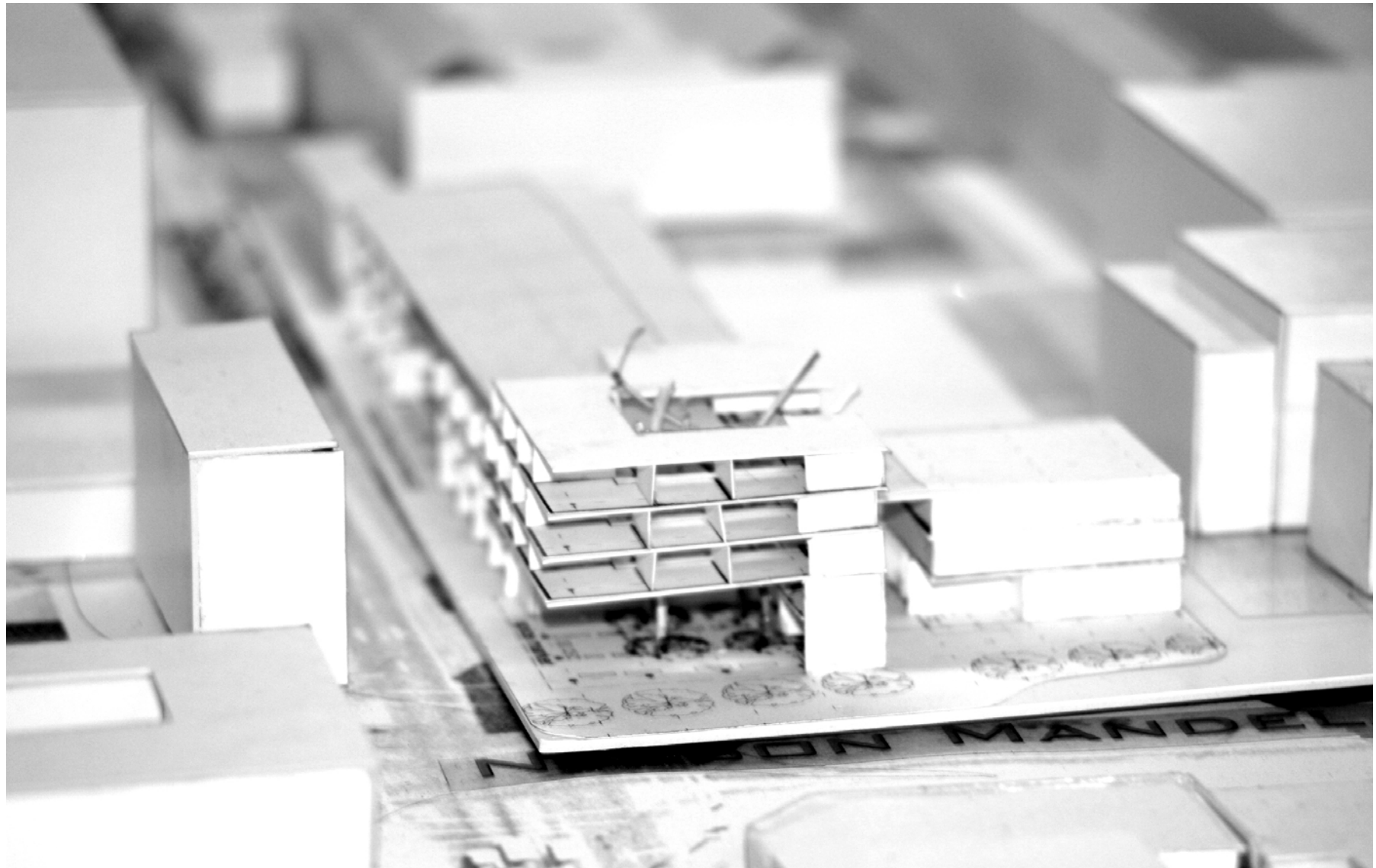


9 Technical Investigation

- 9.1 Introduction
- 9.2 Materials
- 9.3 Structure
- 9.4 Storm-water
- 9.5 Service Cores
- 9.6 Air-conditioning
- 9.7 Fire Strategy



9.1 Introduction

The function of the building is to be reflected in its structure. Just as the talent, the driving force behind the student's creativity is to be revealed, so too is the building to reveal itself, not hiding behind layers of plaster and paint but being what it is meant to be, an honest building that does what it is supposed to do without attracting attention away from the rich heritage present on the site.



9.2 Materials

The building is to be as low-maintenance as possible, thus materials are to be chosen for their ability to weather well.

9.2.1 Brickwork

Red face brick is used for educational institutions throughout Tshwane and is thus being used to make the building read easily as an educational facility within the context of the city. Face bricks, although purchased at a higher cost than stock bricks, save the client maintenance costs as they do not need to be plastered and painted.

9.2.2 Glazing

As the building is to display the movements and activities of its users, the use of glass and structural glazing was imperative. A patented aluminium system with spider fixings is utilized to allow for maximum exposure of the interior.

9.2.3 Timber

Balau timber is used for decking, handrails and sun-shading elements. The choice of timber was made for aesthetic and maintenance reasons. Once again a more expensive material was chosen for its long term advantages and low maintenance costs. The balau weathers to grey and does not need to be treated.

9.2.4 Steel

The use of steel is limited to staircases, with stainless steel being used for balustrades, once again employed for its low maintenance requirement.



Fig.9.2 Brickwork

Fig.9.3 Glazing

Fig.9.4 Glazing

Fig.9.5 Glazing

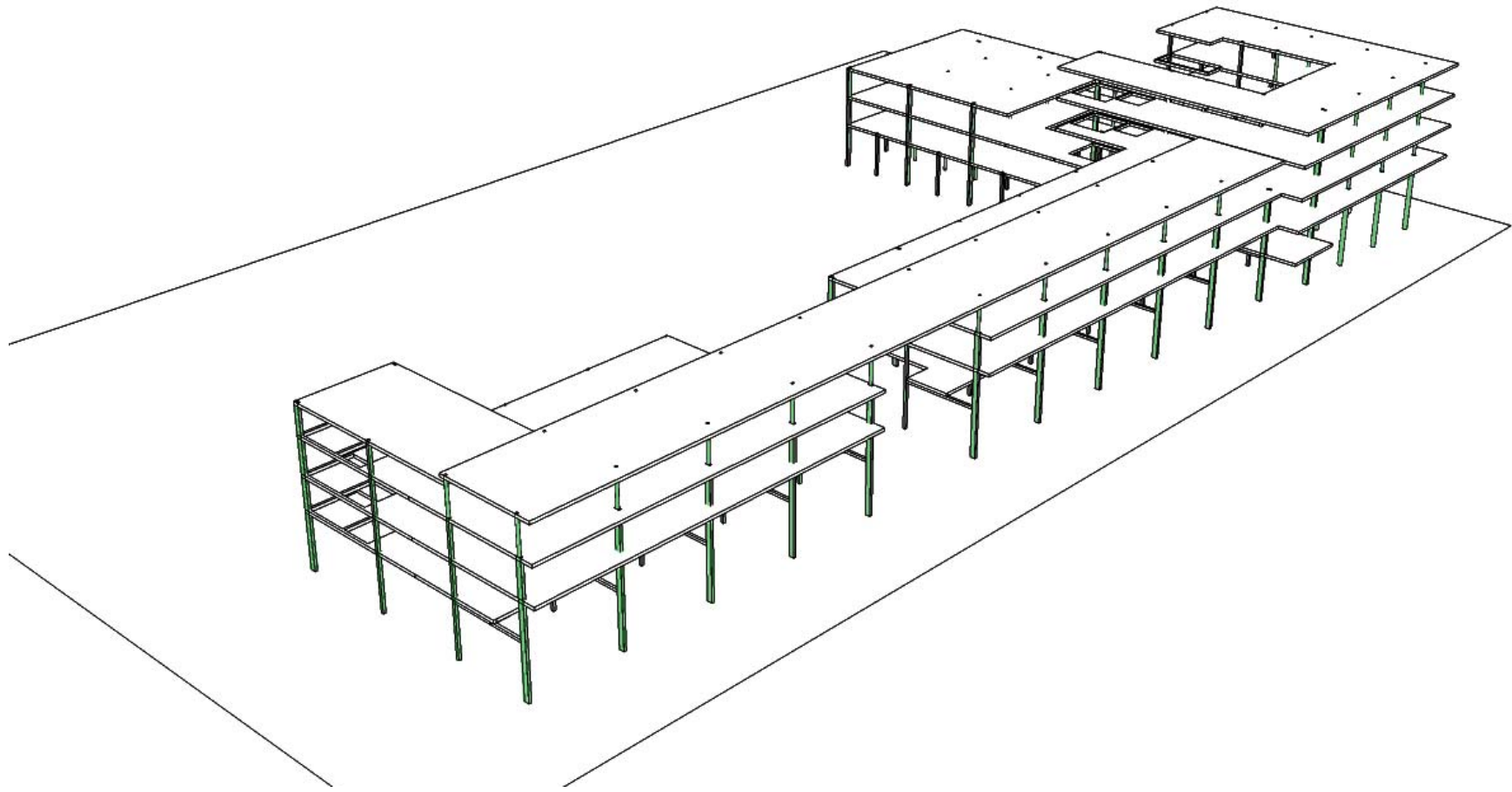
Fig.9.6 Shopfront

Fig.9.7 Stairs

Fig.9.8 Stainless Steel Balustrade

Fig.9.9 Glazing Detail

— 9:6 —



9.3 Structure

A concrete structure is selected for economic and heritage purposes.

A system of reinforced concrete columns, slabs and conservative use of reinforced concrete cantilevers and beams is used. The structure is exposed to take the idea of interaction further: the interaction of raw student talent with the public and the interaction of structure with materials.

9.3.1 Columns

There are 25 rectangular reinforced concrete columns (220 x 440 mm) which encase \varnothing 85 mm rainwater down pipes. These columns are used where needed to aid storm-water drainage and to line up with masonry walls.

There are 5 circular reinforced concrete columns (\varnothing 250 mm) which encase \varnothing 85 mm rainwater down pipes. These columns are used where needed to aid storm-water drainage and to line up with sliding stacking doors.

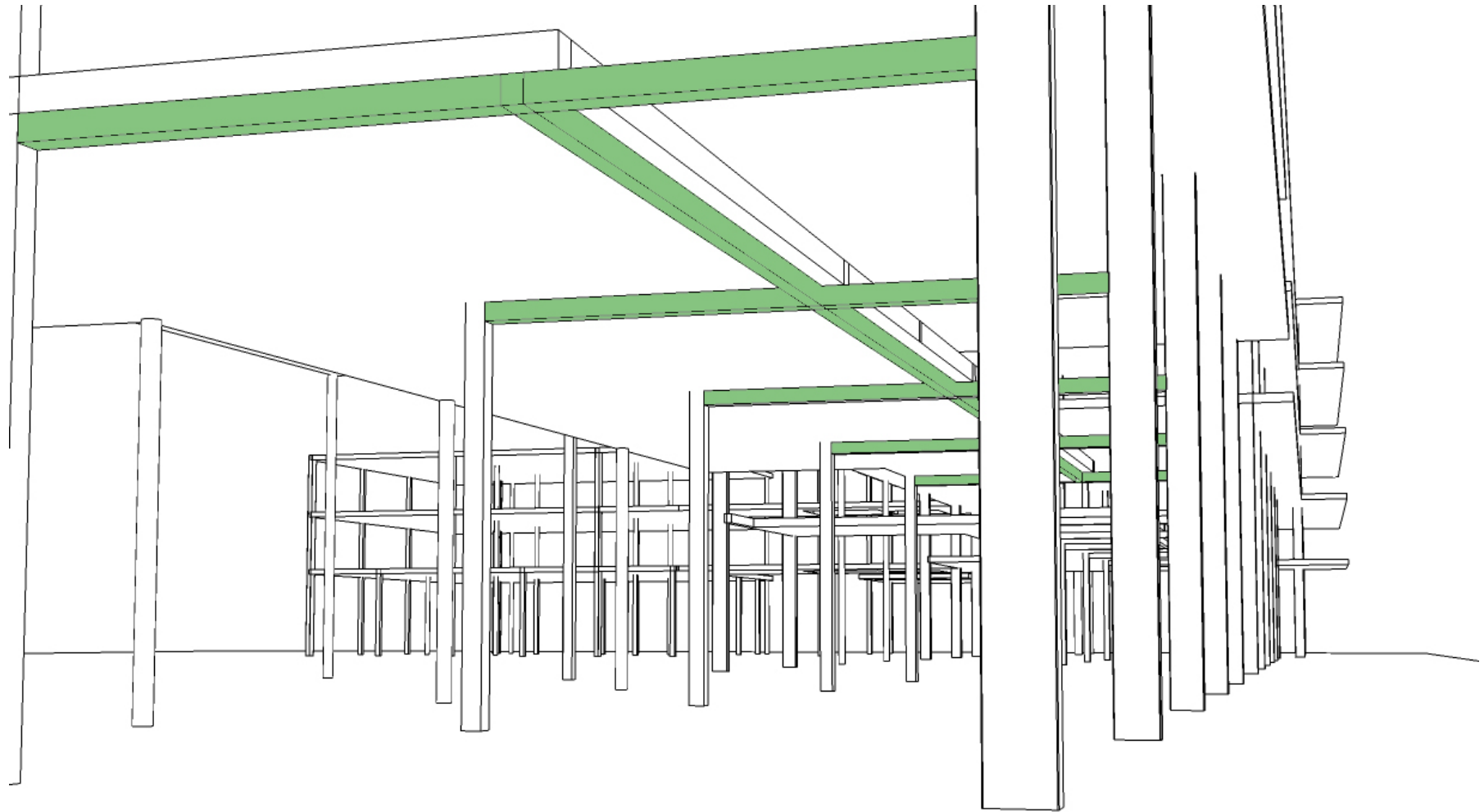
There are 5 circular reinforced concrete columns (\varnothing 400 mm) which encase \varnothing 85 mm rainwater down pipes. These columns are used in the market where needed to aid storm-water drainage and support a double volume where high levels of pedestrian movement can be expected.

There are 14 circular reinforced concrete columns (\varnothing 220 mm). These columns are used where high levels of pedestrian movement can be expected.

There are 28 square reinforced concrete columns (220 x 220 mm). These columns are used where high levels of pedestrian movement can be expected.

Fig.9.10 Column Structure

— 9:8 —



9.3.2 Beams

Reinforced concrete beams have primarily been used in the line shops to facilitate their double volume. The beams serve to support the first-floor slab.

9.3.3 Slabs

Reinforced concrete slabs span no more than 8 m and are 255 mm thick.

Reinforced concrete coffer slabs span no more than 10 m and are 625 mm deep.

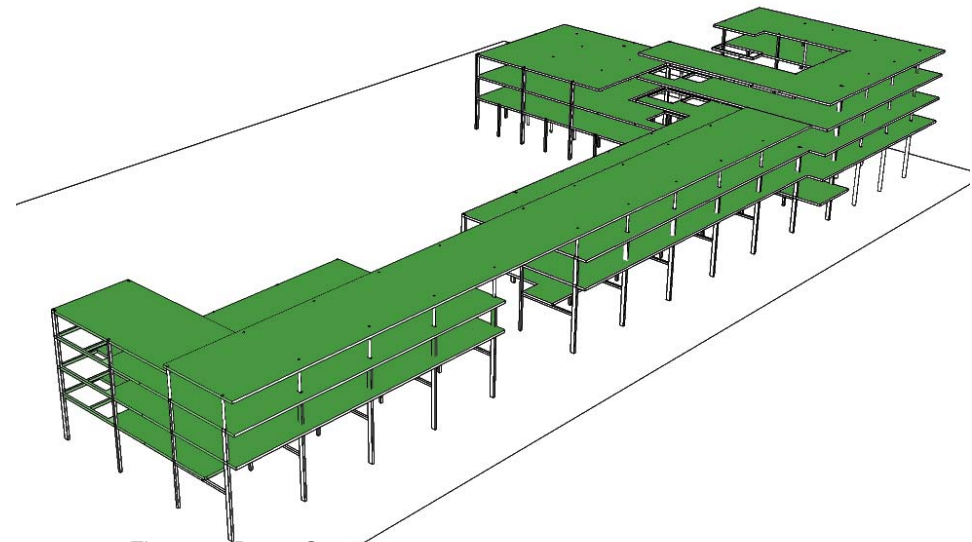
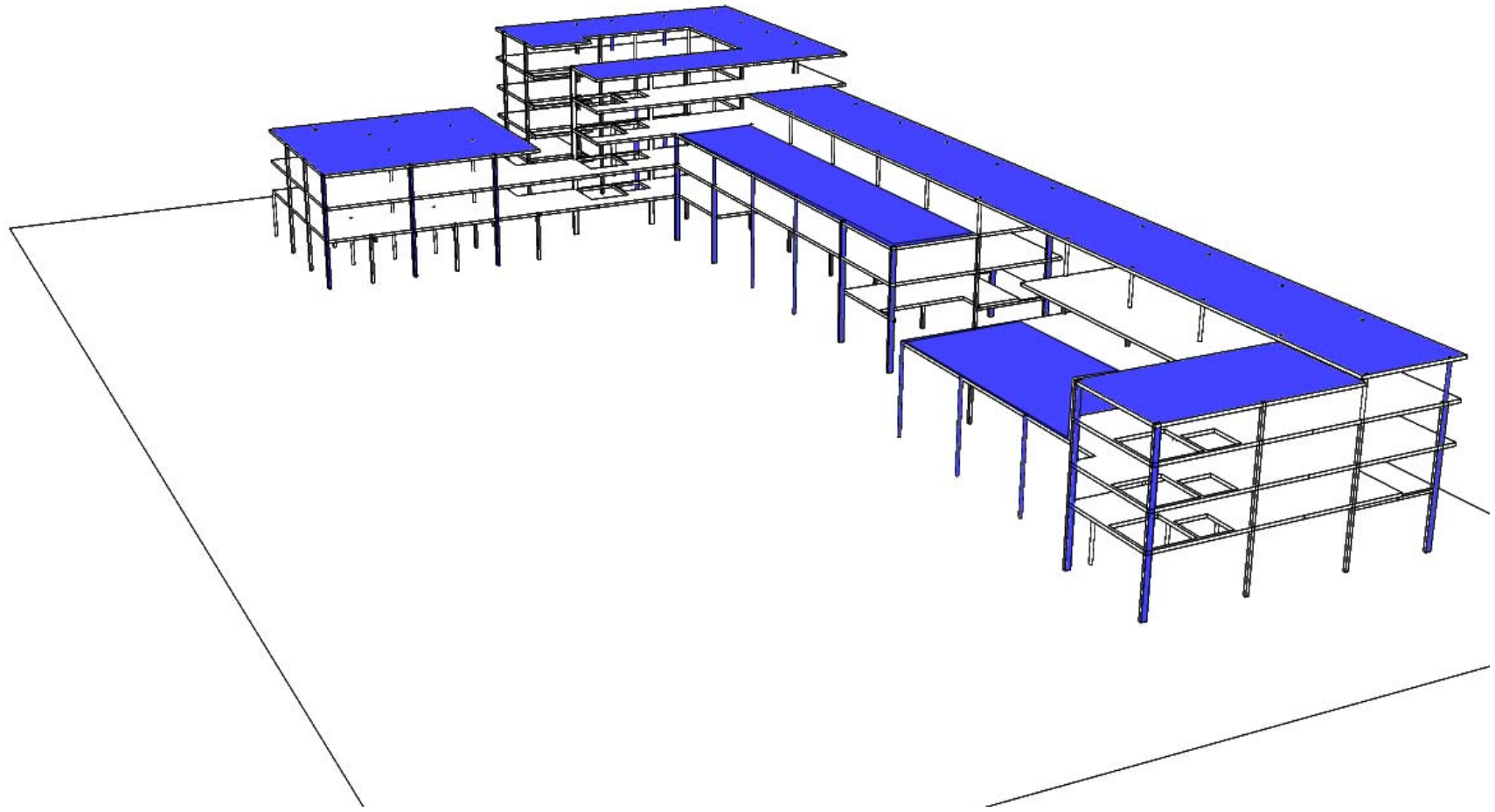


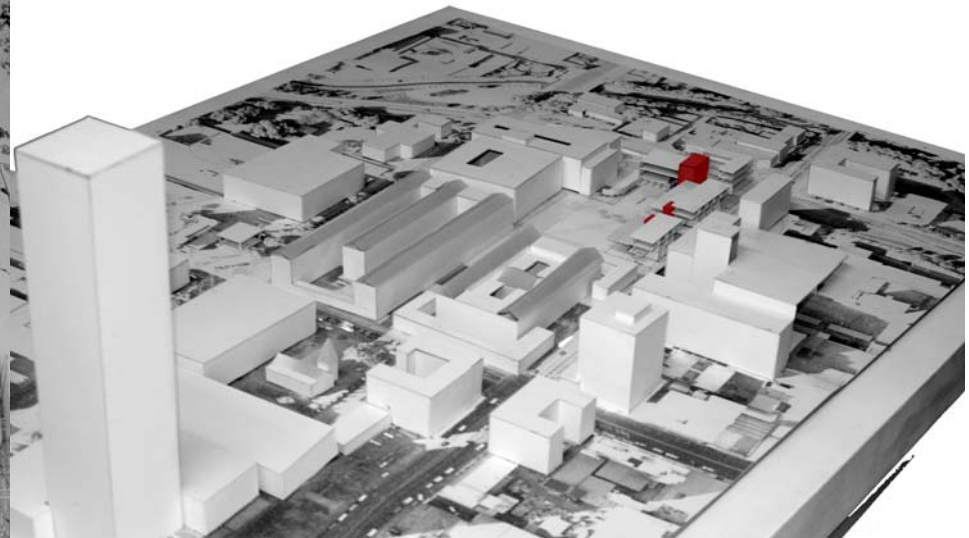
Fig.9.11 Beam Structure
Fig.9.12 Slab Structure



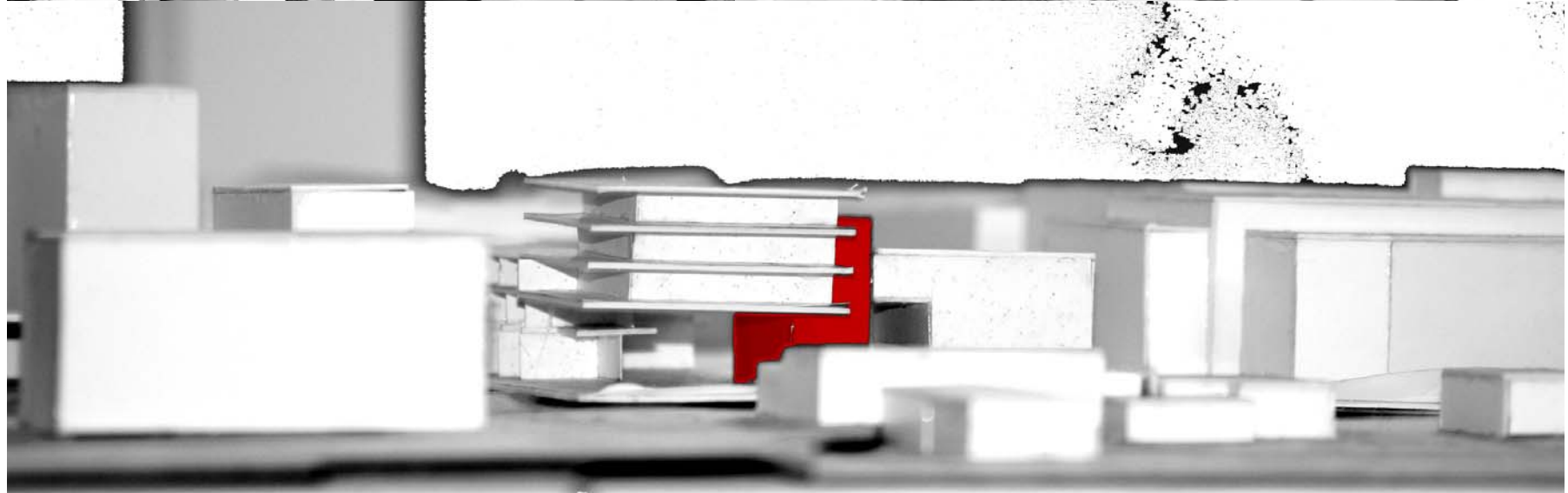
9.4 Storm-water

Storm-water drains off six horizontal surfaces sloped at 1:70 to full-bore outlets which drain in turn into \varnothing 85 mm rainwater down pipes. The down pipes drain into \varnothing 250 mm storm water channels which collect water within the site boundaries and connect to the municipal storm water system at 2 points.





— 9:12 —



9.5 Service Cores

The use of service cores was investigated early on in the design, and the decision was made to concentrate vertical circulation, kitchens and toilets in central cores.

9.5.1 Circulation

The building contains two central vertical circulation cores, each containing a staircase and lift adequate for wheelchair use. Circulation routes are placed to allow for maximum surveillance of outside activities.

The western core serves two upper floors with the staircase continuing to the roof terrace. The circulation route frames the double volume of the studio on first floor level and is open but roofed on the second floor. All routes lead to an additional fire escape.

The eastern core serves five floors and has a bridge linking it to the study centre on first and second-floor level. The circulation route on first-floor level leading to the studios frames the double volume of the restaurant, while the circulation routes for all other floors are open but roofed. The circulation routes lead to two additional fire escapes. The circulation route to the administration offices looks down onto the market below.

Fig.9.15 Conceptual Model

Fig.9.16 Conceptual Model

Fig.9.17 Conceptual Model

9.5.2 Kitchens

There are two kitchens located in the building, one to serve the students in the Pre-Incubation Phase and a permanent kitchen to serve the restaurant used by students in the Incubation Phase.

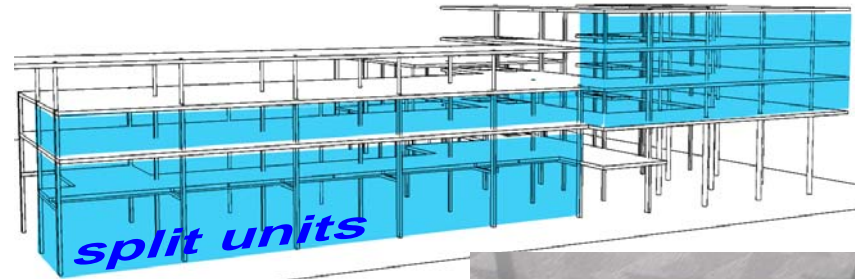
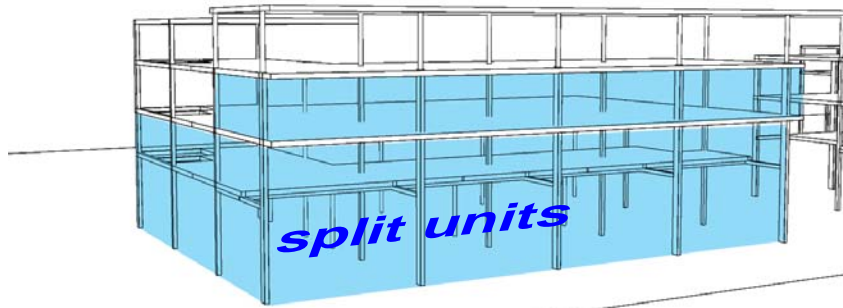
The Pre-Incubation Kitchen is a combined kitchen which functions to serve the six food court outlets located beneath the study centre. Students share facilities such as the goods store, cold room and wash bay. They each have an individual station at a centralized point for preparation and cooking, with separate serving stations near their individual outlets.

The Incubation Kitchen was designed according to commercial requirements and is approximately half the size of the restaurant.

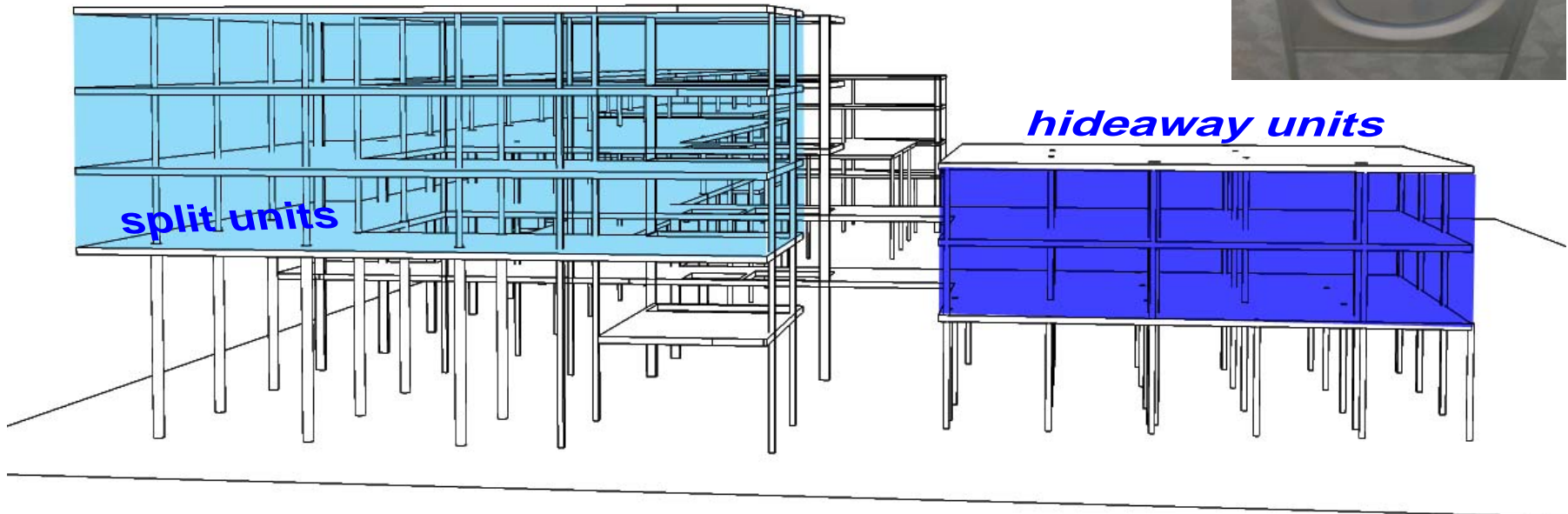
Both kitchens were designed with facilities for storage, preparation, cooking, serving, washing up and refuse removal. Circulation within kitchens had to be dealt with so that users passing each other would not hinder the performance of the kitchen.

9.5.3 Toilets

There are four toilet cores located within the building. The western toilets form part of the vertical circulation core, while the eastern toilets are adjacent to fire escapes, and the fourth serves the study centre. Toilets are all served by ducts and are divided into Gents and Ladies with unisex paraplegic toilets. Double entry doors with a ventilated lobby have been used for toilets in the restaurant and study centre.



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9.6 Air-conditioning

An interview with Pepe Stedman from Climatron (Stedman, personal communication, 2006) revealed that three types of ventilation would have to be used in the building. Different functions of interior spaces and cost implications ruled out the use of a centralized plant system. The three systems are as follows:

9.6.1 Split Units

26 split units are used in the line shops, studios, restaurant and offices. An under-ceiling split unit would have to be used as it can ventilate horizontally up to a distance of 10 m. The split units have exterior units which can be located on a roof or exterior wall but should not be placed further than a 20 m horizontal distance from the interior unit.

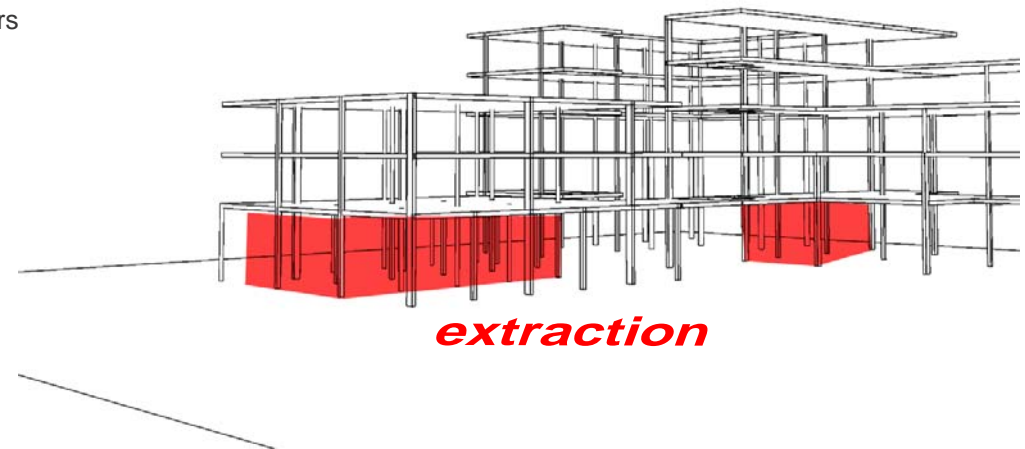
9.6.2 Hideaway Units

Hideaway units are used in the study centre. This allows for 100 m² to be ventilated by a single hideaway unit linked by flexible ducting to six ceiling outlets. 6 hideaway units will be needed to ventilate the two floors of the study centre.

9.6.3 Extraction

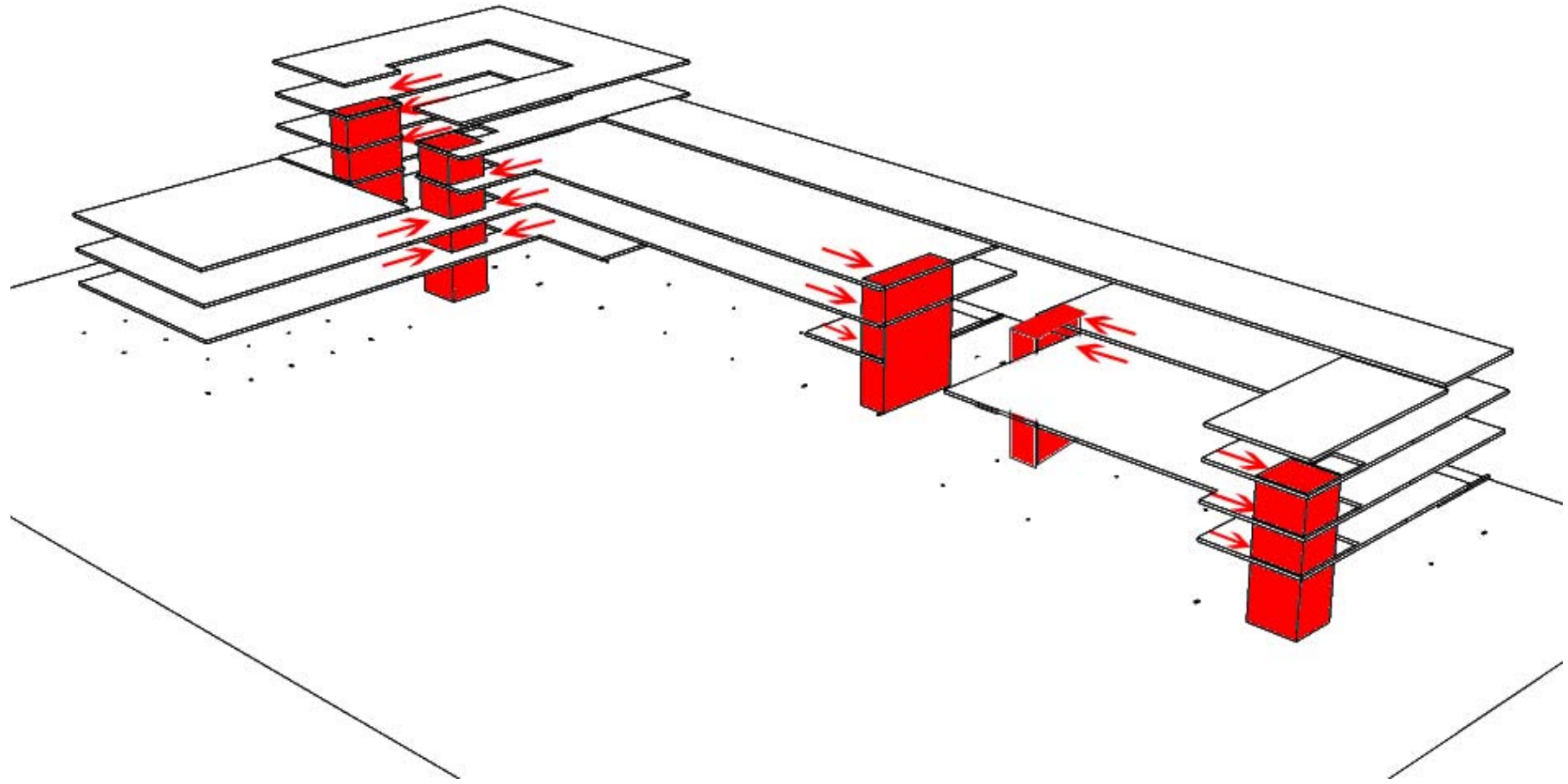
Kitchens and ducts are extracted only and require grills in doors and walls to allow for air replacement. Extraction from kitchens could provide a fire hazard and thus needs to be located on exterior walls. The filters in kitchens need to be cleaned regularly to reduce the risk of fire.

— 9::15 —



- Fig.9.18 MCM Unit
- Fig.9.19 Split Units - Western block
- Fig.9.20 Split Units - Eastern block
- Fig.9.21 Hideaway Unit
- Fig.9.22 Hideaway Units - Study centre
- Fig.9.23 Extraction from kitchens

— 9::16 —



9.7 Fire Strategy

The building has two main vertical circulation cores as well as three additional fire escapes which can open on ground level towards the outside but for security purposes will only be accessed from the interior of the building. Fire escapes are separated from the structure by fire doors at each level and by walls with a 120 minute fire resistance. A high-capacity sprinkler system with a dedicated water supply is fitted in the study centre, restaurant and kitchens. The sprinkler system is activated through a dual redundancy thermal activation system as per SABS 0139. Fire hydrants are placed at 30 m distances where the sprinkler system is not in place.