7

CHAPTER

TECHNIFICATION

The technification of the design is supported by the technical concept that was already mentioned in the design chapter. It does become more specific however and will be discussed henceforth. It leads to the structural and technological intentions and also informs the systems.

TECHNICAL CONCEPT

The structure becomes the threshold between the permanencies of

solid brick and mortar,
heavy concrete and stone,
robust form and mass of the city fabric.

And the ephemerality of

transparent glass and leaves,
intersecting joints and shoots,
light steel and tree branches.

Structural Intentions

The primary structure consists of a 990mm fenestrated concrete and brick wall that provides gravity to the whole device. The wall becomes the support for the secondary structure; a steel colonnade. The steel colonnade connects to the east of the wall and forms a portal frame that supports the floors. The third level in the structural hierarchy is a combination of light weight steel, perforated cladding material with levels of translucency and a clear glass curtain wall that forms the skin on the eastern façade. The fourth level in the structural hierarchy consists of light weight steel boxes (clad with steel and/or glass and solar protection) that protrudes from the portal frame, pushes through the skin and extends out to punctuate the eastern façade. Similar boxes will spill out of the fenestration of the brick wall on the western side.

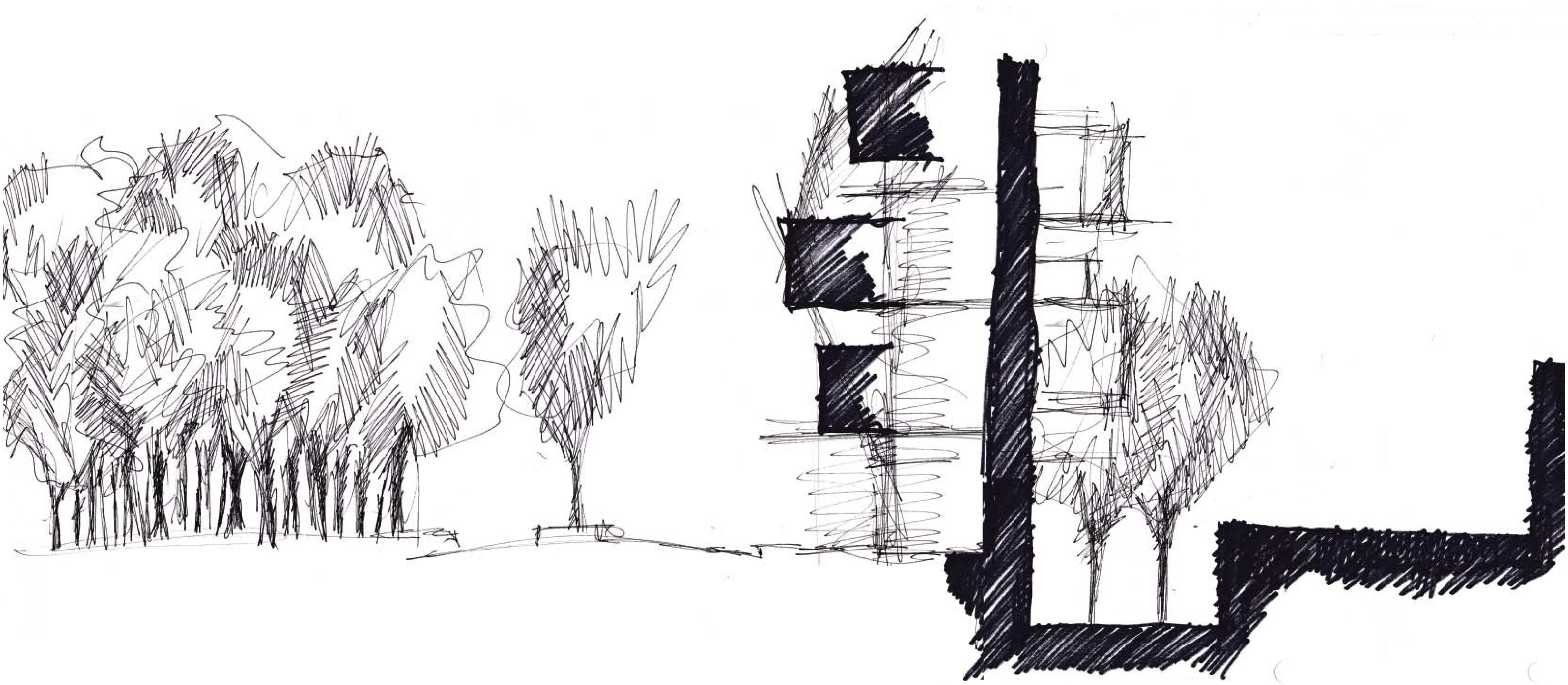


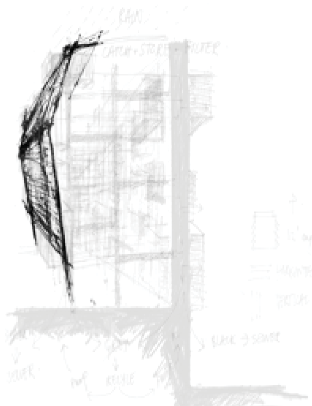
Figure 7.1 - Technical concept.psd

Primary structure:

1255mm fenestrated cotncrete and brick wall that provides gravity to the whole device. The wall becomes the support for the secondary structure.

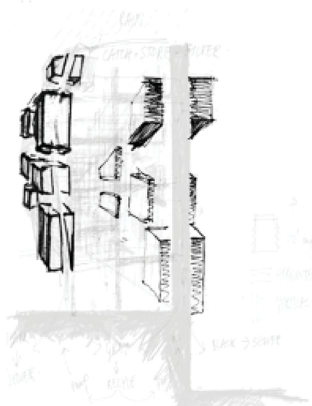
Secondary structure:

A steel colonnade. The steel colonnade connects to the east of the wall and forms a portal frame that supports the floors.



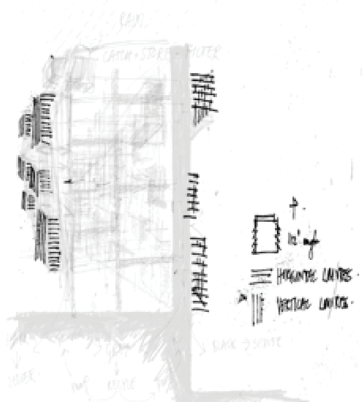
Third level:

Light weight steel, perforated cladding material with levels of translucency and a steel mesh that forms the skin on the eastern façade.



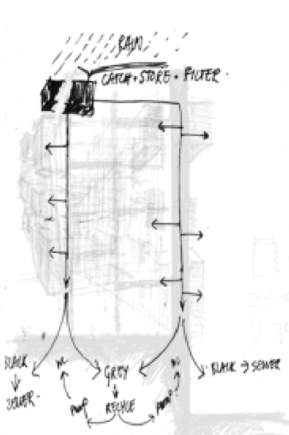
Fourth level:

Light weight steel and timber boxes (clad with steel/ timber and/or glass and solar protection) that protrudes from the portal frame, pushes through the skin and extends out to punctuate the eastern façade. Similar boxes will spill out of the fenestration of the brick wall on the western side.



Environmental system:

Temperature comfort will be tested in the protruding steel boxes housing various programmes. To achieve the comfort zone between 18°C to 22°C for 70% of the time, devices such as solar shading, insulation material and methods to prevent thermal bridging will be used.



Service system:

Rainwater harvesting from the roofs and ground surfaces will be stored for plant irrigation. From storage it will be pumped into the irrigation system. Pumps will be solar powered with photovoltaic panels. Greywater will be harvested and cleaned through a system of filters, microbe additives and oxygen injectors. It will then be stored and pumped for the reuse in the flushing of toilets. The municipal water supply will support the programmes of water for drinking and cleansing.

Figure 7.2 - Technical systems.psd

Technological Intentions

Everything will be done in situ. Initially the wall was intended to be solid brick work with arched opening. It is however not feasible if labour and material costs are considered. To stay true to the essence of the concept the wall will be in situ cast concrete with brick finish. The openings will therefore not be arches, but horizontal concrete lintels. Concrete, being rooted in the site (the béton brut of the State Theatre) is an appropriate material to use as the primary structure. It is however very harsh and brick is therefore used to bridge the scale to the human scale. Brick has a haptic quality that concrete does not have. The concrete core will be exposed where it functions as the primary structure.

The specifically designed steel columns and beams will be pre-ordered and delivered on site in the correct lengths with the correct assembly fixtures. Joints will primarily be bolted. The assembly will happen on site. The floor shuttering will be assembled with the steel structure. The floors will be concrete in situ on permanent shuttering with cast in reinforcement mesh. The light steel boxes will be assembled and attached to the main steel portal frame on site. The glass curtain wall and cladding will be pre-ordered to specific segmental sizes that fit the grid of the design and can be assemble on site.

Figure 7.3 - Material hierarchy.psd

Service System

Water supply and distribution will be the service system focussed on. Rainwater harvesting from the roofs and ground surfaces will be stored for plant irrigation. From storage it will be pumped into the irrigation system. Pumps will be solar powered with photovoltaic panels. Greywater will be harvested and cleaned through a system of filters, microbe additives and oxygen injectors. It will then be stored and pumped for the reuse in the flushing of toilets. The municipal water supply will support the programmes of water for drinking and cleansing.

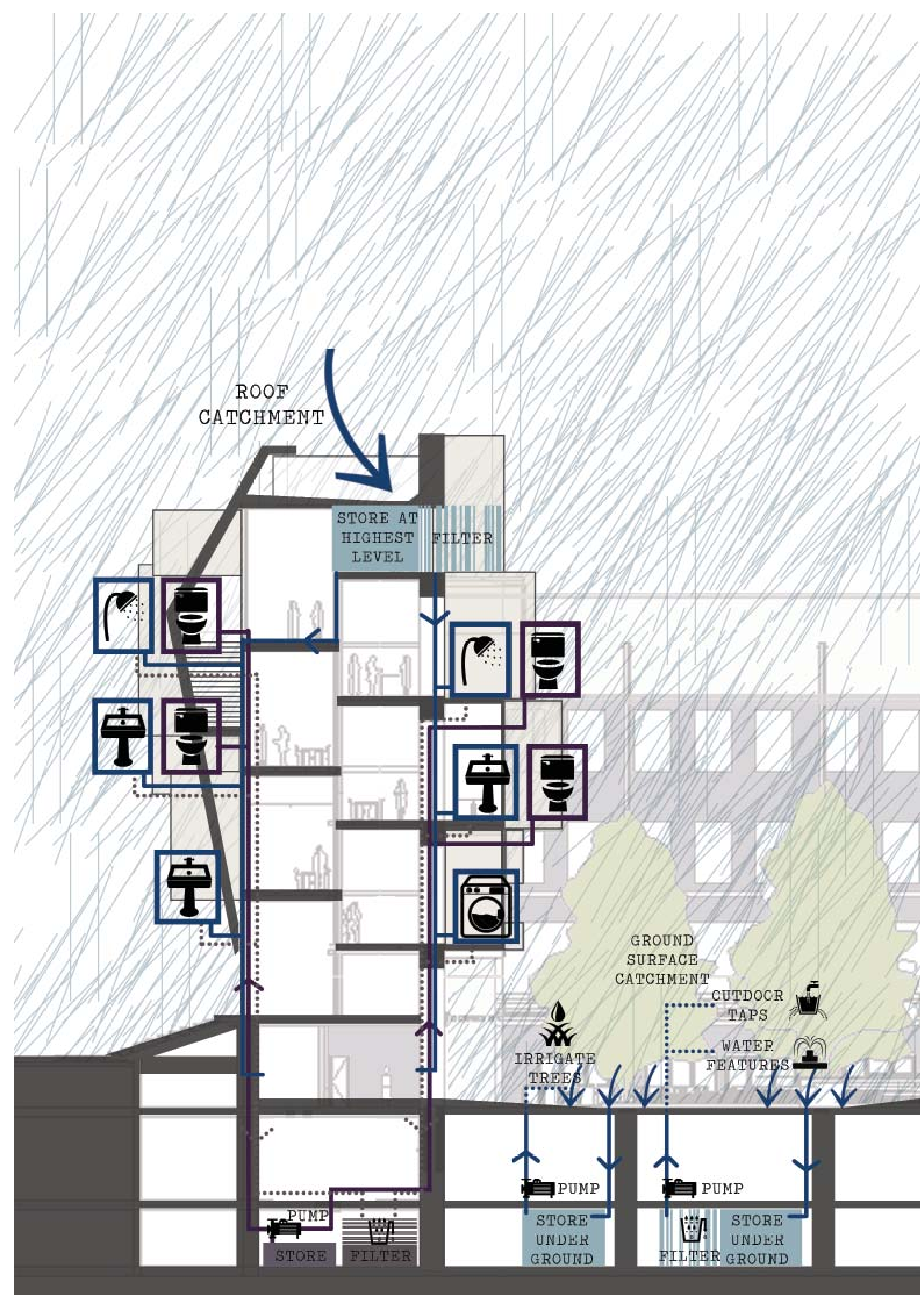


Figure 7.4 - Water catchment and recycle diagram.psd

Environmental System

Temperature comfort and daylighting are the two systems that will be tested and iterated. Temperature comfort will be tested in the protruding steel boxes housing various programmes. To achieve the comfort zone between 18˚C to 22˚C for 70% of the time, devices such as solar shading, insulation material and methods to prevent thermal bridging will be used. For the underground dance studio, sufficient daylighting will be tested. Devices to achieve the desired 300lux will include light shafts, interior surface materials and colours, and additional artificial lighting.

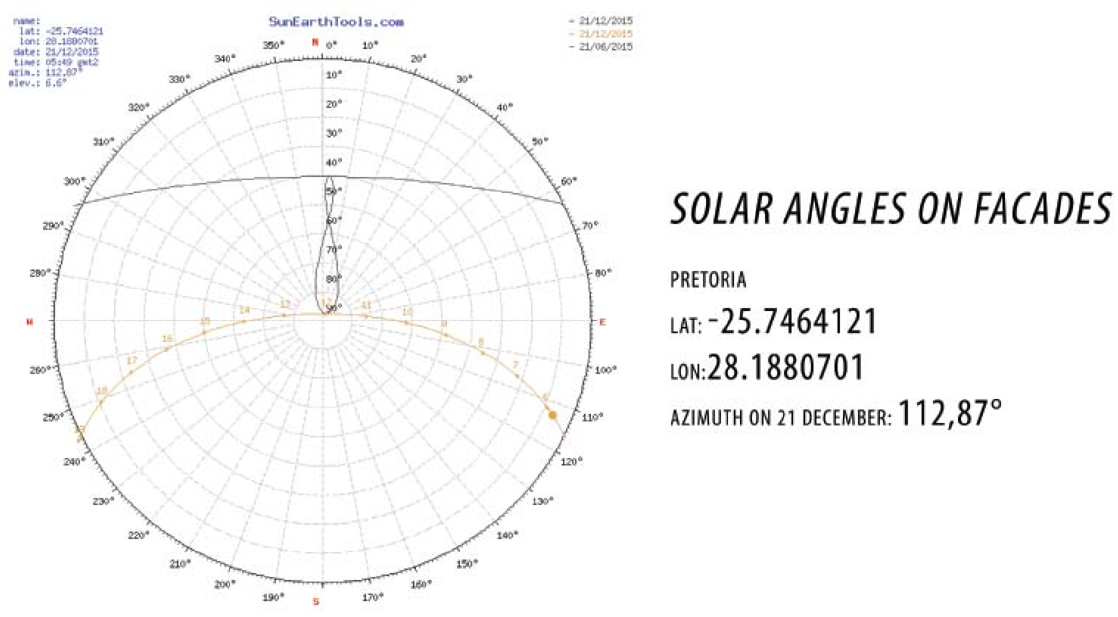


Figure 7.5 - Graph of solar ray angles.psd

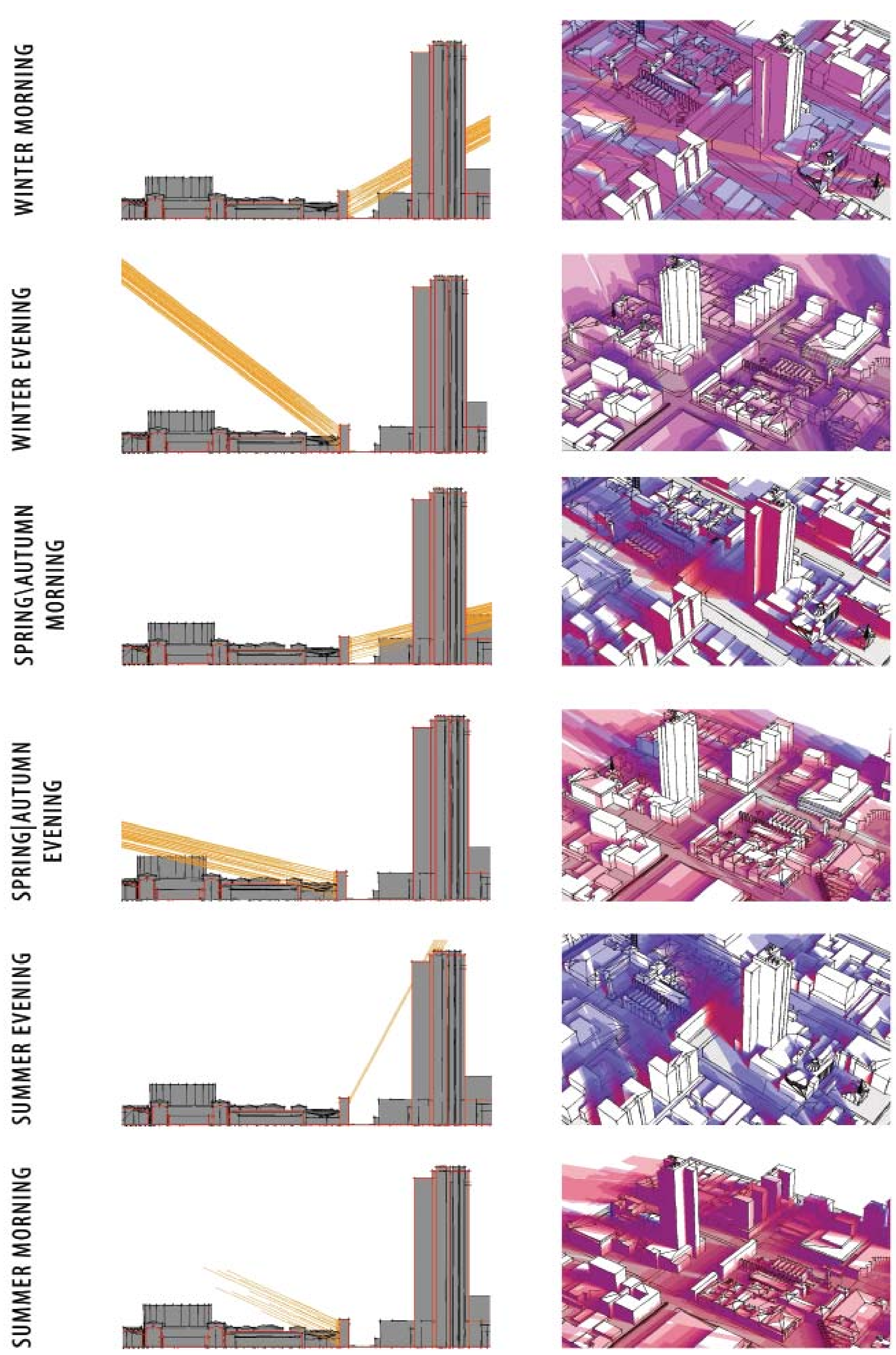


Figure 7.6 - Solar ray angles.psd

Sustainability

Locally manufactured materials will be used. This includes bricks, steel work, aluminium wares, cladding materials and glass. Local builders and contractors will be sourced. Furthermore the structure will be able to house other programmes of a similar nature, its architecture does not limit its ability to adapt. The grid however limits the programmes to small businesses and services ideal for the entrepreneur trying to get into the market. The primary structure of brick, steel and concrete on a fixed grid can be supplemented with a myriad of other light fill-in partitions to adapt it for specific programmes.

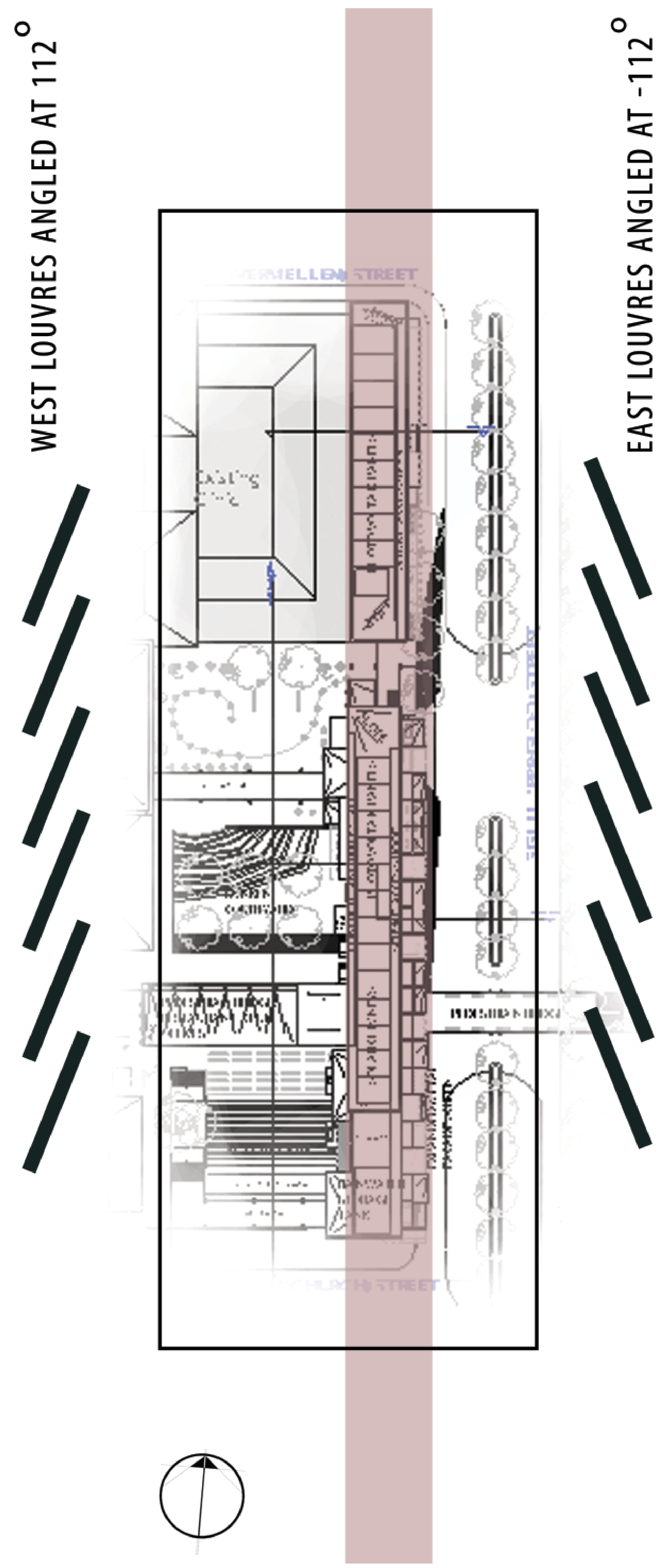


Figure 7.7 - Ideal angles for solar louvres.psd

Site sections

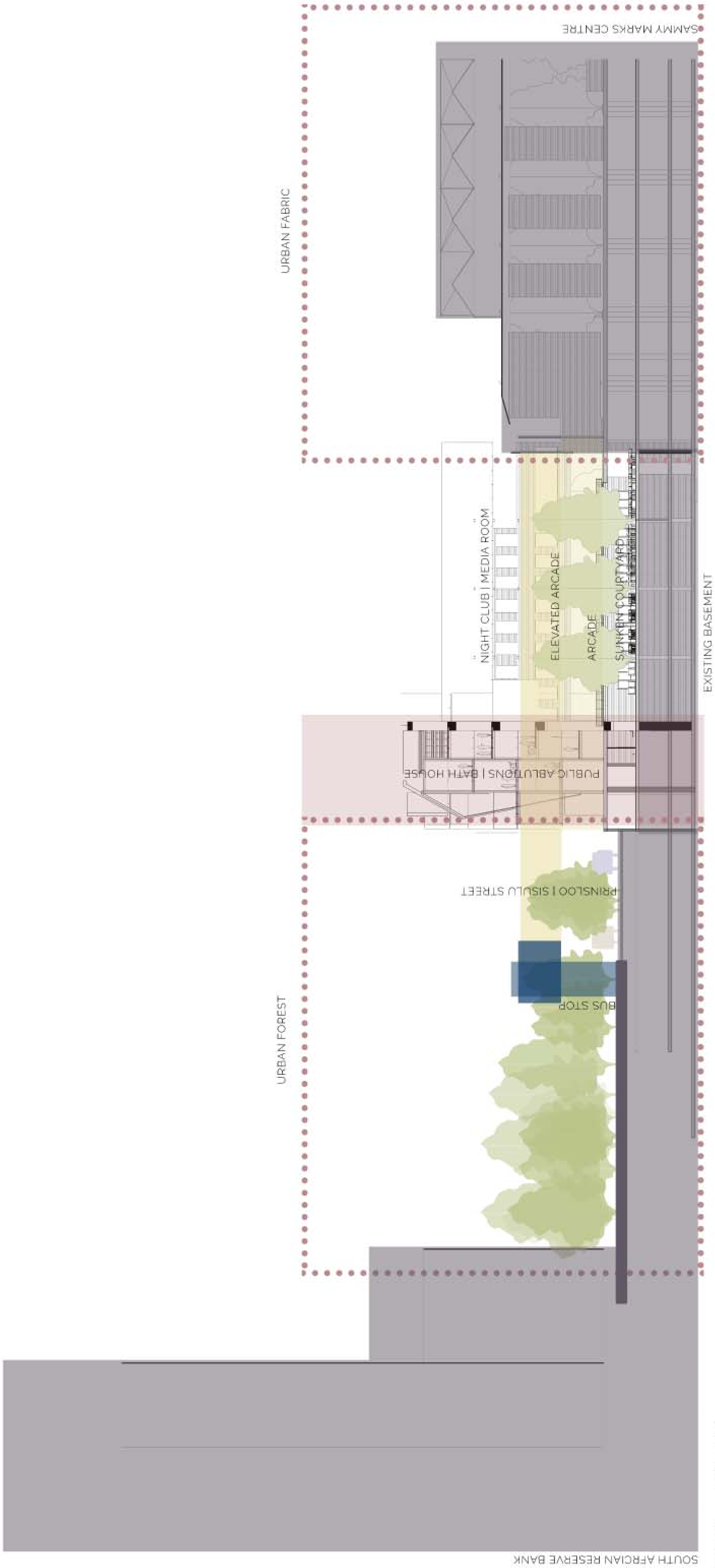


Figure 7.8 – East west site section.psd

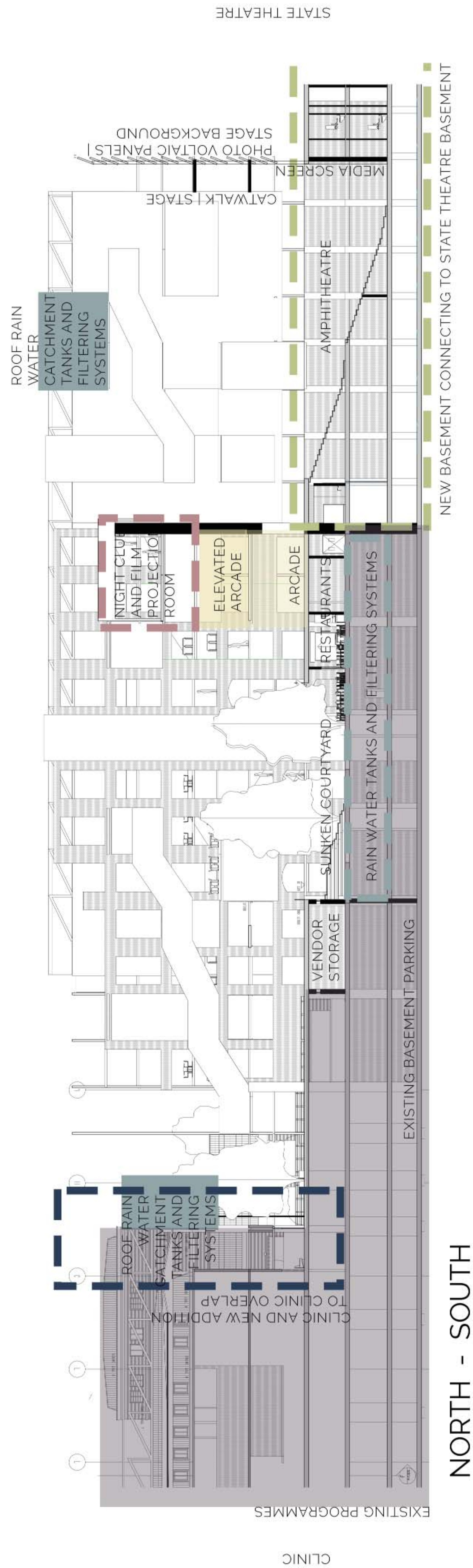


Figure 7.9 – North south site section.psd

Clinic section

Figure 7.10 ~ Clinic site section.psd

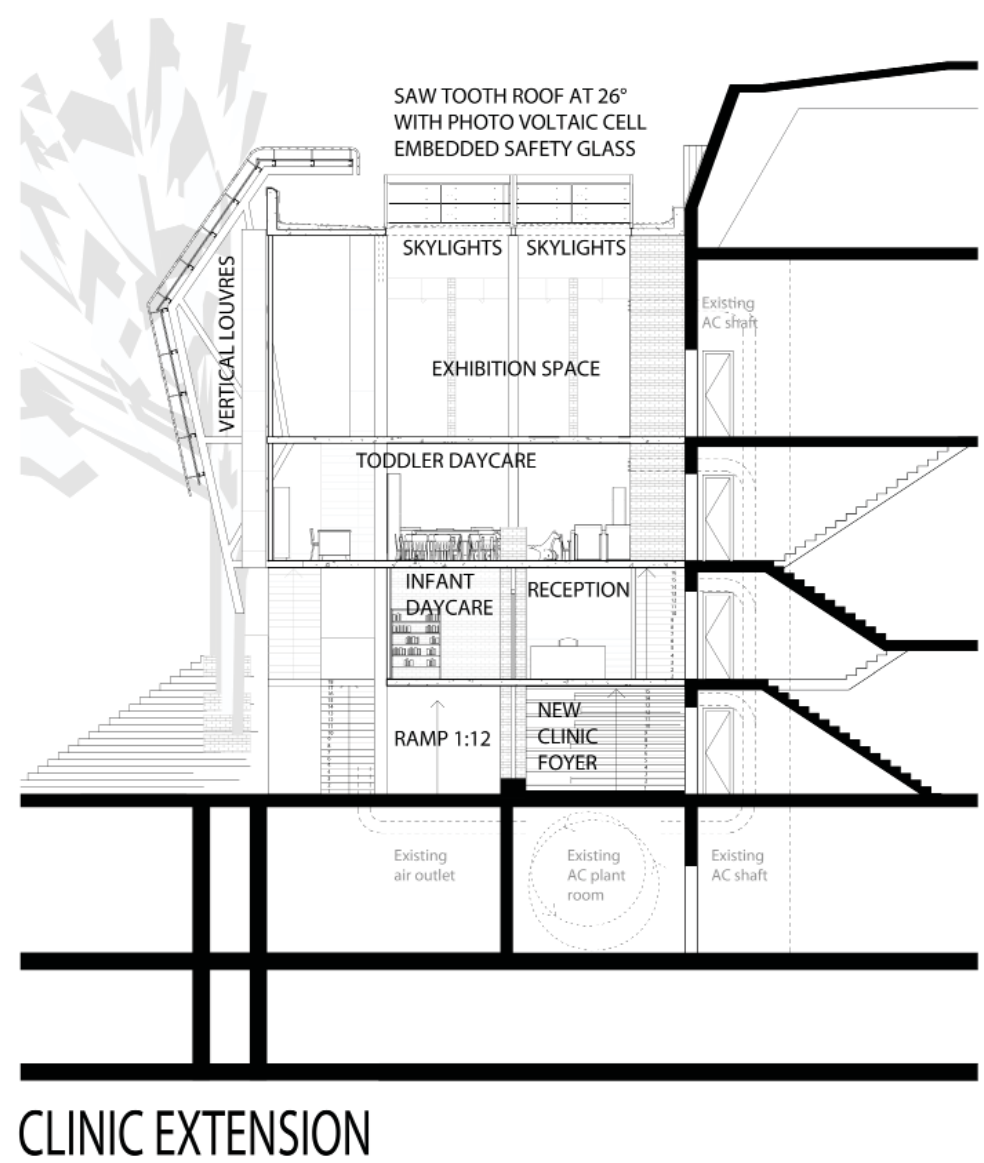


Figure 7.11 ~ Clinic section.psd

Floor plans

Figure 7.12 ~ Site.psd

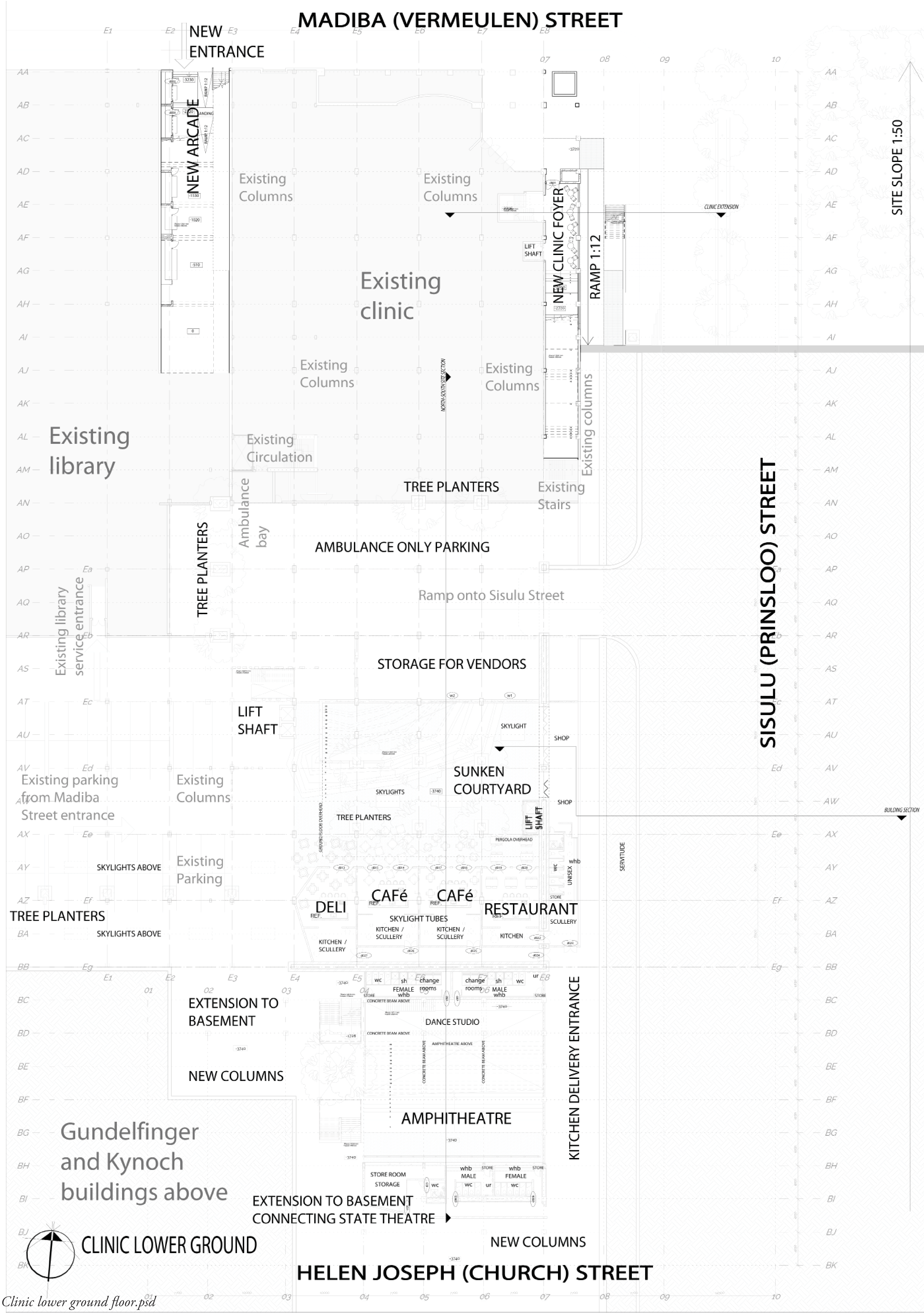


Figure 7.13 – Clinic lower ground floor.psd

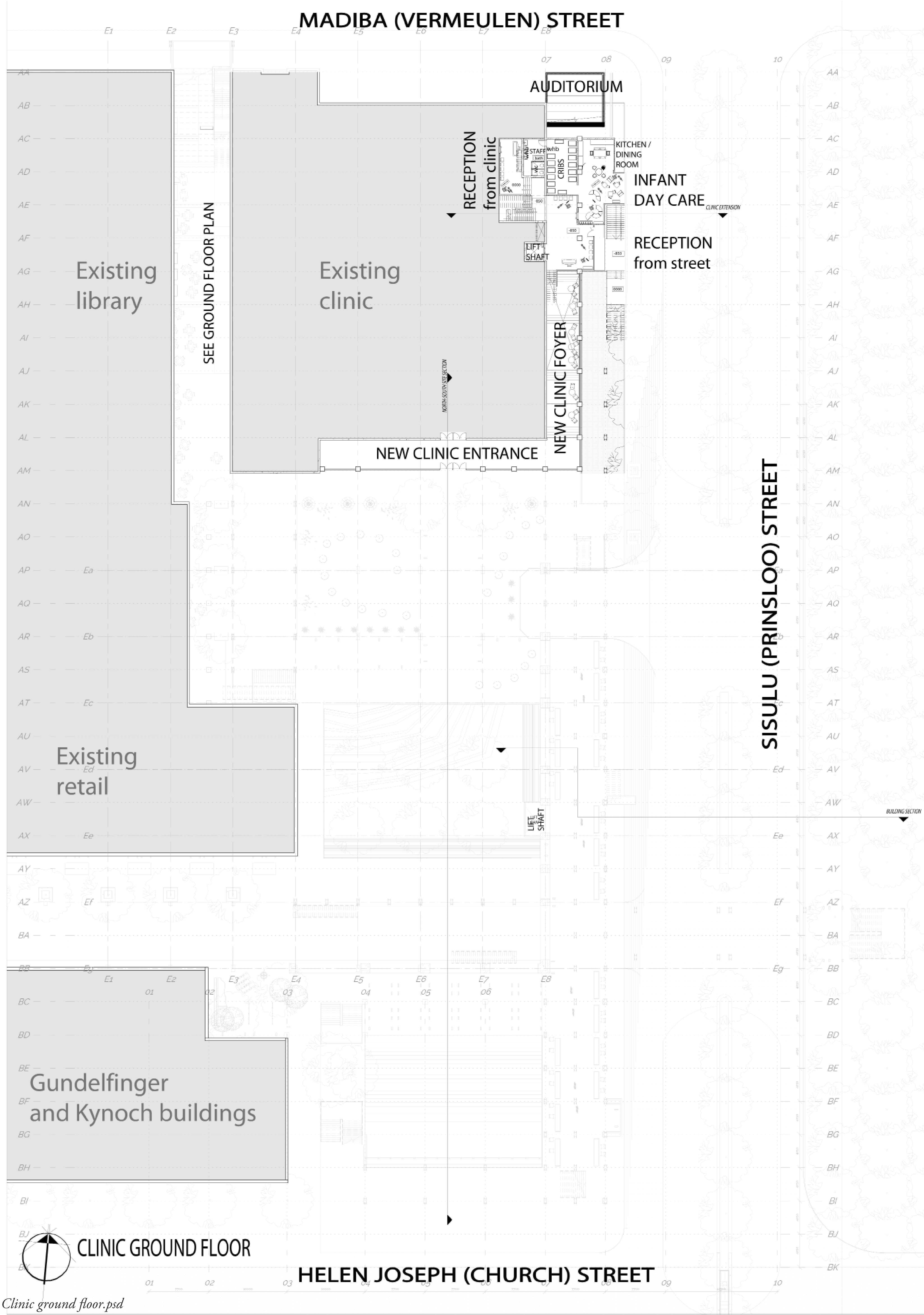


Figure 7.14 - Clinic ground floor.psd

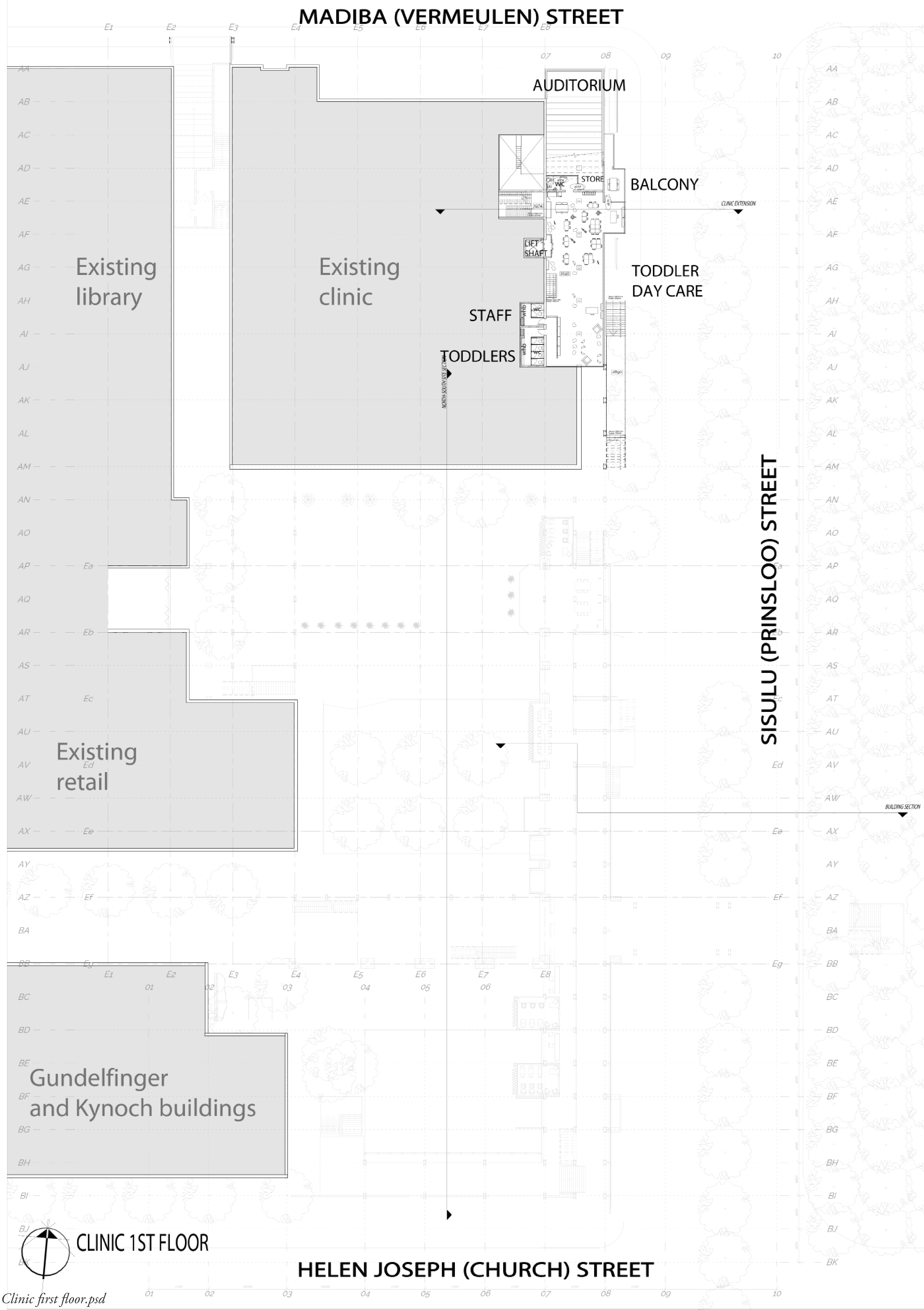


Figure 7.15 - Clinic first floor.psd

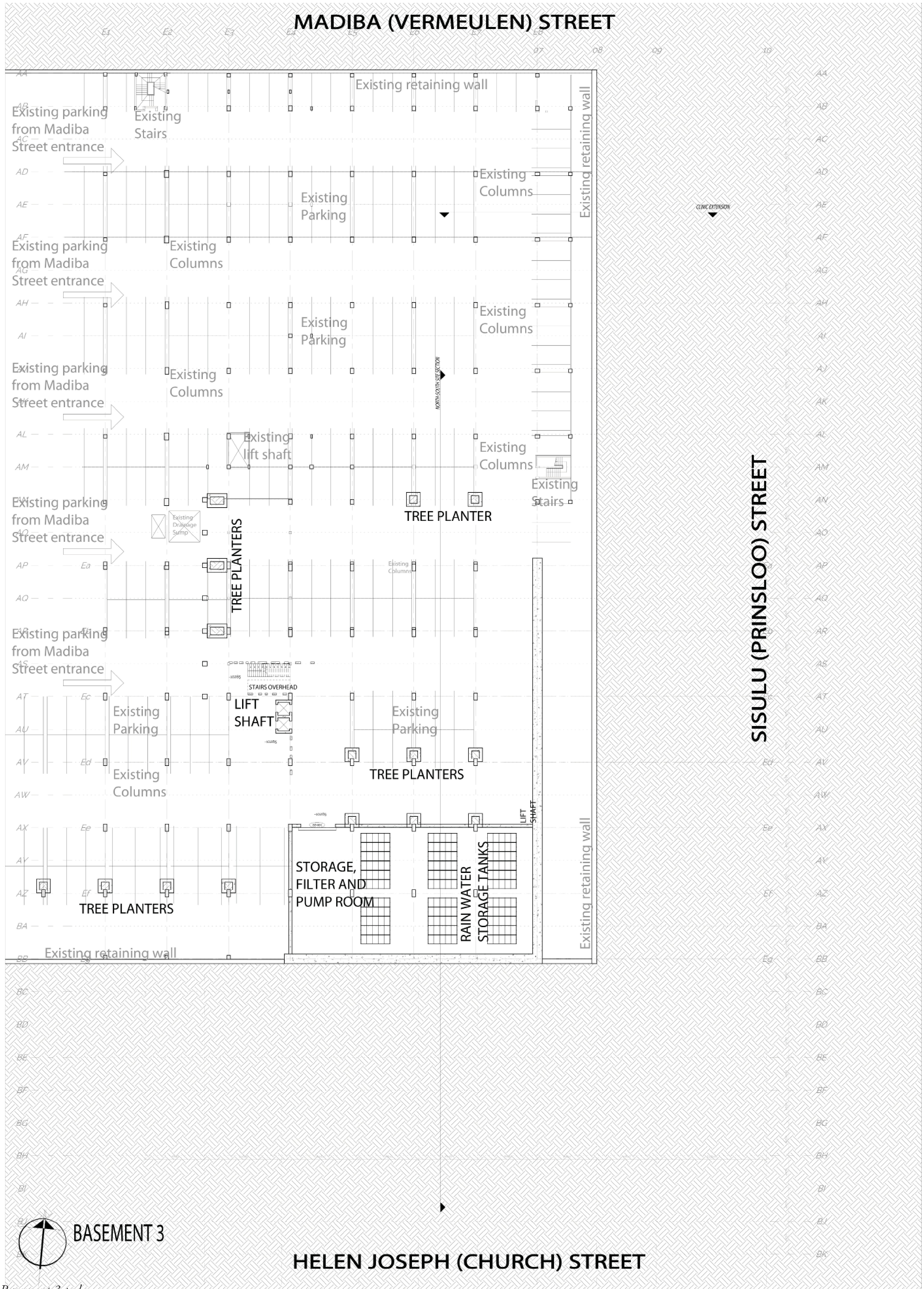


Figure 7.16 - Basement 3.psd

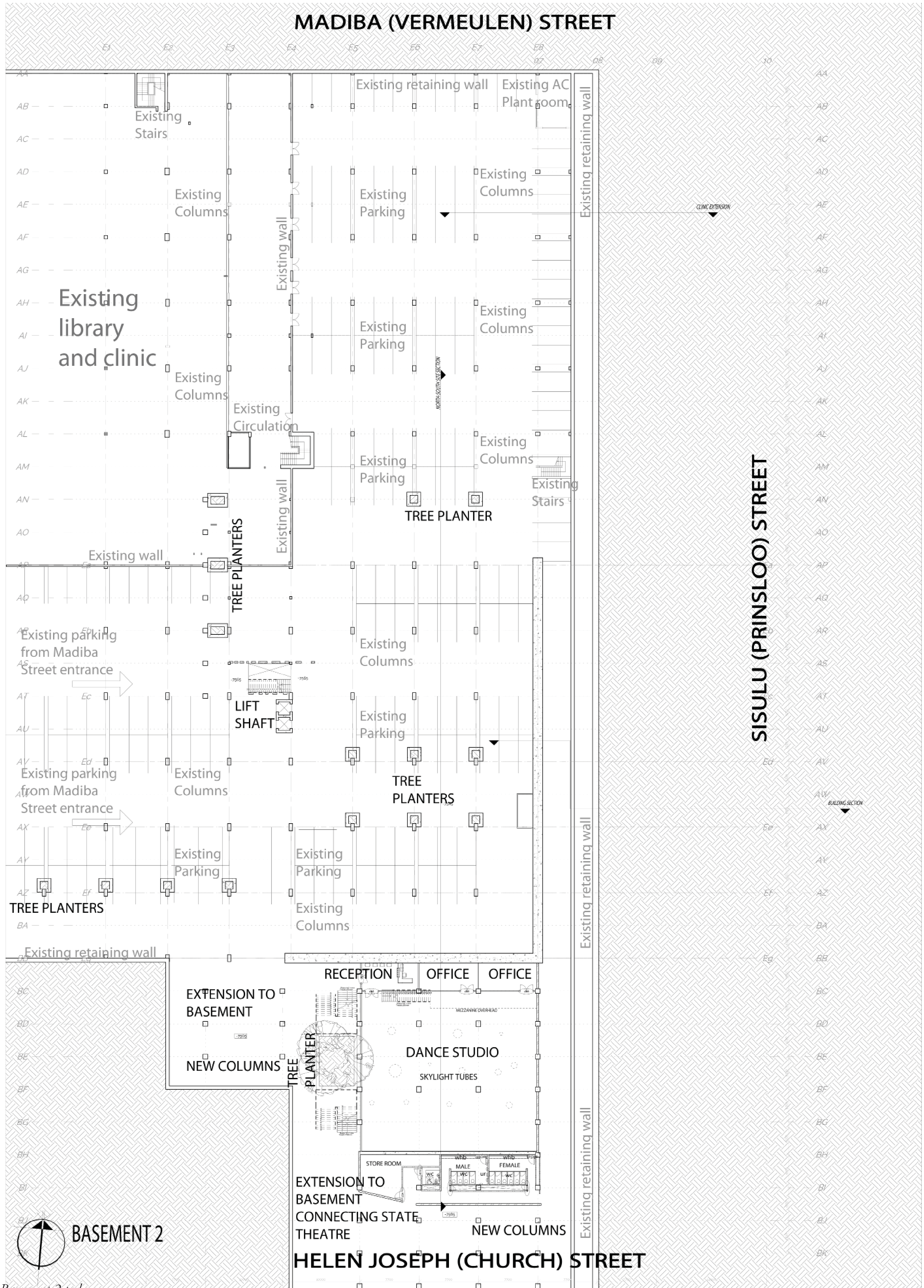


Figure 7.17 - Basement 2.psd

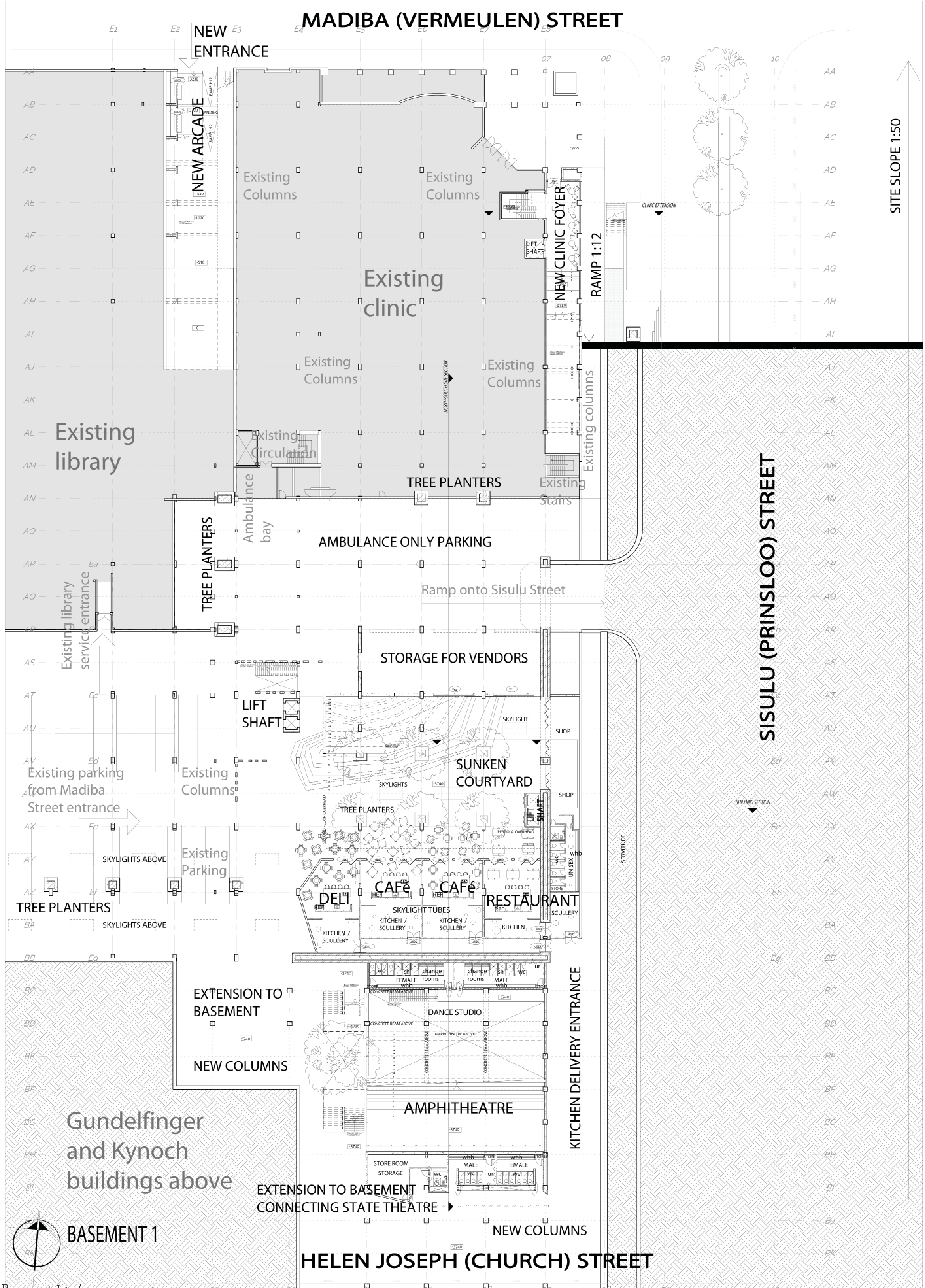


Figure 7.18 - Basement 1.psd

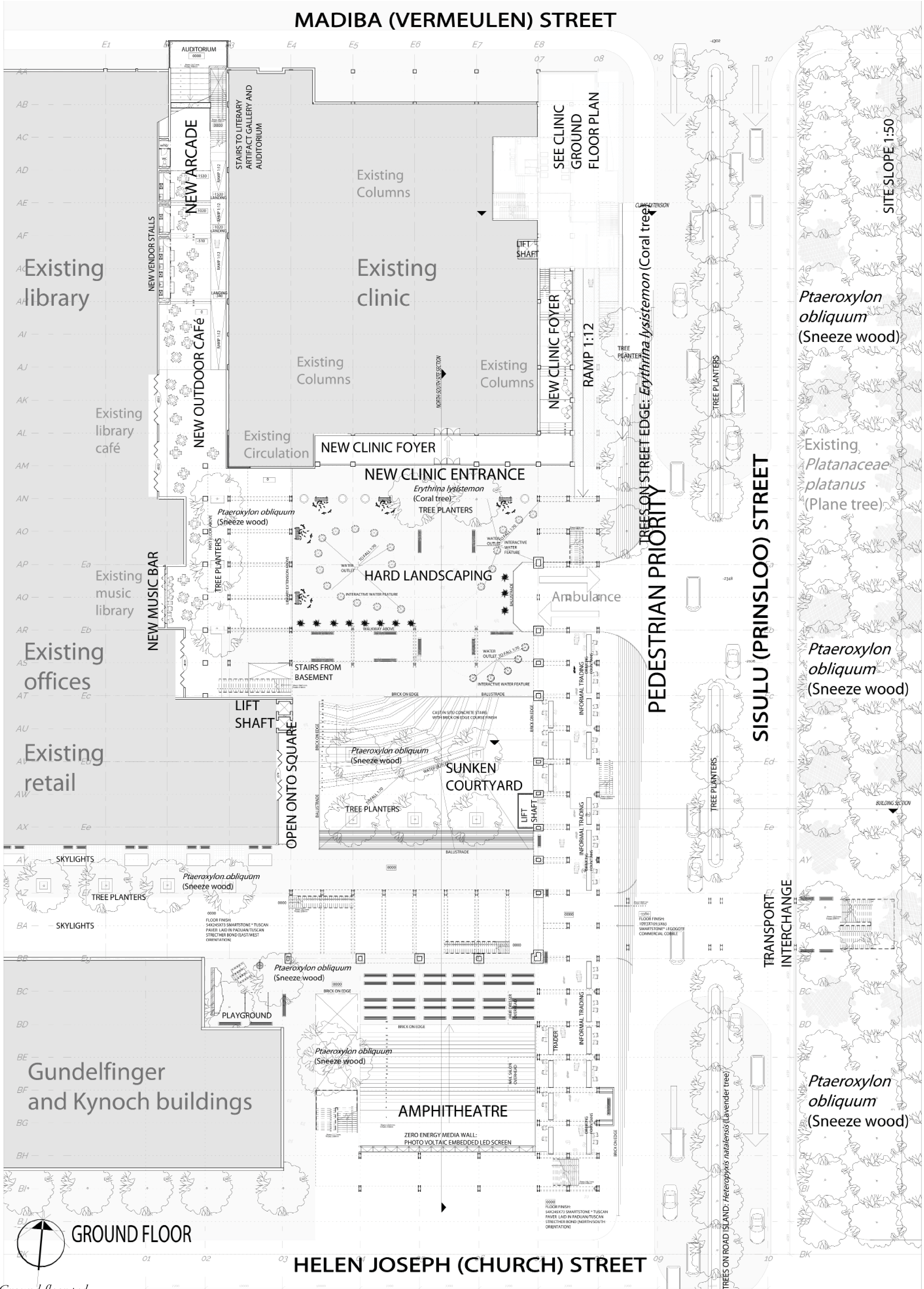


Figure 7.19 ~ Ground floor.psd

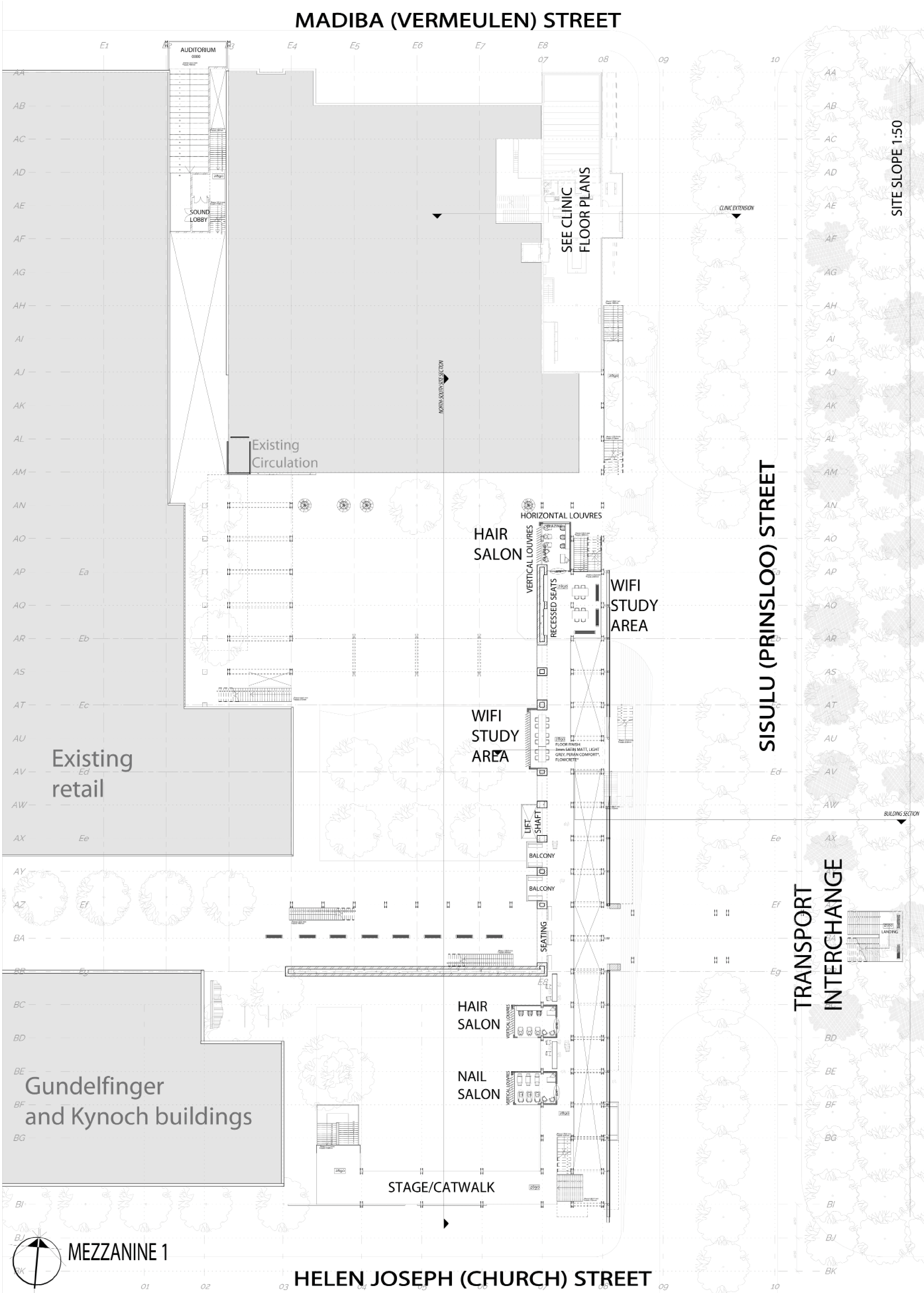


Figure 7.20 ~ Mezzanine 1.psd

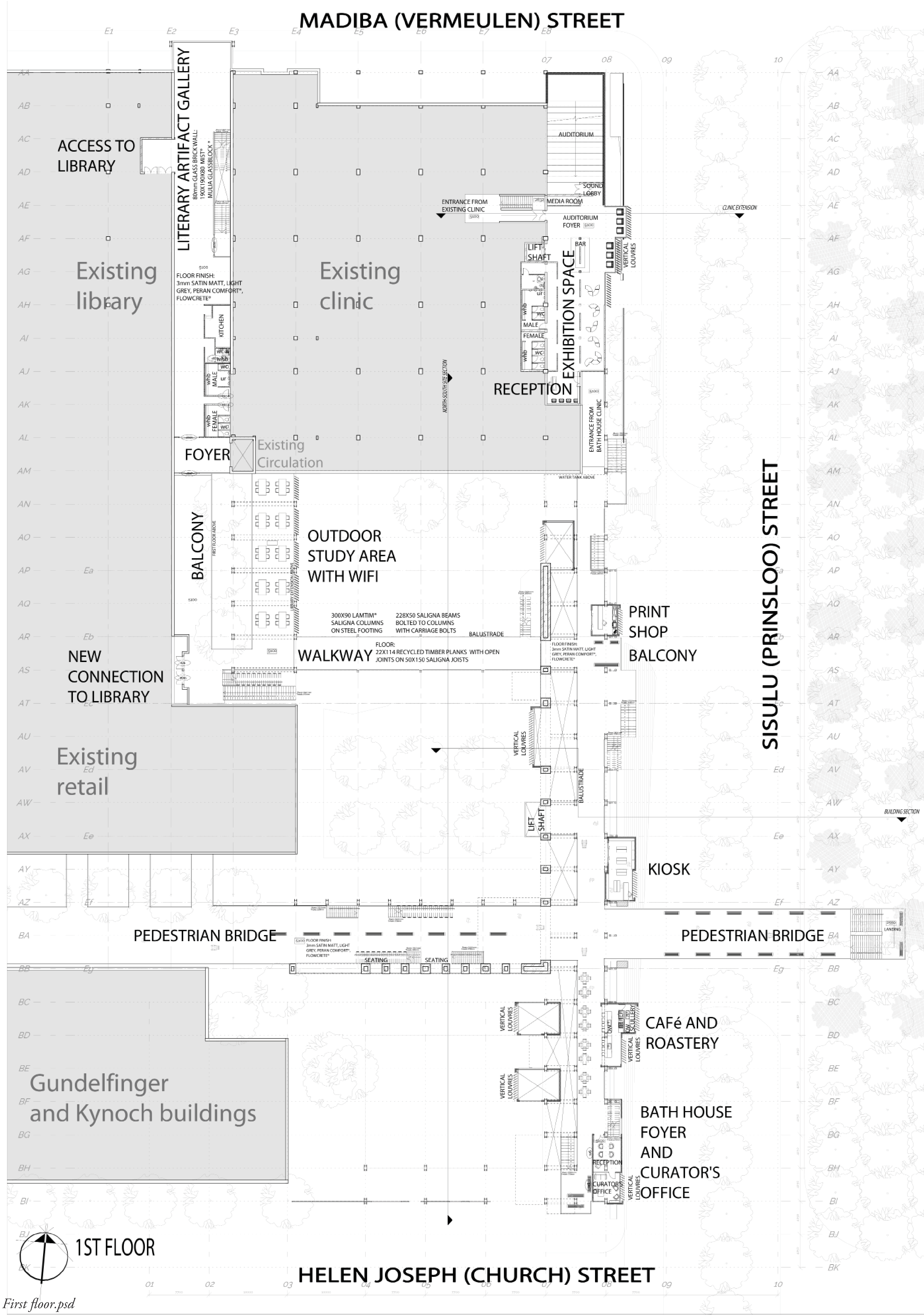


Figure 7.21 ~ First floor.psd

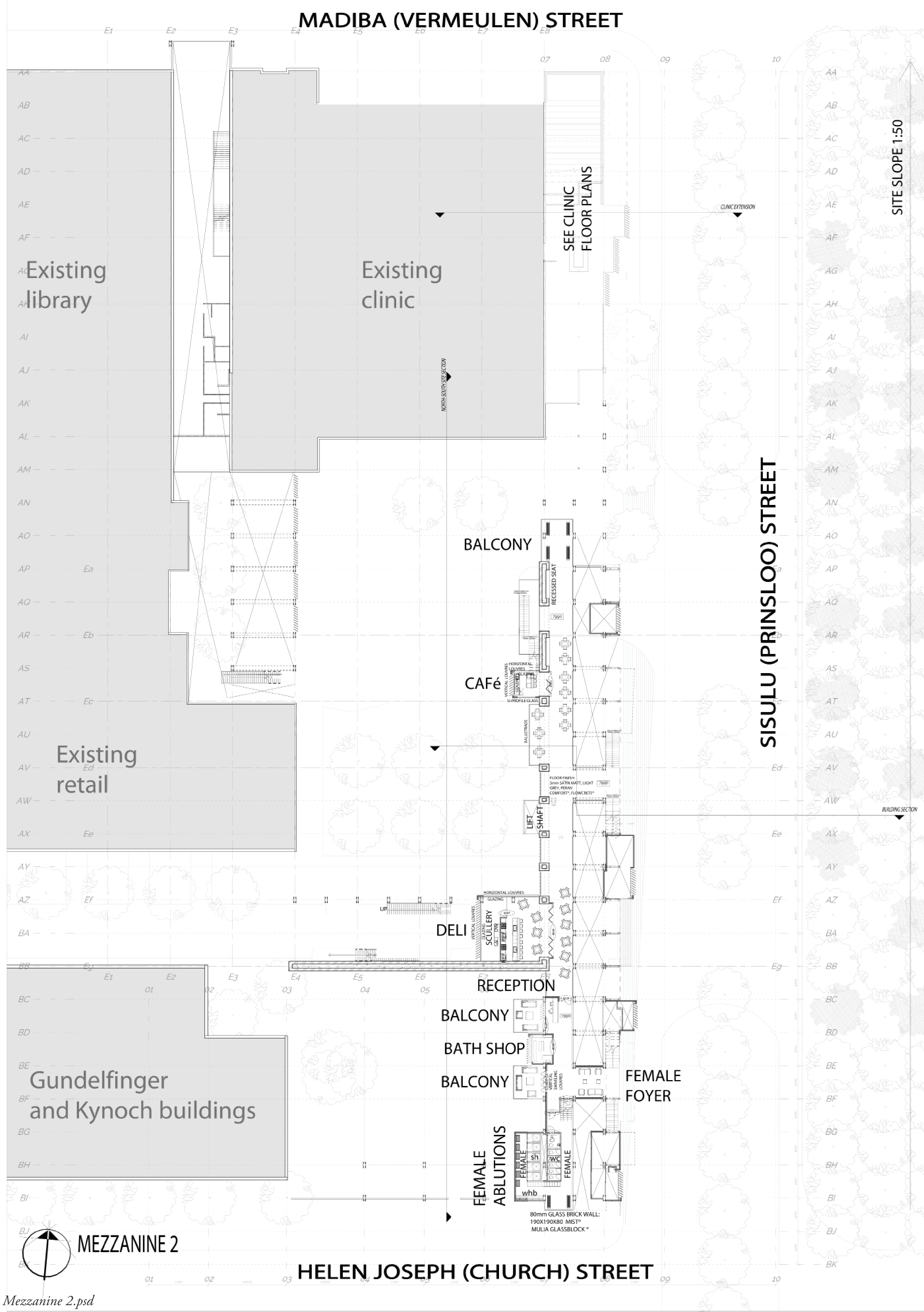


Figure 7.22 ~ Mezzanine 2.psd

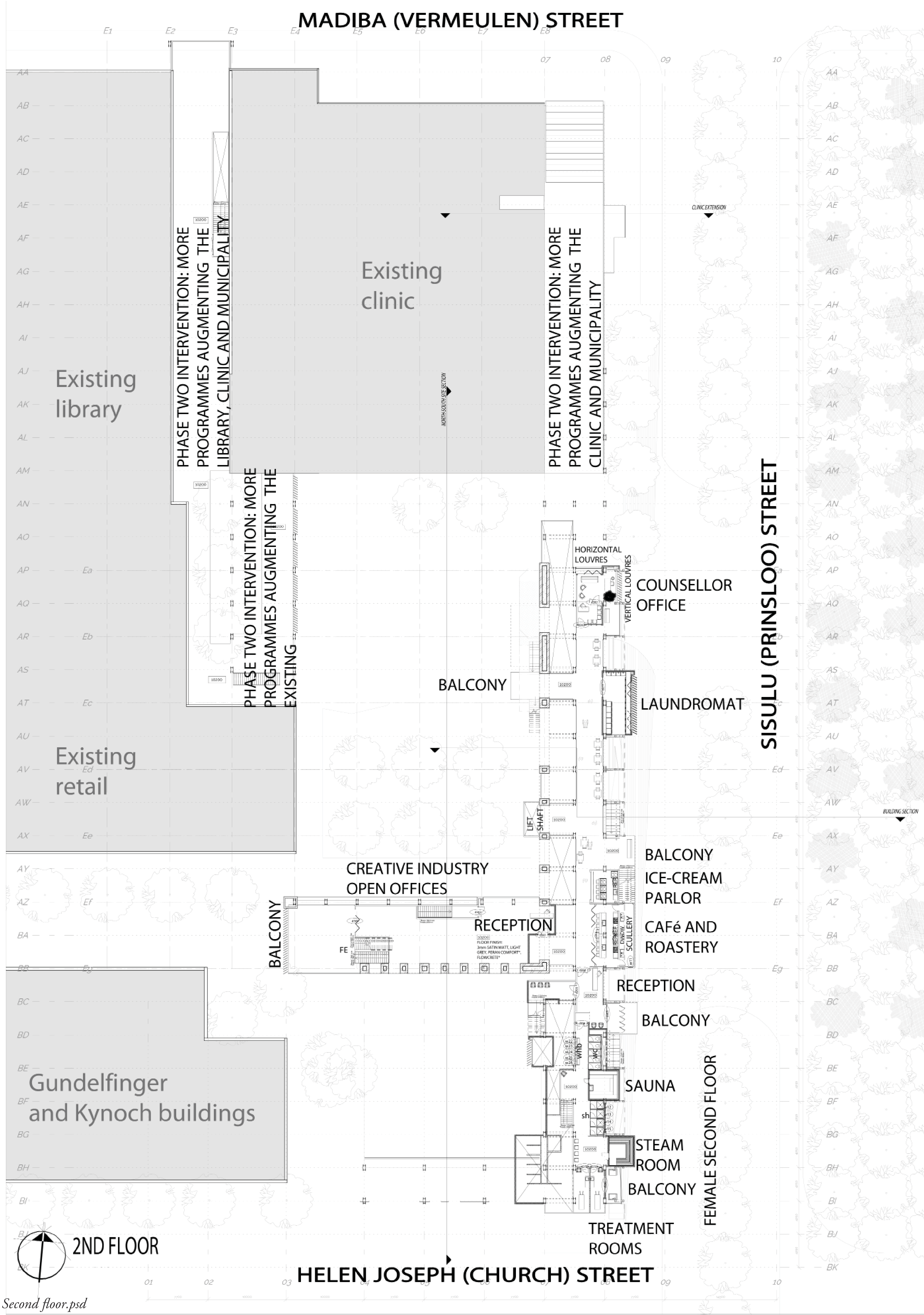


Figure 7.23 ~ Second floor.psd

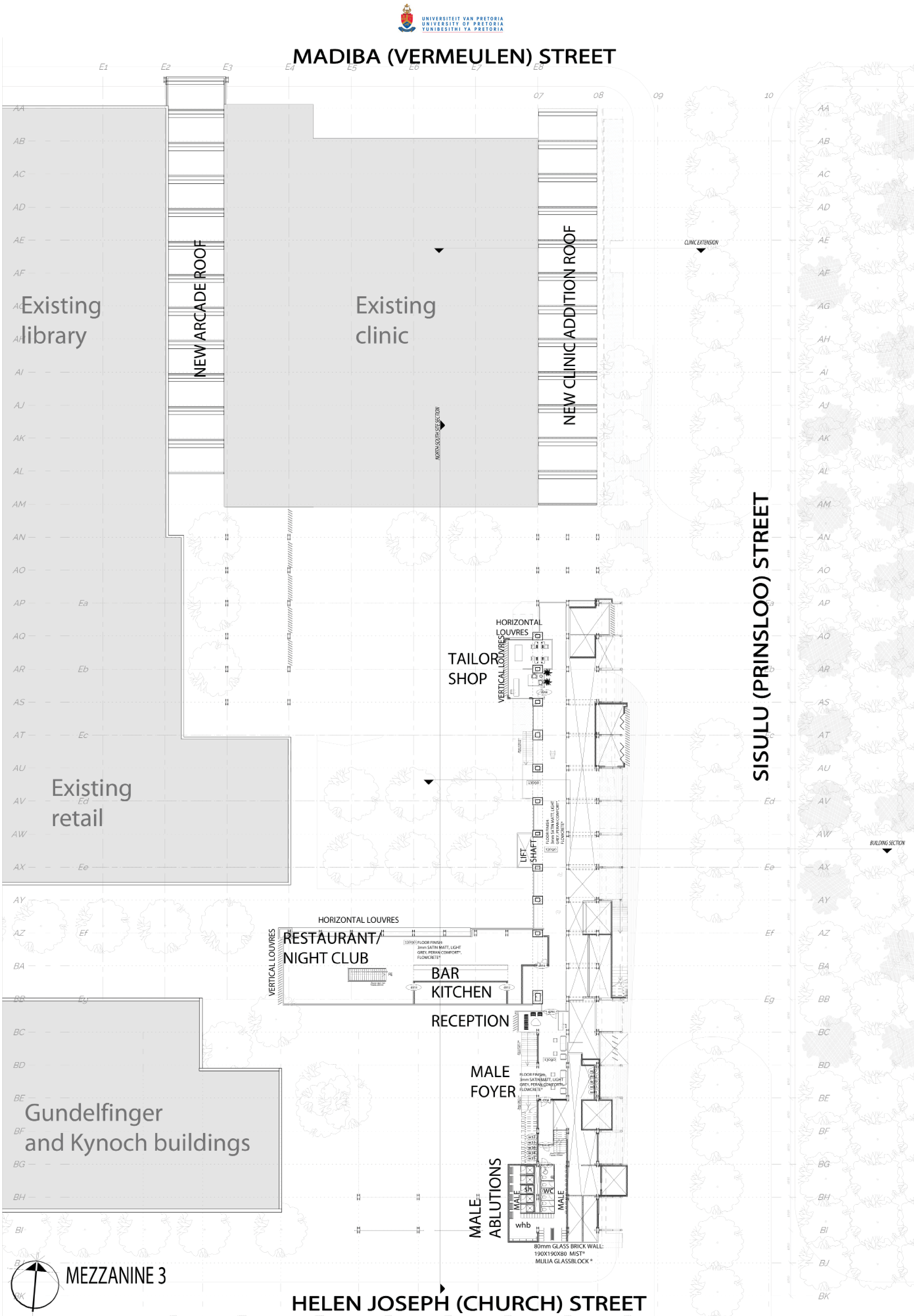


Figure 7.24 ~ Mezzanine 3.psd

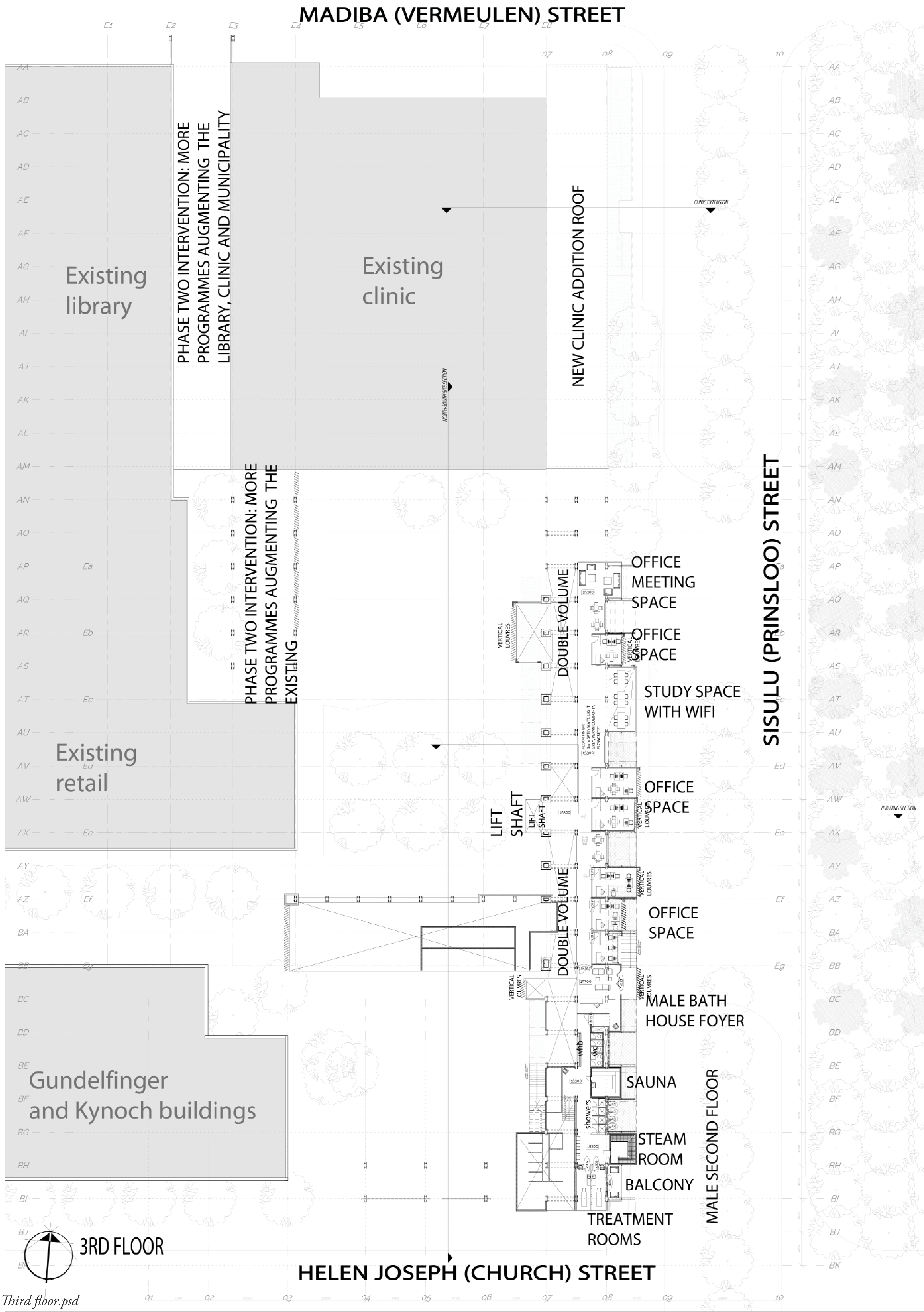


Figure 7.25 ~ Third floor.psd

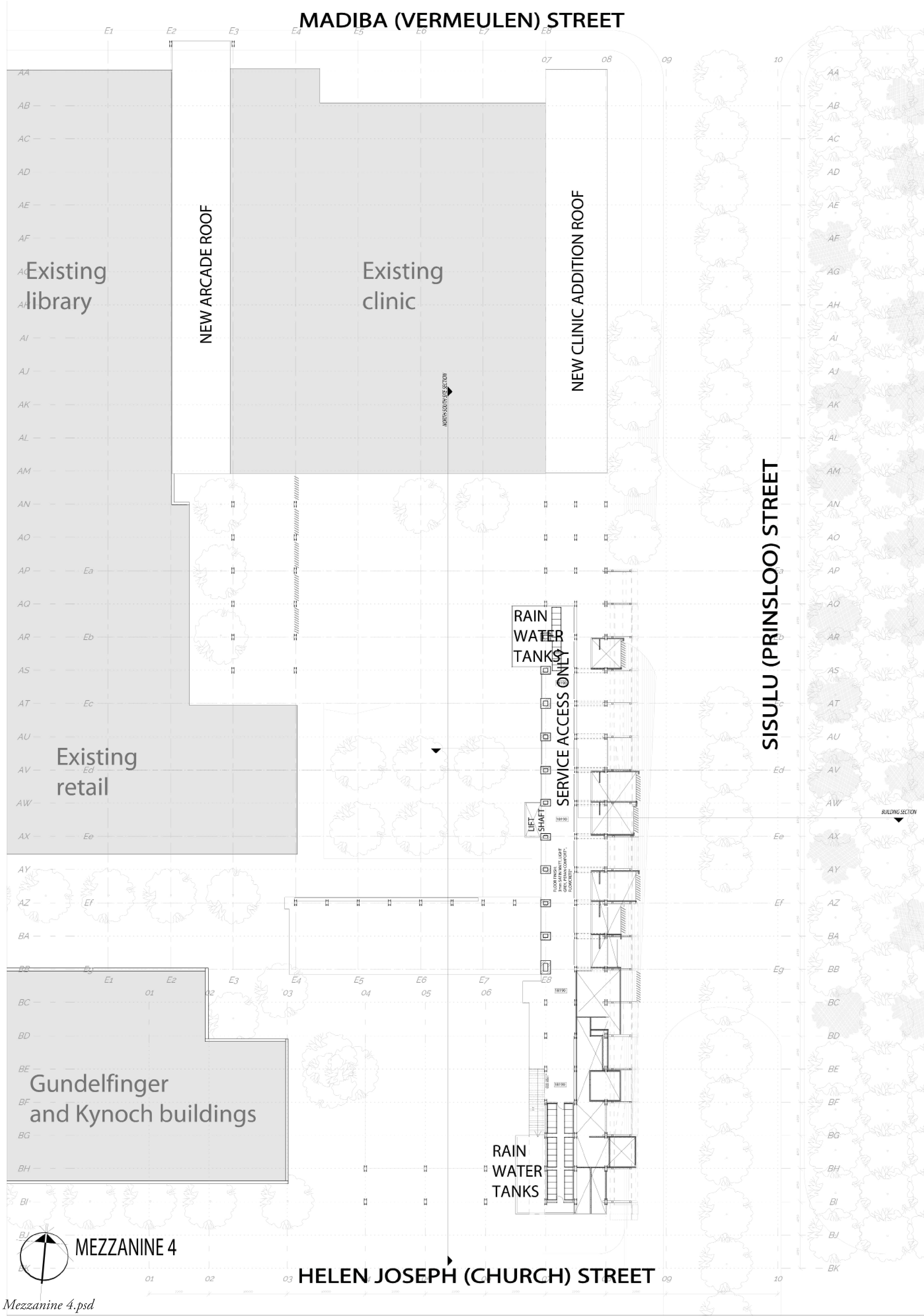


Figure 7.26 ~ Mezzanine 4.psd

Sections

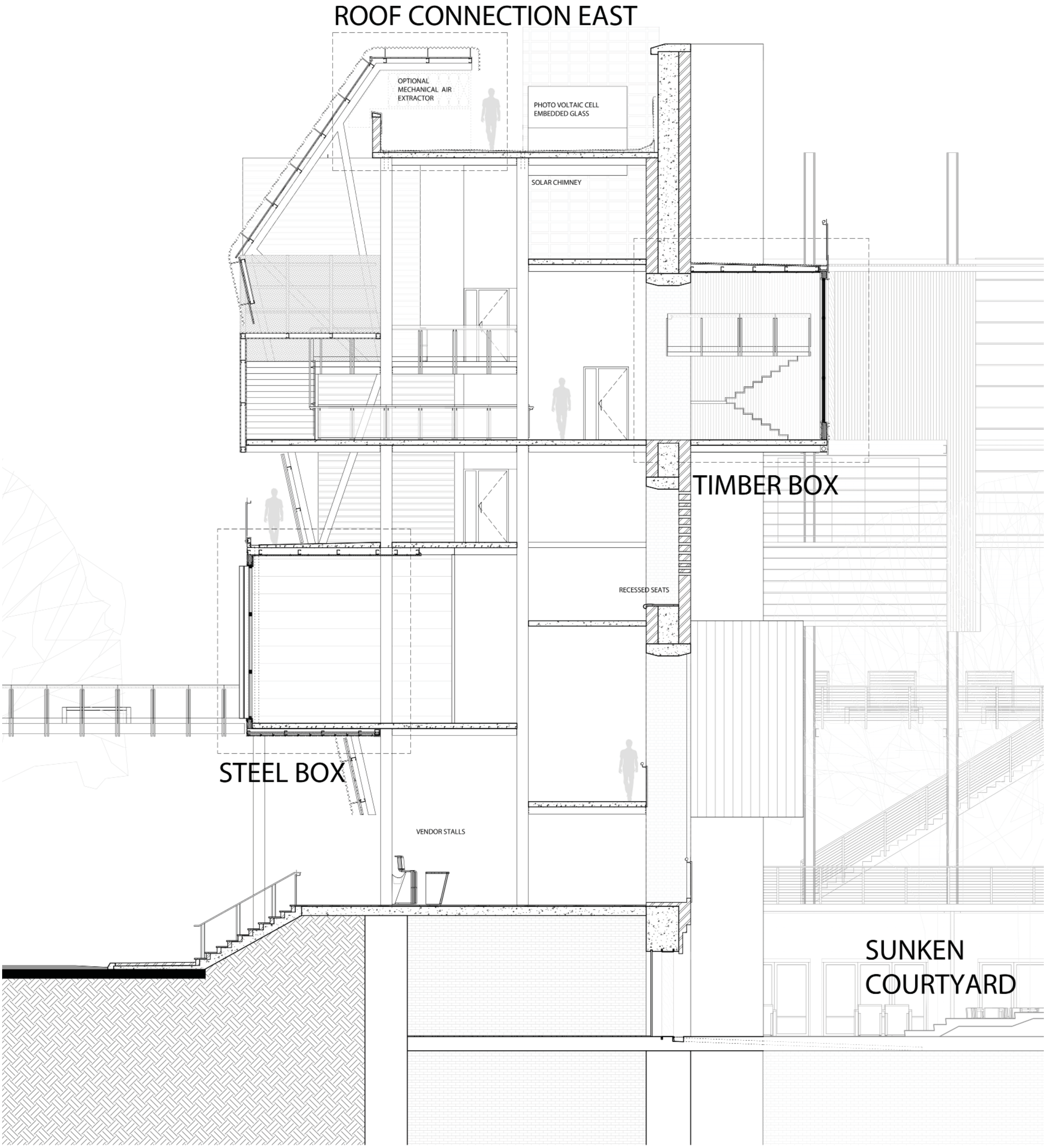


Figure 7.27 ~ Building section.psd

STEEL BOX

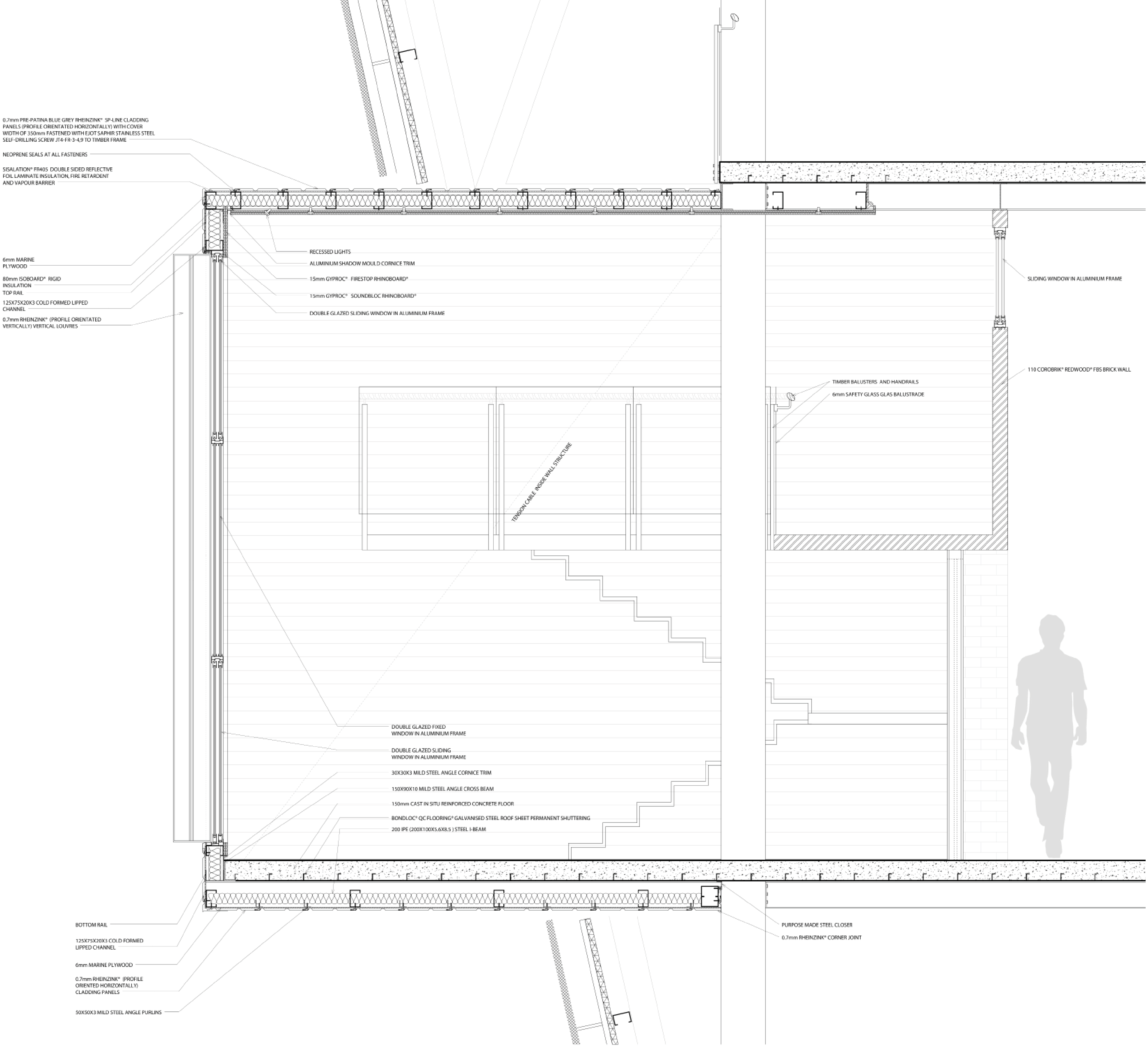


Figure 7.28 ~ Steel box section.psd

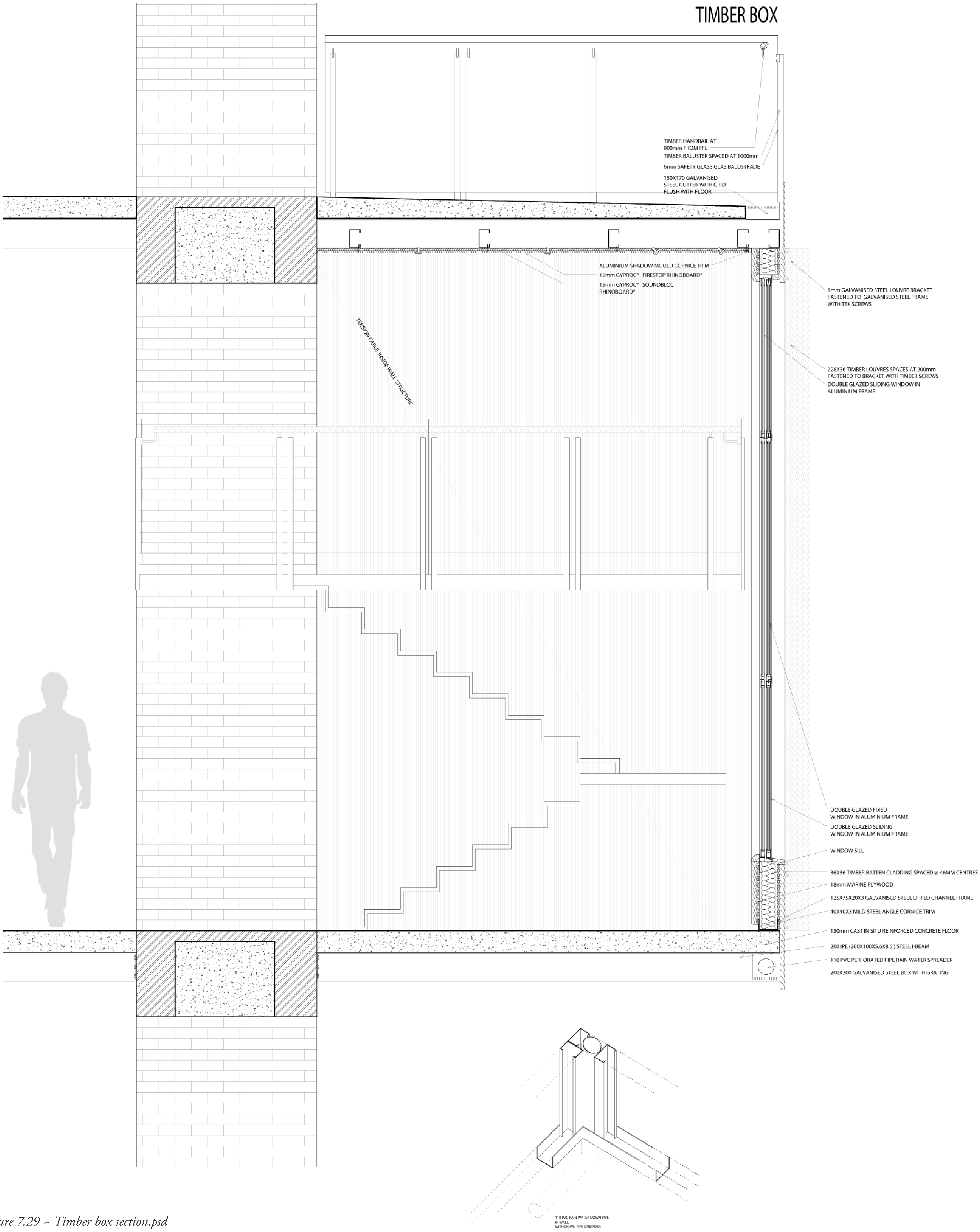
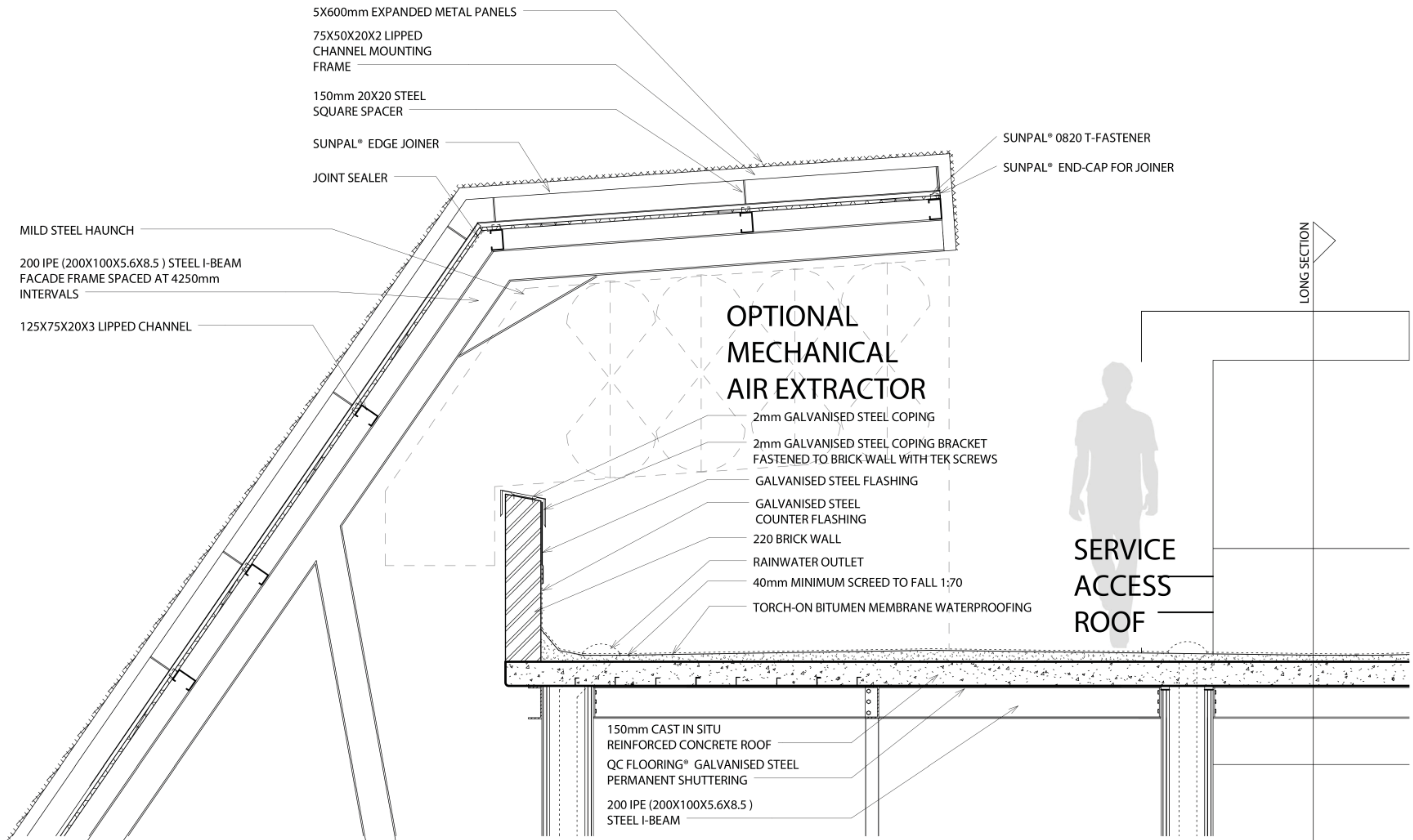
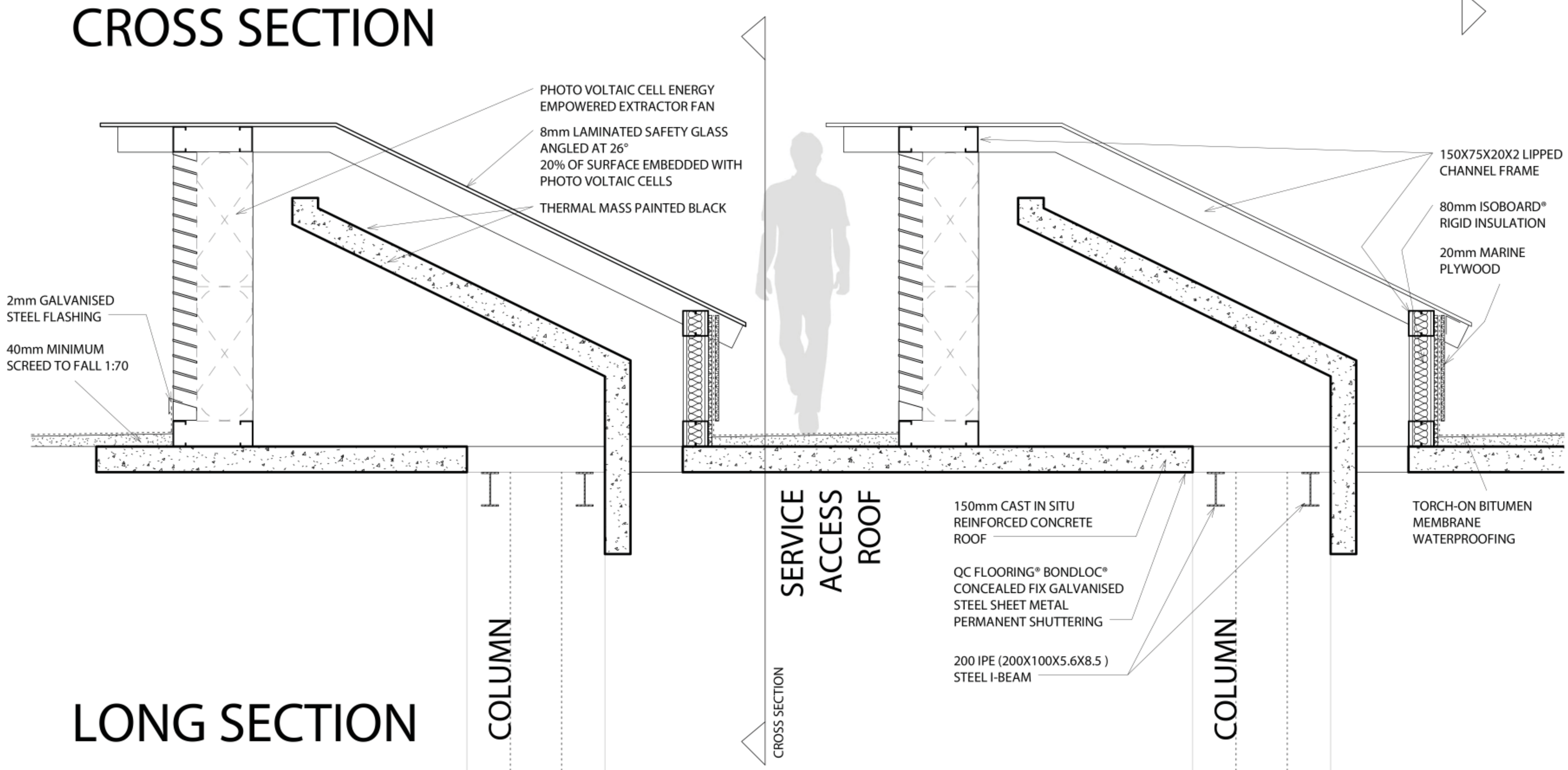


Figure 7.29 ~ Timber box section.psd

ROOF CONNECTION EAST



CROSS SECTION



LONG SECTION

Figure 7.30 ~ Roof connection east.psd

Elevation

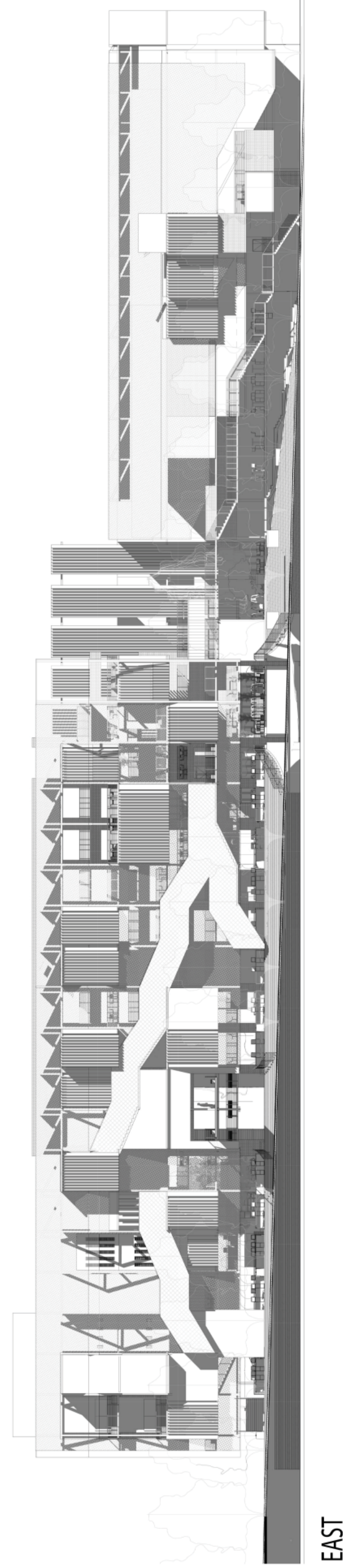


Figure 7.31 ~ East elevation.psd

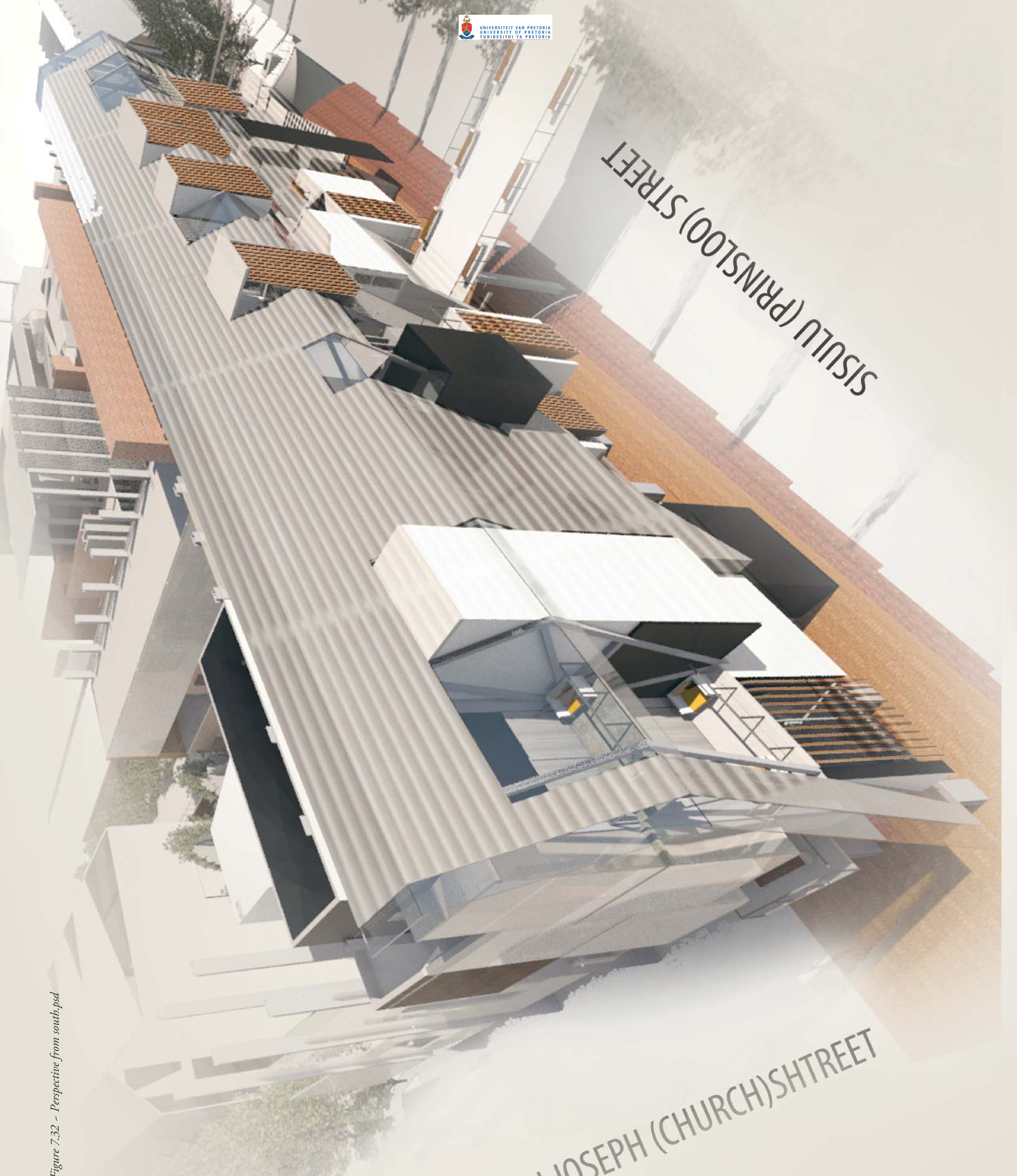


Figure 7.32 - Perspective from south.psd

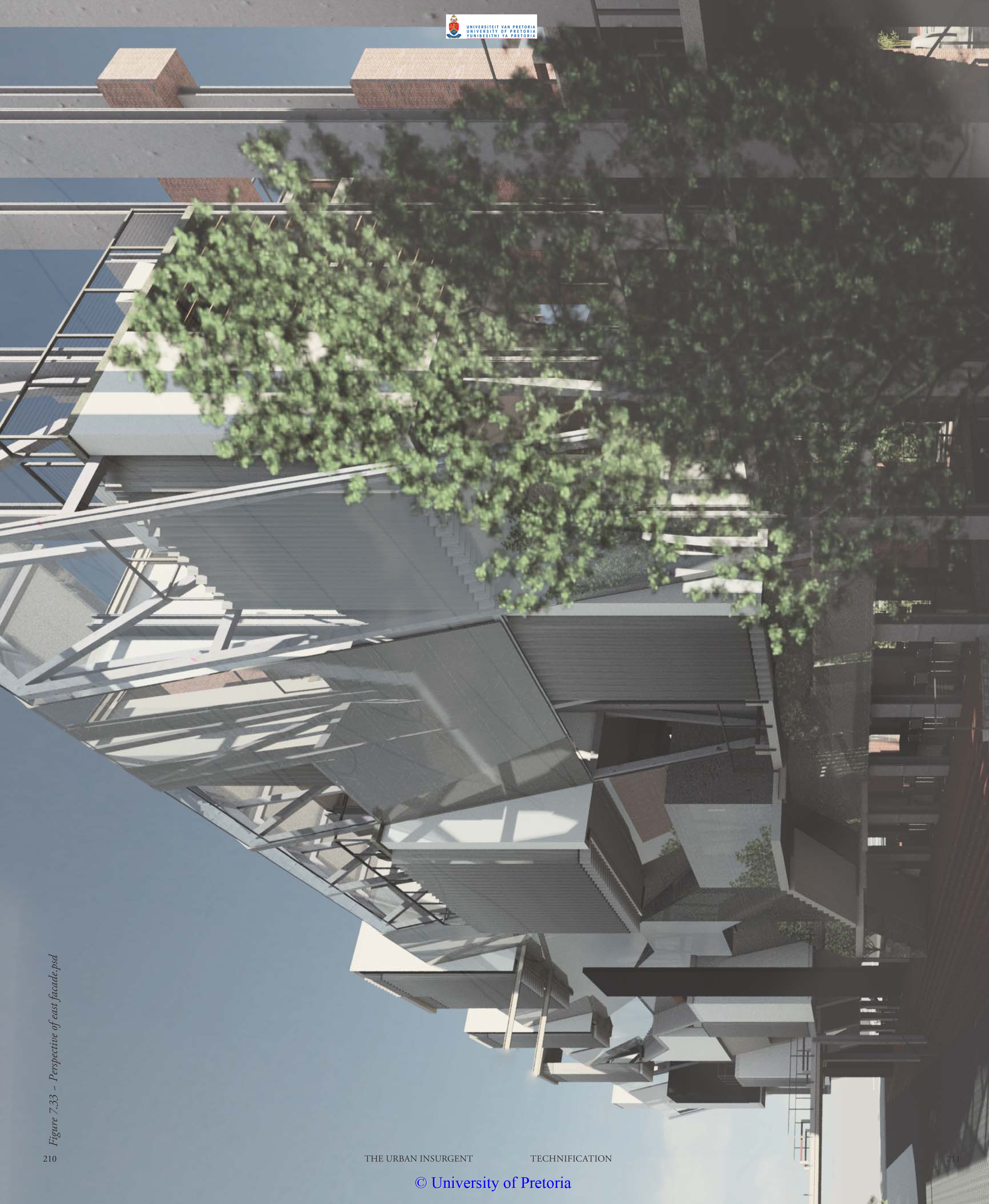


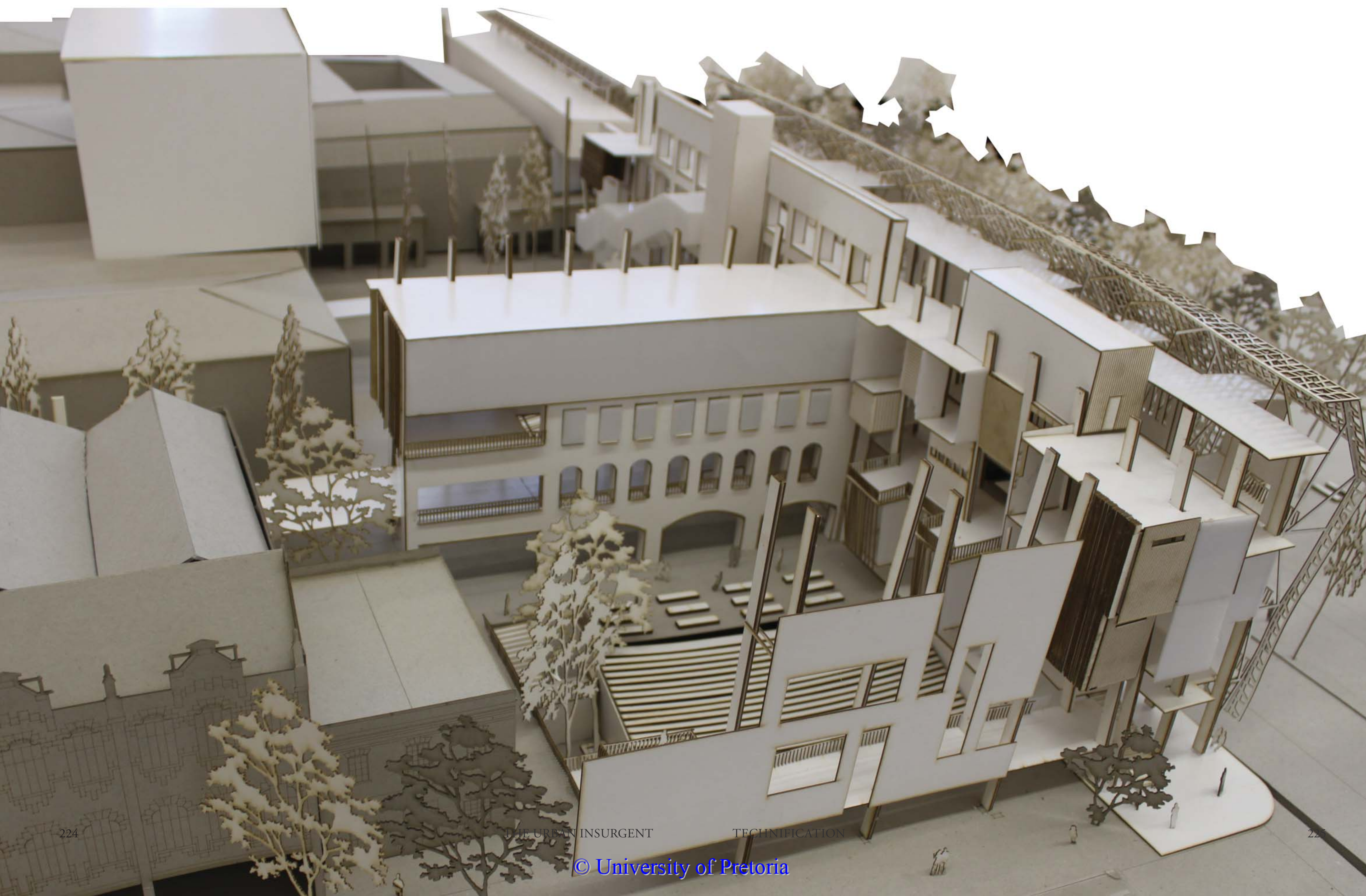
Figure 7.33 – Perspective of east facade.psd

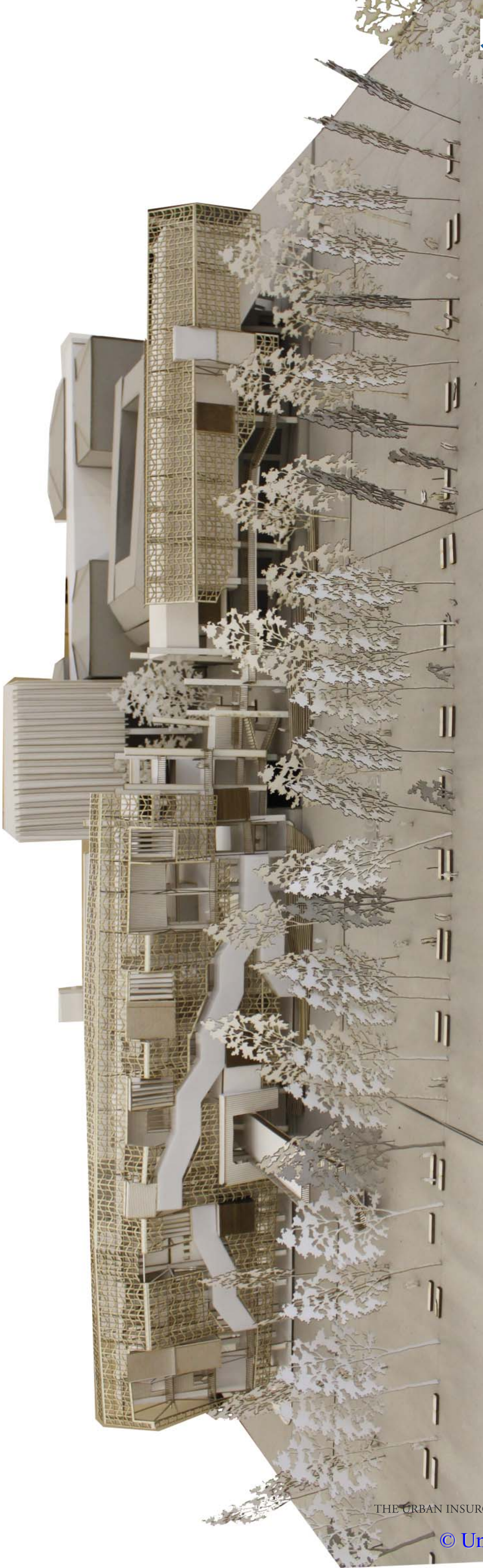
Figure 7.34 - View from Sisulu Street.psd

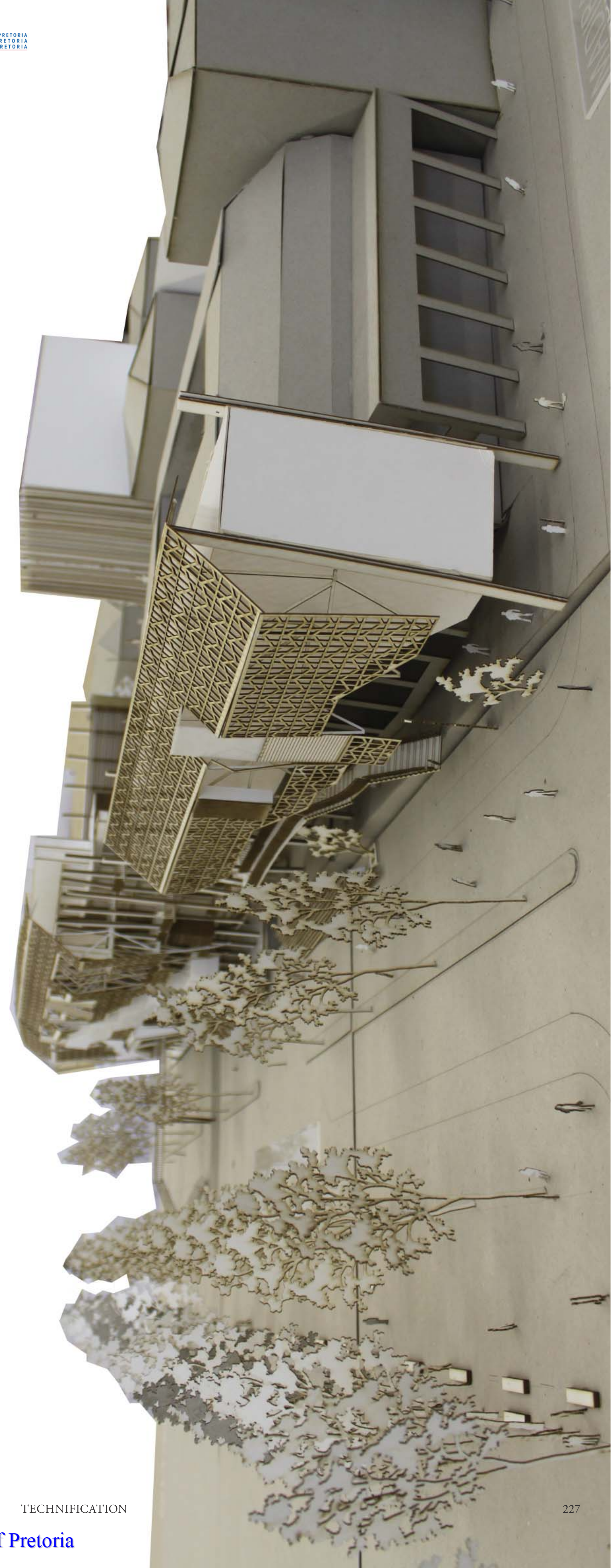
Figure 7.35 - Sunken courtyard.psd

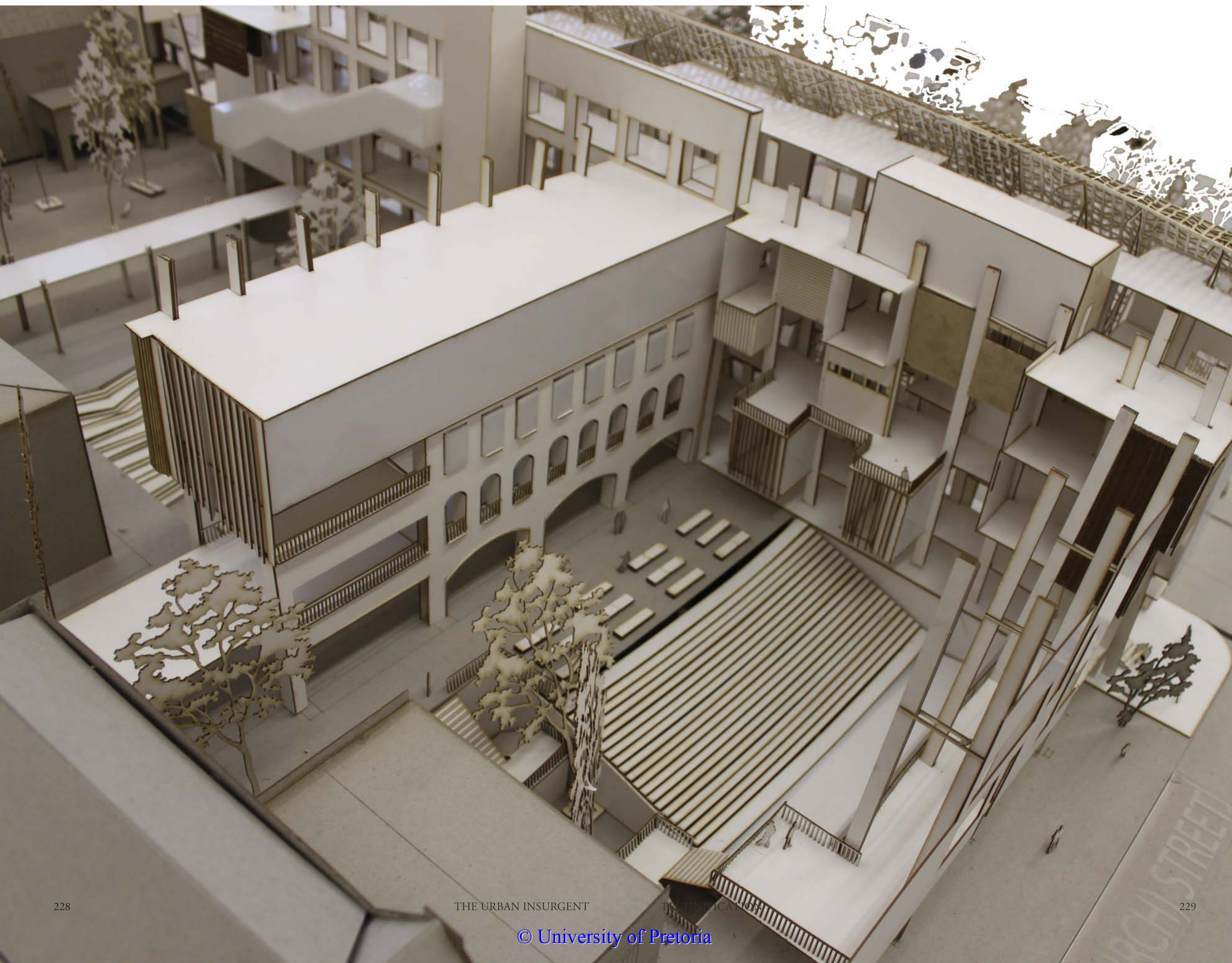
Figure 7.36 - Courtyard.psd

Figure 7.37 - Interior view on ground floor level.psd





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