTURE



Autodesk, Inc. (2025). Revit [Software]

DAYLIGHT OBSERVATION

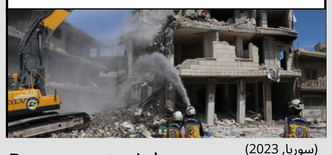


(Daylight Visualizer [Software]. Velux Group)

Classrooms are oriented to the south and east to maximize natural daylight and reduce energy use.

CONSTRUCTION PHASES

Demolition work



(2023 ,سوريا)

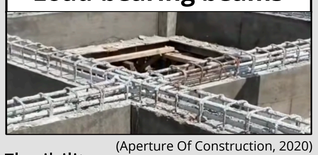
Reuse materials

Foundation

(Betondingen, z.d.)

Quick to build

Load-bearing beams



(Aperture Of Construction, 2020)

Flexibility

Concrete floors

(HTP-Civil Engineering, 2023)

Strength

Bearing columns

(Asad Bashir, 2018)

Flexibility

Walls

Syria 2021-2022, z.d.)

Stability

Roof

(WPD Group, z.d.)

Strength

SAFETY

(Arbowinkel.nl, z.d.), (Techniekwebshop.nl, z.d.)

(Watertank 1000 Liter Huren IBC Container Voor TijdelijkeWatervoorziening, z.d.)

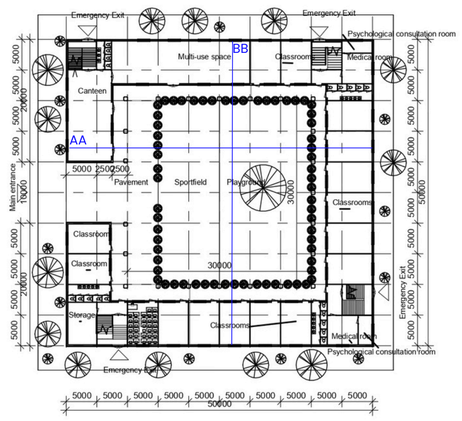
(Easy Up Partytent 3x3m Aluminium, Waterdicht (600133) | Profitent24, z.d.)

(Tol, 2024)

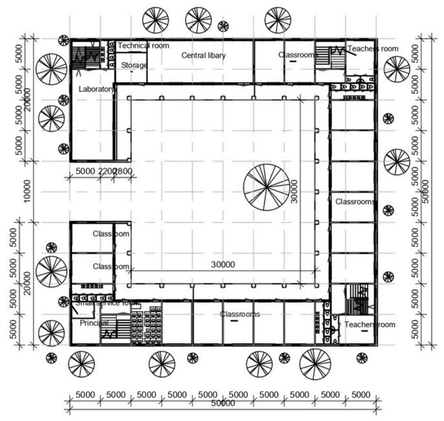
CASE HARASTA-DAMASCUS, SYRIA

FLOOR PLANS

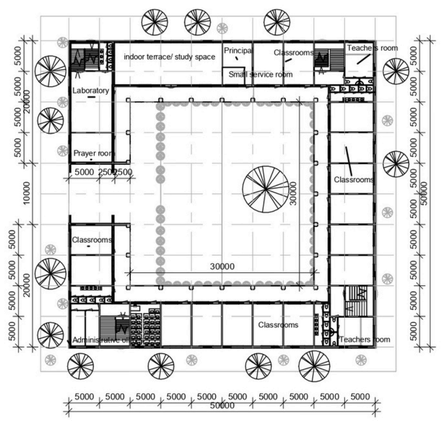
Bron: (Revit)



Begane grond 1:500



1ste verdieping 1:500



2de verdieping 1:500

VIEWS

Bron: (Lumion / Revit)

West façade - Entrance/public use

South façade - Girl school

East façade - Boy school

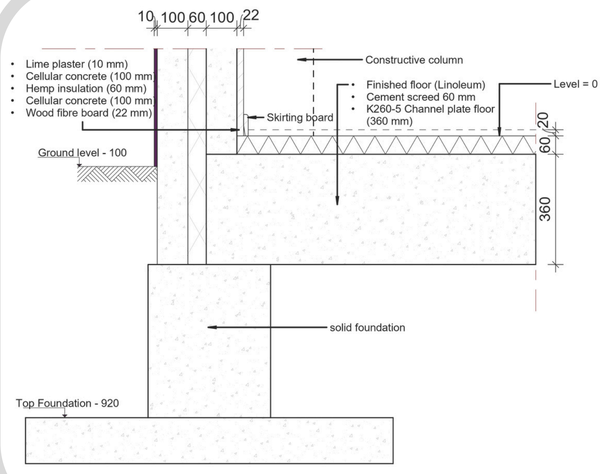
North façade - Public use

RENDERINGS

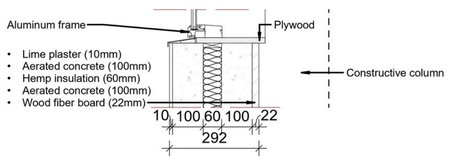
Bron: (Lumion / Revit)

DETAILS

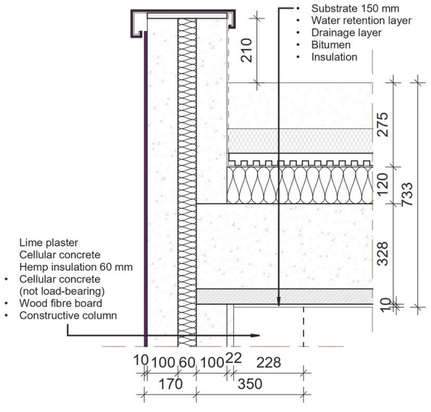
Bron: (Revit)



Detail 1

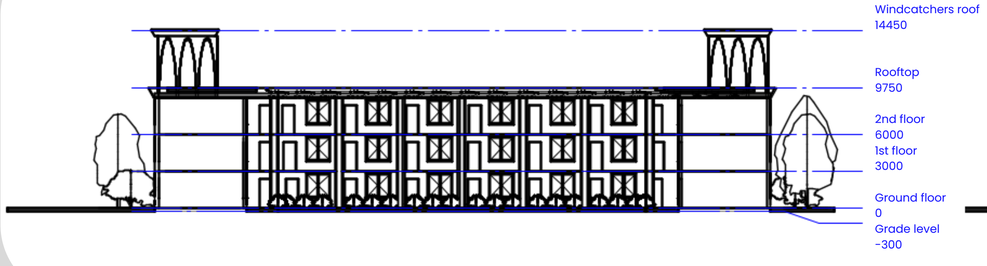


Detail 2

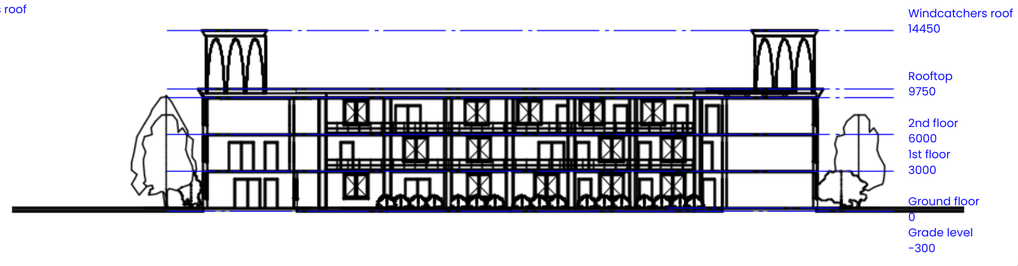


Detail 3

CROSS SECTIONS



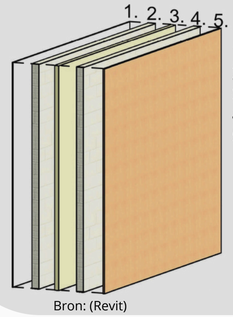
Longitudinal section AA



transverse section BB

Bron: (Revit)

EXPLODED VIEW



1. Lime plaster
2. Cellular concrete
3. Hemp insulation
4. Cellular concrete
5. Wood fibre board

Bron: (Revit)