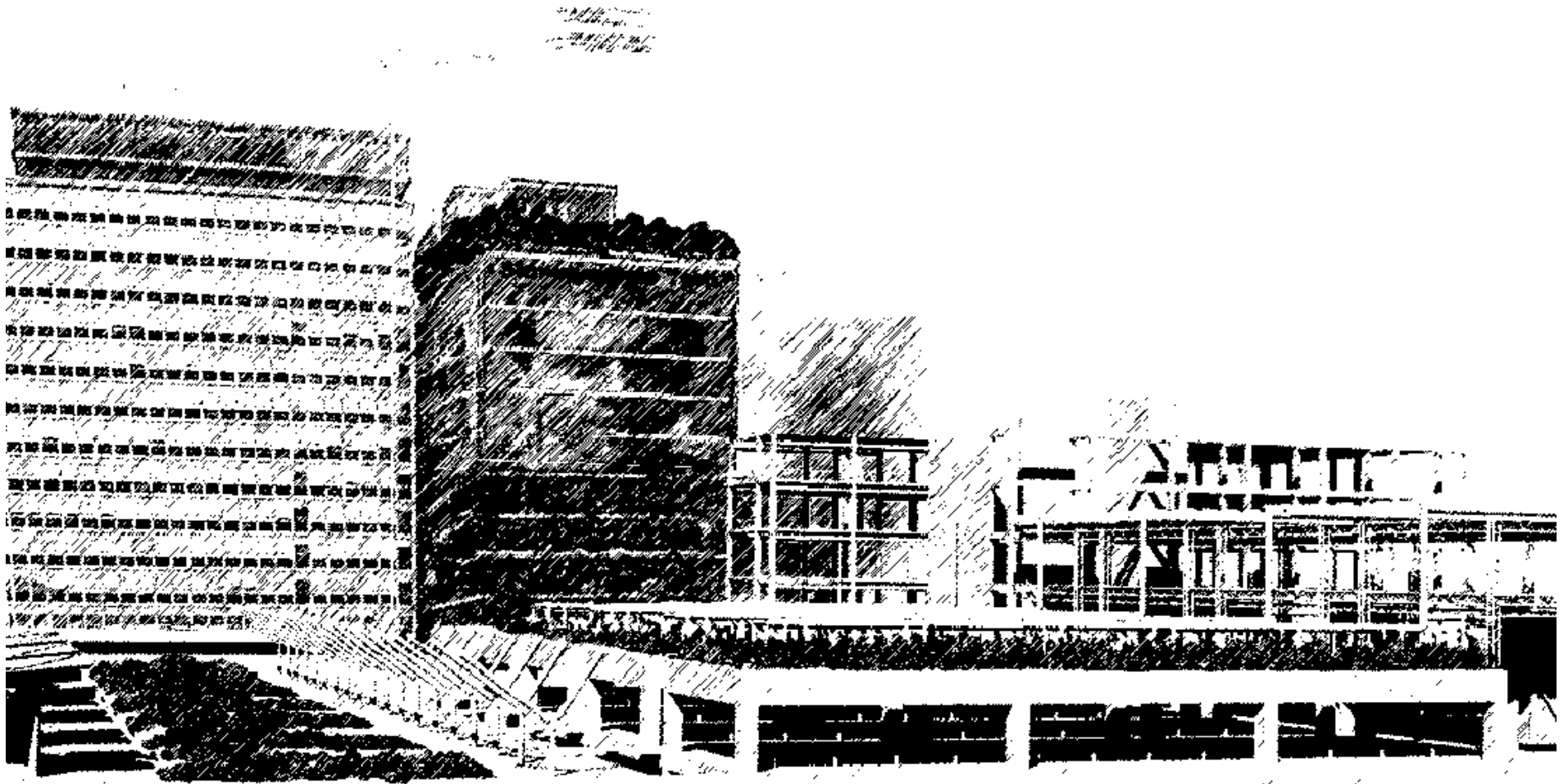


INNER CITY REGENERATION

TECHNICAL REPORT



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FOREWORD

The numbers in the report refer to the baseline document

The focus of this document is on a few issues mentioned in the baseline document in which I had a specific interest.

These issues were explored and technically resolved to a certain point.

TECHNICAL REPORT

2 SOCIAL ISSUES

2.1 OCCUPANT COMFORT

2.1.1 LIGHTING

As mentioned in the Baseline document, the main source lighting will be the sun. The following section of the report will concentrate on details that will illustrate how natural lighting is acquired throughout the building.

The main sources of lighting are the following:

- Atrium
- Hallways
- Roof (lower complex)
- Northern and Southern facade of the office complex

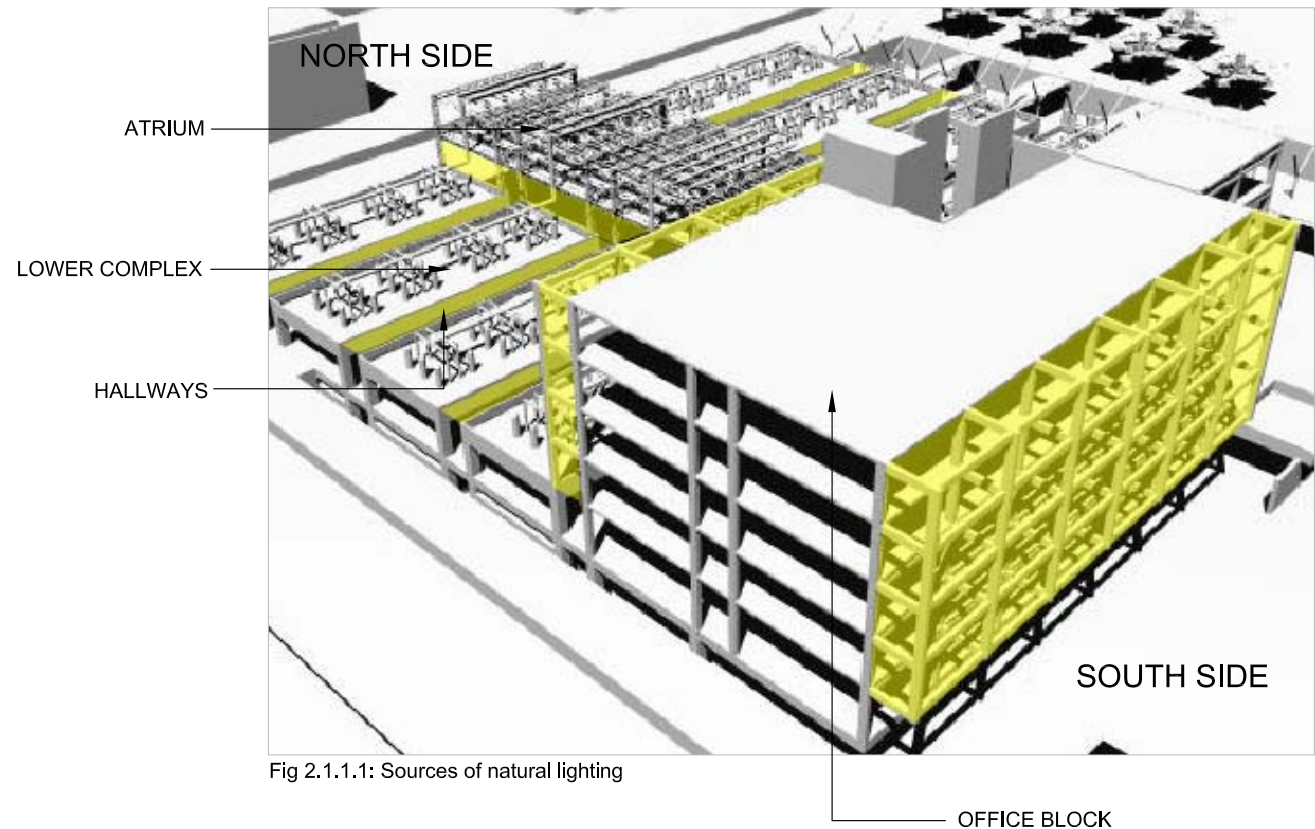


Fig 2.1.1.1: Sources of natural lighting

2.1.1 LIGHTING CONTINUED

Hallways

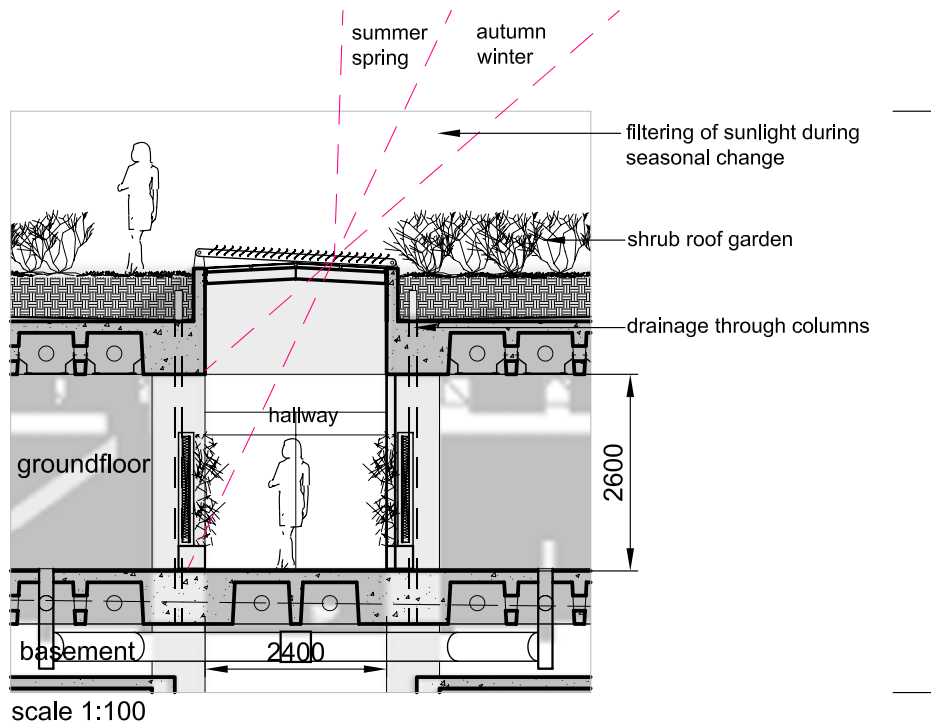
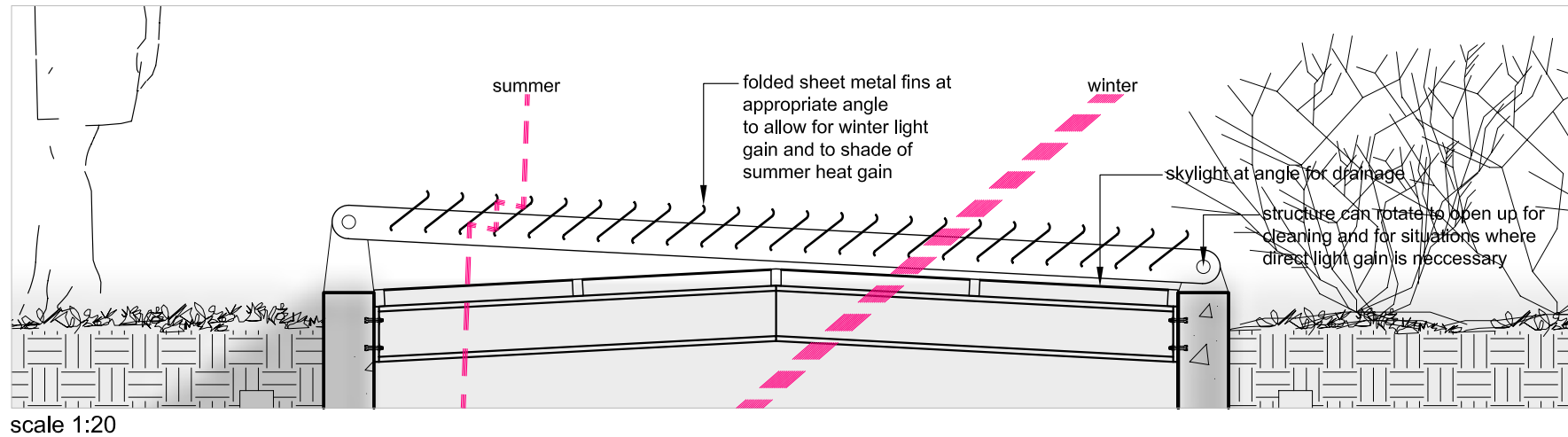
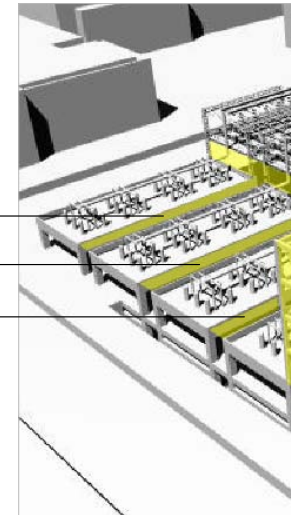


Fig 2.1.1.2: Lighting acquired through hallways



2.1.1 LIGHTING

Hallways

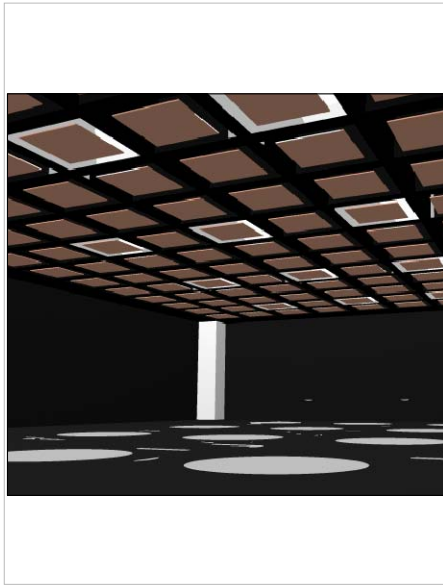
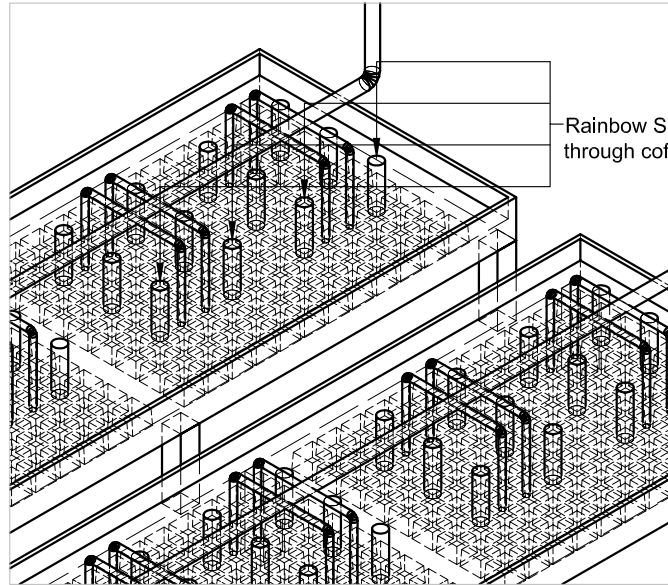


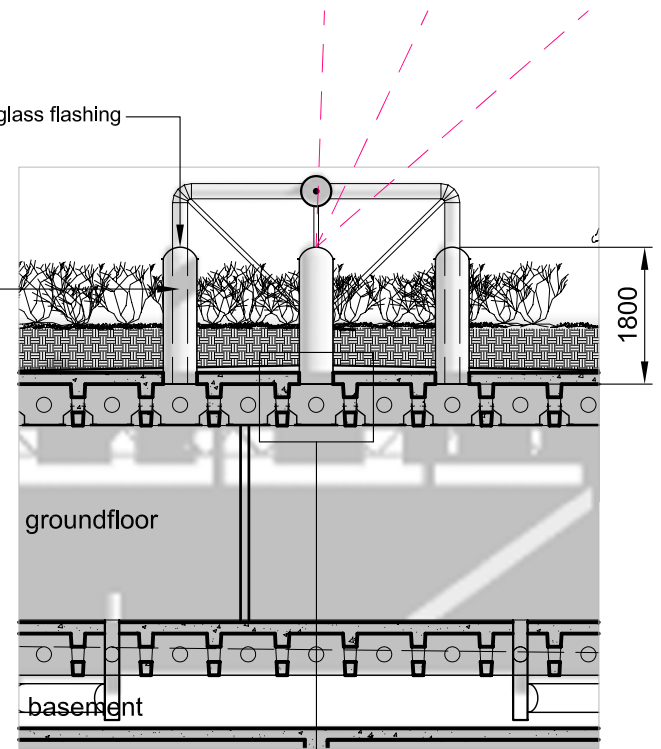
Fig 2.1.1.3: Image of skylight effect



isometric
scale 1:100

Skylight with fibreglass flashing

Rainbow Skylight
through coffer slab



scale 1:100



Fig 2.1.1.4: Skylights through green roof

supershine straight
tube (inside)

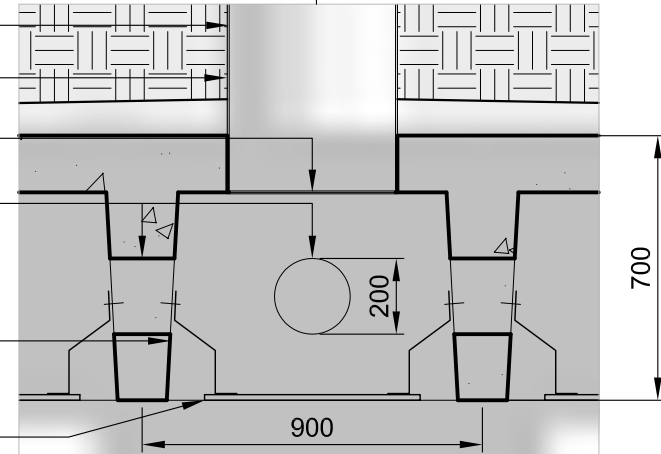
structural steel
tube(outside)

light diffuser

service holes

surface reflecting
layer

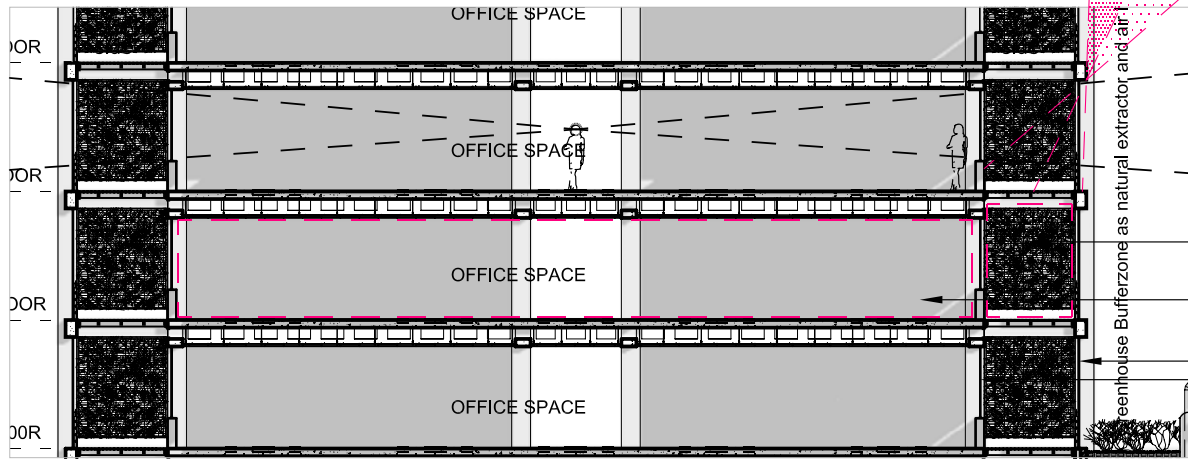
Semi-translucent
polycarbonate
ceiling block



scale 1:20

2.1.1 LIGHTING

Offices



scale 1:100

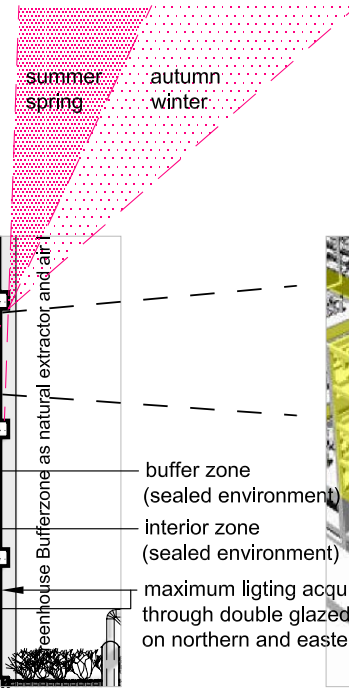
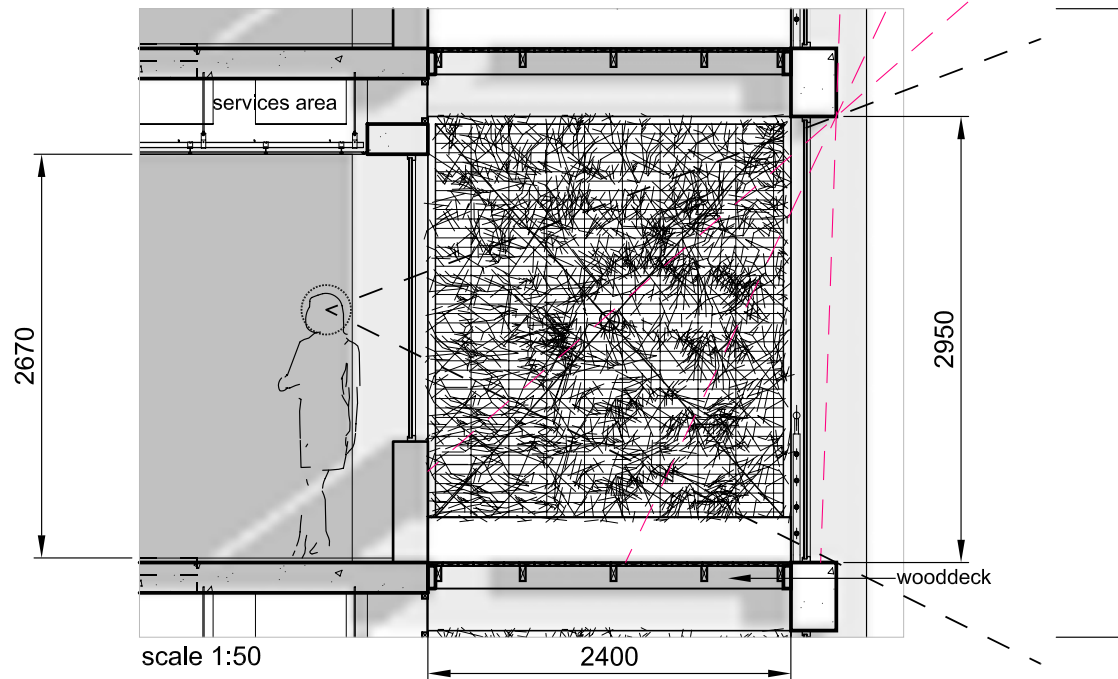


Fig 2.1.1.5: Natural lighting for office block (south)



scale 1:50

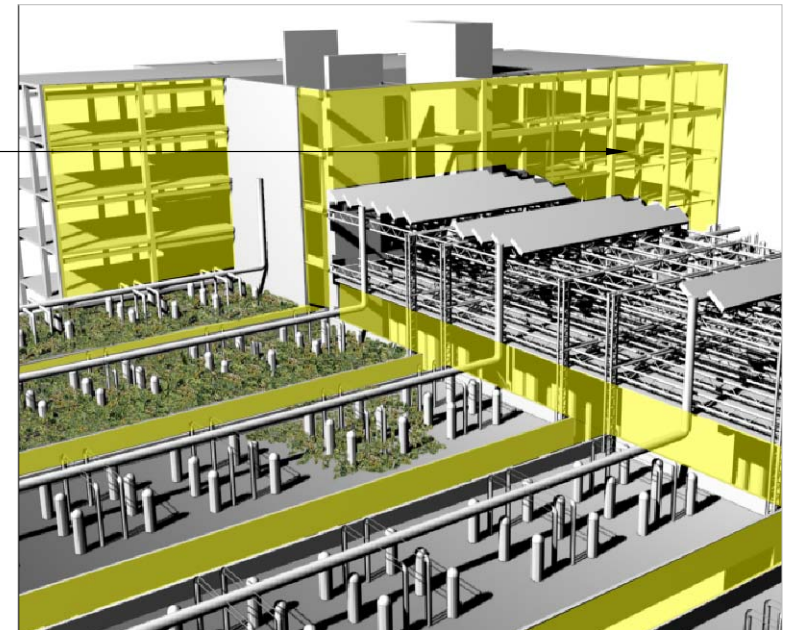


Fig 2.1.1.6: Natural lighting for office block (north)

2.1.1 LIGHTING

Atrium

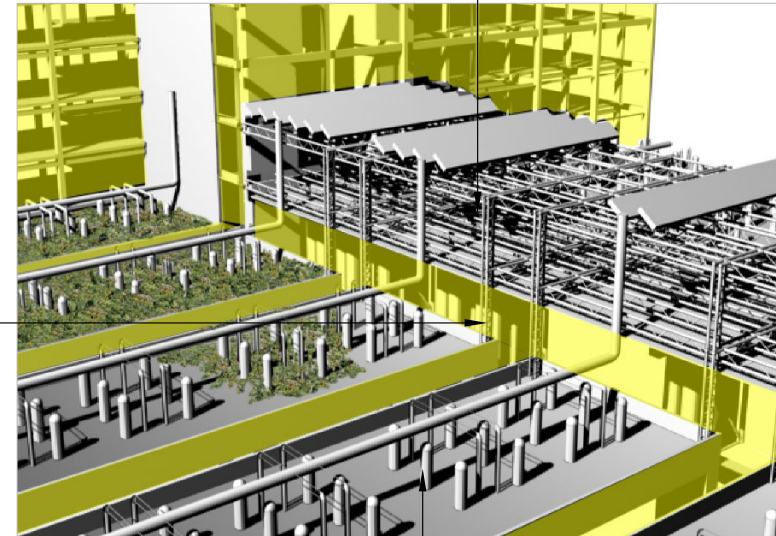
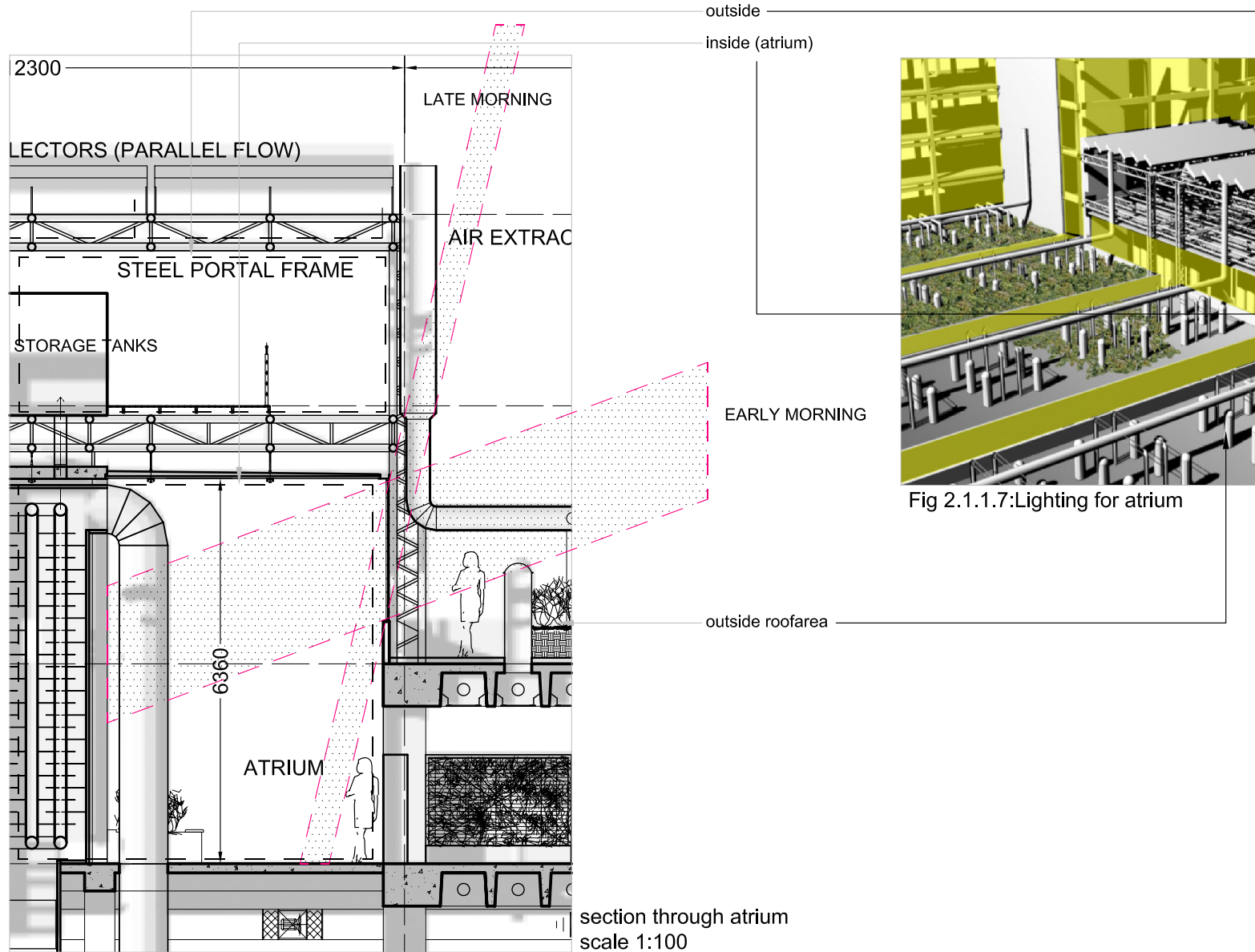


Fig 2.1.1.7:Lighting for atrium

2.1.3 VENTILATION AND THERMAL COMFORT

The site was evaluated and the basement was seen as an asset. Every site, no matter where, offers a potential that has to be harvested. In this way we design buildings that are formed by its context. The old basement of the burned down munitoria building is used to house most of the building's systems. It becomes a valuable aspect of the design and an important factor in the systems development.

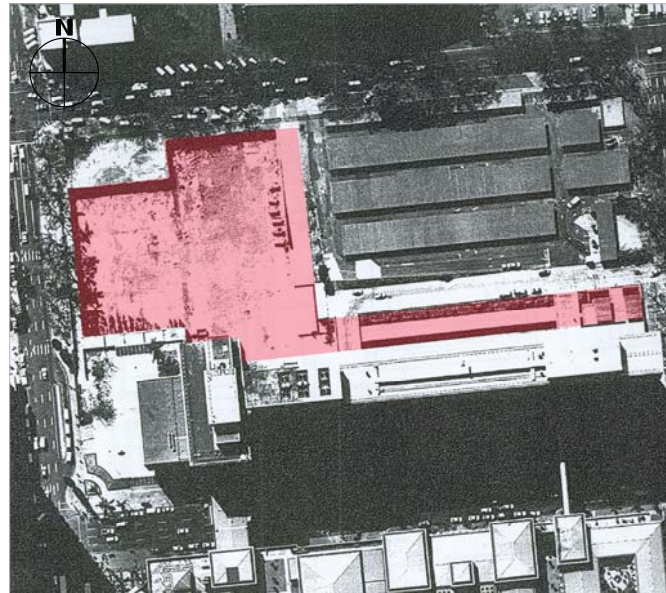
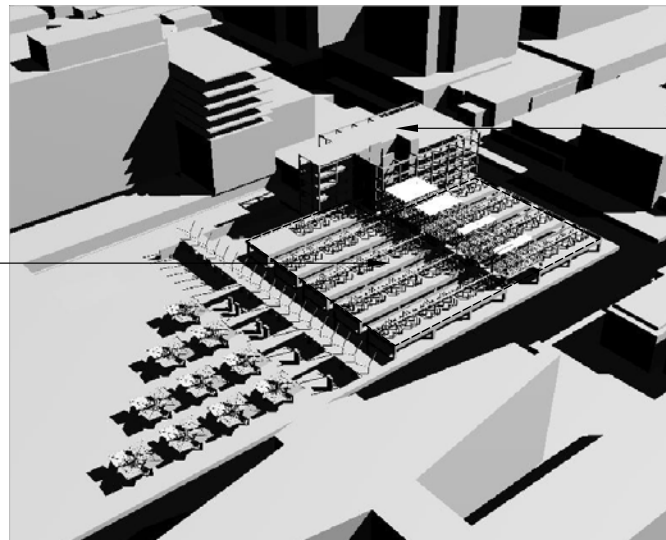


Fig 2.1.1.8: Aerial photograph of site. Basement area marked in red (not to scale).[Pretoria Inner City Aerial Photograph. Tshwane Council.]

The lower complex makes use of the existing basement to house its systems. The complexity of the heating and cooling system is a wanted aesthetic feature of the building.



The office complex ventilation and thermal comfort is designed with less technological intervention than the lower complex

Fig 2.1.1.9: Office complex and Lower complex

2.1.3 VENTILATION AND THERMAL COMFORT

Air requirements for lower complex BLOCK A:

Block A: 316 sqm (square meter)

5l/s per person

@ 6sqm per person (maximum) - 52,6
the maximum amount of persons that will occupy one block of the bottom floor is 53 individuals.

$(5l/s \text{ per person}) \times 53 = 265l/s \text{ per block}$
 $1000l = 0,001m^3 \text{ (cubic meter)}$

0,265m³ per block

24 outlets have been placed beneath the floor to ventilate one block and a maximum speed of 0,3 m/s will be the benchmark for the speed of air passing through this outlet for it not to make a noise.

$\frac{0,265m^3/s}{0.3m/s}$

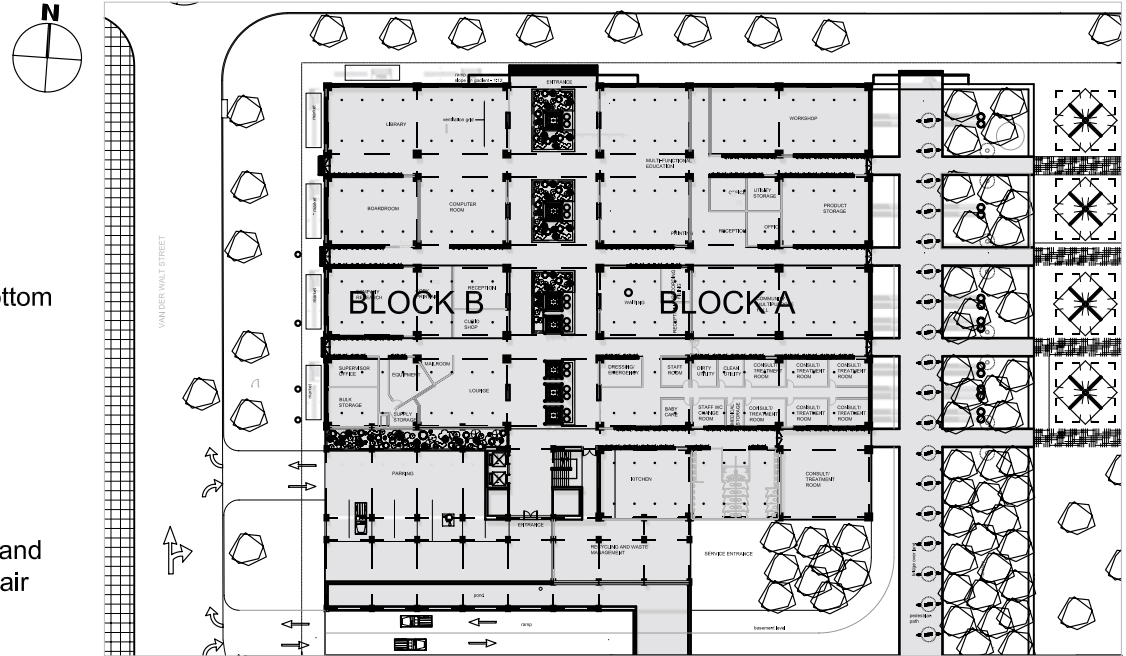
=0.88sqm outlet of air per block

divided by 24 outlets
= 0.036 sqm per outlet

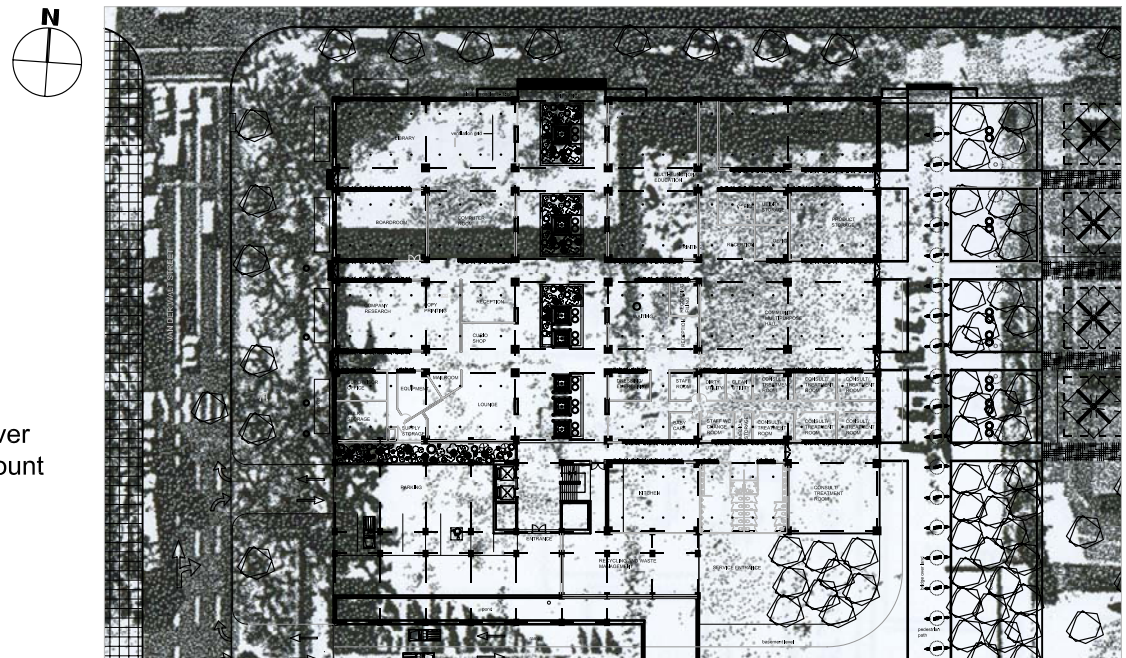
rounded of, is about 190mm x 190mm

Air requirements for lower complex BLOCK B:

Calculations conclude that 0,036sqm per outlet is necessary to deliver the wanted amount of air in block B, which is precisely the same amount per outlet as block A.



Plan. Scale 1:1000



Plan overlay on site photo. Scale 1:1000

2.1.3 VENTILATION AND THERMAL COMFORT

Lower Complex

Heating and cooling system diagram

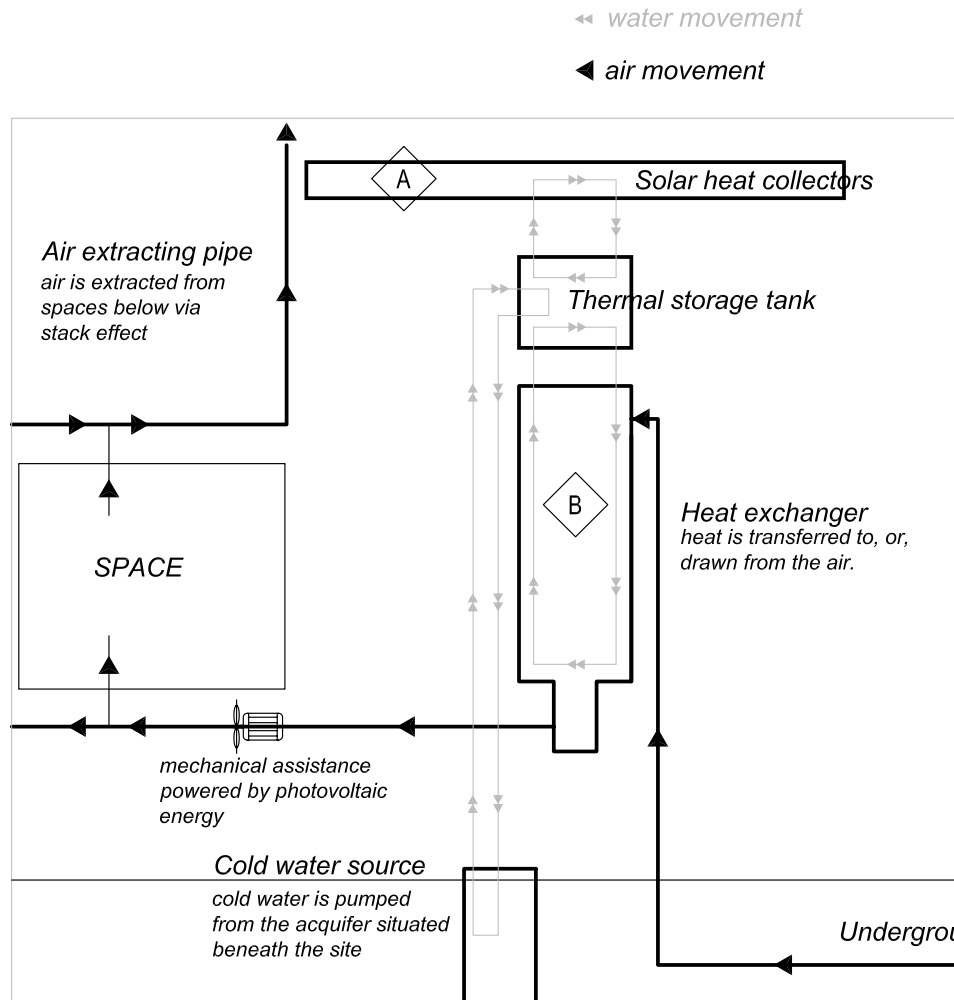


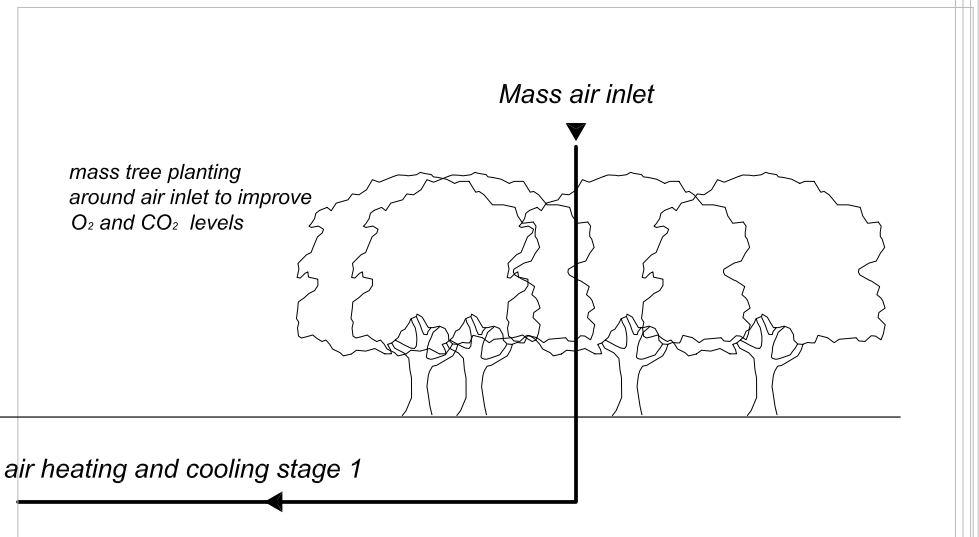
Diagram 2.1.3.1: Solar heating and cooling system for lower complex

The earth's resources are depleting and almost exhausted. Therefore we have to start using nuclear and solar energy. Nuclear energy requires a lot of high technological equipment, not to mention the danger of a nuclear accident. That means that solar energy is our most reliable resource and harvesting its energy does not pollute.

Reversible system that makes full use of its surroundings

During summer, cold water pumped from the acquirer is moved to the storage tank. From there it is transferred to the heat exchanger where it draws heat energy from the air that passes it. This cools the air

During winter, warm water is transferred to the storage tank, from there it runs through the heat exchanger and the air draws energy from this heat source. This warms the air.



2.1.3 VENTILATION AND THERMAL COMFORT

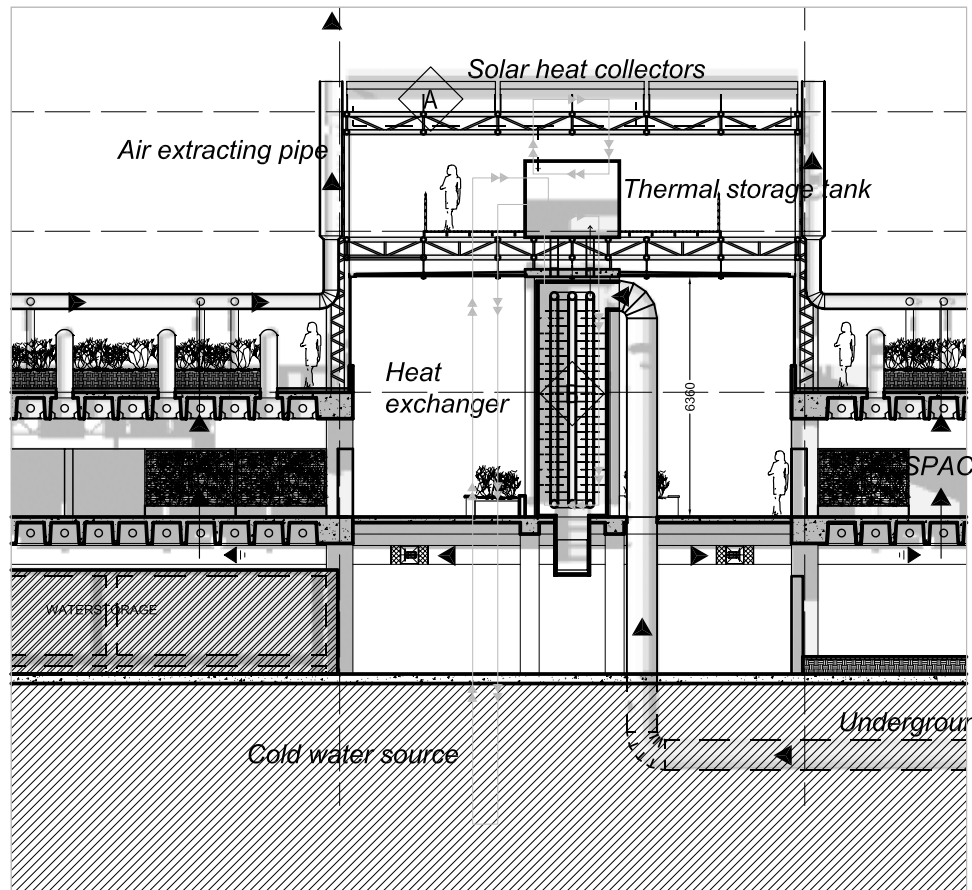
Fig 2.1.3.1: Reverse-side image of system described on current and previous page

Lower Complex
Heating and cooling

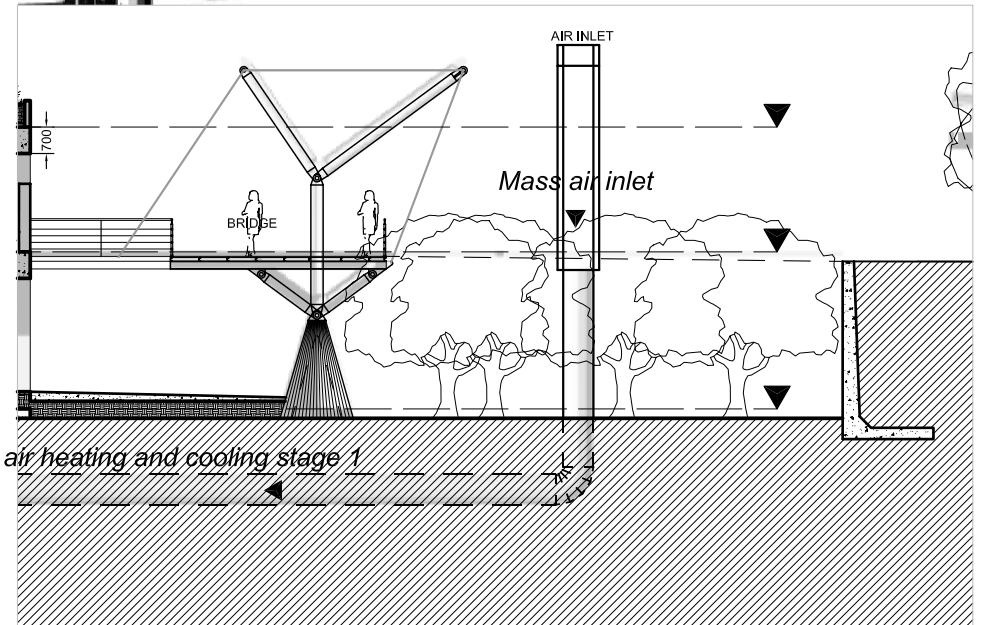
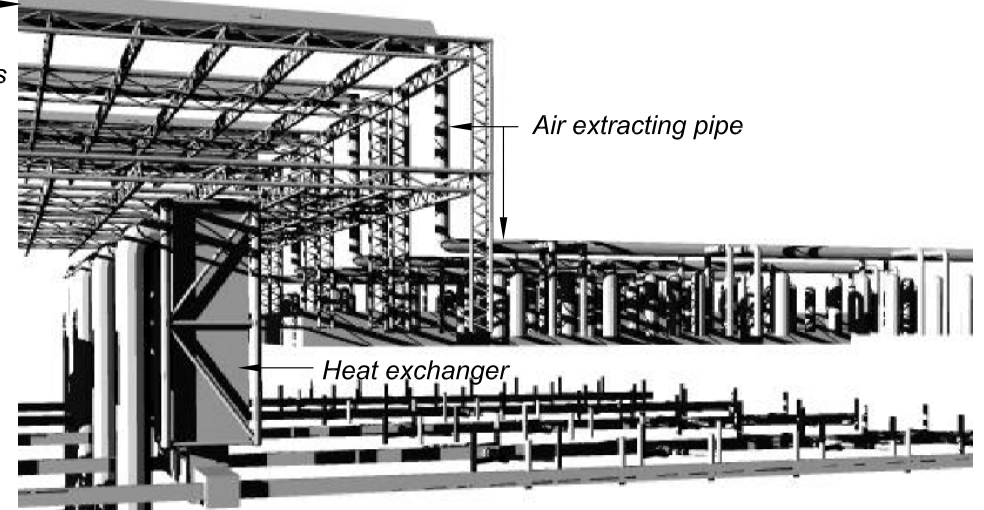
Solar heat collectors

← water movement

◀ air movement



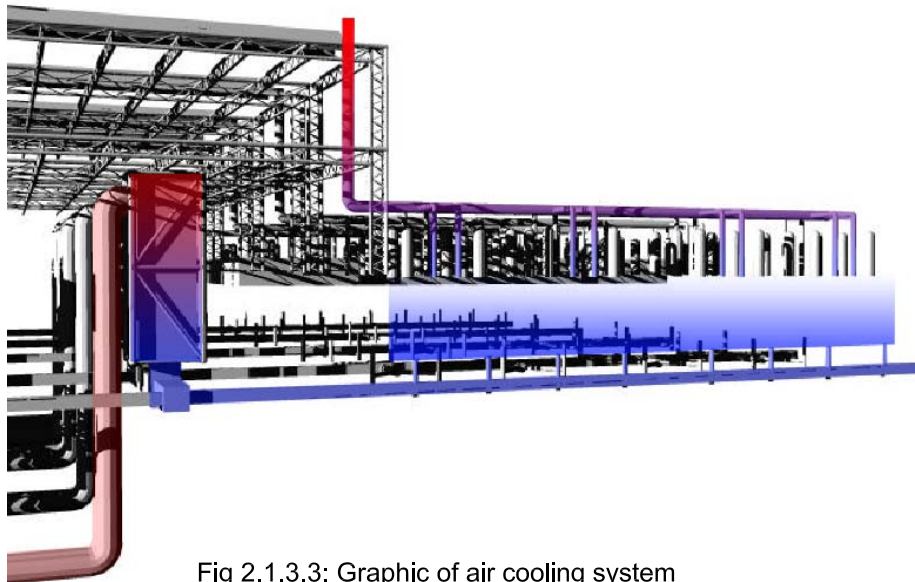
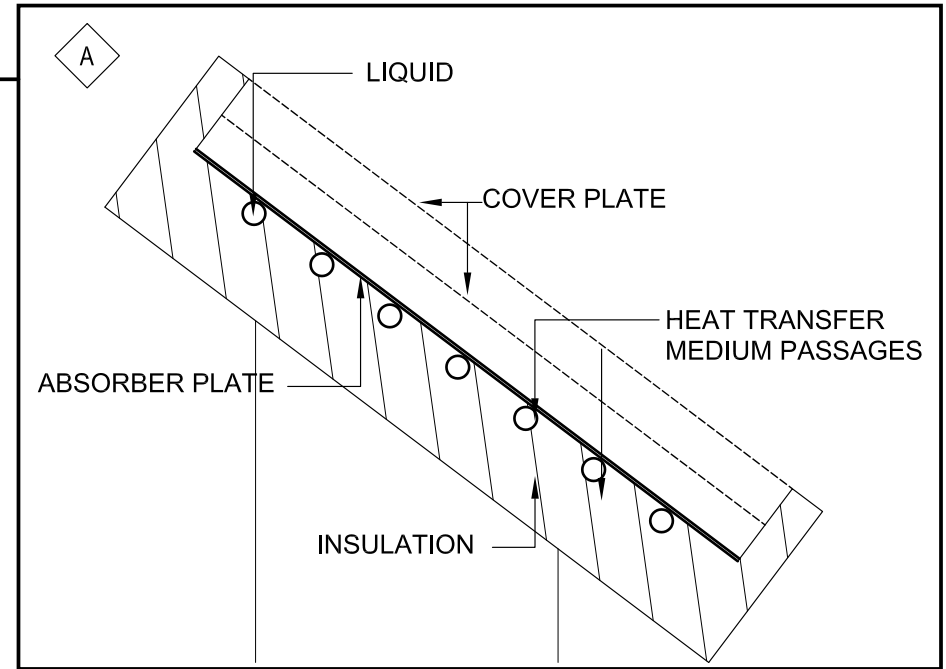
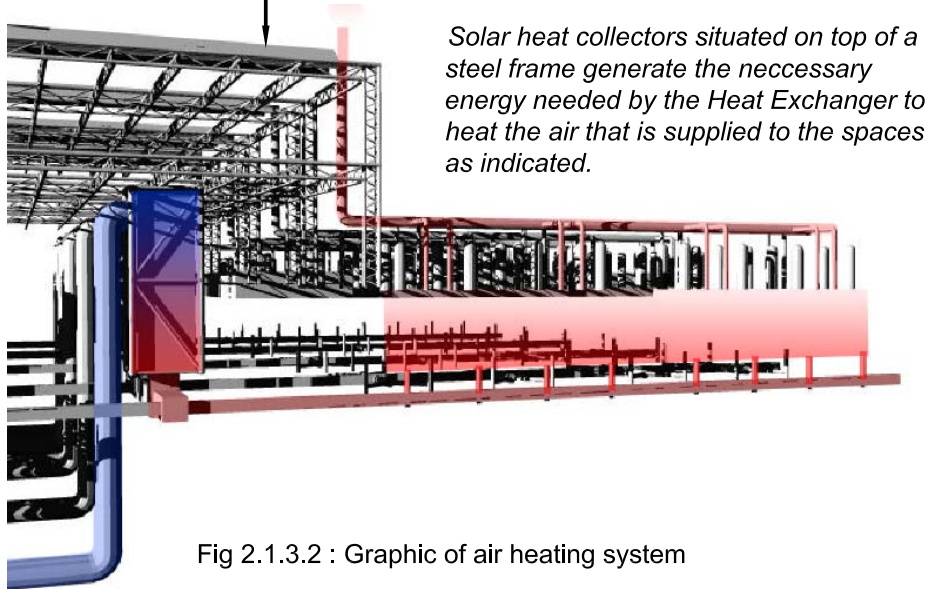
scale 1:200



scale 1:200

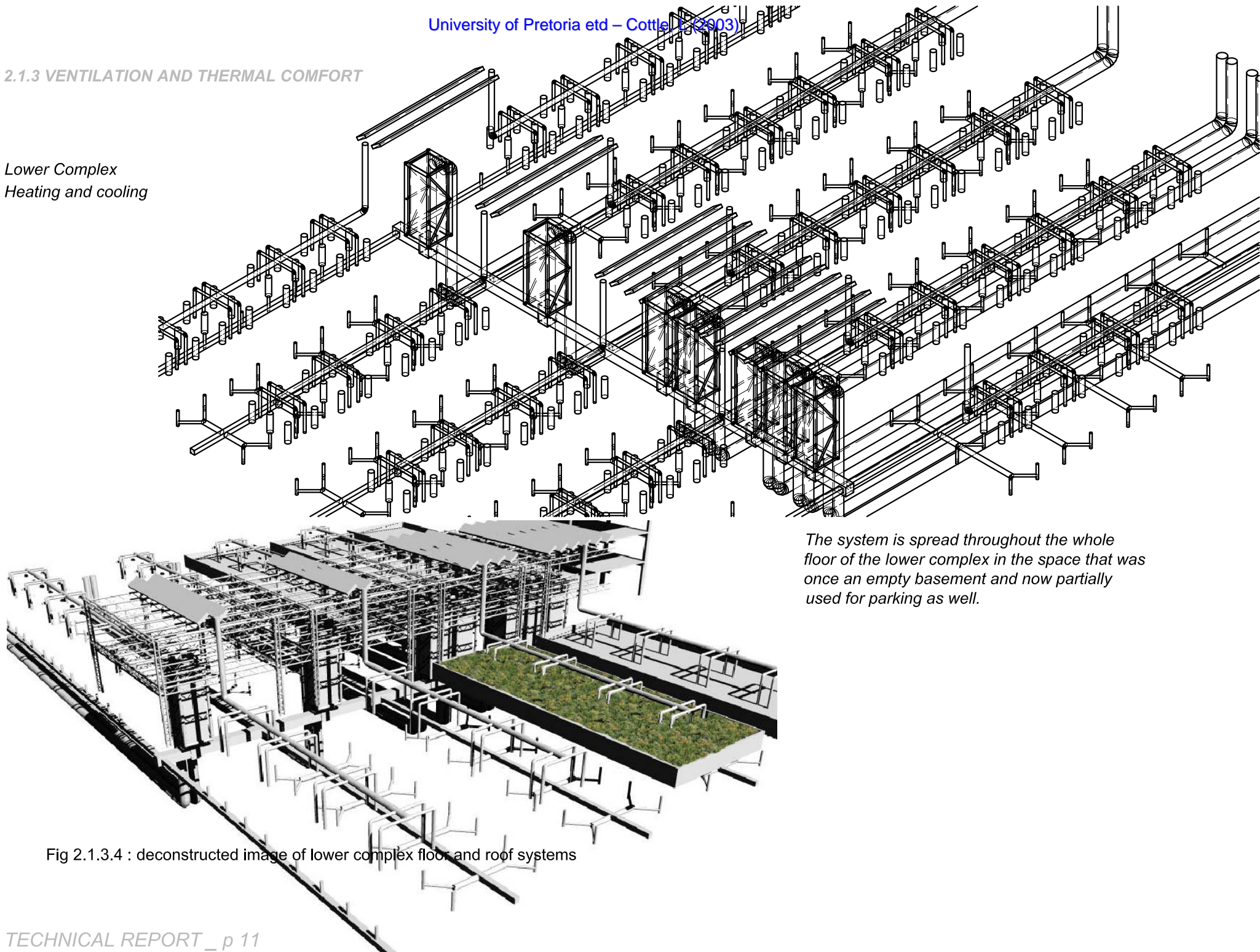
2.1.3 VENTILATION AND THERMAL COMFORT

Lower Complex
Heating and cooling



2.1.3 VENTILATION AND THERMAL COMFORT

Lower Complex
Heating and cooling



The system is spread throughout the whole floor of the lower complex in the space that was once an empty basement and now partially used for parking as well.

Fig 2.1.3.4 : deconstructed image of lower complex floor and roof systems

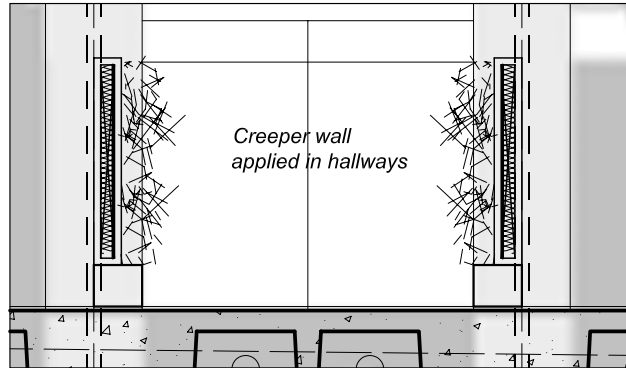
2.1.3 VENTILATION AND THERMAL COMFORT

Lower Complex
Heating and cooling

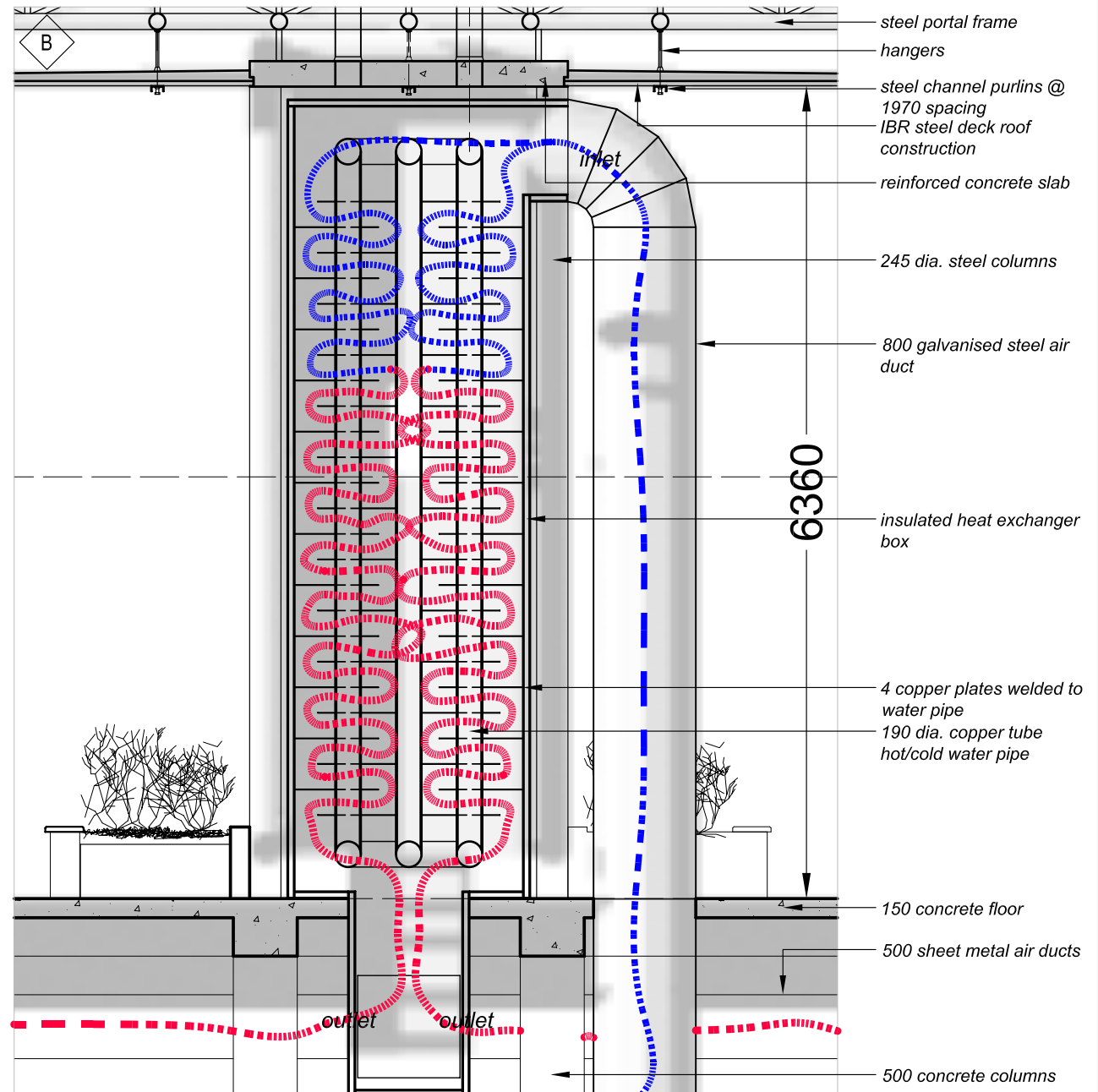
Water heating and cooling dynamic:
(The system is reversible so as an example only the heating of air is described graphically as the cooling of air works on the same concept except that a cold water source is used to feed the heat exchanger)

Warm water is fed to from the storage tank to the copper pipes inside the heat exchanger. Energy is transferred from the copper pipe to the copper plates welded to the pipes. The plates are positioned in such a way that the distance from the the top of the heat exchanger to the bottom is increased allowing the air that passes through the system is exposed for a longer period to the warm surfaces of the copper plates.

To cool the air cold water is fed to the system and warmth of the air is absorbed by the plates.



The cooling of air the heat exchanger causes condensation and loss of moisture from the air distributed into the spaces. The incorporation of 'green' partitioning walls (Black Eyed Susan) into the layout of the lower complex replaces the lost moisture content and improve, partly filtering, the air quality. These partitioning walls are placed, where applicable, in the hallways of the lower complex to enable access to sunlight filtered through the sky-roof structures



Heat Exchanger
Scale 1:50

2.1.3 VENTILATION AND THERMAL COMFORT

Office Complex

Air requirements for office complex :

76 average persons on one floor average (see office floor plan)

5l/s per person

(5l/s per person) x 76 = 380l/s per block

1000l = 0,001m³ (cubic meter)

0,38m³/s per outlet

INLET A:

0,38m³/s

2,16sqm

=0,176m/s

INLET B:

0,38m³/s

3,24sqm

=0,117m/s

FLOOR INLETS

0,38m³/s

58

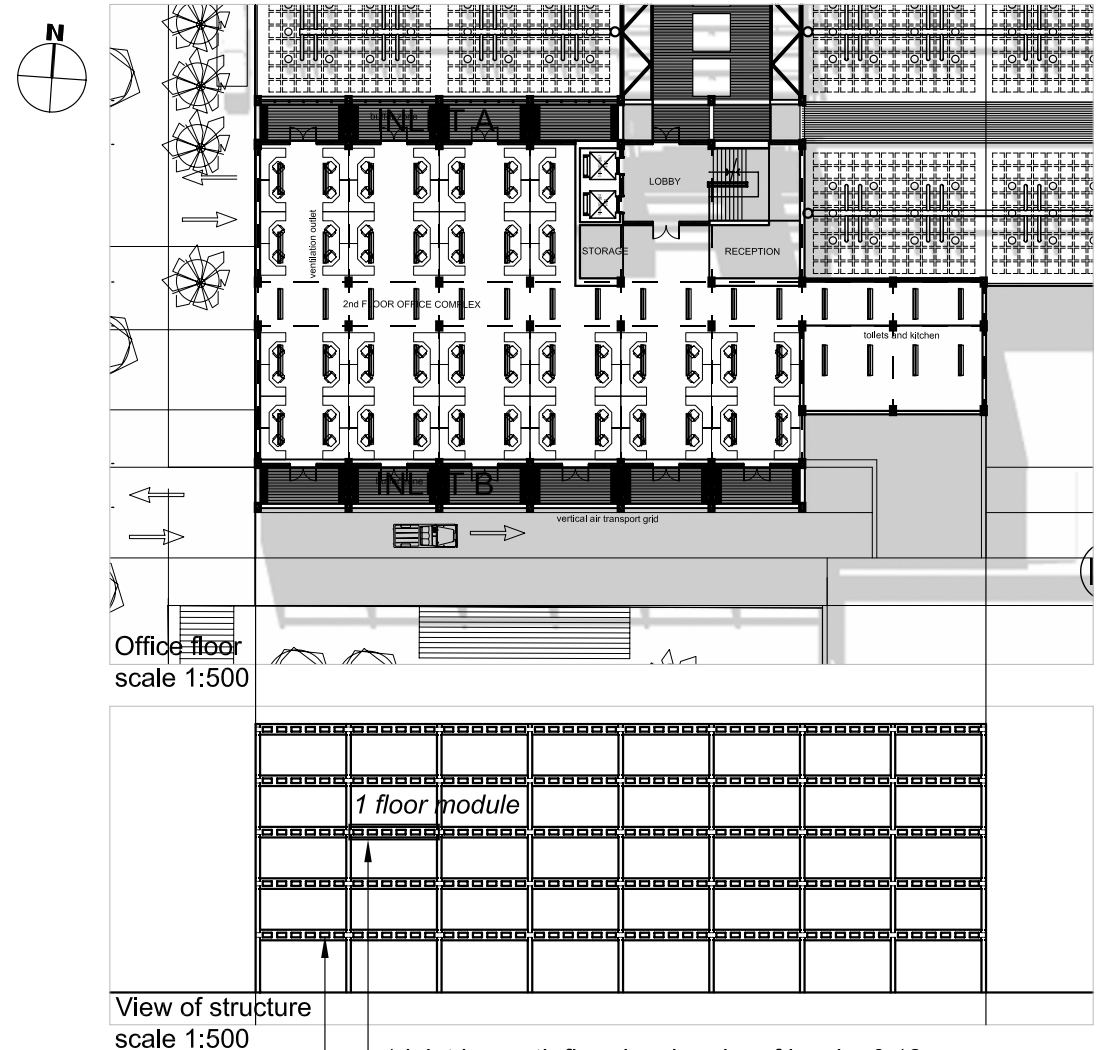
=0,007m³/s per outlet

Air speed 0,02m/s

0,007m³/s

0,02m/s

=0,35sqm per outlet



Office floor
scale 1:500

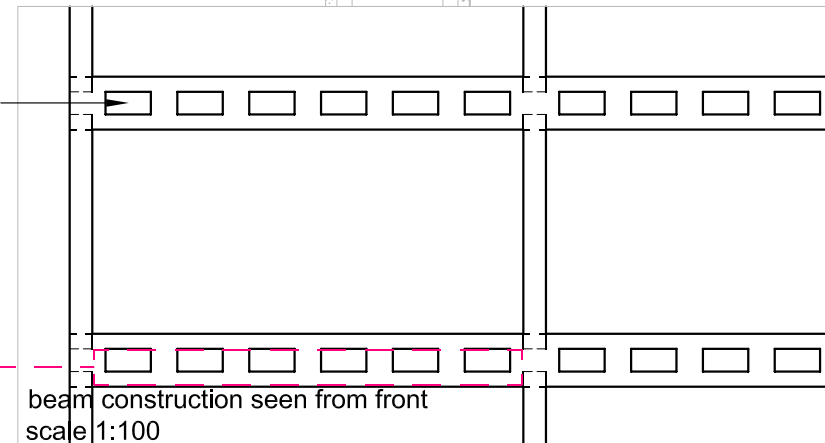
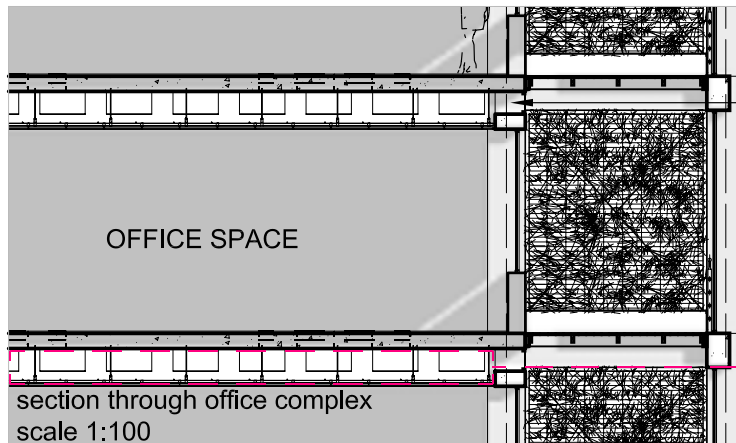
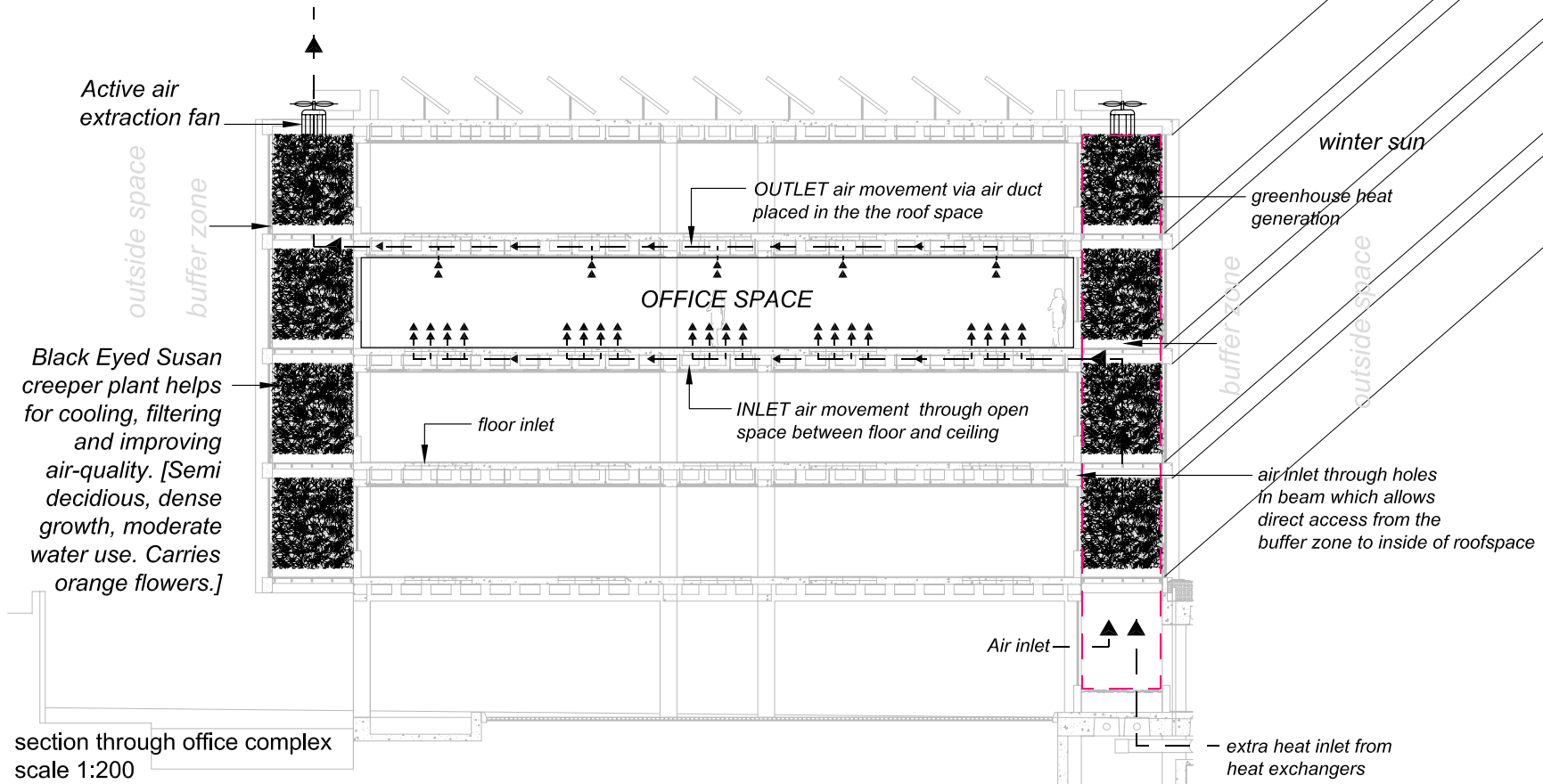
View of structure
scale 1:500

1 inlet beneath floor level and roof level = 0,18sqm
 0,18sqm x 6 = 1,08sqm per floor module
 Northern side has 4 modules
 1,08sqm x 4 = 4,32sqm, but only half can be used
 = 2,16sqm

Southern side has 6 modules
 1,08sqm x 6 = 6,48sqm (only half used)
 =3,24sqm

2.1.3 VENTILATION AND THERMAL COMFORT

WINTER



2.1.3 VENTILATION AND THERMAL COMFORT

WINTER

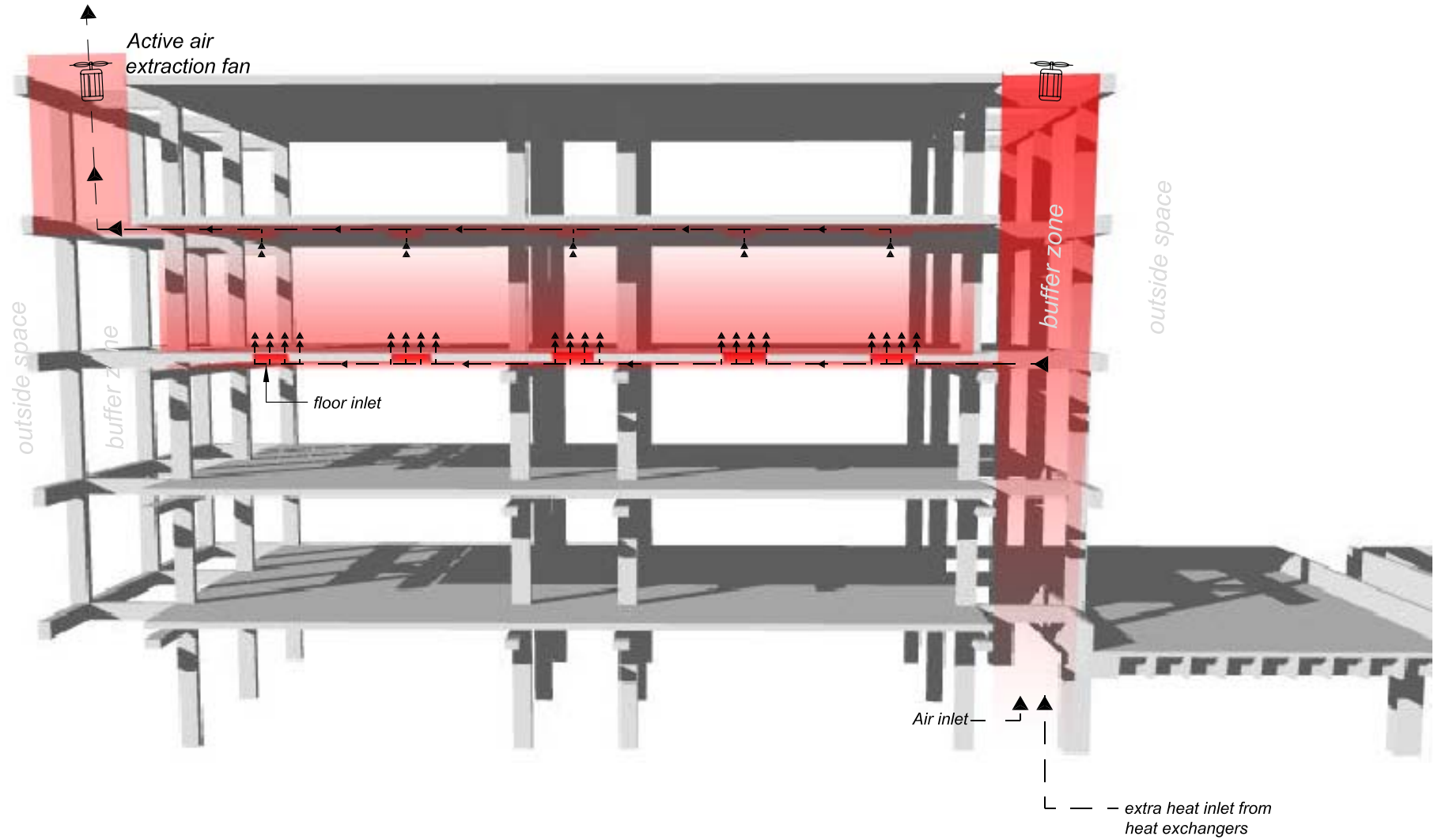
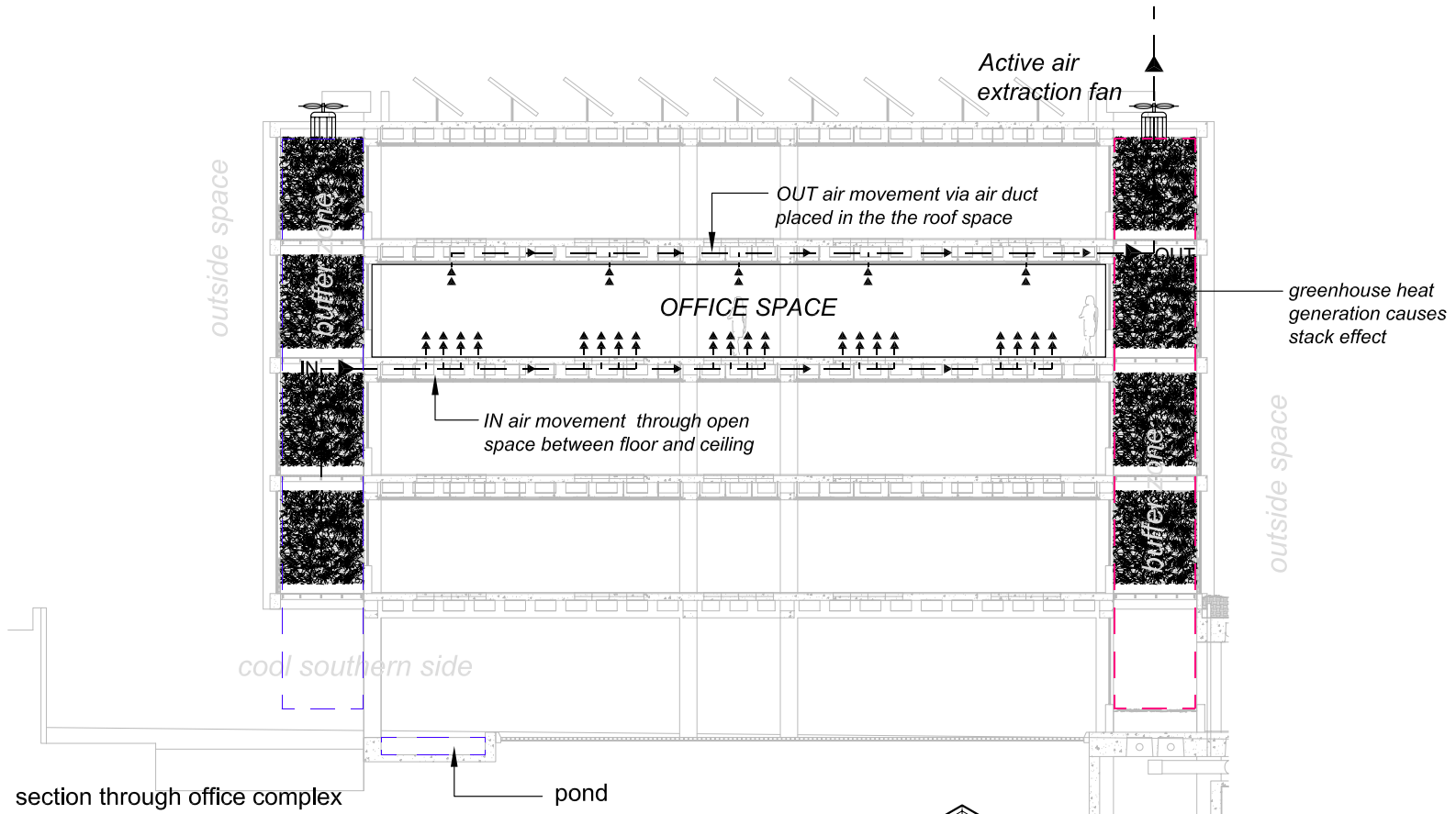


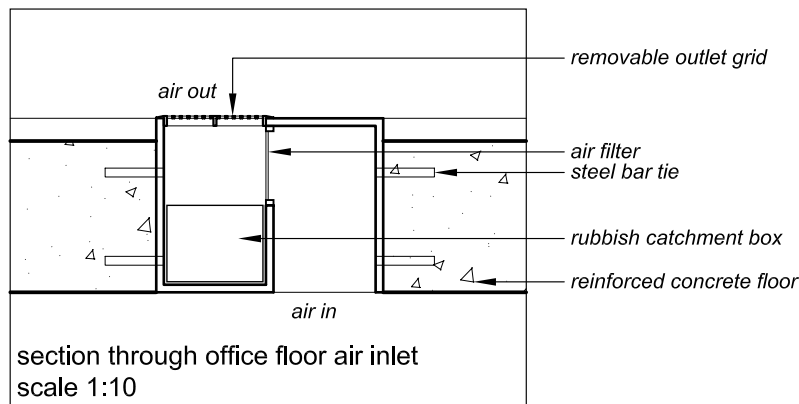
Fig 2.1.3.5 : Air heating system dynamic for office complex

2.1.3 VENTILATION AND THERMAL COMFORT

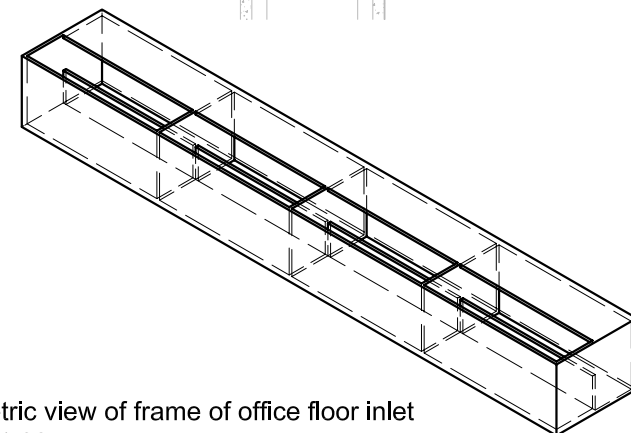
SUMMER



section through office complex scale 1:200



section through office floor air inlet scale 1:10



isometric view of frame of office floor inlet scale 1:20

2.1.3 VENTILATION AND THERMAL COMFORT

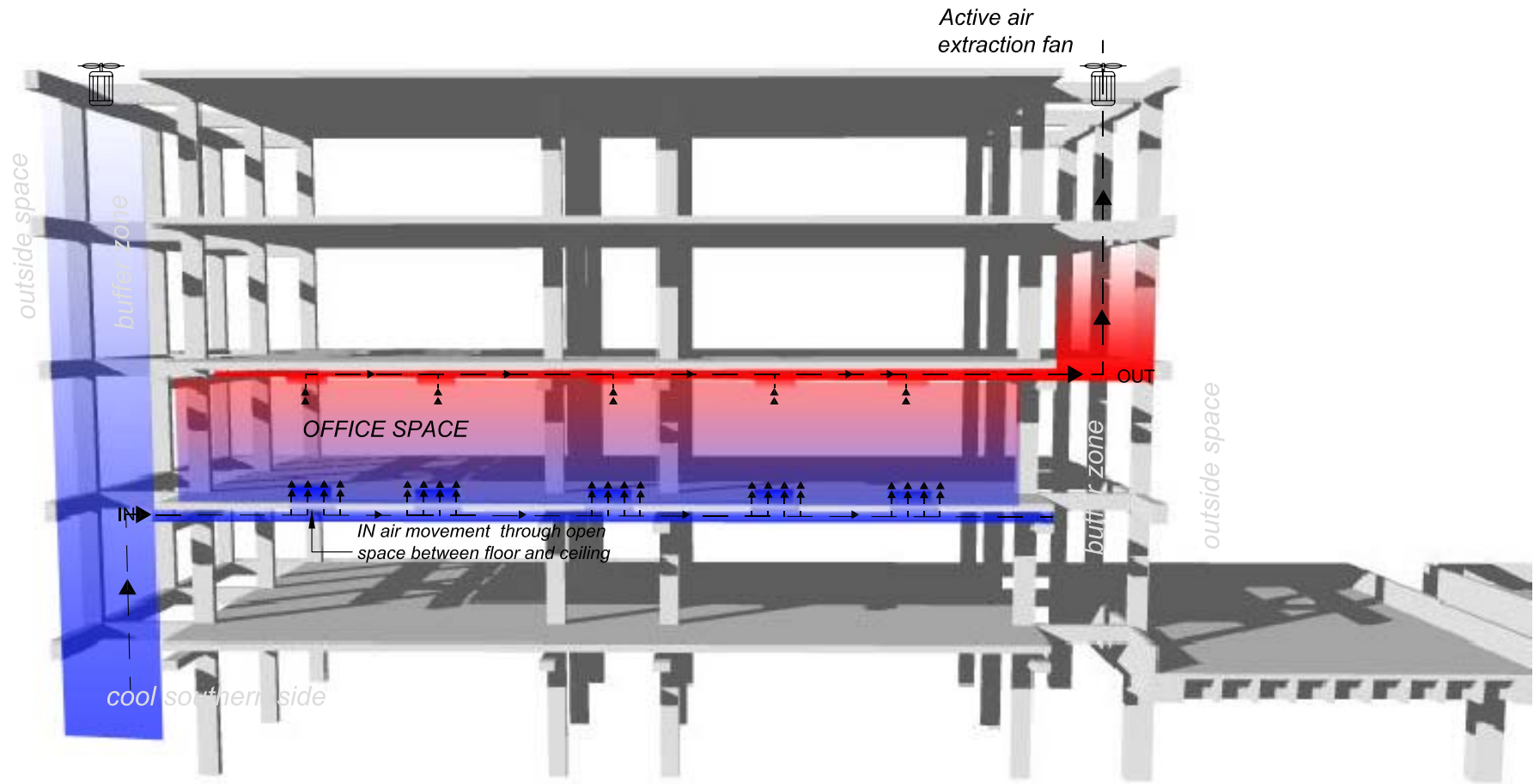


Fig 2.1.3.6: Air cooling system dynamic for office complex

2.1.4 NOISE

SIMPLE EXAMPLE FOR NOISE CONTROL
structures and details that control the noise level



section through slate wall facing noise source
 (extreme case.thickness of will probably be sufficient)
 scale 1:20

plan showing walls facing noisy streets
 scale 1:500

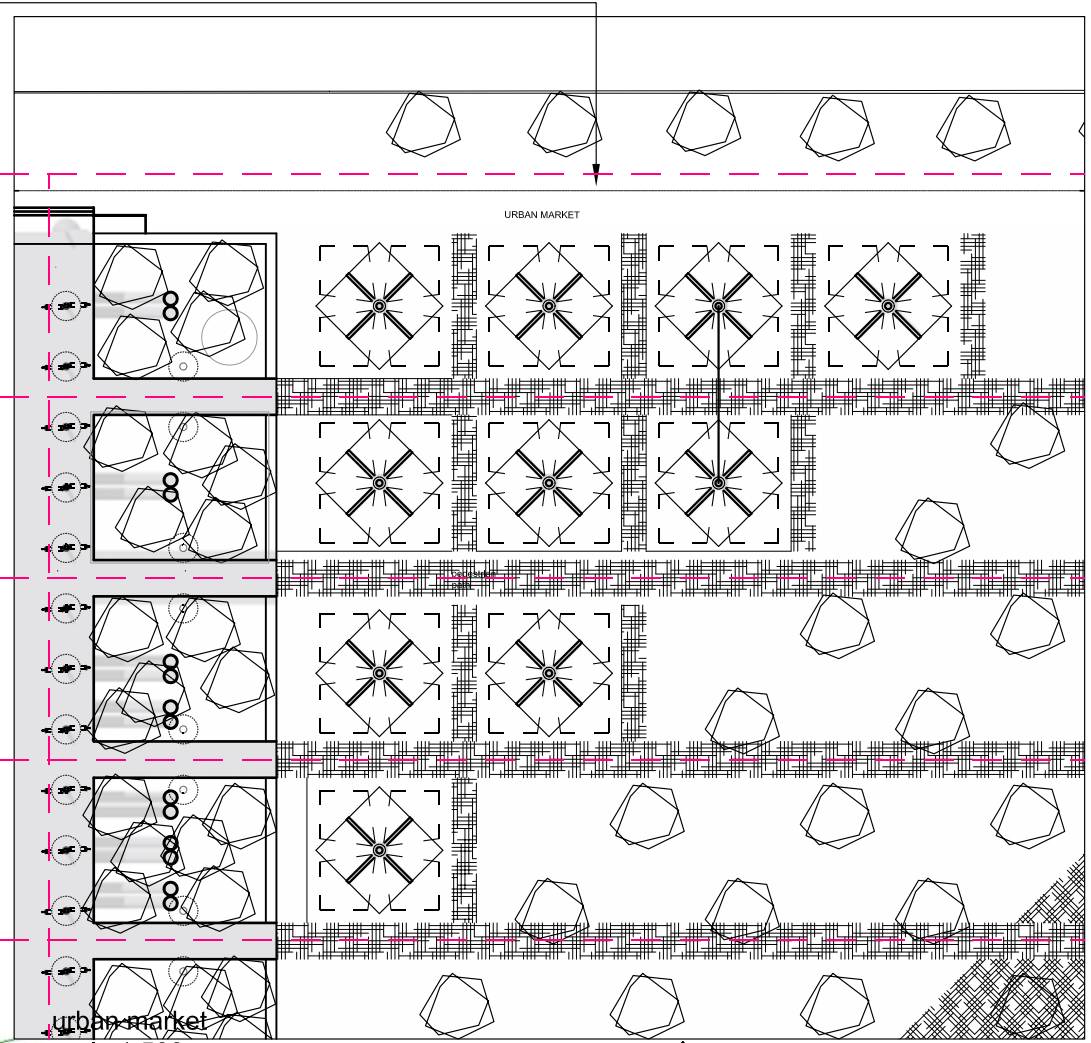
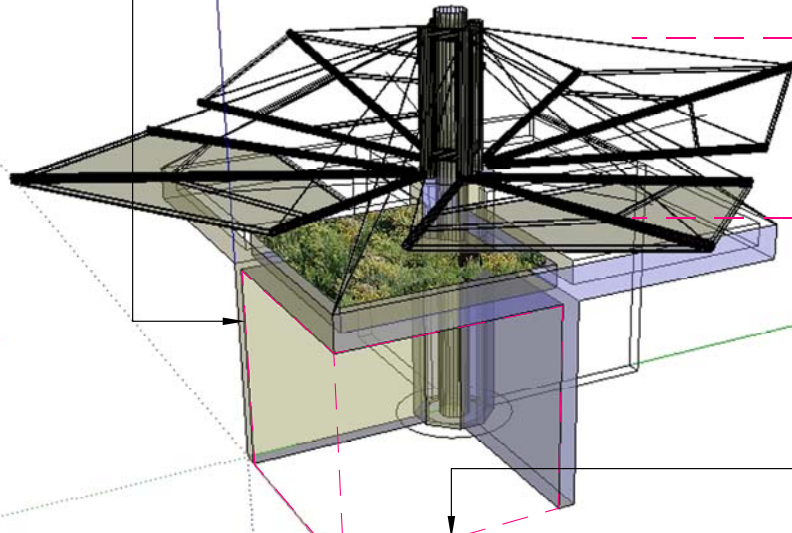
2.3.3 RETAIL

URBAN MARKET

The urban market is situated in the park. Other forms of retail were placed alongside the north and western edges of the block.

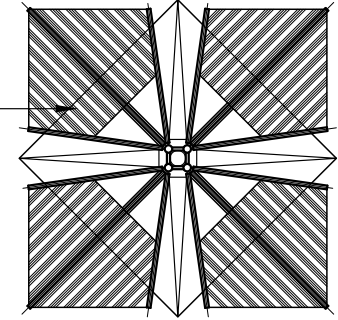
lines represent connections of building entrances/exits with bridge and the market

concrete market structure with plant roof



urban market scale 1:500

sheet metal roof material



plan of market unit scale 1:200

Fig 2.3.3.1:market unit

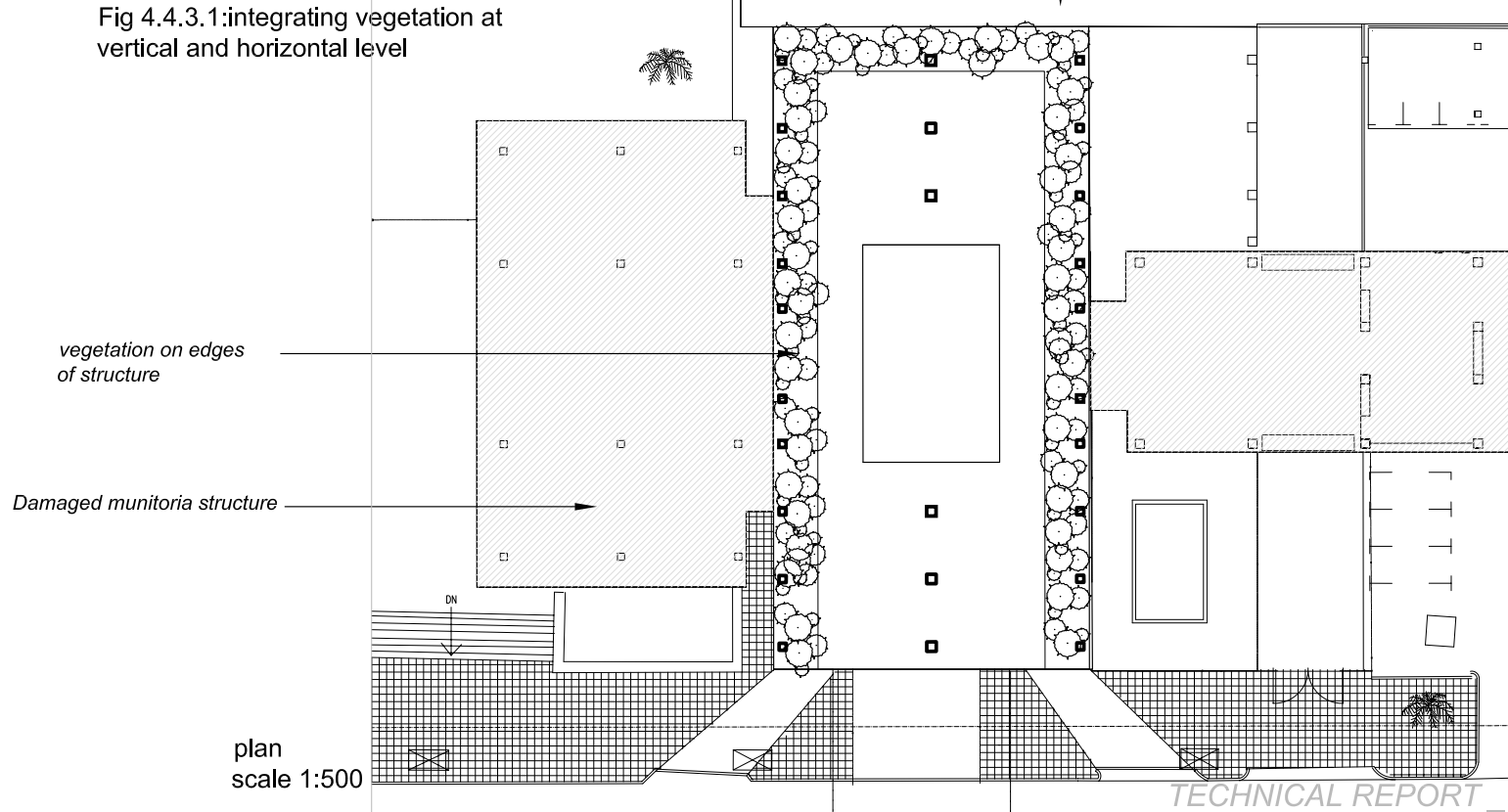
4.4.3 VEGETATION

The use of vegetation at vertical level helps to reduce turbid air conditions and improve oxygen and carbon monoxide levels



Vertical landscaping placed along the edges of the burned structure of the old Munitoria building

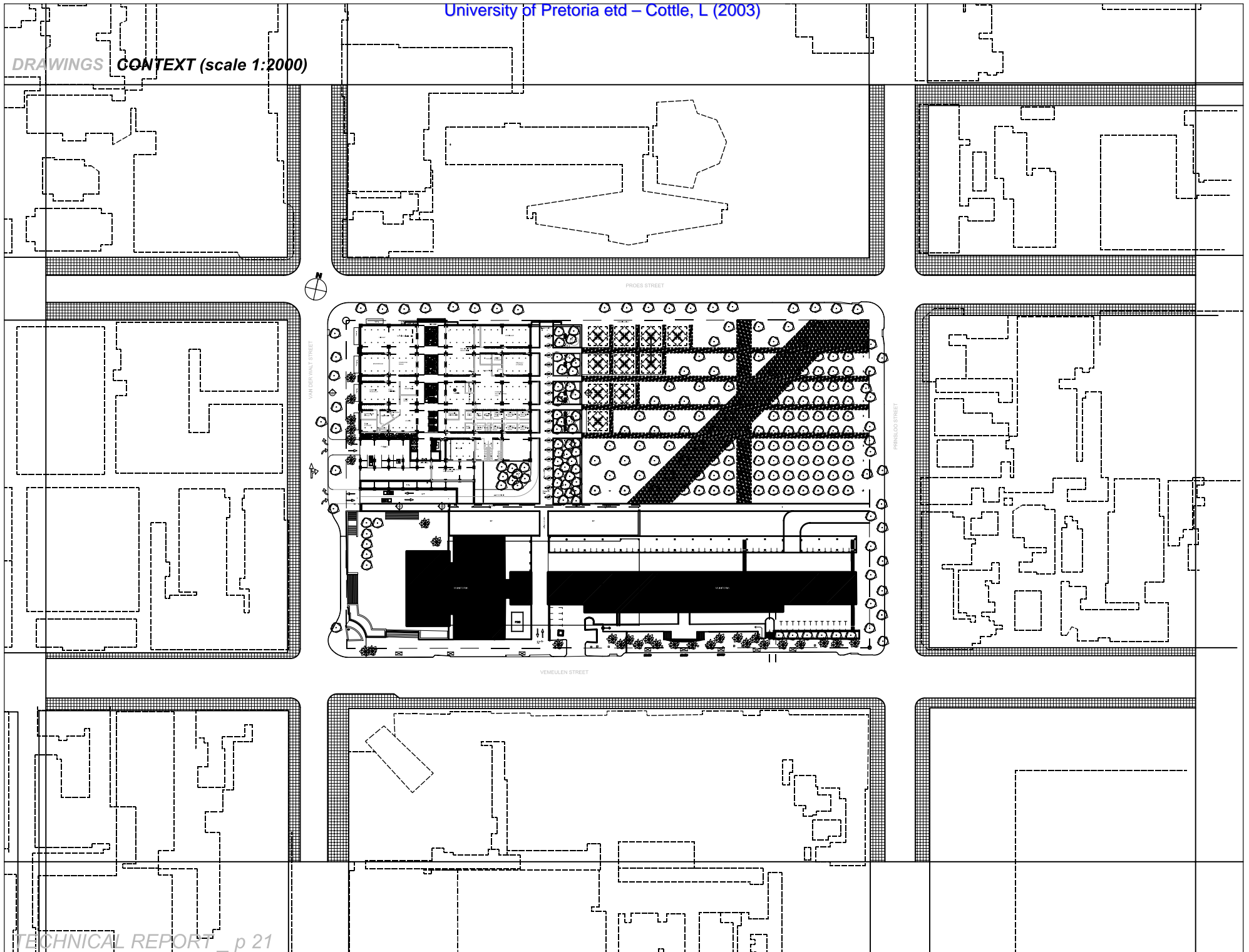
Fig 4.4.3.1: integrating vegetation at vertical and horizontal level



plan scale 1:500

VERT. + HORIZ. LANDSCAPING

DRAWINGS CONTEXT (scale 1:2000)



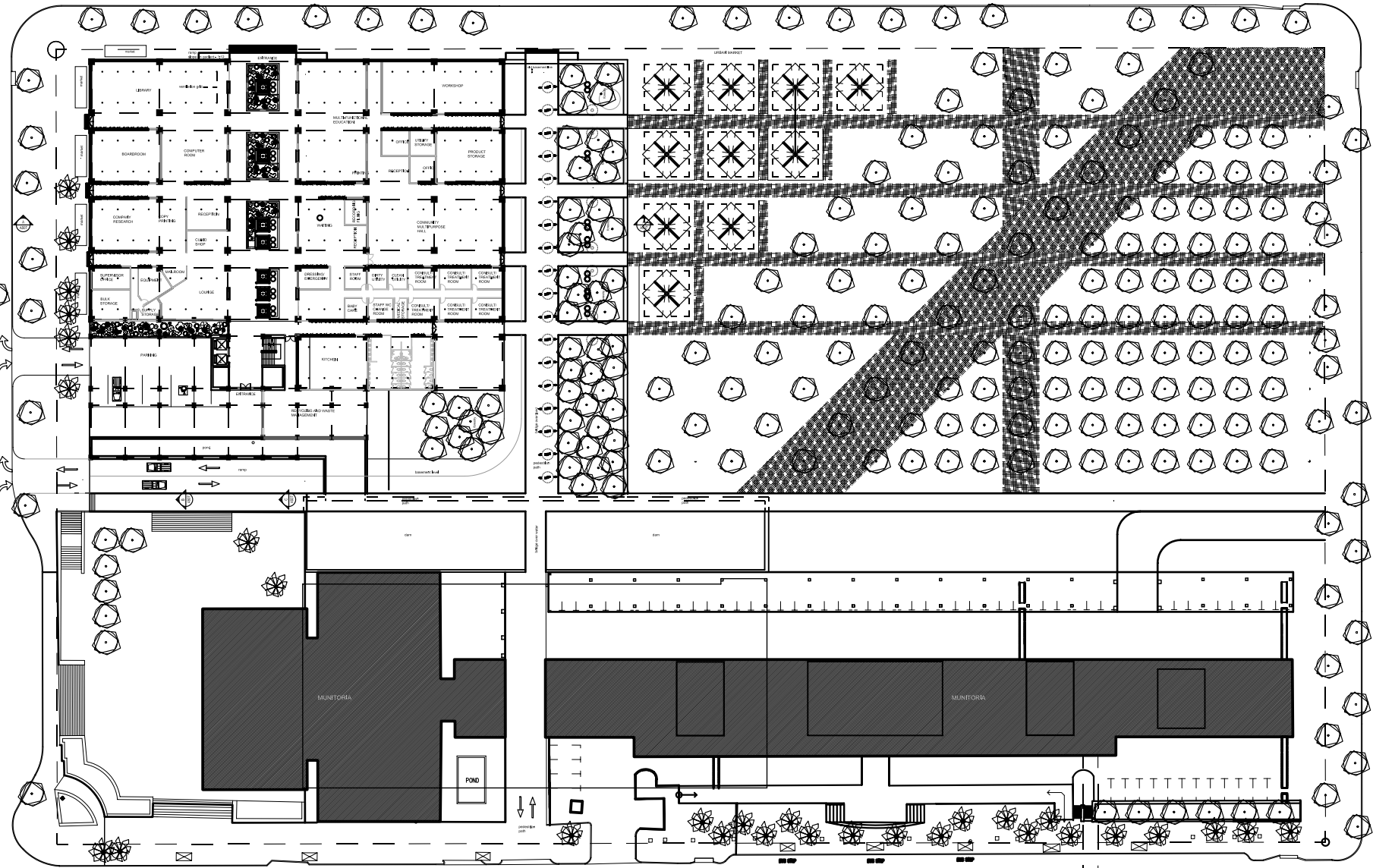
DRAWINGS SITE PLAN (scale 1:1000)



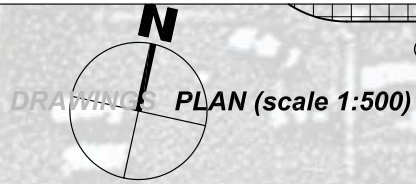
PROES STREET

PRINSLOO STREET

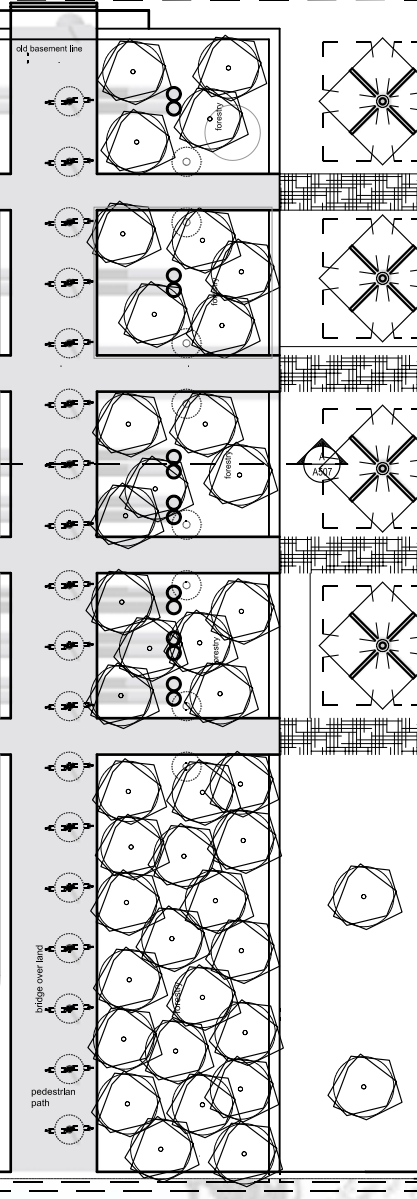
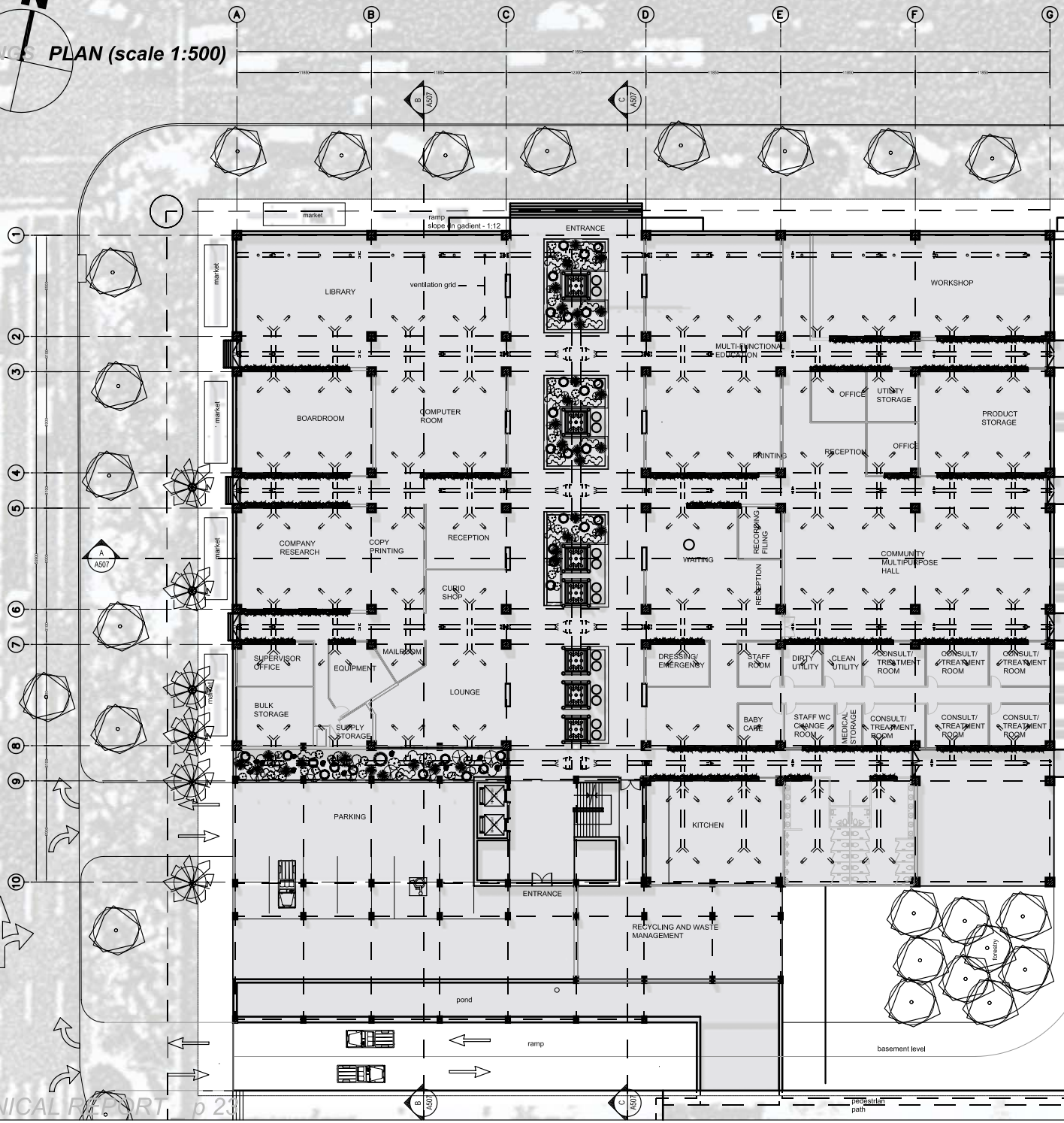
VAN DER WALT STREET



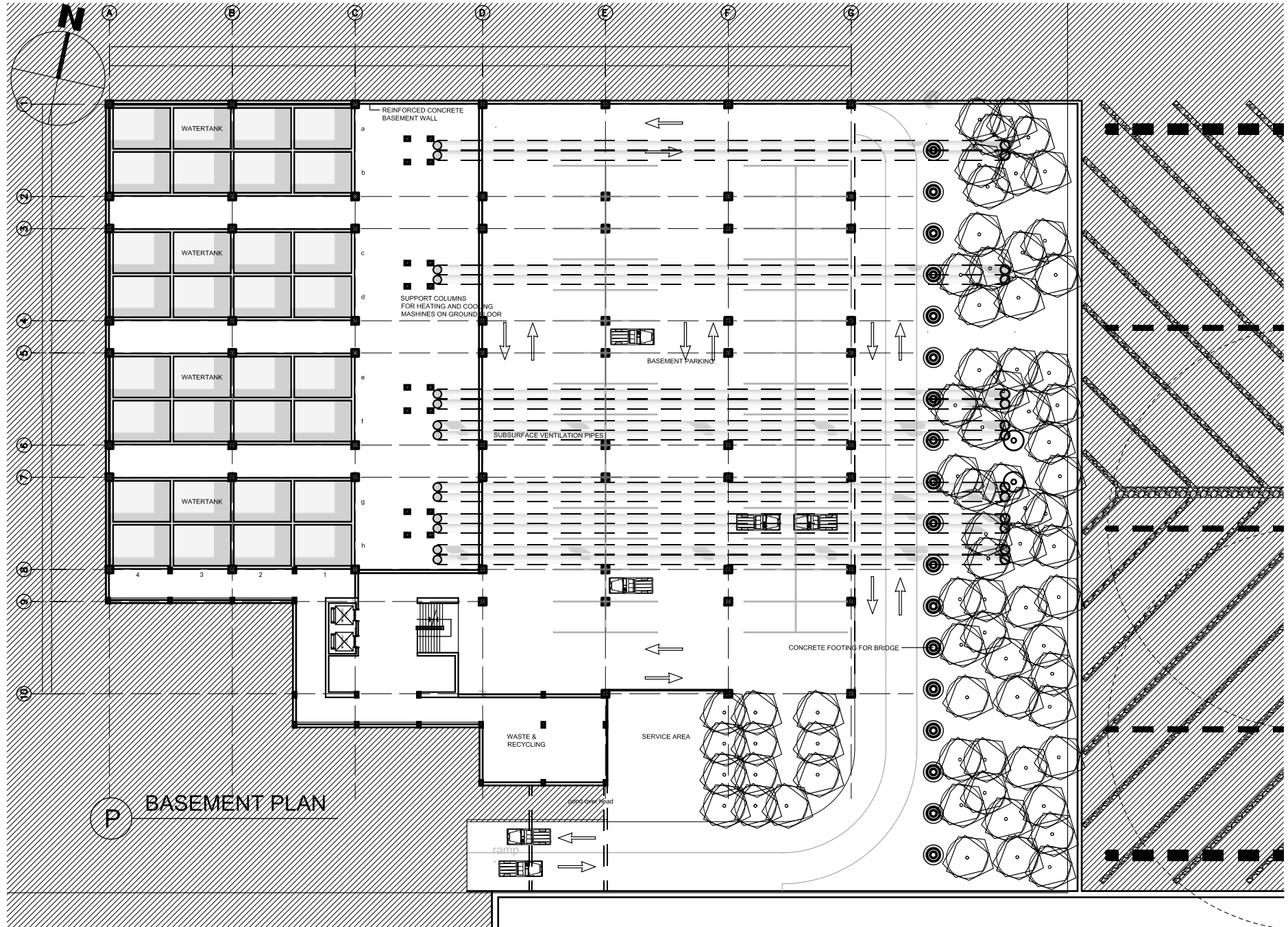
VEMEULEN STREET



VAN DER WALT STREET

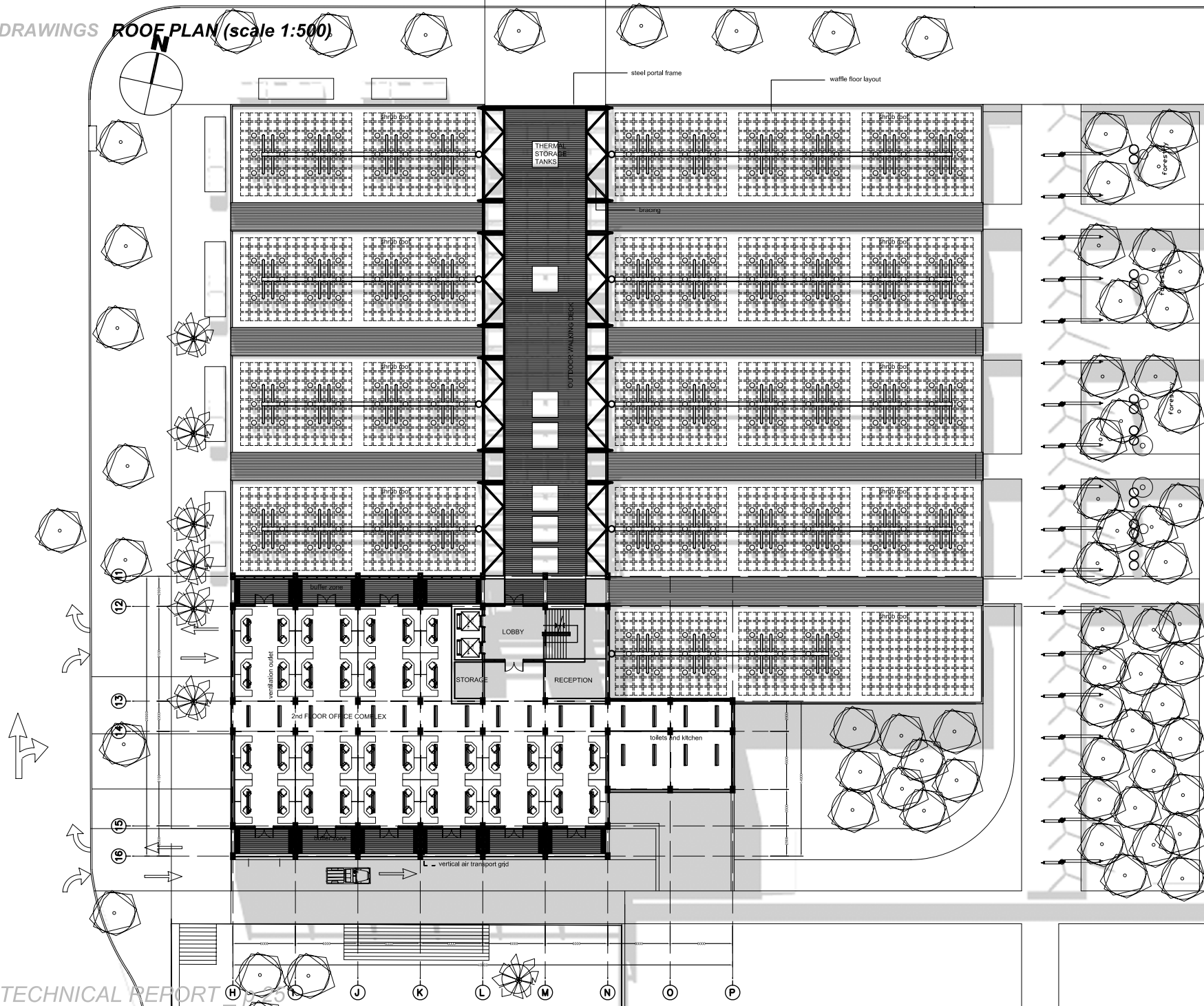


DRAWINGS BASEMENT PLAN (scale 1:500)

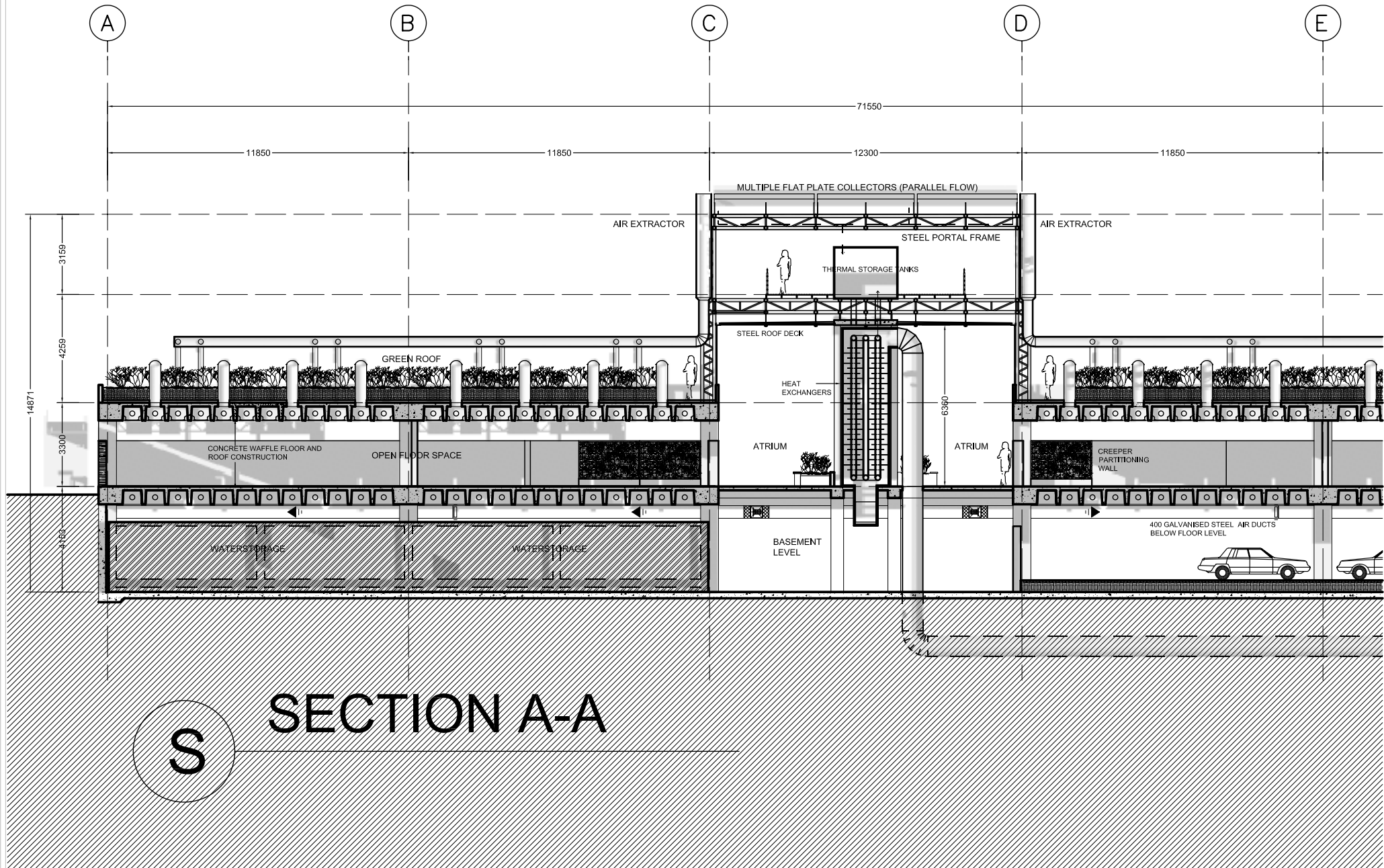


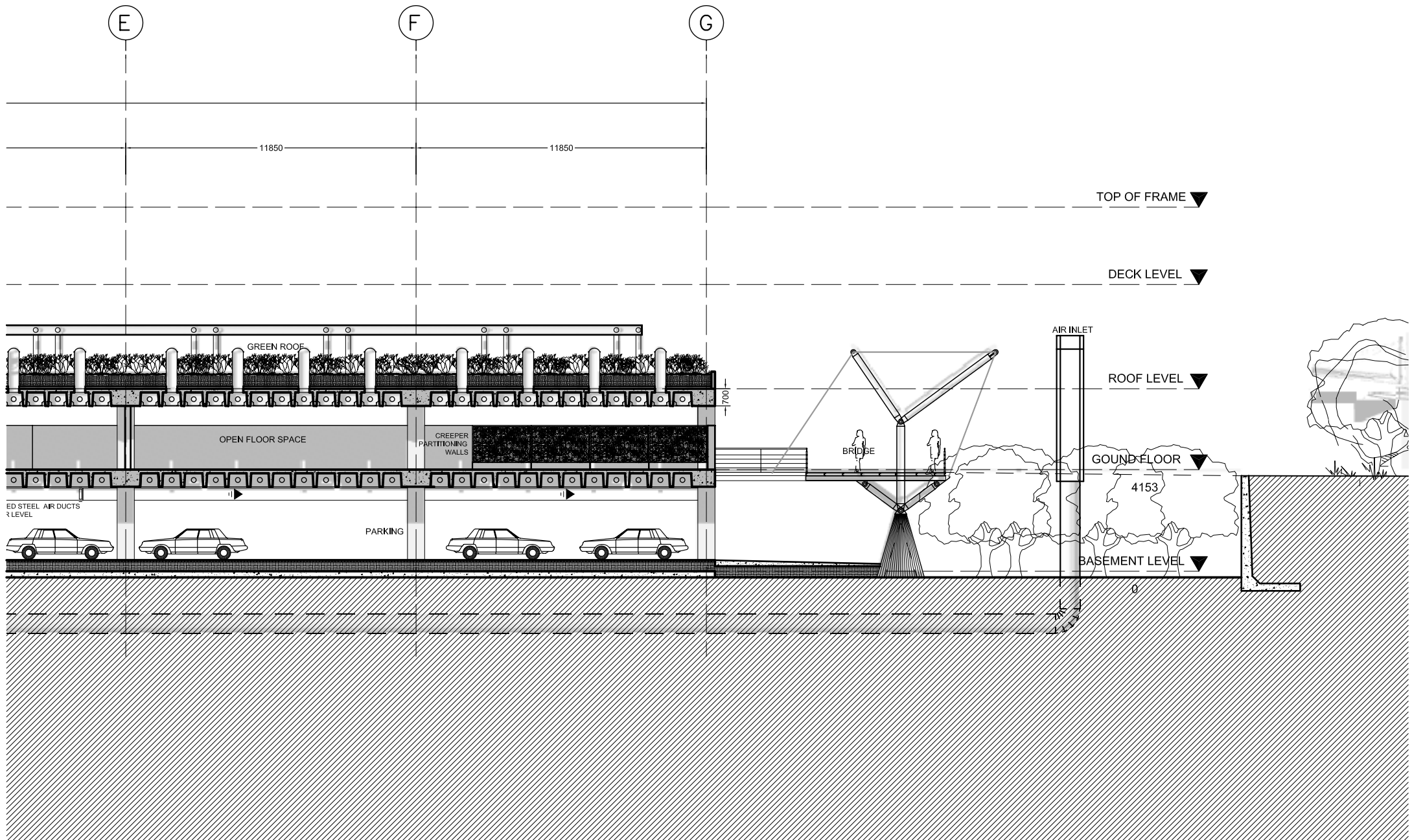
P BASEMENT PLAN

DRAWINGS ROOF PLAN (scale 1:500)

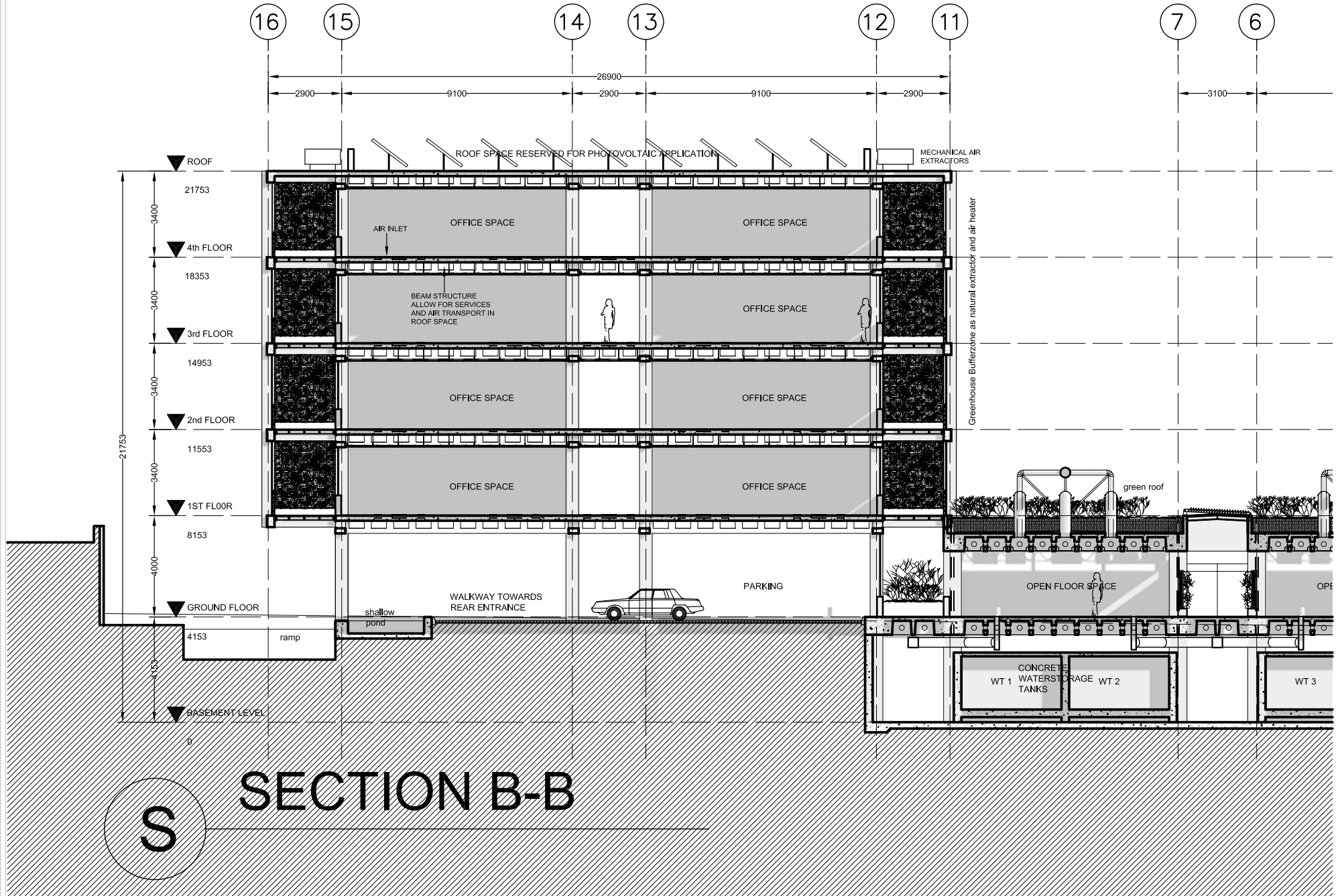


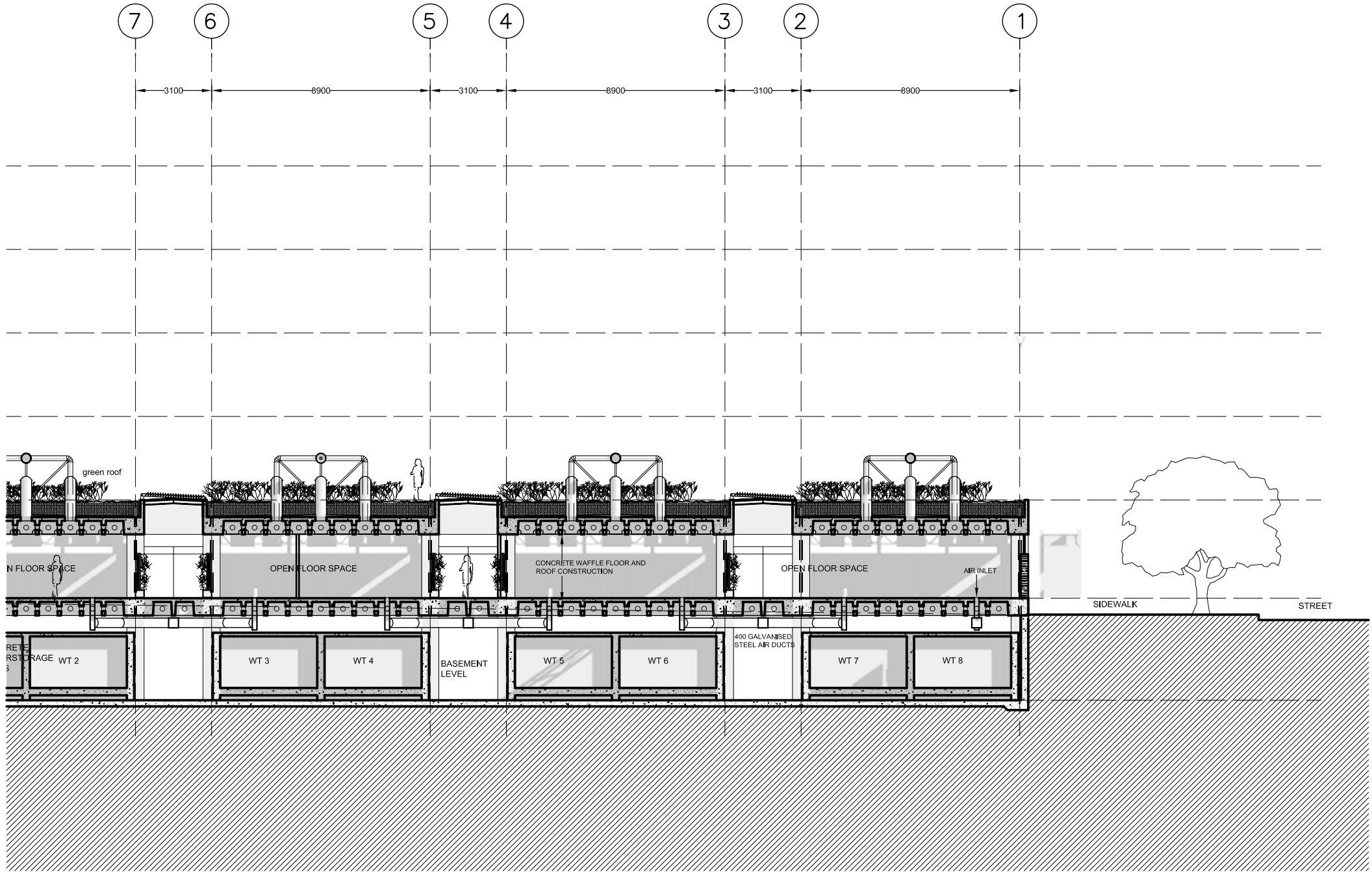
DRAWINGS SECTION A-A (scale 1:200)



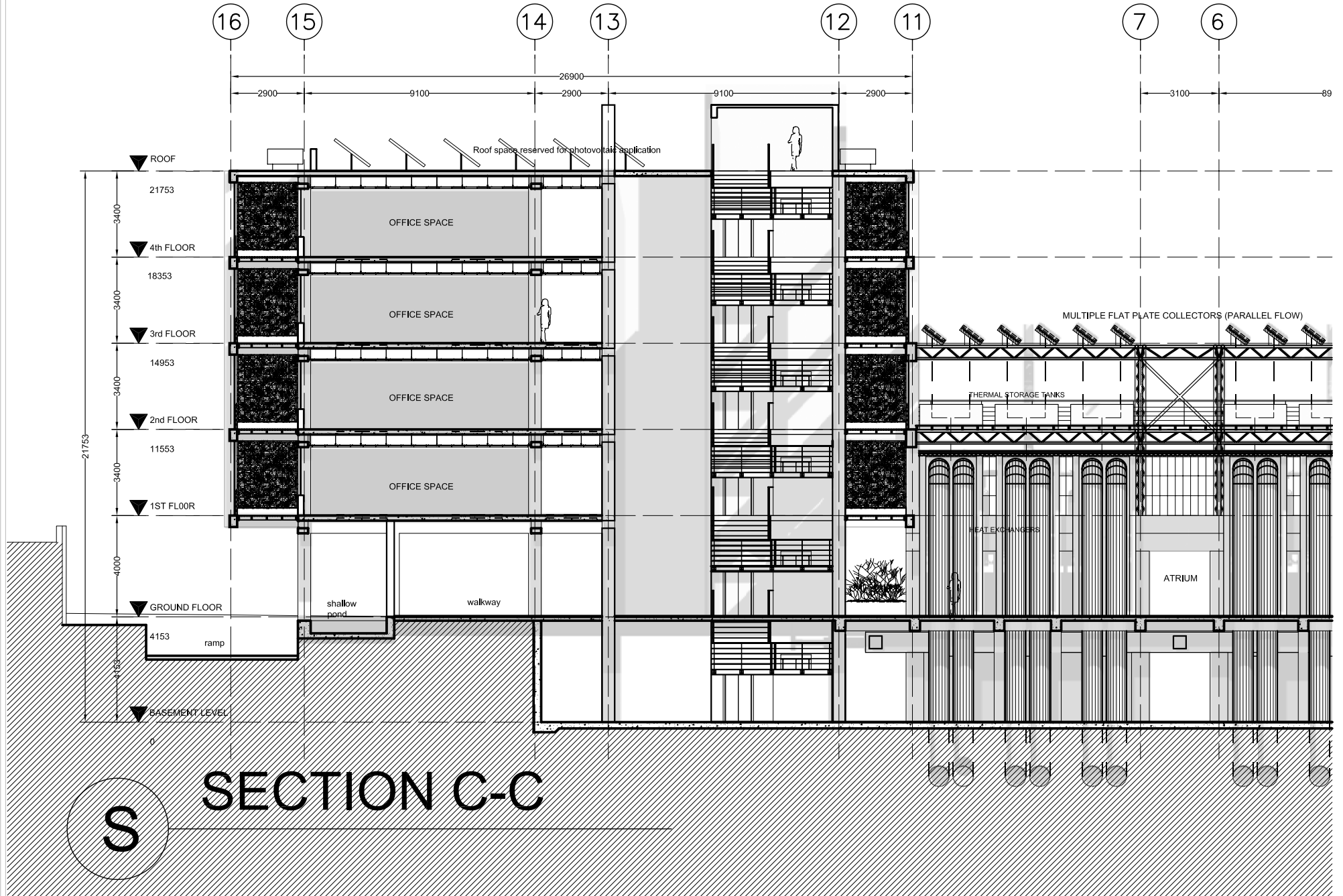


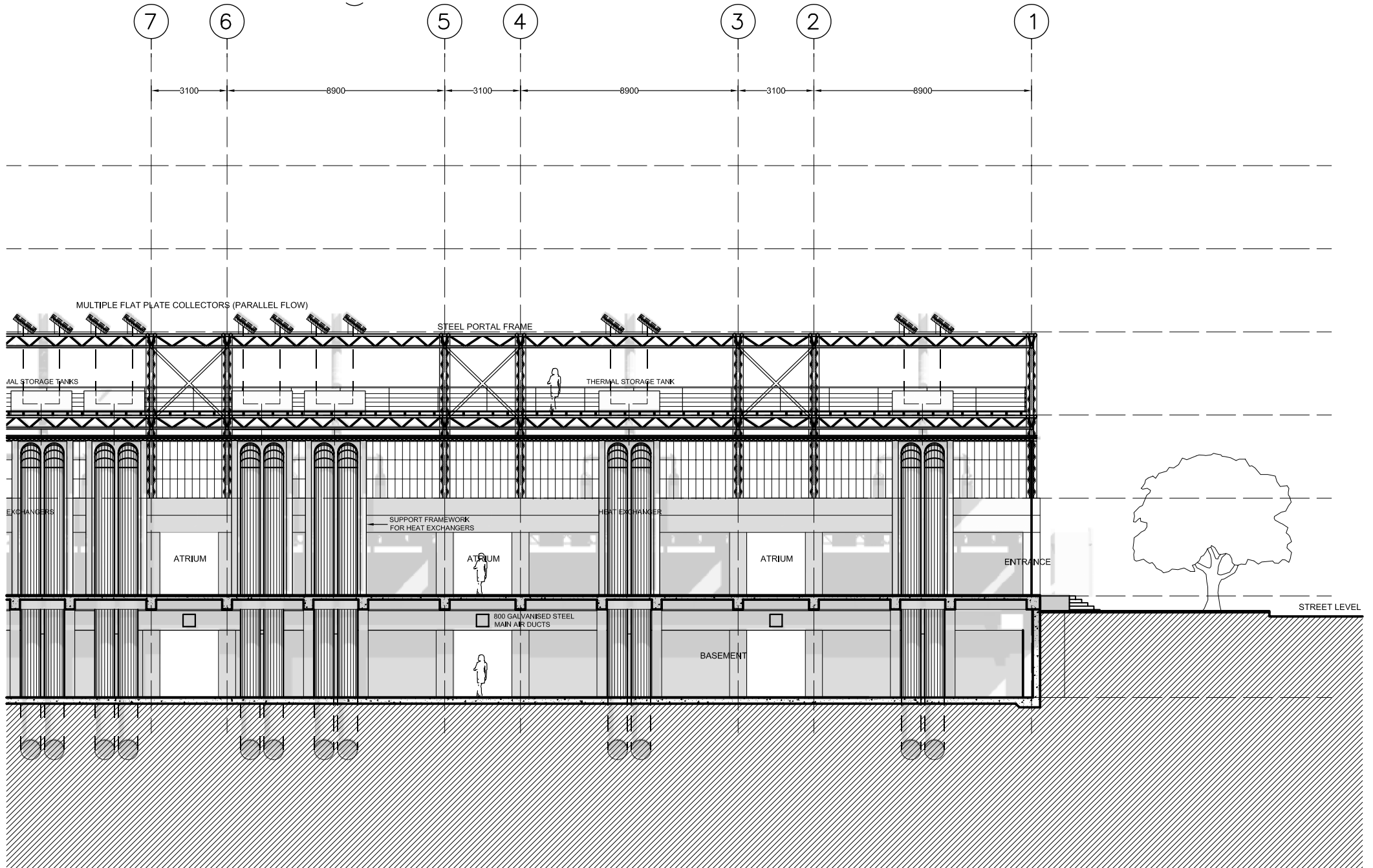
DRAWINGS SECTION B-B (scale 1:200)

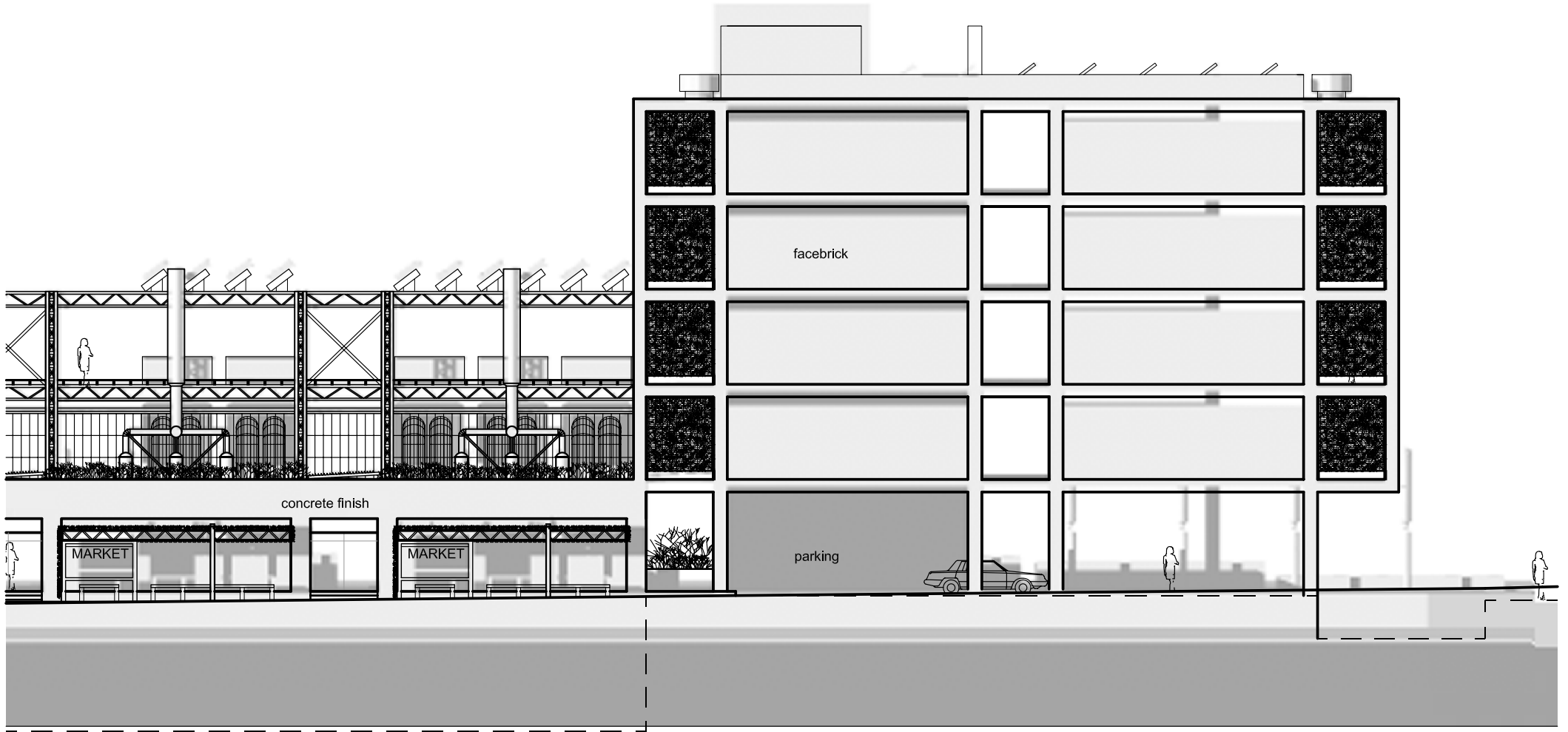




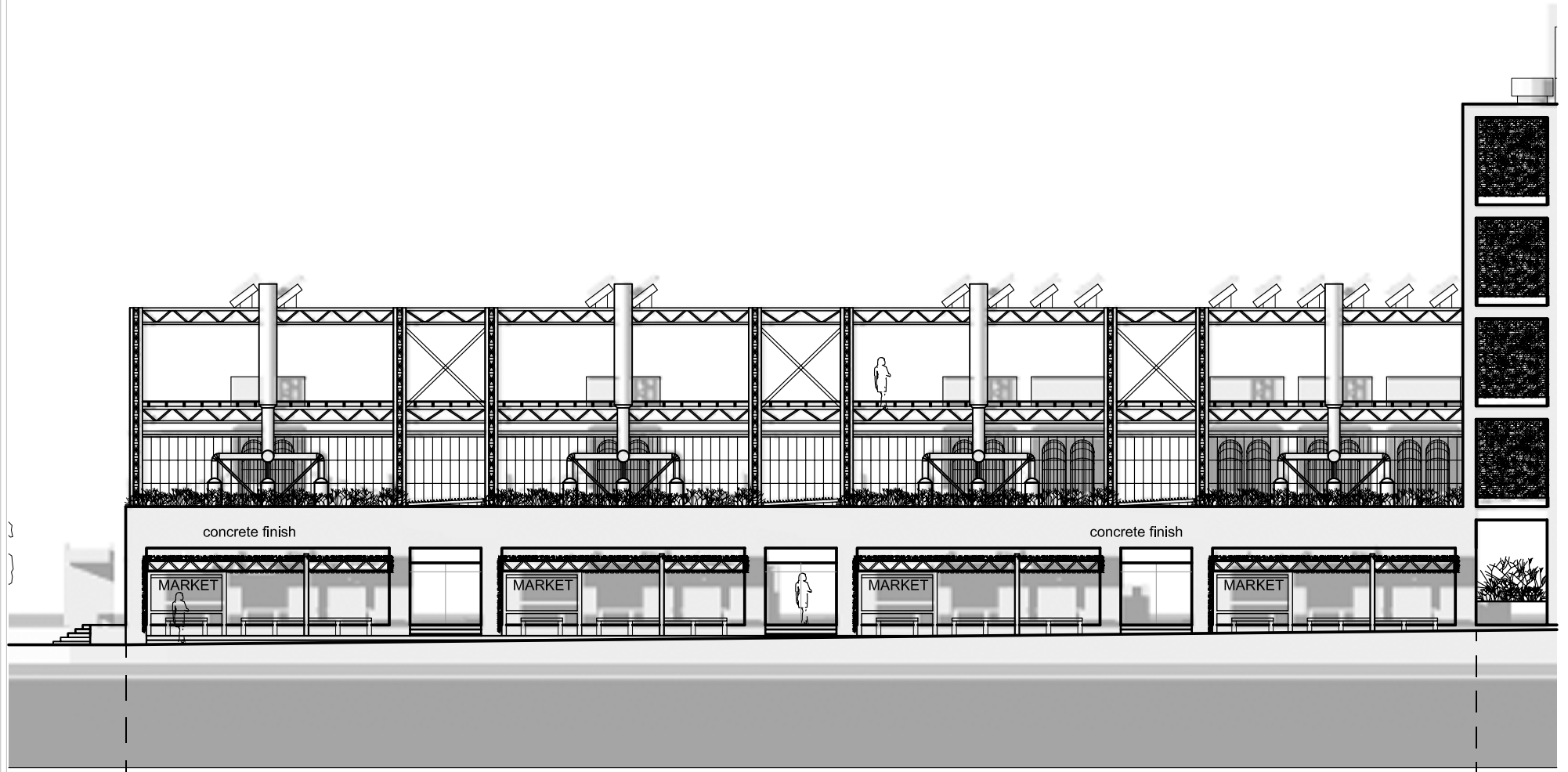
DRAWINGS SECTION C-C (scale 1:200)







DRAWINGS WEST FACADE (scale 1:200)



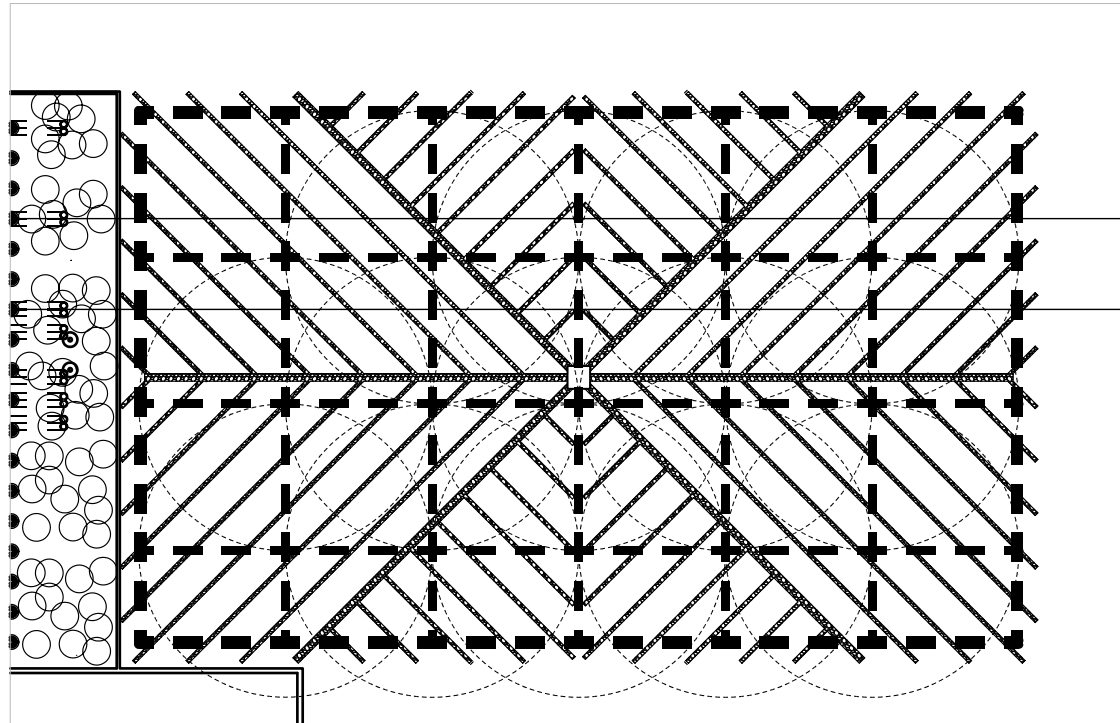
4.1 WATER

4.1.1 Rainwater harvesting and use

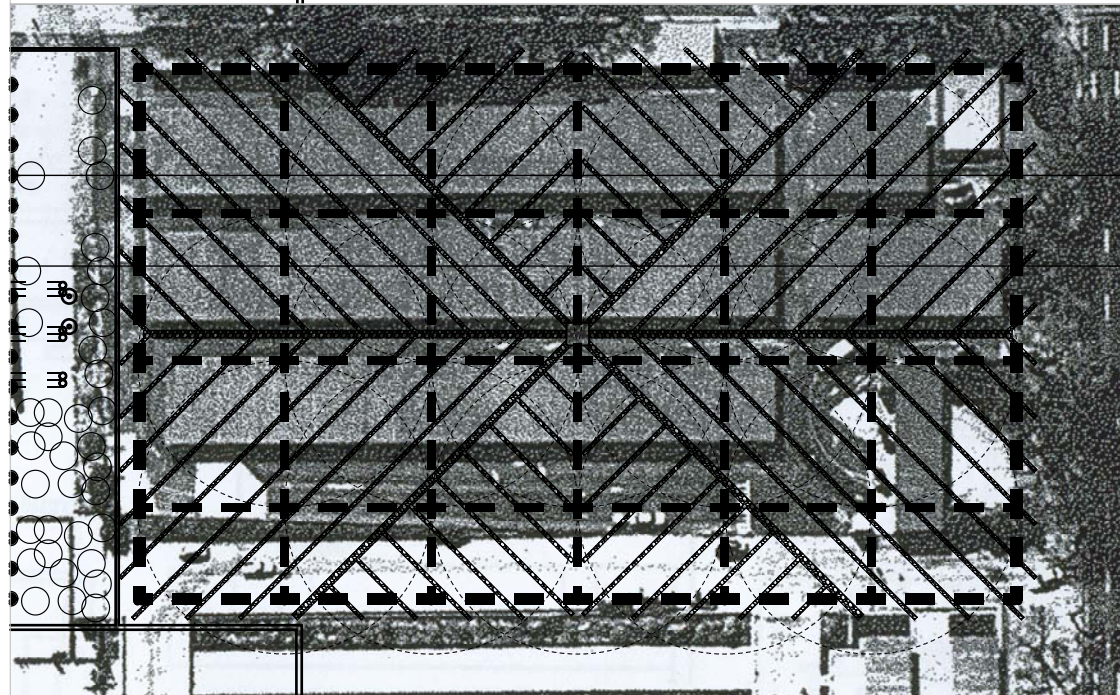
Systems

The aquifer situated beneath the site will play a very important role in the watercycle by being part in the filtration and water-use systems.

waterdrainage in
the urban park
scale 1:1000

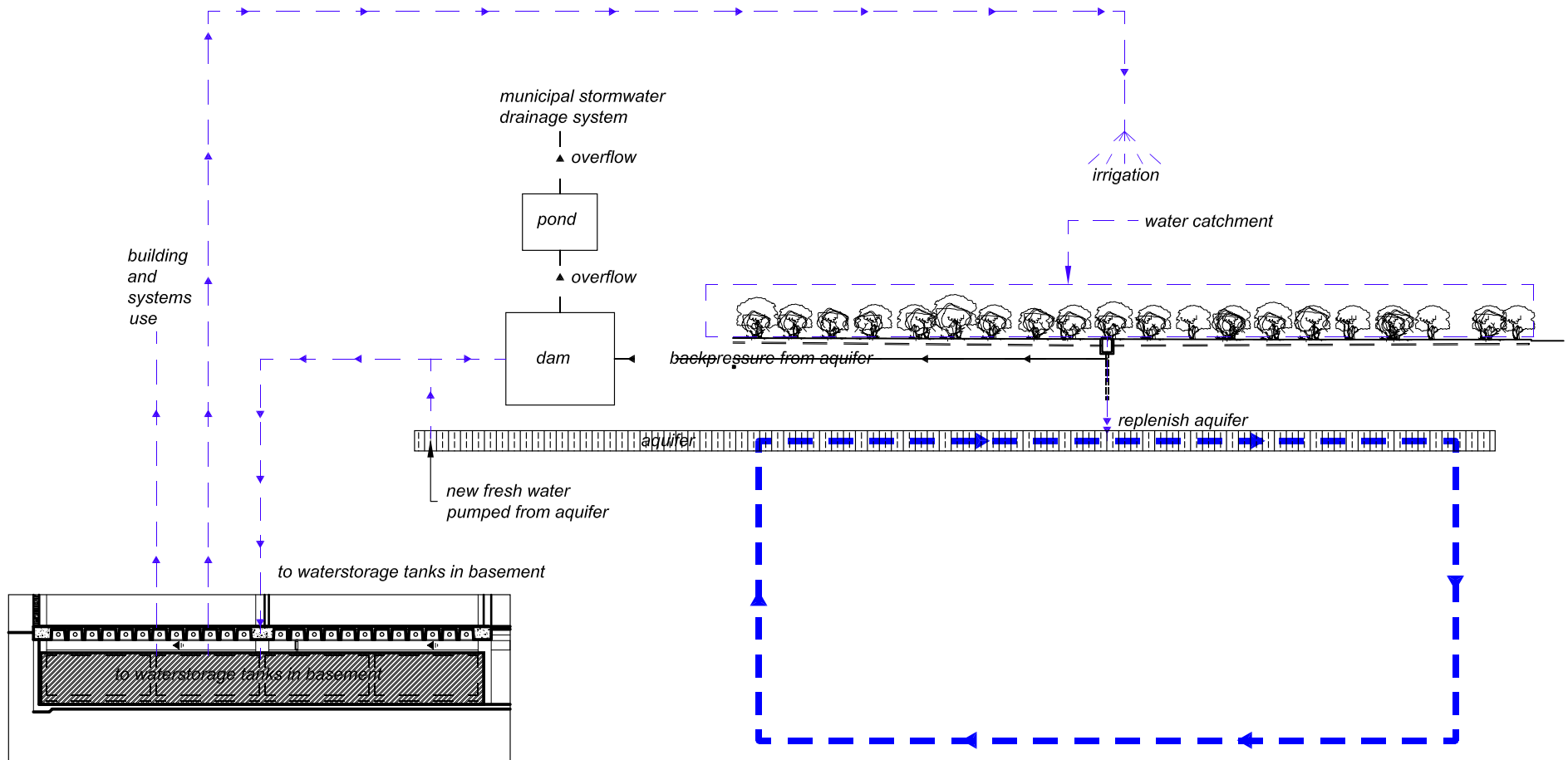


site photo with
drainage layout
scale 1:1000



4.1.1 Rainwater harvesting and use

The water system allows water that was used to purified in a larger natural system. Clean water can then be pumped from the aquifer. In this way that which has been put back can be retrieved, but in a purified state.



the tanks are divided based on their function: some tanks will only store water for consumption and cold water for the building's systems; others will only store water for irrigation

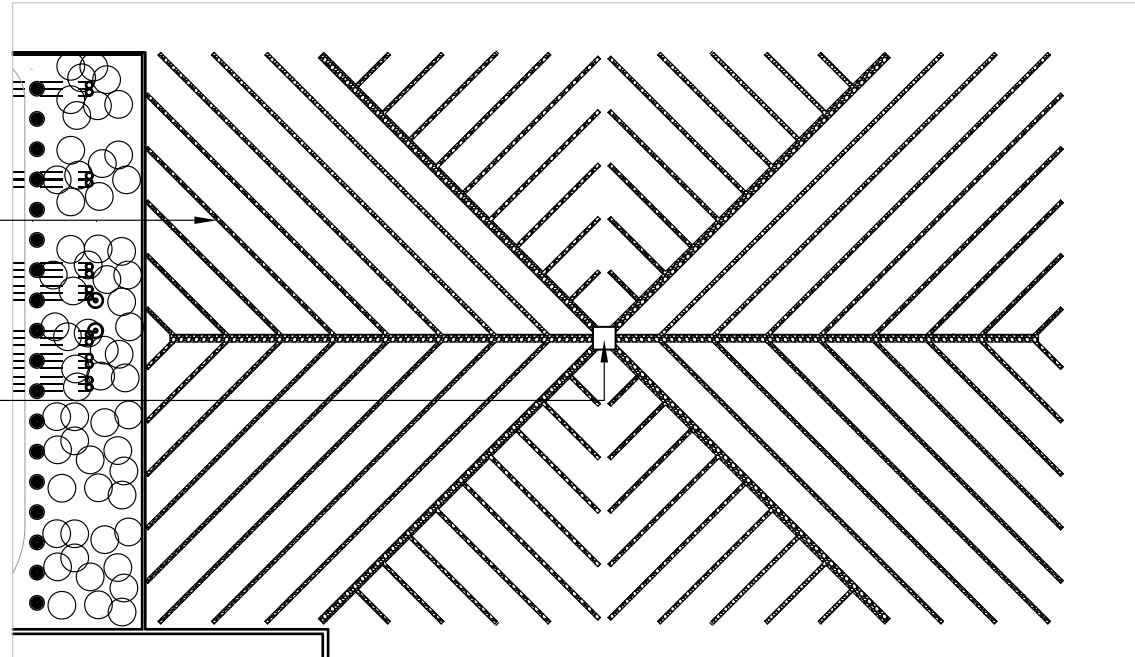
the water that is placed back into the aquifer is naturally filtered by a larger natural underground system

4.1.1 Rainwater harvesting and use

Drainage layout

Herringbone drainage layout
(gravel)
drainage fall - 1:250

Subterranean air
drainage system

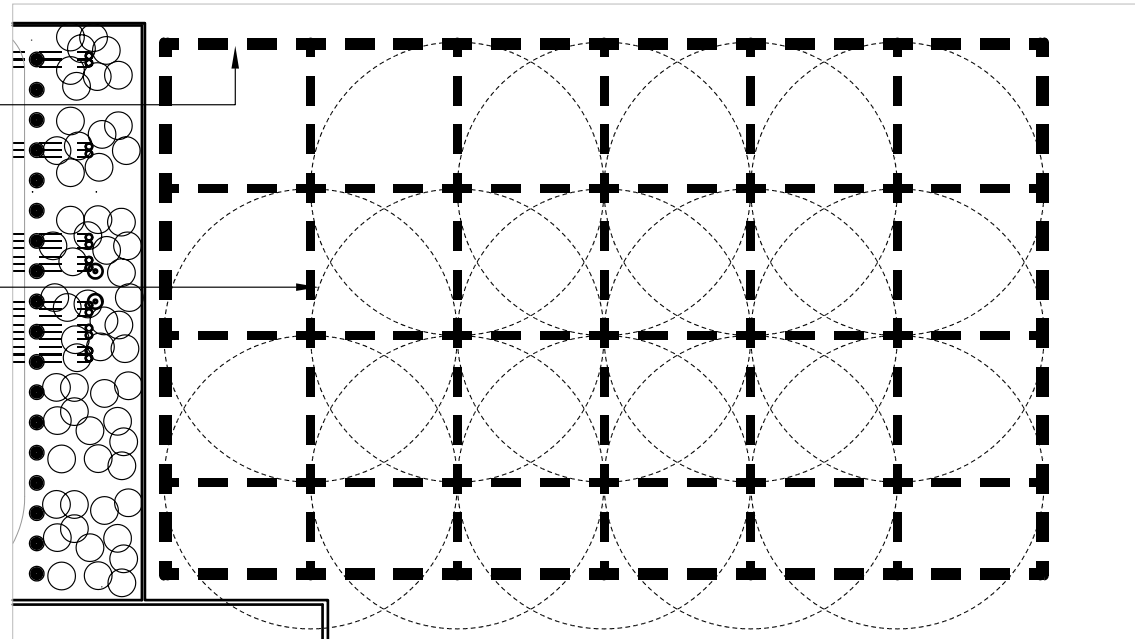


Scale 1:500

Irrigation layout

Ring mainline
-even pressure
-prevents waterhammer

Head to head irrigation



Scale 1:500

IMAGE GALLERY

Fig 5.1: View from North

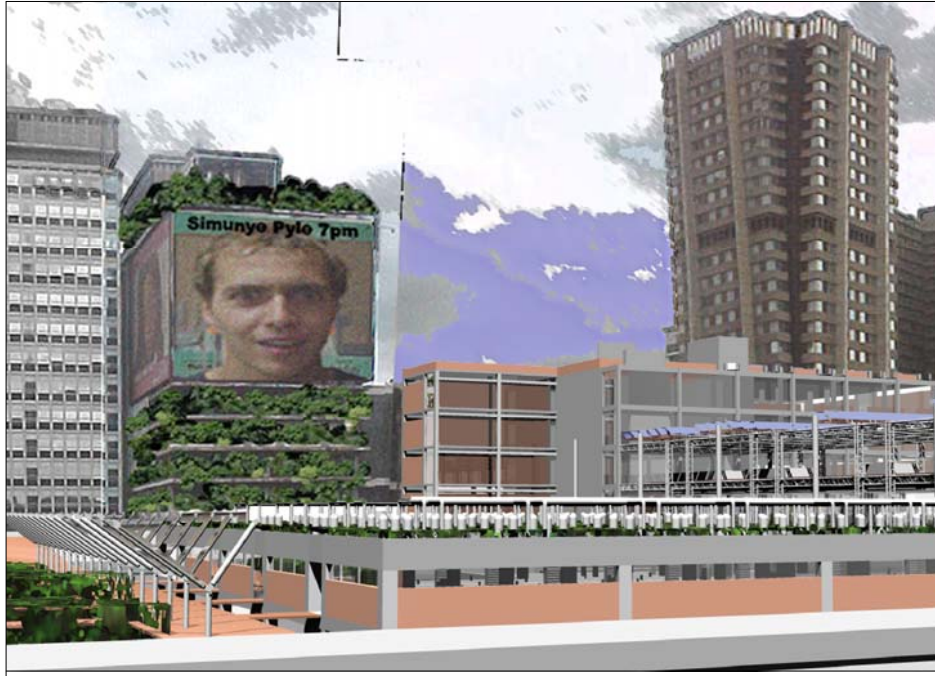


Fig 5.2: View from East

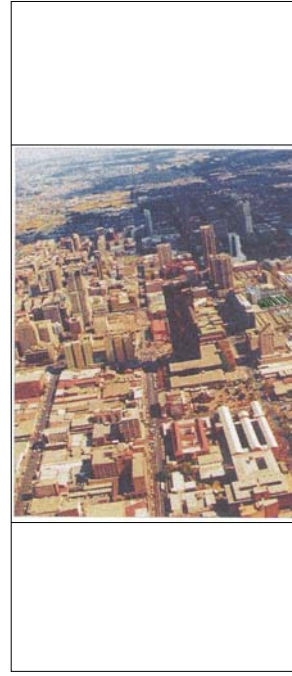


Fig 5.3: View from top of Munitoria



Fig 5.4: View from top of neighbouring building (South-West)



Fig 5.5: View from top of neighbouring building (Building in place)



IMAGE GALLERY

Fig 5.6 : South-east perspective



Fig 5.7 : North -west perspective

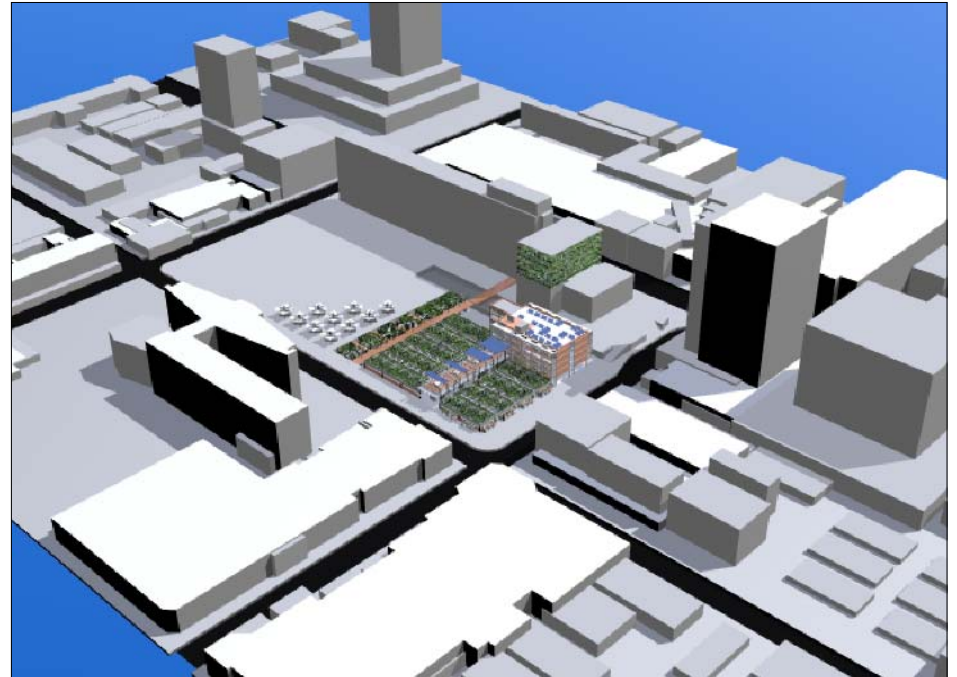


Fig 5.8: North-east perspective



Fig 5.9: South-west perspective



IMAGE GALLERY

IMAGE GALLERY

Fig 5.10 Eastern view of building as isolated entity

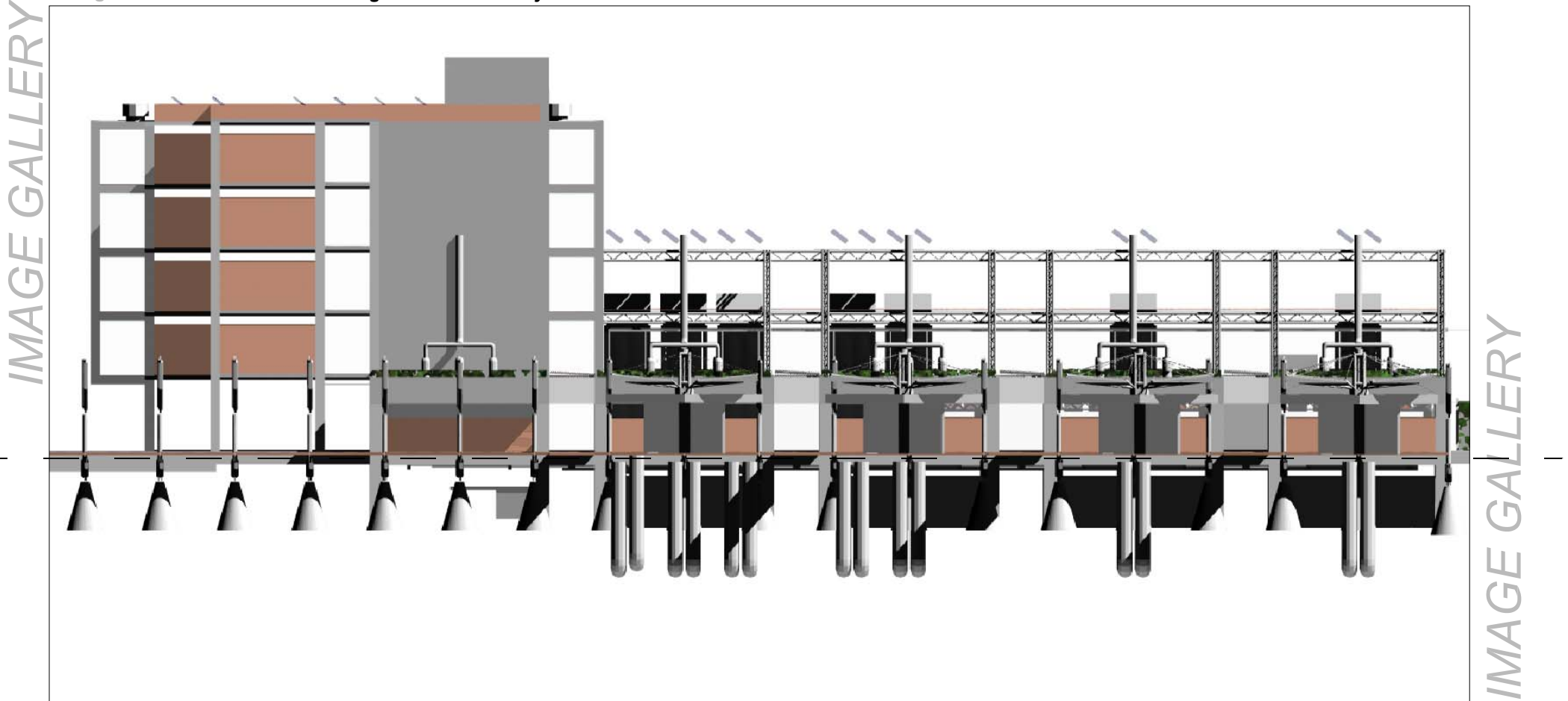


Fig 5.11: Western view of building as isolated entity

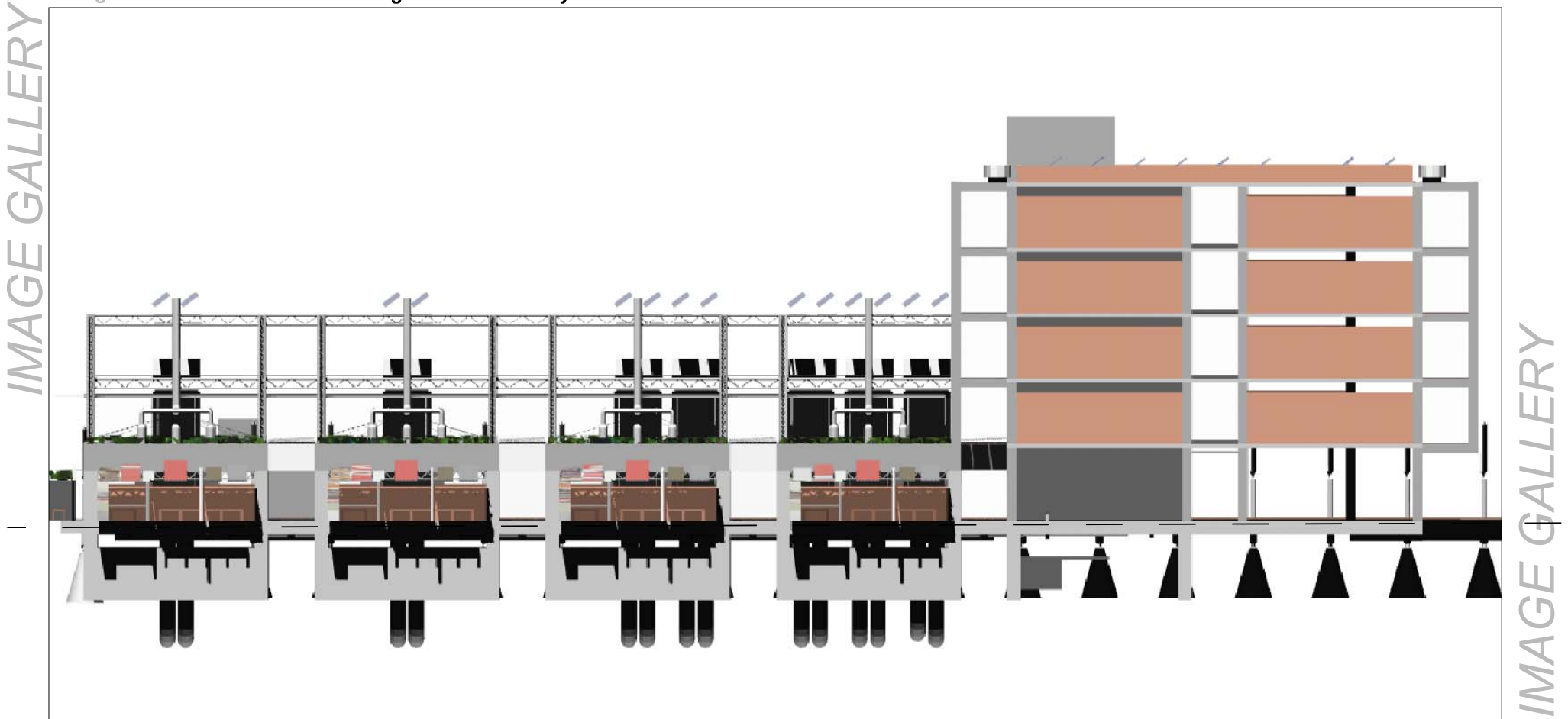


Fig 5.12: Northern view of building as isolated entity

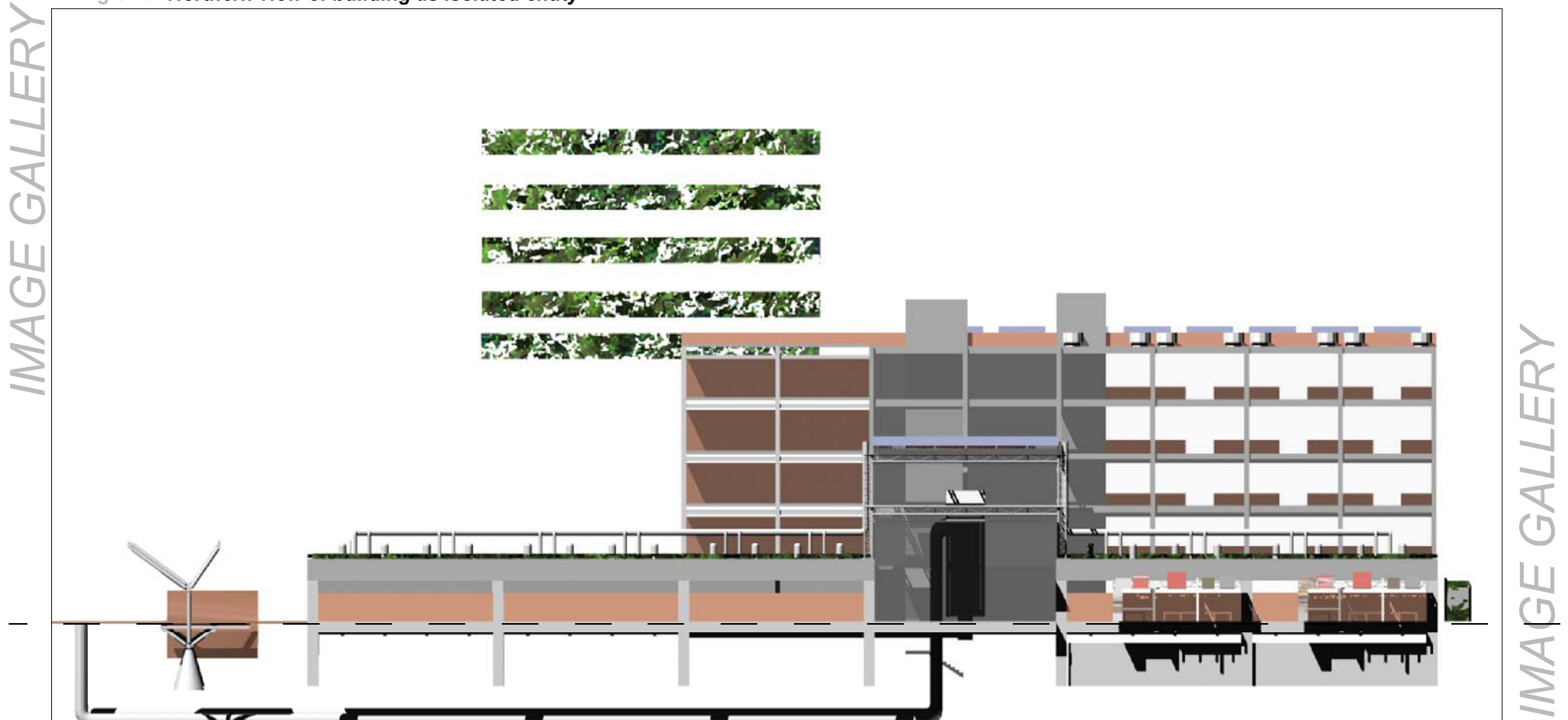


Fig 5.13: *Bottom perspective of building as isolated entity*

IMAGE GALLERY

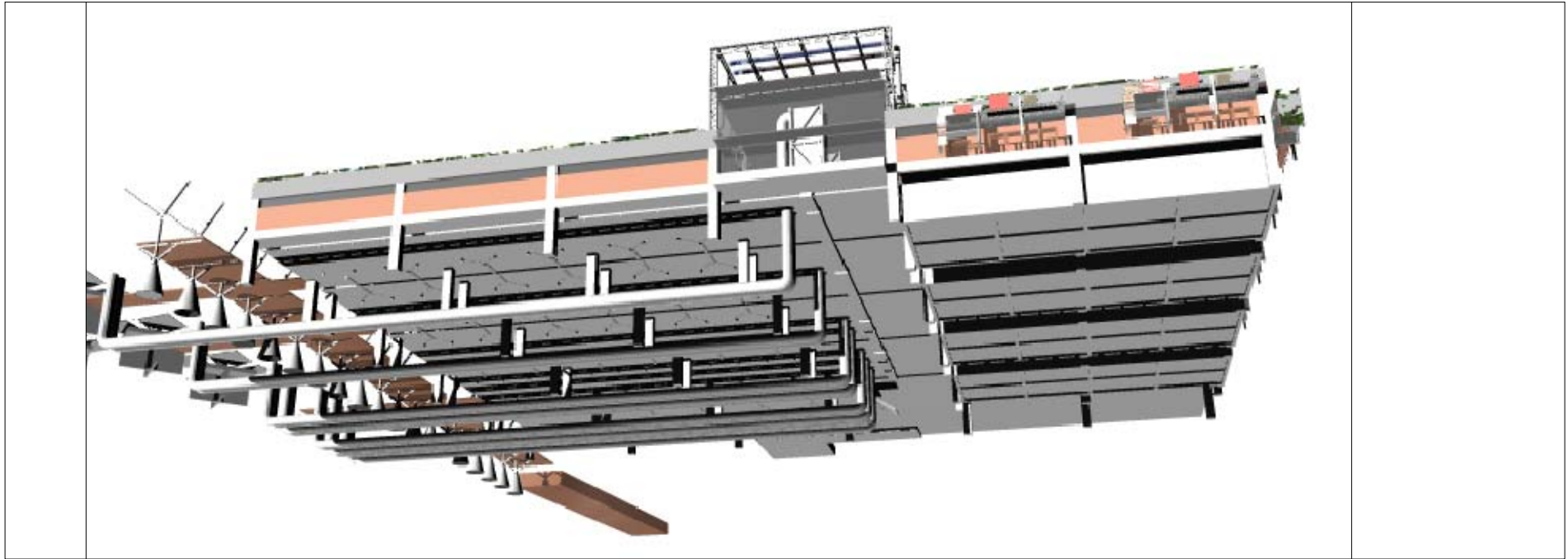


Fig 5.14: *Front perspective of building with Munitoria as isolated entities*



IMAGE GALLERY

Fig 5.15: Southern perspective from outside the atrium and deck area

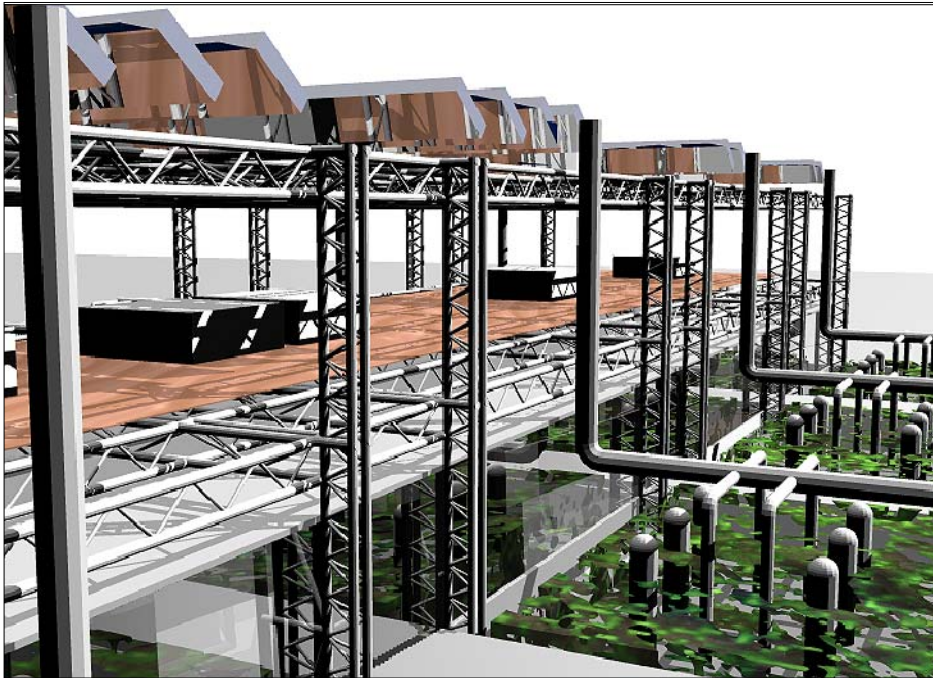


Fig 5.16: South-eastern perspective of atrium and roof gardens

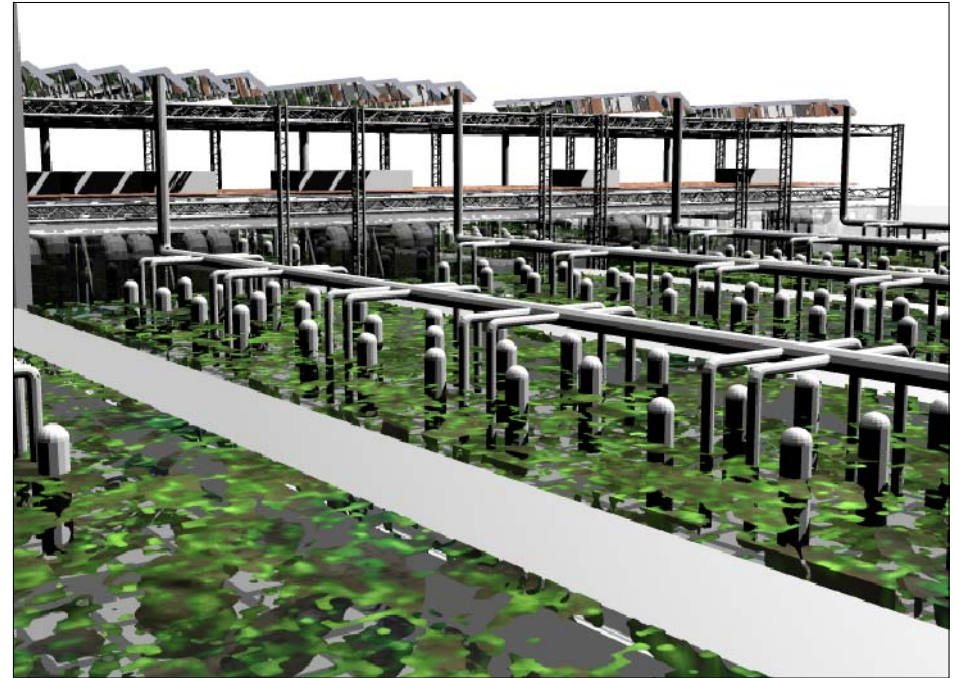


Fig 5.17: Western perspective of atrium and office connection

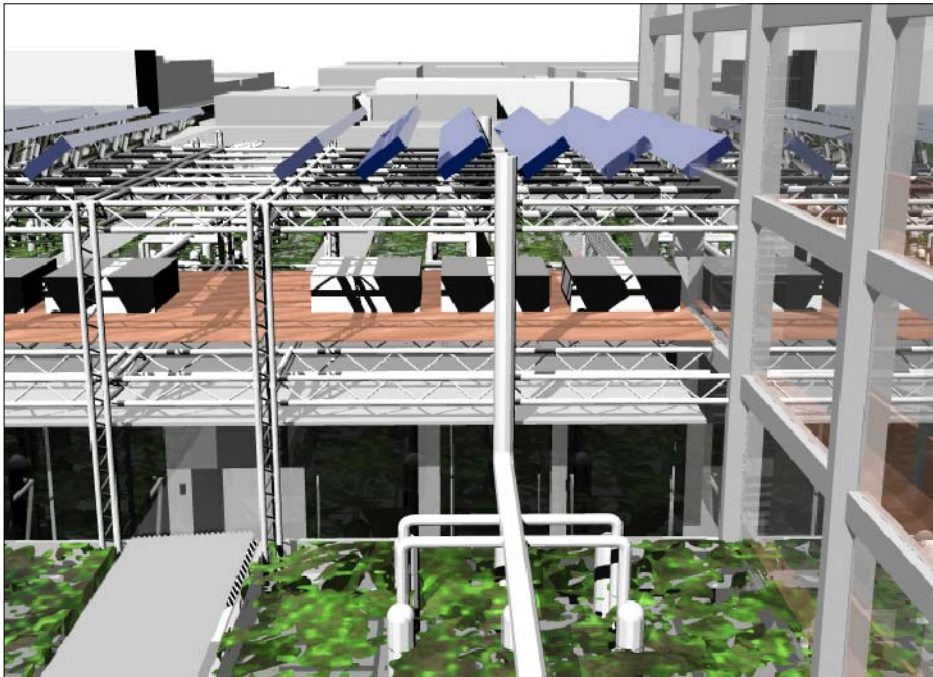


Fig 5.18: Eastern perspective of market area from deck area

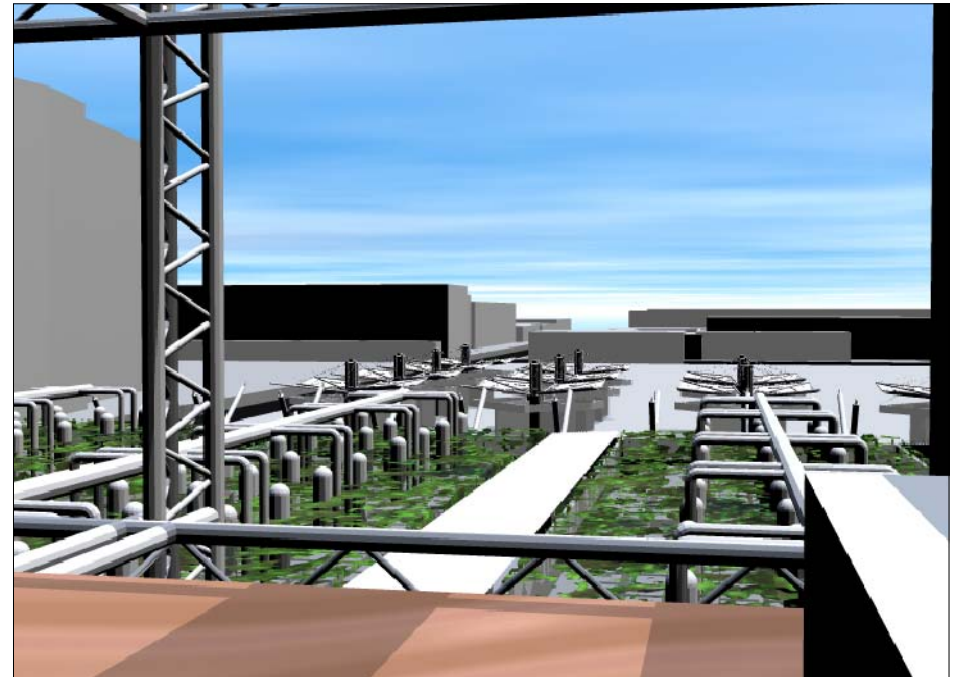


IMAGE GALLERY

IMAGE GALLERY

Fig5.19 : Perspective of bridge from basement level

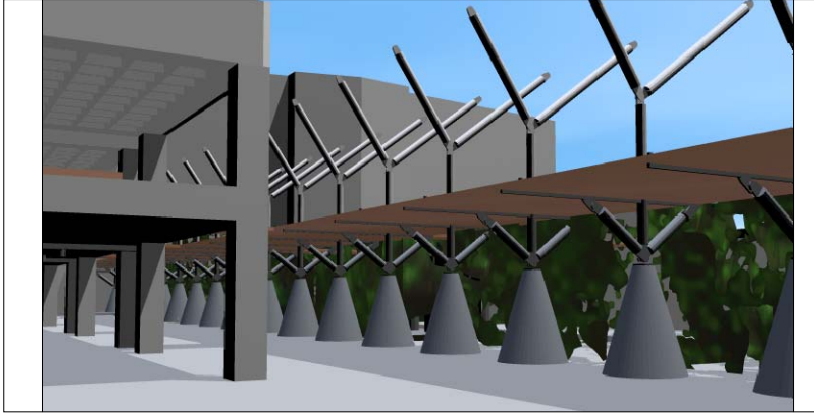


Fig 21 : Bridge from ground floor level



Fig5.23: Perspective of bridge path

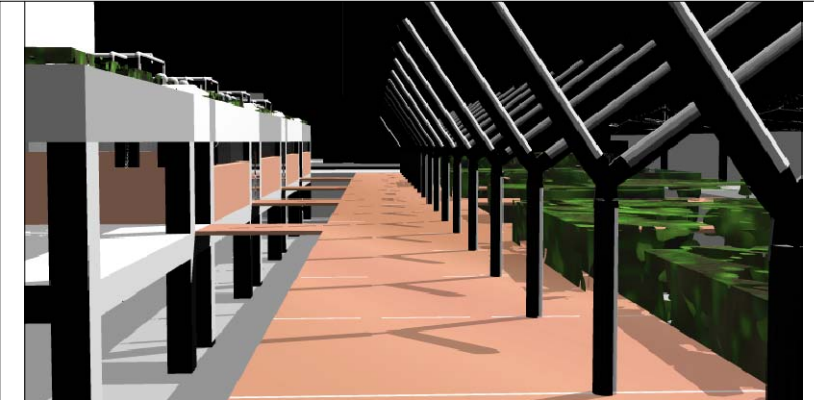


Fig 5.20: Interior of atrium

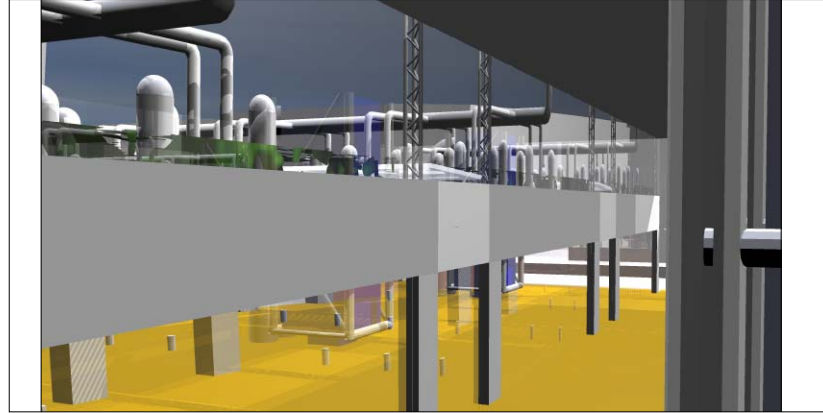


Fig 5.22: Heat exchangers inside the atrium

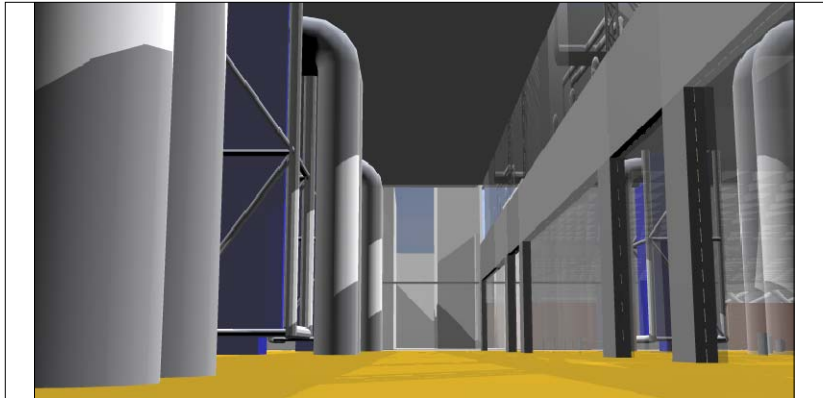


Fig 5.24: Interior of building (facing East)



Fig 5.25 : View from Munitoria building



Fig 5.26 : Urban market situated in park



Fig 5.27 : North-east perspective



Fig 5.28: Eastern perspective



Fig 5.29 : Downward Southern perspective



Fig 5.30 : Urban market stalls



IMAGE GALLERY

Fig 5.31: Office block and Lower complex from a northern perspective



Fig 5.33 : Office block (South-West)



Fig 5.32 .Office block (North-West)



Fig 5.34: The front of Atrium (North-East)

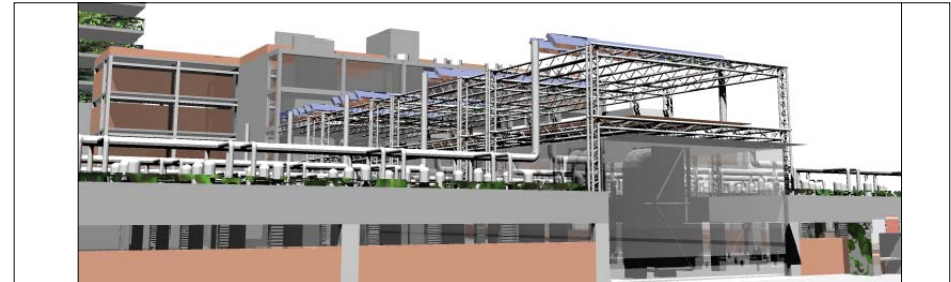


Fig 5.35 Office block (North-West)



IMAGE GALLERY