05

5. Design development

5.1 Introduction

Through theoretical investigations, context analysis, case studies and precedent studies a succession of conceptual approaches developed. In this chapter, the design development will be discussed from the initial to the final approaches. The strengths and weaknesses of each of the design stages will be identified. These stages followed upon one another and served to inform the final design.

5.2 Adaptive Reuse

The author altered the building through a method of design intervention. "An altered building is as an inhabited ruin. The ruin is the means by which a building addresses its past, present and future" Scott (2008:126). Scott paraphrases Louis Khan's idea that the ruin is a building that can show how it was made (Scott, 2008:96). In ruined buildings privileged views are formed, that were previously inaccessible, enabling the building to show a fresh explanation of itself (Scott, 2008:96). Scott refers to the works of Matta-Clark who intentionally and programmatically breaks and ruins buildings and in the process he reveals the hidden nature of the building (2008:127-9). Matta-Clark cut through buildings revealing the structure and connecting detached spaces through views and paths of light. His interventions were art pieces and did not leave the spaces functional, structural or safe.

The author aims to break the building to make it more usable as a school structure and, like Matta-Clark, reveal and connect the hidden.

The question of fit is more complex when architecture is reused. The appropriateness of a new use, in an existing building, is usually only coincidence. The search for a solution to manipulate the old, so that the new can exist, is usually the part of the design process which takes the most time (Scott, 2008:173). The author went through numerous iterative processes and investigations to establish how the structure should be broken, in order to enable the new use to fit comfortably within the building. Even though the building has already housed the client for a number of years, the structure prohibited a rich educational environment.

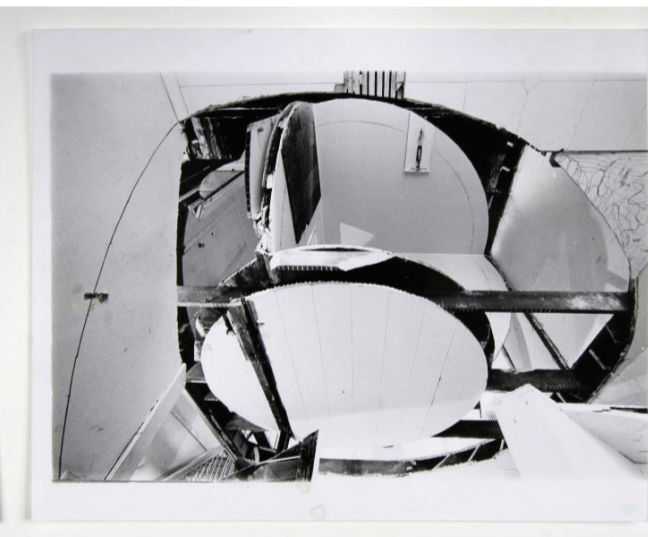Figure 5.1 Conical Intersect 2. From "Conical Intersect" París, France (Matta-Clark, 1975)

Figure 5.2 Circus 2. From "Circus-Caribbean Orange", Chicago (Matta-Clark, 1978).

(Figure 5.1) Matta-Clark cuts through concrete revealing the structural steel aggregate and thickness of the slab. (Figure 5.2) The floor joist and layering of materials become evident. Both works expose how their structures have been put together.

5.3 The MST plug-in as a catalyst.

By moving the student centre to the underutilised roof space, the 3rd floor of the building became available for an MST facility. Just like Bambisanani (c.f.4.2.2), the MST facility was envisioned as an add-on to the current school. The concept of an MST plug-in developed. The facility would have allowed the school to grow into an educational environment of experiential learning.

The MST plug-in would act as a catalyst, connecting subjects and students across the school's currently detached levels (Figure 5.6). The MST level would be rich with experiences. The boundaries between spaces were to be permeable. It was envisioned as a hub where research, collaboration and project-based learning could take place (Figure 5.9).

The science store (Figure 5.13) was seen as an element that could act as a catalyst to activate the space around it. MST was seen as the driving agent to initiate a change in perception and use of school spaces, enabling change in the current educational environment of the school.

This first response was an intuitive investigation. At this point the author still needed to conduct a more in-depth investigation theoretically. This vision helped to juxtapose the idea of a new educational model next to the existing traditional model (Figures 5.10-5.12).
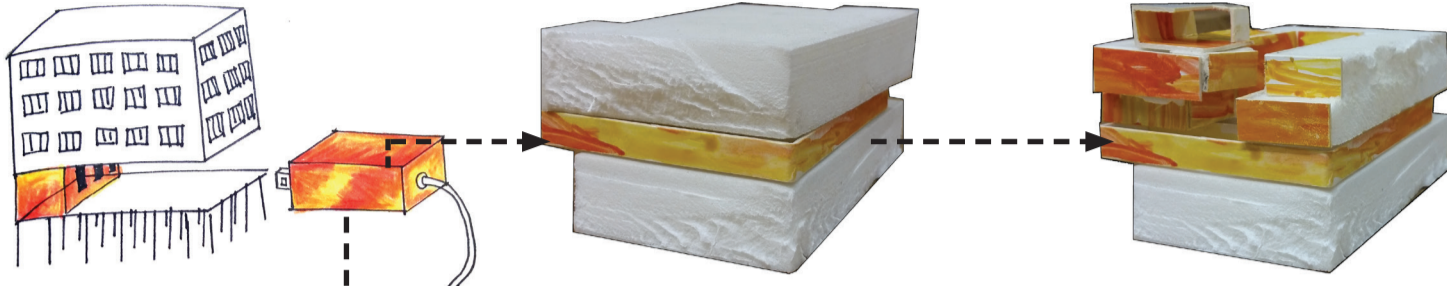
Figure 5.3 Skin

Figure 5.4 Mass

Figure 5.5 Structure

Figure 5.6 Plug-in

Figure 5.7 Plug-in between parking & school
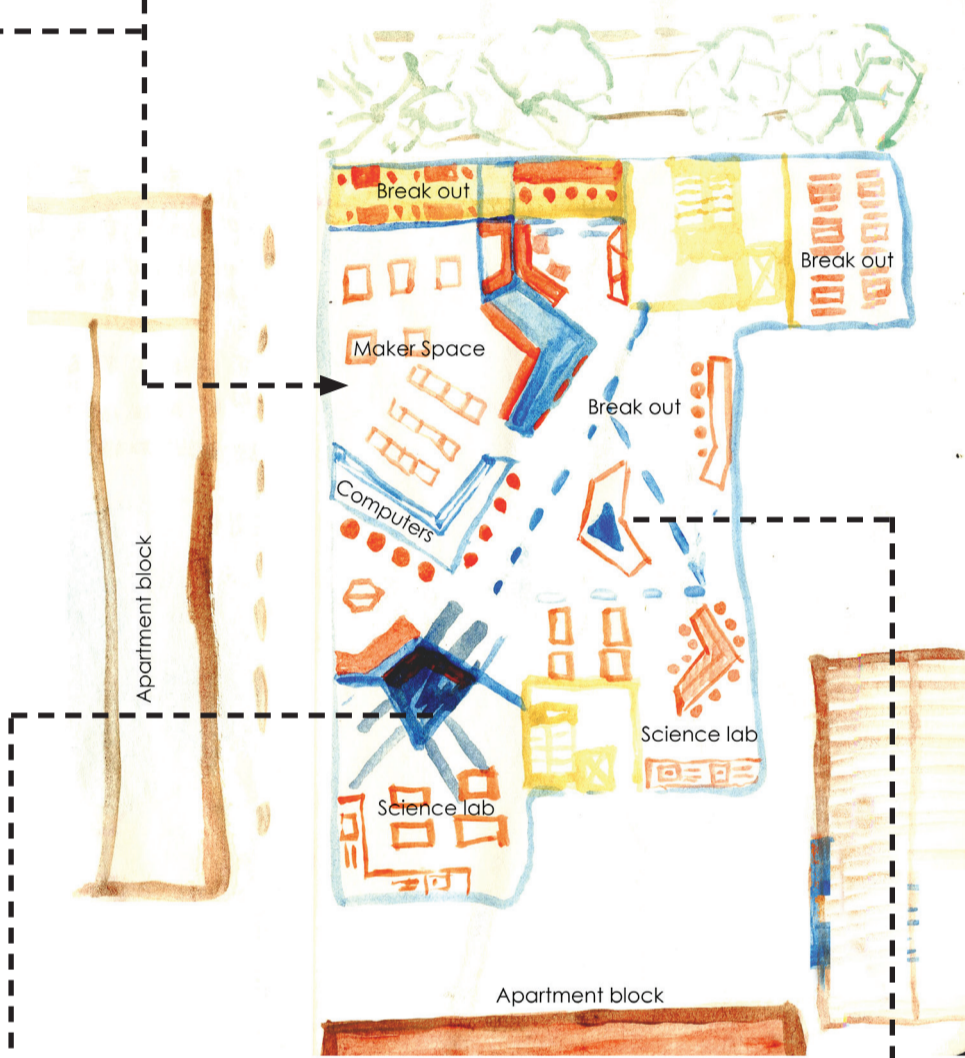
Jeff Masemola

Figure 5.8 Plug-in acting as catalyst

Break out

Break out

Maker Space

Break out

Computers

Apartment block

Science lab

Science lab

Apartment block

Figure 5.9 conceptual floor plan of MST level
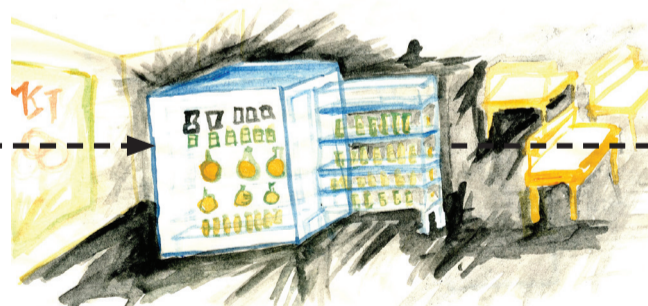
Figure 5.13 Science store becomes display

Traditional education

Experience-based MST

Traditional education

Experience-based MST
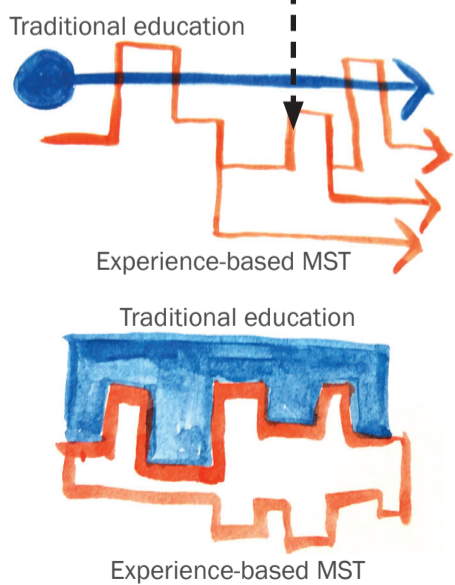
Figure 5.10 Diagram of MST facility plugging into traditional school enviroment

Formal learning

Infromal learning

Formal learning
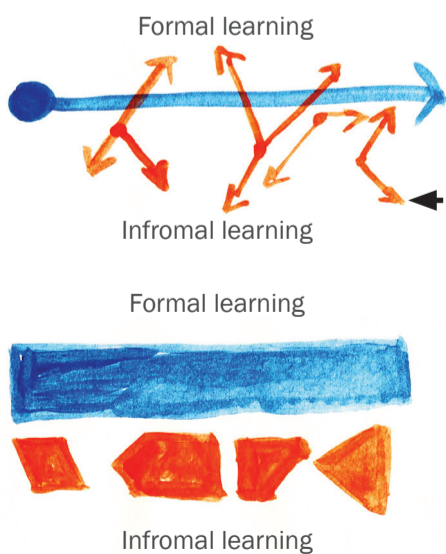
Infromal learning

Figure 5.11 Diagram of MST informal learning intersecting with formal learning

Traditional education

Experiential education

Traditional education
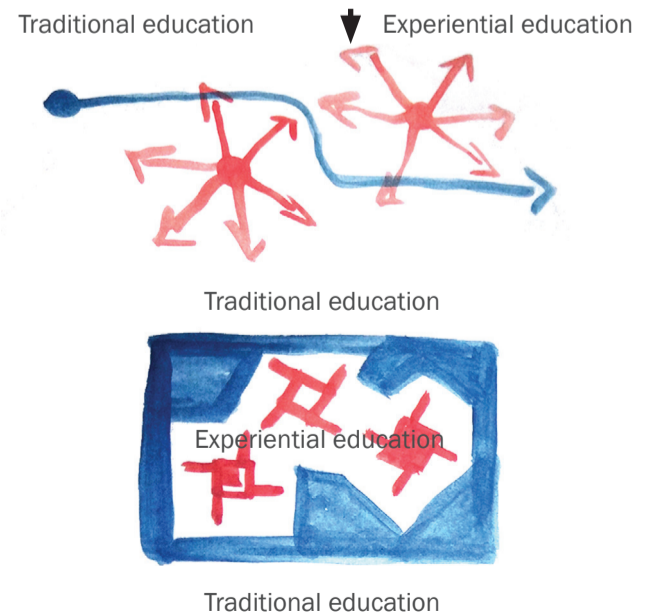
Experiential education

Traditional education

Figure 5.12 Diagram of catalysing experiential learning

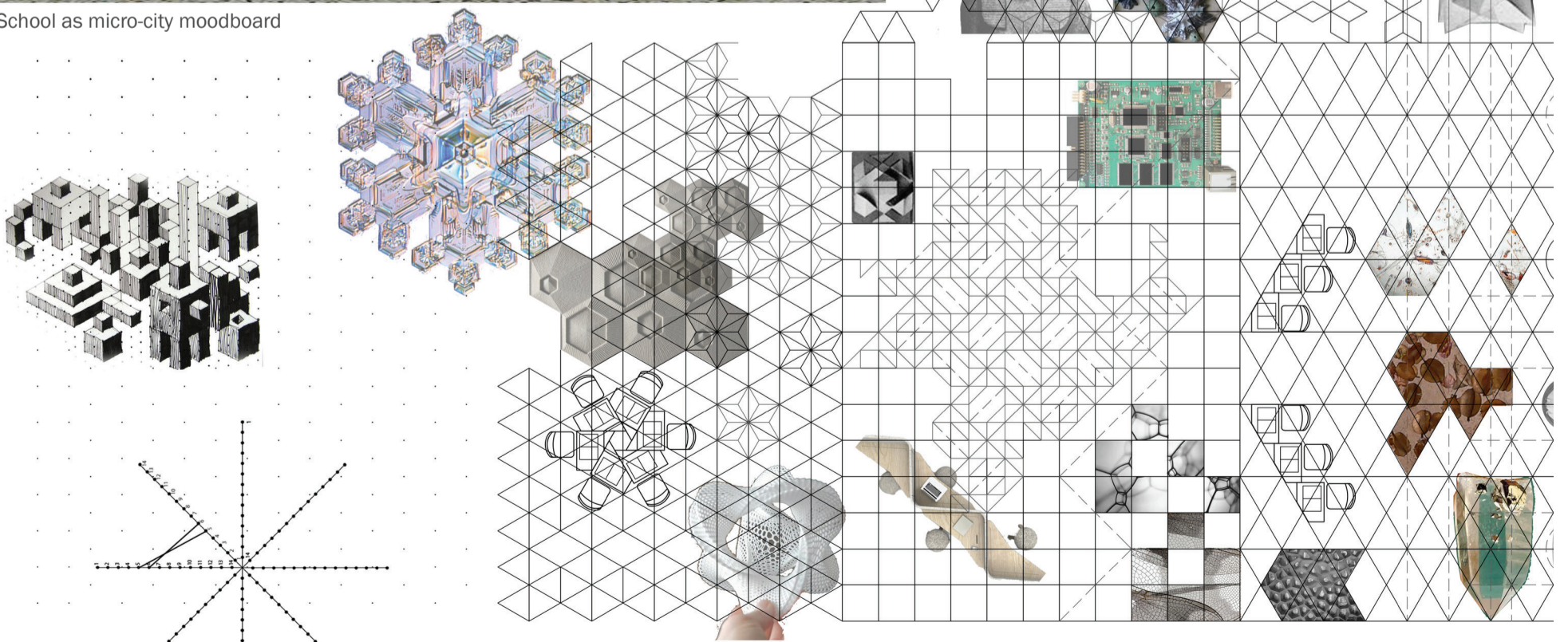Figure 5.14 School as micro-city moodboard

Figure 5.15 Building blocks in nature moodboard

5.4 Two poles

After returning to theory the author realised that the school environment needed to be grounded with real life experiences. To achieve this, the author's investigation was approached from two opposite poles. On the one side, the school as a whole was compared to a city (Chapter 2.3.1) and on the other side, the traditional use of the rectangular classroom with rectangular desks (Chapter 2.2.1) as the building block for a school was challenged.

5.4.1 School as a Micro City

Hertzberger's analogy of the school that resembles a city (c.f. 2.3.1) was investigated and applied on the school's circulation spaces. Through visual links and pause areas the environment became rich with everyday experiences, just like the experiences one would come across in the real world beyond the walls of the school. The walls and shapes of the classrooms were used to create intermediate spaces into which learning could extend. The classrooms were designed to be openable, so that they could become public squares or cul-de-sacs where the students could adapt the spaces to their needs.

5.4.2 Building blocks

In nature different building blocks exist which fulfil different functions. As determined through the theory, the traditional use of the classroom is no longer sufficient and alternative educational environments are needed for the changing educational model. New building blocks were investigated to facilitate new educational functions. Inspiration was drawn from the building blocks found in real life natural phenomena, i.e. in elements, molecules, crystal structures, organic cells, light waves, sound waves and many more of nature's building blocks.
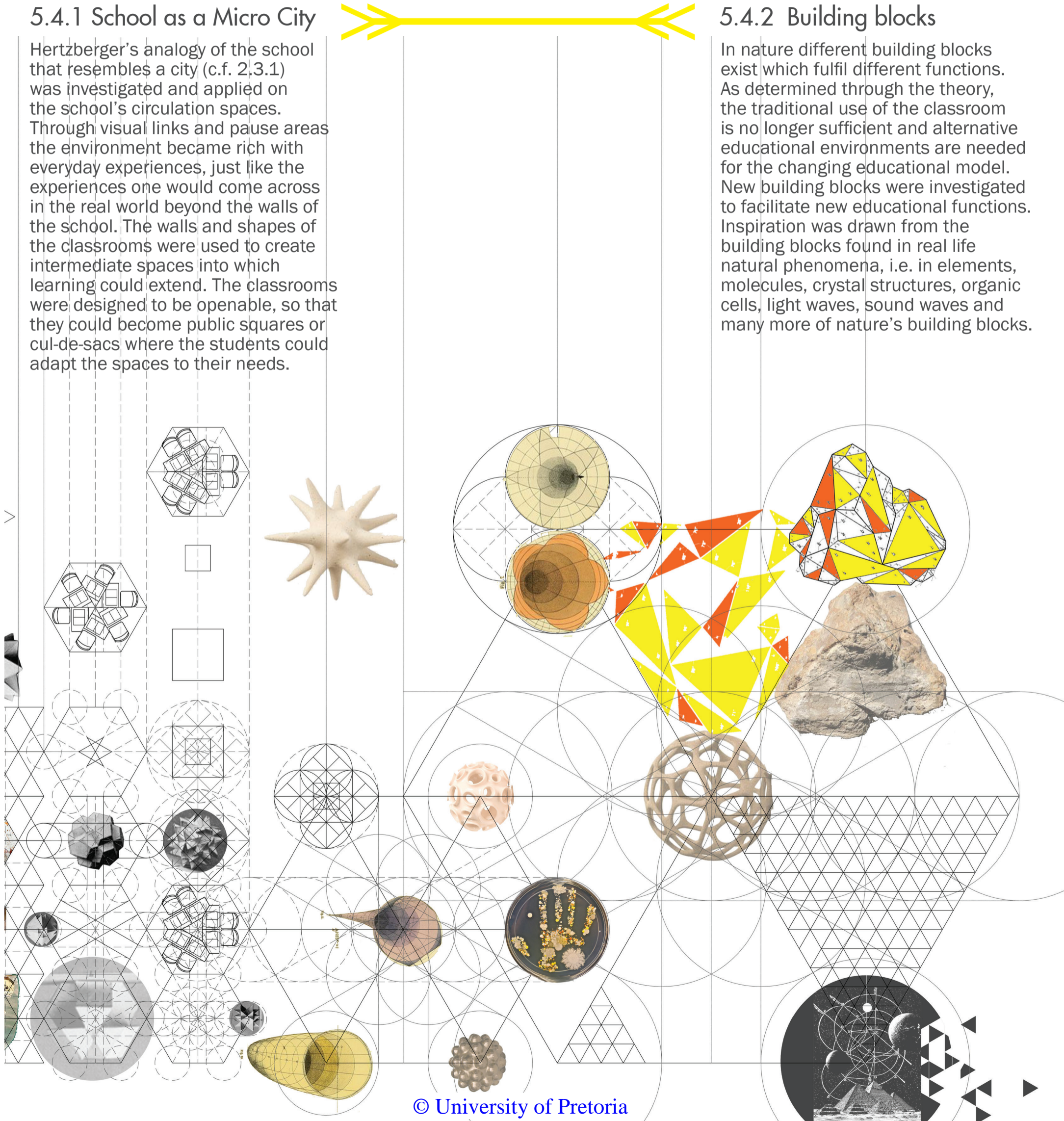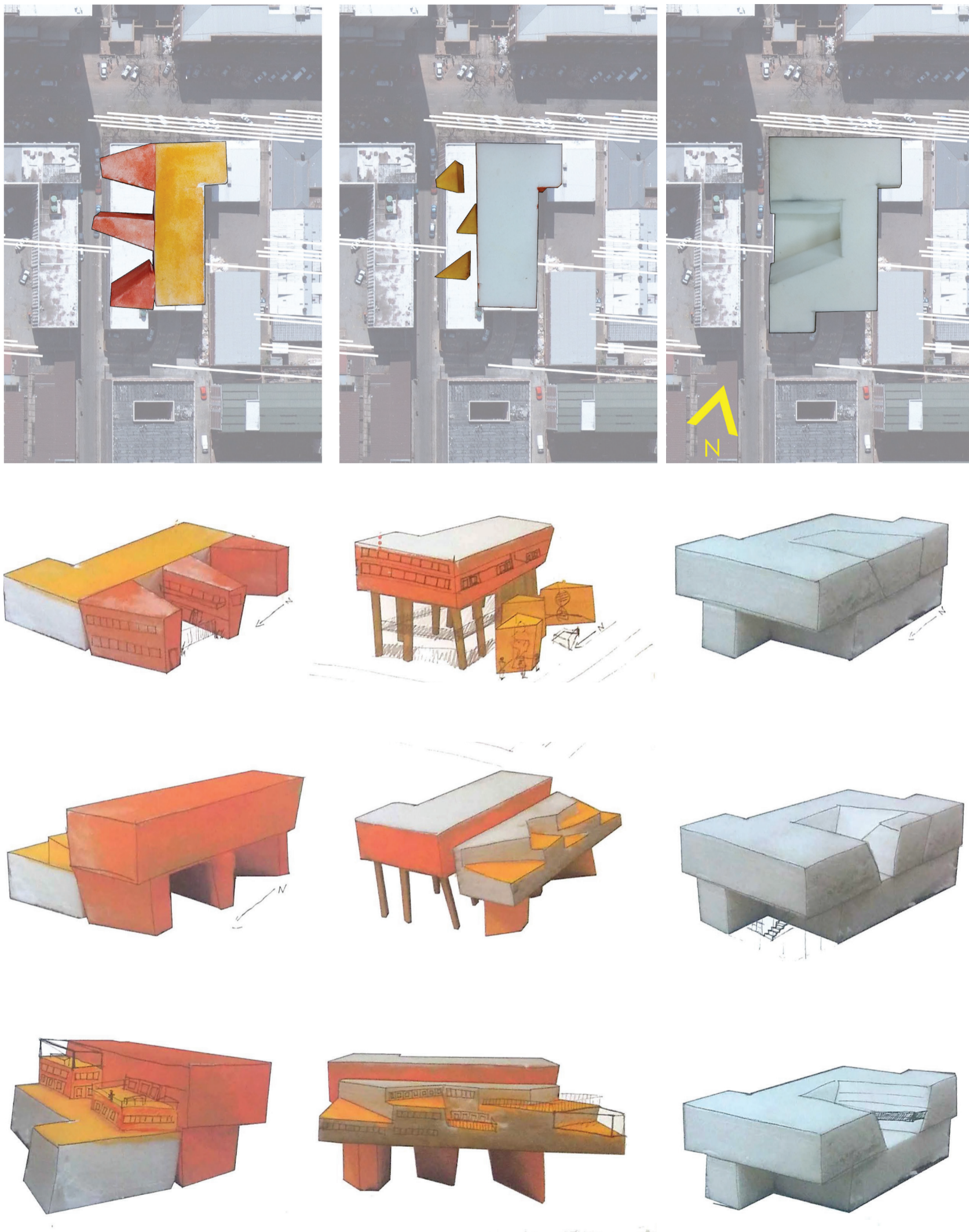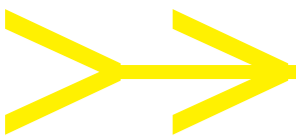
Figure 5.16 Conceptual models

5.4.1 School as a Micro City

Initial Concept Models

Here the author intuitively started to cut away from the building structure, to open the school up to the experiences of the city. The main aim was to create a dialog in the form of 'public space' between the formal educational classrooms and new experience-based learning spaces. These models were to transform the rigid mass of the existing building into a dynamic structure rich with visual links and places of interaction. These models did not take into consideration the building's structural grid or the spatial requirements necessary for different methods of learning to take place.
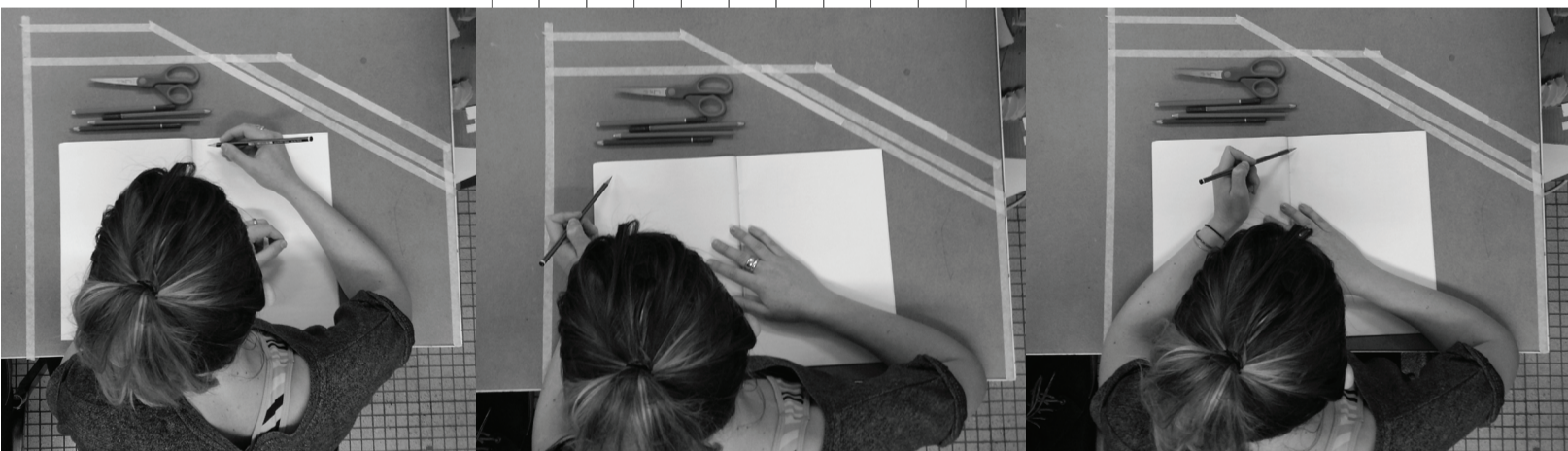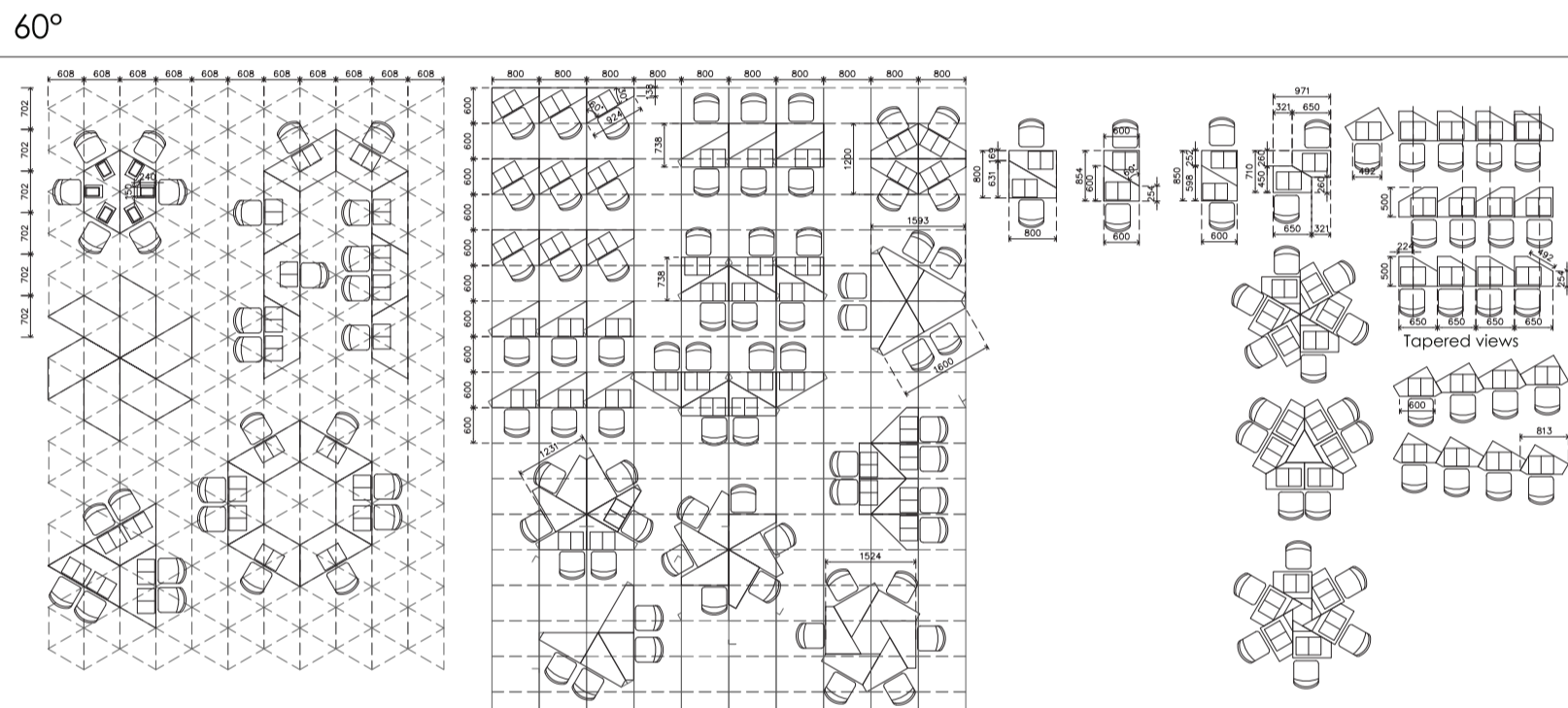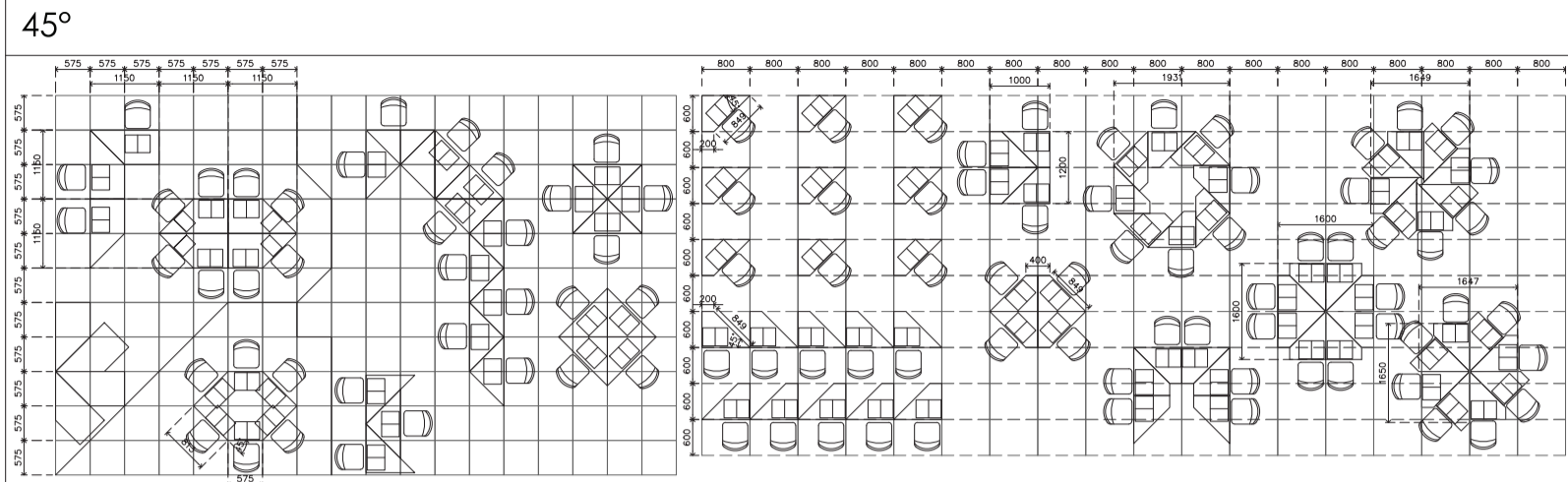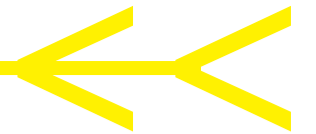
45°

60°

Figure 5.17 Desks as creative spacial organisers

Figure 5.18 Naef Cubicus
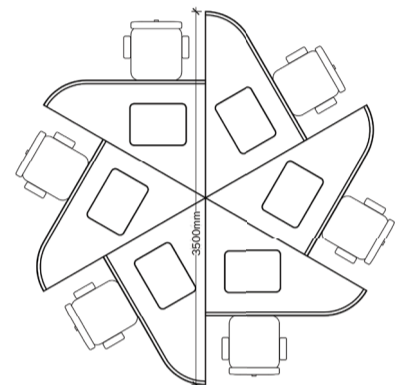

Figure 5.19 Exchange by Smart Desks
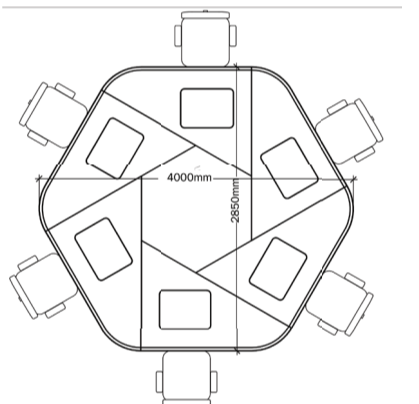

Figure 5.20 Exchange by Smart Desks

Figure 5.21 Exchange by Smart Desks

Exchange office furniture by Smartdesks was used as a starting point to the investigating. By introducing an angle into their furniture a multitude of different layouts was achieved that made different levels of collaboration possible. These desks were however large and while they could be arranged in group clusters the distance between people opposite each other were not inductive to group discussions.

5.4.2 Building blocks

Desks

As previously stated the traditional classroom as a building block led to a distinct repetitive spatial organisation, which also translated to the form and organisation of the school as a whole (Figure 2.1). The rectangular school desk also forms another building block in the interior spaces and they led to repetitive classroom layouts which encourage little adaptation and exploration of alternative learning environments. The author started to investigate how furniture can influence the learning that takes place and how it can promote self-adaptation of space, to accommodate different teaching and learning methods through layout.

The author started the investigation by introducing 45° and 60° angles into school size furniture and placing them on a seating grid. The 45° group configurations with eight students had too large a distance between opposite ends, whereas the 60° angled desks had a six person group configuration with more intimate distances between opposite ends. From these investigations it was determined that by introducing a 60° angle in combination with 90° angles would make for the most flexible and intriguing new building block solution.

5.5 Programmatically breaking the existing

5.5.1 Cutting away

Before the author could break the structure, the type of concrete slab to be used had to be determined. The following indicators were used to assume that the slab is indeed a reinforced slab and not a pre-stressed or post-tension slab. The structure is a flat slab with drop panels. On the original drawings the slab was drawn to be 260mm thick, whereas with pre- and post-tension slabs, the thickness of the slab is usually thinner. The column spacing is at 5300mm intervals, whereas with pre-stressed construction the spans can be greater and the building would have had fewer columns. These assumptions have been confirmed by a structural engineer (Steyn, 2016).

After the structure of the building was surveyed and analysed, the author started cutting away from the building to visually connect the levels, so as to bring in natural light and create open public spaces.

5.5.2 Programme

The Minimum Norms and Standards for Schools (DOBE, 2013) was consulted as a guideline to determine adequate space for specific functions. Through an iterative process driven by theory, case studies and the micro-context analysis, the programmatic arrangement of the school was determined.

Shift College is an independent school, thus the maximum students per classroom is determined by the school. The fire escape routes of the host building can accommodate 260 users (SANS part T). The school therefore falls within the small school category of the Minimum Norms and Standards (DBE, 2015).
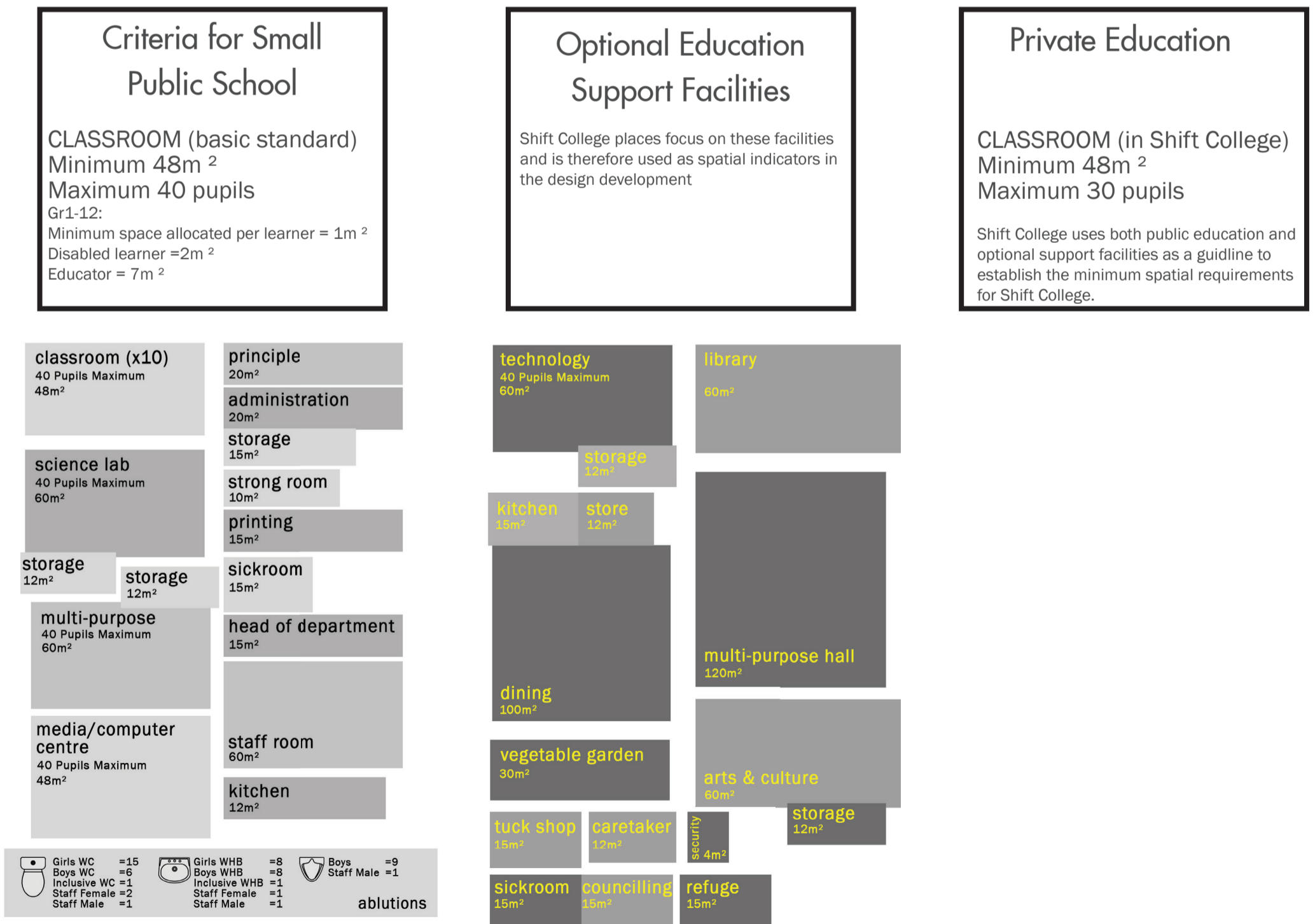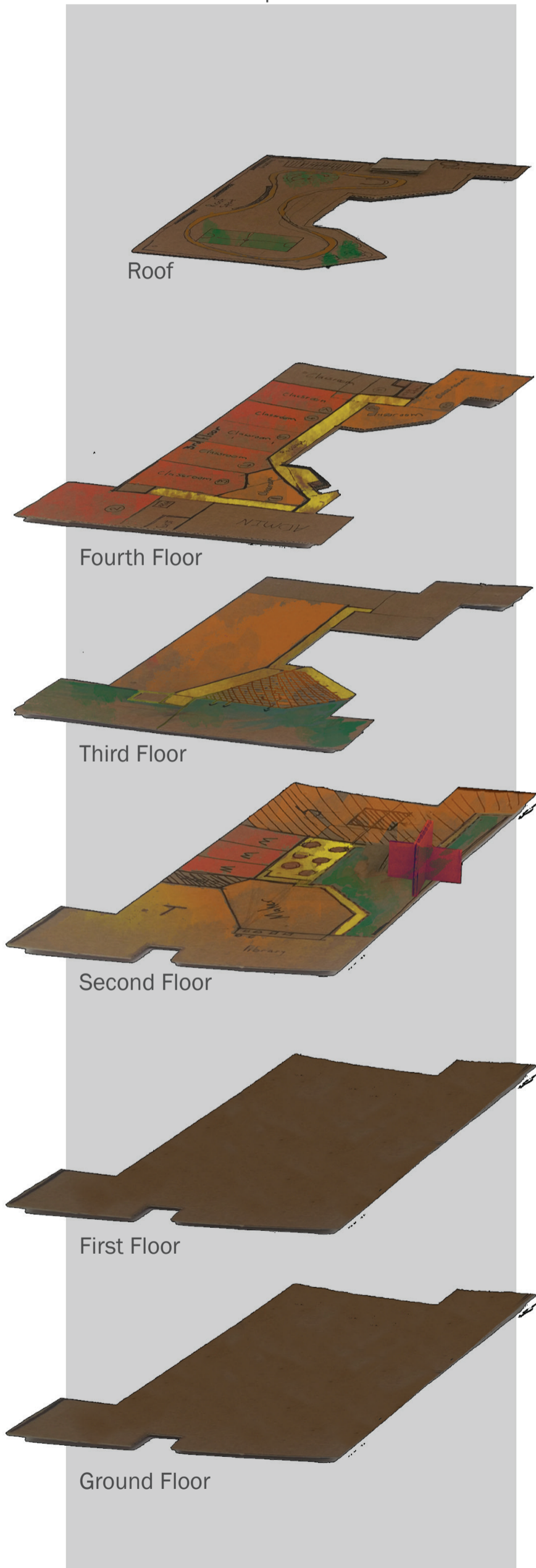

Figure 5.22 Minimum Norms and Standards

Intervention Development 1:

Roof

Fourth Floor

Third Floor

Second Floor

First Floor

Ground Floor

Intervention Development 2:

Roof

Fourth Floor

Third Floor

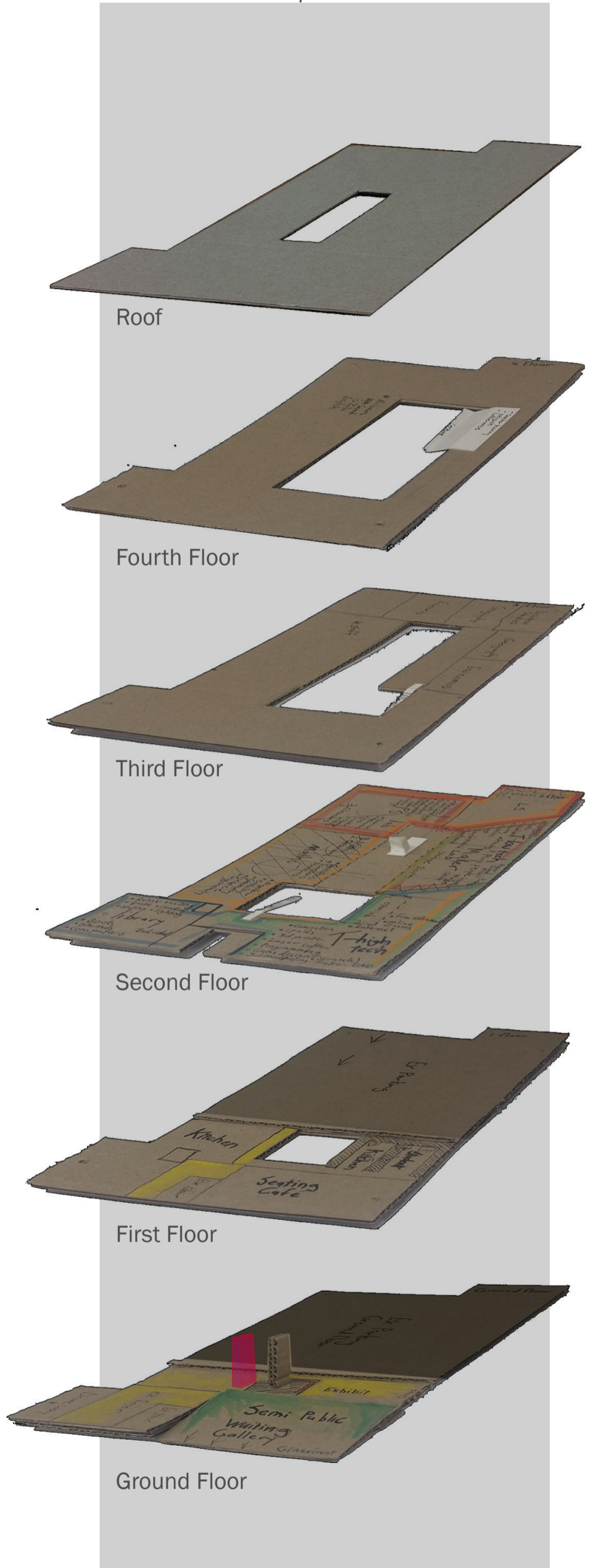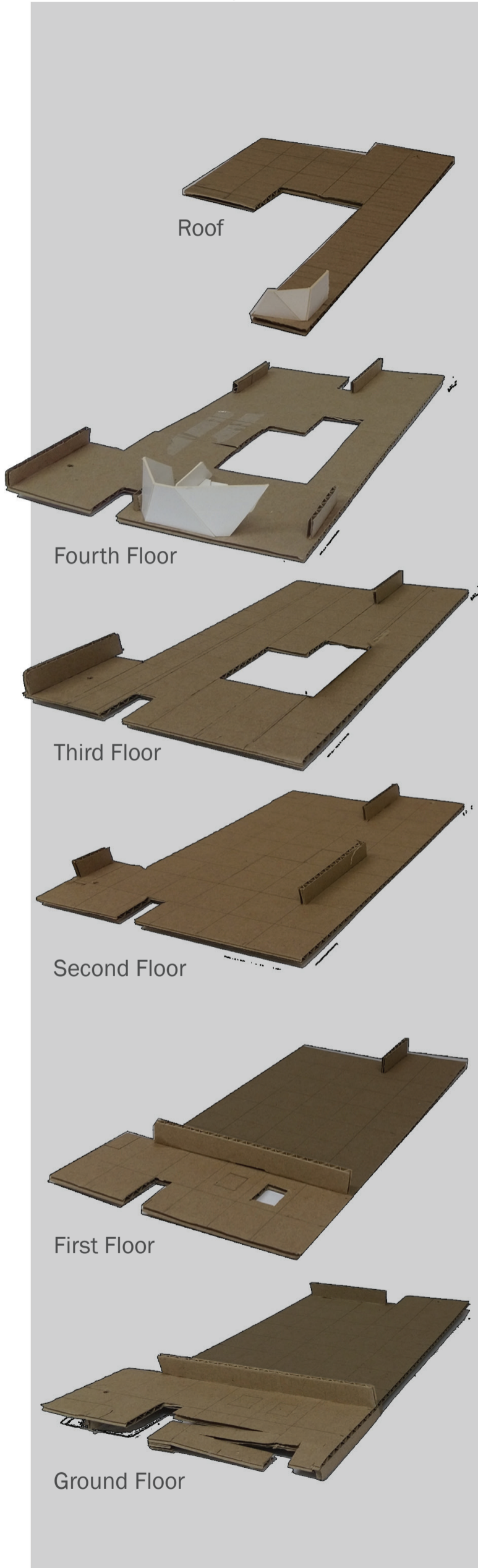Second Floor

First Floor

Ground Floor

Figure 5.23 Models investigating connection between levels

Intervention Development 3:

Intervention Development 4:

Roof

Fourth Floor

Third Floor

Second Floor

First Floor

Ground Floor

Roof

Fourth Floor

Third Floor

Second Floor

First Floor

Ground Floor

Figure 5.25 Models investigating connection between levels

Intervention Development 5:

Roof

Fourth Floor

Third Floor

Second Floor

First Floor

Ground Floor

Intervention Development 6:

Roof

Fourth Floor

Third Floor

Second Floor

First Floor

Ground Floor
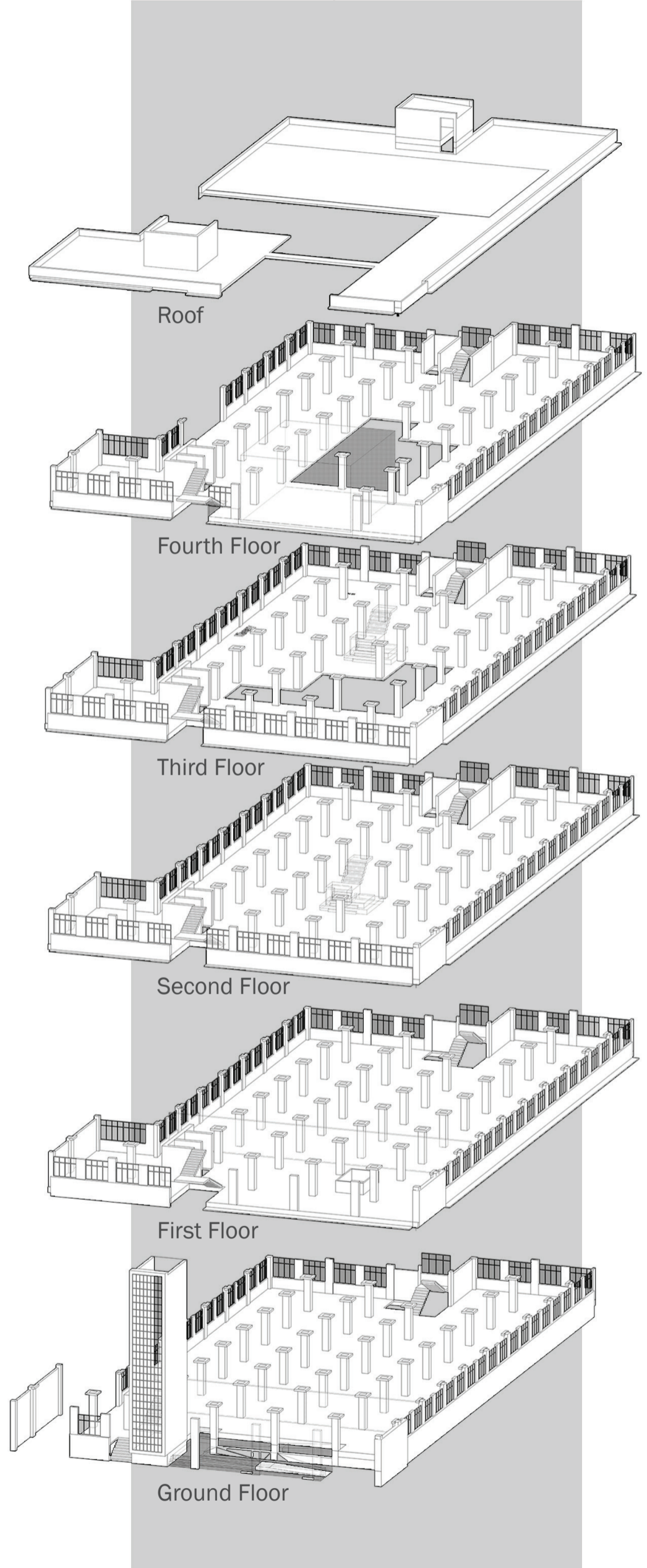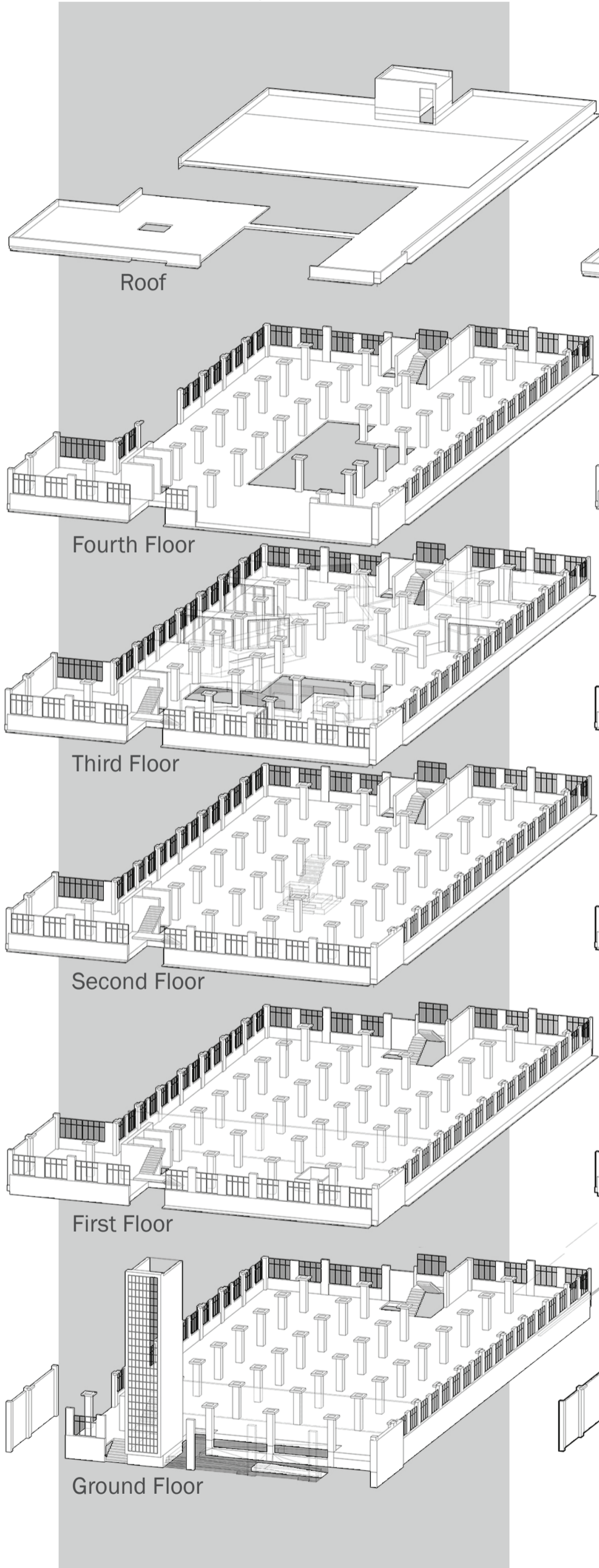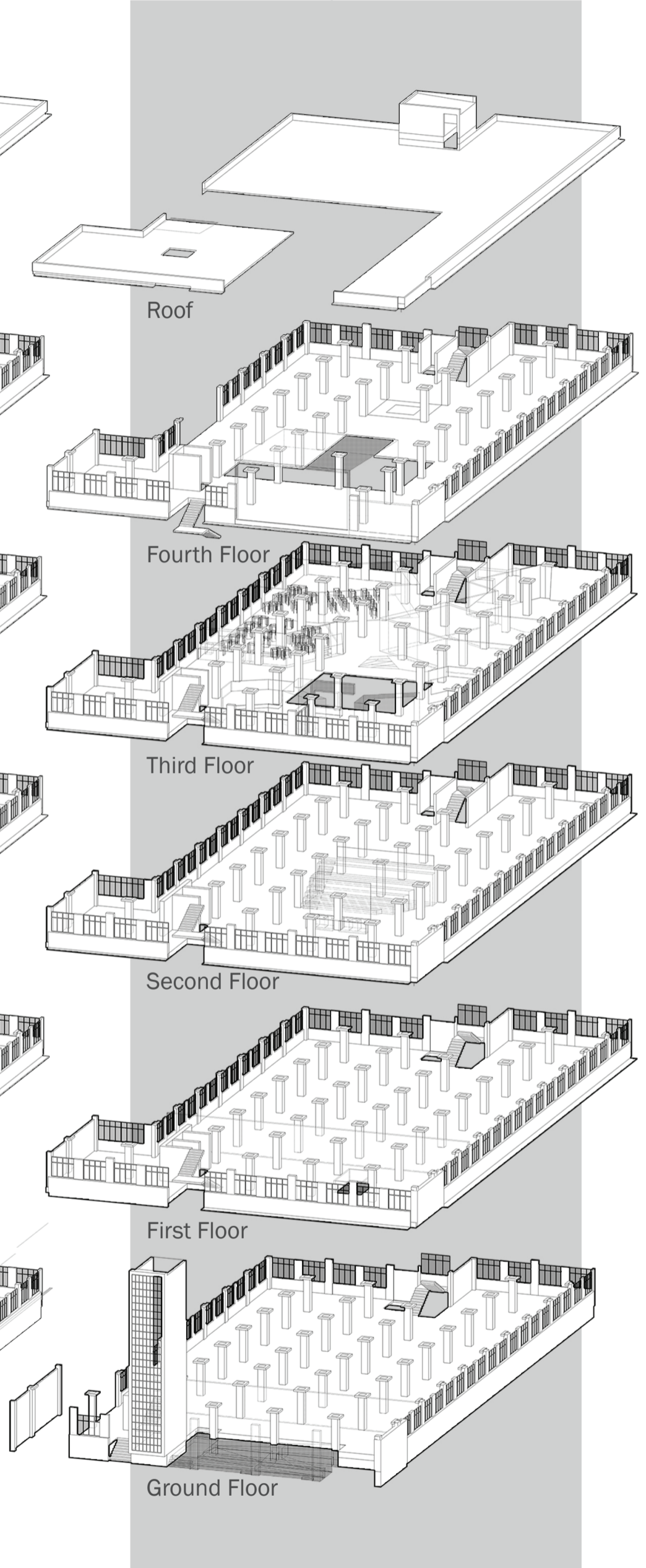
Figure 5.27 Models investigating connection between levels

Intervention Development 7:

Intervention Development 8:

Roof

Roof

Fourth Floor

Fourth Floor

Third Floor

Third Floor

Second Floor

Second Floor

First Floor

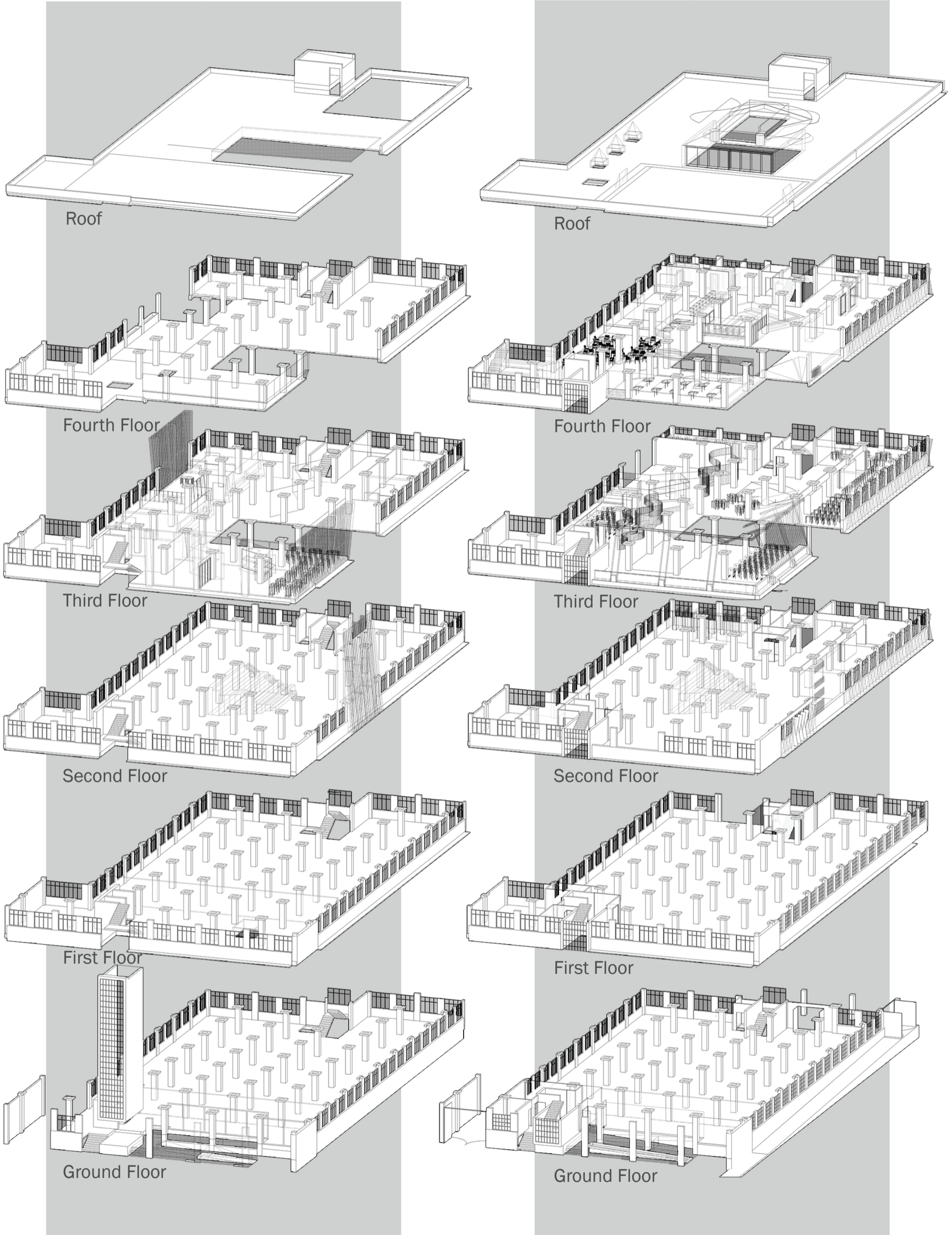First Floor

Ground Floor

Ground Floor

Figure 5.28 Models investigating connection between levels

5.6 Users

The users of the space can be broken up into daily users (teaching staff, administrative staff, cleaning staff and most importantly the pupils) as well as visitors (parents, teaching staff and scholars from other visiting schools).
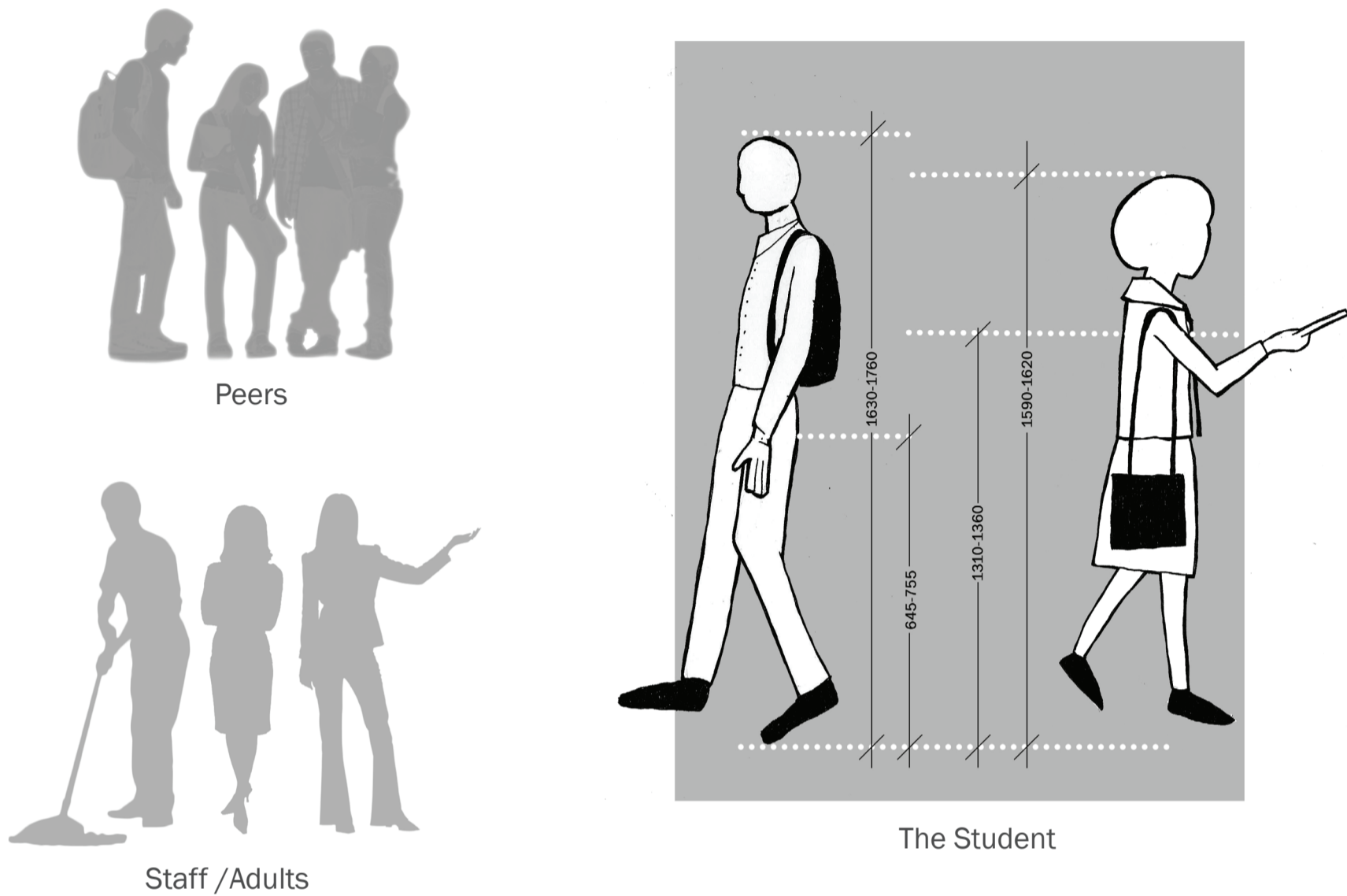
Peers

The Student

Staff /Adults

Figure 5.29 Everyday users

5.7 Client

The client is Shift College, an independent high school group. The brief was to design an educational environment which shifts the perspective of MST education. The school should be able to fulfill the prescribed academic curriculum while incorporating experiential learning into the traditional educational model.

The students should be exposed to real life situations where they can test and experiment with their skills.
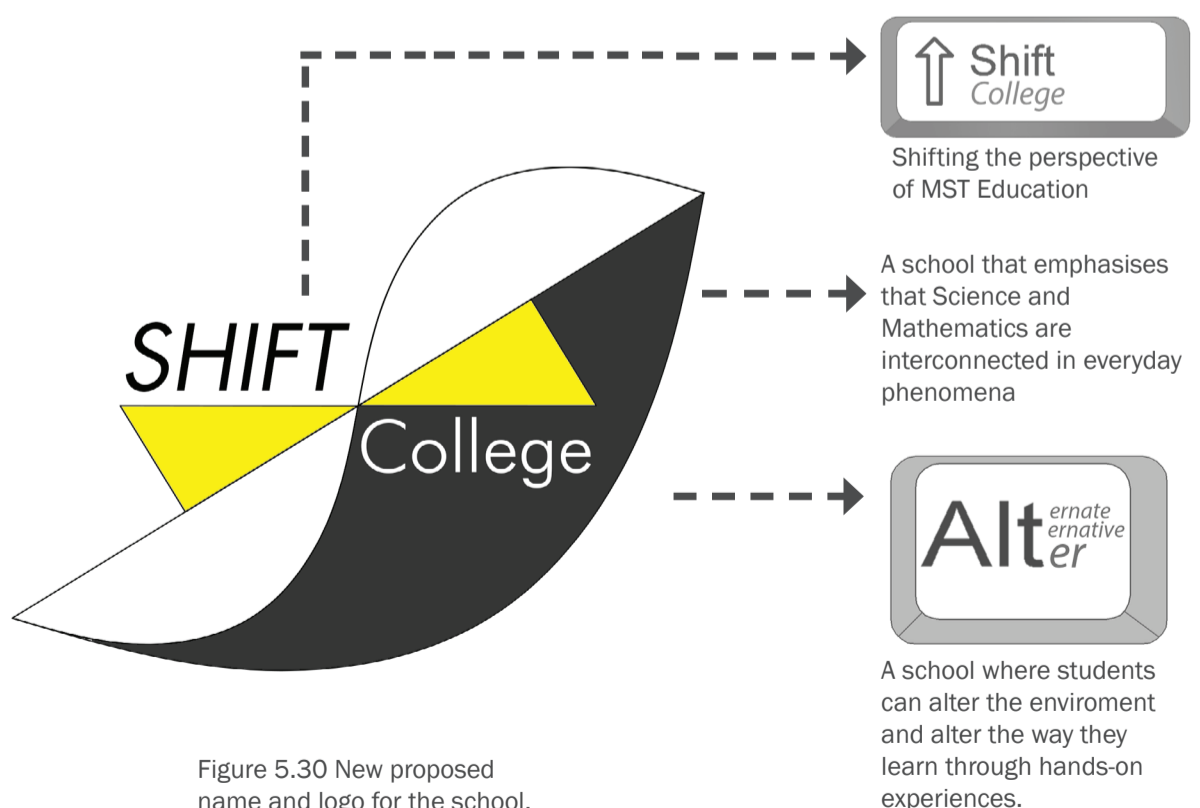
⇧ Shift
College

Shifting the perspective of MST Education

A school that emphasises that Science and Mathematics are interconnected in everyday phenomena

Alt*ernate* *ernative* *er*

A school where students can alter the enviroment and alter the way they learn through hands-on experiences.

SHIFT
College

Figure 5.30 New proposed name and logo for the school.

5.8 Conclusion

These design stages determined how the school could spatially, socially and educationally become more interconnected. The relationship between subjects and adjacent spaces were established to enable cross-pollination between different learning activities. This chapter also investigated how students can organise space through furniture to their needs. It was determined that spatial layout plays a major role in enabling different teaching and learning methods.