COLOUR CODED

A Study on Elementary Schools as a
Typology for Modular Architecture

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CHAPTER 01

Modularity Basics

1.1

MODULARITY BASICS

Introduction to Modularity

What is it and why?

Modular architecture refers to a type of building construction system that subdivides a project into many repeatable parts. To streamline the entire construction process, these parts are typically prefabricated off-site and then subsequently transported to site for rapid assembly. Because components are manufactured indoors under precise conditions, modularity reduces construction times, costs and waste while simultaneously ensuring high quality and performance. Modular construction also enables a high level of scalability, as modules can be combined and aggregated in a multitude of ways in response to various spatial and programmatic requirements. As such, it is becoming increasingly common in contemporary building practices. While modular architecture may conventionally lend itself to residential or commercial projects, this study examines how it can be effectively used in an educational typology.

Why educational?

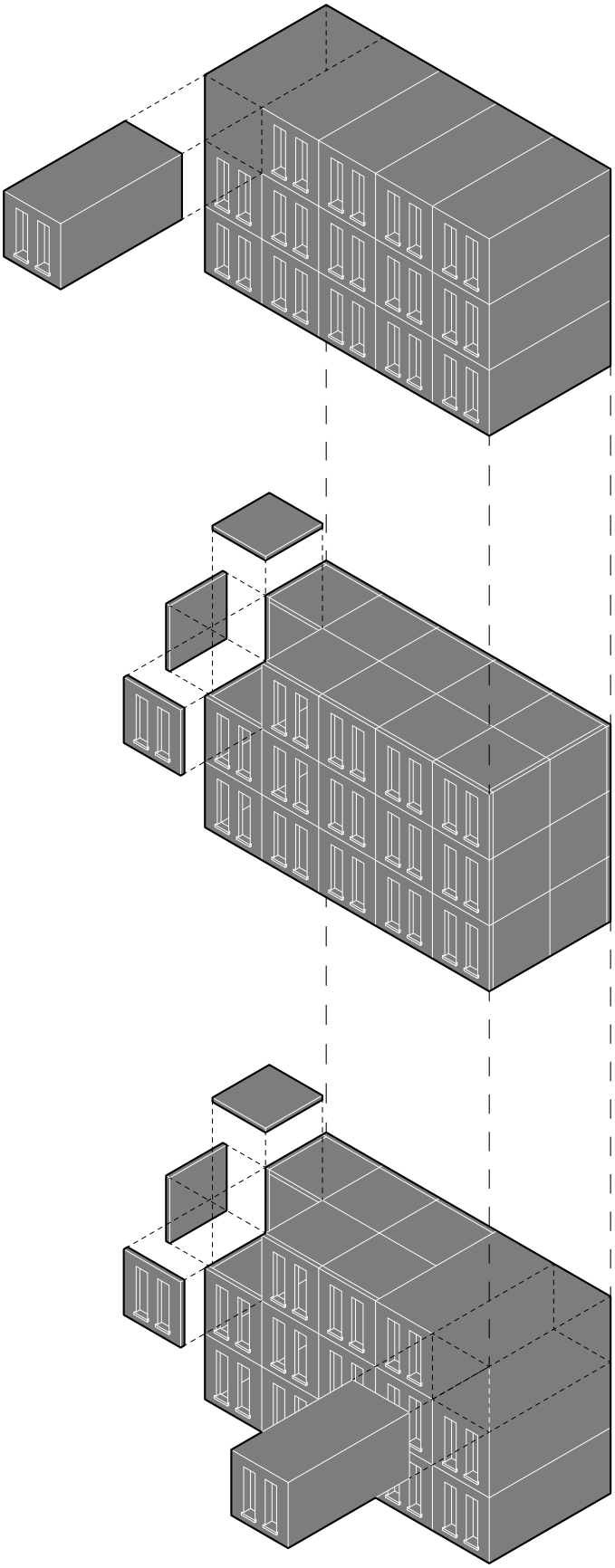
Our contemporary context is largely characterized by changing demographic conditions and shifts in communities - cities are growing, neighbourhoods are growing, and as such, so are the pressures on schools. At the time of this study (Fall 2025), we have seen the issues this has caused within the education system. Ever-increasing numbers of students and all the varieties in learning types and requirements that come with this have demonstrated that flexibility and adaptability are non-negotiables when it comes to school design. In fact, it can be argued that the thoughtful design of schools is more important now than ever before.

This is where modularity comes into play. The kinds of modular systems explored in this study present solutions to these issues. Modular design can be used to produce the kinds of highly flexible, high-performing spaces needed in schools, and can do so quickly and efficiently. While the majority of our current schools lack the ability to change and adapt to reflect the changing needs of their users, modular schools can be designed for this very function, without compromising design excellence. The purpose of this study is to examine how educational spaces can be beautiful and vibrant while also accomodating very different programs. The question is: what kinds of modular systems make the most sense for this kind of challenge?

What types of modularity are there?

Modular architecture can be broadly categorized into three general types. Volumetric modularity refers to prefabricated modules being assembled completely or near completely off-site before they are brought together at the actual project location. Modules can be thought of as completed rooms or miniature buildings that are subsequently aggregated together to create a larger overall building form. Kit of parts modularity refers to prefabricated panels or pieces (such as walls, floors and roofs) which are assembled off-site before they are brought together at the actual project location. While volumetric buildings can be conceptualized as many individual volumes brought together, kit of parts buildings can be conceptualized as fewer, larger volumes created by way of many individual pieces being fit together. Hybridized modularity refers to a mixture of the two, which is what is employed in this project.

Types of Modularity



VOLUMETRIC

Prefabricated modules aggregated together to create building form on site

KIT OF PARTS

Prefabricated panels pieced together to create building form on site

HYBRIDIZED

Combination of volumetric and kit of parts strategies

1.3 Precedents and Examples

Despite it continuing to gain prevalance in the fields of architectural design and building construction, there are already many stellar examples of modularity in projects found around the world today. Researching these kinds of projects proved to be a critical step in developing my own specific modular system; the analysis of these buildings revealed several examples of how modularity can and has been shaped by various factors including materiality, local climatic and geographic conditions, transportability, building typology and more.Two modular precedents that were examined consistently in the early research phase were the 1000 m^2 Prefabricated Housing by SUMMARY in Vale de Cambra, Portugal (Fig. 01 & 02) and Coexistence by FOGO in Zurich, Switzerland (Fig. 03). Both are residential projects but employ modularity in very different ways. The SUMMARY project represents a cross between kit of parts and volumetric strategies, utilizing a system in which prefabricated concrete sections are attached together to create spaces of different lengths. In contrast, the FOGO project uses outfitted shipping containers as small-scale, affordable housing units and stacks them to create a residential compound for refugees, students and more.

Figure 01 **Prefab Housing | SUMMARY | Portugal**

Figure 02 **Prefab Housing | SUMMARY | Portugal**

Figure 03 **Coexistence | FOGO | Switzerland**

Modularity in Education

1.4

Beyond understanding modularity as an overall concept, it was crucial to examine how it has been employed as a purveyor of educational design. As such, many of the modular precedents looked into during the research phase were existing or conceptual school projects. These included the 4 Modular Kindergartens by SUMMARY in Lisbon, Portugal (Fig. 04), the Plugin Learning Box by PAO in Shenzhen, China (Fig. 05) and a modular wood system by OMA and Circlewood in Amsterdam, Netherlands (Fig. 06). These projects are all significantly different from one another in terms of the specifics of their systems; each one exhibits a different use of materiality, construction techniques and overall modular logic. The SUMMARY projects utilize large concrete volumes and panels, the PAO project employs a volumetric steel box logic and the OMA project combines hybridized wood elements with mass timber construction. What these precedents have in common (other than a creative use of colour...) however, is that their designs are meaningful within the context of an elementary school. All three projects utilize modular architecture as a way to enhance the experience of attending these institutions. This is a critical concept that leads directly into the objectives of the project.

Figure 04 **4 Kindergartens | SUMMARY | Portugal**

Figure 05 **Plugin Learning Box | PAO | China**

Figure 06 **Modular School | OMA & Circlewood | Netherlands**

Project Objectives

With all of this in consideration, three objectives were established at the end of the research phase to guide the development of the project.

OBJECTIVE 01

Establish system that allows both modular typologies to use the same dimensions and components.

Rather than the kit of parts and volumetric areas using unrelated systems, objective 02 ensures overlap between them by way of consistent components (but assembled in different ways and at different stages during the construction process).

OBJECTIVE 02

Utilize both kit of parts and volumetric strategies effectively and efficiently within the elementary school concept.

Because this project was prescribed to be a hybridized modular building, both kit of parts and volumetric systems needed to be utilized. Objective 01 ensures that these systems are assigned appropriately for different areas of the school.

OBJECTIVE 03

Use modularity to enhance the design of the elementary school.

The use of modular strategies needs to extend beyond just efficiency and needs to be mean something in terms of the actual architectural experience of the school. How can modularity be used to make an elementary school a better designed and more enjoyable place to learn, play, teach and grow?

CHAPTER 02

A Simple System

2.1

A SIMPLE SYSTEM

Explaining the System

The Building Blocks

As discussed in Chapter 01, this project employs a hybridized modular approach, meaning parts of the building utilize a kit of parts system while other parts utilize a volumetric system. While these systems have different requirements and processes, the intent was to establish an overall construction and assembly strategy that can be used for both (objective 01). As a result, a foundational 3m x 3m grid was decided upon, which would ultimately dictate the size of all components (modules and panels for walls, floors and roofs). The kit of parts sections use panels following this grid to create larger building volumes on-site while the volumetric sections use modules following the grid to seamlessly slot in later on in the overall process. By maintaining this consistency with the grid, panels used for the kit of parts sections (either 3m x 3m or 3m x 6m) are also able to be used to construct the volumetric modules. This level of redudancy ensures an efficient hybridization of the two different systems.

While this sets objective 01 in motion, objective 02 dictates that the two systems are used efficiently and effectively within the context of an elementary school. To achieve this, it was decided that larger spaces (either in terms of span or floor to ceiling height) requiring more flexibility would employ the kit of parts system (panels) and smaller, more repetitive spaces would employ the volumetric system (modules). This means that school spaces such as the gymnasium, cafeteria and foyer are constructed using panels and spaces such as classrooms and offices are constructed using modules. This also means that spaces falling in between these two extremes, such as libraries, music rooms, art rooms and even hallways/circulation, could be conceived through either modular system, an idea that is further explored in Chapter 04.

Getting into Detail

It was decided that the entire system, both prefabricated elements as well as typical building components, would utilize timber-based products. The kit of parts system relies on a grid of glulam columns on which the roof panels rest and the wall panels are anchored to. The kinds of prefabricated panels used in this project are prevalent in modular design and are often referred to as SIPs (structurally insulated panels). Roof and floor panels are DLT-based, allowing for convenient, pre-routered grooves for MEP and track systems for foldable partitions. Wall panels are CLT-based, ensuring structural stability while enabling different options for openings. Options for doorways are relatively simple, but options for windows in the project are extensive. Almost all windows measure 2.5m x 0.5m, creating characteristic tall, thin openings that can be implemented into wall panels in different numbers and arrangements. This simple window shape was selected for several reasons, including structural stability by avoiding large horizontal spans, visual equality to ensure teachers and students have the same view, and exterior aesthetics. The plug-in-play nature of the windows catalogue allows for a dynamic, piano key-like facade that echoes the playfulness of the design. Details of this catalogue, panel assemblies and the project's construction processes make up the rest of this chapter.

Finally, extensive research was conducted on buildings that implment mass timber and/or prefabricated timber components. Noteworthy precedents include Brock Commons in Vancouver (Fig. 07), the Emma Hjorth School in Norway (Fig. 08) and 111 East Grand in Des Moines, Iowa (Fig. 09). Mass timber and timber-based panels are often used successfully in modular projects. Additionally, they present many benefits including certain levels of fire resistance, C02 retention and aesthetic qualities.

Figure 07 UBC Brock Commons | Acton Ostry Architects | Canada

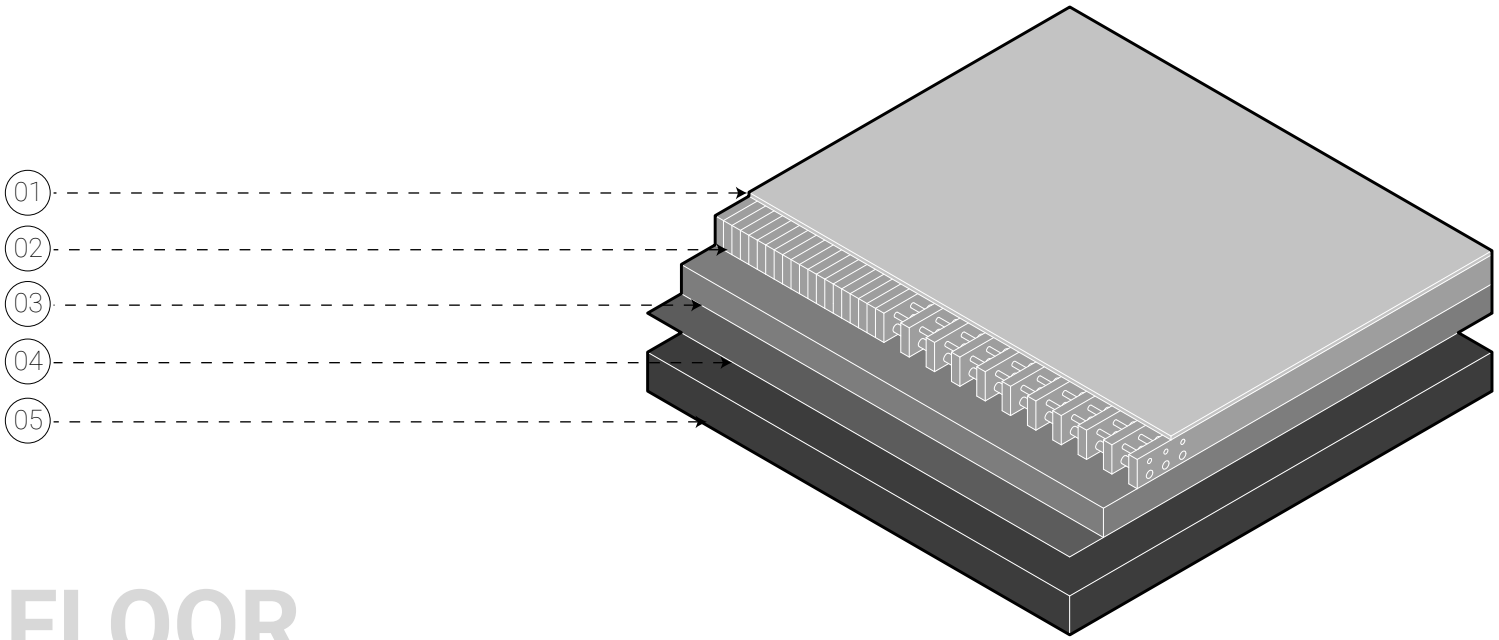
Figure 08 Emma Hjorth School | Acetra | Norway

Figure 09 111 East Grand | Neumann Monson | USA

2.2

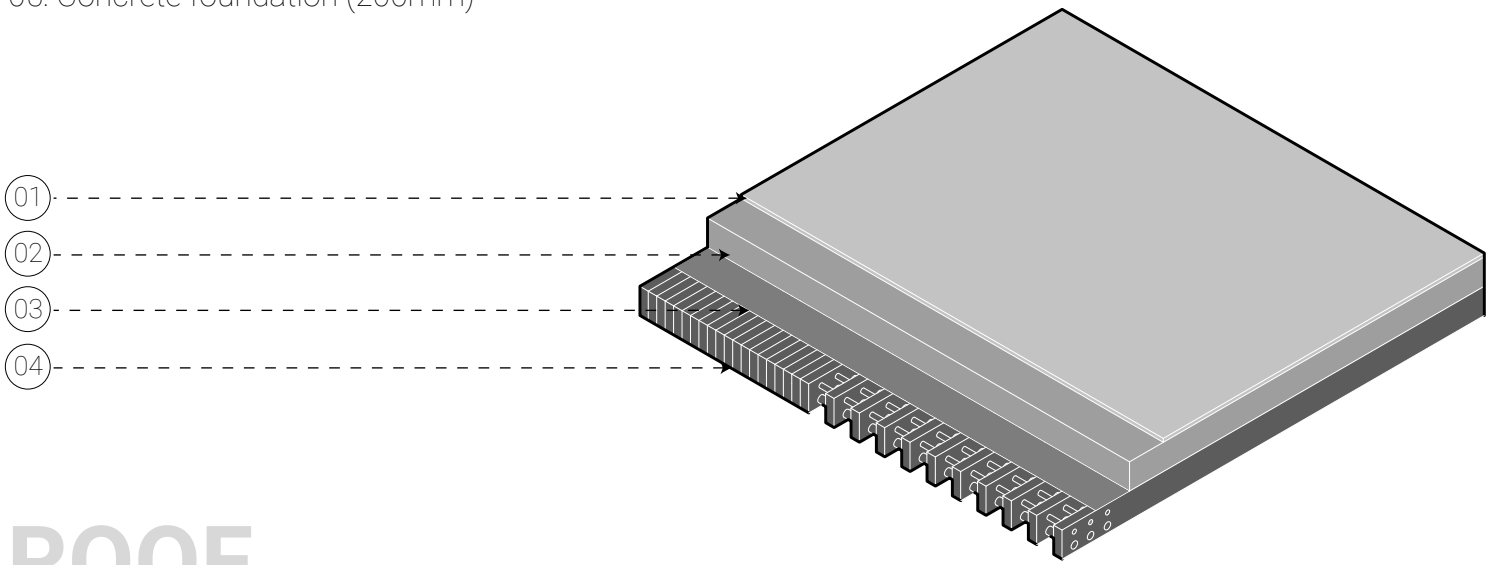
A SIMPLE SYSTEM

Panel Assemblies



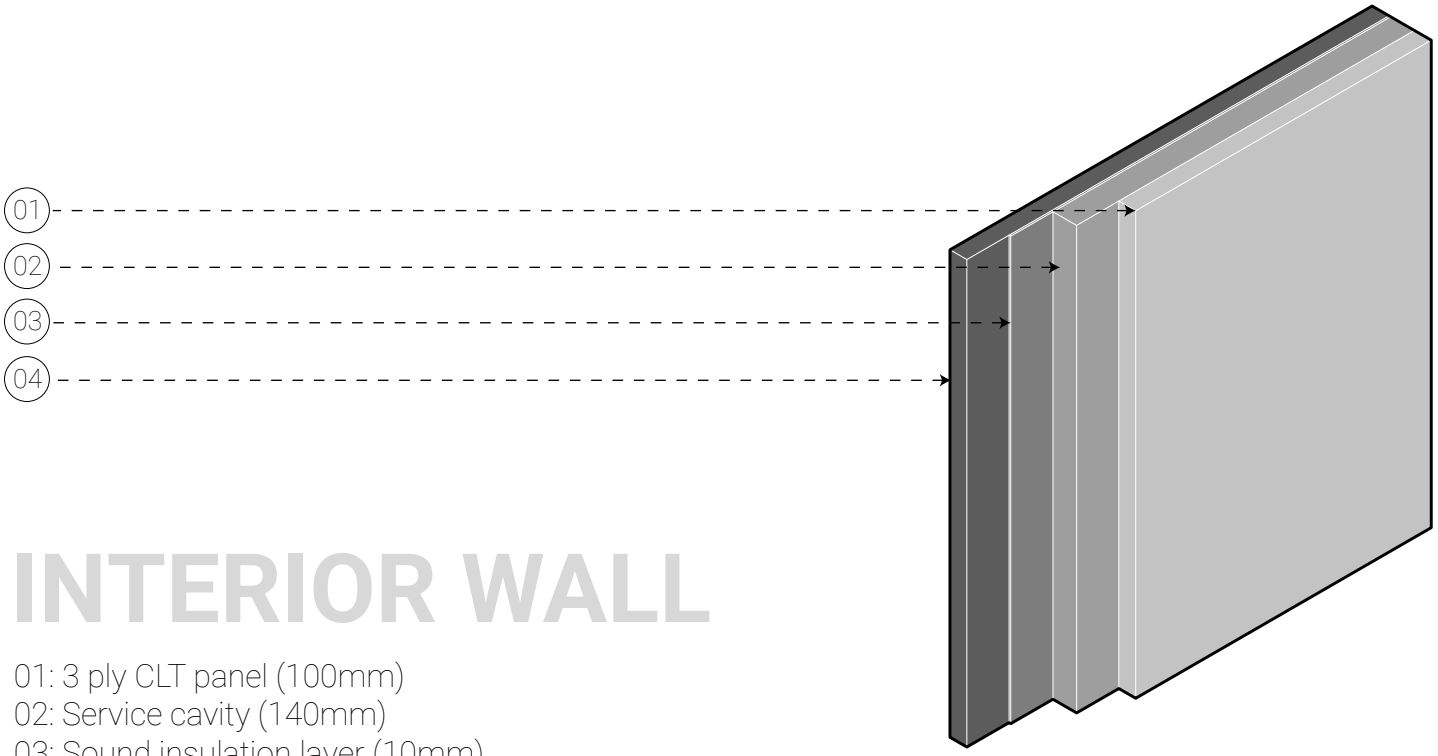
FLOOR

01: Interior vinyl floor finish (20mm)
02: 2x6 inch DLT panel (150mm)
03: Rigid mineral wool insulation (150mm)
04: Air/Vapour barrier (thickness N.A.)
05: Concrete foundation (200mm)



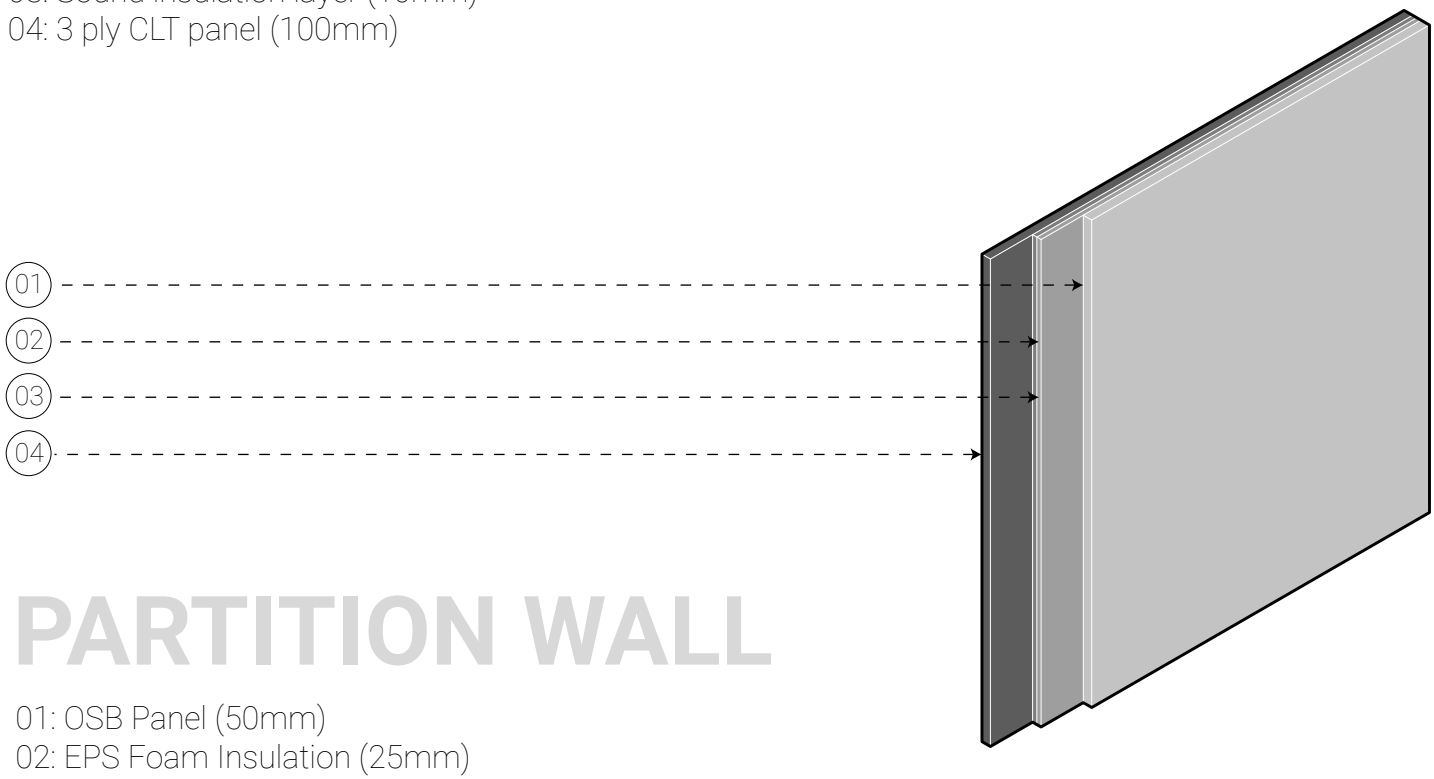
ROOF

01: Roof membrane (20mm)
02: Rigid mineral wool insulation (150mm)
03: Air/Vapour barrier (thickness N.A.)
04: 2x6 inch DLT panel (150mm)



INTERIOR WALL

01: 3 ply CLT panel (100mm)
02: Service cavity (140mm)
03: Sound insulation layer (10mm)
04: 3 ply CLT panel (100mm)



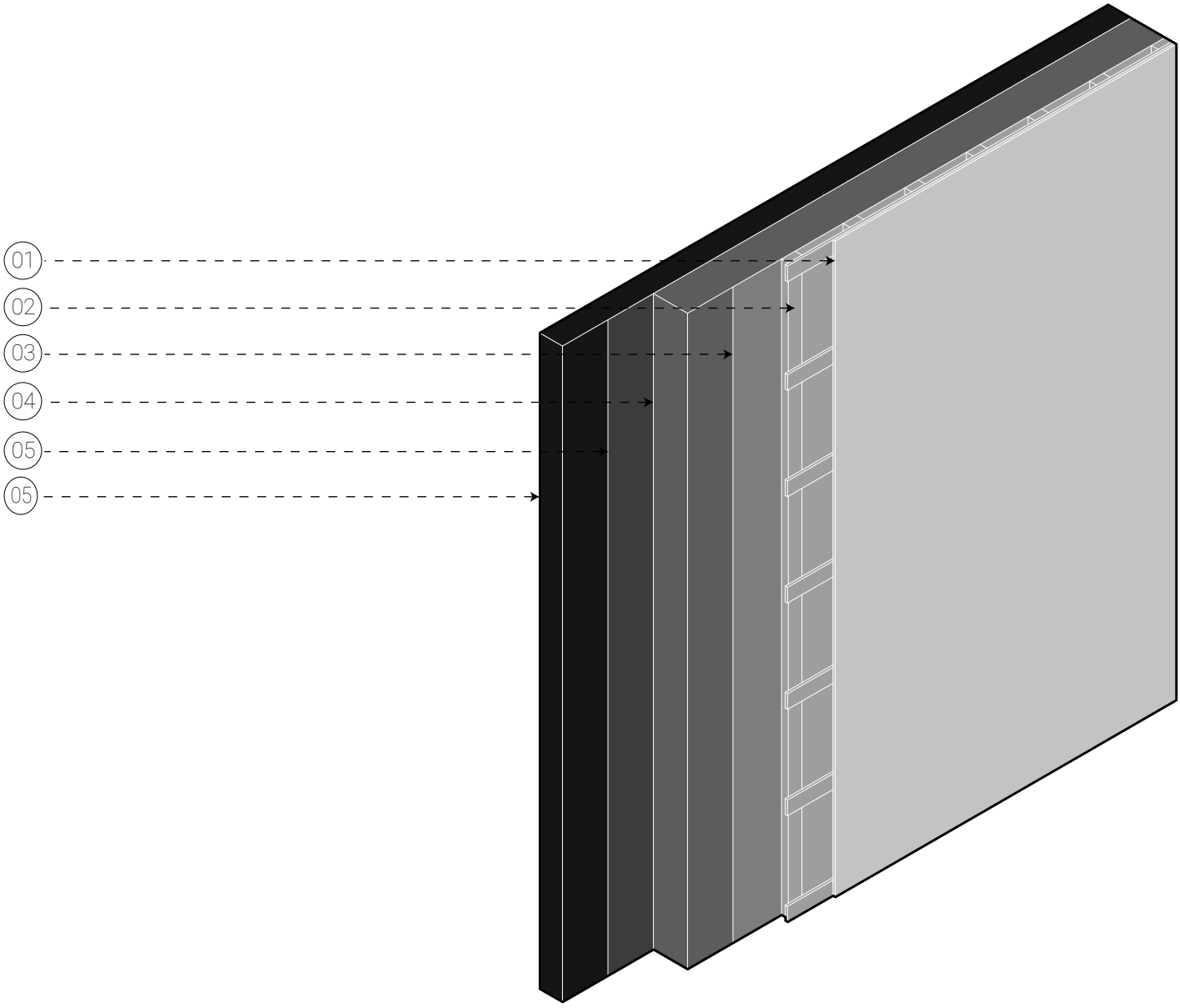
PARTITION WALL

01: OSB Panel (50mm)
02: EPS Foam Insulation (25mm)
03: EPS Foam Insulation (25mm)
04: OSB Panel (50mm)

2.2

A SIMPLE SYSTEM

Panel Assemblies

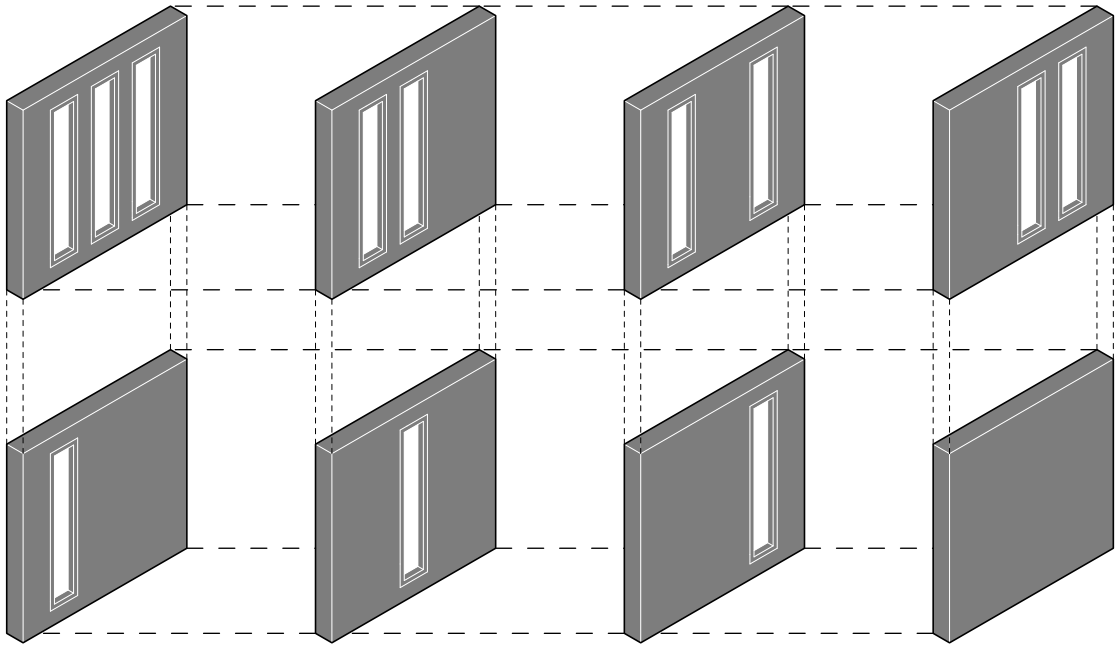


EXTERIOR WALL

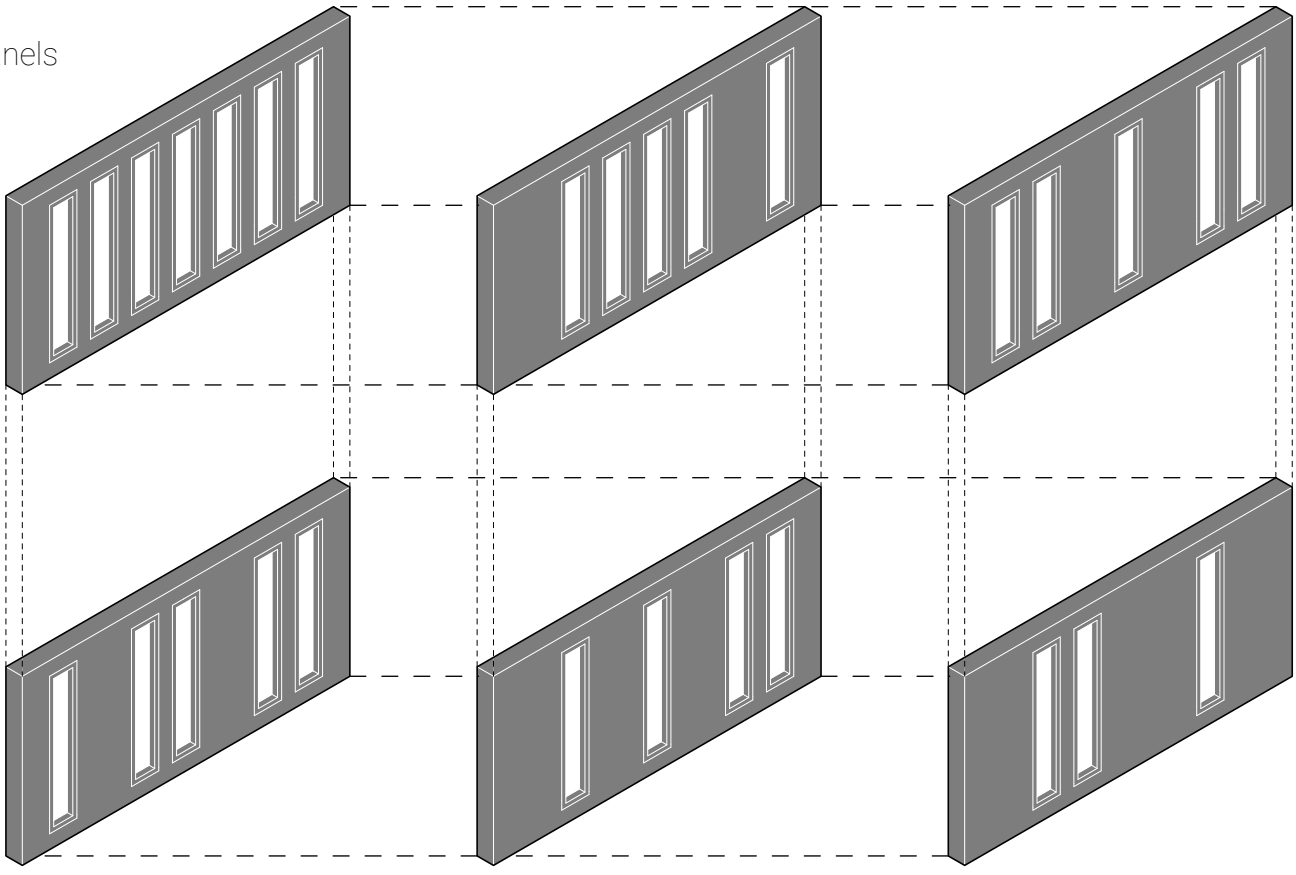
01: Aluminium composite panel (10mm)
02: Ventilation layer + fastener system (40mm)
03: WRB layer (thickness N.A.)
04: Rigid mineral wool insulation (150mm)
05: Air/Vapour barrier (thickness N.A.)
06: 3 ply CLT panel (100mm)

Windows Catalogue

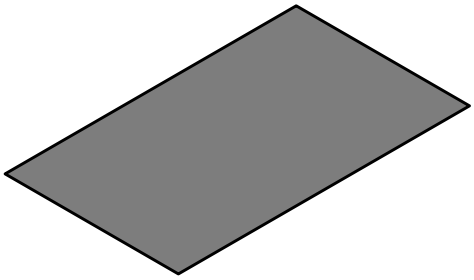
Options for
3m x 3m
exterior panels



Options for
3m x 6m
exterior panels

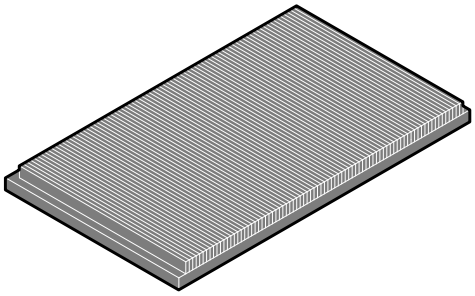


Volumetric Construction Process



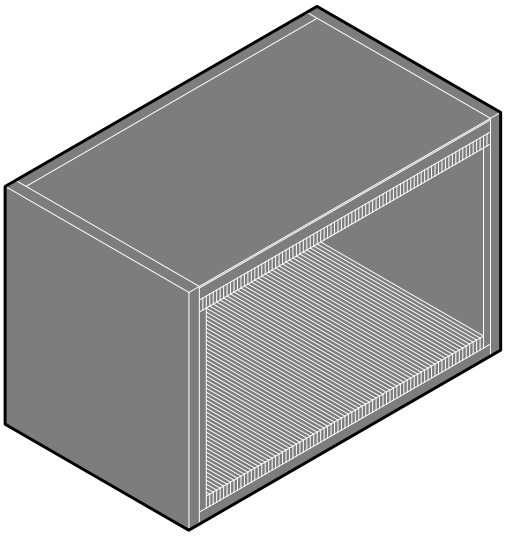
01

Establish module foot-print (3m x 6m)



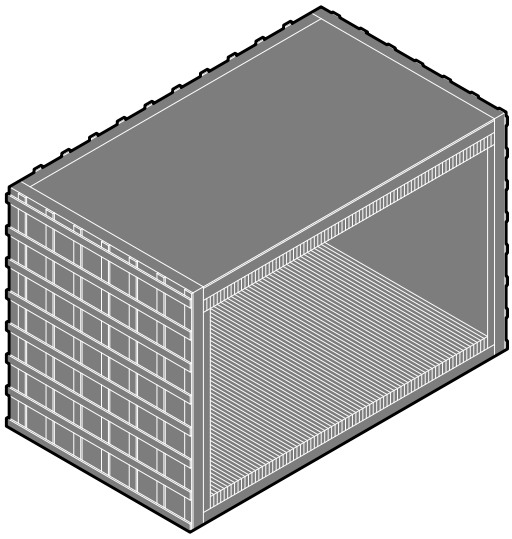
02

Assemble DLT floor panel



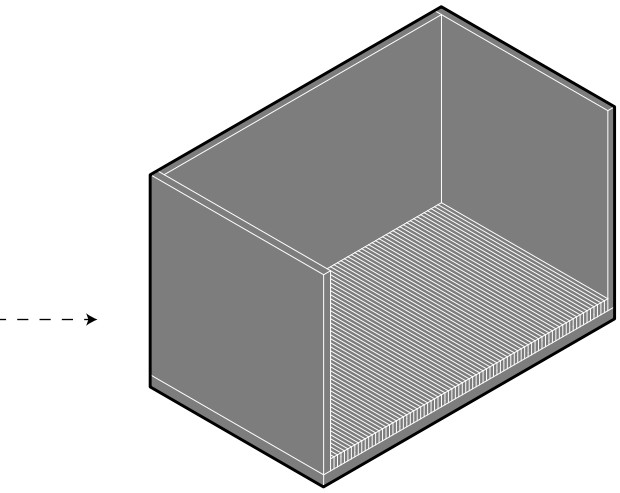
05

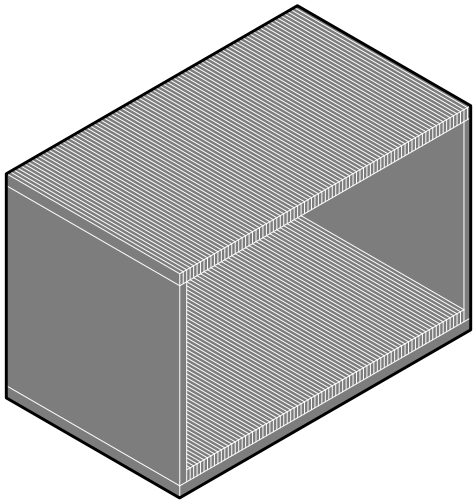
Attach wall insulation and upper layers of built-up roof



06

Attach fastener system to wall panels



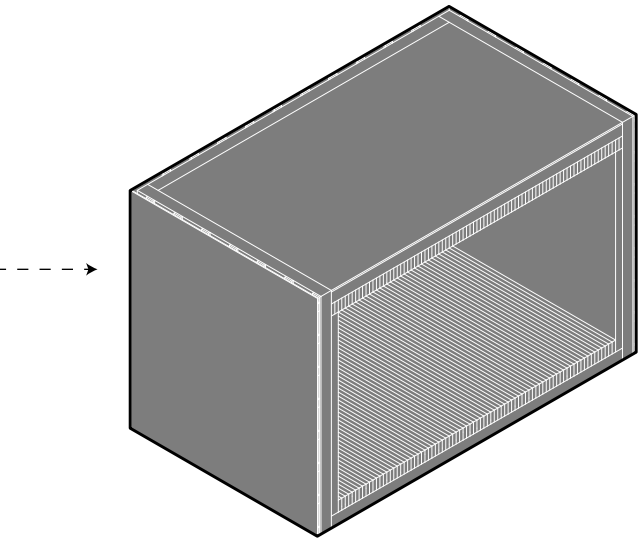


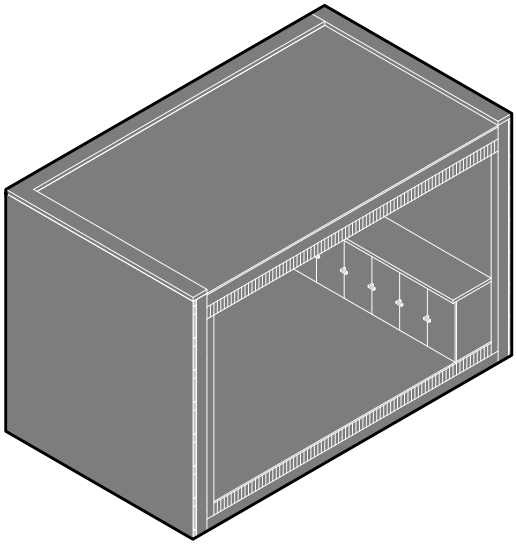
03

Assemble CLT wall panels

04

Assemble DLT roof panel





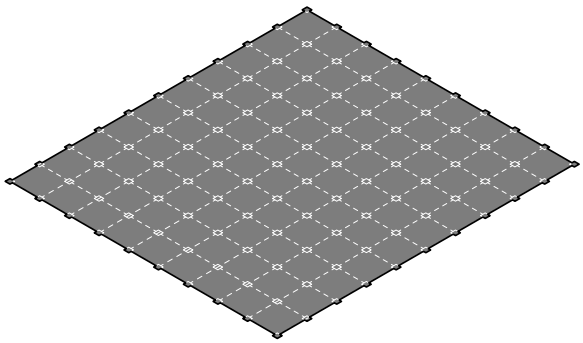
07

Attach aluminium composite panels to finsh walls

08

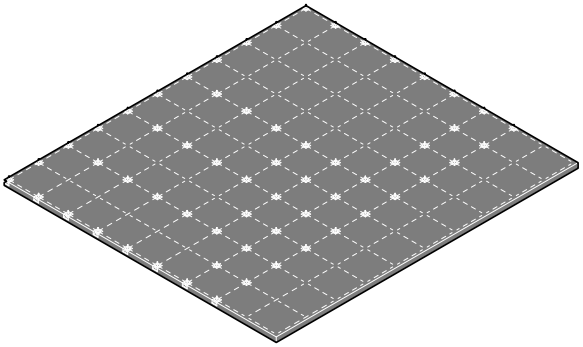
Install interior finishes and millwork and ship to site...

Kit of Parts Construction Process



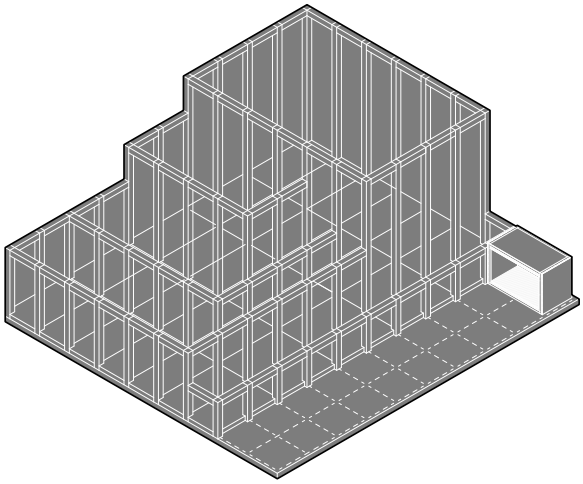
01

Establish 3m x 3m grid
for columns



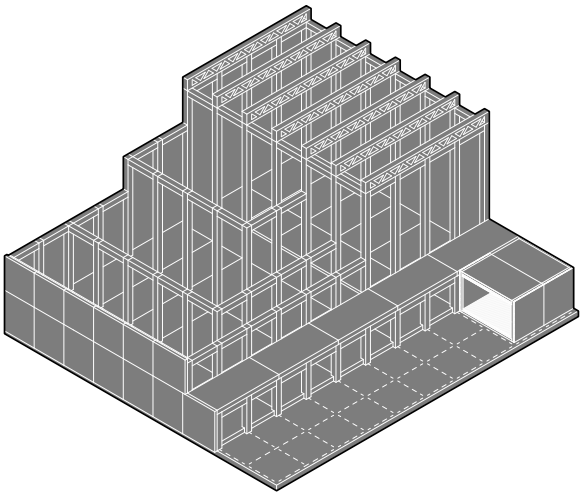
02

Determine where columns go, install
bases and pour foundation



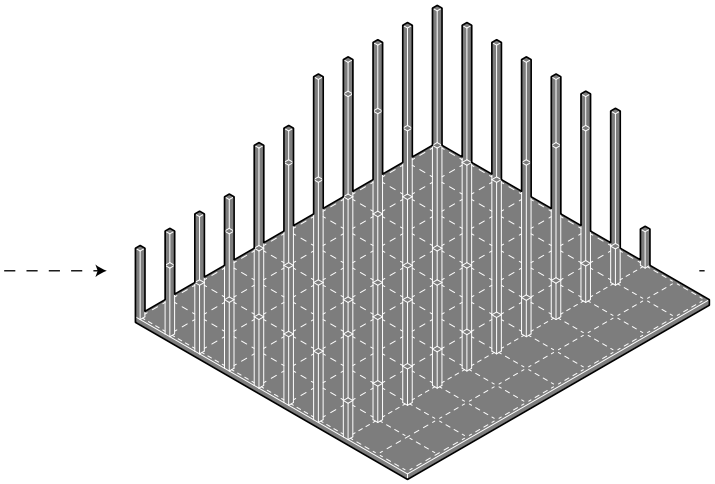
05

Begin placing modules and wall,
roof and floor panels



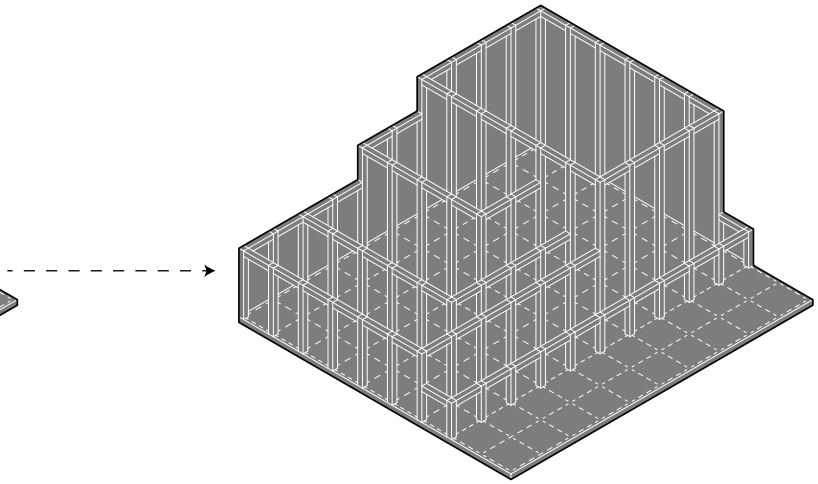
06

Assemble timber trusses for gymnasium.
Continue placing modules and various panels.



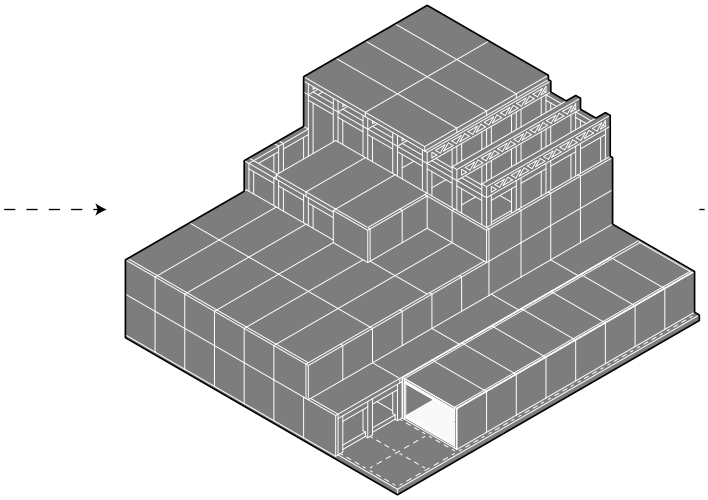
03

Install glulam columns of varying heights



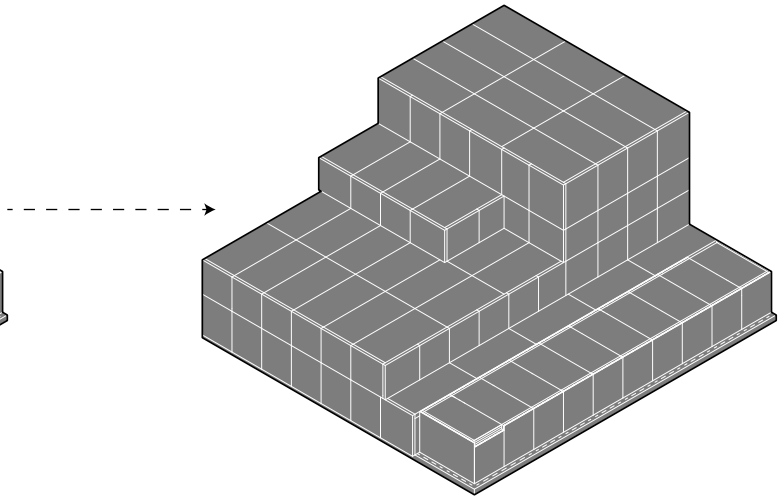
04

Finish framing of different spaces with glulam beams



07

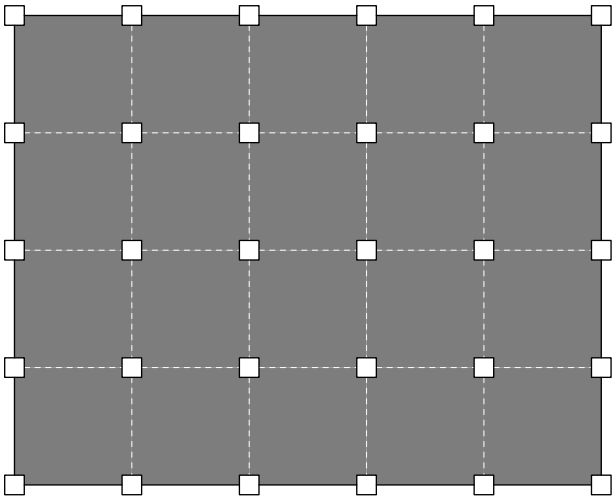
Continue placing modules and wall, roof and floor panels



08

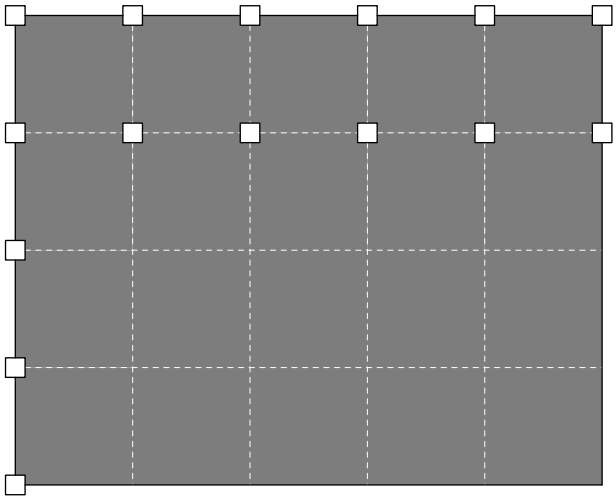
Finish placing modules and wall, roof and floor panels. Project complete.

Volumetric to Kit of Parts Integration



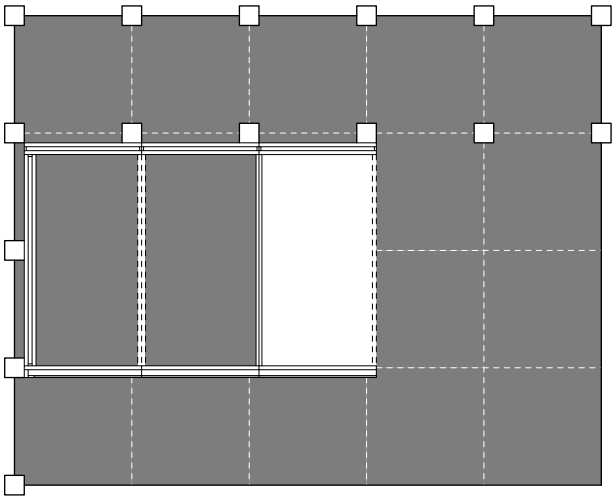
01

Establish 3m x 3m grid for columns



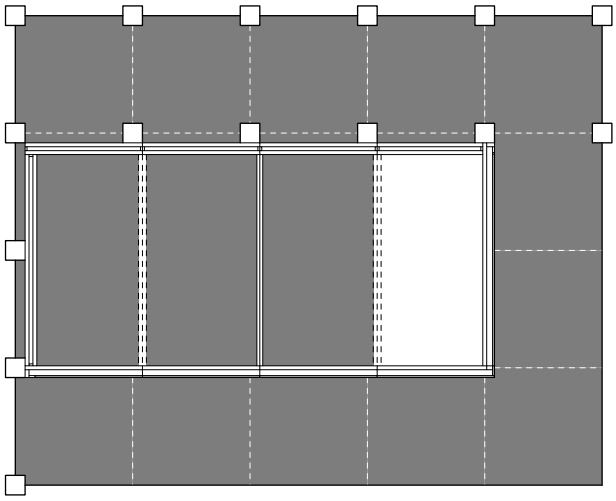
02

Determine where columns go, install bases and pour foundation



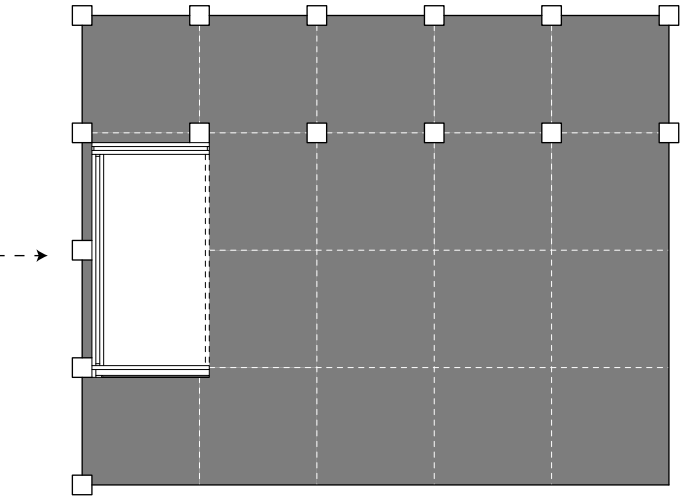
05

Input third 3m x 6m module (one shown features slidable partition and rigid partition wall)



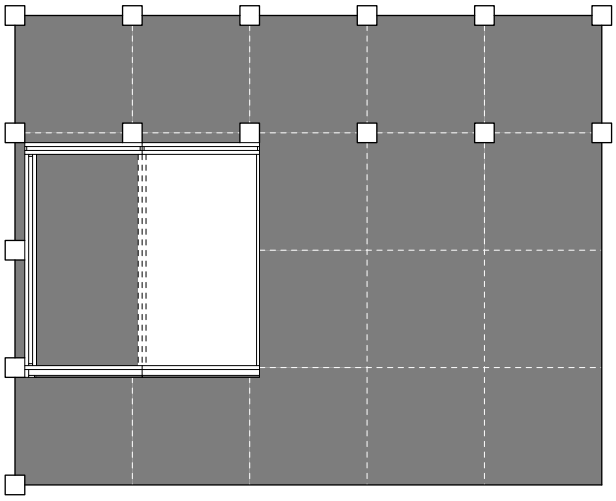
06

Input fourth 3m x 6m module (one shown features slidable partition and exterior wall)



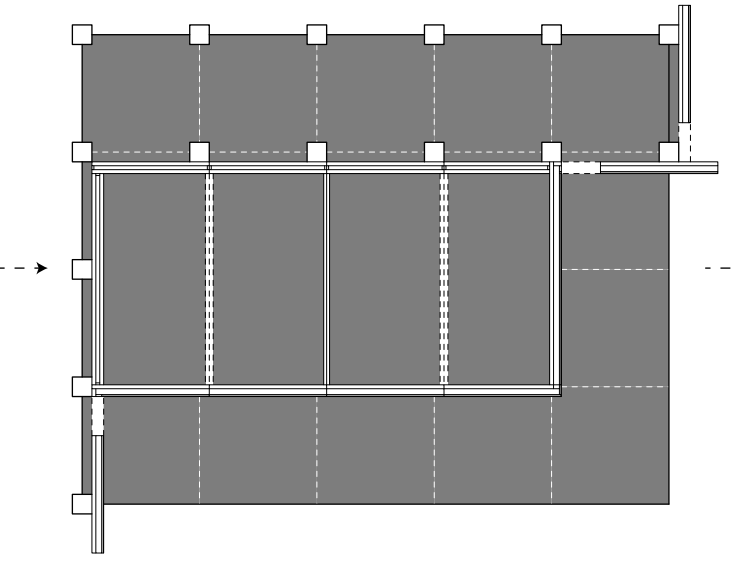
03

Input first 3m x 6m module (one shown features slidable partition)



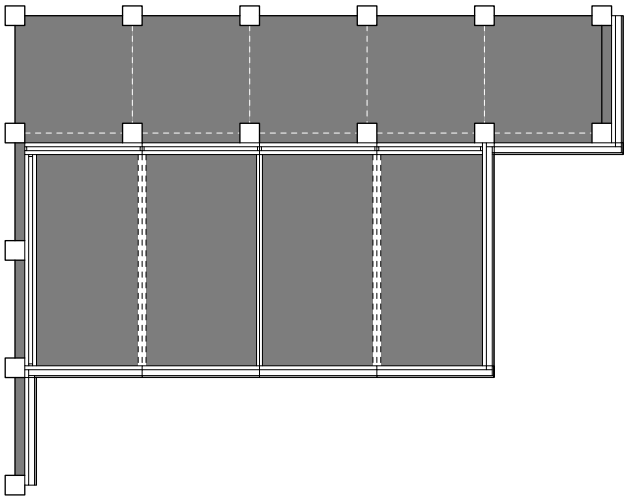
04

Input second 3m x 6m module (one shown features slidable partition and rigid partition wall)



07

Finish connections and input envelope panels for kit of parts sections



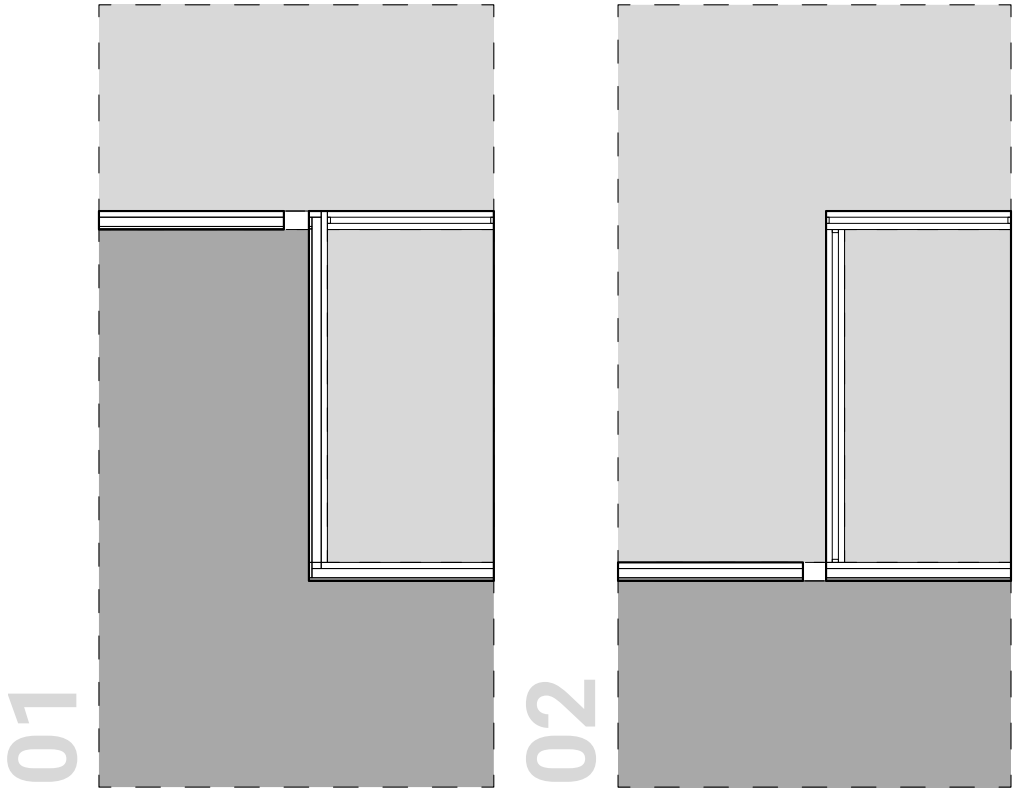
08

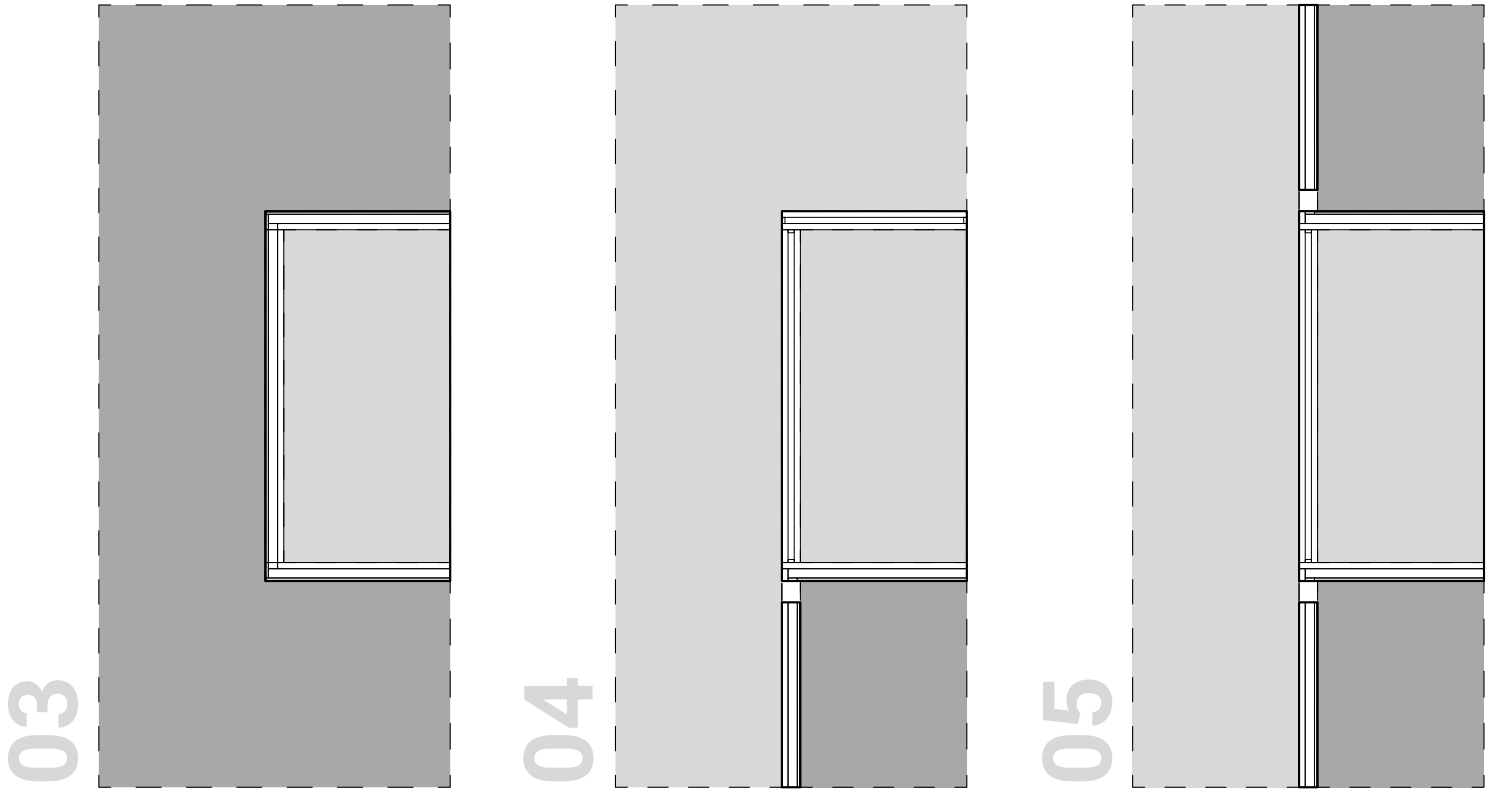
Project complete.

Connections Catalogue

These construction processes are facilitated by the flexibility in the panels. The system enables volumetric modules to connect to individual panels used for the larger kit of parts sections in a number of ways, as visualized here. This allows for different kinds of corner and edge conditions, producing different relationships between exterior and interior and an overall more compelling massing. It also enables more precise adjacencies and spatial arrangements to optimize the school experience, which leads directly into Chapter 03.

Interior Exterior





CHAPTER 03

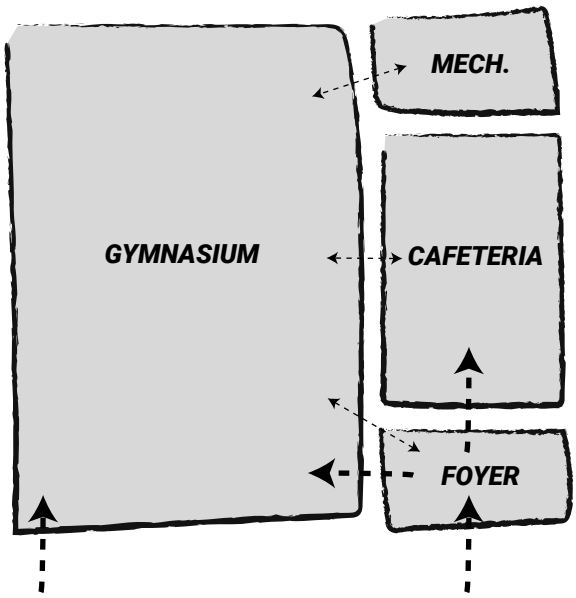
School Principles

3.1 SCHOOL PRINCIPLES
Design Aims

While the previous chapter delved into how the project achieves Objectives 01 and 02, this chapter is concerned with how the project achieves Objective 03, which considers the meaningful and intentional use of modularity as a means to improve the design of the school. Typical issues in elementary school design were identified as poor, monotonous circulation in the form of long, boring hallways, subpar adjacencies in terms of the spatial arrangement of different programs and a lack of engaging or playful elements. To address these concerns, the concept of different blocks of classrooms or "neighbourhoods" strategically arranged around a central hub of other programs was introduced. Furthermore, these blocks would be connected to each other and the hub by an internal courtyard/atrium space winding its way throughout the project to provide a unique and playful approach to circulation. The steps for building out this concept in terms of program placement and adjacencies are described in the subsequent diagrams.

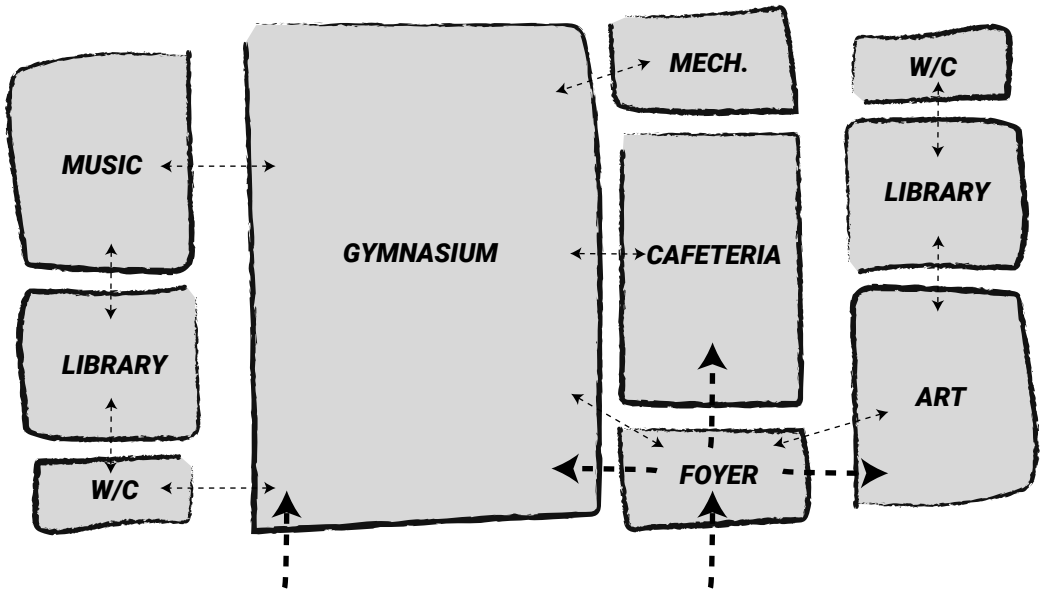
01

The first step involved determining which programs would fit within the main core of the central hub, which would remain the same and at the centre of each design iteration. It was decided that the school's primary entrance should lead to a foyer, connected closely to the gymnasium, cafeteria and main mechanical room.



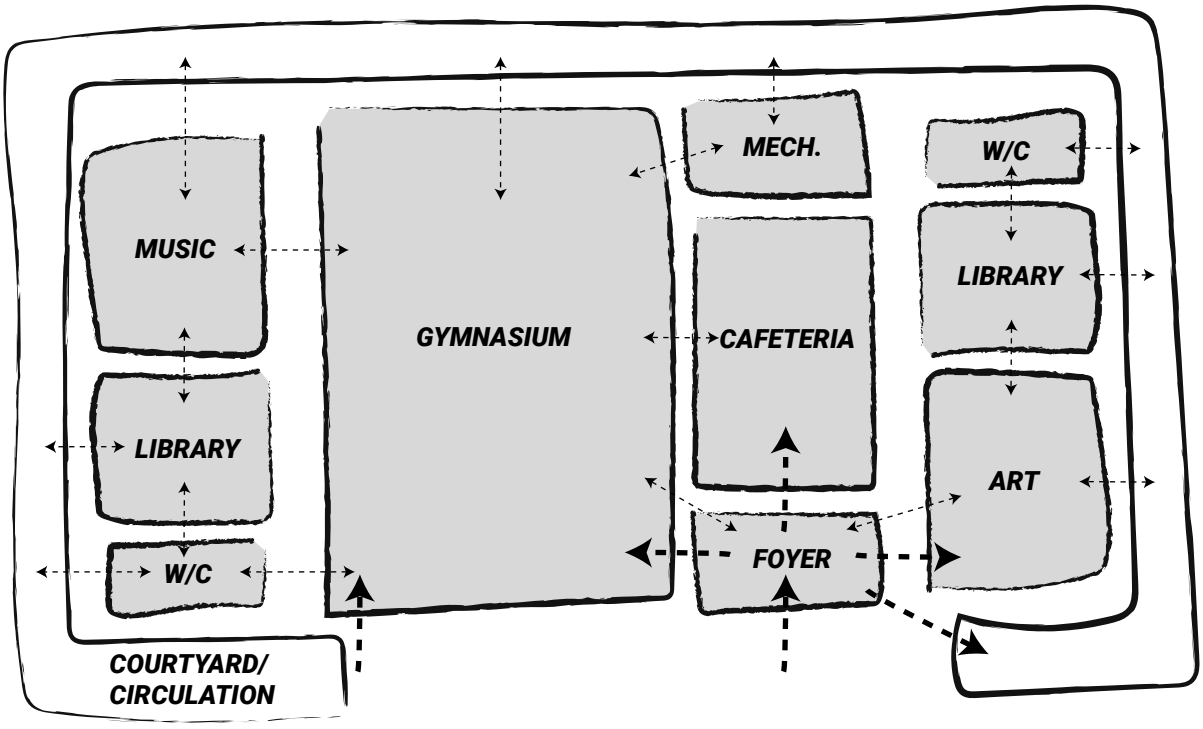
02

The next step involved locating programs that could be more flexible in their placements, but still mostly in the central hub. These included libraries, music rooms, art rooms and washrooms.



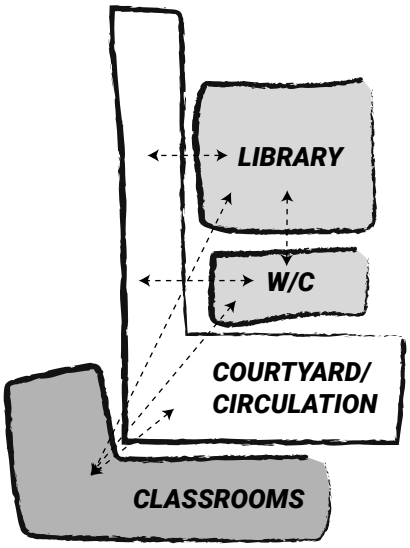
03

The third step was essentially just understanding that all programs in this central hub would be encased by a snaking atrium space for circulation. This massive volume bridges the gape between central hub and peripheral classroom blocks/neighbourhoods, and is effectively the one and only ""hallway" in the project.



04

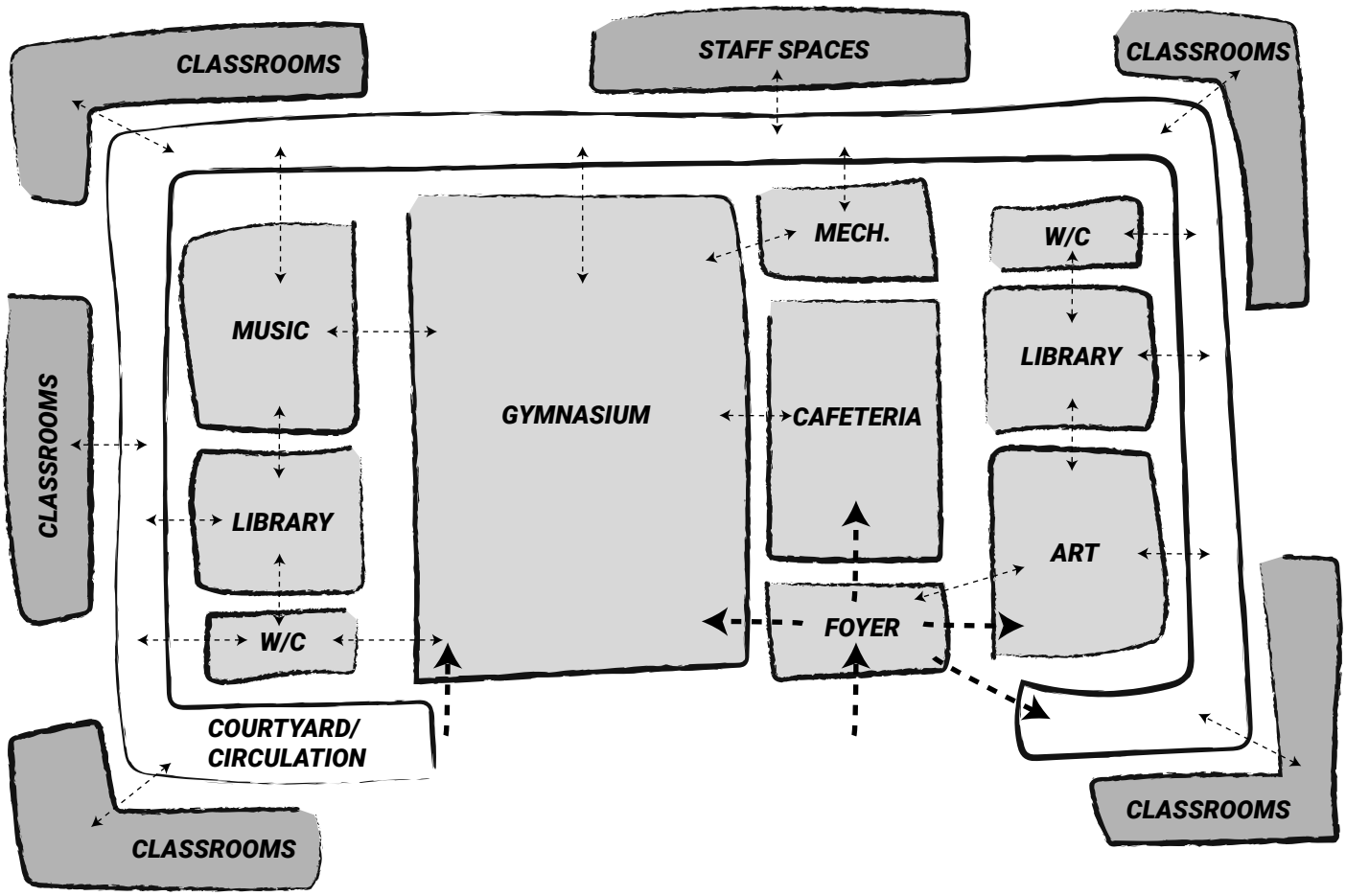
Step 04 represents a bit of a departure from this sequence, and is instead concerned with the spatial adjacencies of the classrooms blocks or neighbourhoods themselves. Each block contains 3-5 classrooms (depending on their configurations) and is close to a library space, washrooms and an entrance to the courtyard. This requirement dictated the positioning of both classroom blocks around the hub as well as the central programs to combat adjacency issues seen in most schools.



Design Aims

05

The fifth and "final" step involved the actual arrangement and positioning of all classroom and staff space blocks around the central hub and courtyard/circulation volume. With this step, not only is a basic programmatic blueprint for the school complete, but common issues such as poor circulation and subpar adjacencies are effectively addressed. One major aspect of the design to bring in elements of playfulness was missing, but before discussing what this resulted in, it is critical to first ask the question: where and how does this relate to the modular systems outlined in Chapter 02?



Making it Modular

3.2

With Objective 02 in mind, both modular systems were assigned to different areas of the project based on their spatial characteristics. The central hub is defined by the kit of parts system. This is due to the variety in size and span of the programs in this zone, including the gymnasium, cafeteria, music room, art room, libraries and courtyard space. Surrounding this kit of parts hub are the blocks for classrooms and staff spaces, which are defined by the volumetric system. These spaces are characterized by repetition and standardization, and as such lend themselves well to highly repetitive, prefabricated modules shipped to and placed on-site. This is illustrated in the previous program diagrams; white represents circulation space, light grey represents kit of parts spaces and dark grey represents volumetric spaces.

Making it modular does not just refer to the general design of the school itself, but also to the classrooms specifically at a very intricate level. As discussed in Chapter 01, the elementary school typology was chosen to see how modularity could enhance flexibility and adaptability, effectively responding to differences in class sizes and learning and teaching methods. As such, volumetric modules can be stacked horizontally in different numbers to allow for different classroom sizes. Furthermore, this is paired with intentional design elements *inside* the classrooms. Extensive research was carried out to examine optimal tenants of classroom design. The two main features discussed to promote flexiblity in spaces for both students and teachers that are implemented in this project are foldable partitions and modular furniture. Foldable partitions allow for the easy, temporary segmentation of spaces, while modular furntiture (in the case of this project, mainly desks that can be configured in several ways), offer students different types of seating arrangements. Examples of both of these can be seen in Fig. 10. All of these features, and the many configurations that can result from them, are displayed in the next diagram.

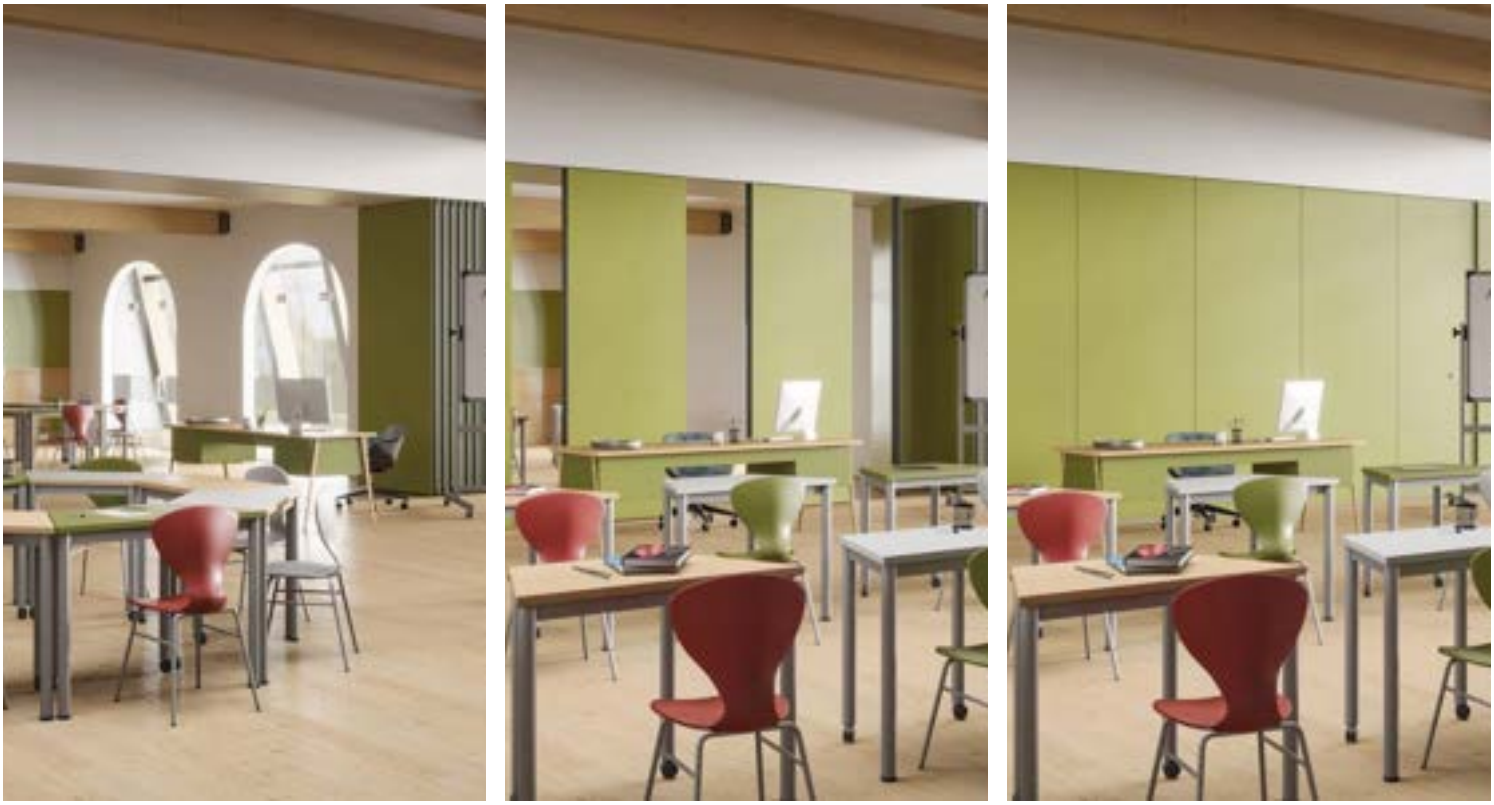
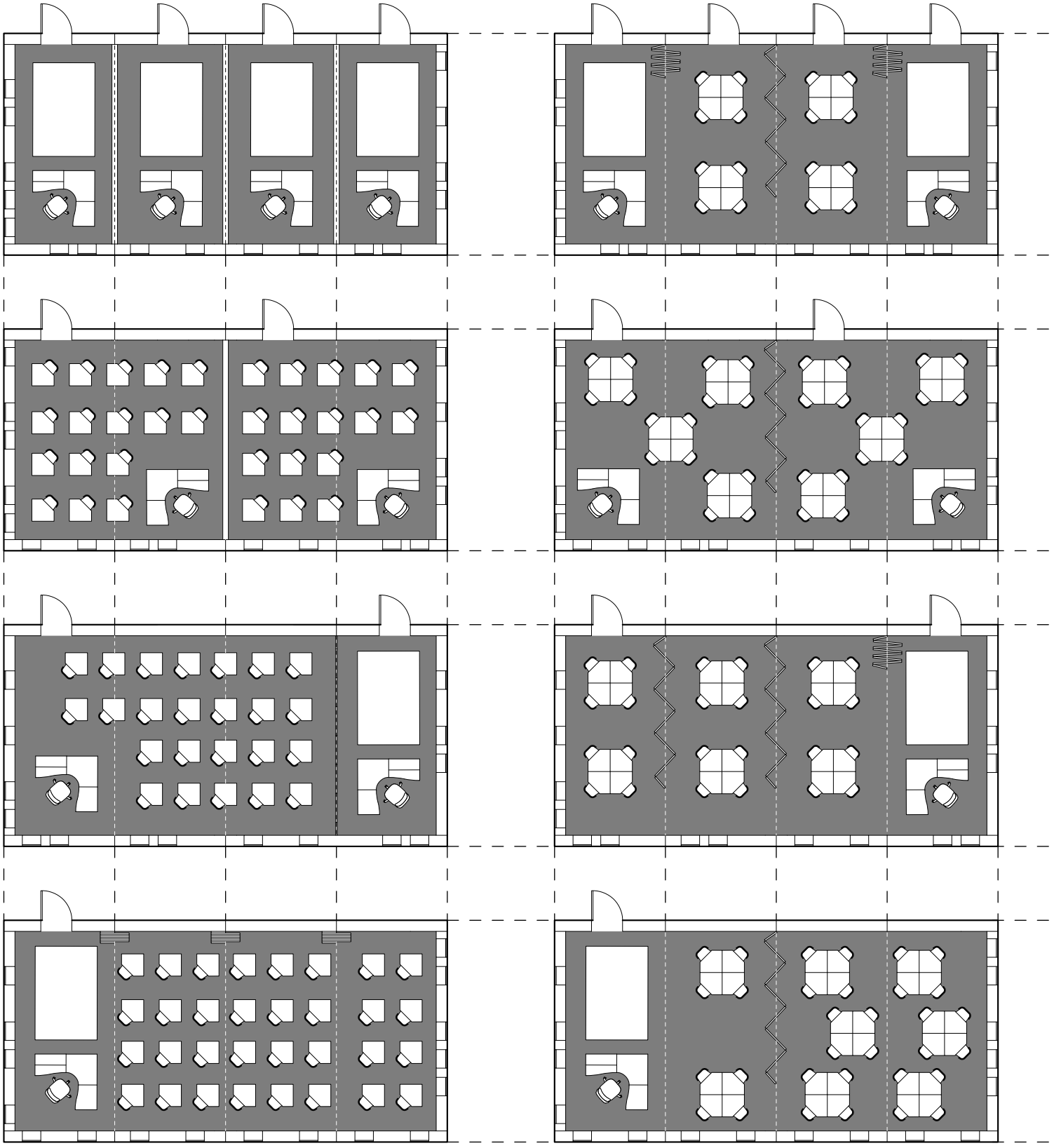
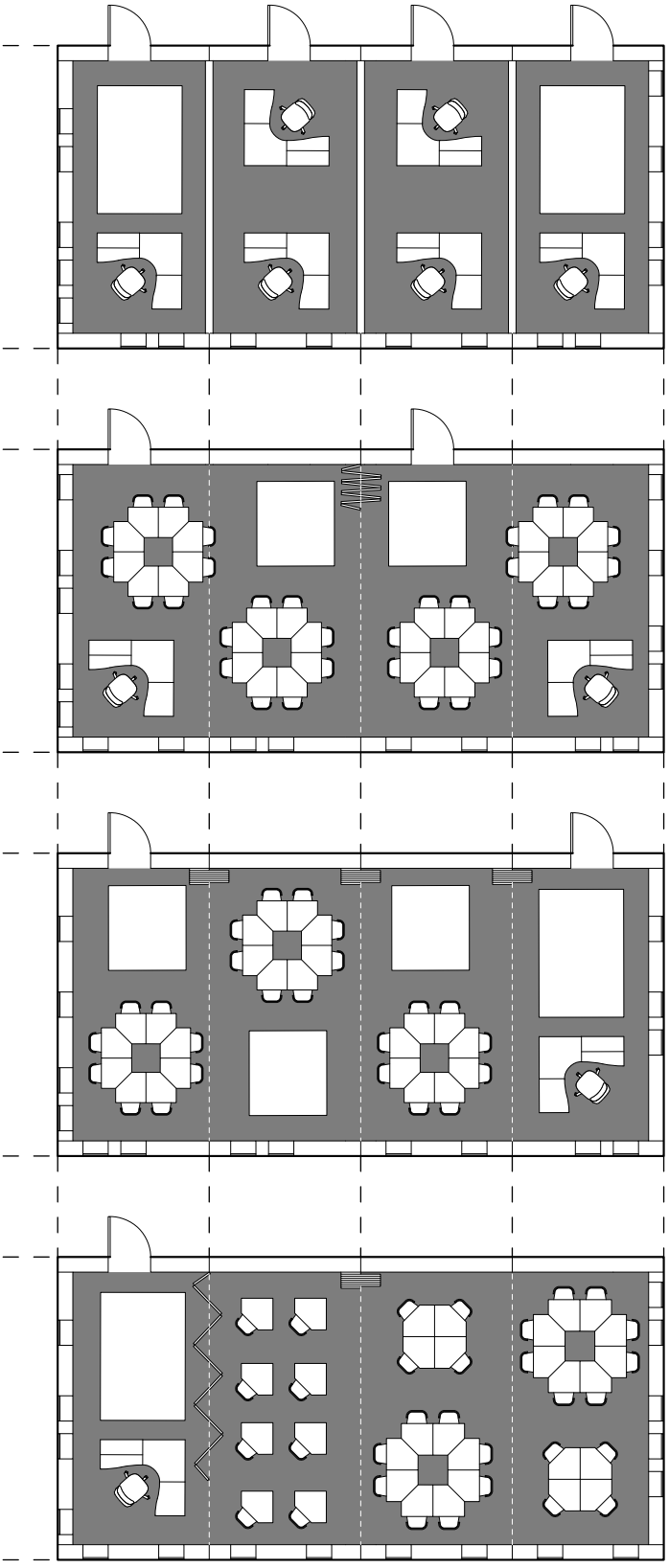


Figure 10 Use of Partitions in Schools | Esteller | Italy

Classroom Configurations





OPTION 01

Four 3m x 6m modules
Four offices for staff separated by partition walls

OPTION 02

Four 3m x 6m modules
Two small classrooms suitable for 16 students each, separated by partition walls or foldable partitions

OPTION 03

Four 3m x 6m modules
One mediurm classrooms suitable for 24 students + one connected office for teacher, separated by foldable partitions

OPTION 04

Four 3m x 6m modules
One large classroom suitable for 32 students, with foldable partitions

The Element of Colour

With all of this covered, the final (and most important) design aspect can be discussed: the element of *colour*.

The driving force behind the framing of these "neighbourhoods" became colour. Colour was chosen from a technical standpoint, as it would be very easy to integrate a plethora of colours into the prefabricated panels/modules, but also from a programmatic standpoint, as colour (and lots of it) would work well as an enhancing factor in an elementary school. The concept became each neighbourhood corresponding to a certain colour, thus creating a gradient that wraps around the entire building. Several precedents (most of which are educational) that employ a vibrant use of colour were examined, including the Sandy Hook School addition by Svigals + Partners in Newtown, Connecticut (Fig. 11), Nanyang Primary School by Studio 505 in Singapore (Fig. 12), the Sports and Leisure Centre by KOZ Architectes in Saint-Cloud, Minnesota (Fig. 13), Kaleidescope Kindergarten by SAKO Architects in Tianshui City, China (Fig. 14), the French International School of Hong Kong by Henning Larsen Architects (Fig. 15) and 4 Modular Kindergartens by SUMMARY in Lisbon, Portugal (Fig. 16). Many concepts from these precedents were integrated into the design iterations explored in Chapter 04.

Figure 11 Sandy Hook School | Svigals + Partners | USA

Figure 12 Nanyang Primary School | Studio505 | Singapore

Figure 13 Sports and Leisure Centre | KOZ Architectes | USA

Figure 14 Kaleidoscope Kinergardten | SATO | China

Figure 15 French School | Henning Larsen | Hong Kong

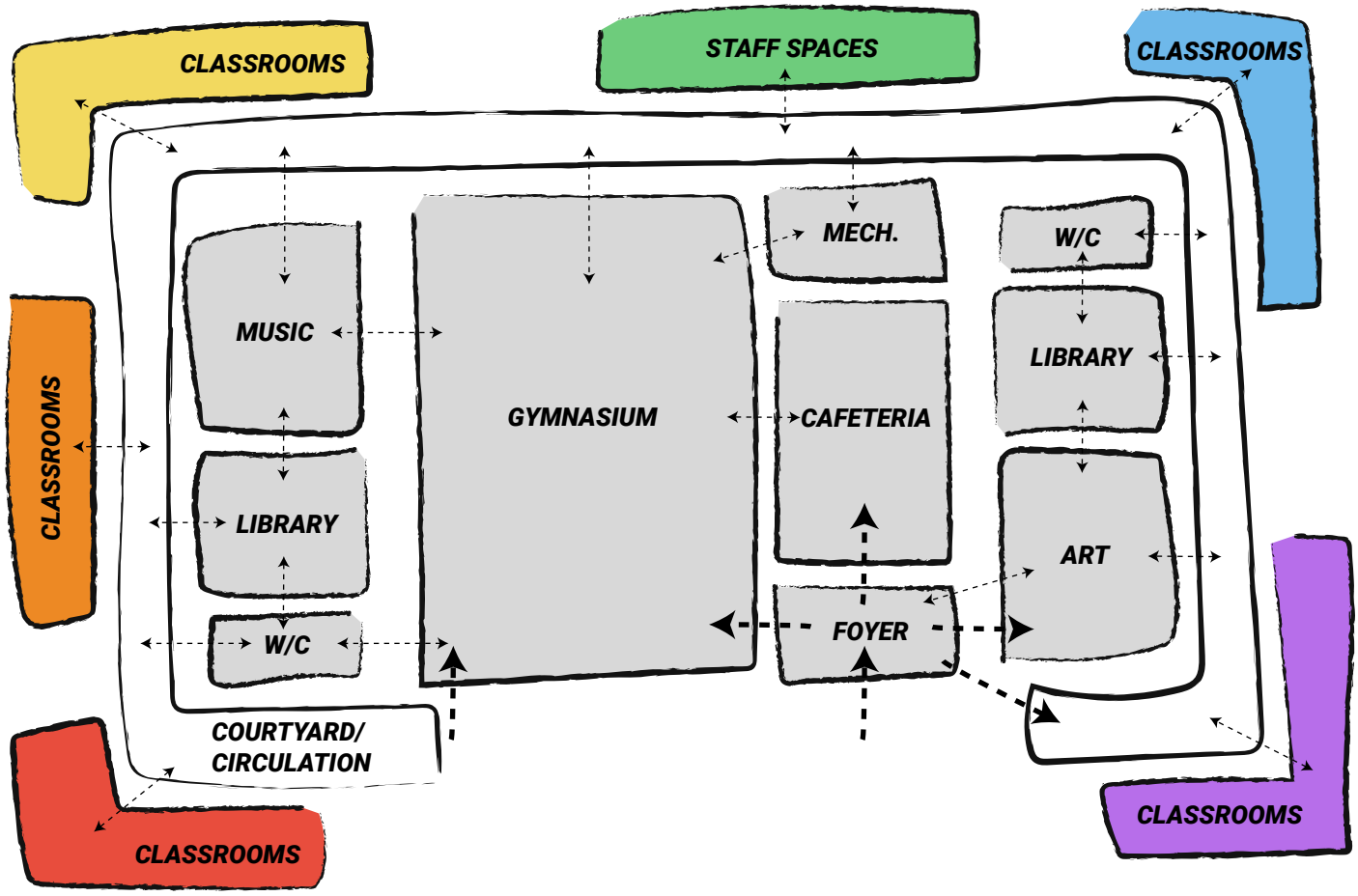
Figure 16 4 Kindergartens | SUMMARY | Portugal

Putting it All Together

As discussed previously and represented in the modified program diagram below, the concept was for colour to be added specifically to each peripheral block. In addition to the volumetric modules, the theme of colour is also used in various elements throughout the schools, from furniture in classrooms to, most notably, the skylights featured in the courtyard/atrium space. This space was conceptualized as a kaleidescope of colours, with tinted skylights casting vibrant light for aesthetic and wayfinding purposes.

With the details of the modular system established and the guiding principles behind the design of an elementary school determined, design iterations could start to be developed. It was decided that three iterations would be created, with the intention of exploring a variety of options in terms of scale, budget, number of students held and, the ratio of kit of parts and volumetric sections and the types of programs assigned to each one respectively.

Each of these three iterations, as well as some signature spaces found in each, are explored in more detail in Chapter 04.



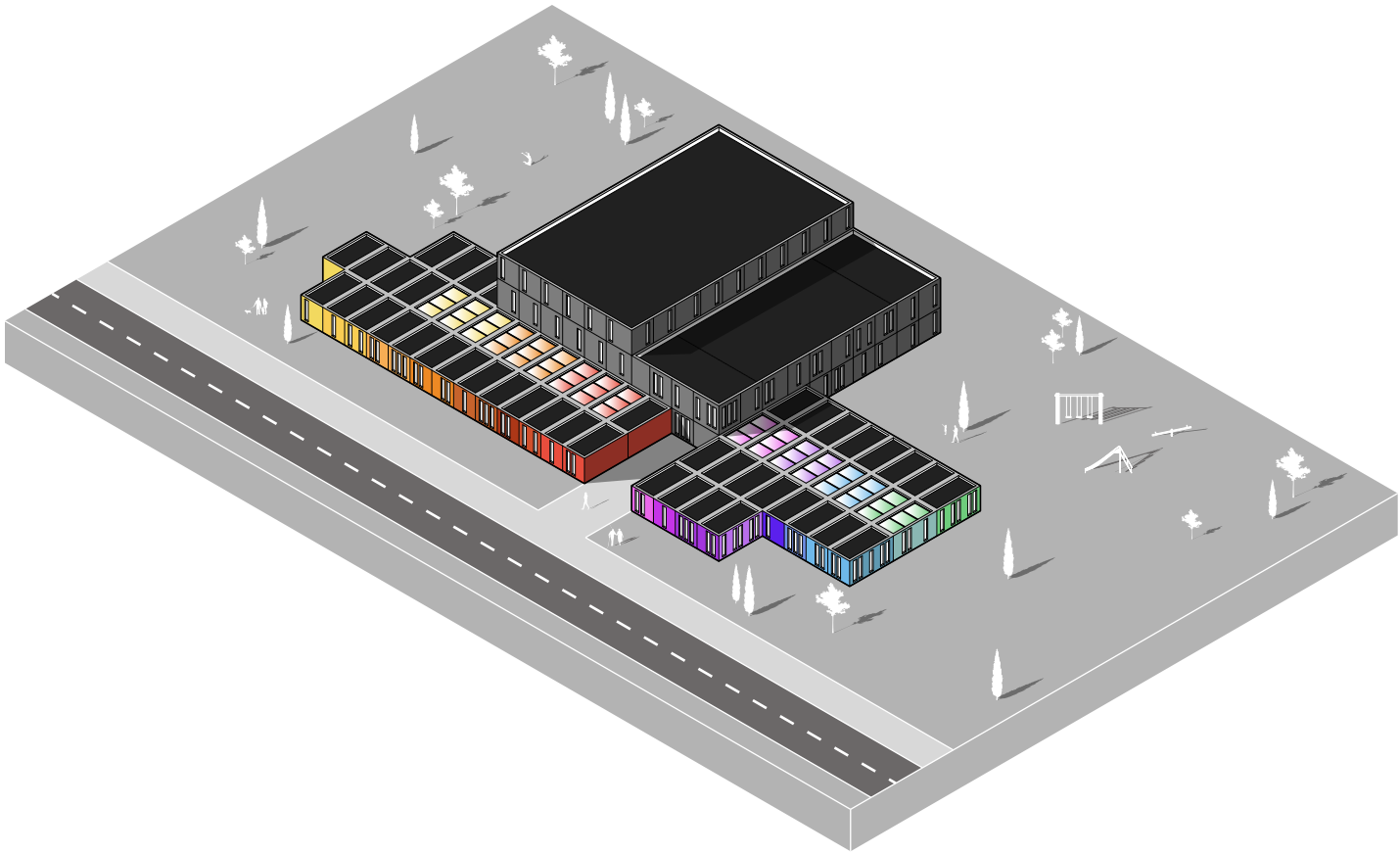
CHAPTER 04

Design Iterations

4.1

DESIGN ITERATIONS

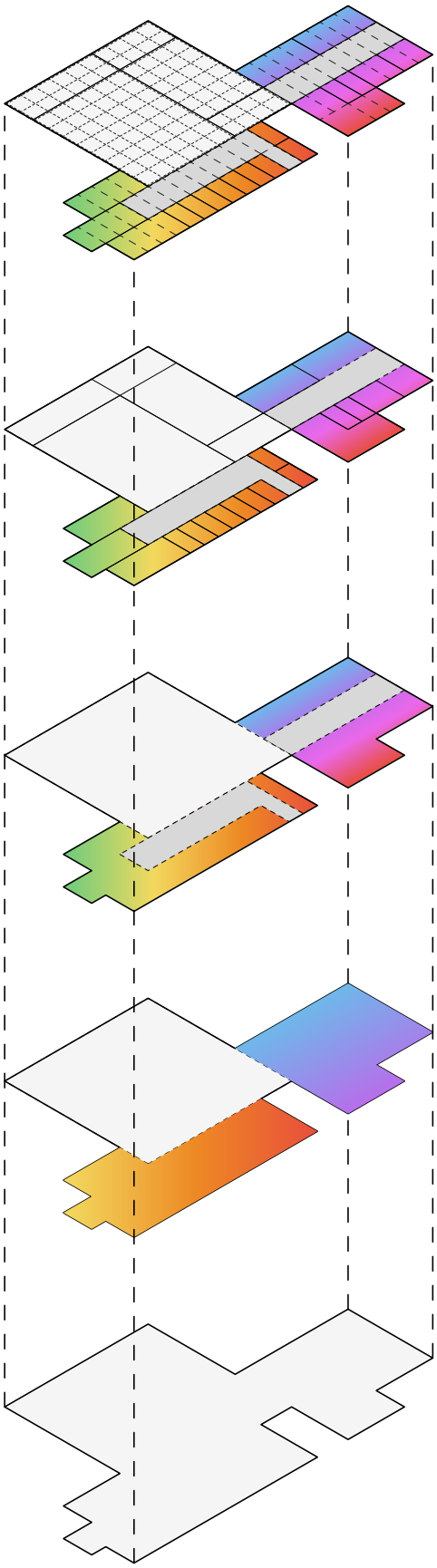
First Iteration



OPTION 01

Small-scale design, “low” budget
Total area: 1990 m2
Total number of modules: 59
Number of classroom modules: 24
Students capacity: 192

Approximate distribution of modularity type: 65% volumetric, 35% kit of parts
Volumetric spaces include classrooms, staff spaces/offices, washrooms, the library, multipurpose room (for art or music) and courtyard/circulation spaces. Kit of parts spaces include the gymnasium, mechanical room, cafeteria and foyer.



05

- School spaces
- Courtyard
- Volumetric blocks
- 3m x 3m grid
- 3m x 6m modules

04

- School spaces
- Courtyard
- Volumetric blocks

03

- School spaces
- Courtyard
- Volumetric blocks

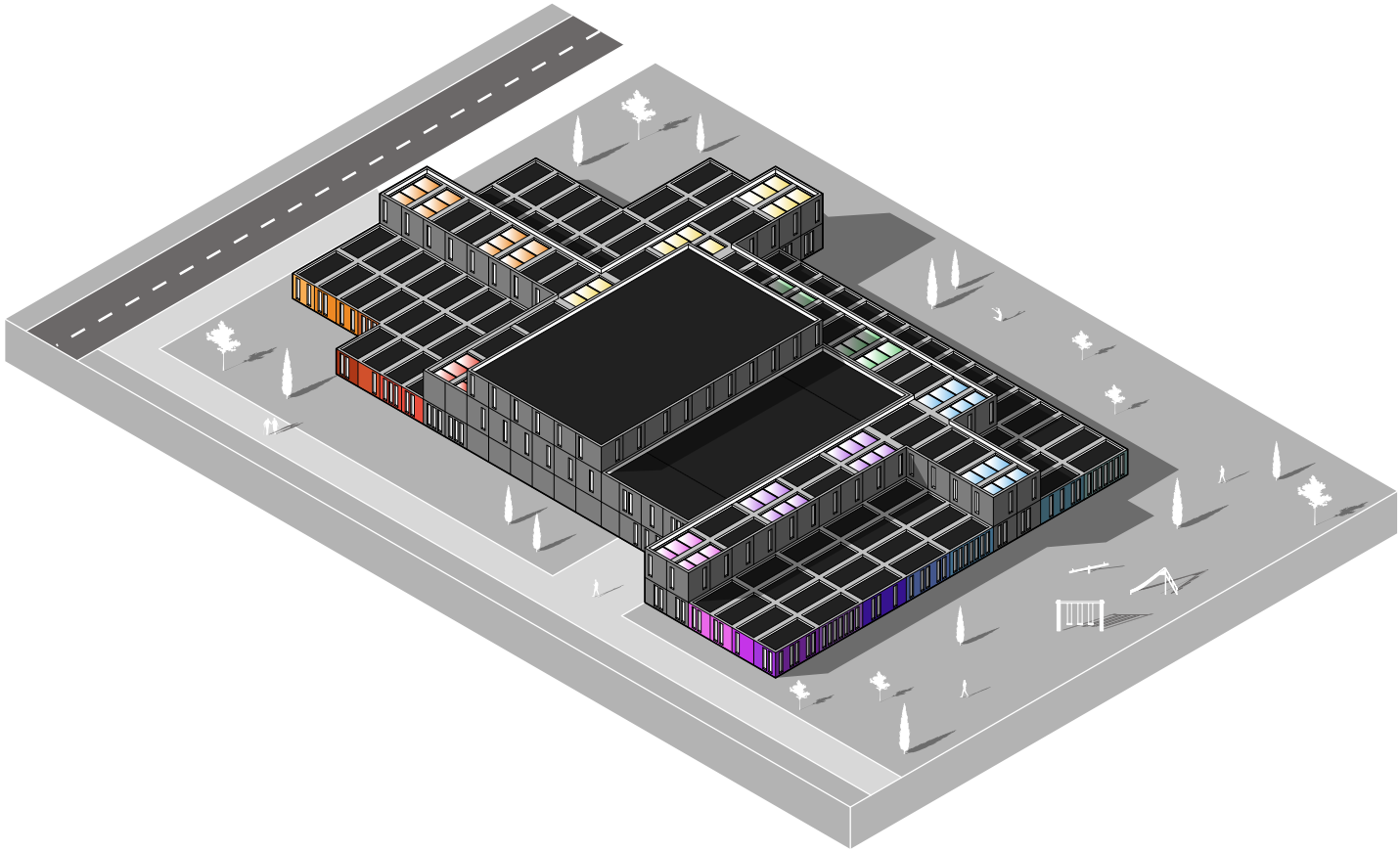
02

- Kit of parts
- Block 01
- Block 02

01

- Base footprint

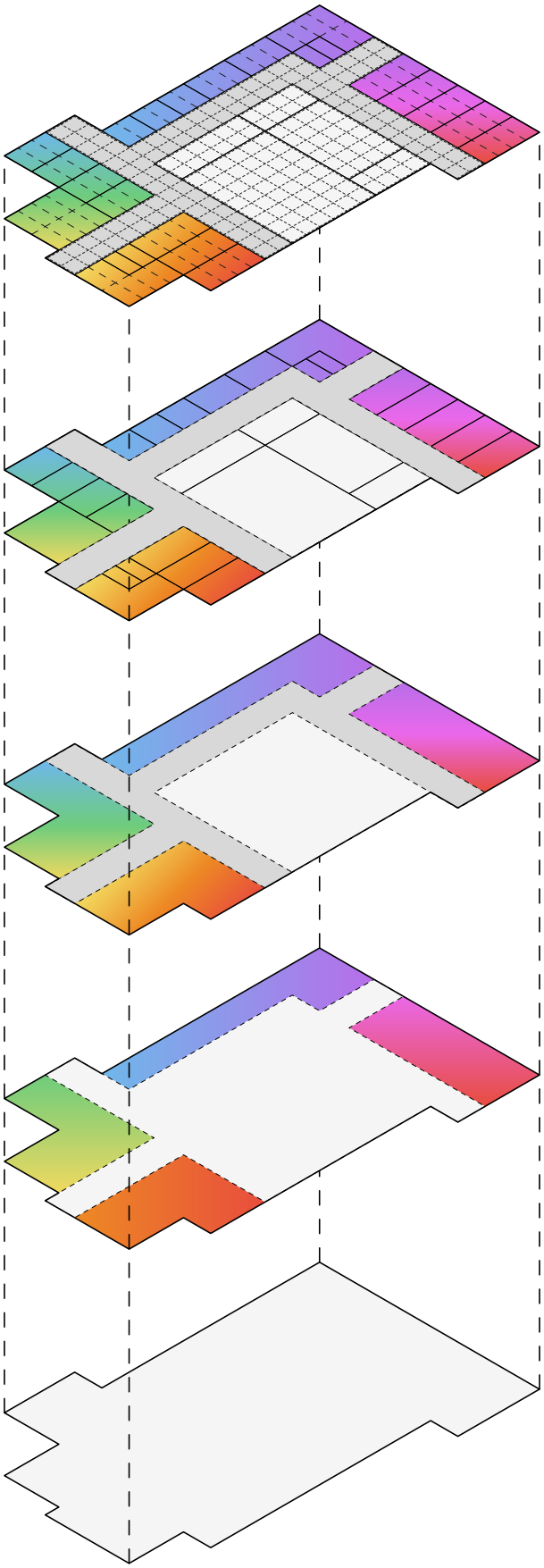
Second Iteration



OPTION 02

Mid-scale design, “middle” budget
Total area: 3340 m2
Total number of modules: 80
Number of classroom modules: 48
Students capacity: 384

Approximate distribution of modularity type: 45% volumetric, 55% kit of parts
Volumetric spaces include classrooms, staff spaces/offices, washrooms, libraries, the art room and the music room. Kit of parts spaces include the gymnasium, mechanical room, cafeteria, foyer and court-yard/circulation spaces.



05

- School spaces
- Courtyard
- Volumetric blocks
- 3m x 3m grid
- 3m x 6m modules

04

- School spaces
- Courtyard
- Volumetric blocks

03

- School spaces
- Courtyard
- Volumetric blocks

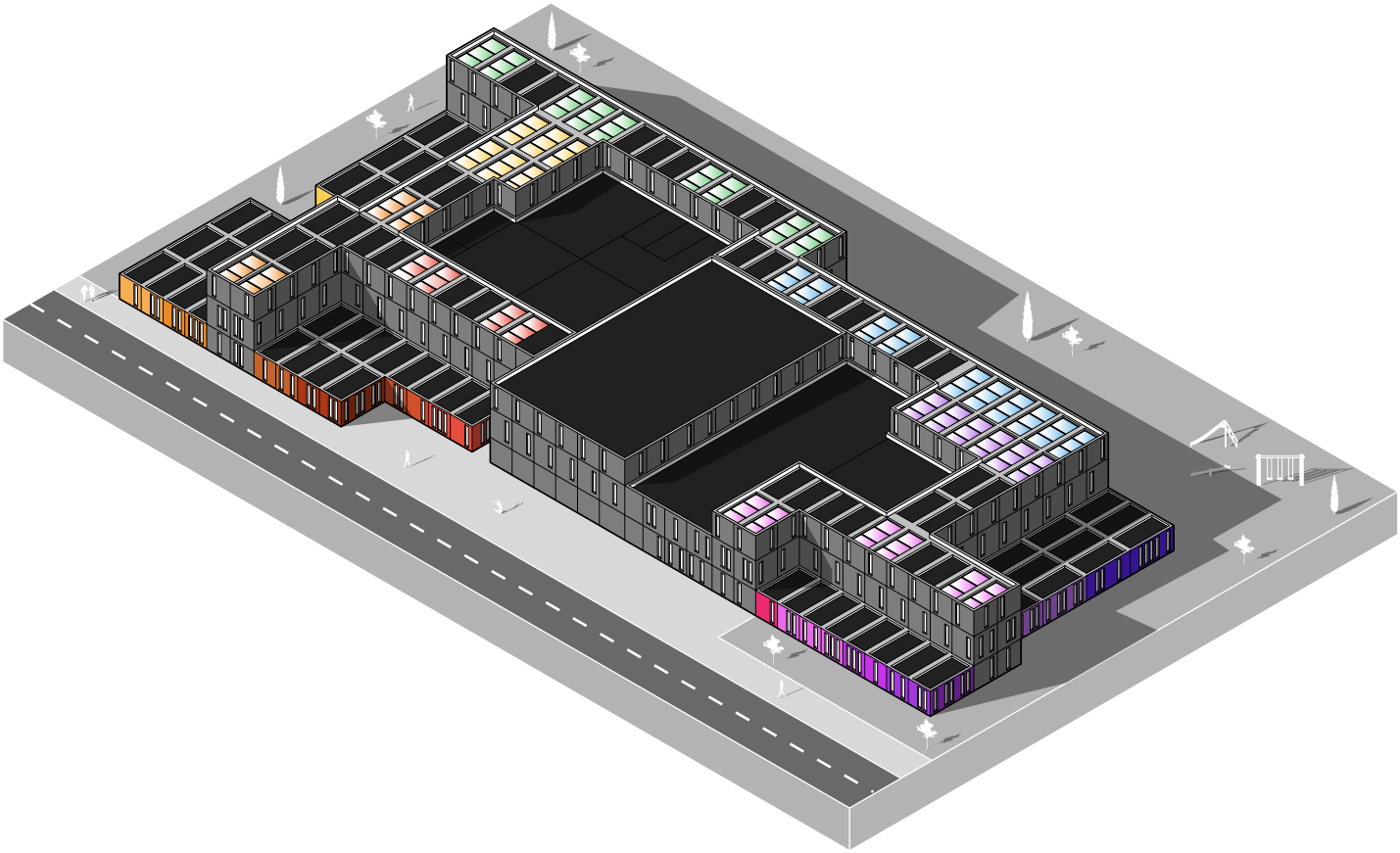
02

- Kit of parts
- Block 01
- Block 02
- Block 03
- Block 04

01

- Base footprint

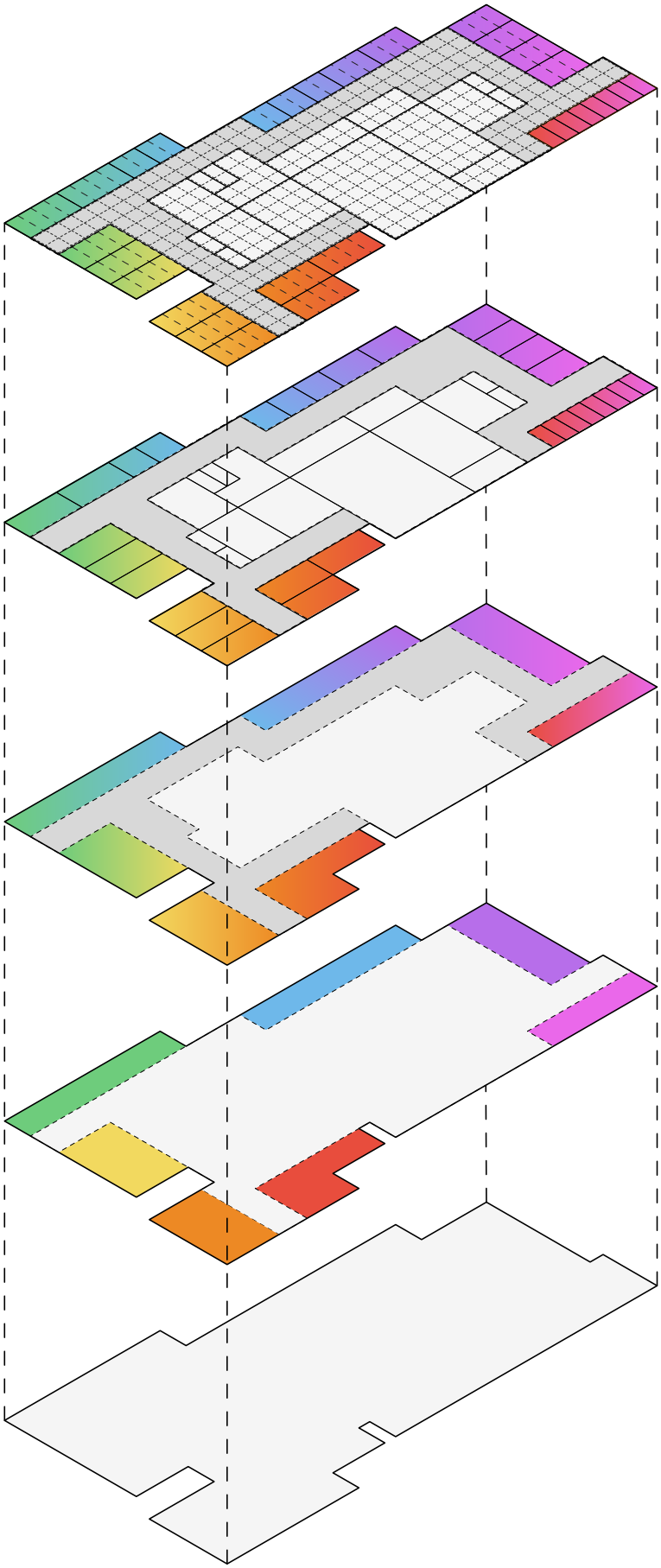
Third Iteration



OPTION 03

Large-scale design, “high” budget
Total area: 4500 m2
Total number of modules: 80
Number of classroom modules: 72
Students capacity: 576

Approximate distribution of modularity type: 30% volumetric, 70% kit of parts
Volumetric spaces include classrooms and staff spaces/offices. Kit of parts spaces include the gymnasium, mechanical room, cafeteria, foyer, courtyard/circulation spaces, washrooms, libraries, the art room and the music room.



05

- School spaces
- Courtyard
- Volumetric blocks
- 3m x 3m grid
- 3m x 6m modules

04

- School spaces
- Courtyard
- Volumetric blocks

03

- School spaces
- Courtyard
- Volumetric blocks

02

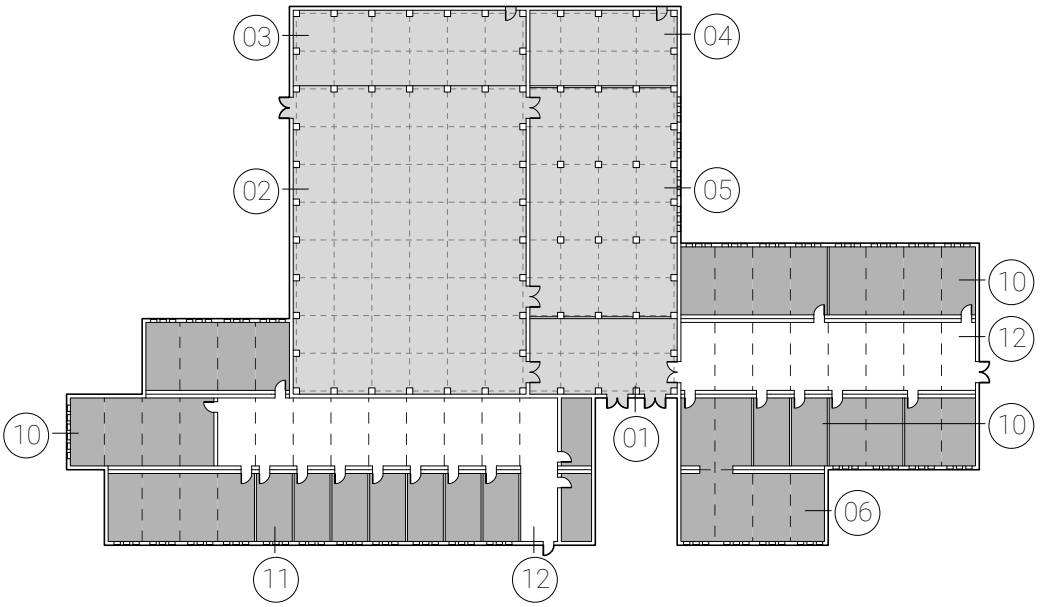
- Kit of parts
- Block 01
- Block 02
- Block 03
- Block 04
- Block 05
- Block 06
- Block 07

01

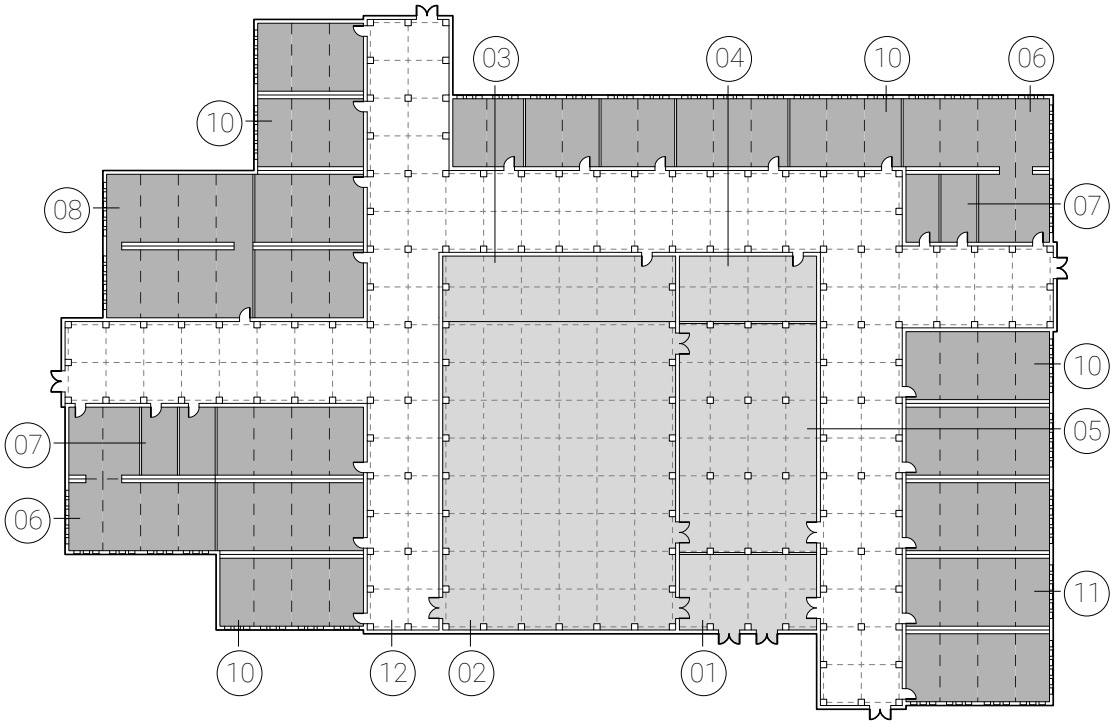
- Base footprint

Iterations in Plan

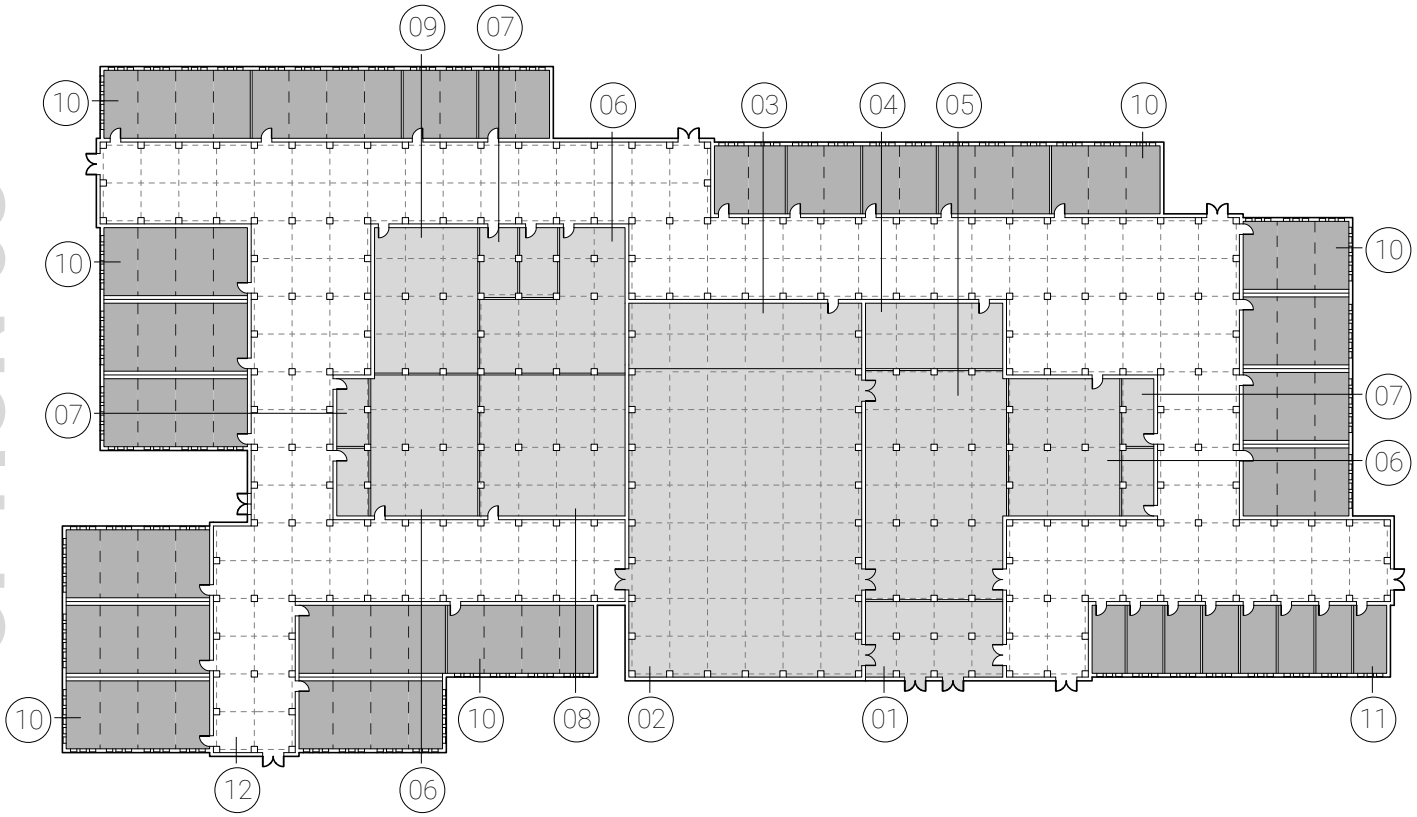
OPTION 01



OPTION 02



OPTION 03

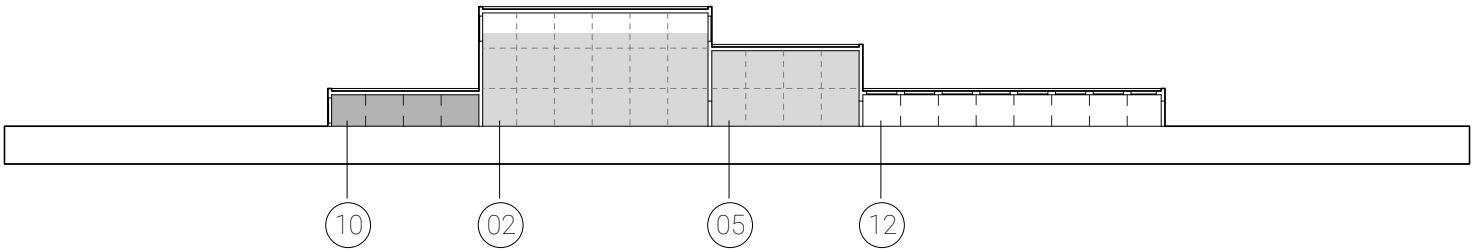


Kit of Parts | Volumetric | Circulation/Courtyard | 3m x 3m Grid | 3m x 6m Grid

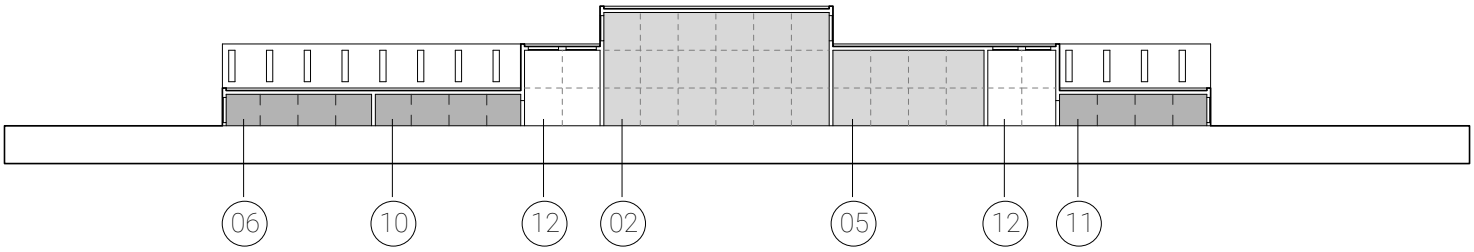
Room Key

01 Foyer
02 Gymnasium
03 Gym Stage
04 Mechanical Room
05 Cafeteria
06 Library
07 Washrooms
08 Art Room
09 Music Room
10 Classrooms
11 Offices
12 Courtyard/Circulation

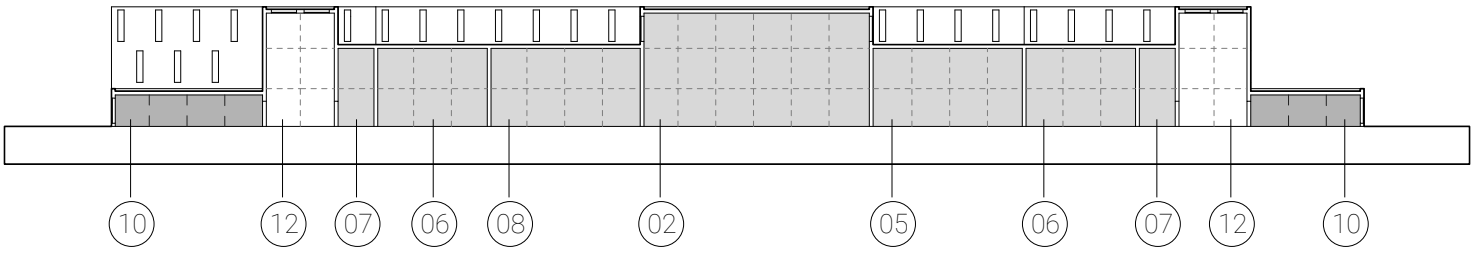
Iterations in Section



OPTION 01



OPTION 02



OPTION 03

Kit of Parts Volumetric Circulation/Courtyard 3m x 3m Grid 3m x 6m Grid

Room Key

01 Foyer
02 Gymnasium
03 Gym Stage
04 Mechanical Room
05 Cafeteria
06 Library
07 Washrooms
08 Art Room
09 Music Room
10 Classrooms
11 Offices
12 Courtyard/Circulation

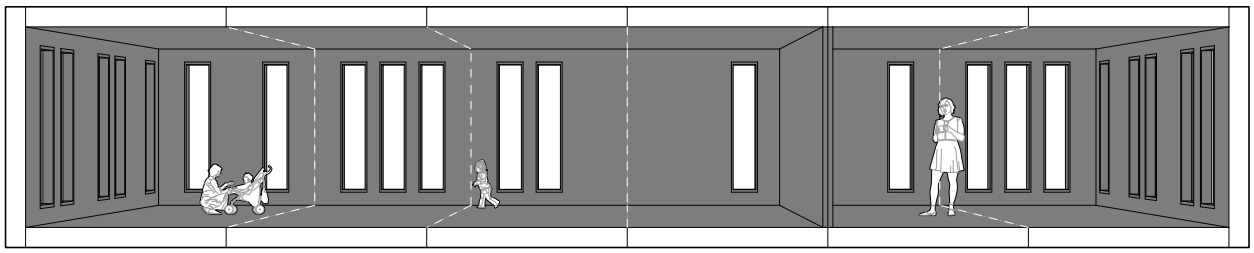
When viewing these iterations side by side in both plan and section, what becomes immediately clear is the variety the three present in terms of scale and complexity. It was important to show how these modular systems could produce very large-scale, ambitious designs just as easily as they could produce small-scale, simple ones. With this growth in complexity from iteration 01 to 03, we also see the changing dynamic between kit of parts and volumetric spaces. As discussed in Chapter 01 and 02, the kit of parts system is more appropriate for large, unique spaces, whereas the volumetric strategy is best for small, repetitive ones. This meant that for iteration 03, the most ambitious option, more spaces are designed to be larger and higher and as such utilize the kit of parts system. In this option, only classrooms and staff spaces are volumetric; every other space in the project is pushed to maximum dimensions for the most dramatic user experiences. This, however, comes with a trade-off, which is losing the extremely high-efficiency and standardization made possible with volumetric modules. As such, option 01 explores the other side of this trade-off, adapting all spaces except the core gymnasium, mechanical room, cafeteria and foyer to volumetric. While not nearly as ambitious a design, the first iteration instead opts for efficiency and feasibility, making it the more "realistic" option. The second iteration, of course, represents a middle-ground between these two extremes.

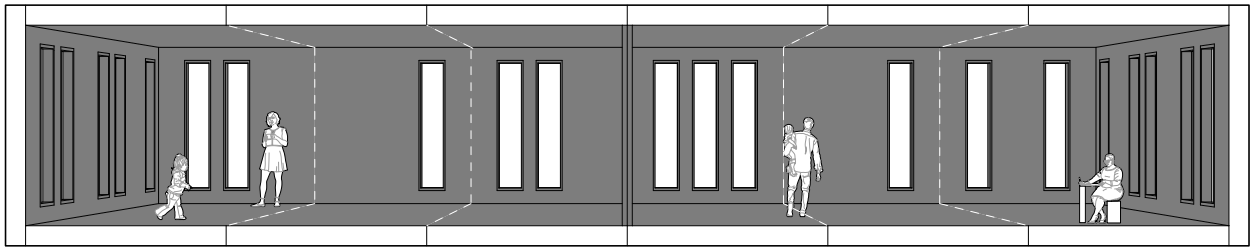
Despite the dramatic differences between each design iteration, all three share the same kinds of signature spaces. These refer to the most significant areas of the project which best showcase how modularity has been used to address each of the three initial objectives. These signature spaces are explored in more detail in the next section.

Signature Spaces

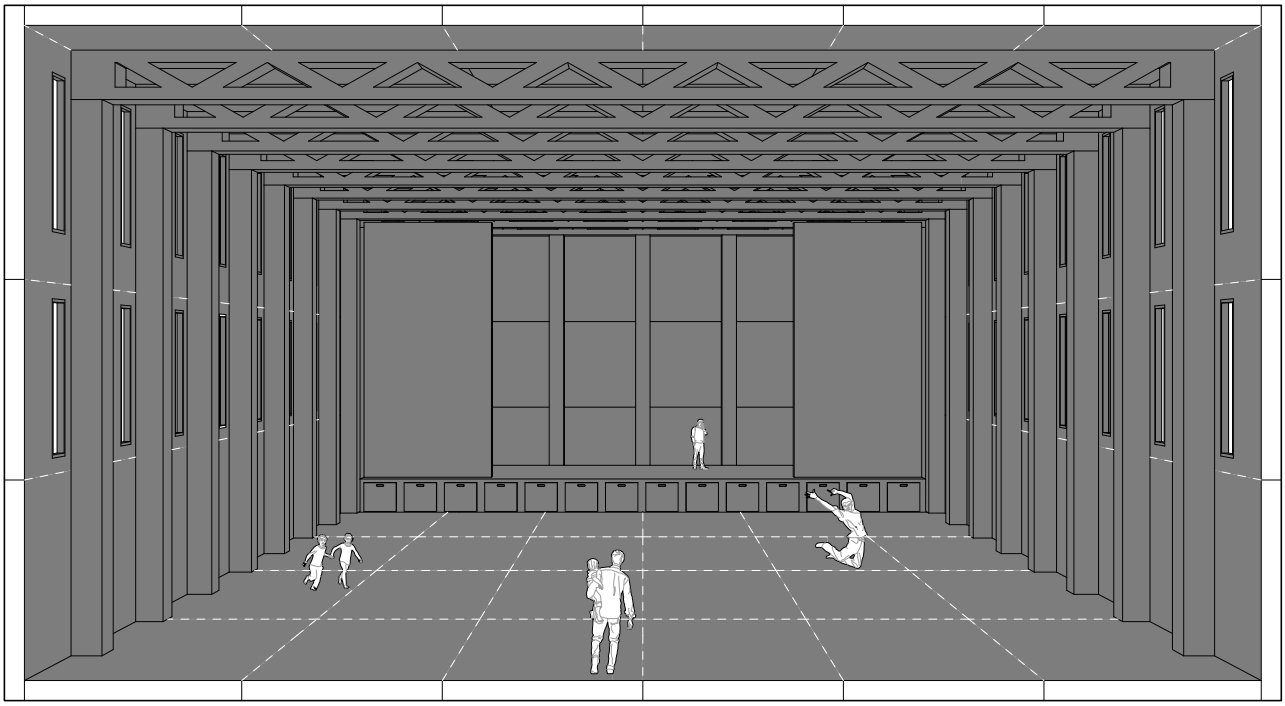
As previously discussed, these spaces were common throughout the three iterations and were considered integral to the concept of the project and the feeling imposed by the architectural design of the building. Classrooms were chosen because, evidently, they are the most fundamental building block in the design of an elementary school. Because of the volumetric modular nature of these classrooms, the same number and arrangment of modules can result in different configurations. The gym was chosen because it is the largest space within the school. As such, it employs its own structural system (glulam trusses fabricated off-site in pieces and then assembled on-site). This space was meant to feel light, airy and large enough to accomodate a variety of activities. The courtyard is how users circulate throughout the project and while its scale varies in each iteration, its foundational principle of a kaleidescopic pathway system remains the same in each design. Coloured skylights bathe the space in vibrant light, serving as both an aesthetic tool and a wayfinding technique.

CLASSROOMS

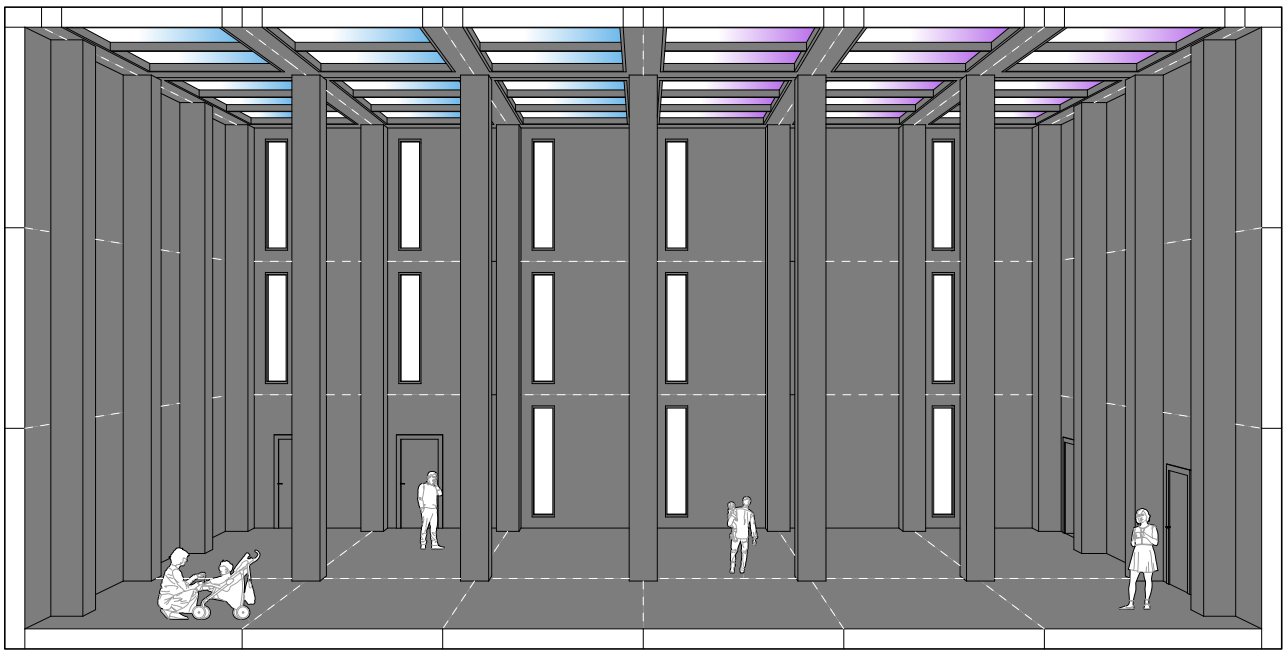




GYMNASIUM



COURTYARD



Conclusion

With the modular system, design principles, and all three iterations now explored, we can conclude by seeing if and how the project has been successful in its response to the three guiding objectives from Chapter 01.

OBJECTIVE 01

Establish system that allows both modular typologies to use the same dimensions and components.

As discussed extensively in Chapter 02, the SIPs, which serve as the essential building blocks of the project, correspond to both kit of parts and volumetric spaces. The connections catalogue and various construction processes demonstrate the redundancy between the two modular typologies.

OBJECTIVE 02

Utilize both kit of parts and volumetric strategies effectively and efficiently within the elementary school concept.

As reviewed in Chapter 02 and 03, both strategies are assigned to spaces that make the most logistical sense. This assignment served as the basis for the programmatic arrangement of the project, with the kit of parts hub in the center surrounded by peripheral blocks composed of volumetric modules.

OBJECTIVE 03

Use modularity to enhance the design of the elementary school.

As covered in Chapter 03, modularity is used to enhance the quality of circulation spaces, improve adjacencies, and foster an overall sense of playfulness in each iteration. This last point is achieved with the use of colour, which has become the most essential aspect of the project.

In conclusion, this study, as guided by these three main objectives, has delved into how modular construction and design can be used to create an architecturally significant elementary school. Colour Coded shows how simple building blocks and the use of colour can enrich an educational space significantly, and is a (hopefully) interesting case study within the world of modular architecture and the design of school buildings going forward.

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COLOUR CODED

A Study on Elementary Schools as a
Typology for Modular Architecture

KEEGAN MUTH

kasian