CHAPTER 8
TECHNICAL RESOLUTION

This chapter will focus on the following aspects:

- Materials
- Structure
- Services
- Floor plans
- Sections
- Technical details

8.1 MATERIALS

The main materials used in the Platform Building at Menlyn will now be discussed.

8.1.1 CONCRETE

"Concrete is extremely durable, easy to work with, easy to connect and, in conjunction with steel, has a high loadbearing capacity" (Hertzog et al., 2004: 101). The predecessor of concrete, lime mortar, was used as a building material in buildings as early as 12 000 B.C., but the invention of Portland cement in 1824 introduced concrete to modern architectural form (Hertzog et al., 2004: 101).

The mouldability of concrete and its various constituents enable the material to be used in many different forms and finishes.

The structure of the Platform Building at Menlyn will be cast-in-situ concrete with an off-shutter finish. This makes the construction of the big column-and-beam structures possible and enables the use of the grid (used throughout the building) to be implemented in the concrete finish.

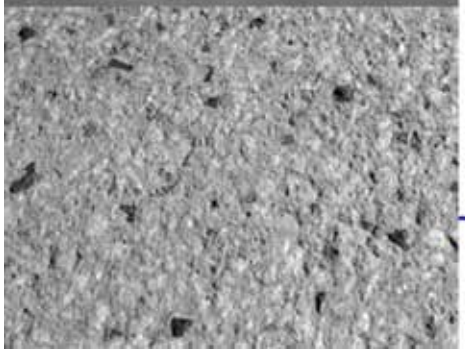
The *Artevia* concrete range by Lafarge will be used as illustrated in illus. 8.1. These different finishes will aid in distinguishing various spaces in the building as well as mirror and accentuate the rhythm created by the column-and-beam structures.

ILLUS. 8.1: Illustration of use of concrete in design.

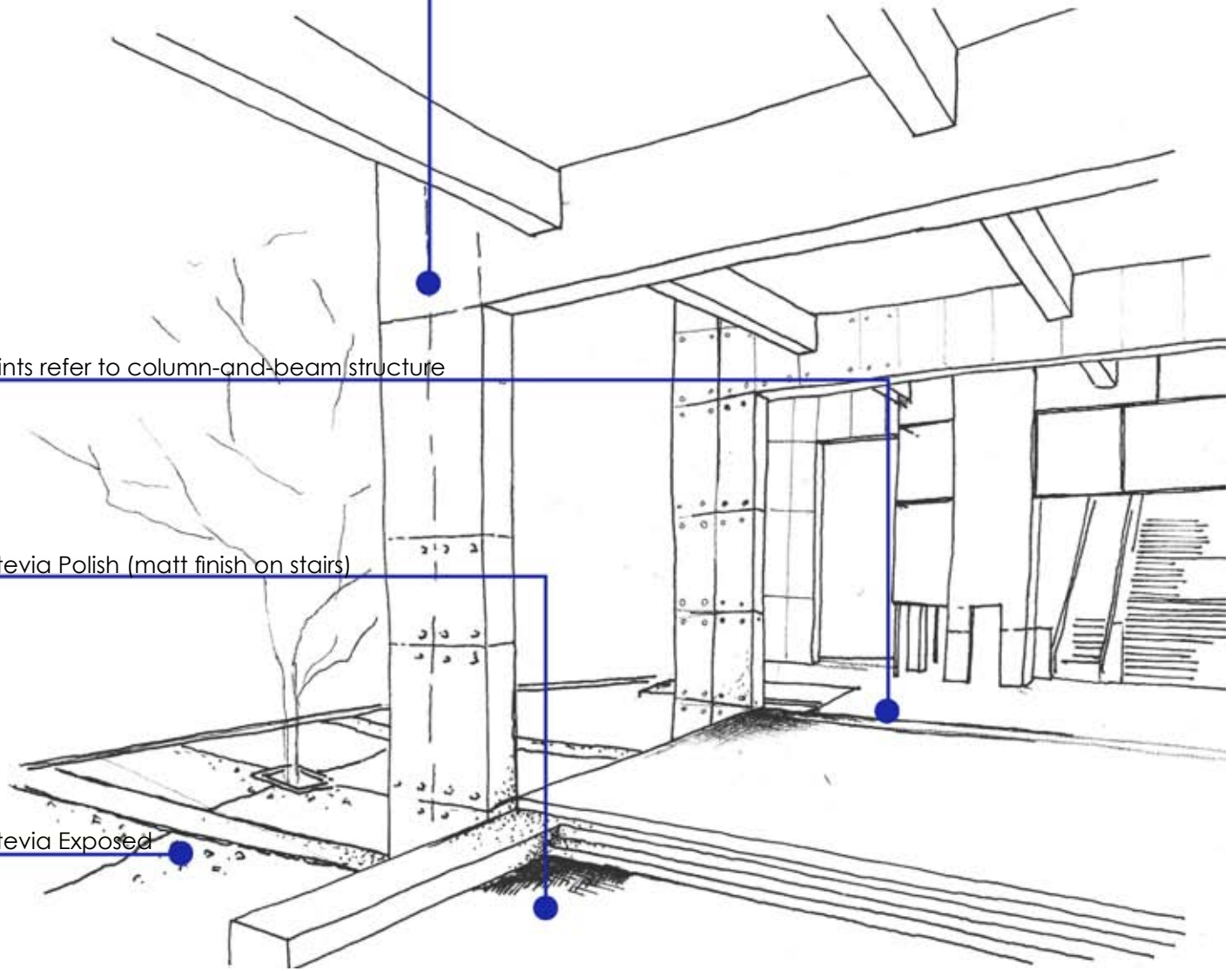
Off-shutter finish according to grid with exposed tie

Joints refer to column-and-beam structure

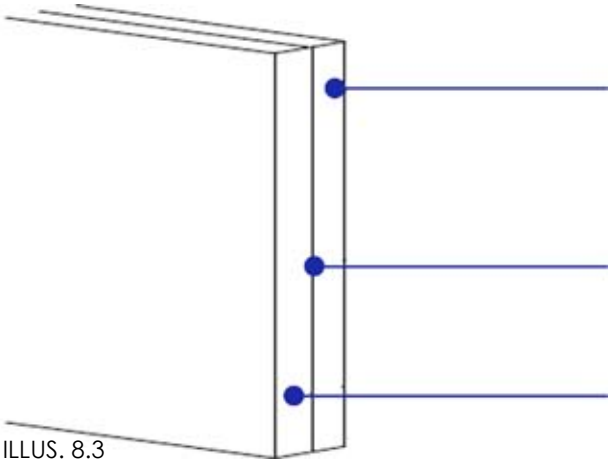
Artevia Polish (matt finish on stairs)



Artevia Exposed



ILLUS. 8.2



ILLUS. 8.3

8.1.2 SEMI-TRANSPARENT PHOTOVOLTAIC GLASS

The glass roof structure is placed above the Gautrain entrance/exit in the Platform Building will make use of semi-transparent glazing panels. These panels make use of photovoltaic silicone cells sandwiched between glass to generate electricity. The glazing panels allow diffused light to pass through.

The semi-transparent photovoltaic glazing panel consists of three layers, a tempered glass sheet, an amorphous high grade silicone cell film and a glass sheet or high grade polymer. The thin film is 0.3microns thick and cells are connected in a series circuit. The cells are chemically treated to have a positive and negative side. When the sun's rays come in contact with the cells, the electrons enter an excited state and flow out of the cell thereby creating electrical flow. Plug-and-play DC cables are installed on the silicone layer and edge-mounted. The glazing panel is framed, hiding the edge-mounted electrical connection system and all wiring. The DC cables are connected to an inverter which changes the energy from DC to AC. When the energy is successfully converted, it is fed into the electrical grid and used.

The amount of energy generated is sufficient to power the escalators of the Platform Building as shown in the calculations on the right.

PRODUCT: 8mm 50% clear PA1 Panel Powerglaze by PV Glaze
FINISH:
Exterior - Tinted; Interior - Light Grey
VISIBLE LIGHT: 50% clear
HEAT CUT: 30%
POSSIBLE ENERGY GENERATED/DAY:
= roof area x 40W
= 336 x 40
= 13 440W
= 560kWh
AVERAGE ENERGY USAGE OF 1 PAIR OF ESCALATORS/DAY: = 103kWh (Rastogi, 2010)
ENOUGH ENERGY GENERATED PER DAY TO SUPPLY ELECTRICITY TO 5 PAIRS OF ESCALATORS

ILLUS. 8.2: Interior view of installed semi-transparent photovoltaic glazing, location unknown. (Opposite)

ILLUS. 8.3: Construction of semi-transparent photovoltaic glazing. (Opposite)

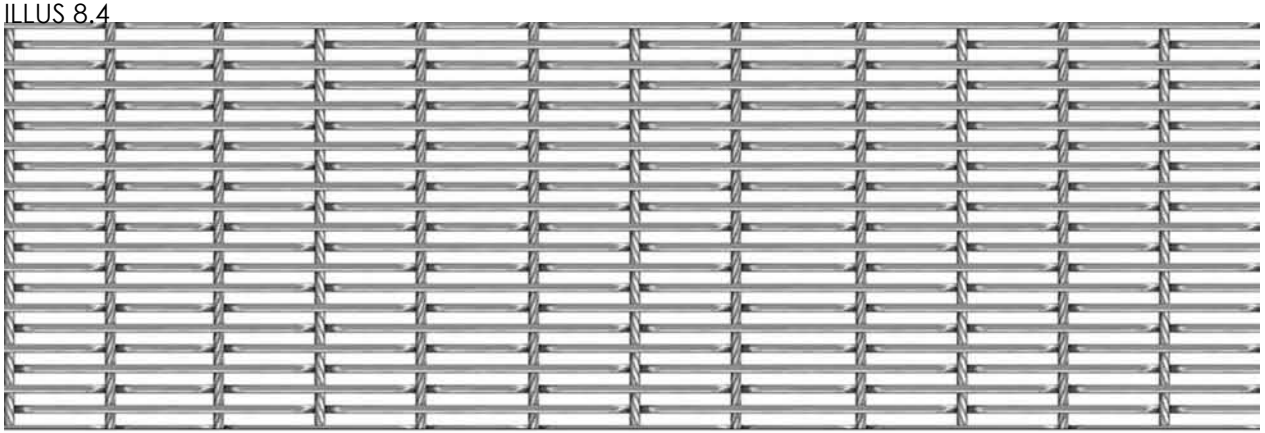
ILLUS. 8.4: Omega 1520 GKD metal fabric.

ILLUS. 8.5: Union theological seminary, Richmond, Virginia.

ILLUS. 8.6: Doral Park, Doral, Florida.

ILLUS. 8.7: Woven-in bar with spring GKD metal fabric attachment method.

ILLUS 8.4



8.1.3 METAL FABRIC

Metal fabrics were originally invented for industrial applications such as filters (Hertzog et al. 2004: 166). Metal fabrics enable the design of permeable building facades. Different effects are created depending on the position of the viewer, the reflective properties of the material, the aperture of the mesh, the thickness and texture of the material (Hertzog et al., 2004: 166).

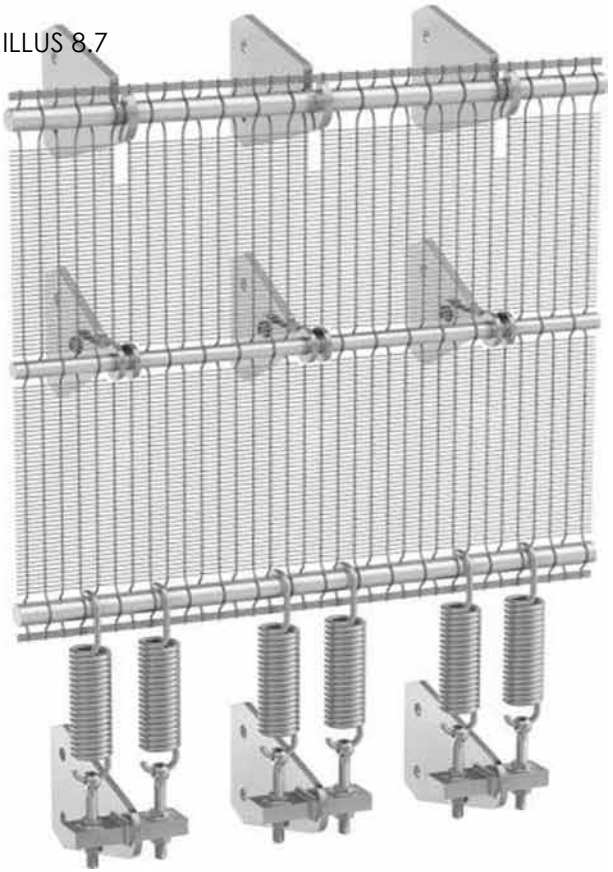
In addition to visual effects, metal fabrics are applied in the Platform Building at Menlyn to:

- shade certain areas from the sun
- redirect light
- separate and indicate different spaces
- cover service shafts
- allow for natural ventilation

ILLUS 8.5

ILLUS 8.6

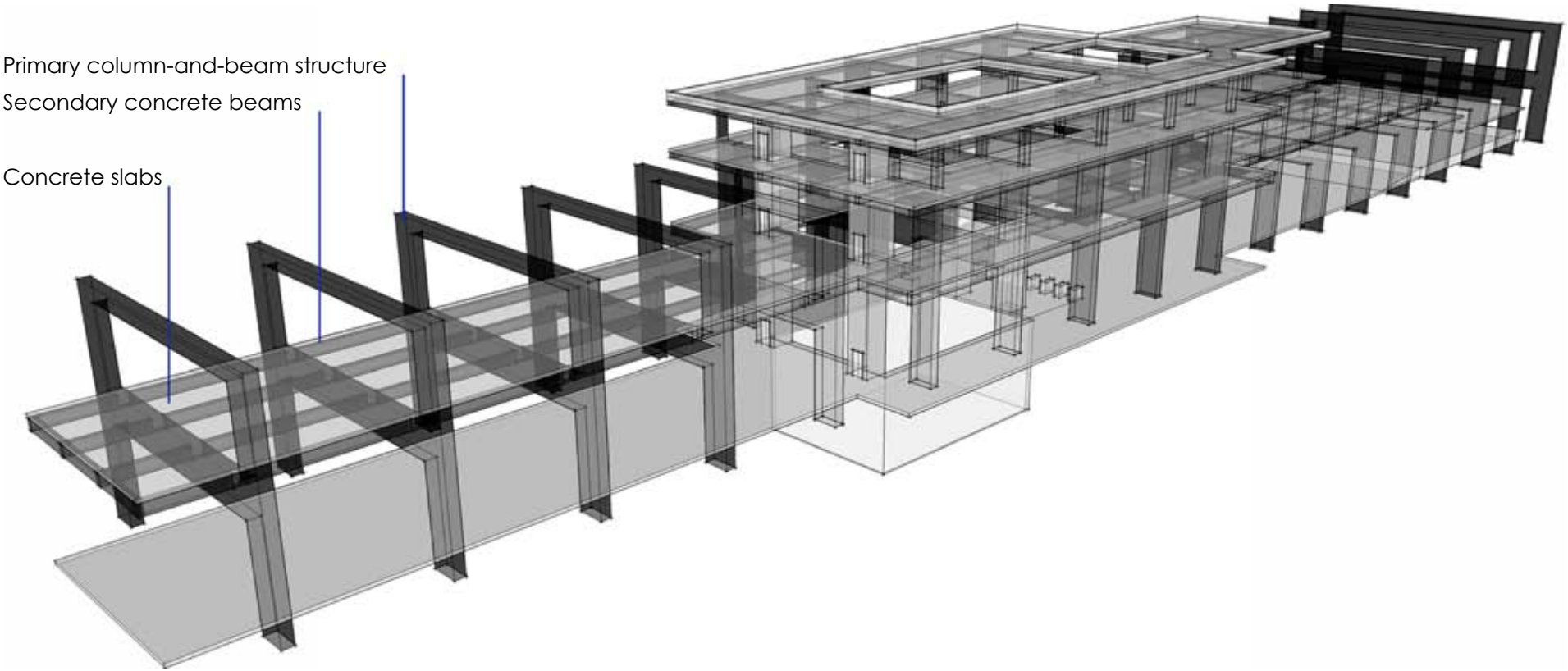
ILLUS 8.7

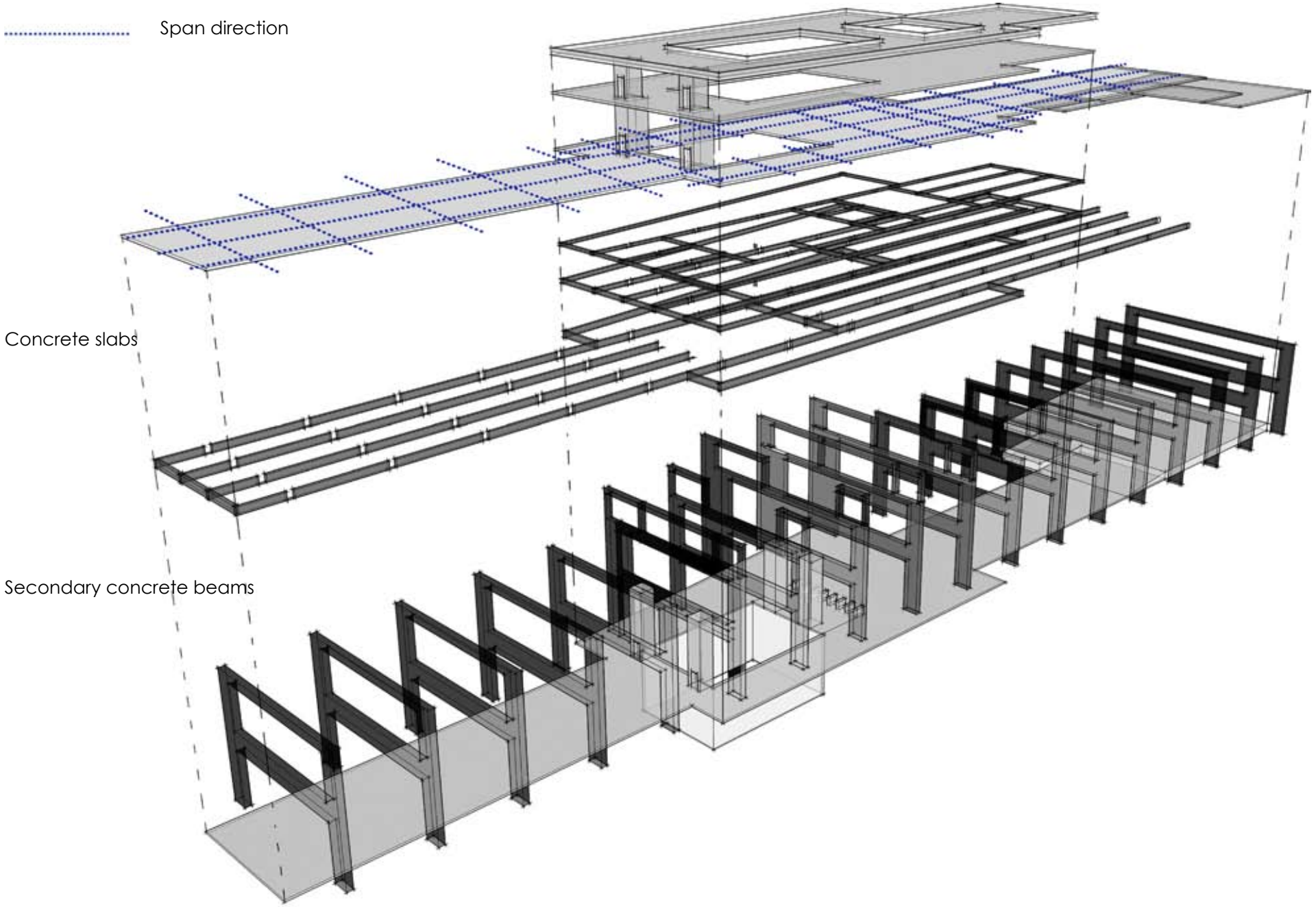


ILLUS. 8.8: Perspective of the structural system of the Platform Building at Menlyn. (Below)

ILLUS. 8.9: Exploded axonometric of the structural system of the Platform Building at Menlyn. (Opposite)

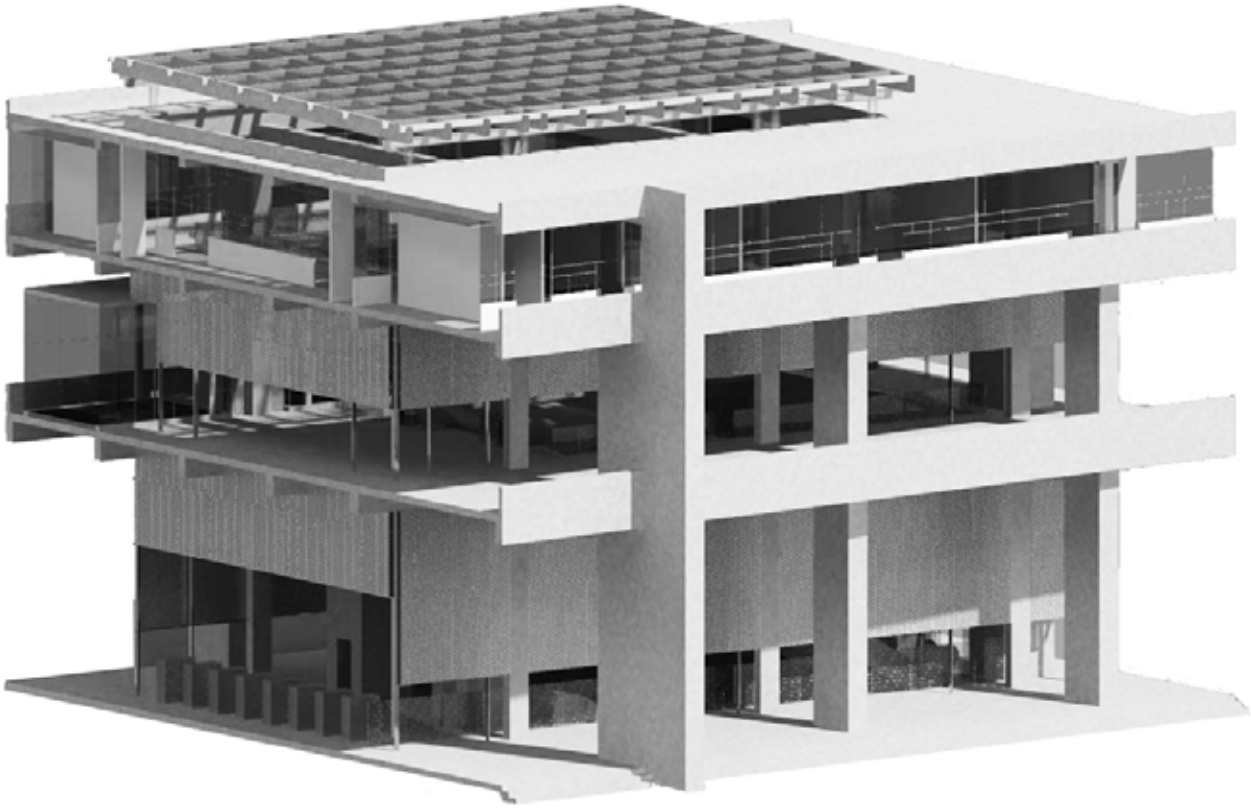
8.2 STRUCTURAL SYSTEM

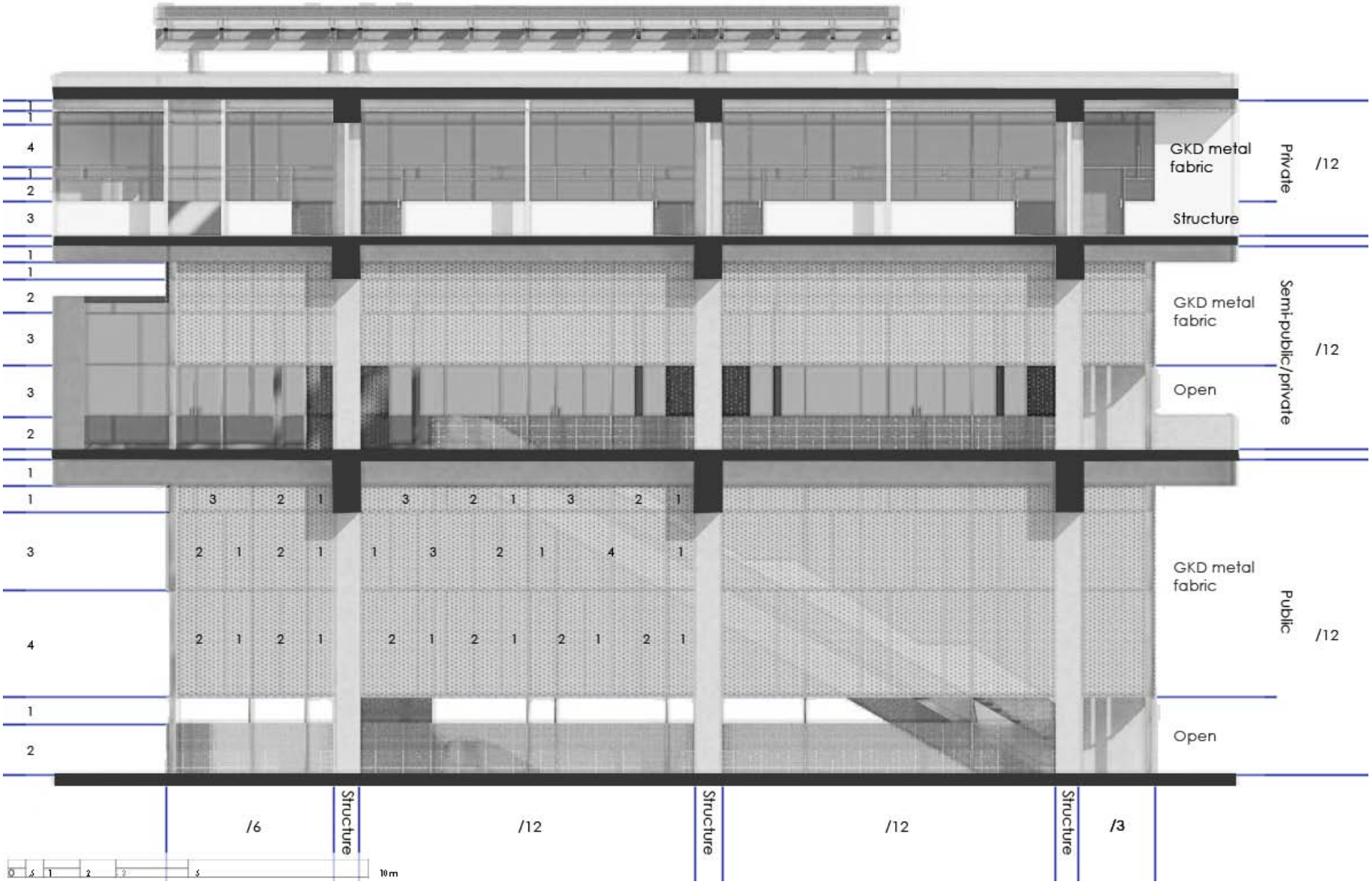


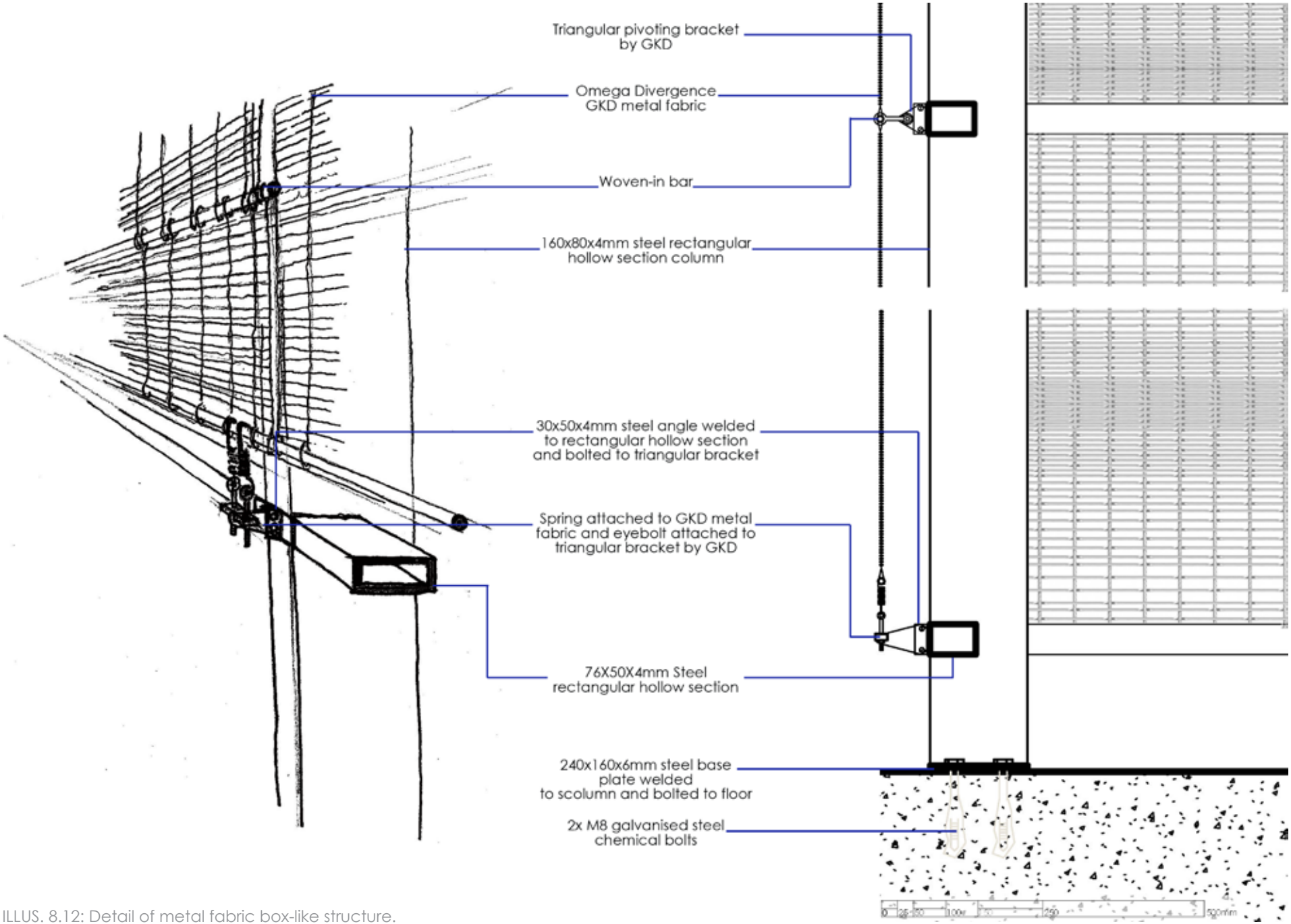


ILLUS. 8.10: Perspective of the metal fabric box-like structure of the Platform Building at Menlyn. (Below)
ILLUS. 8.11: Graphic portrayal of the grid used for the metal fabric box-like structure. (Opposite)

8.3 METAL FABRIC BOX-LIKE STRUCTURE





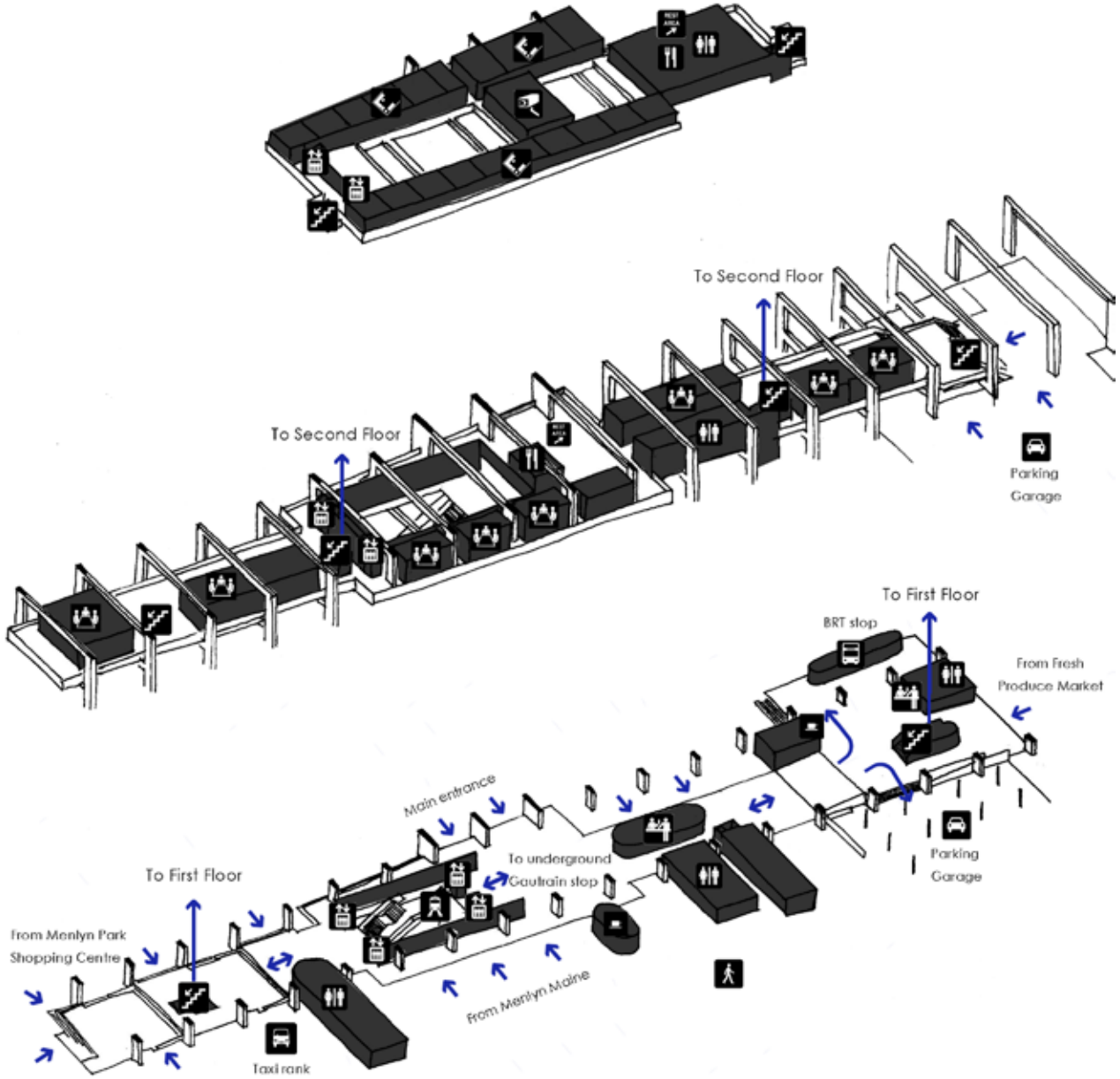


ILLUS. 8.12: Detail of metal fabric box-like structure.

8.4 CIRCULATION

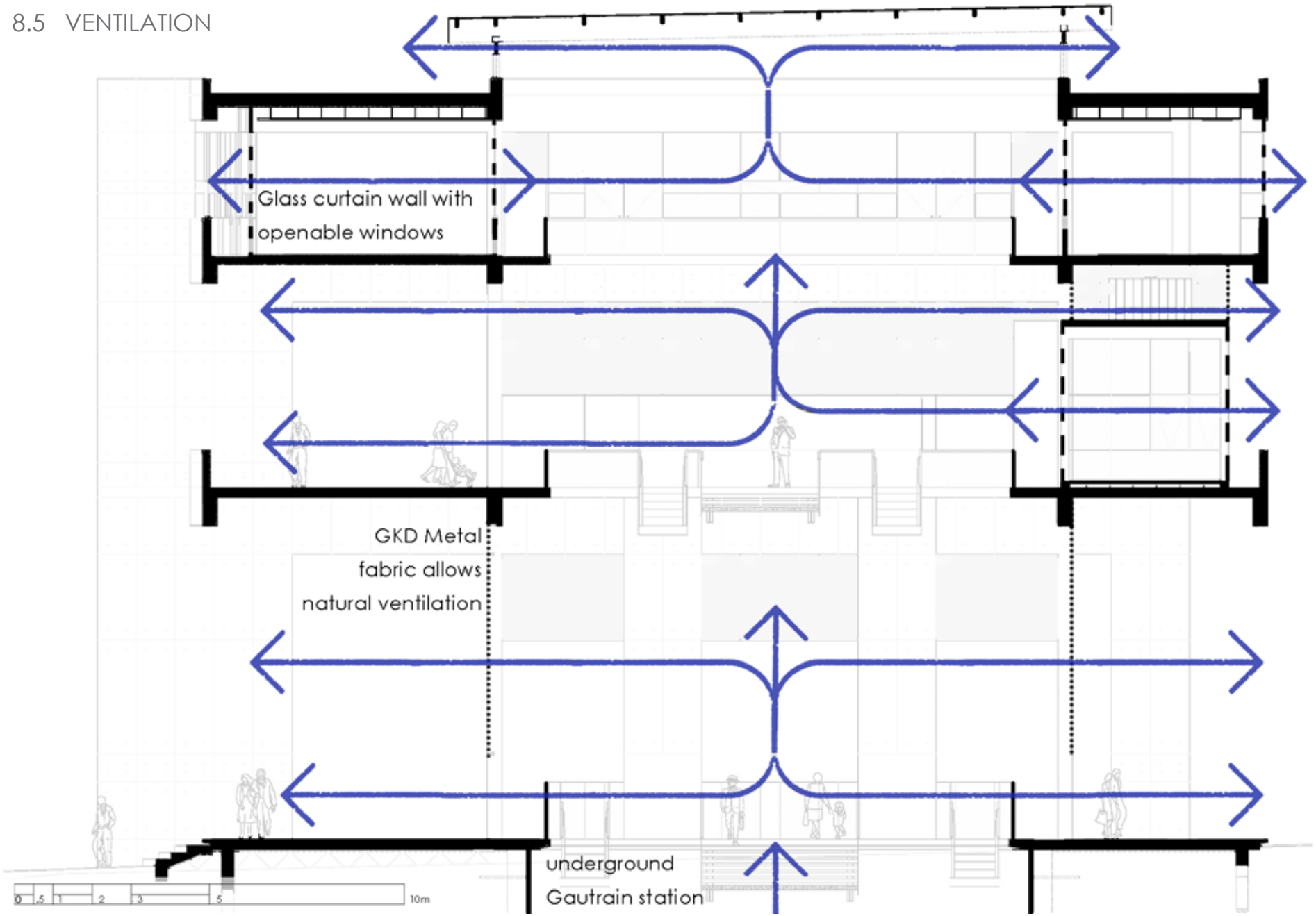
KEY

- Elevator
- Stairs
- Ablution
- Offices
- Ticket kiosk
- Conference/exhibition space
- Rest/restaurant seating area
- Restaurant
- Kiosk
- Gautrain
- BRT stop
- Parking Garage
- Taxi rank



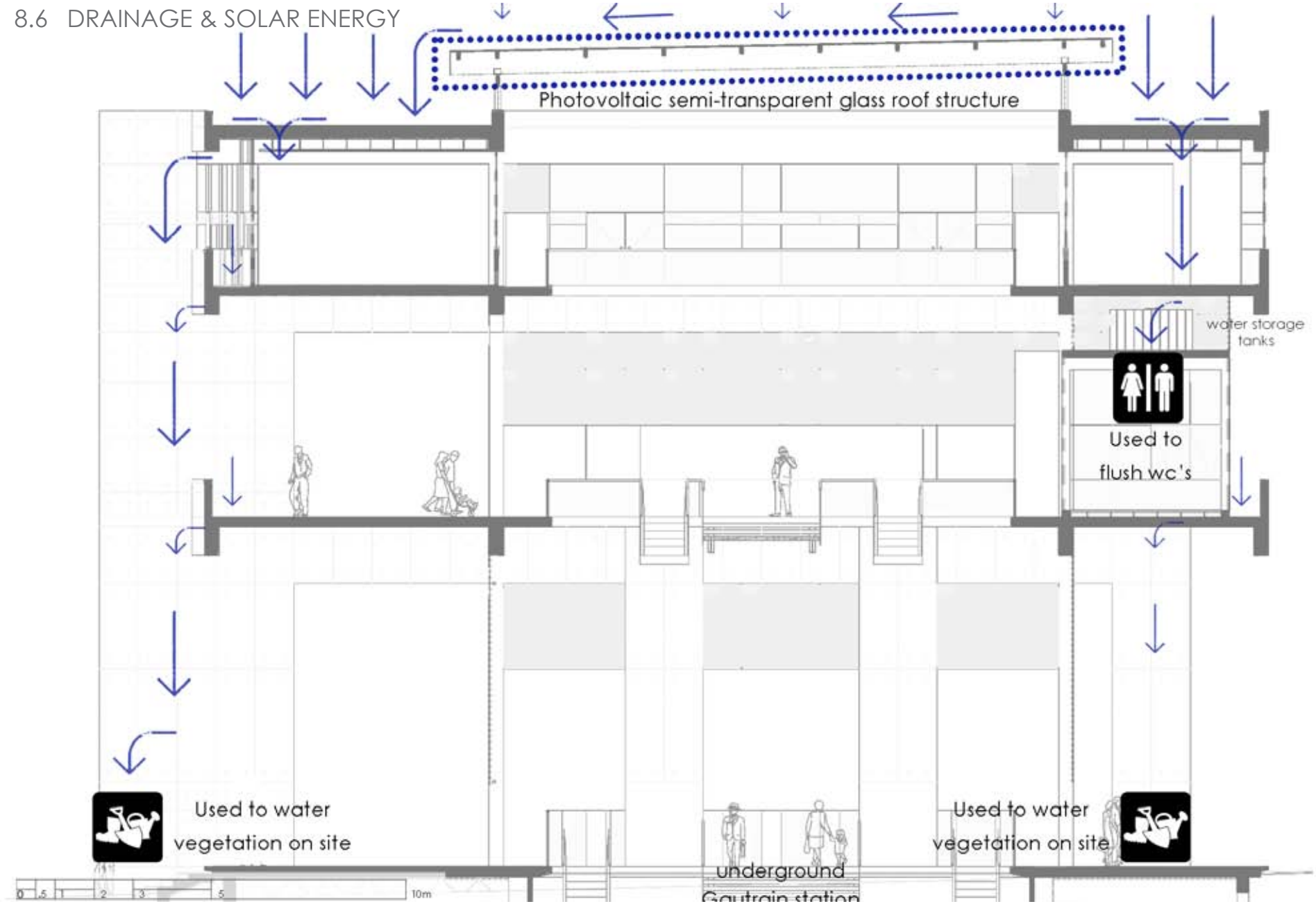
ILLUS. 8.13: Circulation routes.

8.5 VENTILATION



ILLUS. 8.14: Natural ventilation system.

8.6 DRAINAGE & SOLAR ENERGY

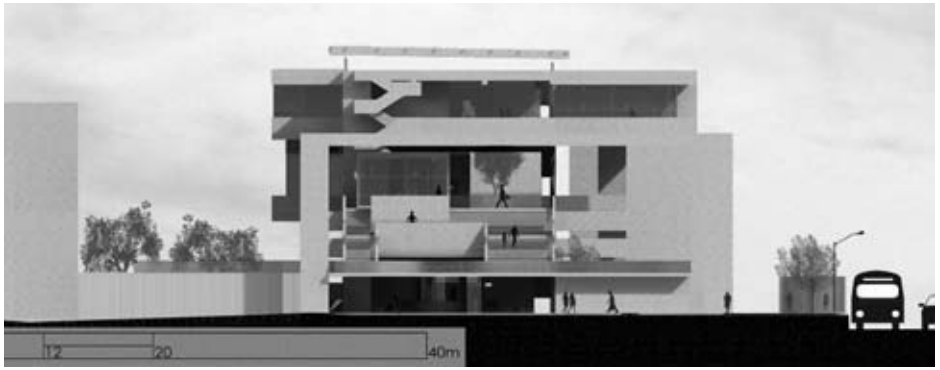


ILLUS. 8.15: Rainwater collection and solar energy systems.

8.7 ELEVATIONS

ILLUS. 8.16: North elevation.

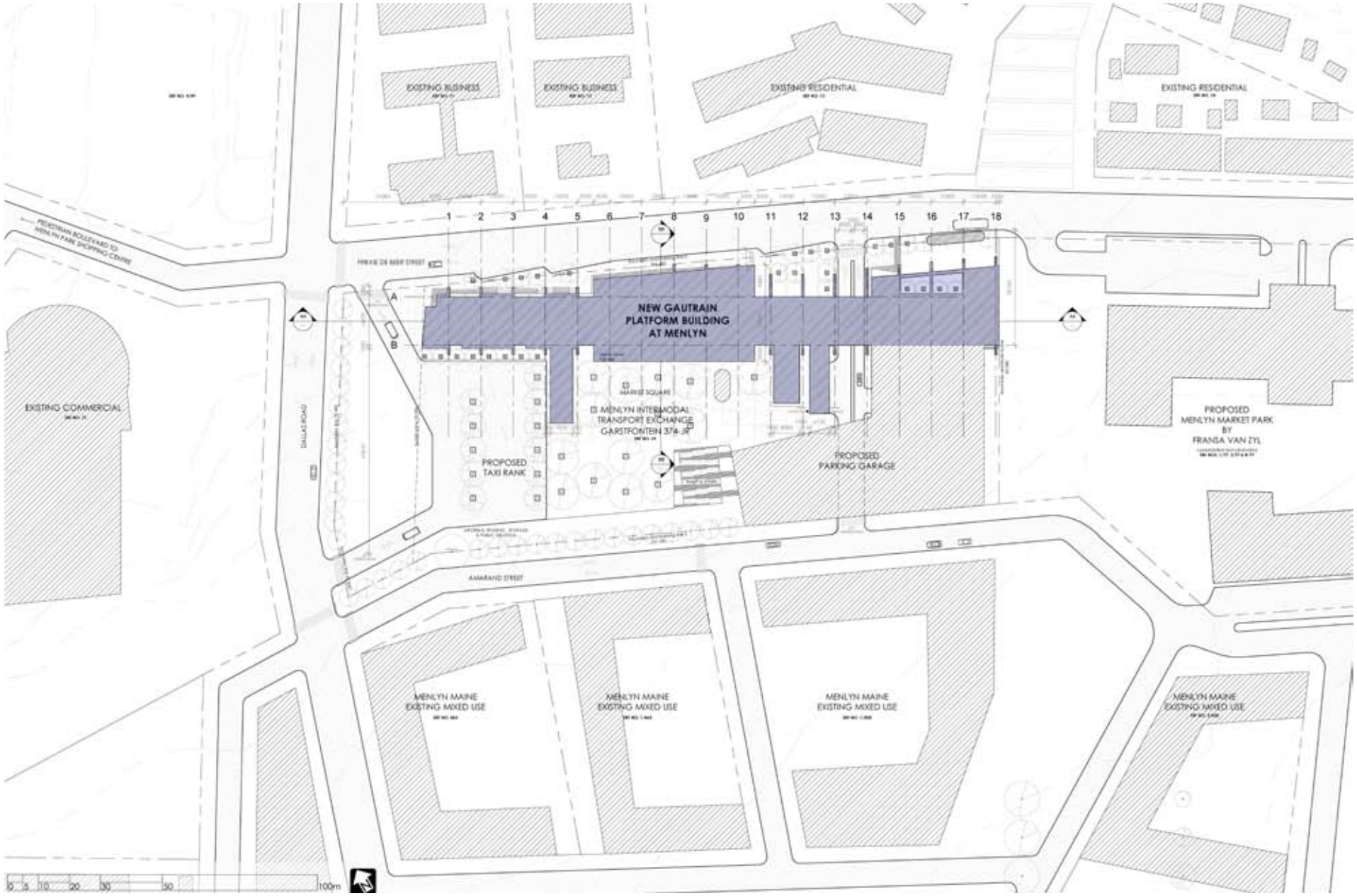
ILLUS. 8.17: South elevation.



ILLUS. 8.18: East elevation.

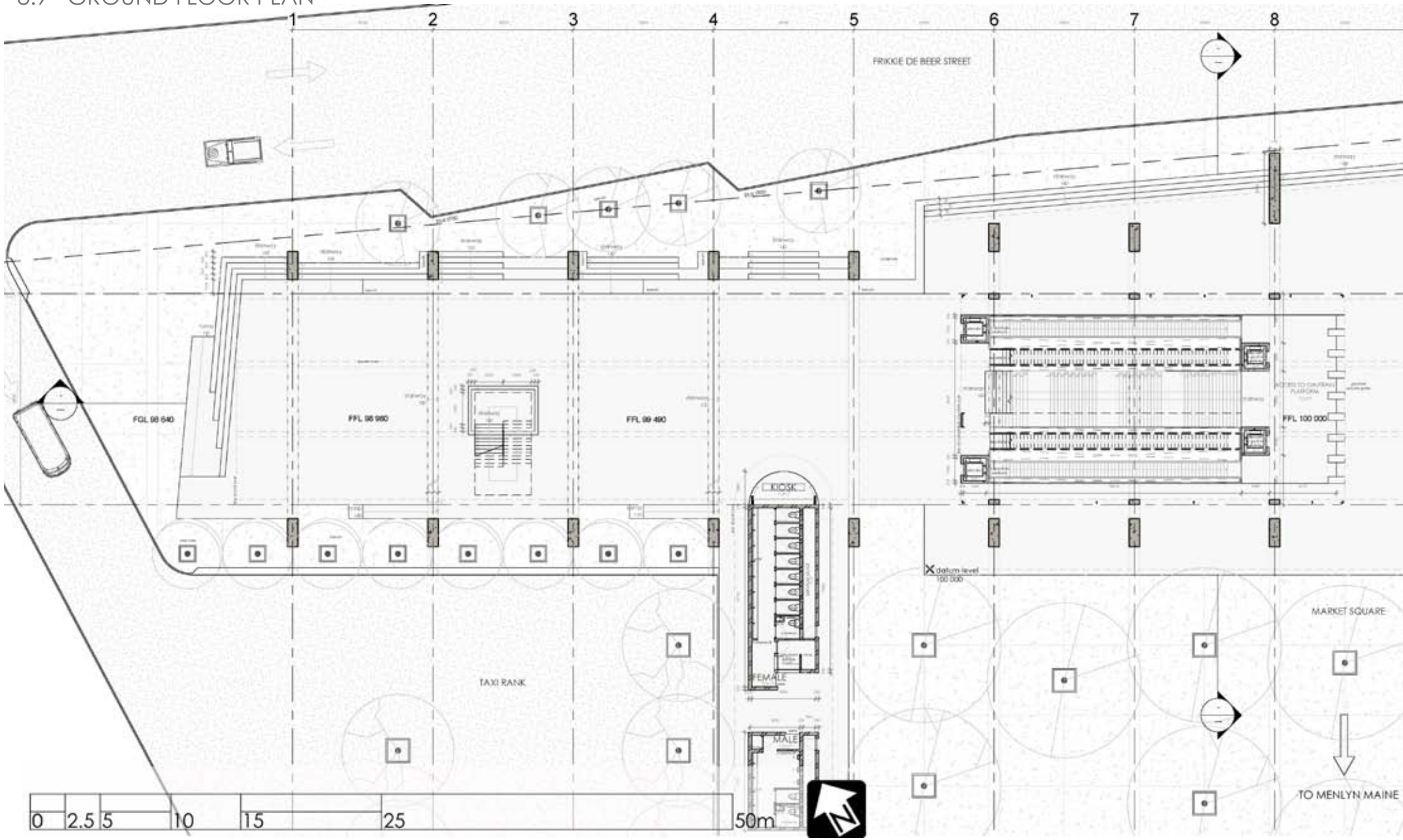
ILLUS. 8.19: West elevation.

8.8 SITE PLAN

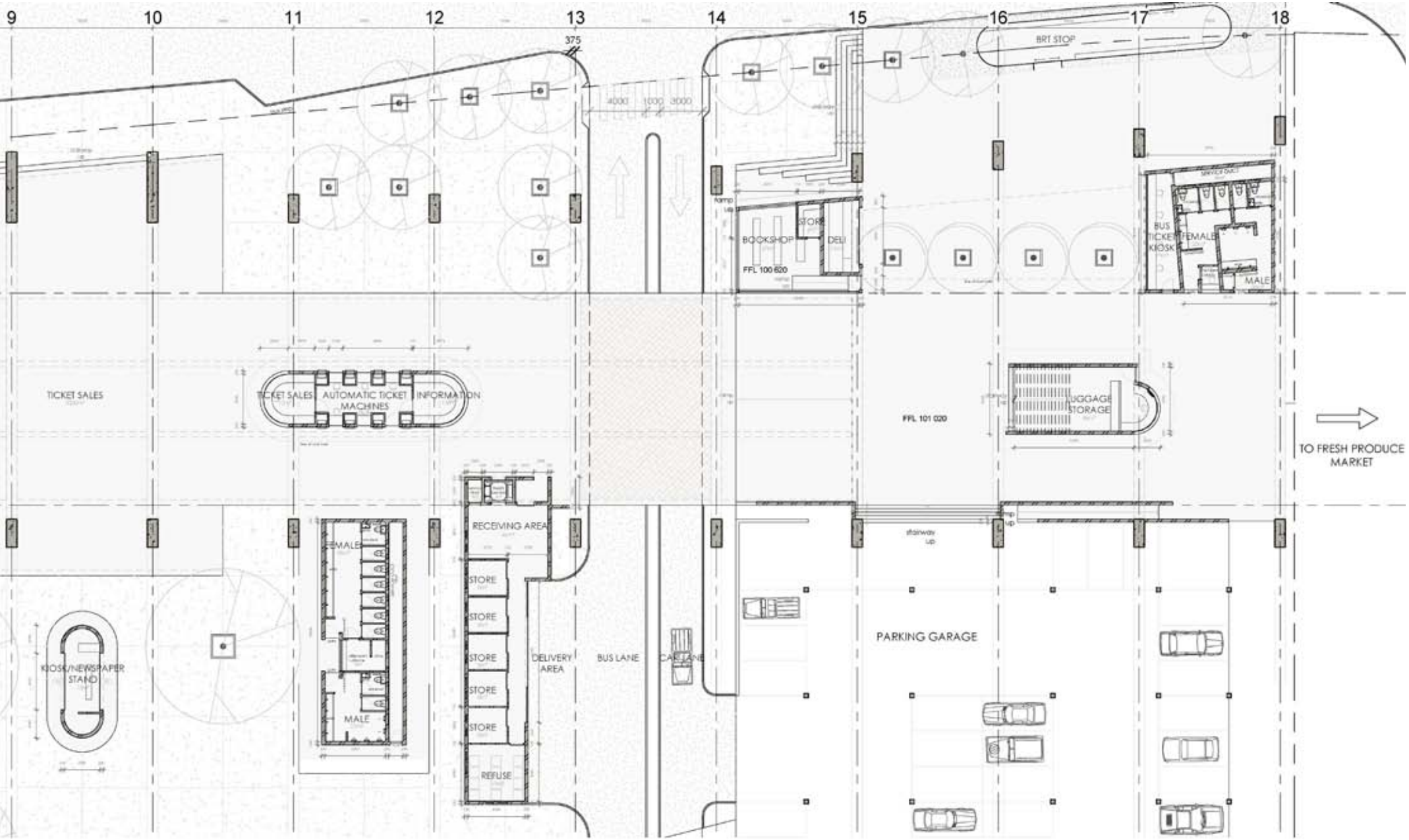


ILLUS. 8.20: Site plan.

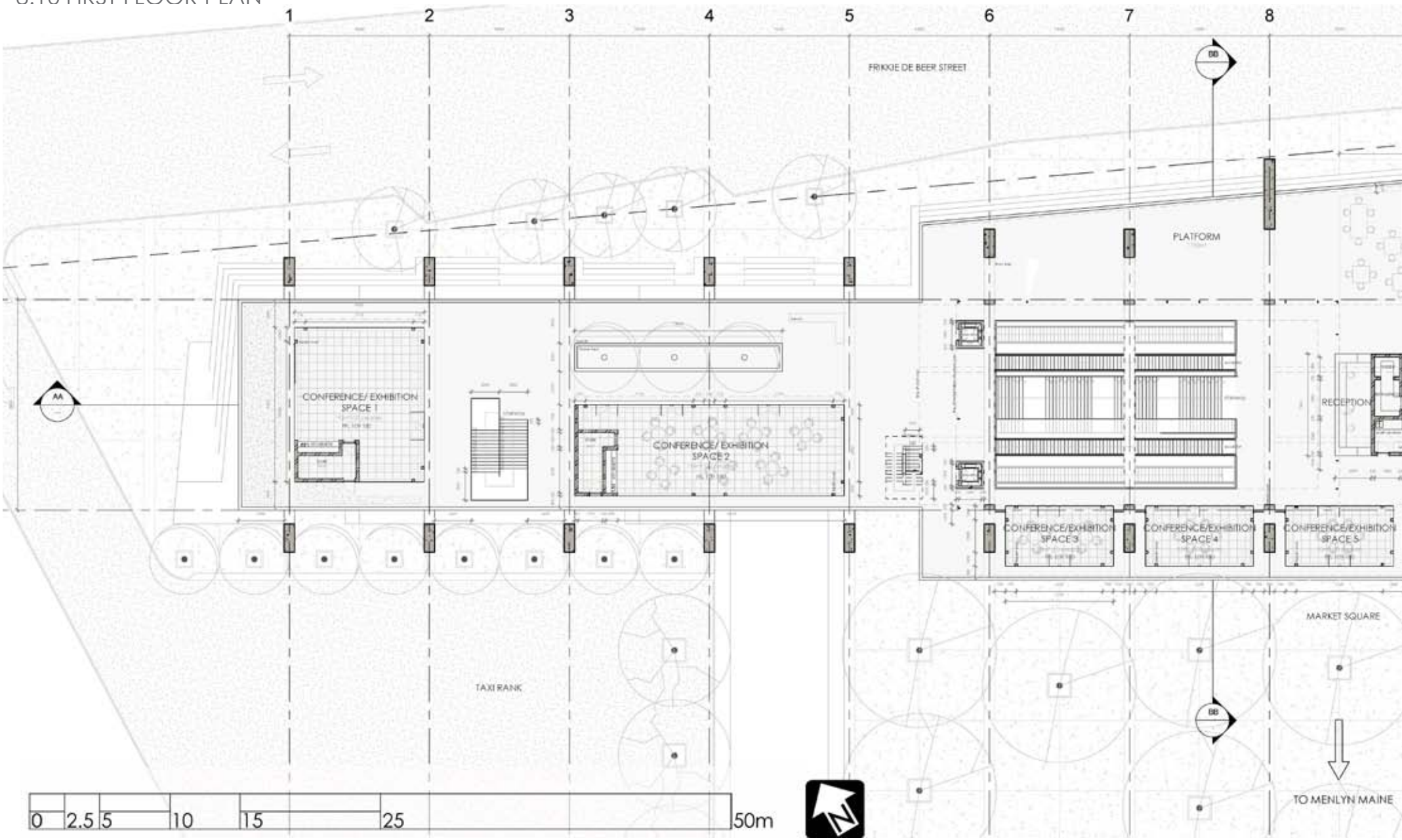
8.9 GROUND FLOOR PLAN



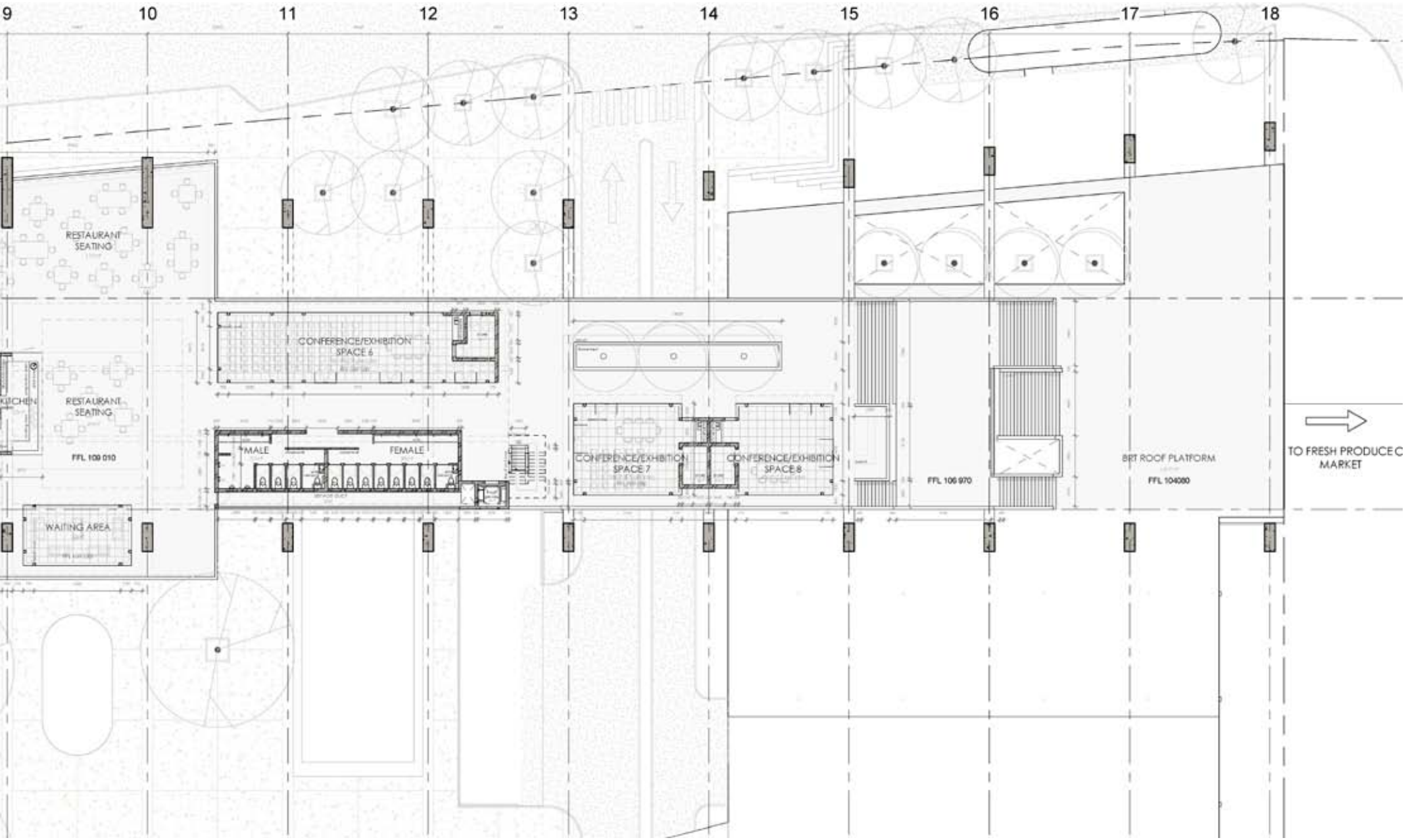
ILLUS. 8.21: Ground floor plan.



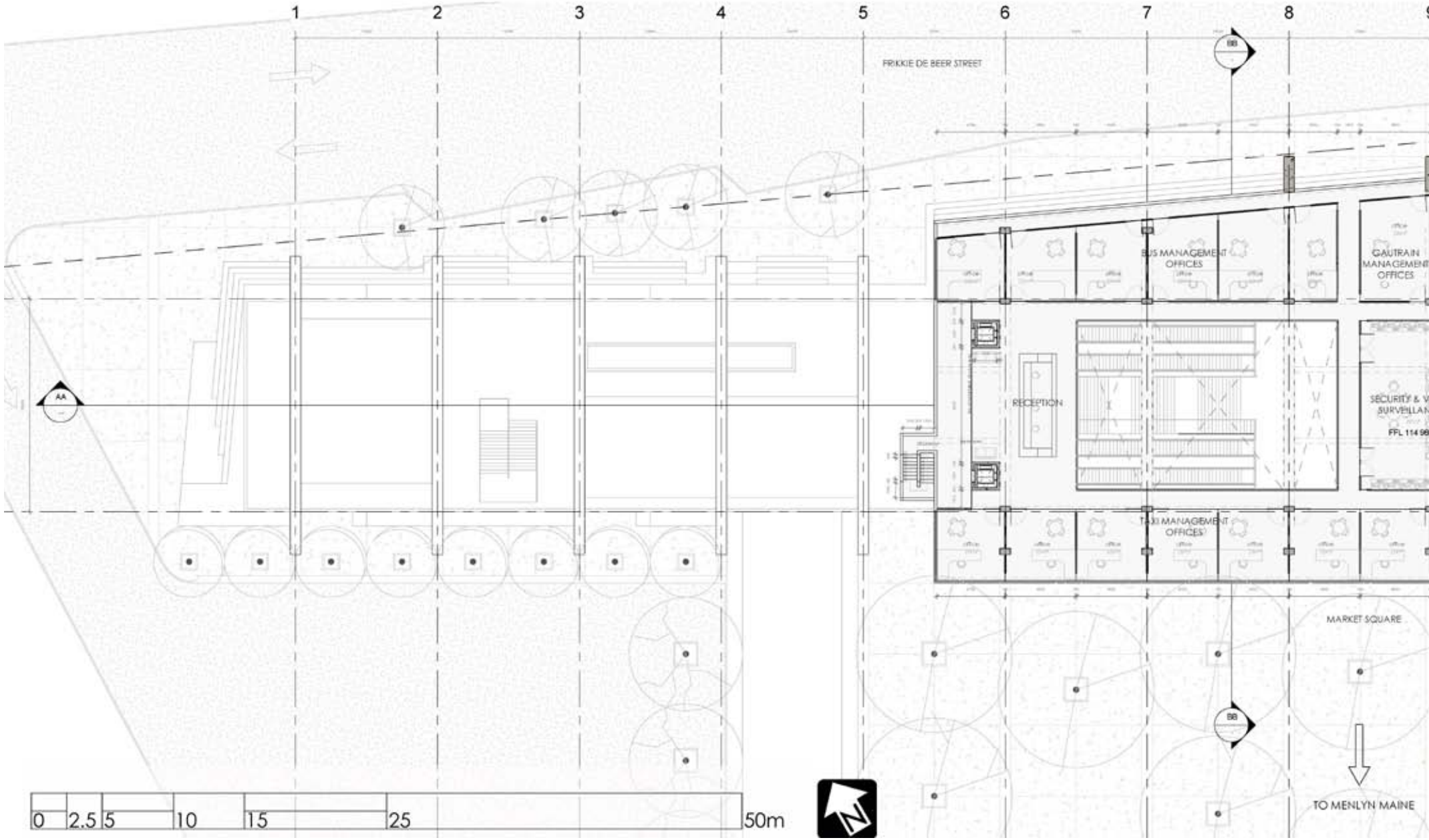
8.10 FIRST FLOOR PLAN



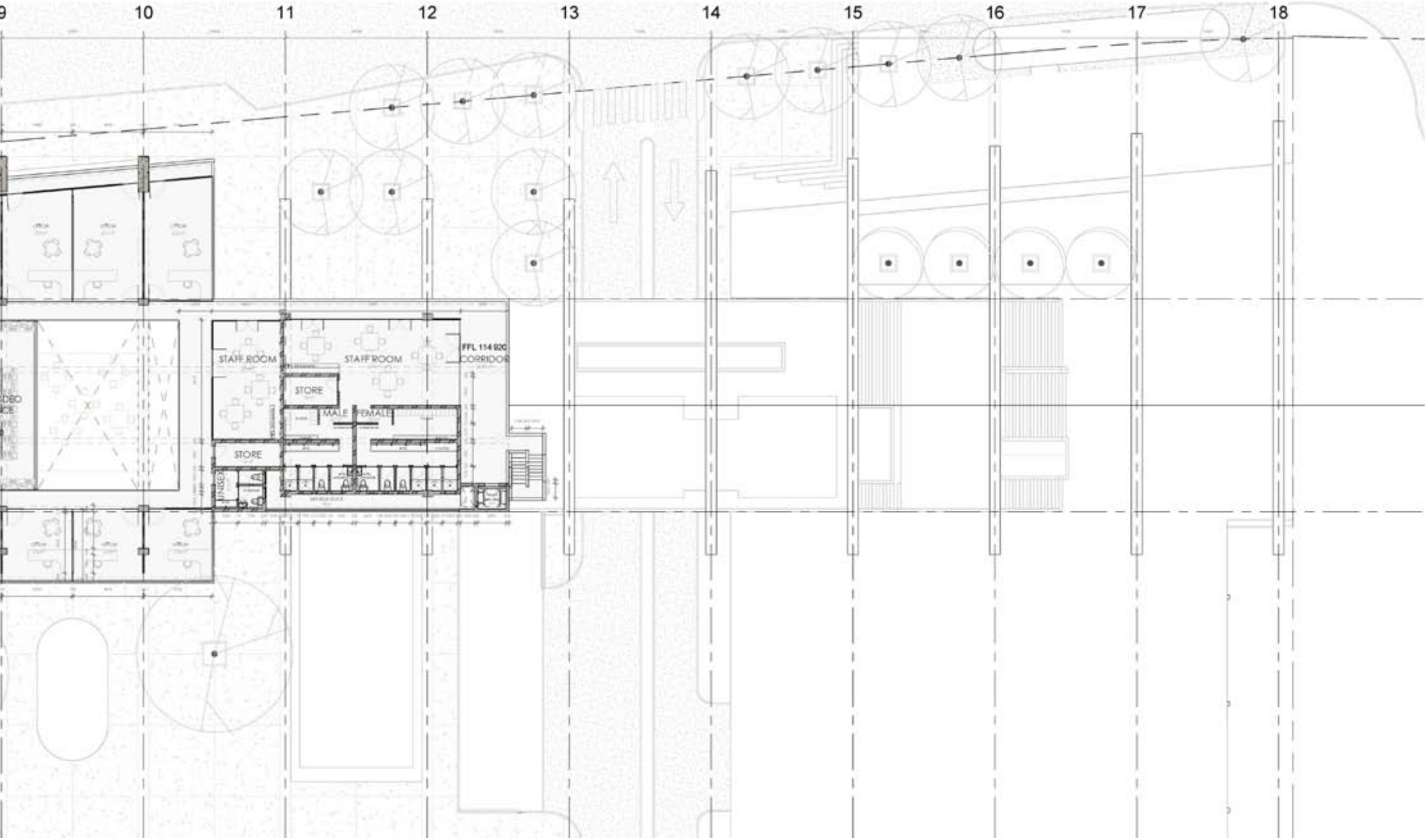
ILLUS. 8.22: First floor plan.



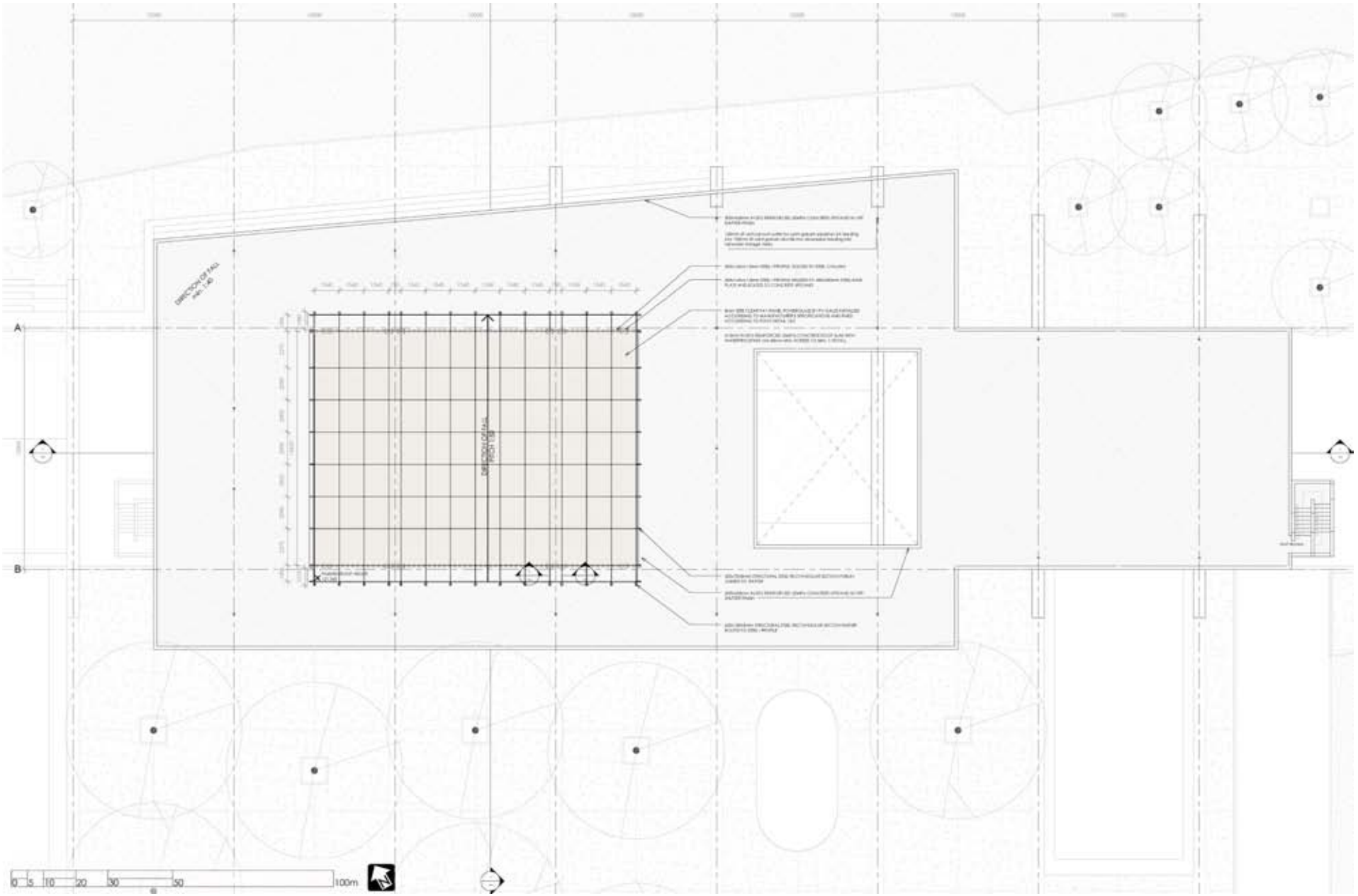
8.11 SECOND FLOOR PLAN



ILLUS. 8.23: Second floor plan.

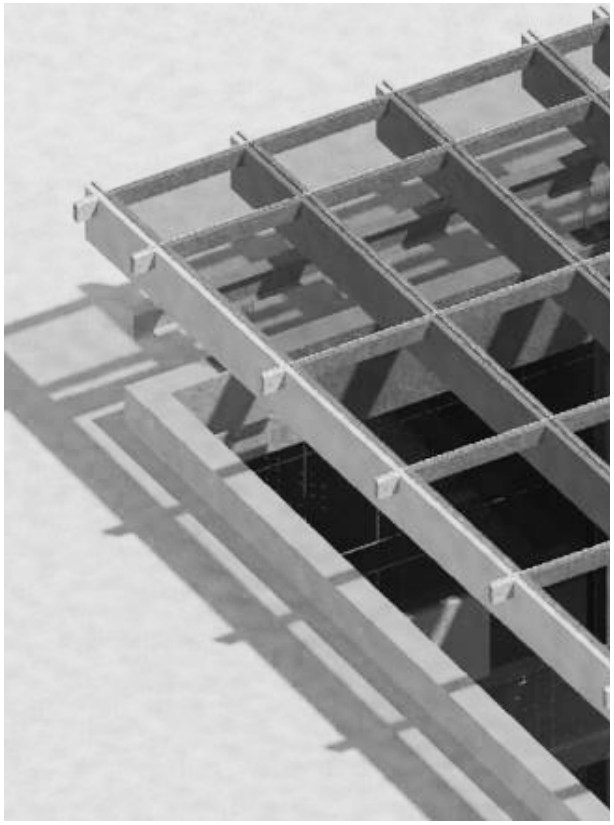


8.12 ROOF PLAN & DETAIL

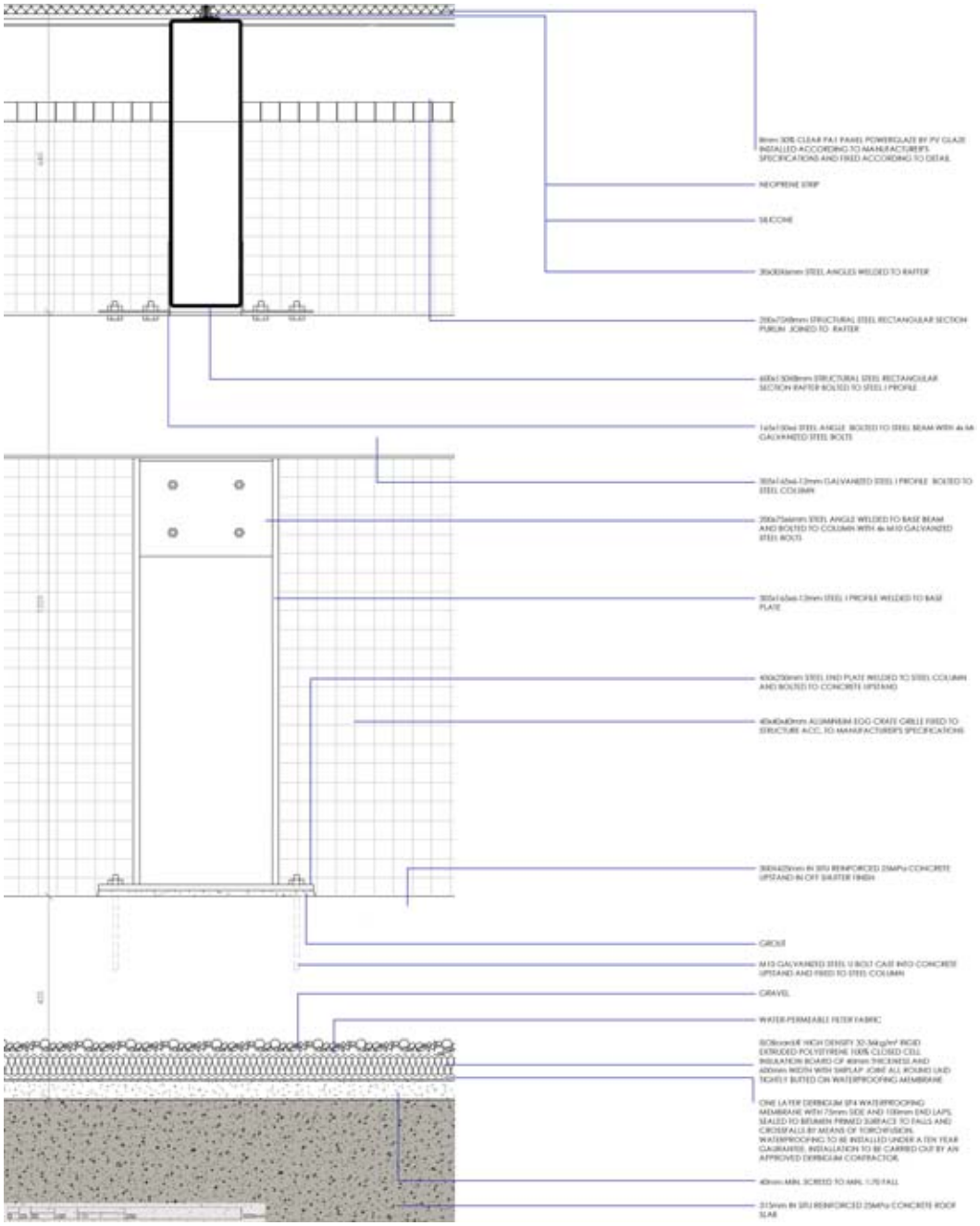


ILLUS. 8.24: Roof plan.

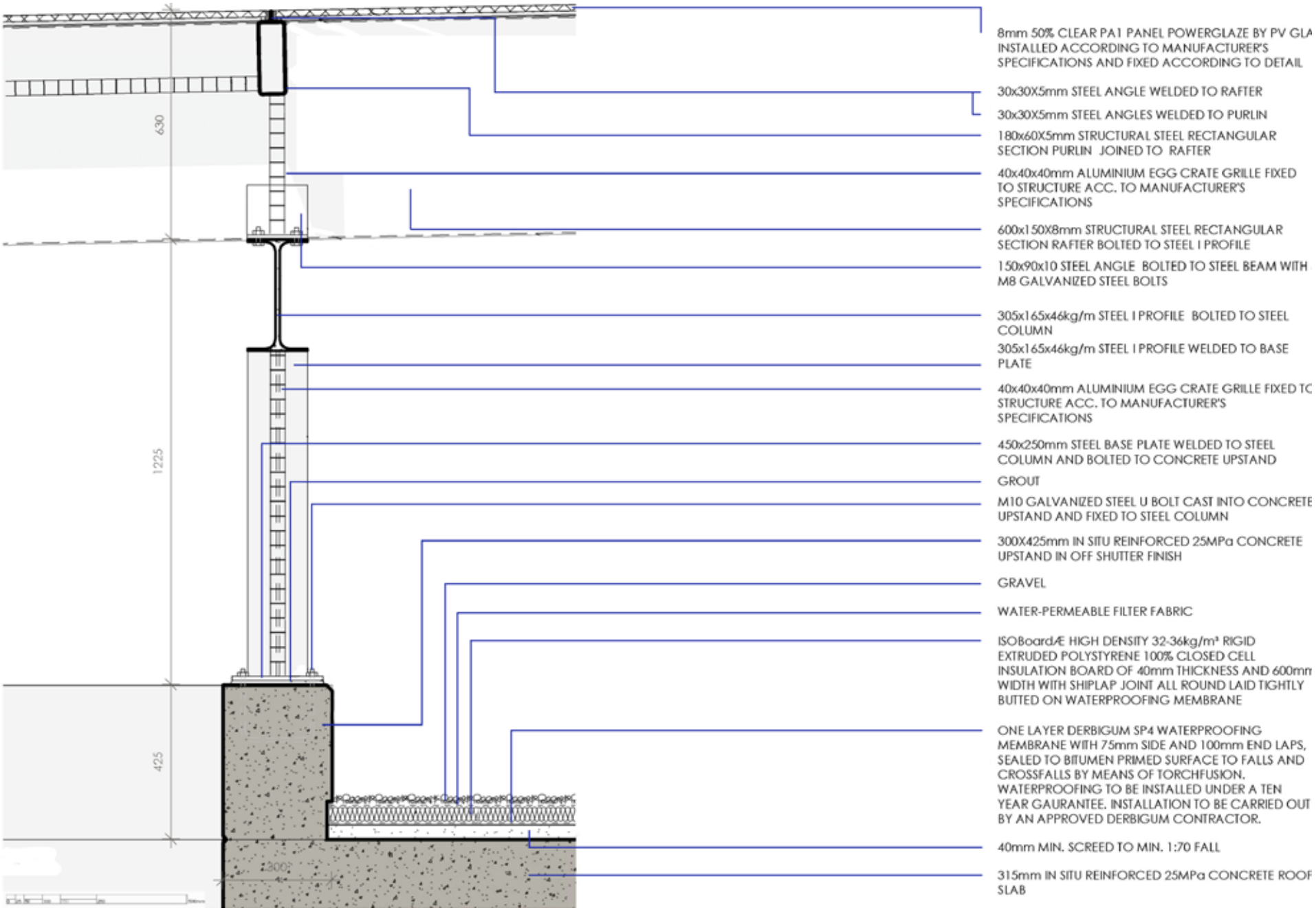
ILLUS. 8.25: Glass canopy at California Academy of Sciences (2008) by Renzo Piano.



ILLUS. 8.26: Glass roof structure perspective.

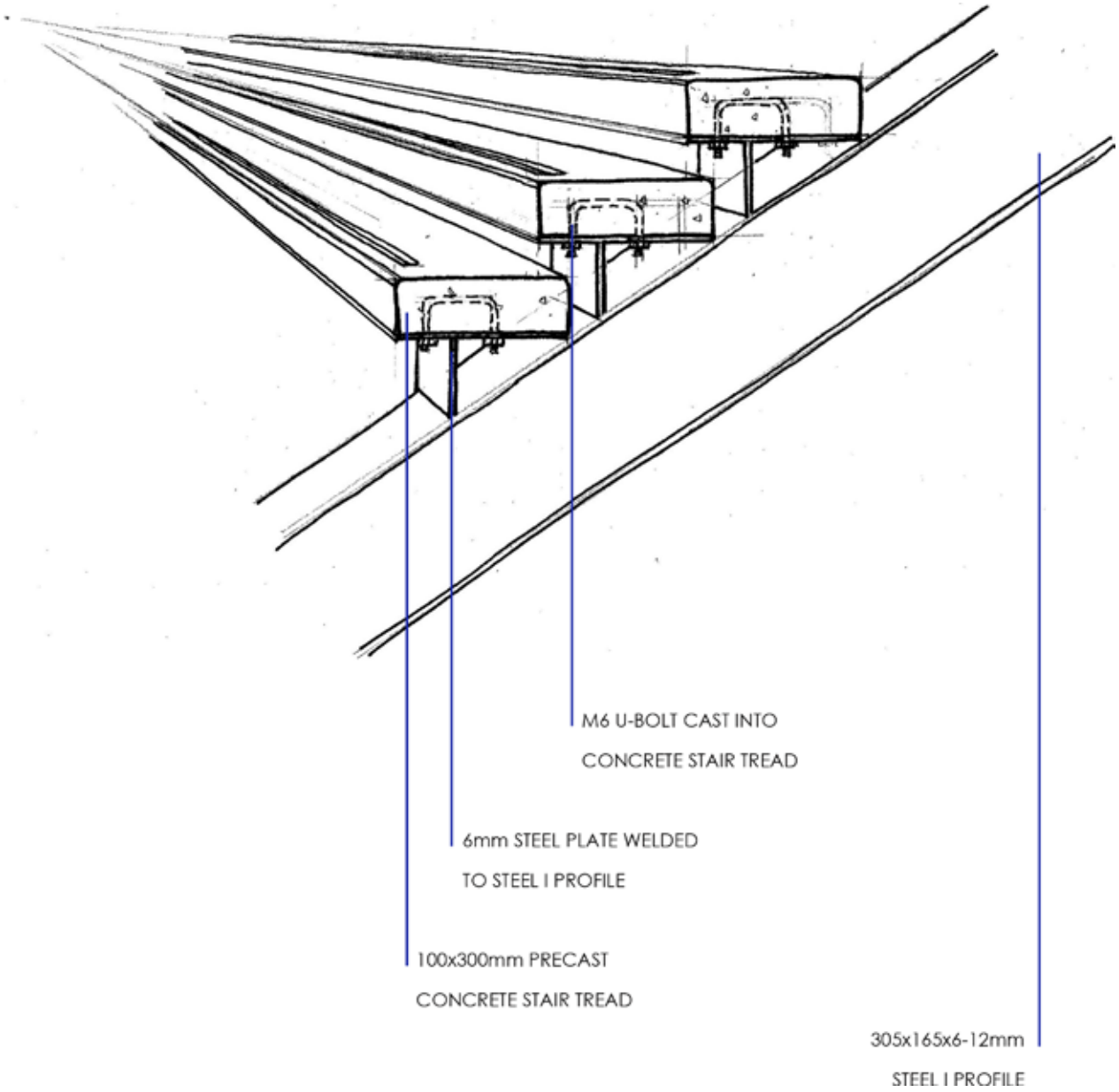


ILLUS. 8.27: Roof detail 1.

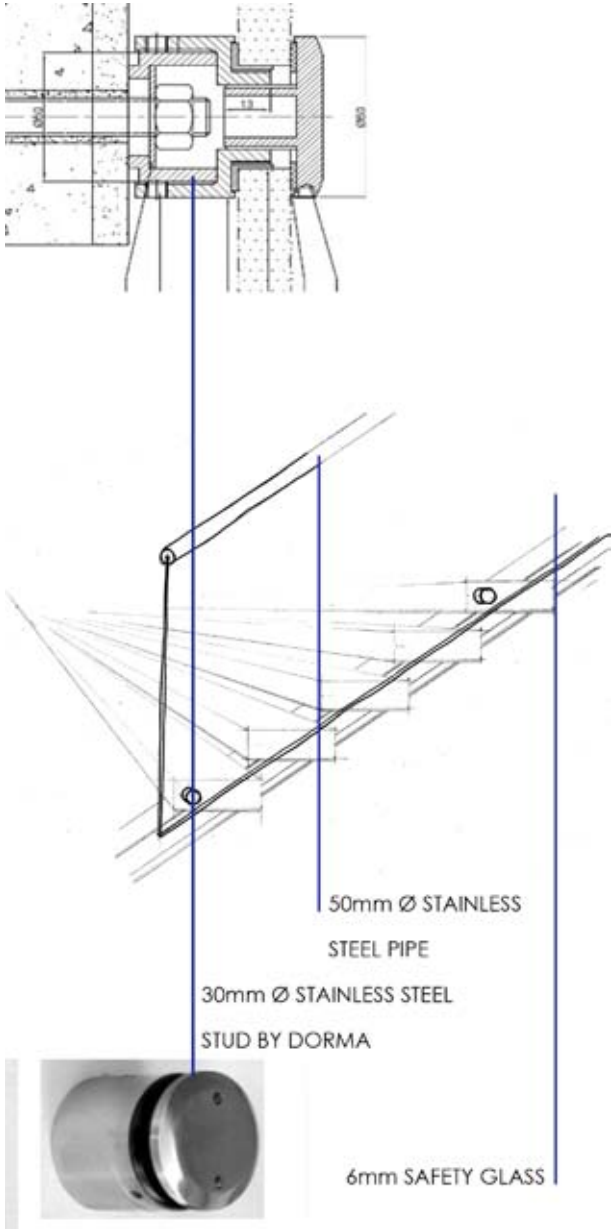


ILLUS. 8.28: Roof detail 2.

8.13 OTHER



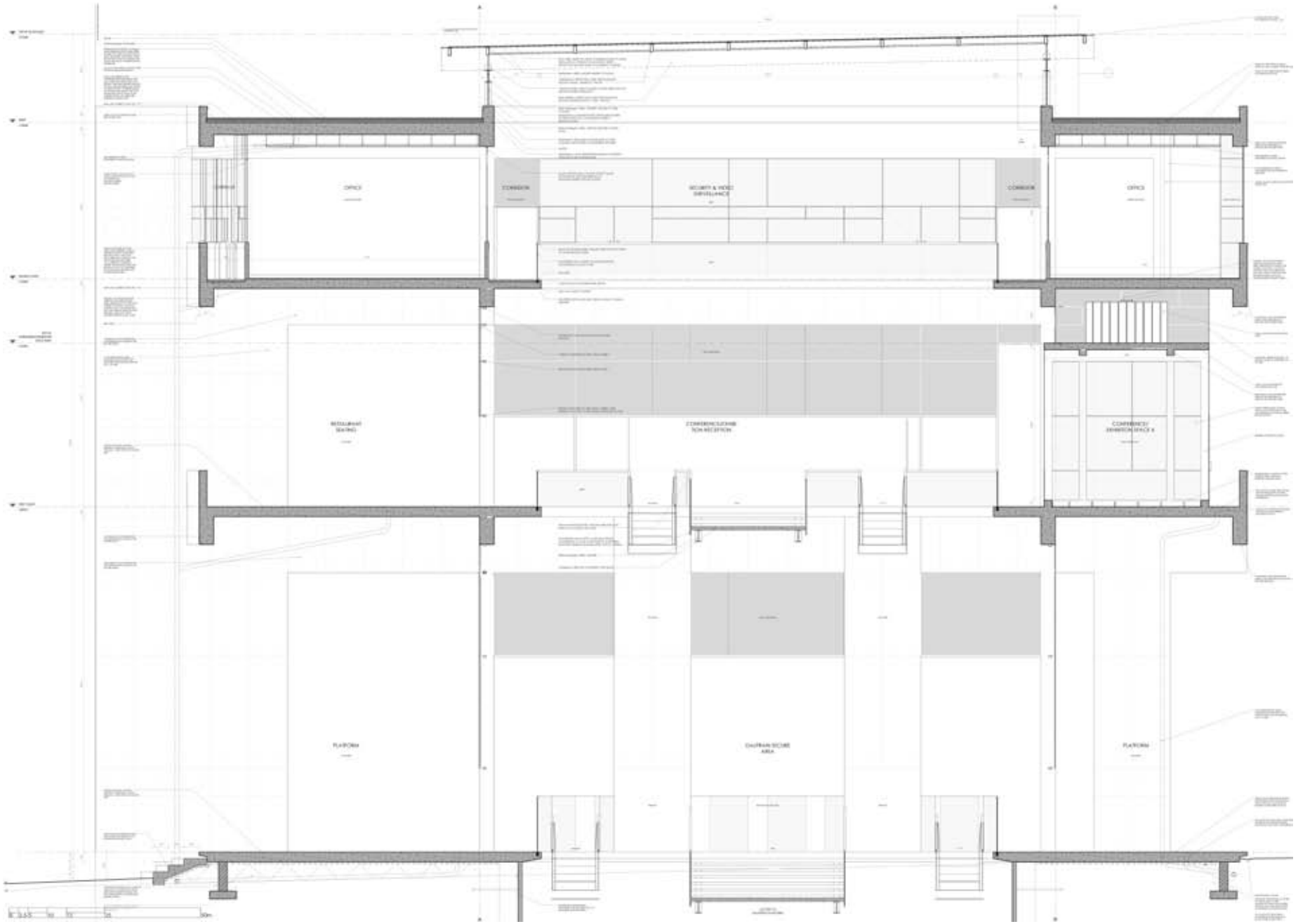
ILLUS. 8.29: Stair detail.



ILLUS. 8.30: Balustrade detail.

8.14 SECTION AA

ILLUS. 8.31: Perspective of section AA.



ILLUS. 8.32: Section AA.

8.15 LESSONS I LEARNED AS AN ARCHITECTURE STUDENT

- Making a decision is better than not making one at all.
- When in doubt - dance.
- There will never be enough time, manage what you have.
- Day is for work, night is for sleep.
- People with lives outside of study get more done.
- Your life is only as rich as the people in it.
- Don't buy cheap coffee.
- Design won't save the world, but it can change lives.
- Don't forget why you are doing what you are doing, and do it.
- Backup.