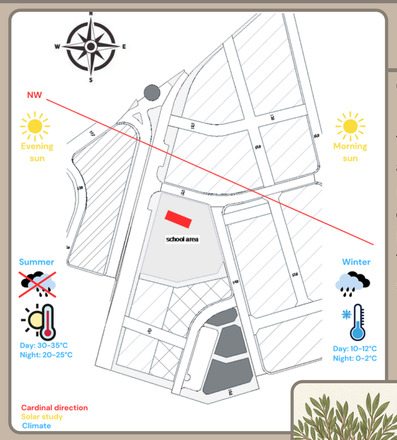
# Rebuilding their future!

## The road to the program of requirements

## Site research

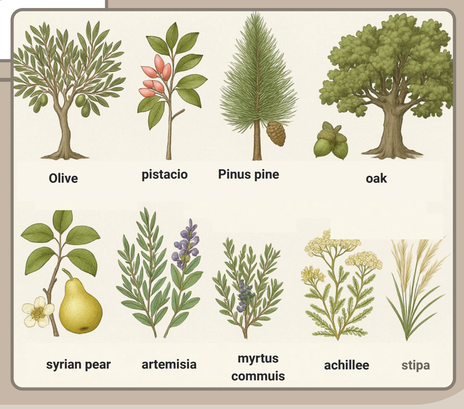



**Climate-Responsive School Design for Harasta**

The design takes into account Harasta's **hot and dry climate**. Through smart orientation, natural ventilation, **shade from plants and canopies and rainwater collection**, the building remains **cool and comfortable**. This creates a sustainable and future-proof school building.

**Integration of Local Flora**

By placing strong plants such as olive trees, oaks and herbs around the school, you get shade and cooling in an **inexpensive** way. These plants require **little water** and are easy to maintain. It also helps **preserve** nature and biodiversity




## Utilitarian function of a school

**How does a school function in Syria?**
Education in Syria lasts **12 years**. School is **compulsory** until grade 9, after which students (grades 10-12) choose general, technical or vocational education. The school year lasts **38 weeks** and is divided into **two semesters.**

**What additional spaces improve focus and collaboration?**

**Additional spaces** that enhance the learning environment:

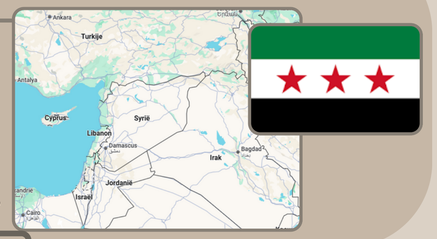
- **Breakout spaces** for group work and creative learning
- **Quiet rooms** for concentration and relaxation
- **Knowledge squares** for informal collaboration

**How can the school also be a neighborhood center?**

After school, parts of the school can be used by **local residents**. Think sports, workshops, homework help or religious gatherings. The library can become a cozy reading café, the cafeteria a neighborhood restaurant and the auditorium a place for courses or performances.
With a **separate entrance** in the evening and a smart layout, it remains safe and orderly.

## General information about Syria

Syria is centrally located in the **Middle East** and borders five countries. It has always been important for trade between Europe, Asia and Africa. The **population is mixed** and consists of different groups, with Islam and Christianity the largest religions. Years of war have hit the economy hard and damaged many buildings and infrastructure, making new construction more difficult.




## Program of requirements

**qualitative**

- Orientation of the building, one of the widest facades parallel to the wind so parallel to the northwest, to maximize natural ventilation and maximize wind;
- Use of insulating materials and thick walls with high thermal mass for temperature stabilization;
- Facilities for rainwater harvesting and storage to reduce water shortages during dry periods;
- Flexible shading and daylighting based on solar study to regulate heat and light;
- Extra attention to foundation and structural safety due to possible soil instability.
- The application of locally adapted trees and shrubs provides natural shade and cooling.

**quantitative**

| Rooms | Number of | Square meters | Total ($m^2$) |
|---|---|---|---|
| Classrooms | 24 | 32 | 768 $m^2$ |
| Teachers' room | 2 | 32 | 64 $m^2$ |
| Administration | 2 | 15 | 30 $m^2$ |
| Director's room | 1 | 20 | 20 $m^2$ |
| Serviceroom | 1 | 20 | 20 $m^2$ |
| Psycho consult | 1 | 9 | 9 $m^2$ |

| Rooms | Number of | Square meters | Totaal ($m^2$) |
|---|---|---|---|
| Laboratory | 2 | 60 | 120 $m^2$ |
| Multi-function hall | 1 | 150 | 150 $m^2$ |
| Central library | 1 | 130 | 130 $m^2$ |
| Prayer room | 1 | 30 | 30 $m^2$ |

## Common room and outdoor area research

**How can the shared space be optimally designed for both school students and Harasta residents?**

Spaces such as the library, auditorium, prayer room and playgrounds can be used by both **students** and **local residents**. By cleverly **separating functions,** it remains orderly. The library will have **quiet** and group **spaces**, and perhaps catering. The hall should be flexible for events. **The prayer room** should face **Mecca** and be separate for men and women. A **separate entrance** keeps the school from being disturbed.


**what design choices can be applied to deliver good thermal comfort in outdoor spaces?**

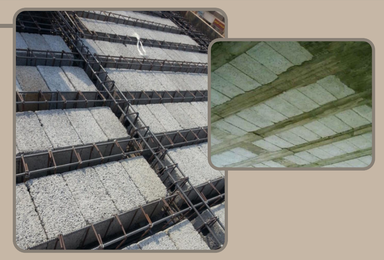
In Harasta, **shade** is important because of the heat. **Light facades**, **natural materials** and **pergolas** provide coolness. **Open panels** and **half-height walls** provide **fresh air. Shades** and **open design** increase **comfort.**

**What design choices encourage social interaction in shared space?**
**Shared spaces** encourage **social interaction**. Library has **quiet** and **group rooms** with **good acoustics**. Multi-purpose space is flexible and comfortable. Outdoor seating and play elements promote contact in separate areas. Clear layout increases comfort.

## Construction methodology

**What construction methods allow neighborhood residents without construction experience to participate?**

**Neighbourhood participation** can be done with simple, local construction methods. Residents help stack construction or pour concrete; **professionals** do the foundation. Reusable formwork and training reduce costs. A mix makes collaboration effective.



**How can you get local, inexperienced people to co-build safely?**

For safe neighborhood participation, **preparation is important**. With training and guidance, residents can do simple, safe tasks. Heavier work remains for professionals. Light formwork materials, protective equipment and proper supervision provide additional safety. This keeps co-building safe and feasible.

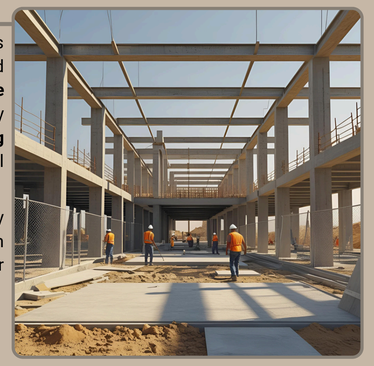
## Logistic solution

The new school will be built on a known site where a school also previously stood. Connections for **water and electricity** are believed to still be present, but **caution is required** when digging due to possible bomb damage. Water could possibly be connected through a nearby water tower, electricity through the overhead grids in the area.

## Technical solutions

The design of the high school in Harasta takes into account climate, culture, resources and rules. The school has a **reinforced concrete skeleton** with columns, floors and stability walls. **Stairwells are important load-bearing parts**, sometimes supplemented by additional walls.

In-situ concrete was chosen, with locally available materials. This allows even inexperienced residents to help build under supervision.



**Building techniques, ventilation, shade, thermal mass and local planting** (such as olive trees or shade cloths) help keep the indoor and outdoor **climate comfortable**. In winter, radiators are needed. Green roofs or facades cool, if they suit the local climate.

# Rebuilding their future!

## Road to the beginning of our design

## Mass study

**Mass 3 was chosen**
because it strategically organizes the different user groups (boys, girls, general) around a central courtyard, which provides both a socially and functionally strong structure.

This layout promotes **interaction**, offers **shelter from sun and wind**, and creates a pleasant **microclimate** that responds to the climatic challenges of Harasta.

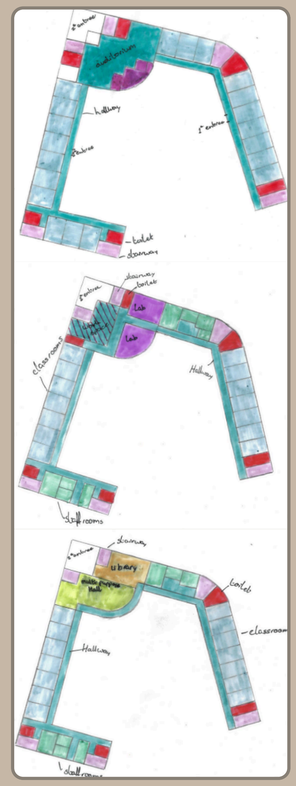
The compact, semi-enclosed form enhances **natural ventilation** and optimizes daylight access, while its orientation offers flexibility to make the design **climate-responsive**. As such, this massing best aligns with the cultural, spatial, and sustainable ambitions of the project.


## Schematic design floor plans

**First Floor**
This is the floor plan of the ground floor, showing various functional spaces. The level includes **multiple classrooms, a spacious auditorium, and a prayer room.** In addition, there are supporting facilities such as restrooms, stairwells, and a service area.

**Second Floor**
This is the floor plan of the first floor, with a focus on educational and support spaces. This level includes several **classrooms, a laboratory, staff rooms, and a server room.** There are also facilities such as restrooms, a storage closet, and stairwells that connect to the other floors. The central corridor ensures easy access to all rooms.

**Third Floor**
This floor includes **several classrooms, a library, a multifunctional space**, and supporting facilities such as restrooms and stairwells. The layout is clear and well-organized, with a central corridor providing access to all rooms..



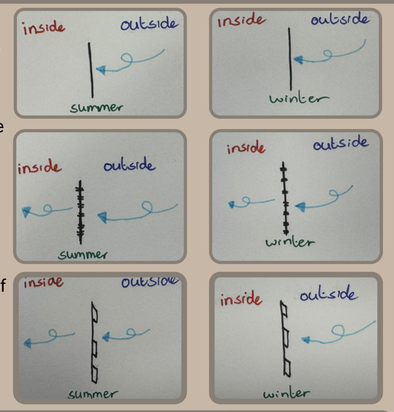

## Comparison of facade types

**The closed facade** provides good insulation in winter, but no daylight or ventilation. This makes it unsuitable for hot summers.

**The permanently perforated façade** always allows air and light to pass trough, but cannot be closed en is therefor les efficient in winter.

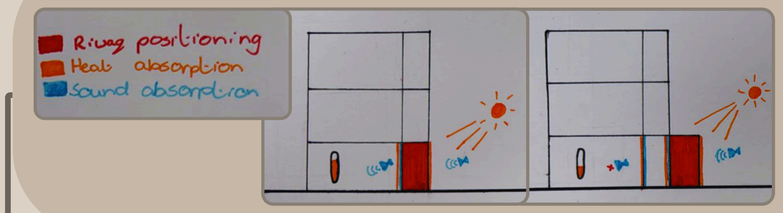
The **dynamic louvre system** adapt to the season: open in summer, closed in winter, with control over light, ventilation and appearance

We chose the dynamic louver system because of its seasonal flexibility, natural ventilation, and adjustable daylight. The system combines comfort with cultural aesthetics and operates without additional energy consumption.

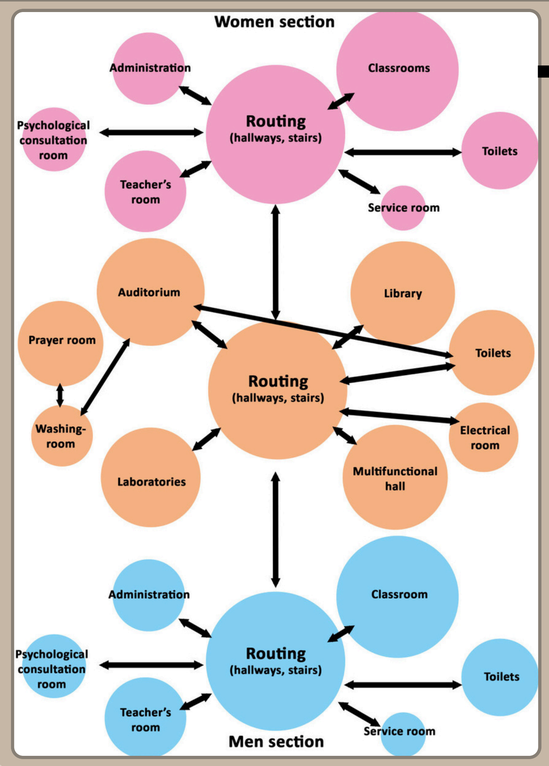



| Good | Criteria | Dense facade | Permanently perforated facade | Dynamic slats |
|---|---|---|---|---|
| Decent | Thermal comfort | | | |
| Badly | Ventilation | | | |
| | Daylight | | | |
| | Seasonal flexibility | | | |
| | Aesthetics | | | |

## Comparison Riwaq positioning




## Functional layout

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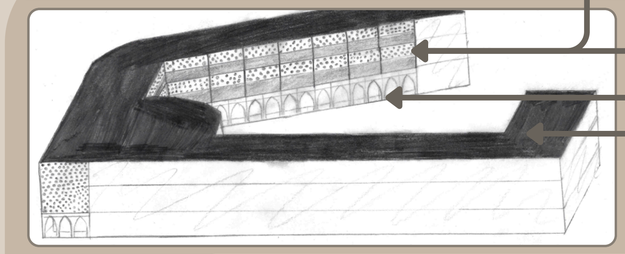
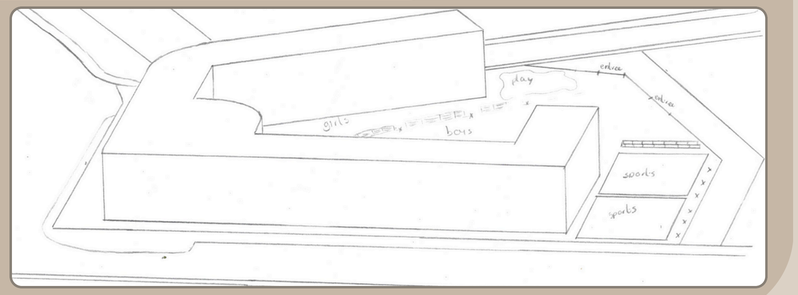
**Program of Requirements**

## Façade reference

## 3D view & siteplan






## Research green roof in Damascus

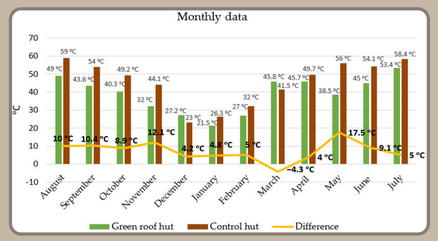
**Green roof research results**

A study in Cyprus shows that green roofs with ±8 cm of substrate **significantly reduce indoor temperatures**, especially in summer. Shrubs perform best. The results are easily applicable to Syria thanks to the similar climate.

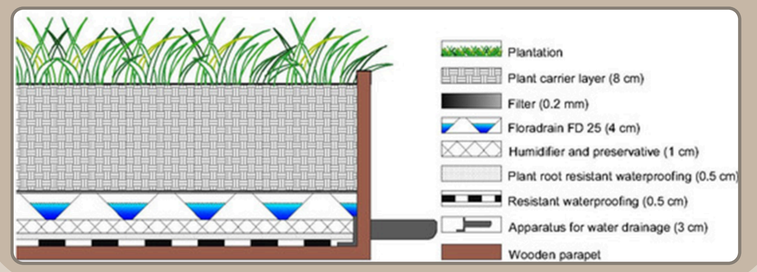
**Recommended vegetation for a Syrian green roof**

Drought-tolerant species are crucial for a green roof in Syria. Suitable species include:

- Sedum species such as sedum album and sedum reflexum
- Herbs and ground cover plants such as thyme, lavender and english grass
- if possible, with greater load bearing capacity: oreganoi, holy flower, and ornamental grasses



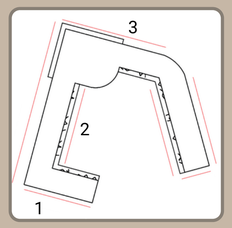

Preferably use **light substrate** and avoid plants with high water requirements. Native species are preferred because of their adaptation to the local climate.

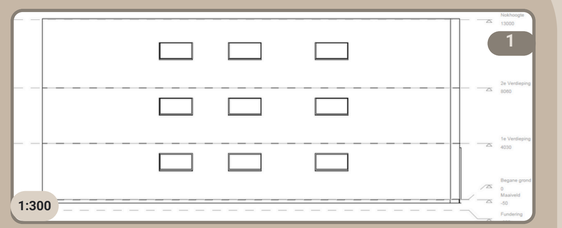


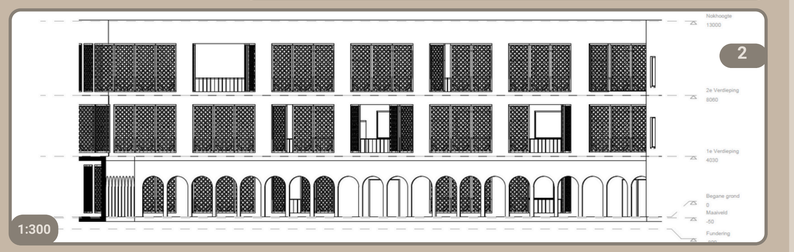
# Rebuilding their future!

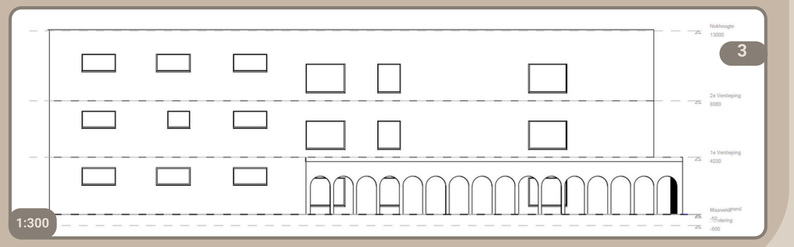
## Our solution for their future - preliminary design

## Façade views

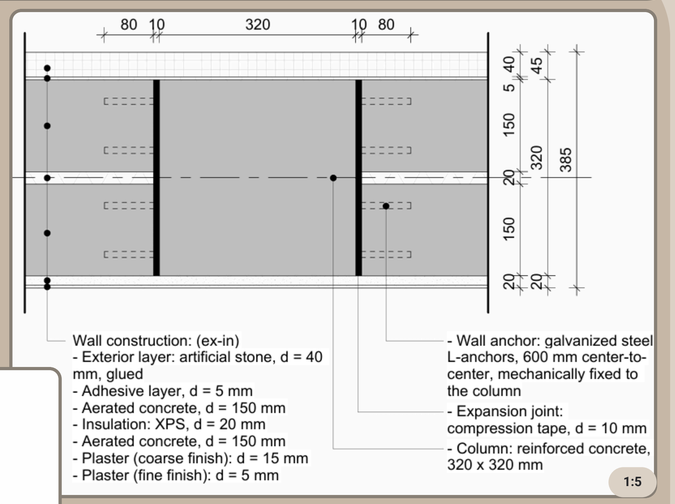


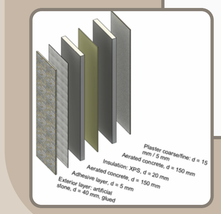




## Constructive detail



## Renders

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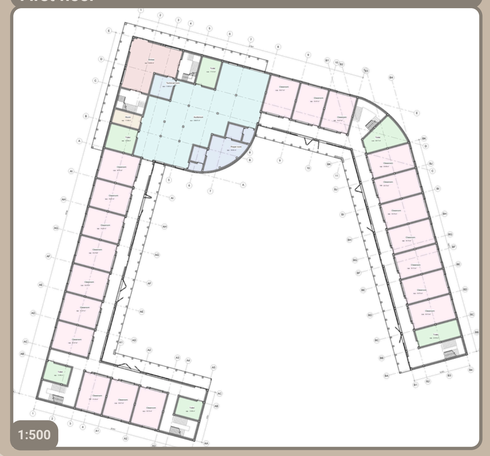
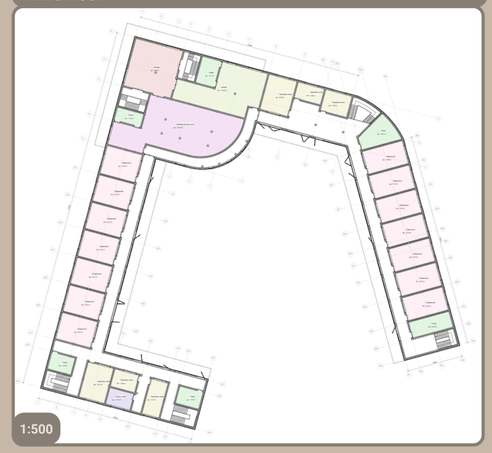
## Floor plans

### First floor

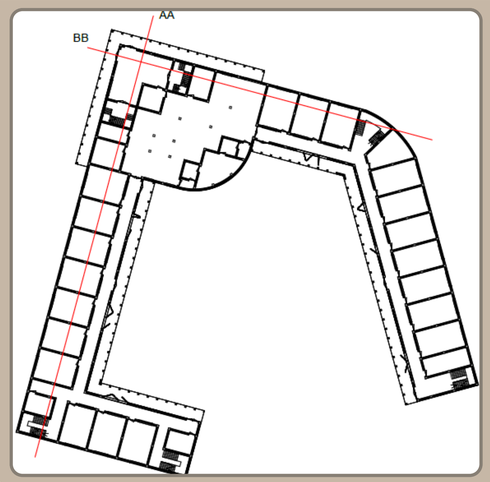


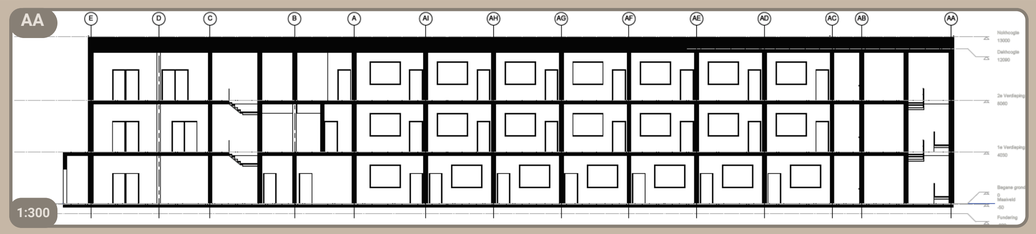

### Second floor

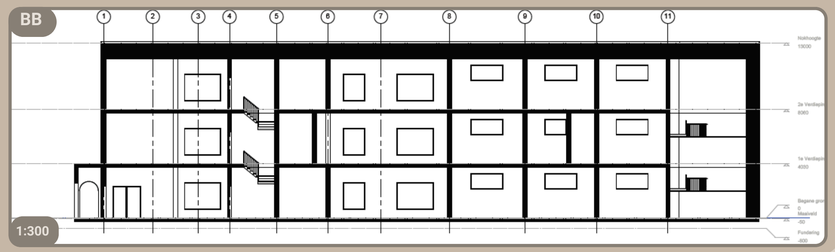

### Third floor




## Section views



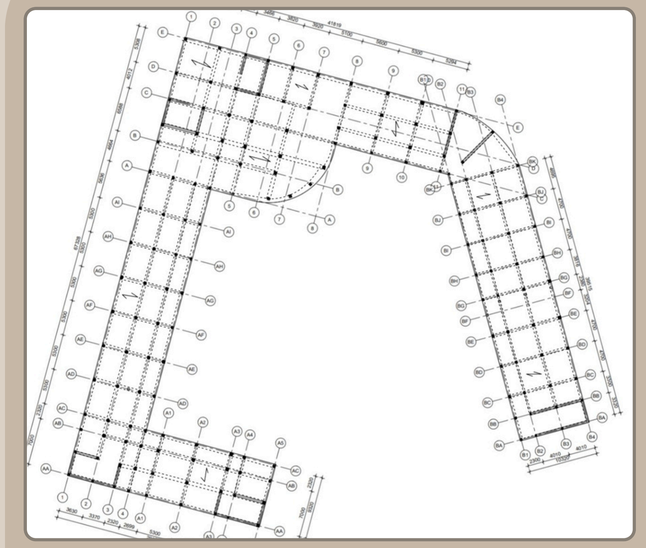



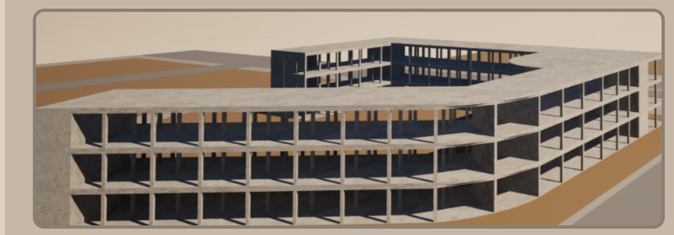
# Rebuilding their future!

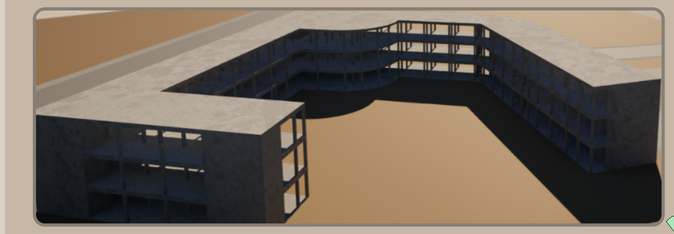
## Our solution for their future - calculations and implementation

## Construction



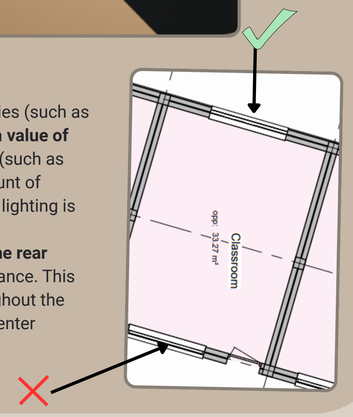
The building design incorporates 320x320 mm columns, with a maximum span of 5.3 meters, for the beams.
The structural stability is ensured through the placement of stairwells. Each section of the building is equipped with two stairwells, which serve as key stabilizing elements within the structure.



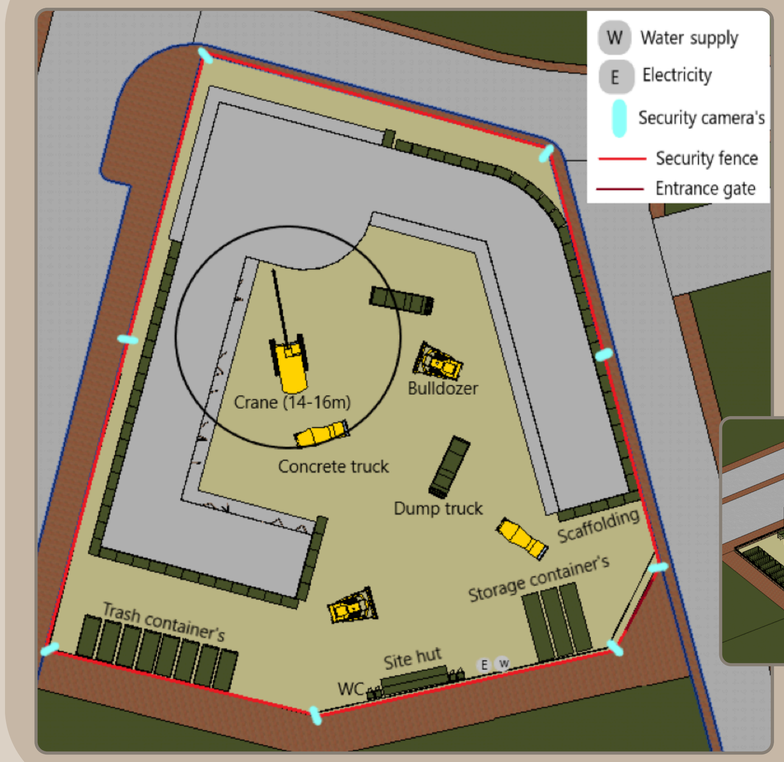


$$D_f = \frac{2{,}3 \times 0{,}6 \times 0{,}8)}{37{,}1} \times 100 = 2{,}98\%$$

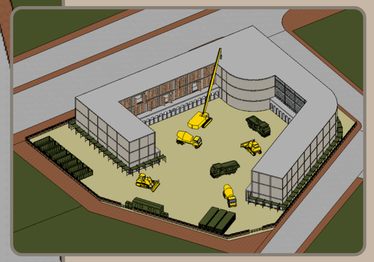
A daylight factor of **3%** is sufficient for basic activities (such as meeting rooms or cafeterias), but for a classroom a **value of 5% is recommended** according to many guidelines (such as Building Bulletin and BREEAM). Therefore, the amount of natural daylight is actually insufficient and artificial lighting is currently used in the classrooms.
The daylight factor was calculated based on **only the rear** window of the classroom, not the one near the entrance. This is because the façade does not remain open throughout the whole year and therefore sunlight does not always enter through that window.




## Logistics and safety



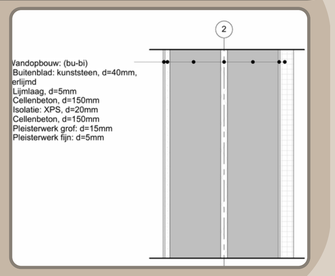

We have established a strict PPE (Personal Protective Equipment) schedule. Wearing the required PPE at all times is **mandatory**. Failure to comply with these safety protocols will result in immediate removal from the site. **Safety is our top priority, and non-compliance will not be tolerated.**





## Thermal resistance

The **required** thermal resistance (Rc-value) for the façade is **2.0 m²K/W** and with a calculated value of **3.35 m²K/W**, the school building's façade meets this requirement.




## Ventilation


The ventilation in the school building is based on **natural ventilation**. This is achieved through a façade with **shutters** that can be opened in various positions, in combination with standard **operable windows**.

## Cooling and heating

A **green roof** cools the building in summer, while **electric heaters** provide winter warmth using energy from **polycrystalline solar panels.**

## Including the neighbourhood

**To support clear communication** on site, we've created simple, easy-to-understand infographics that **help professional builders explain construction processes to less experienced workers**. These visual guides have also been translated into the local Arabic dialect to ensure everyone can follow along and work safely and efficiently.