Graduation report

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Foreword

For the past seven months, working on this graduation project has been a great pleasure for me. From the very beginning, my personal motivation to contribute to a meaningful design for children affected by conflict has remained a guiding force throughout the process. This motivation helped me stay focused and committed to developing a project that aims to support and positively impact as many children as possible, something which is close to my heart.

Above all, I would like to express my gratitude to everyone who has contributed to this graduation project.

First and foremost, I would like to thank my supervisors Job and Alessandra for the time and energy they invested in this project. Their constructive feedback, guidance and the confidence they placed in me to explore this important topic have been invaluable.

I would also like to thank everyone else who contributed to this project. In particular, I am grateful to Dana, my family, and my fellow group members for their continuous support, encouragement, and understanding during the past several months.

With this project, I hope to inspire reflection within our profession. In fragile contexts, architecture can have a meaningful impact. We should not shy away from the challenges we face. As desginers, we have ability, and the responsibility, to create *a future of hope*.

David

Chapter one

Introduction

“I saw that when they see a child they shoot without hesitating. In our school they aimed missiles towards us, and when the missiles hit the school it destroyed half the building. I was not at school that day, but I saw it on fire. I have seen many bodies. In the streets, thrown outside homes, and even in the river.”

Fadi, 12, Syria

Qaddour, K., & Husain, S. (2022)

1.1
Problem statement

From 2011 until 2024, Syria dealt with a destructive civil war, in which armed opposition groups fought against the reigning regime. Although the situation is still fragile, the war officially ended in 2024 with the fall of the Assad regime.

Over the past fifteen years, Syria has been affected by one of the most destructive civil wars of the twenty-first century. Ongoing armed conflict between the ruling regime and opposition groups left millions of Syrians exposed to violence, danger and displacement. In 2024, as a result of the war, more than 12 million Syrians had been forcibly displaced, either internally or as refugees. Although the civil war is now officially considered over, Syrian society is still dealing with the consequences of the conflict. The situation in Syria therefore remains one of the world's most complex and urgent humanitarian crises (UNHCR, 2025).

Children are among one of the most severely affected groups. A significant amount of an entire generation has grown up during the war, living their daily lives while surrounded by violence, instability and a lack of prospective. During war times, going to school was almost never an option for children. At the moment of writing this research, 2.4 million kids in Syria are still out of school (Qaddour & Husain, 2022; UNICEF, 2025). Many school buildings have been targeted, repurposed or (partially) destroyed due to years of conflict. In 2013, already 22% of all school buildings in Syria were rendered unusable for educational purposes (Al Hessan et al., 2016; Save the Children, 2013). UNICEF states that in 2025, this percentage increased to 33%, meaning one out of every three schools has become unusable for education. As a result, those who do still attend school are often faced with overcrowding, unsafe buildings, limited resources and untrained staff.

Beyond these physical challenges, the psychological toll on children is also profound: a study has shown that over 60% of Syrian children exhibit symptoms of at least one probable psychological disorder, with PTSD, depression, and anxiety particularly common (Perkins, 2018). Direct exposure to war and violence, in combination with stressful social and material conditions as a result of the war, have led to serious challenges regarding psychological well-being of Syrian kids (Miller & Rasmussen, 2009; Perkins, 2018).

The size of destruction of school buildings, combined with the psychological vulnerability of children growing up in a conflict area, creates a complex architectural and societal challenge. The challenge is not merely a matter of rebuilding educational infrastructure. It requires thinking about how new schools can respond to children's educational and psychological needs in a sensitive, yet hopeful, context.

FIGURE 1. *Syrian boy in school.* By: Adam Patterson.

1.2
Relevance

Education plays a crucial role in breaking cycles of violence and instabilities. Research has shown that not being able to receive education often prevents kids from leaving this violent cycle. The longer education remains disrupted, the greater children's vulnerability to recruitment by armed groups, trafficking, and other threats to their personal safety (Save The Children, 2013). On the contrary, educational engagement is shown to have an important impact on reducing violence and improving young people's handling of their lives, as well as their social status (Petersen, 2013).

A recent development in the recovery of Syria is that, for the first time since the start of the war, children are now returning to school under a unified national calendar and educational framework. This milestone introduces a new chapter of hope. A "Back to Learning" campaign, supported by the Syrian Ministry of Education, aims to help ensure that every child can reclaim their right to education. However, the success of this initiative depends heavily on the availability of a sufficient amount of school infrastructure and the professionals involved.

FIGURE 2.
Destroyed school building in Syria.
By: Omar Haj Kadour

Given the scale of destruction, the reconstruction of schools in post-conflict Homs and Syria is an urgent priority. While a substantial body of research exists on learning environments and their impact on educational outcomes, far less attention has been given to how school architecture functions in post-conflict settings where large numbers of children are affected by trauma and PTSD. As a result, it remains insufficiently understood how architectural and spatial elements can influence stress, fear, and exclusion in such contexts. This research is relevant in addressing this gap by exploring how school design can move beyond functional requirements and actively support children's psychological well-being and recovery in post-conflict environments.

In addition, this thesis addresses the need for school buildings to be conceived as flexible and adaptive structures rather than single-purpose facilities. In the post-conflict reconstruction phase, schools are often required to accommodate multiple user groups and functions throughout the day, such as staggered shifts of pupils, early childhood care before formal school hours, teacher training sessions, and community-based workshops. By exploring how architectural flexibility can be embedded in school design, this research contributes to a wider discourse on buildings that are capable of accommodating changing functions over their lifespan, making the findings applicable beyond the Syrian context.

1.3
Objective and motivation

The urgency and scale of the current educational crisis in Syria are evident. Research and reports show that over the past fifteen years, the country has endured a prolonged and violent conflict, severely affecting millions of children and disrupting their learning and development. As Syria slowly enters a phase of reconstruction, the question of children and education becomes more critical than ever. Without timely and thoughtful intervention, an entire generation risks becoming trapped in a continuing cycle of conflict and instability. This moment therefore calls for action.

The pressing need for new school buildings in Syria has led me to focus my graduation project on the design of a primary school. This school and its learning environment aim to provide children with the opportunity to return to education in a supportive and appropriate manner. It is essential to recognise that many children are growing up in vulnerable and sensitive conditions, which must be carefully considered in the architectural design. However, the impact of war has created a multidimensional challenge that extends beyond the mere construction of a school building. It requires the creation of environments in which children, each affected by the conflict in their own way, can once again feel safe, free, and supported. Beyond education alone, the school should function as a place where children can reconnect with a society in recovery.

In addition, it is my ambition to design a school building that extends beyond its educational function. Particularly in the post-conflict context, the building should accommodate multiple uses and be accessible to different groups within the community. By doing so, the school can act as a catalyst for social cohesion and serve as a foundation from which the surrounding neighbourhood and the city can further rebuild.

Finally, the project aims to propose a forward-looking and sustainable school building. The design will respond to local conditions, including available construction materials and the Syrian climate. Local involvement is considered essential in this process, not only to strengthen a sense of ownership and responsibility, but also to ensure that knowledge and skills are shared and embedded within the community.

1.4
Research and design questions

Based on the research problem and the motivation, this report is guided by the following main question:

How can a primary school in post-conflict Homs be designed to support both children's educational progress and psychological well-being in a context-aware and resource efficient manner?

This main research question is divided into the following sub-questions:

1. What educational and psychological well-being problems do children in post-conflict Syria face?

2. How have architectural features shown to provide educational and psychological well-being benefits?

3. How do existing policy frameworks and guidelines approach the reconstruction of education and the importance of psychological well being?

4. What other functions can schools in post-conflict Homs host to serve broader community needs?

5. How can sustainable, climate-responsive, and culturally grounded design strategies create a future-proof school building suited to the environmental conditions of Homs?

1.5
Scope

The outcome of this graduation report is the design of a multifunctional primary school building that can be used throughout the day for both educational and community-related activities. The school will be located in the middle of the Al-Wa'er neighbourhood. During the design phase, the broader urban context will be analysed in detail, and the exact site for the school will be determined.

The project focuses on architectural strategies at the building and immediate site scale, while acknowledging the broader social, psychological, and environmental dimensions that shape post-conflict recovery.

FIGURE 3.
Children playing in front of their demolished school.
By: Save the Children International

FIGURE 4.
Children returning to their school.
By: Khudr Al-Issa (2018)

How can a primary school in post-conflict Homs be designed to support both children's educational progress and psychological well-being in a context-aware and resource effienct manner?

Main research question

Chapter two

Approach

2.1 Methods

In this chapter, the approach of the graduation project is explained. The research strategy, expected output and theoretical framework explain the structure of the project. Please note that the theoretical framework presented in this chapter is a summary of the complete research paper which was written during the first ten weeks of the graduation process. The full paper is added to the document as a fifth chapter. In order to understand the results better, it is highly recommended to read this paper before reading the results presented in chapter three.

FIGURE 5. *Syrian kids on their way to school.*
By: Amer Almohibany.

2.1.1 Research strategy and planning

This graduation project combines both research and design. In the first phase, a theoretical framework and research paper are developed to understand the impact of conflict on children's psychological well-being and the role of the built environment in supporting learning and recovery. In parallel, policy documents by international organisations active in conflict-affected fragile states (CAFS) are analysed to identify functional, organisational, and environmental recommendations for school design.

Following the research phase, the design phase begins. The findings from the research are intended to guide the design process by providing practical recommendations and design principles. At the same time, the design phase allows room for exploration and the development of new ideas. Throughout the process, the research framework functions as a reference to evaluate and support design decisions.

2.1.2 Tools and expected output

As explained in Chapter 1.5, the final outcome of this graduation project is the design of a multifunctional primary school in the city of Homs, Syria. The design proposal and the decisions made during the process should be traceable to the research findings.

To achieve the final design, a wide range of tools and techniques are used throughout the project, including sketches, models, use of 3D software(s), litertaure studies, case studies, etc. These tools support the development and communication of the design proposal.

2.2 Theoretical framework

This subchapter presents the theoretical framework. First, the educational and psychological background are outlined. After, both literature and policy review findings provide useful and context-appropriate input for the design input table, which is presented in the last subchapter.

2.2.1 Educational and psychological background

To understand the design context, it is essential to first examine the educational and psychological conditions of Syrian children. Prior to the outbreak of the civil war in 2011, Syria had achieved near-universal enrolment in primary education, with 95.6% of children aged seven to eight attending school (Save the Children, 2013; Welker et al., 2021). The education system was largely state-run and relatively stable, particularly in urban centres such as Homs (Al Hessan et al., 2016).

The conflict, however, led to large-scale disruption of education through the destruction of school infrastructure, displacement of families, and loss of teaching staff. By 2016, more than two million children were out of school inside Syria, while hundreds of thousands of refugee children were unable to access education abroad (Al Hessan et al., 2016; Qaddour & Husain, 2022). Even in government-controlled areas where schools remained operational, overcrowding, teacher shortages, and inadequate facilities severely compromised educational quality (UNICEF, 2015).

Beyond educational disruption, the psychological impact of the conflict on children has been profound. Research by Perkins et al. (2018) demonstrates that Syrian children have been exposed to both acute traumatic events and chronic daily stressors, including violence, displacement, fear of attacks, and continuous exposure to conflict-related media. More than 60% of the children studied showed symptoms of at least one probable psychological disorder, with PTSD, depression, and anxiety being most prevalent. These findings underline that the post-conflict educational challenge is not solely infrastructural, but deeply intertwined with children's mental health and emotional recovery.

2.2.2 Literature review: the physical environment, education and psychological well-being

A growing body of research demonstrates that the built environment can significantly influence both educational outcomes and psychological well-being. Environmental psychology studies have shown that spatial conditions can either exacerbate stress or support emotional regulation, which is particularly relevant for children affected by trauma.

One of the most influential theories in this field is the Stress Reduction Theory developed by Ulrich (1991), which explains how exposure to natural environments can facilitate rapid recovery from stress. This theory is supported by later studies showing that access to green spaces provides children with opportunities for retreat, self-regulation, and restorative experiences, especially in contexts of poverty, war, and displacement (Chawla, 2014; Chawla, 2015). For primary school-aged children, natural environments have been linked to improved attention, emotional stability, and opportunities for creative play.

In addition to green spaces, research on learning environments has identified a range of architectural factors that influence educational performance. Barrett et al. (2015; 2016) demonstrated that classroom design accounts for a significant proportion of variance in pupils' learning progress, comparable to the influence of teaching quality. Their research identifies three overarching design principles: naturalness, individualisation, and stimulation.

Naturalness includes factors such as daylight, ventilation, thermal comfort, acoustics, and visual connections to nature. Studies show that sufficient daylight, controlled sunlight, good air quality, and thermal comfort are associated with improved concentration and academic performance (Heschong et al., 2002; Coley et al., 2007; Bako-Biro et al., 2012; Barrett et al., 2015).

Individualisation refers to the extent to which spaces support flexibility, ownership, and connection. Opportunities for personalisation, differentiated learning zones, and child-scaled spaces have been shown to increase engagement and well-being, particularly for younger pupils (Barrett et al., 2015; Killeen et al., 2003).

The level of stimulation addresses visual complexity and colour use. Research indicates that environments that are either over- or under-stimulating negatively affect learning, while spaces with moderate levels of stimulation support both cognitive performance and emotional comfort (Read et al., 1999).

Together, these findings highlight that school architecture can actively contribute to creating supportive learning environments, especially when design parameters are considered in combination rather than isolation.

FIGURE 6. *Syrian kids.*
By: Rodi Said/Reuters

2.2.3 Policy review: education and psychological well-being in post-conflict contexts

In parallel to academic research, numerous NGOs have developed policy frameworks addressing education in conflict-affected fragile states. These documents are grounded in extensive field experience and provide valuable guidance on functional and organisational requirements for schools in post-conflict settings.

The UNICEF Child-Friendly Schools Manual (2009) emphasises the importance of child-centred, safe, inclusive, and flexible learning environments. It highlights spatial considerations such as access to daylight and ventilation, child-scaled facilities, safe outdoor spaces, and the integration of health and sanitation functions within school design.

UNESCO's Green Schooling Quality Standard (2024) approaches school reconstruction as an opportunity to embed sustainability and climate resilience. Although sustainability may not appear to be an immediate priority in post-conflict contexts, the framework argues that rebuilding phases offer a unique moment to establish long-term environmental responsibility and resilience.

Save the Children (2010; 2013) stresses the critical role of education in preventing further marginalisation of children in conflict-affected societies. Their work highlights the importance of flexible learning spaces, alternative education programmes, and schools as community anchors.

Finally, the IASC Guidelines on Mental Health and Psychosocial Support (2007) provide essential insights into how spatial environments can support psychological recovery. The guidelines emphasise the need for safe spaces, predictable environments, and access to support services, reinforcing the relevance of architectural design in addressing mental health and psychosocial well-being.

FIGURE 7. *Syrian children receiving help from UNICEF.* By: UNICEF/UN0497230.

2.2.4 Design input table

This theoretical framework demonstrates that the reconstruction of schools in post-conflict Syria cannot be reduced to a functional or quantitative task. Educational recovery is deeply interconnected with children's psychological well-being, and both are influenced by spatial, environmental, and organisational conditions.

By combing academic literature and policy frameworks, this chapter forms a coherent basis for translating research findings into architectural design input. In this subchapter, these insights are structured into an integrated design input framework that forms the foundation for the design brief and following architectural proposal.

FIGURE 8.
Design input table (1/4).
Own image.

Design parameter	Design implication	Source(s)
Aid	Facilitate healthcare and nutrition interventions that promote learning and development. "For adolescent girls and female teachers, washing places must be provided with enough water and privacy to wash and dry clothes and rags used during menstruation." "A doctor's office integrated with the school layout can function as a school clinic and community health centre." "Fire prevention and emergency evacuation plans must be part of the design process and built into the school programme."	UNESCO (2025) Save the Children (2010); UNICEF (2009) UNICEF (2009) UNICEF (2009)
Classroom size and shape	Young pupils are functioning better in complex-shaped classrooms, because it enables for more learning zones and flexibility. Older pupils performed better in classrooms with simpler shapes (squarer). For younger children, safe spaces within the classroom can be designed to provide a place where children can retract when feeling stressed.	Barrett et al. (2015) IASC (2007)
Colour	"Use brighter accents for play corners, decks, corridors and furniture. Learning spaces should be light and relaxed in colour, not gloomy, dull or dark." White walls with a highlight or a feature best improved learning progress. Within the room, bright coloured furniture, carpets and other elements also positively influence learning progress. Young children from 3 to 5 years old prefer cool colours over warm colours. In interior environments, the colour red is preferred by children. Designing classrooms with an intermediate level of stimulation has the best effects on learning progress. Space with differentiated ceiling height and wall colour may be too stimulating for children.	UNICEF (2009) Barrett et al. (2015); Read & Upington (2009) Read et al. (1999)
Community	Design space for workshops and meetings where local stakeholders can discuss, suggest ideas, share experiences, and actively contribute to the school's agenda	UNESCO (2025)

FIGURE 8.
Design input table (2/4).
Own image.

Design parameter	Design implication	Source(s)
ECCD	Designing space for Early Childhood Care and Development supports children's development before entry into primary school. At the same time, it frees up families who would have to look after these young children. "Children in these age ranges do not have to be seated in chairs, but could instead have mats to sit on, materials to learn from and room to play on their own or in small groups." "Provide 4.5 to 5.5 square metres of space per child. Design large classrooms that facilitate programmatic flexibility and provide space for both quietness and active play. This decreases aggressive behaviour. Classrooms need to be spatially differentiated. Activity areas can be separated by physical objects like movable partitions, open shelves, cabinets and plants; or by visual signs such as different flooring materials, wall textures or colours; or by changes in lights or ceiling or floor height."	Save the Children (2010) UNICEF (2009) UNICEF (2009)
Flexibility	Provide (space for) flexible and alternative education opportunities.	Save the Children (2010); IASC (2007)
Green	"Designing green spaces with trees, naturalized habitats and gardens offer benefits for many dimensions of children's well-being. Children often state a preference for green spaces that include flowers, shrubs and trees" Provide green views from within the classrooms. A green view has shown to have a restorative impact and also stimulates attention. Integrating healing green spaces into the design can help children recover after conflict or war exposure.	Chawla (2015); UNESCO (2024) Ulrich (1991); Barrett et al. (2015); Chawla (2014)
Kitchen	"Establish small-scale school farms by collaborating with local farmers or community members that provide handson agricultural education and supplement school meals." "Providing food (on-site or as take-home rations) in educational settings can be an effective strategy for increasing attendance and retention, which in itself contributes to mental health and psychosocial well-being."	UNESCO (2024) IASC (2007)

FIGURE 8.
Design input table (3/4).
Own image.

Design parameter	Design implication	Source(s)
Library	Facilitating a library space helps to connect the school to the surrounding community. The library should be located and designed so they are accessible to the community.	UNICEF (2009)
Light	Optimize natural lighting. Providing enough natural light significantly influences children's performances, especially in reading and science scores. Large windows have also shown to be associated with better learning performances. Providing direct sunlight presence in rooms has shown to have restorative effects, provided that there is no visual discomfort. Sufficient amounts of daylight also has positive restorative effects.	UNESCO (2025) Barrett et al (2015); Heschong et al (2002) Karaman Madan et al. (2024)
Materiality	"Materials and finishes should be the light, natural colours of the materials themselves, selected in harmony with warm natural hues as accents."	UNICEF (2009)
Noise	The design should minimize external noises of traffic, industries, etc. "External and internal noise were found to have a significant negative impact upon performance. "	UNICEF (2009) Shield & Dockrell (2008
Outdoor spaces	"Organize a swap fair or permanent stalls for the school and/or the surrounding community." "Facilitate appropriate spaces for active play, stimulation and socialisation. These may help to mitigate the negative psychosocial impact of crisis situations." "Design an outdoor stage that can serve as a classroom and performance space for certain classes or school activities. Such a space can also function as a meeting place for community activities after school hours since schools are sometimes the only places for communities to gather." "Use outdoor spaces as classrooms to foster a connection with nature."	UNESCO (2024) IASC (2007) UNICEF (2009) UNESCO (2024)
Ownership	Provide personalized displays and desks to provide a sense of ownership. This has a positive effect on children's learning. Provide sufficient wall-space for pupil's work. "Permanent student artwork enhanced the student's sense of ownership over the learning process. There was a significant positive effect on children's self-esteem" "Individual learning spaces should also be provided, since individual children have their own learning styles and some will need space to be on their own at times to study or reflect."	Barrett et al (2015) Killeen et al. (2003) UNICEF (2009)

FIGURE 8.
Design input table (4/4).
Own image.

Design parameter	Design implication	Source(s)
Sustainability	"Dedicate soil patches for growing crops that can be managed by learners. "Set up green roofs and/or vertical gardens to improve insulation, reduce energy consumption,enhance air quality, utilize rainwater, reduce stormwater runoff and enhance biodiversity."	UNESCO (2024) UNESCO (2024)
Temperature	Minimize overheating within the school building and classrooms. Heat has a negative effect on children's (educational) performances. Design should include adequate external shading devices.	Wargocki & Wyon (2007) UNICEF (2009); Barrett et al (2015)
Toilets	Facilitate separate toilets for girls and boys. When designing, keep privacy, cleanliness and safety in mind. F"acilitate child-sized adaptations of toilet seats, urinals, taps, doorknobs, locks and handrails. Make sure water and sanitation facilities are simple and easy to use."	Save the Children (2010) UNICEF (2009)
Ventilation	Provide sufficient fresh air circulation to stimulate learning progress. "Large room volume with big window opening size at different heights can provide ventilation options for varying conditions'.'	UNICEF; Coley et al. (2007); Bako-Biro et al. (2012) Barrett et al. (2015)
Water	Install a greywater recycling and rainwater harvesting system. Water used for hand washing should be recycled and used to water the orchards and vegetable gardens. Provide children at school access to clean water and sanitation.	UNESCO (2024); UNICEF (2009) Save the Children (2010); UNICEF (2009)

Chapter three

Results

This chapter presents the results of the graduation project. As discussed in Chapter 2, the final outcome is the design of a multifunctional primary school. In this chapter, the reader is guided through the design proposal in the chronological sequence on which the Syrian educational system is based (further explained in the research paper, see chapter V). Beginning with preschool education, followed by the lower and upper primary levels, and concluding with the central school building, the complete design is explained in detail. For each component of the project, key design aspects are addressed. In this way, the results are presented as comprehensively as possible, while also demonstrating how the design responds to each of the research questions.First, the program of requirements, the context and the concept are explained in further detail.

3.1 Program of requirements

The program of requirements is formed based on the first two chapters of this report. The design input table has been the main source of input for this program of requirements.

Area	Quantity	Area (m²)	Total (m²)
Early Childhood Education rooms	5	70	350
Classrooms lower grades (Grade 1-6)	12	60	720
Classrooms higher grades (Grade 7-9)	6	60	360
Labaratory	1	75	75
Outdoor classrooms	4	Variable	Variable
Teacher rooms	6	15	90
Administration office	2	15	30
Central hall	1	300	300
Canteen	1	100	100
Kitchen	1	50	50
Library	1	150	150
Doctor's office	min. 2	15	30
Psycholocial support office	min. 2	15	30
Prayer room	2	30	60
Technical room	min. 3	10	30
Toilets	1 per 15 kids	Variable	Variable
Playground	Variable	Variable	Variable
Green spaces	Variable	Variable	Variable
Total		**Net floor area**	**2375 m²**

FIGURE 9.
Program of requirements.
Own image.

3.2 Context

The project is located in the neigbourhood of Al-Wa'er, a residential area west of Homs' old city. The neigborhood is well connected, bordered by national and regional highways that connect the city with the rest of Syria, and even parts of Lebanon. The Orontes river, one of the most important agricultural lifelines of Syria, runs on the eastern side of the neigbourhood.

The design specific site lies on an empty spot in the middle of the neigbourhood. The empty plot is surrounded by both residential buildings and public buildings. A large shopping mall is located right next to the plot.

FIGURE 10 + 11 + 12.
Design location on different scales.
Google earth.

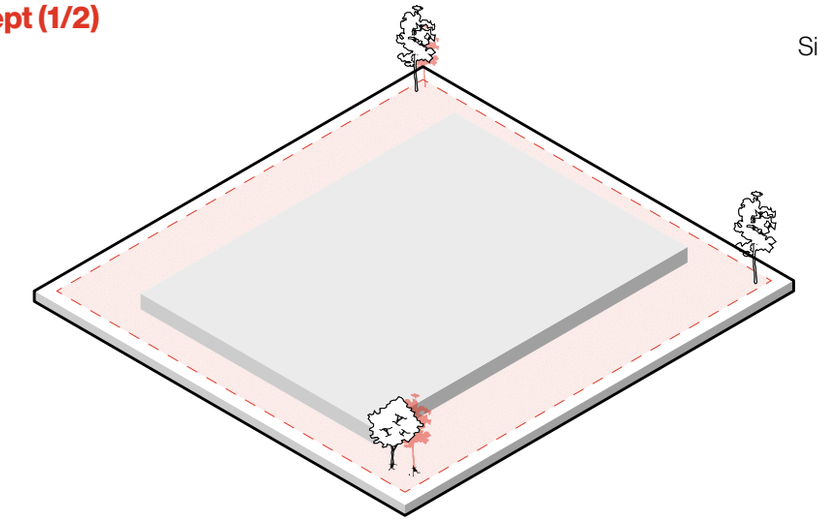
Following the outbreak of the Syrian Revolution in 2011, as part of the wider Arab Spring, Al-Wa'er rapidly emerged as a stronghold for opposition forces. It remained one of the final opposition-held districts in Homs until 2017.

In 2017, after agreements were made, all opposition member and numerous residents were transported out of the neigbourhood.

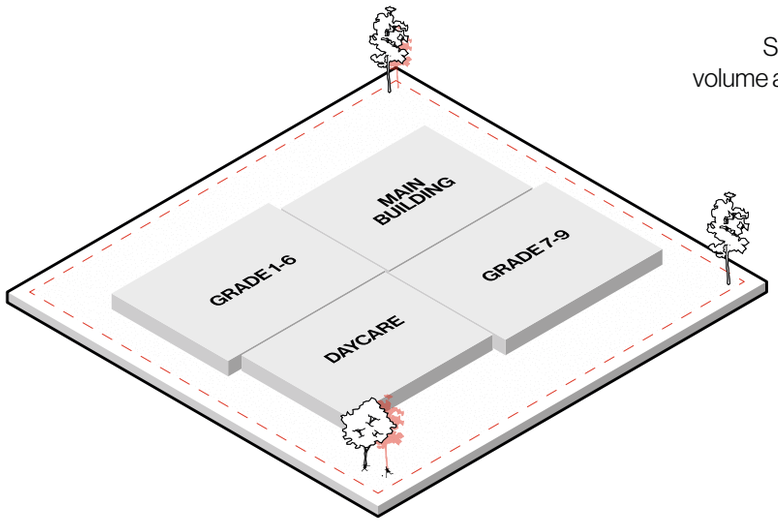
With the fall of the regime in 2023, people slowly started to move back into their old neighbourhood.

FIGURE 13.
Al-Wa'er neigbourhood, design location highlighted.
Own image.

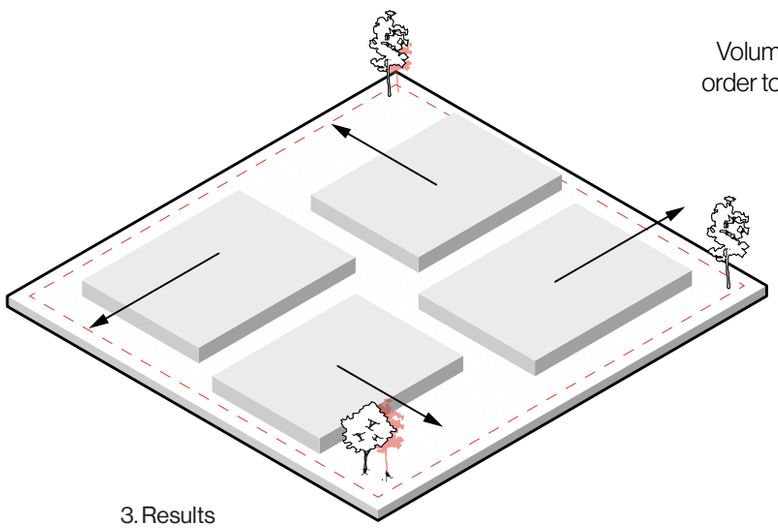
3.3 Concept (1/2)



Step 1
Site and volume.



Step 2
Seperation of the volume according to the concept.



Step 3
Volumes are shifted in order to create outdoor spaces.

Step 4
Volumes are added on top in order to fit the program.

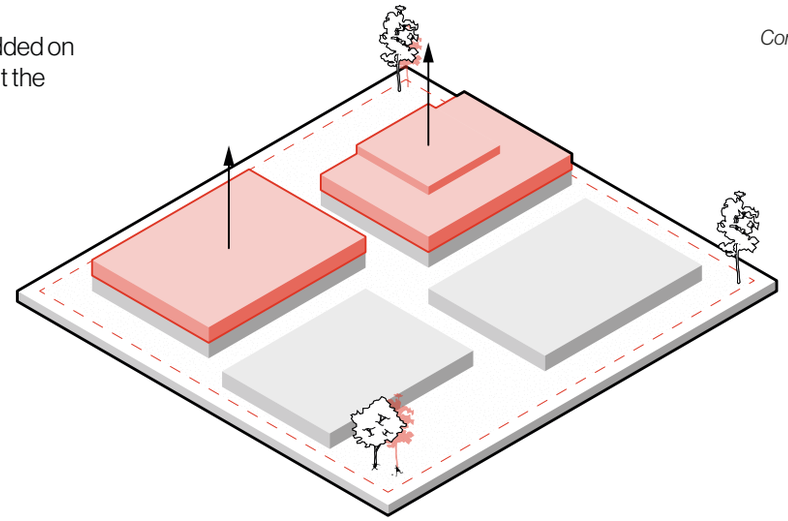
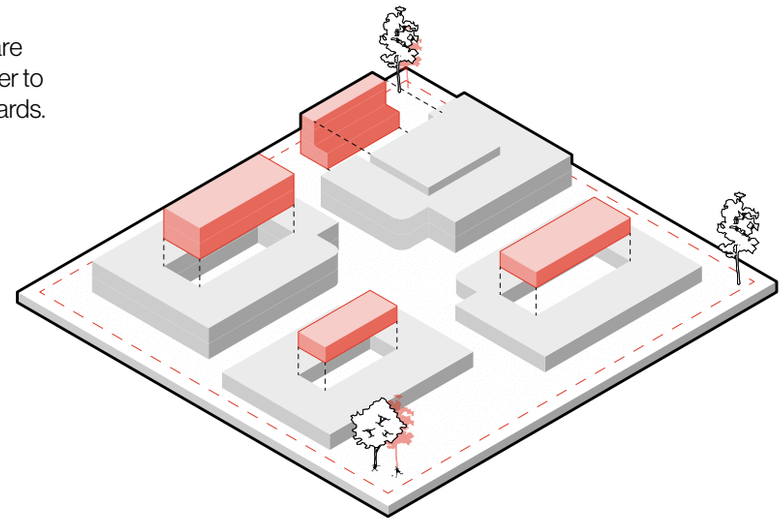
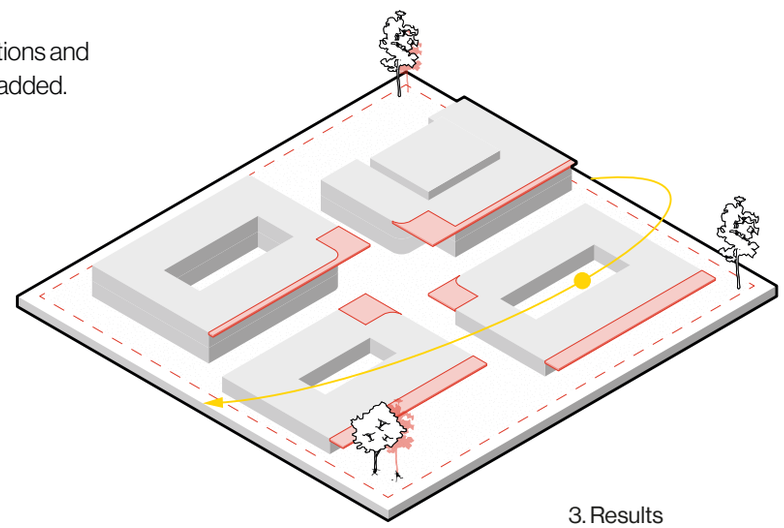


FIGURE 14-19.
Concept axonometries.
Own images.

Step 5
Building parts are removed in order to create (court)yards.



Step 6
Climate protections and thresholds are added.



3.3 Concept (2/2)

A central concept in the design it the use of courtyards. Courtyards are a longstanding feature within Syrian and broader Middle Eastern architecture. Known as cool outdoor spaces, courtyards are often amongst the busiest places in a building. People use the courtyard to relax, meet others and enjoy being outside without being excessively exposed to sun and heat.

In the design, each building hosting classrooms is arranged around it's own private courtyard. These courtyards serve as dedicated outdoor space for each different age group. Children able are to play and learn together without direct exposure to the larger school environment. The intimate character of the courtyards makes them a special place, in which children feel safe and protected.

Moreover, the courtyards provide clear climate benifits. Planting helps to cool and shade the area, making it more comfortable than the surrounding playgrounds. The courtyard configuration also encourages airflow through the buildings by enhancing natural ventilation.

Step 7
The final building.

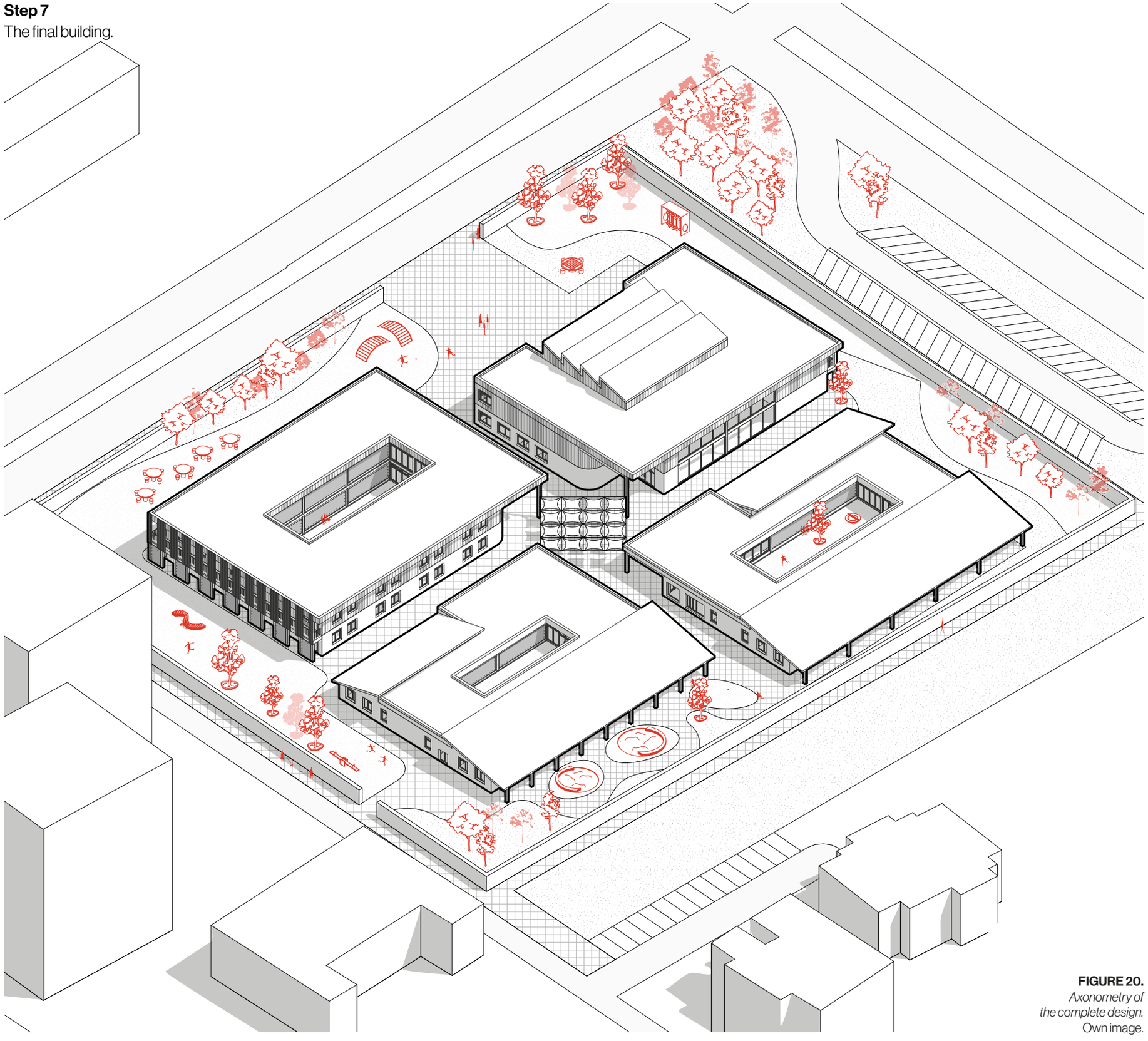


FIGURE 20.
Axonometry of the complete design.
Own image.

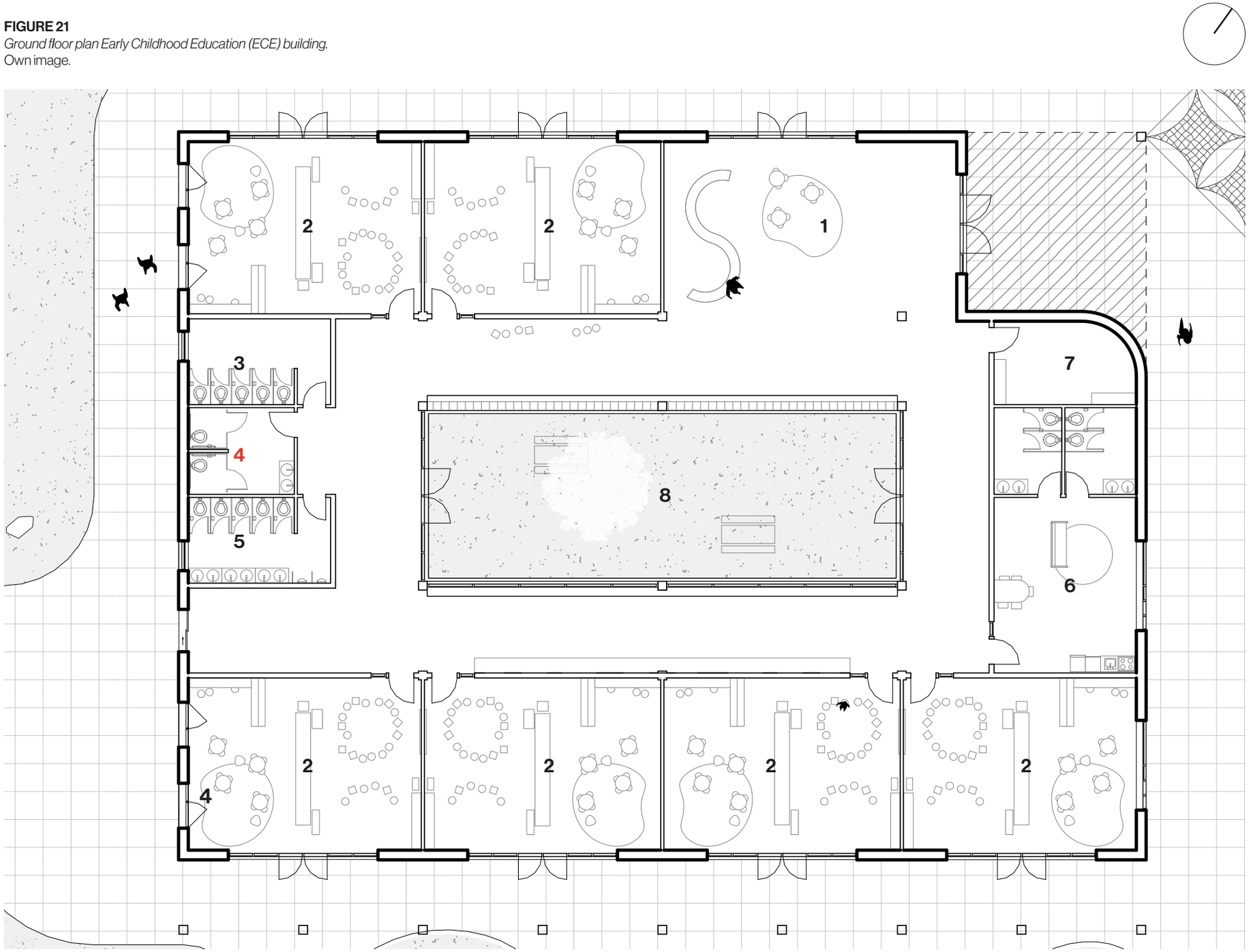
Early Childhood Education

3.4.1

The journey through the design begins in early childhood. Before entering the primary school cycle, which starts at the age of 6, Early Childhood Education (ECE) allows for kids to attend preschool education. Although preschool is not widely common in the Syrian context, it is included in the design because, in a recovery setting, ECE relieves parents and caregivers from full-day childcare. When children attend ECE, parents are able to devote their time to other pressing challenges they face in this fragile context.

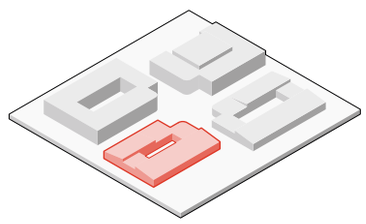
The ECE building is described in this chapter by looking at the floor plan, the classroom principles, and finally the implemented sustainability aspects.

FIGURE 21
Ground floor plan Early Childhood Education (ECE) building.
Own image.



1. Entrance hall
2. Classrooms
3. Toilets boys
4. Changing room with large toilets
5. Toilets girls
6. Staff's room
7. Storage
8. Courtyard

Within ECE, an extra toilet space is provided in which children can be washed and diapers can be changed.



ECE: The classroom principles.

The ECE building consists of five classrooms. Research has shown that larger classroom sizes provide greater flexibility in the learning environment for younger children; therefore, the ECE classrooms are the largest within the design. Each classroom measures 9.6 metres in width and 7.2 metres in depth, resulting in a total floor area of roughly 70 m².

In the axonometric drawing below, several key design decisions are highlighted. On the following page, these decisions are further explained and directly linked to the design input table. In this section, the connection between research and design becomes clearly visible.

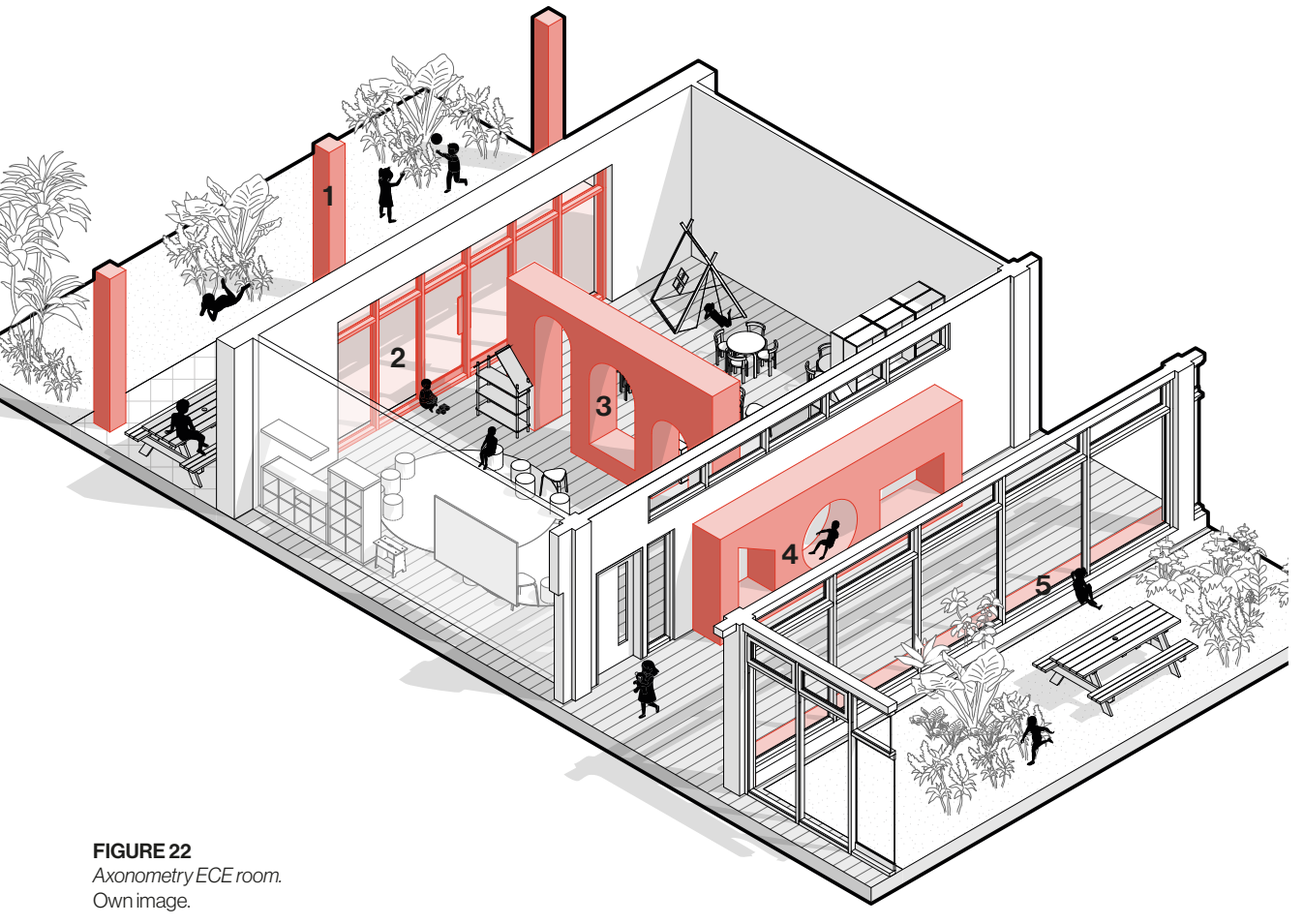


FIGURE 22
Axonometry ECE room.
Own image.

		RESEARCH DESIGN INPUT THEME
1.	Shaded outdoor spaces (protected by a canopy), can be used for learning and playing.	**Outdoor spaces**
2.	Green views are provided from within the classroom. At the same time, outdoor spaces are always accessible from within the classroom. The canopy also hinders direct sunlight from entering, while optimizing natural light.	**Green, Outdoor spaces, Light**
3.	The large classroom size allows for programmatic flexibility. Moveable partitions and open shelves seperate the room into multiple activity areas.	**ECCD, Classroom size and shape**
4.	Wide corridors are designed so that they can be used as a place for interaction and learning.	
5.	Window sills are designed at age-specific seatin heights, so that they can be used as seating space. From here, children can look out on the calming green private courtyard.	**Green**

ECE: Sustainability aspects.

On this page, the ECE building is used to further explain different sustainability aspects. As explained within the first two chapters of this report, sustainability is an important element of the design. By sketching, designing and discussing with different tutors, sustainability aspects became part of the design process once the research was finished. On the next page, highlighted elements from the image are explained in further detail.

1.

Sloped roofs create higher ceilings, promoting natural air convection.

2.

Natural ventilation throughout classrooms and building is stimulated by high, openable windows. Airflow from the bottom to the top of the classroom is stimulated.

3.

Green roofs contribute to biodiversity while also protecting the indoor climate from extreme heats or colds.

4.

Green private courtyard helps to cool the air, simultaniously promoting airflow and natural ventilation.

5.

Sloped roofs and windows allow for extra daylight inside classroom.

6.

South facing canopy creates shaded outdoor playing/learning space, functioning as bufferzone between the inside and outside, also protection the sun from entering the classroom during summer time.

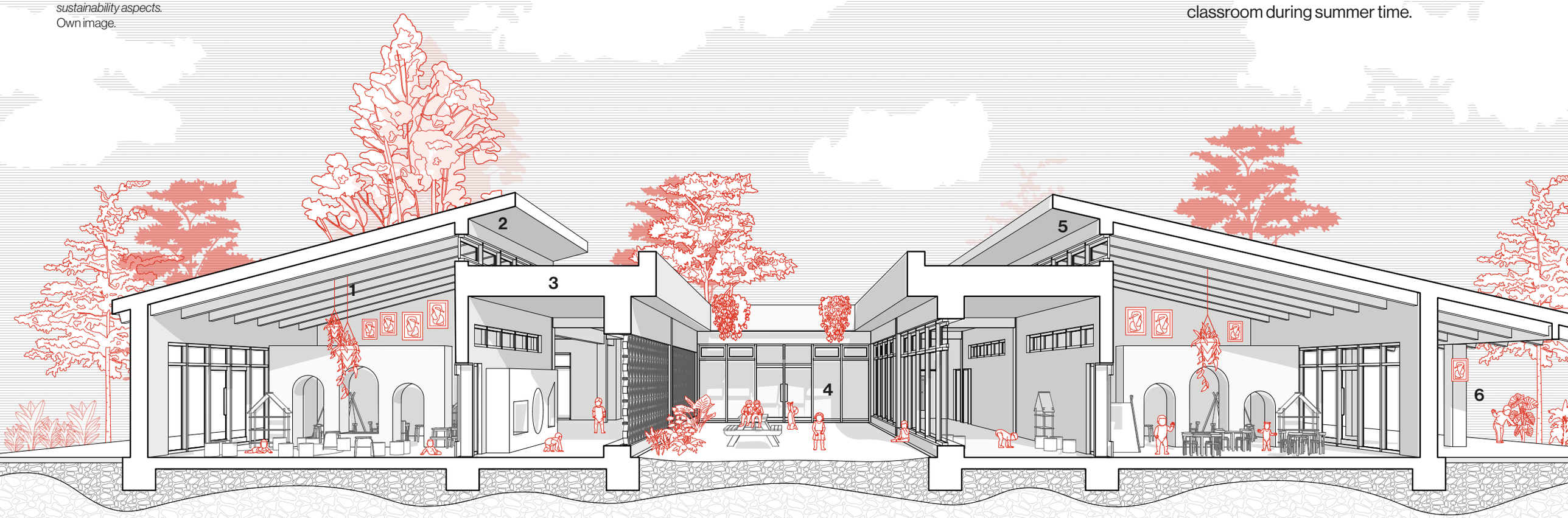


FIGURE 23
Perspective section including sustainability aspects.
Own image.

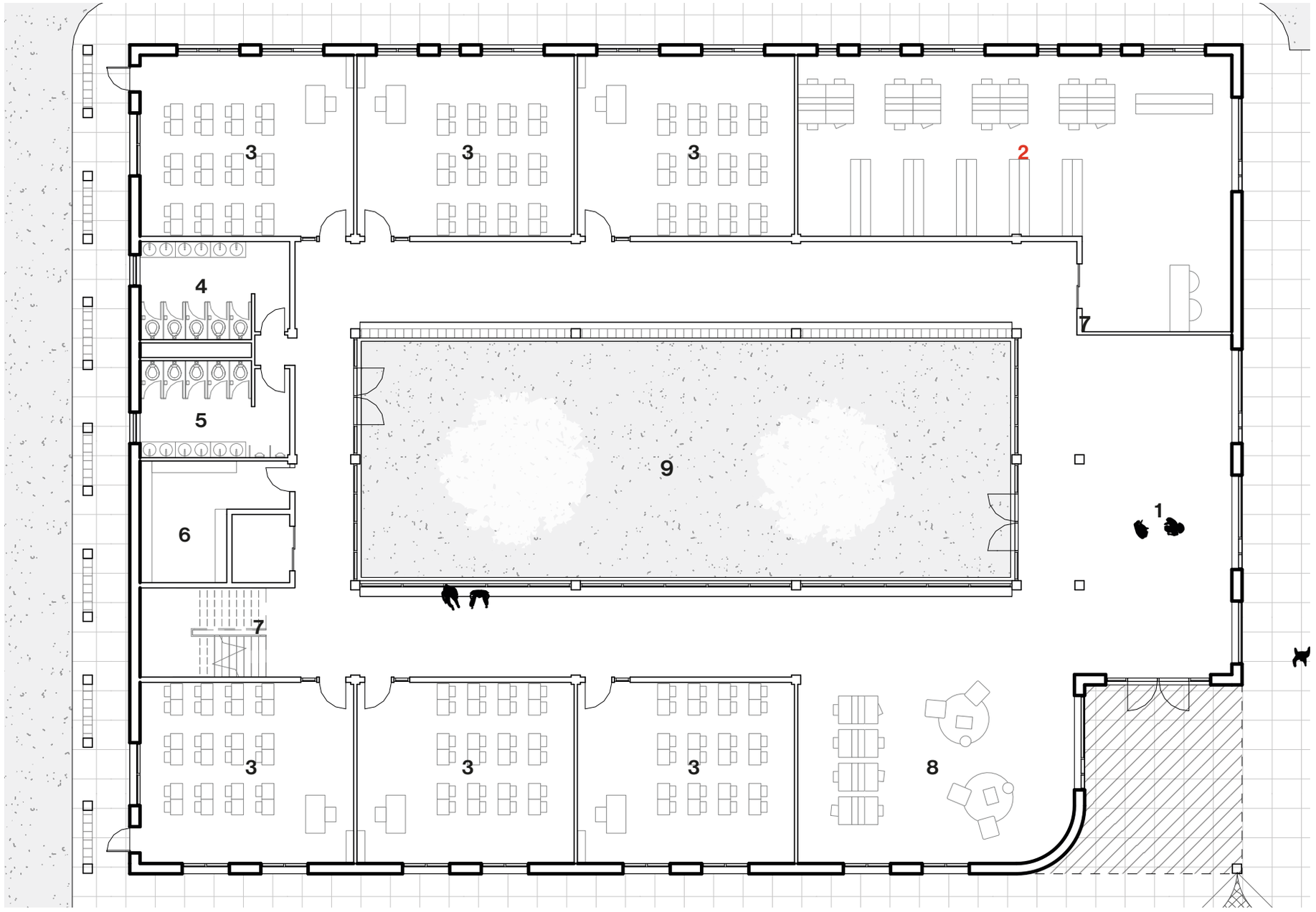
Grade 1-6

3.4.2

At the age of 6, children in Syria enter the primary educational cycle. This first cycle lasts for 6 years.

The building that hosts these classes has two storeys, allowing two classrooms for each grade. Just like other school buildings in the design, this one is also situated around a central courtyard. Within this chapter, the floor plans, classroom principles, building fragments and sustainability aspects are described in more depth.

FIGURE 24
Ground floor plan grade 1-6 building.
Own image.



1. Entrance hall
2. Library
3. Classrooms
4. Toilets boys
5. Toilets girls
6. Storage
7. Staircase and elevator
8. Learning square
9. Courtyard

The grade 1-6 building includes a library that can be opened to the public if the school board chooses to do so. This shared facility can foster interaction and strengthen connections between students and residents of the surrounding community.

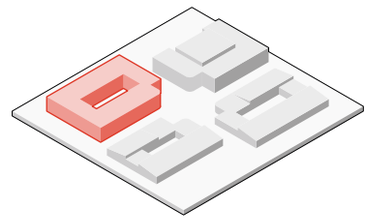
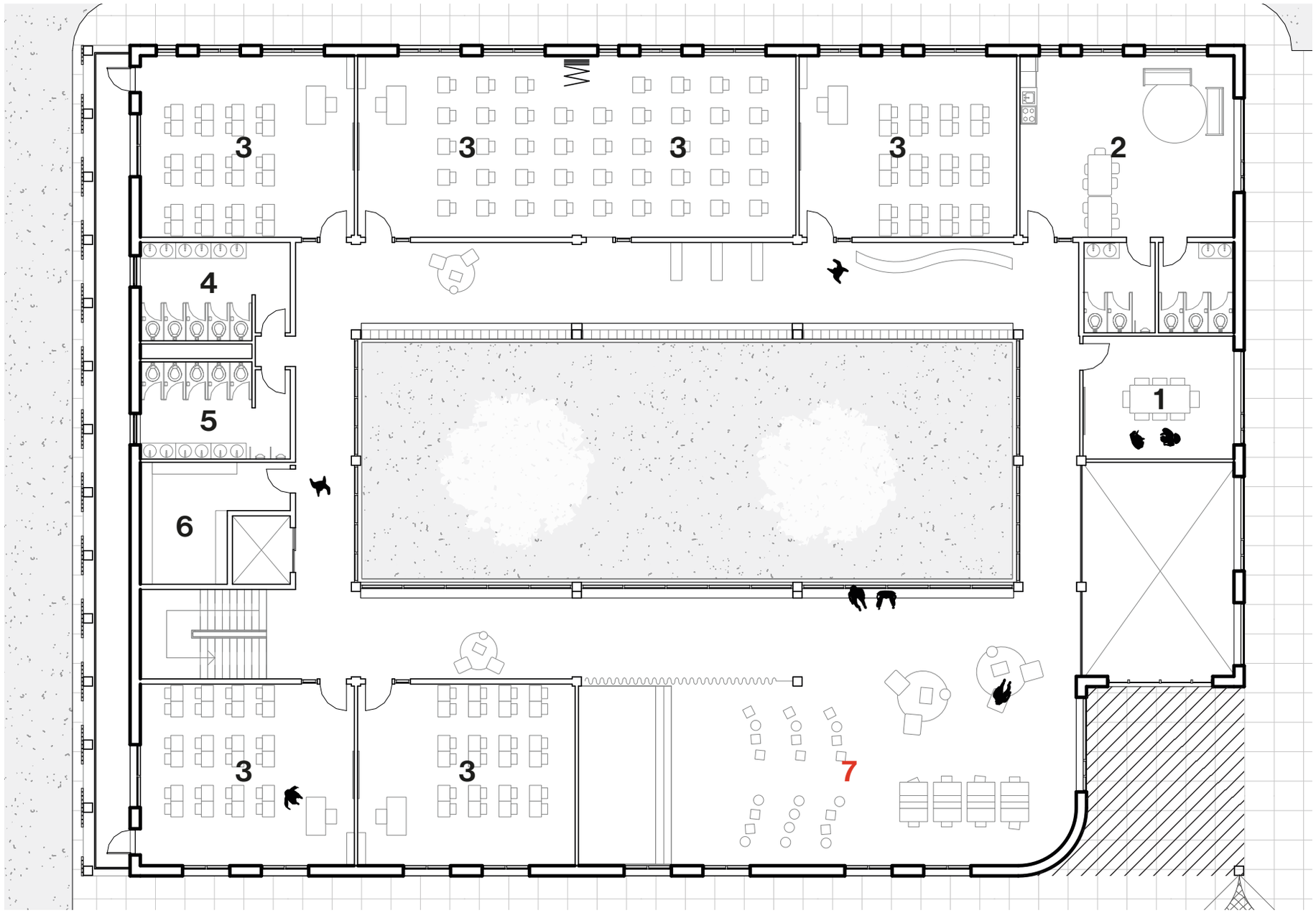
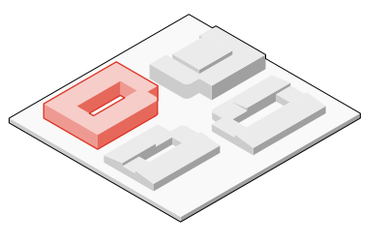


FIGURE 25
First floor plan grade 1-6 building.
Own image.



1. Office/meeting room
2. Staff's room
3. Classroom
4. Toilet boys
5. Toilet girls
6. Storage
7. Multifunctional learning square

Within the design, mulitple learning squares are designed. These "squares" can be used in any way that suites the school/destined age group.



Grade 1-6: The classroom principles.

The following pages elaborate on the classroom principles for grades 1-6. Classrooms for this age group measure 8.4 by 7.2 meters (about 60 m²), sized for 24 pupils per room. With two classrooms per grade across six grades, the building accommodates for 288 children. The axonometric on this page highlights key design decisions, which are elaborated on the following page and linked to the design input table.

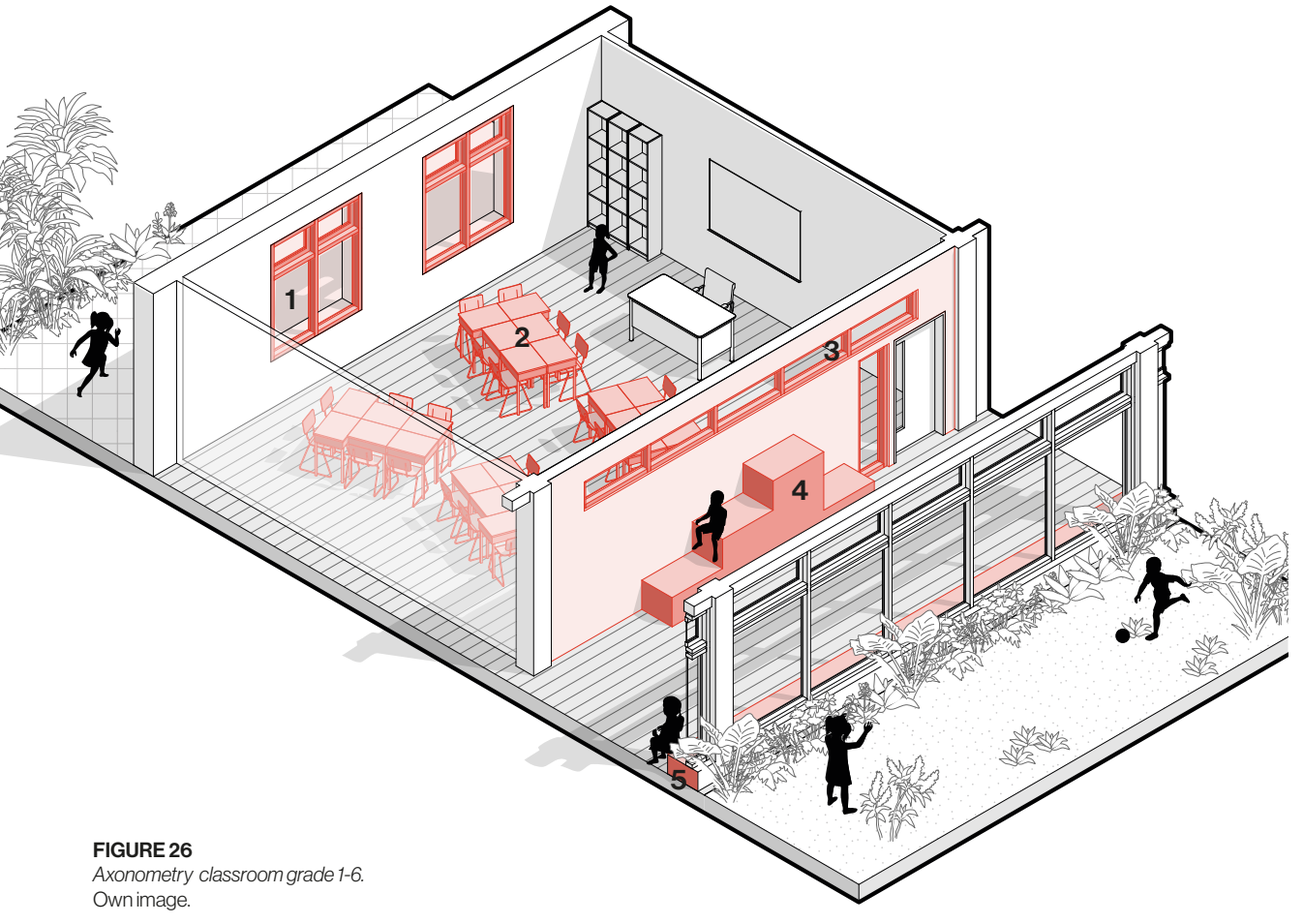
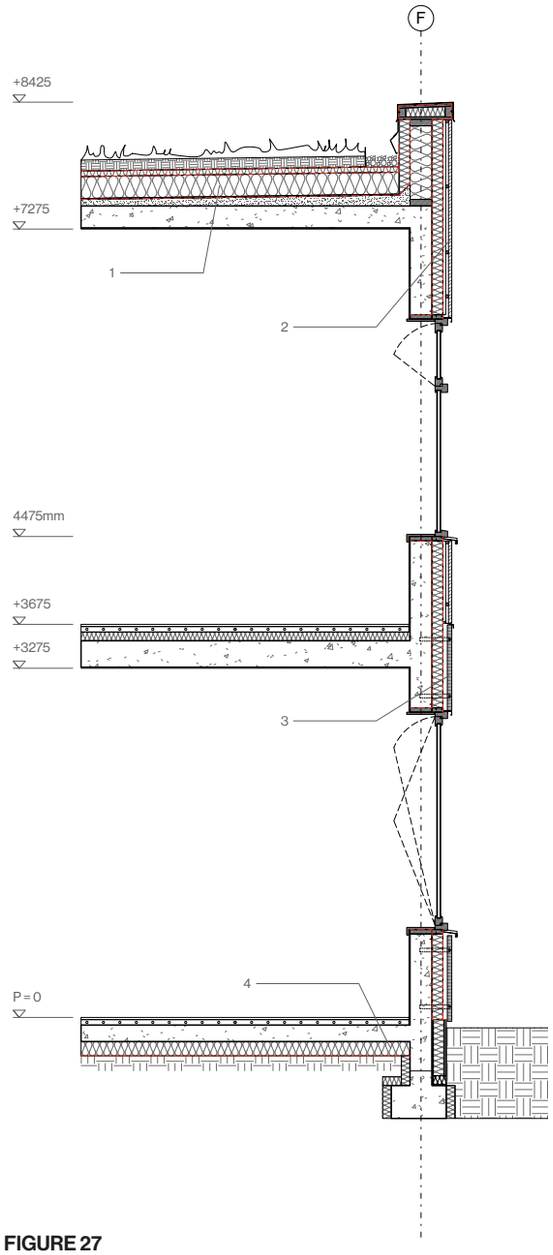


FIGURE 26
Axonometry classroom grade 1-6.
Own image.

	RESEARCH DESIGN INPUT	THEME
1.	Green views are provided from within the classroom. Sufficient natural daylight enters the classroom through the large windows, while external shading devices are also provided.	**Green, Light**
2.	Simple classroom shapes allows for flexibility within. Teachers can set up the room in any way that suites the style of class/learning. Desks are personalized in order to enhance a sense of ownership.	**Classroom size and shape, ownership**
3.	More daylight enters the classroom from the corridor area. At the same time, these windows allow for natural ventilation.	**Light, Ventilation**
4.	Wide corridors are designed so that they can be used as a place for interaction and learning. Brighter accents can be used within furniture elements.	**Colour**
5.	Window sills are designed at age-specific seatin heights, so that they can be used as seating space. From here, children can look out on the calming green private courtyard.	**Green**



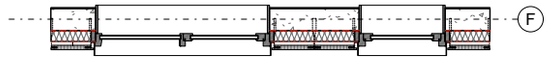


FIGURE 27
Building fragment 1.
Own image.

1 Roof detail

Drougth resistant vegitation	-
Growing medium	100mm
Filter fabric	-
Water retention + drainage layer	50mm
Root barrier	-
XPS Insulation	200mm
Drainage mat	8mm
Cement screed (sloped)	100mm
In-situ concrete roof	200mm
Plaster finish	20mm

2 Wooden facade detail

	30mm
Wooden facade cladding	2x25mm
Facade carrying wooden framing	100mm
EPS insulation	200mm
In-situ concrete wall	20mm
Plaster finish	

3 Limestone facade detail

Limestone facade panels	40mm
Ventilated cavity	40mm
Breather membrane	-
EPS insulation	100mm
Vapour barrier	-
In-situ concrete wall	200mm
Plaster finish	20mm

4 Foundation detail

Linoleum flooring	20mm
Sand cement screed	50mm
In-situ concrete floor	150mm
EPS insulation	130mm
Vapour barrier	-
Sand layer	-

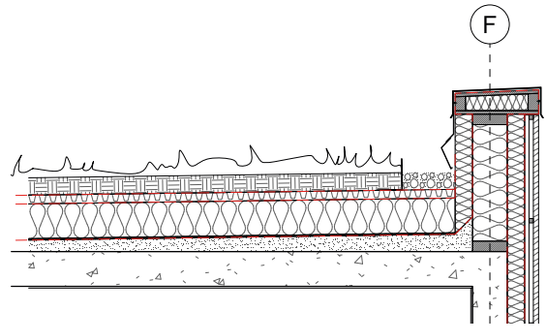


FIGURE 28
Detail 1, roof.
Own image.

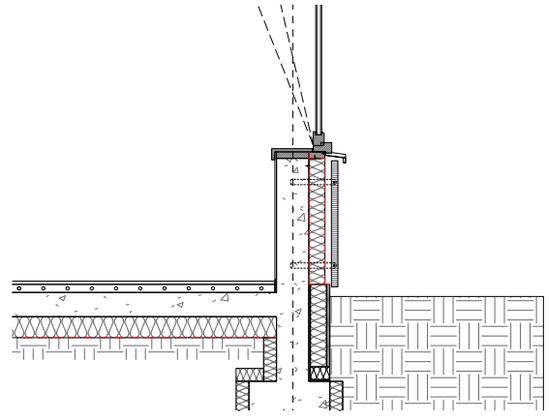


FIGURE 29
Detail 3&4, facade and foundation.
Own image.

Grade 1-6: The building fragments (1/2)

The fragments and details show the small-scale design decisions in the project. Materials are chosen for their natural colours and textures, used to create a calm and safe atmosphere, as the research suggests. The ground floor facades are clad in locally sourced limestone, which supports durability and sustainability. The upper floors use timber cladding, pointing to a future-oriented approach in which sustainability will become more and more important. Window frames in a natural wood finish complement the limestone and bring a warm contrast, resulting in a clear and coherent material palette.

Grade 1-6:
The building fragments (1/2)

The fragment on the next page shows the climate buffer on the west side of the grade 1–6 building. In the late afternoon, low western sun causes glare and heats up the classrooms, which reduces comfort and visibility. To address this, a buffer zone is added with a canopy, vertical wooden facade planks, and mashrabiyas on the ground floor. These elements all protect the indoor climate from extreme heat and glaring. The detail below also shows how the upper-floor gallery is thermally separated so that cold in winter does not bridge through the concrete structure.

FIGURE 30
Building fragment 2.
Own image.

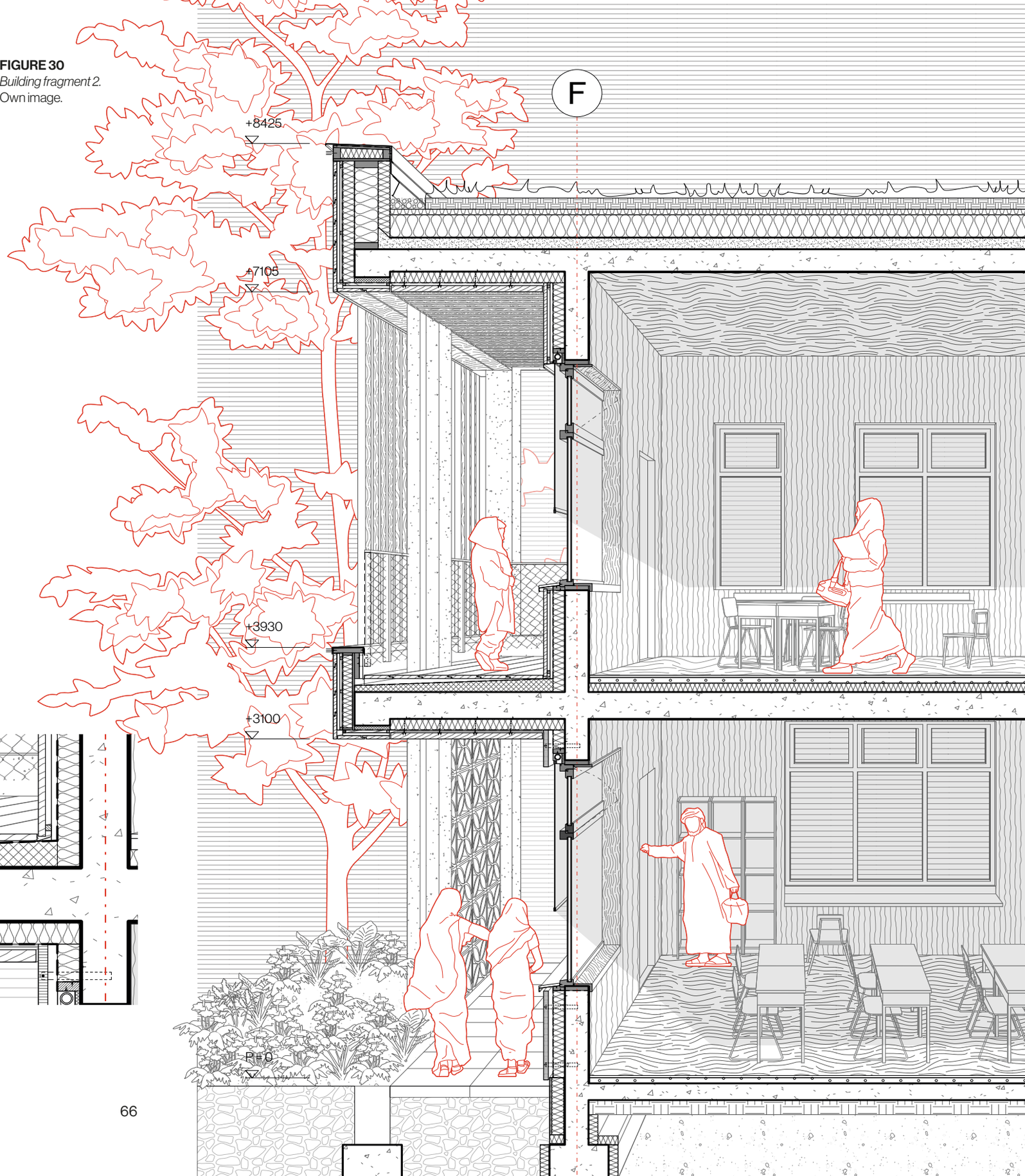
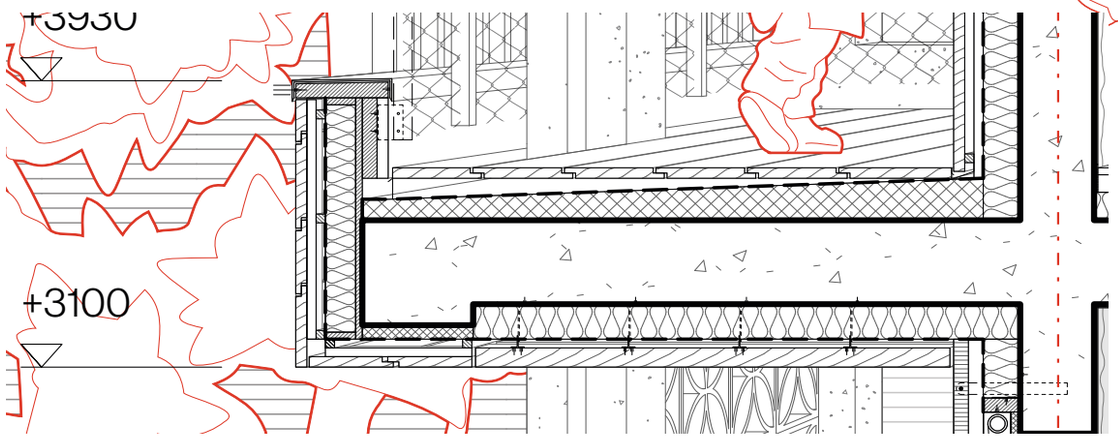


FIGURE 31
Detail outdoor gallery.
Own image.



ECE: Sustainability aspects.

On these pages, the sustainability aspects of the grade 1-6 building are explained further. The design combines passive shading, good daylight access, and natural ventilation supported by the courtyard. Materials are locally sourced where possible. On the next pagve, the sustainability aspects of the grade 7-9 building are explained further.

1.

A canopy on the south facade protects the classrooms from the sun in the middle of the day during summer time.

2.

Green roofs contribute to biodiversity while also protecting the indoor climate from extreme heats or colds. On top of the roof, solar panels are added.

3.

Green private courtyard helps to cool the air, simultaniously promoting airflow and natural ventilation. In this building, the effect is strengthened by the height of the two storey building.

4.

On the southern courtyard facade, mashrabiya's are designed in order to protect the sun from heating up the gallery. Holes in the mashrabiya blocks allow for extra airflow.

5.

On the north facade, the facade is kept straight in order to allow as much daylight as possible to enter the classrooms.

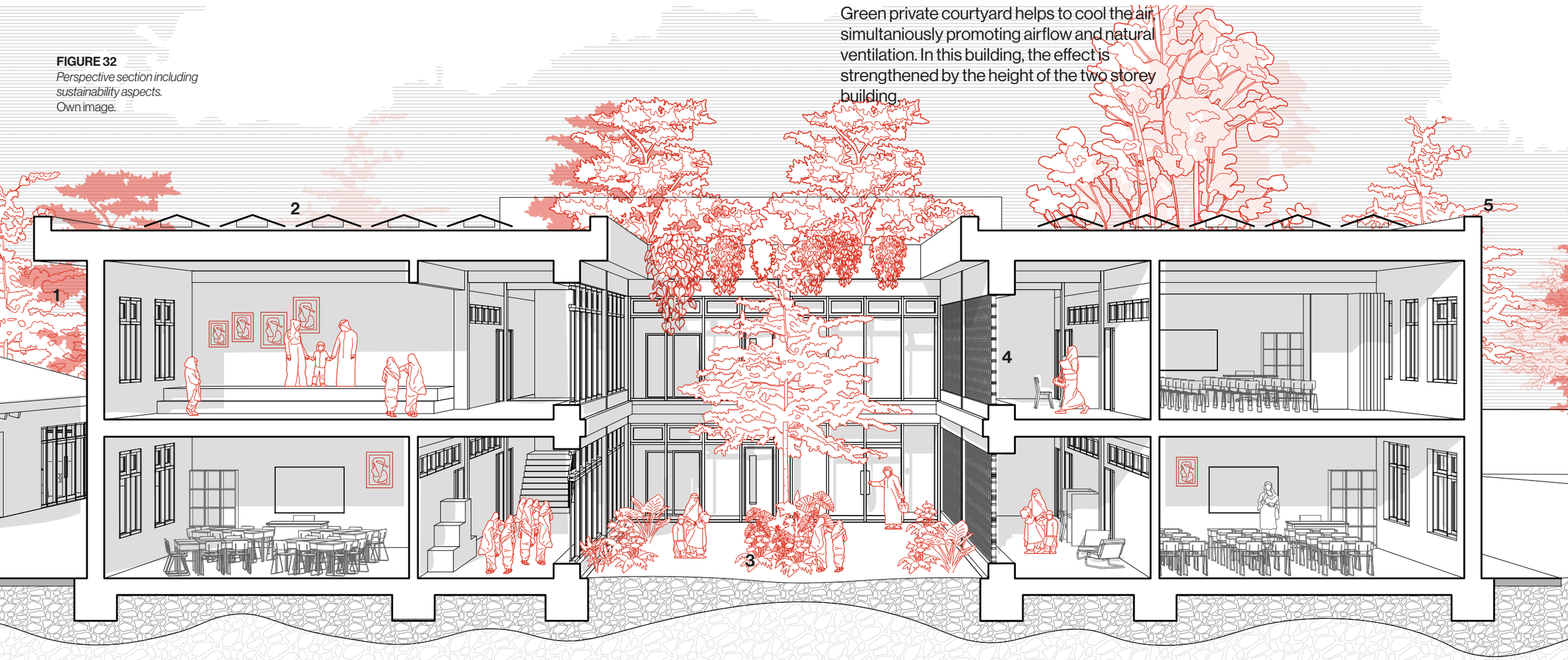


FIGURE 32
Perspective section including sustainability aspects.
Own image.

FIGURE 33
Courtyard grade 1-6 building, atmospheric impression.
Own image.

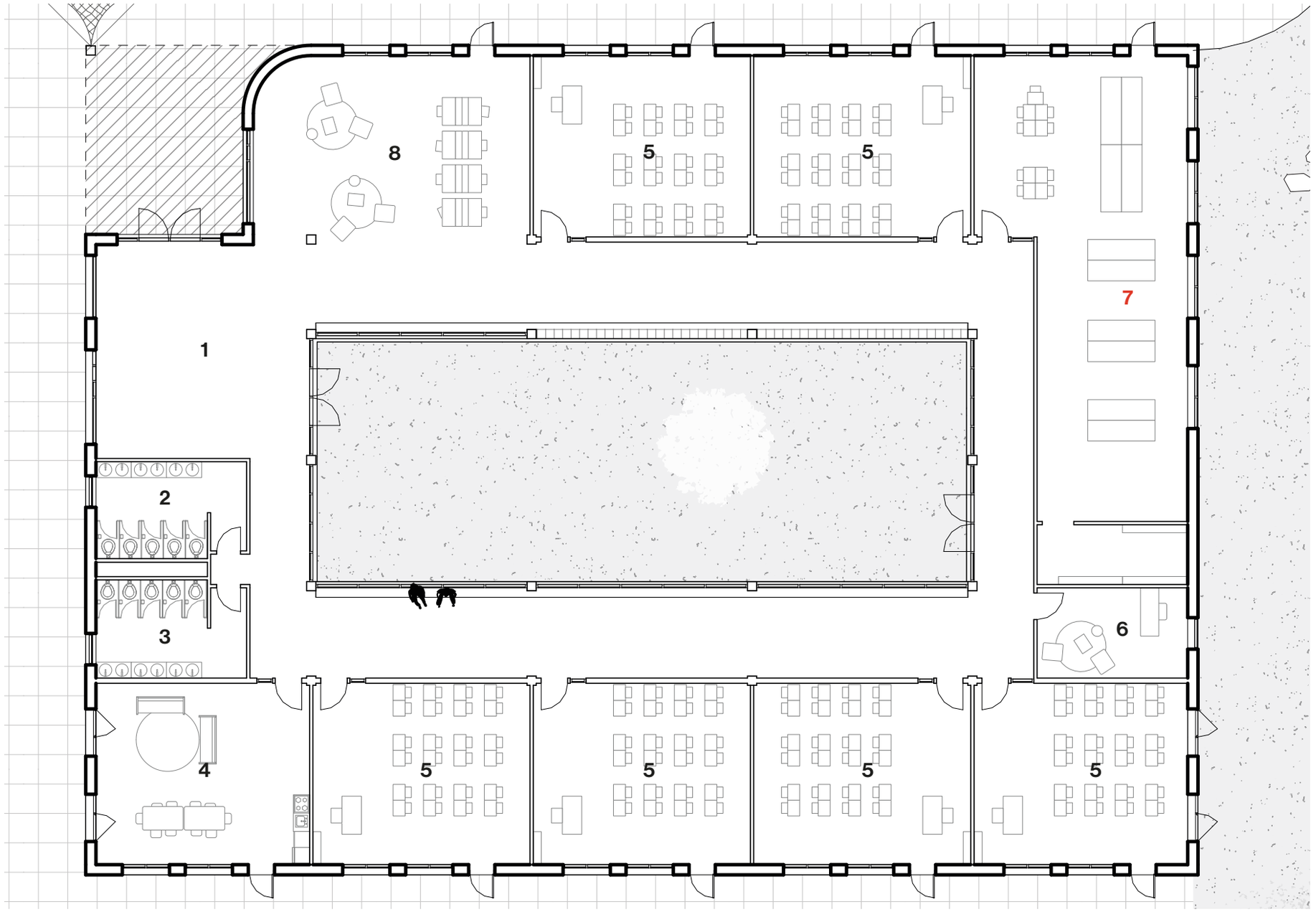
Grade 7-9

3.4.3

After completing the primary cycle, children enter the secondary cycle of primary education at the age of 12. In this phase, they spend three more years before finishing primary school.

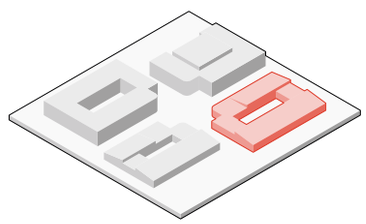
The building that accommodates the 7th until 9th grade is designed as a separate volume to provide a greater degree of privacy for children as they grow older. At this stage, students benefit from spending more time with peers of a similar age in a more defined and slightly more independent learning environment. For this reason, a seperate building has been designed for this age group. In this chapter, the floor plans, classroom principles, as well as construction and flexibility strategies, are explained in more detail.

FIGURE 34
Ground floor plan grade 7-9 building.
Own image.



1. Entrance hall
2. Toilets boys
3. Toilets girls
4. Staff's room
5. Classroom
6. Staff's office
7. Labaratory
8. Courtyard

A laboratory is designed for the oldest age group in the school. This classroom can be used for subjects like science and chemistry.



Grade 7-9: The classroom principles.

Just like the explained in the previous chapter, classrooms destined for grade 7-9 are also dimensioned at 8,4x7,2 meters (about 60 m²) therefore also accomodating for 24 children per classroom. On these pages, the classroom principles for the oldest children within the school are explained. The design choices are highlighted in the axonometry below and are retraceable to the research from the beginning of this report.

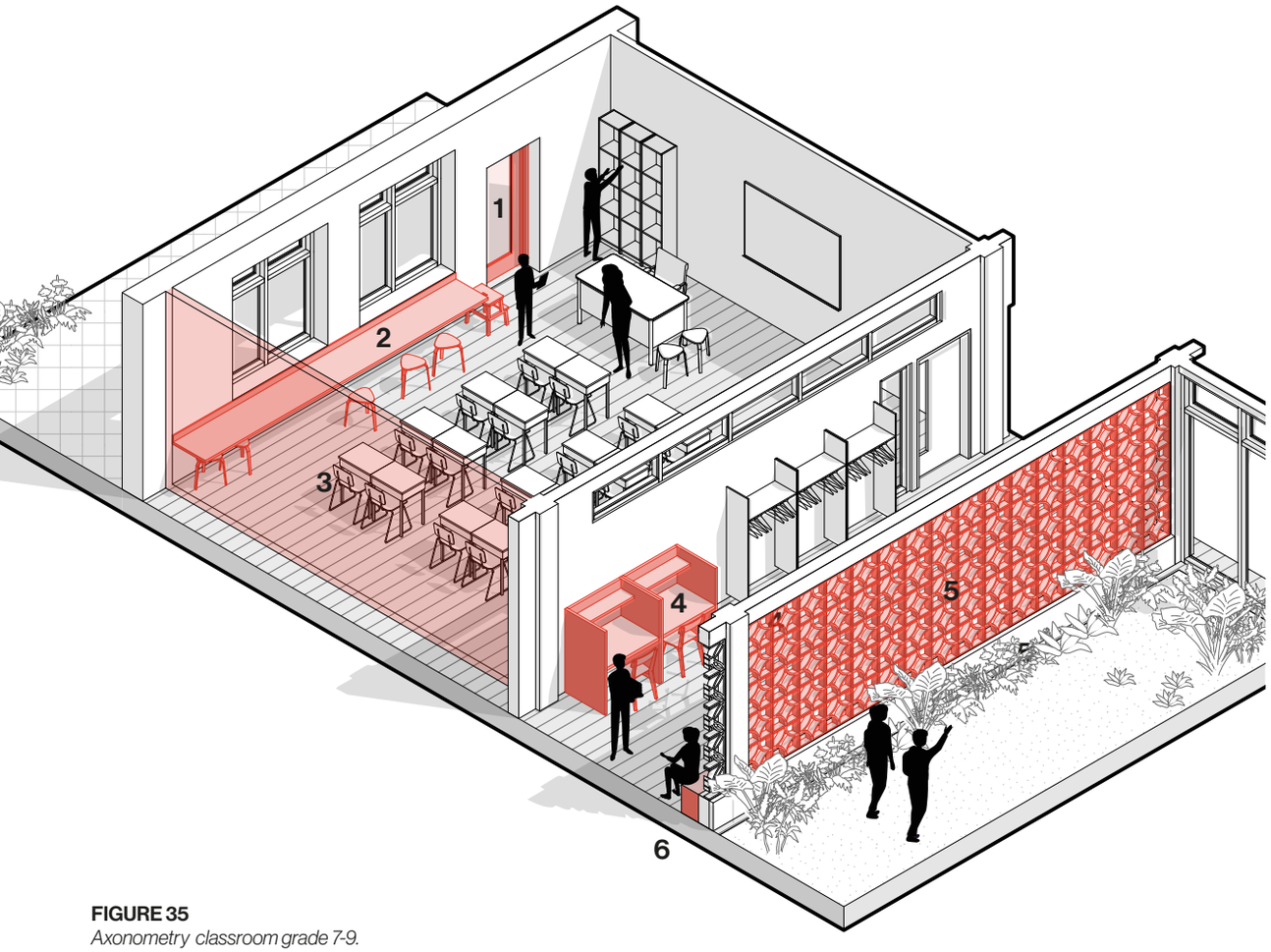


FIGURE 35
Axonometry classroom grade 7-9.
Own image.

		RESEARCH DESIGN INPUT THEME
1.	Outdoor green spaces are dierctly accessible from the classroom	**Green, Light**
2.	Window sill spaces can be (partially) used as learning spaces. Children can study with a view on the green outdoor area's.	**Green**
3.	Sufficient wall space for students' work is provided. Walls are kept in a naural colour, while interior or decorating elements can be of colour.	**Ownership, Colour**
4.	Individual learning spaces are designed within the corridor.	**Ownership**
5.	A mashrabiya is designed to protect the south facing corridor from the sun, while at the same time allowing for ventilation thourgh the holes within the blocks.	**Ventilation, Light, Temperature**
6.	Window sills are designed at age-specific seatin heights, so that they can be used as seating space. From here, children can look out on the calming green private courtyard.	**Green**

Grade 7-9: Construction

On this page, the construction plans of the building are shown. On the left page, the plan of the grade 7-9 building is displayed. It becomes clear how the building is structured around a load bearing outer facade, supported by a grid of columns and beams on the inside. While the outer facade provides stability, the column-based interior allows for greater flexibility in the floor plan, making the building more adaptable to future changes and needs.

FIGURE 36
Grid plan grade 7-9 building.
Own image.

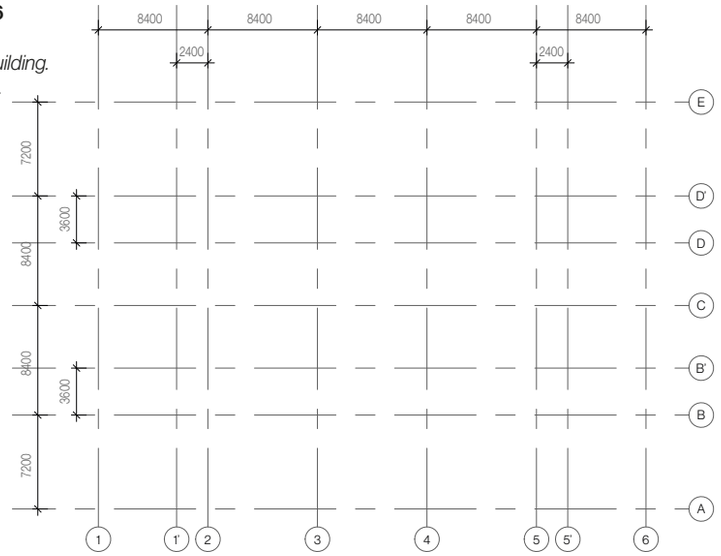


FIGURE 37
Foundation and load bearing walls plan grade 7-9 building.
Own image.

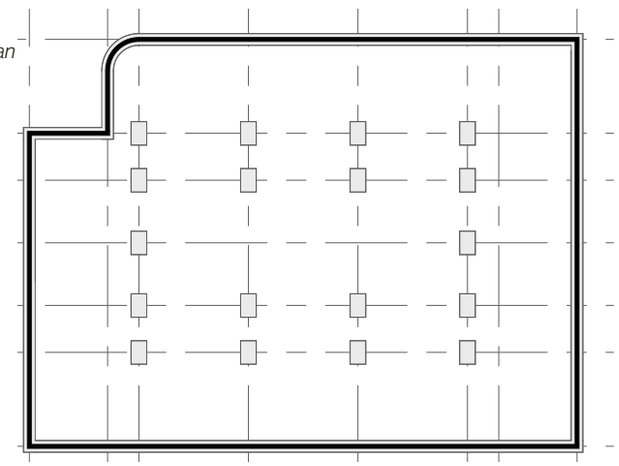


FIGURE 38
Full construction plan grade 7-9 building.
Own image.

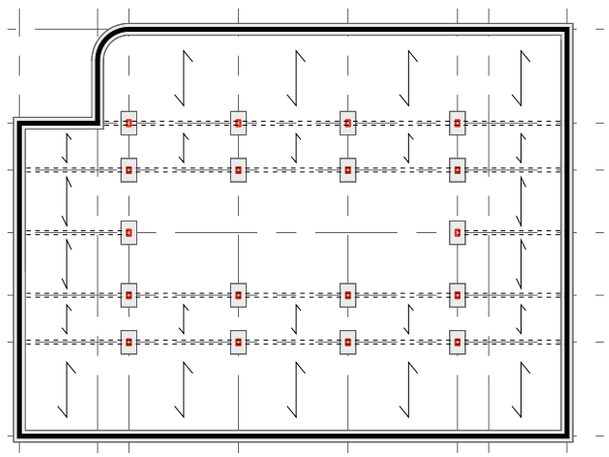


FIGURE 39
Construction axonometric.
Own image.

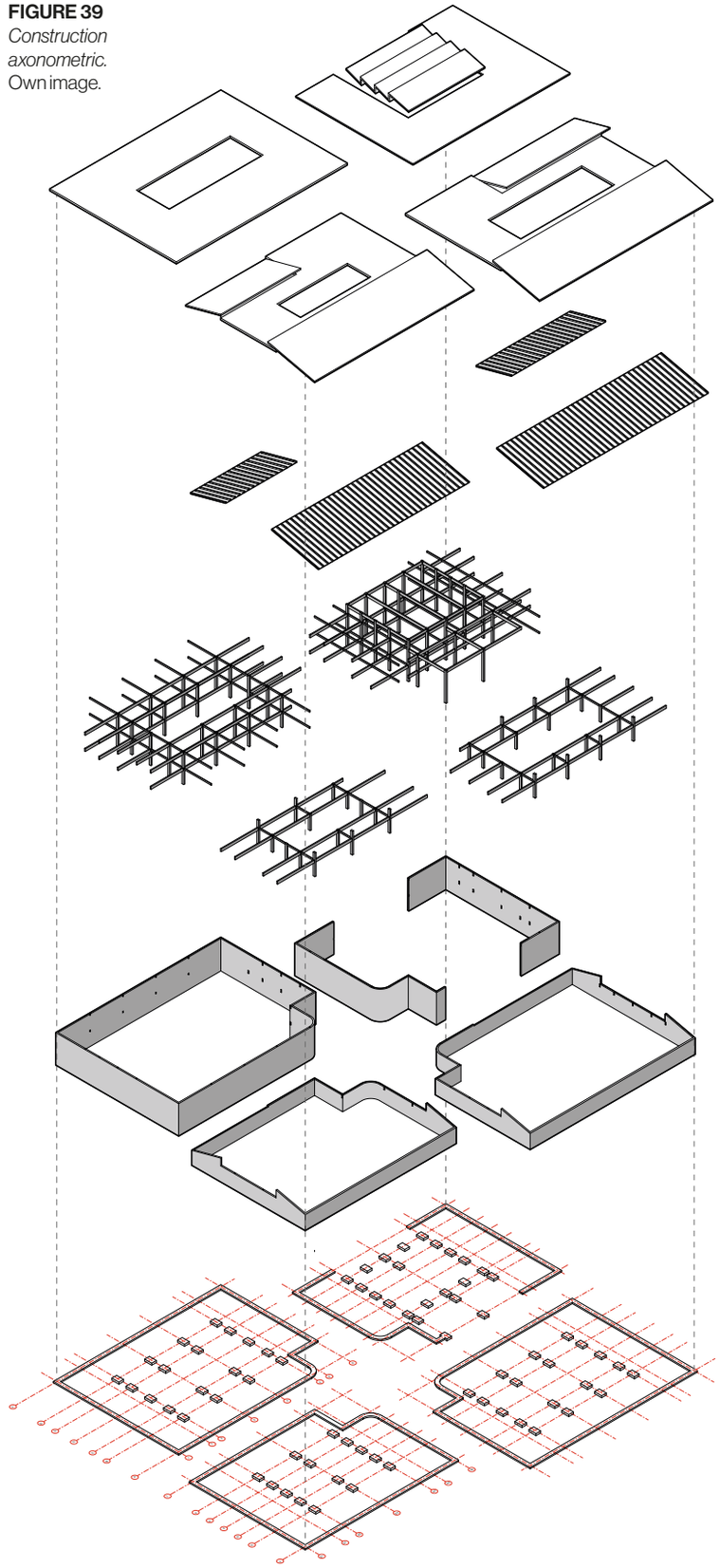
Roof
Green flat roof
Sloped regular roofs

Sloped roof construction
Wooden rafters 200x250mm

Cast-in-place "skeleton" concrete structure
Columns 350x350mm
Load bearing beams 300x500mm
Secondary beams 200x300mm

Cast-in-place concrete walls
250mm thick load bearing walls
Providing stability to the building

Foundation and grid system



Grade 7-9: Flexibility

Current program
Staff's room and four standard classroom

First alternative
Exam setup. Sliding walls double the classroom size. On the right side, walls are removed and a library is created.

Second alternative
Three standard classrooms. On the right, walls are left out in order to create a multifunctional learning square.

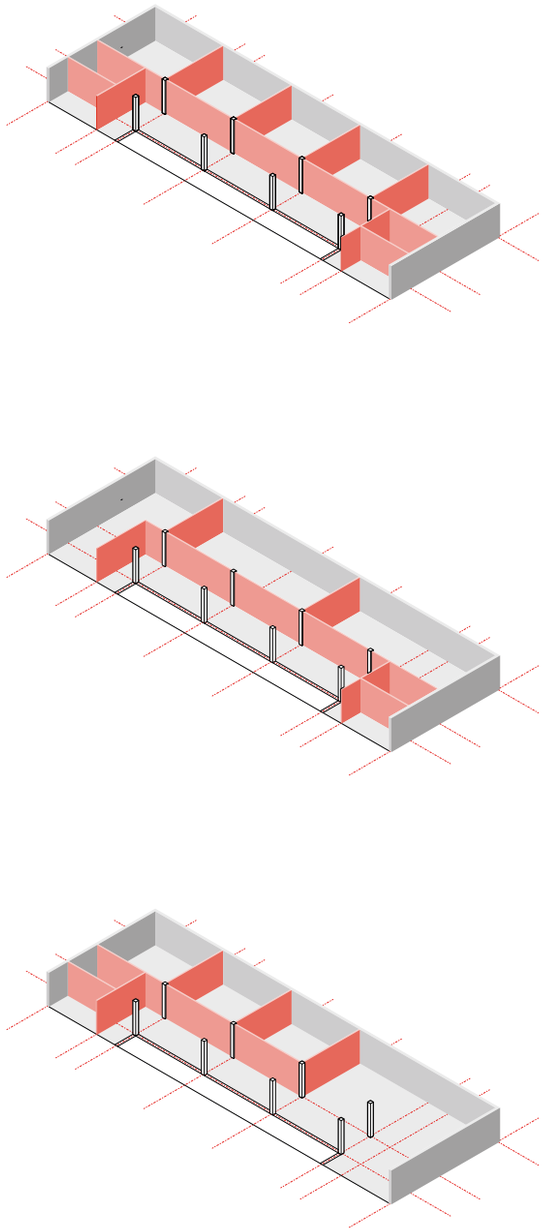


FIGURE 40-42
Schematic wall infills.
Own image.

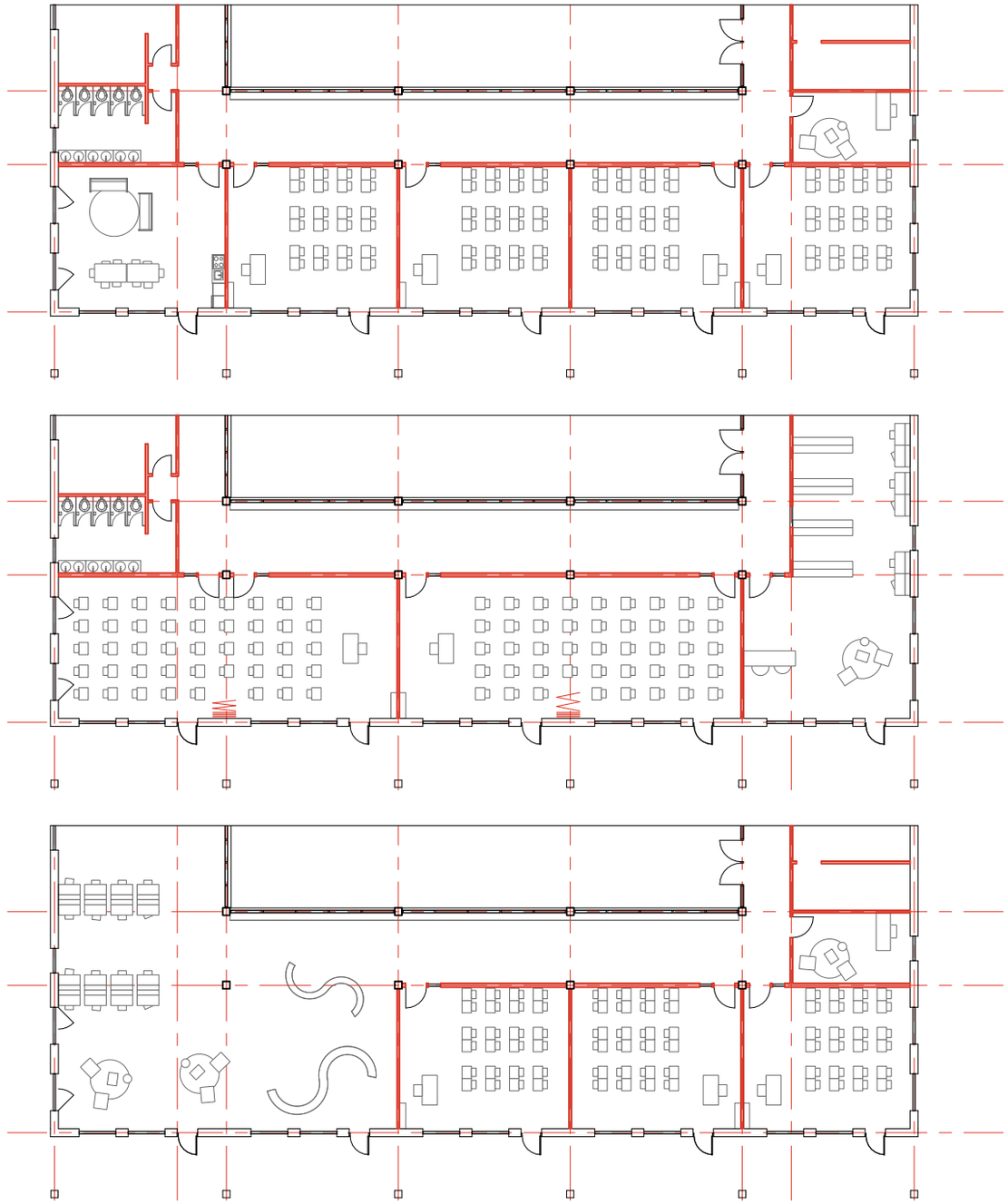


FIGURE 43-45
Schematic floor plans.
Own image.

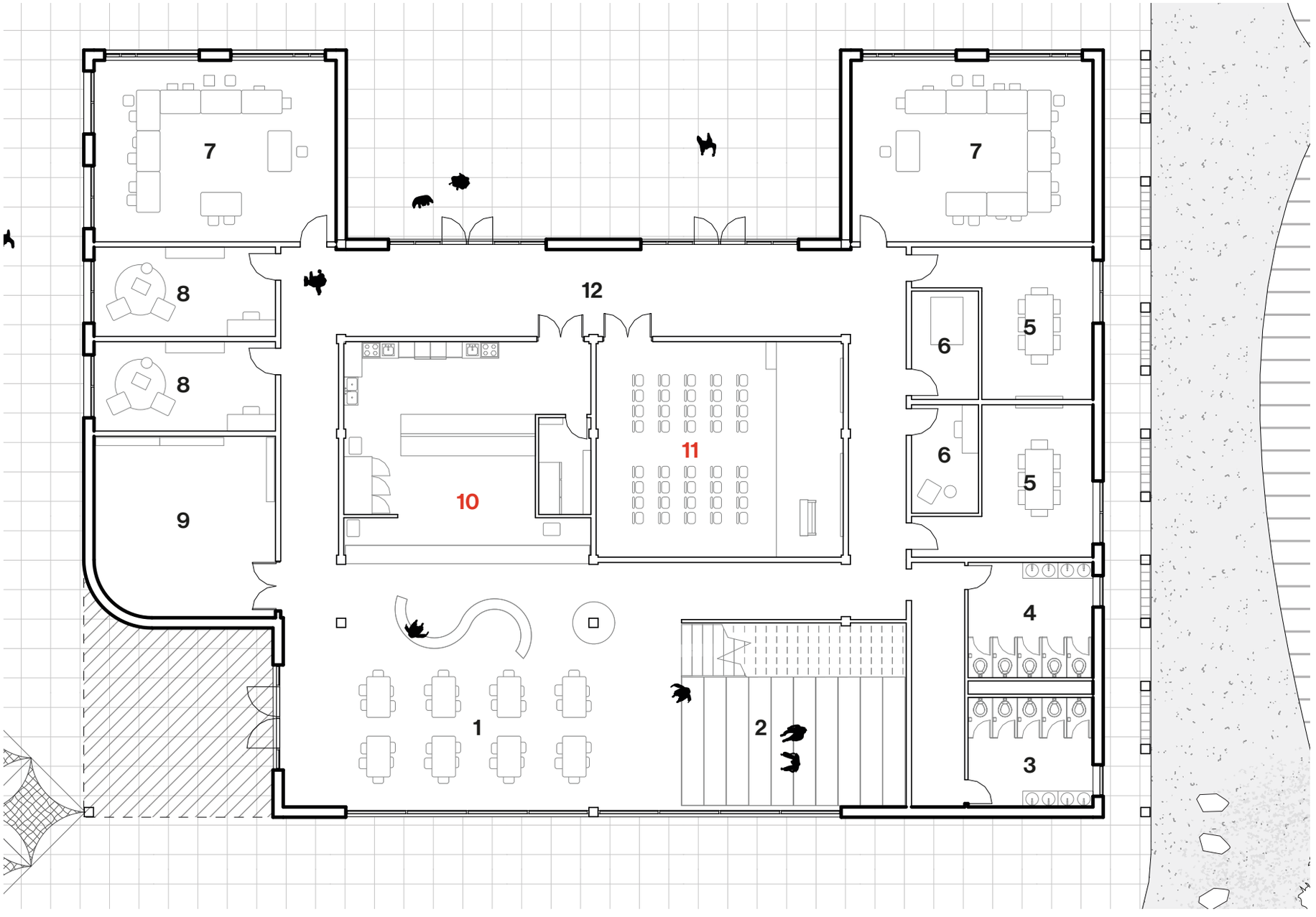
FIGURE 46
Classroom grade 7-9, atmospheric impression.
Own image.

Main building

3.4.4

The main building of the project is characterised by its multifunctionality. During school hours, the canteen, theatre room, kitchen, gymnasium, and supporting spaces are used by students. Outside school hours, these spaces can support a wide range of activities for different user groups.

FIGURE 47
Ground floor plan main building.
Own image.



1. Canteen
2. Interactive staircase
3. Toilet boys
4. Toilet girls
5. Small meeting room
6. Multifaith room
7. Large meeting room
8. Office
9. Storage room
10. Multi-use kitchen
11. Theather room
12. Entrance hall

The kitchen and theather room can be used by different users throughout the day and night.

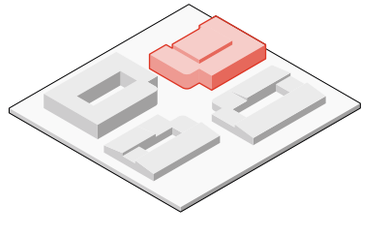
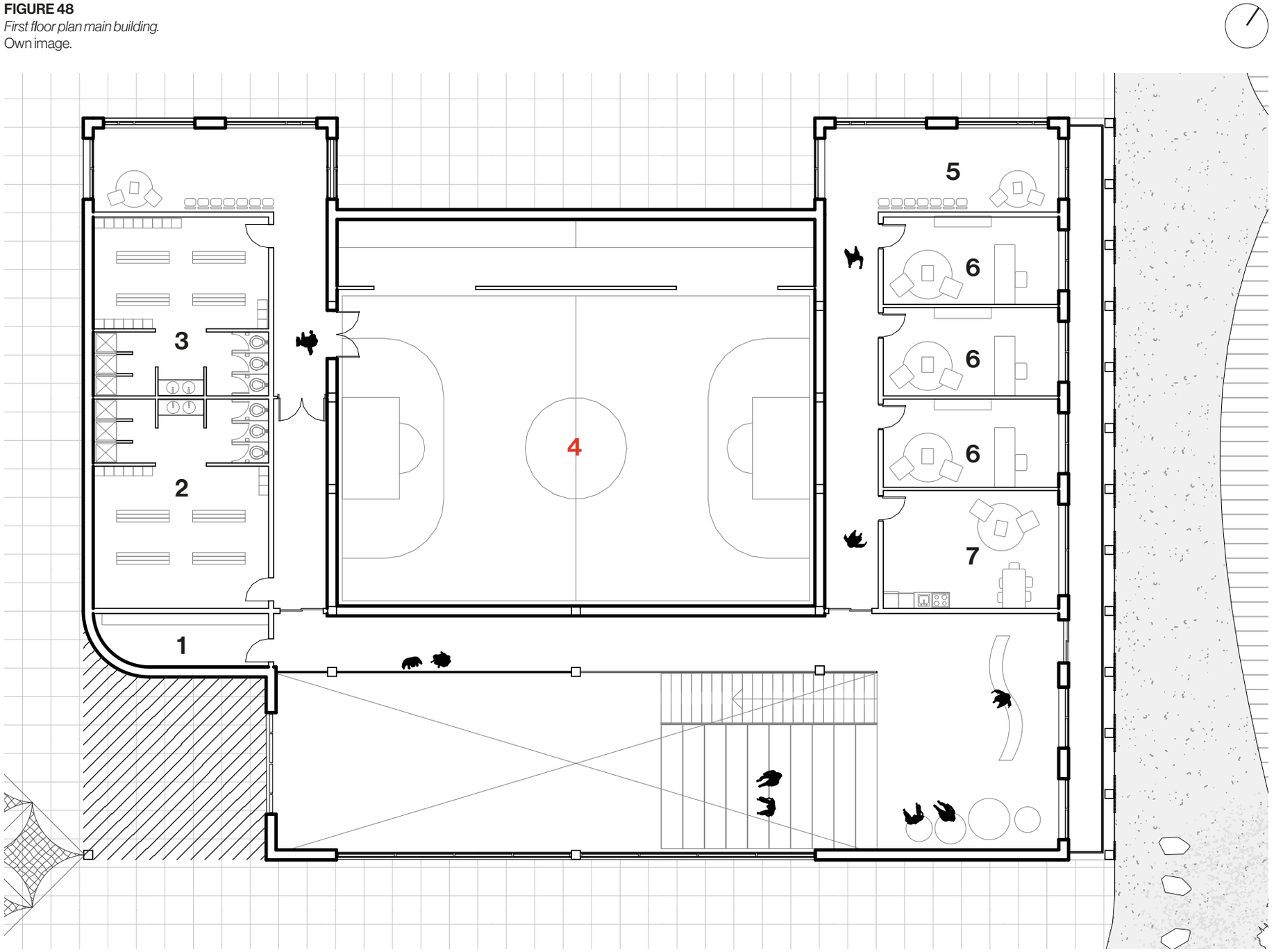


FIGURE 48
First floor plan main building.
Own image.



1. Storage
2. Changing room girls
3. Changing room boys
4. Gym and storage
5. Multifunctional area
6. Flexible office
7. Flexibile room

Due to the extreme summer heat, a gym is located on the first floor of the main building, providing children with a comfortable indoor space for physical activity throughout the year.

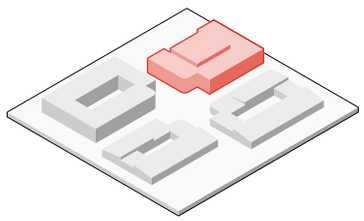
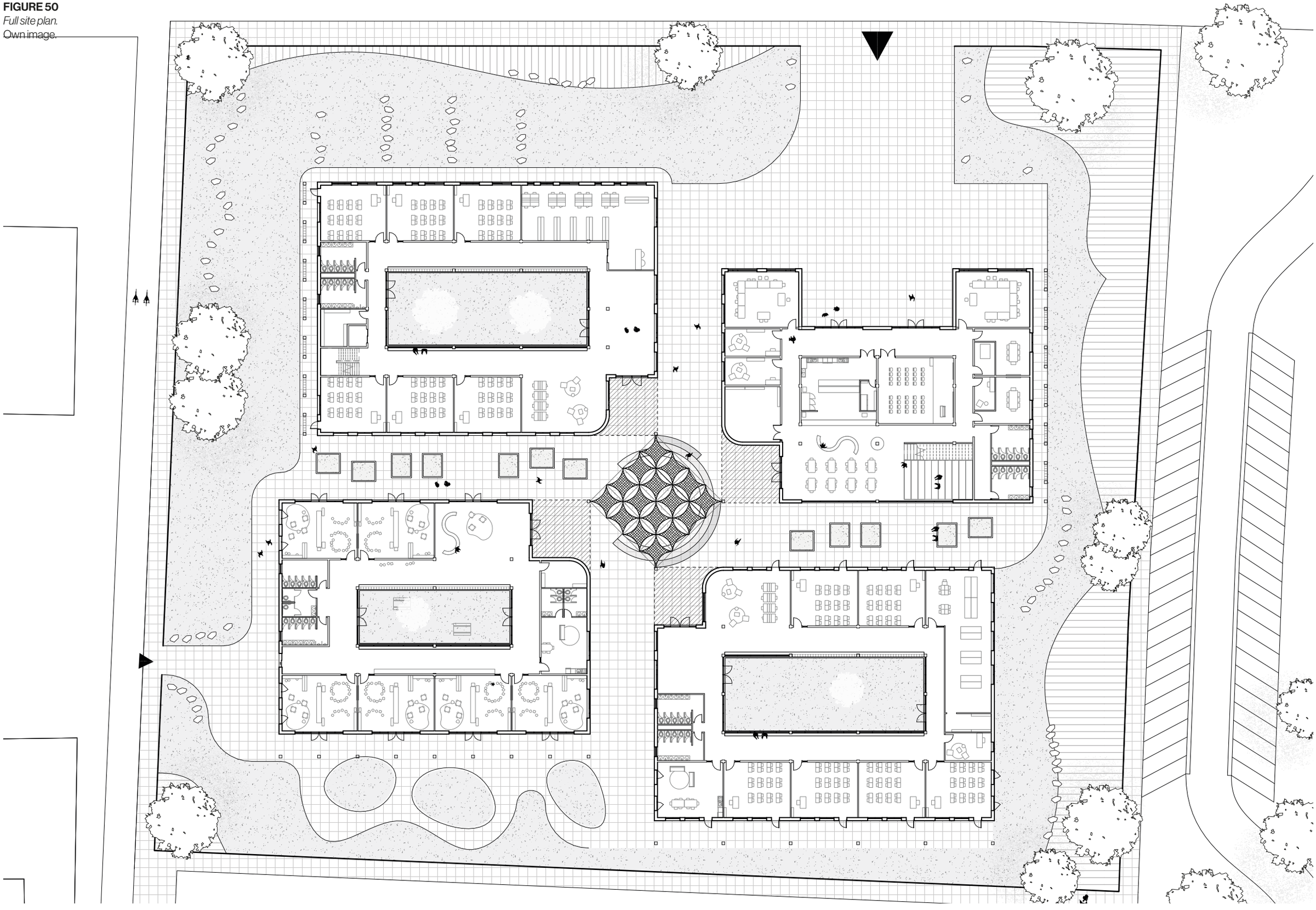


FIGURE 49
Canteen area, atmospheric impression.
Own image.

FIGURE 50
Full site plan.
Own image.



Chapter four

Conclusion

In this final chapter of the graduation report, both the research and the design are brought together into a coherent conclusion and discussion. The conclusion aims to answer the following main question presented in chapter one:

How can a primary school in post-conflict Homs be designed to support both educational progress and psychological well-being in a context-aware and resource-efficient manner?

The design, presented in chapter three, combines the outcomes of all research subquestions. Within the design, the first three subquestions are answered in close relation to the research presented in chapter two. During the design phase, subquestions 4 and 5 were explored through a research-by-design method. In this chapter, the answers to all research questions together form the overall conclusion of the graduation project.

4.1
Conclusion

1. What educational and psychological well-being problems do children in post-conflict Syria face?

More than a decade of conflict has left many children in Syria without a stable educational environment. Many school buildings are damaged or unusable, classes are often overcrowded, and a lack of qualified teaching staff further worsens the situation. In addition, almost seven out of ten Syrian children are dealing with psychological disorders, with PTSD, depression, and anxiety being the most common. Children are missing a sense of safety, which a school environment should be able to provide. They need places that allow them to gradually return to everyday life and society. The challenge is therefore not only one of rebuilding educational capacity, but also of addressing children's mental health and restoring stability in daily life.

2. How have architectural features shown to provide educational and psychological well-being benefits?

To address this within the design, literature was analysed to understand how architecture can support both learning progress and psychological well-being. Key architectural elements include the presence of daylight, good acoustics, and thermal comfort through shading strategies and natural ventilation. Restorative views and direct access to greenery further support well-being and recovery. Age-appropriate and flexible classroom environments foster a sense of ownership while enabling both small-group interaction and spaces for quiet retreat. A balanced visual environment, characterised by neutral base colours combined with brigther accents, supports concentration and reduces overstimulation. Courtyard-based layouts and green outdoor spaces provide safe environments for play and social interaction, while also enabling quick stress regulation, particularly for younger children.

3. How do existing policy frameworks and guidelines approach the reconstruction of education and the importance of psychological well being?

Existing policy frameworks approach the reconstruction of education in conflict-affected contexts as more than simply rebuilding physical infrastructure. They emphasise the creation of safe, inclusive, and child-centred learning environments that support both education and psychological recovery. Key priorities include flexible learning spaces, access to daylight and ventilation, safe outdoor environments, and the integration of health and support services. In addition, these frameworks recognise schools as important community anchors that can foster stability and resilience in the recovery process. Furthermore, sustainability and climate resilience are also considered essential components of long-term reconstruction strategies.

4. What other functions can schools in post-conflict Homs host to serve broader community needs?

As mentioned before, a school building in a post-conflict setting should serve broader functions than only education. Within the final design, the school functions as a catalyst for the surrounding neighbourhood, where more people are gradually returning. The main building of the project is characterised by its multifunctionality. During school hours, the canteen, theatre room, kitchen, gymnasium, and supporting spaces are used by students. Outside school hours, these spaces can support a wide range of activities for different user groups. The kitchen can be used for neighbourhood meals, the rooms for meetings, and the gymnasium for sports and community activities. Parts of the main building could even accommodate different functions, such as a doctor's office or a small business.

In addition, the flexibility of the other three school buildings allows for multifunctional use of the complex as a whole. If the school, for whatever reason, cannot immediately function at full capacity, parts of the buildings can temporarily accommodate other programmes or users. The flexible floor plans therefore allow the complex to adapt to changing needs over time.

5. How can sustainable, climate-responsive, and culturally grounded design strategies create a future-proof school building suited to the environmental conditions of Homs?

A future-proof school building in Homs can be achieved through the integration of sustainable, climate-responsive, and culturally grounded design strategies. Sustainability is supported through the use of local materials, traditional construction techniques, and the involvement of local craftsmen, strengthening both environmental and social resilience. Climate-responsive principles respond to Homs' hot and dry climate through shading devices, natural ventilation, greenery, and passive cooling strategies. Cultural grounding is reinforced through the use of traditional limestone and mashrabiyas, while spatial flexibility allows the school to adapt to changing educational and community needs over time.

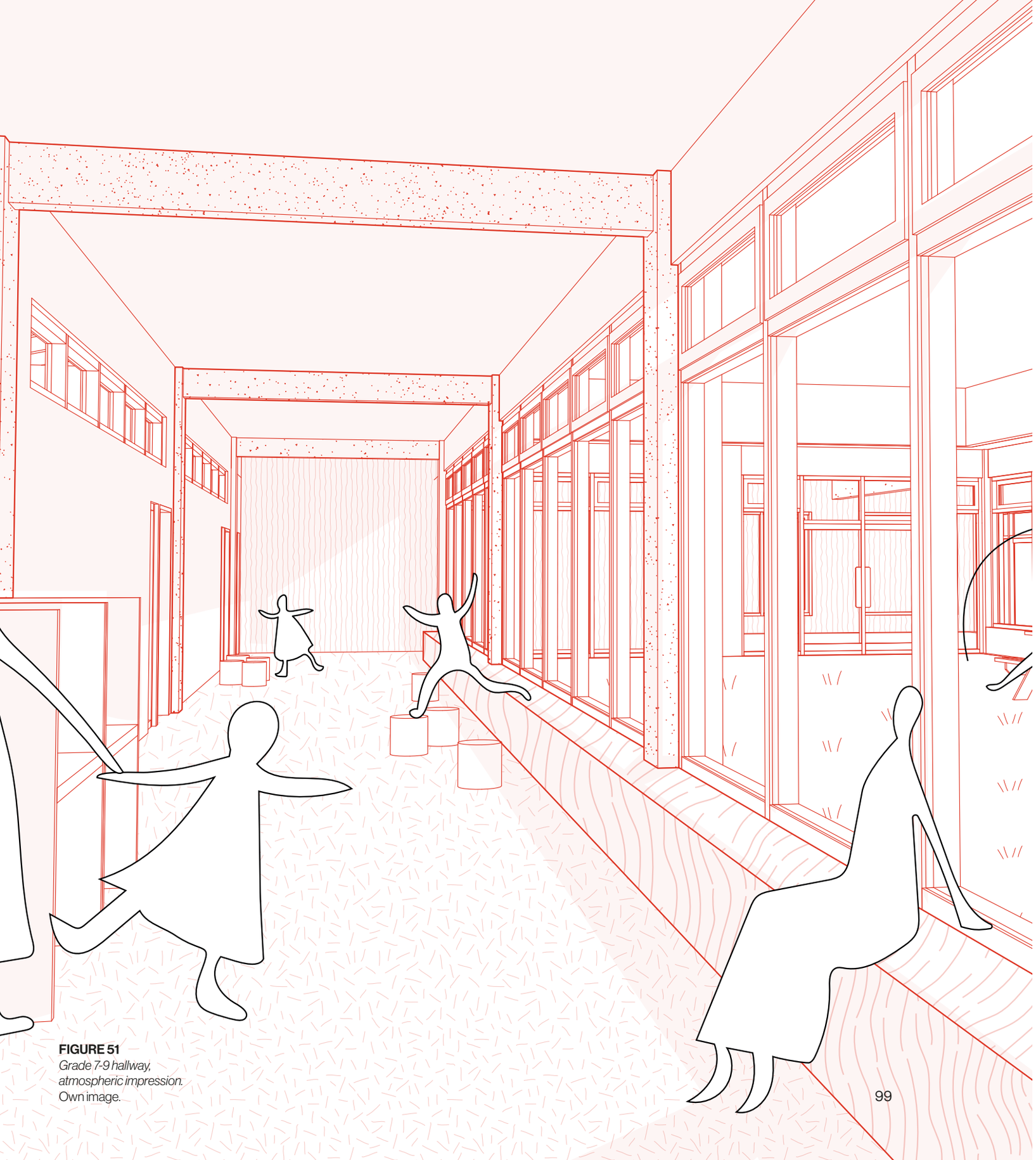


FIGURE 51
Grade 7-9 hallway, atmospheric impression.
Own image.

4.2
Recommendations and implications

This research underlines the important role of the architect being engaged with complex social, educational, and psychological questions. It demonstrates that architecture can actively contribute to educational progress and psychological well-being. Within this context, the architect has the ability to meaningfully influence the daily lives of children by shaping environments that support safety, stability, and development.

This graduation research provides a set of practical design implications that can guide the development of future educational facilities in post-conflict and fragile contexts. A central finding is the importance of placing the child at the core of the design process, ensuring that spatial, environmental, and organisational decisions are consistently aligned with their needs. While the research is grounded in the specific context of Homs, the outcomes are not limited to this setting. Instead, they are transferable to a broader range of contexts where the aim is to create schools that go beyond providing education, and instead offer children a safe and supportive environment in which they can fully develop.

At the same time, it is important to recognise that the challenges addressed in this report extend beyond the scope of architecture alone. The successful implementation of such educational environments depends on collaboration with national and local governments, as well as international and local organisations. Without meaningul collaborations, the spatial and programmatic ambitions outlined in this project cannot be fully realised. Architecture can provide the framework and spatial conditions, but long-term impact relies on broader institutional and societal support.

4.3
Reflection

For the past seven months, this graduation project has been a highly valuable and informative joruney for me . Beginning with an extensive research phase allowed me to develop a deeper understanding of the context and the urgency of the situation in which this project is situated. From the start, my personal motivation to contribute to a meaningful design for children affected by conflict remained a guiding theme throughout the process. This motivation helped me stay focused and committed to developing a project that aims to support and positively impact as many children as possible, something which is close to my heart.

An important aspect of my process was the opportunity to engage with people of Syrian background. Architecture, in my view, is not only about designing buildings, but also about listening, understanding, and discussing about solutions together. Conversations with individuals who have lived experience within the context of the project, were therefore essential in helping my understanding of the situation. Their input helped me move beyond theoretical research and provided valuable insights that were directly integrated into the design process.

Although I believe that the final result presents a thoughtful design that responds to the research questions and provides a safe and supportive environment for children, I also recognise the limitations of my position as a foreign designer. Fully understanding the needs, sensitivities, and complexities of a context such as post-conflict Syria is inherently difficult without having lived within it. This distance, I believe, will always mean that certain key nuances may not be fully captured within the design outcome.

It is also important to acknowledge that the Syrian context extends far beyond architecture. It represents a rich cultural and historical narrative ranging back thousands of years. As a result, this graduation project will always fall short in fully representing the depth and complexity of Syrian society and culture. In addition, the current social and political situation in the country is highly complex and was difficult to fully understand for me.

The design input table presented in Chapter 2.4 played a significant role throughout my design process. It provided a structured foundation that helped me ground my design decisions in research and policy-based evidence. This framework allowed me to maintain clarity and consistency while, at the same time, giving me the freedom to explore broader architectural themes such as sustainability, flexibility, and multifunctionality. It acted as a reference point throughout the project, something that I could always use to fall back on.

Alltogether, this project has strengthened my belief that architecture can be a tool for care, recovery, and dignity. While it will never be possible to fully resolve the complexity of post-conflict reconstruction through design alone, I do believe that thoughtful and context-aware architecture can create meaningful conditions for healing and growth. If this project contributes even in a small way to imagining safer, more supportive environments for children, then it has fulfilled its purpose and my personal aim. The hope is that this work is not seen as a final answer, but as an ongoing invitation to continue questioning how architecture can responsibly engage with societies in recovery, and how we, as designers, can remain attentive to the people for whom we design.

Chapter five

Research paper

1.1
Introduction

To clearly understand the context in which the design is created, it is important to understand the educational context of Syria. This chapter outlines the structure and performance of Syria's education system, both prior to 2011 and during war times. The impact of the conflict on the psychological well-being of Syrian children is also researched.

1.2
Education in pre-conflict Syria

Before the civil war started in 2011, the Syrian educational system was structured around three main stages: Early childhood education (ECE), basic education and secondary schooling. ECE in Syria is non-compulsory and not free of charge (Welker, 2021), with 63% of ECE centres in Syria being privately funded (Central Bureau of Statistics, 2011b). In 2006, only 10.6% of Syrian kids between the ages of three and five attended any form of ECE. Participation in ECE was lowest in regions where female labor market participation was low, whereas regions with higher ECE participation rates also displayed higher rates of female participation in the labor market (Central Bureau of Statistics, 2010b).

At the age of six, children enter the Syrian school system, where they pass through a nine-year basic educational stage, which is free of cost. Until the end of the 9th year, at 15 years old, basic education is compulsory (Ministry of Education, 2015). In contrast to ECE centres, basic education was almost entirely state-run, with 97% of schools under government control. In 2010, Syria counted 17.120 schools nationwide. The basic education school was divided into two cycles. The first cycle ranges from first until sixth grade, the second from seventh to ninth grade. After these nine years, students who pass are awarded a certificate of basic education. Classes typically consist of 25 to 35 children per basic education class. While boys and girls were in the same class together during the first four years, in the later grades gender segregation was introduced (Al Hessan, 2016).

After basic education, the secondary education stage starts, consisting of three years (grades ten to twelve). This secondary education is also free of charge, with almost 94% of all secondary schools operated by the state.

Although only 10,6% of kids between 3 and 5 years old attended any form of ECE, 95,6% of all 7/8 year old kids were attending basic education, meaning Syria was almost reaching universal primary school enrollment (Save the Children, 2013). In most cities, including Homs, this percentage was even higher (98,1%). However, attendance declined significantly among older adolescents. For children aged fourteen to sixteen, average attendance dropped to 60.8%, and to 65.8% in Homs. This decline can partly be attributed to the end of compulsory education at age fifteen (Gebel, 2012). This research done by Gebel (2012), which is based on interviews with more than 3000 Syrian adolescents between 15-30 years old, also showed that 40.6% of early school dropouts did so because they felt unable to succeed in education, while another 22.3% felt tired of studying.

1.3
Education during conflict

Since 2011, the Syrian conflict has led to a dramatic deterioration in access to education. In 2016, over 2 million Syrian children were out of school (Al Hessan, 2016). The educational crisis Syria is facing will have severe long-term effects on Syria's economy and prosperity. UNICEF has estimated that children missing out on education as a result of the conflict could lead to a 10.7 billion USD (=9.14 billion euros) loss of human capital. This is equivalent to more than 17% of Syria's GDP in 2010 (Bouchane, 2016).

During the conflict, different areas of Syria were controlled by different groups. Large parts, including Homs, were government controlled throughout the majority of the Syrian conflict. Education during the conflict was more stable within government-controlled regions than in other, opposition-controlled, areas (Al Hessan, 2016). However, this stability was relative, since a significant number of schools were dealing with overcrowding and a lack of adequate teachers, with one fifth of all Syrian teaching staff and school counsellors being lost only in 2015 already (UNICEF, 2015). This resulted in student-teacher ratios being extremely high, with some teachers being accountable for over 100 students each (Qaddour & Husain, 2022). At the same time, the conflict led to a significant number of people being internally displaced. This resulted in many children being out of school. A lack of available learning spaces and official documentation often led to displaced children not being able to enroll in education, even in government-controlled regions such as Homs. Children who were not displaced or were still able to go to school, most of the time did so. Only when war tensions were high or incidents, such as bombing, appeared, were schools closed off and education shut down (Al Hessan, 2016).

The Syrian crisis did not only lead to millions of internally displaced people (IDPs), but also led to a massive stream of people fleeing the country. While inside Syria, more than 2 million kids were out of school in December 2014, outside of Syria, 2% of all refugee children were not able to receive education, which comes down to a number of around 640.000 children.

As of December 2025, out of the 2.6 million kids (2 million in Syria, 600.000 outside of Syria) who dropped out of school because of the conflict, 950.000 have been reached by UNICEF. These children, which included around 50% girls, have been supported with educational services and supplies. Although this shows that Syria is recovering and that children are slowly reclaiming their right to education, it also shows the way still to go. 1.7 million kids are yet to be reached and supported, making sure each of them gets the opportunity to go back to school.

1.4
Pyschological well-being of Syrian kids

Beyond educational disruption, the Syrian civil war has also had profound effects on children's psychological well-being. A study done by Perkins (2018), involving children from grades three to nine, shows that Syrian children have been experiencing traumatic events and war associated daily stresses that are hugely impacting their psychological well-being. Among negative experiences, warzone (43.7%), violence and displacement (both 17.1%) were most often reported. The sounds of shelling and explosions, the fear of terrorism and the destruction perceived by these children, have had a significant amount of influence on their psychological well-being. An additional and notable finding was the impact of continuous media coverage of conflict. Repeated viewing of violent imagery on social media appeared to expose children to traumatic content on a regular basis, potentially exacerbating psychological harm.

The research shows that out of the total of 492 students, at least 291 participants (60.5%) were above threshold for at least one psychological disorder. PTSD was the most common (35.1%), followed by depression (32.0%) and anxiety (29.5%). Females were one and a half times more likely to indicate problems than men.

The Syrian crisis did not only lead to millions of internally displaced people (IDPs), but also led to a massive stream of people fleeing the country. While inside Syria, more than 2 million kids were out of school in December 2014, outside of Syria, 2% of all refugee children were not able to receive education, which comes down to a number of around 640.000 children.

1.5
Conclusion

This chapter has demonstrated that, while Syria's pre-conflict education system achieved high levels of school participation, the outbreak of conflict resulted in large-scale educational disruption, damaged infrastructure, overcrowded schools, and significant barriers for displaced children. At the same time, Syrian children have been exposed to prolonged traumatic experiences and chronic stressors, leading to high prevalence rates of PTSD, depression, and anxiety. Together, these findings demonstrate that the current educational crisis in Syria cannot be addressed solely through the reconstruction of school capacity. Instead, it requires a more holistic approach in which learning environments are reconsidered as spaces that must respond not only to educational needs, but also to children's psychological well-being in a post-conflict context.

2.1
Introduction

This chapter examines the relationship between the psychological well-being of Syrian children and the built environment, with a specific focus on school environments. The aim of this chapter is to provide input for a clear and applicable framework of spatial interventions and considerations that can be translated into the design brief.

This chapter is divided into two sections. The first section focuses on spatial tools and interventions, aiming to find architectural solutions that have proven to positively influence either psychological well-being or educational performance. The second subchapter addresses organisational recommendations. Although these may appear less directly related to architecture, they are expected to influence the design brief by influencing programmatic choices and spatial requirements.

2.2
Architecture and its effects on education and psychological well-being

Green spaces

A substantial body of research has examined the influence of natural and green environments on learning performance and psychological well-being. A widely recognized and influential study of Ulrich (1991) introduced the Stress Reduction Theory, better known as SRT. This theory explains why and how certain natural environments can help people recover from stress, providing evidence that nature has a restorative effect on human beings. Interestingly, this study also highlights the speed of recovery associated with nature exposure. Within the Syrian context, where a lot of children are dealing with trauma, depression and anxiety, this knowledge is particularly relevant. Access to natural environments may help mitigate sudden emotional responses, such as flashbacks or mood swings, by supporting rapid emotional regulation. This reasoning is supported by a research of Chawla (2014), in which the high value of green refuge for children in conditions of poverty, war and displacement is shown.

Further research by Chawla (2025) shows that trees, naturalized habitats and gardens offer benefits for many dimensions of children's well-being. Natural areas have proven to provide places for creative play, self-testing, and quiet retreat. These have all been linked to psychological well-being, making natural areas a relevant design theme within this thesis. Notably, the strongest effects were observed among children up to the age of twelve, making these findings particularly applicable to primary school design.

Architectural implementations

In addition to access to green spaces, other architectural factors have also shown to significantly influence children's educational performances and well-being. Research by Barret et al. (2015, 2016) has identified the impact of the physical learning environment on academic progress. In the earlier research, academic progress of 3766 pupils, split across 153 classrooms and 27 schools, was analysed in relation to their physical environment. Pupils were aged between five and eleven years, making the findings highly relevant to the age group considered in this thesis.

Within the research, three design principles have been used to suggest and structure physical environmental factors to be considered. These are:

Naturalness (Light, Sound, Temperature, Air Quality, Links to nature)
Individualisation (Ownership, Flexibility, Connection)
Stimulation (Complexity, Colour)

These three design principles all consist of different design parameters, which have been measured through criteria. The design parameters are put in brackets behind each design principle.

Naturalness (light, sound, temperature, air quality, links to nature)

Both natural and electrical light were found to have a strong impact on pupils' academic progress. Larger windows that would let in more natural light were beneficial, provided that issues such as glaring and direct sunlight were adequately controlled. This is in line with later research, which has found that large windows orientated without direct sunlight (E, W, NE, NW, and N) had better results than those receiving direct sun (S, SE, and SW) (Barrett et al., 2016). The quality and quantity of electrical lighting were also significantly correlated with pupils' learning progress. Poor-quality electrical lightning has shown to increase headaches and weaken visual performance (Winterbottom & Wilkins, 2009), while high-quality lightning has been found to positively influence children's learning progress (Barrett et al., 2015).

Furthermore, the research found that pupils perform better in classrooms where temperature is easy to control and where there is sufficient (mechanical) ventilation. The mental attention of pupils is significantly (s)lower when the level of CO2 in classrooms is high and when the air exchange rate is low (Coley et al., 2007; Bako-Biro et al., 2012).

Individualisation (ownership, flexibility and connection)

The second design principle, individualisation, refers to the degree to which physical learning environments support connection, adaptability and a sense of ownership. The findings of Barrett et al. were consistent with findings from existing literature, revealing that:
Unique, child-centered design elements significantly correlate with pupils' academic progress, with specialized facilities being essential to student well-being.
Opportunities for personalisation and the presence of specialised facilities contribute to a stronger sense of ownership and engagement.
Younger pupils showed more learning progress in classrooms with complex spatial layouts, as these provided for more private and intimate learning zones. On the contrary, older pupils performed better in simpler, regular classroom shapes that supported both group work and whole-class instruction;
Wider and more orienting corridors didn't influence pupils' progress to a significant extent. However, this finding may not be directly applicable to post-conflict contexts. Research has found that for people experiencing trauma, improved sense of orientation can reduce stress symptoms, meaning that wider and more orientating corridors could have positive effects on children's well-being, rather than educational performances.

Level of stimulation (complexity and colour)

The last design principle concerns the level of stimulation within the learning environment. Both under-stimulating and over-stimulating classrooms were found to have negative effects on pupils' learning progress, while classrooms with an intermediate level of stimulation showed more favourable outcomes (Read et al., 1999).
Within the classroom, white walls with a highlight or a feature wall showed the strongest correlation with learning progress. Additionally, bright coloured furniture, carpets and other interior elements also contributed positively to educational outcomes.

Overall, the research concluded that the combined impact of these environmental aspects accounted for approximately 16% of the variance in pupils' learning progress. This percentage is high and comparable to the effect of teachers, which is commonly estimated to range between 8% and 20%. It is important to note that this percentage is only achieved when all factors operate in combination; single design parameters alone make up for only a fraction of the estimated 16%.

2.3
Conclusions

Research has found that multiple physical environmental elements can positively influence both educational progress and psychological well-being. To translate research findings into meaningful design input, these environmental factors must be converted into concrete architectural strategies. For example, evidence demonstrating the positive effects of daylight on educational outcomes, can later be translated into specific design requirements, such as a minimum percentage of facade glazing. The translation of environmental elements into architectural solutions forms a crucial bridge between research and design. It provides a coherent basis for the formulation of the design brief in the later stages of this thesis.

3.1
Introduction

In recent decades, many non-governmental organisations (NGOs) have developed frameworks and policy documents aiming to improve quality of education all over the world, with particular attention to conflict-affected fragile states (CAFS) (Save the Children, 2013). The documents provide practical guidance for designing sustainable, green and resilient school infrastructure.

Although these documents tend to focus less explicitly on spatial interventions than the academic literature discussed in the previous chapter, they provide environmental and functional recommendations which can later be translated into architectural solutions within the design brief. Their relevance is furthermore supported by the extensive field experience on which they are based, making these documents an important source of knowledge for this research and the further thesis.

Within this research, multiple documents set up by NGOs have been used. In this chapter, their aims and relevance relating to this thesis are studied and summarized. In the concluding chapter, insights from these policy documents will be combined with findings from academic literature to form an integrated design-input framework.

The policy documents reviewed include:

UNICEF: Child-Friendly Schools Manual (2009)
UNESCO: Green Schooling Quality Standard (2024)
Save the Children: The future is now: education for children in countries affected by conflict (2010)
IASC: IASC Guidelines on Mental Health and Psychosocial Support in Emergency Settings (2007)

3.2
Policy documents

UNICEF: Child-Friendly Schools Manual

This manual, which was developed by UNICEF during three-and-a-half years of work in 155 countries and territories, aims to provide practical guidance on the design, operation and management of child-friendly schools (CFS). The CFS model presents a pathway towards education that is not just a human right, but a child-centered ideology in which children are able to achieve their full potential. Therefore, it also aims to address elements that influence the well-being of children.

The manual covers a wide range of themes, including curriculum, governance and community engagement. For the purpose of this thesis, the chapter of Location, design and construction, is of particular relevance, as it provides a coherent framework of spatial and environmental considerations essential to the creation of CFS.

UNESCO: Green Schooling Quality Standard

UNESCO's Green Schooling Quality Standard is a document rooted in the organisation's longstanding work in education for sustainable development (ESD). The starting point is the belief that schools play a crucial role in addressing climate change and promoting sustainable development. Research revealed that climate change is often not featured in curriculums, with 70% of youth surveyed in a research study saying they have limited understanding of what climate change is based on what they learn in school (UNESCO, 2024). In response, this multi-dimensional framework offers a structured approach that can support schools in achieving a holistic transformation towards a climate-ready school.

Although sustainability may not appear to be an immediate priority within a post-conflict context, the reconstruction phase can be approached as a unique opportunity to establish a new standard. Post-conflict rebuilding offers an opportunity to design resilient and sustainable school facilities that can help educate future generations about environmental responsibility.

Save the Children: The future is now: education for children in countries affected by conflict.

This document focuses specifically on education in conflict-affected fragile states. It argues that educational progress remains possible in countries that are or have been affected by conflict. The document aims to clarify the importance of education within CAFS and provides recommendations that can help enhance educational quality, access and resilience; making it a valuable source of information within this research.

IASC: IASC Guidelines on Mental Health and Psychosocial Support in Emergency Settings.

The IASC guidelines aim to improve mental health and psychosocial well-being during emergencies and conflict situations. It outlines concrete strategies for mental health and psychosocial support (MHPSS). both during and after conflicts. Given the high presence of trauma among Syrian children, these guidelines provide essential insights into how educational and spatial environments can support psychological recovery. The collaborative development of the guidelines by a wide range of NGOs further reinforces the relevance and credibility of this document.

4.1 Introduction

This research has aimed to provide a brief overview of the historical context of education within Syria by tracing the development of the education system from the pre-conflict period through the years of armed conflict and into the current phase of recovery. Next to this, the effects of the Syrian civil-war on children's psychological well-being has been researched.

Building on this analysis, the second chapter investigated how architecture, through environmental elements, can influence both psychological well-being and educational performances. By synthesising findings from environmental psychology, educational research, and architectural studies, this research identified key environmental factors that are relevant to school design in post-conflict settings.

These insights have been combined with recommendations derived from policy frameworks developed by numerous NGOs. In the following subchapter, the findings are structured into an integrated and coherent table that translates research outcomes into relevant design input. The table is structured around a set of key design parameters, each informed by literature and/or policy review findings. Furthermore, for each parameter, corresponding design implications have been identified. In the next stage of this thesis, this input can serve as the foundation of the design brief.

4.2
Design input table

Design parameter	Design implication	Source(s)
Aid	Facilitate healthcare and nutrition interventions that promote learning and development. "For adolescent girls and female teachers, washing places must be provided with enough water and privacy to wash and dry clothes and rags used during menstruation." "A doctor's office integrated with the school layout can function as a school clinic and community health centre." "Fire prevention and emergency evacuation plans must be part of the design process and built into the school programme."	UNESCO (2025) Save the Children (2010); UNICEF (2009) UNICEF (2009) UNICEF (2009)
Classroom size and shape	Young pupils are functioning better in complex-shaped classrooms, because it enables for more learning zones and flexibility. Older pupils performed better in classrooms with simpler shapes (squarer). For younger children, safe spaces within the classroom can be designed to provide a place where children can retract when feeling stressed.	Barrett et al. (2015) IASC (2007)
Colour	"Use brighter accents for play corners, decks, corridors and furniture. Learning spaces should be light and relaxed in colour, not gloomy, dull or dark." White walls with a highlight or a feature best improved learning progress. Within the room, bright coloured furniture, carpets and other elements also positively influence learning progress. Young children from 3 to 5 years old prefer cool colours over warm colours. In interior environments, the colour red is preferred by children. Designing classrooms with an intermediate level of stimulation has the best effects on learning progress. Space with differentiated ceiling height and wall colour may be too stimulating for children.	UNICEF (2009) Barrett et al. (2015); Read & Upington (2009) Read et al. (1999)
Community	Design space for workshops and meetings where local stakeholders can discuss, suggest ideas, share experiences, and actively contribute to the school's agenda	UNESCO (2025)

Design parameter	Design implication	Source(s)
ECCD	Designing space for Early Childhood Care and Development supports children's development before entry into primary school. At the same time, it frees up families who would have to look after these young children. "Children in these age ranges do not have to be seated in chairs, but could instead have mats to sit on, materials to learn from and room to play on their own or in small groups." "Provide 4.5 to 5.5 square metres of space per child. Design large classrooms that facilitate programmatic flexibility and provide space for both quietness and active play. This decreases aggressive behaviour. Classrooms need to be spatially differentiated. Activity areas can be separated by physical objects like movable partitions, open shelves, cabinets and plants; or by visual signs such as different flooring materials, wall textures or colours; or by changes in lights or ceiling or floor height."	Save the Children (2010) UNICEF (2009) UNICEF (2009)
Flexibility	Provide (space for) flexible and alternative education opportunities.	Save the Children (2010); IASC (2007)
Green	"Designing green spaces with trees, naturalized habitats and gardens offer benefits for many dimensions of children's well-being. Children often state a preference for green spaces that include flowers, shrubs and trees" Provide green views from within the classrooms. A green view has shown to have a restorative impact and also stimulates attention. Integrating healing green spaces into the design can help children recover after conflict or war exposure.	Chawla (2015); UNESCO (2024) Ulrich (1991); Barrett et al. (2015); Chawla (2014)
Kitchen	"Establish small-scale school farms by collaborating with local farmers or community members that provide handson agricultural education and supplement school meals." "Providing food (on-site or as take-home rations) in educational settings can be an effective strategy for increasing attendance and retention, which in itself contributes to mental health and psychosocial well-being."	UNESCO (2024) IASC (2007)

Design parameter	Design implication	Source(s)
Library	Facilitating a library space helps to connect the school to the surrounding community. The library should be located and designed so they are accessible to the community.	UNICEF (2009)
Light	Optimize natural lighting. Providing enough natural light significantly influences children's performances, especially in reading and science scores. Large windows have also shown to be associated with better learning performances. Providing direct sunlight presence in rooms has shown to have restorative effects, provided that there is no visual discomfort. Sufficient amounts of daylight also has positive restorative effects.	UNESCO (2025) Barrett et al (2015); Heschong et al (2002) Karaman Madan et al. (2024)
Materiality	"Materials and finishes should be the light, natural colours of the materials themselves, selected in harmony with warm natural hues as accents."	UNICEF (2009)
Noise	The design should minimize external noises of traffic, industries, etc. "External and internal noise were found to have a significant negative impact upon performance. "	UNICEF (2009) Shield & Dockrell (2008
Outdoor spaces	"Organize a swap fair or permanent stalls for the school and/or the surrounding community." "Facilitate appropriate spaces for active play, stimulation and socialisation. These may help to mitigate the negative psychosocial impact of crisis situations." "Design an outdoor stage that can serve as a classroom and performance space for certain classes or school activities. Such a space can also function as a meeting place for community activities after school hours since schools are sometimes the only places for communities to gather." "Use outdoor spaces as classrooms to foster a connection with nature."	UNESCO (2024) IASC (2007) UNICEF (2009) UNESCO (2024)
Ownership	Provide personalized displays and desks to provide a sense of ownership. This has a positive effect on children's learning. Provide sufficient wall-space for pupil's work. "Permanent student artwork enhanced the student's sense of ownership over the learning process. There was a significant positive effect on children's self-esteem" "Individual learning spaces should also be provided, since individual children have their own learning styles and some will need space to be on their own at times to study or reflect."	Barrett et al (2015) Killeen et al. (2003) UNICEF (2009)

Design parameter	Design implication	Source(s)
Sustainability	"Dedicate soil patches for growing crops that can be managed by learners. "Set up green roofs and/or vertical gardens to improve insulation, reduce energy consumption,enhance air quality, utilize rainwater, reduce stormwater runoff and enhance biodiversity."	UNESCO (2024) UNESCO (2024)
Temperature	Minimize overheating within the school building and classrooms. Heat has a negative effect on children's (educational) performances. Design should include adequate external shading devices.	Wargocki & Wyon (2007) UNICEF (2009); Barrett et al (2015)
Toilets	Facilitate separate toilets for girls and boys. When designing, keep privacy, cleanliness and safety in mind. F"acilitate child-sized adaptations of toilet seats, urinals, taps, doorknobs, locks and handrails. Make sure water and sanitation facilities are simple and easy to use."	Save the Children (2010) UNICEF (2009)
Ventilation	Provide sufficient fresh air circulation to stimulate learning progress. "Large room volume with big window opening size at different heights can provide ventilation options for varying conditions'.'	UNICEF; Coley et al. (2007); Bako-Biro et al. (2012) Barrett et al. (2015)
Water	Install a greywater recycling and rainwater harvesting system. Water used for hand washing should be recycled and used to water the orchards and vegetable gardens. Provide children at school access to clean water and sanitation.	UNESCO (2024); UNICEF (2009) Save the Children (2010); UNICEF (2009)

Chapter six

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