fig. 77_ exterior photograph of a typical courthouse and corresponding section

material precedent_

Law Courts
Bordeaux, France
1998
Rogers Stirk Harbour + Partners
_red cedar timber was used to clad the soft shape of the courtrooms

materials + technical development_05

fig. 78_ bamboo strip floor in a public facility

fig. 79_ texture of a laminated bamboo panel

fig. 80_ texture of a bamboo strip floor

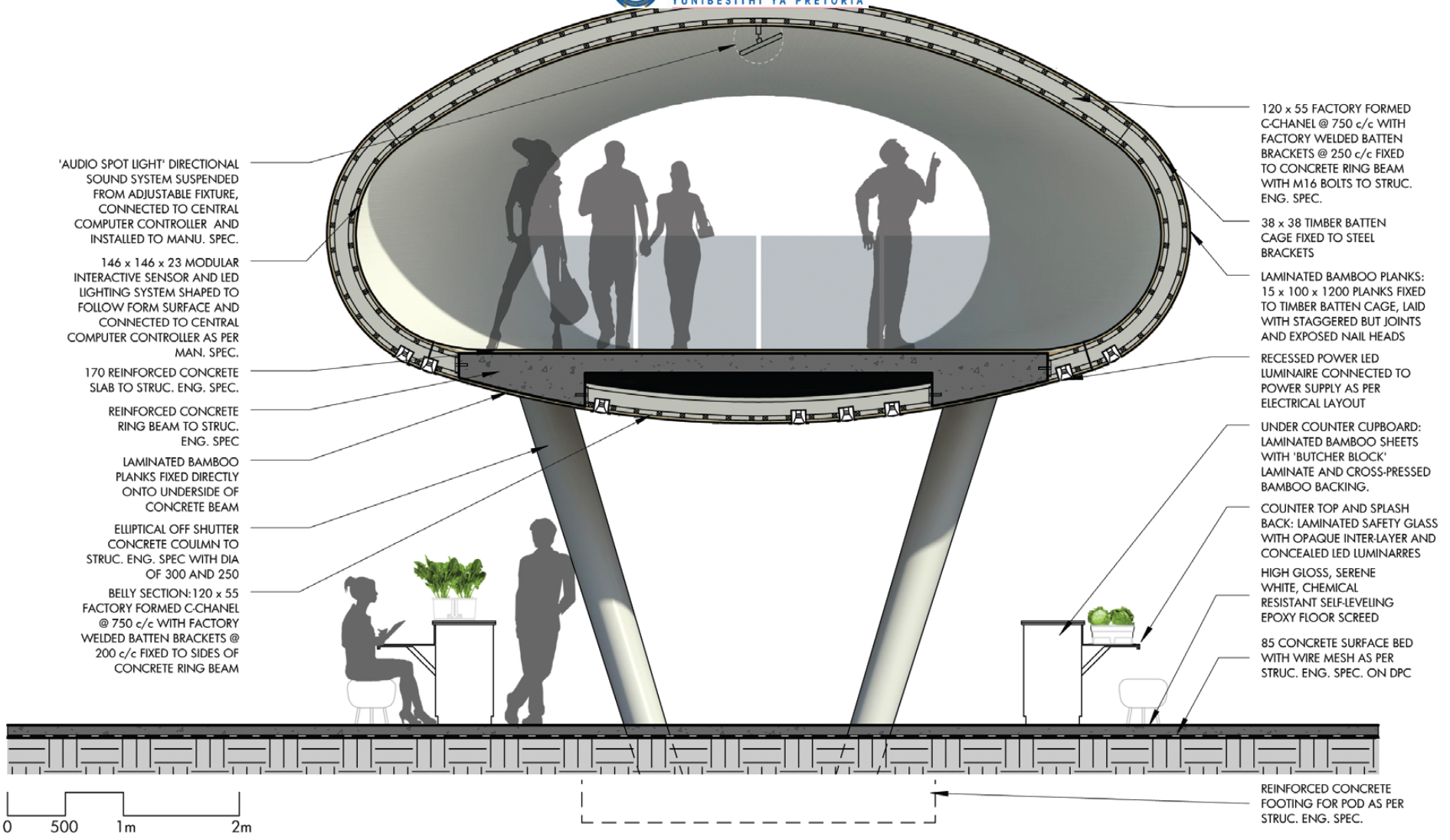
bamboo_

Bamboo is chosen for its versatility, strength, sustainable characteristics and fire retardation after treatment. Bamboo is used in the facility as flooring, ceiling panels and to clad the metaphorical seeds. For each application a different specification of bamboo is used.

floors_ Laminated bamboo strips measuring 197 x 25 x 30 are bundled and taped together to form various length strips. The bundles are glued directly onto the concrete screed using a low volatile organic compound (VOC) adhesive. After the glue has set, the tape is sanded off, creating a varied pattern.

ceilings_ Bamboo ceiling panels consist of 5 veneer layers pressed together. Ceiling panels are laid out in a staggered pattern with the grain. Panels are fixed to the manufacturer's clip-in aluminum track system and suspended from above.

seeds_ Un-carbonized solid laminated bamboo boards are fixed to a timber cage frame in a staggered pattern with exposed screws. The grain of the boards and staggered pattern are aligned over the length of the seed on the inner and outer skins.



section_ exhibition pod_

fig. 81_ uppsala konsert & kongress, uppsala, sweden

fig. 82_ lawyers office, stockholm, sweden

fig. 83_ planted wall from green fortune

bio-wall_

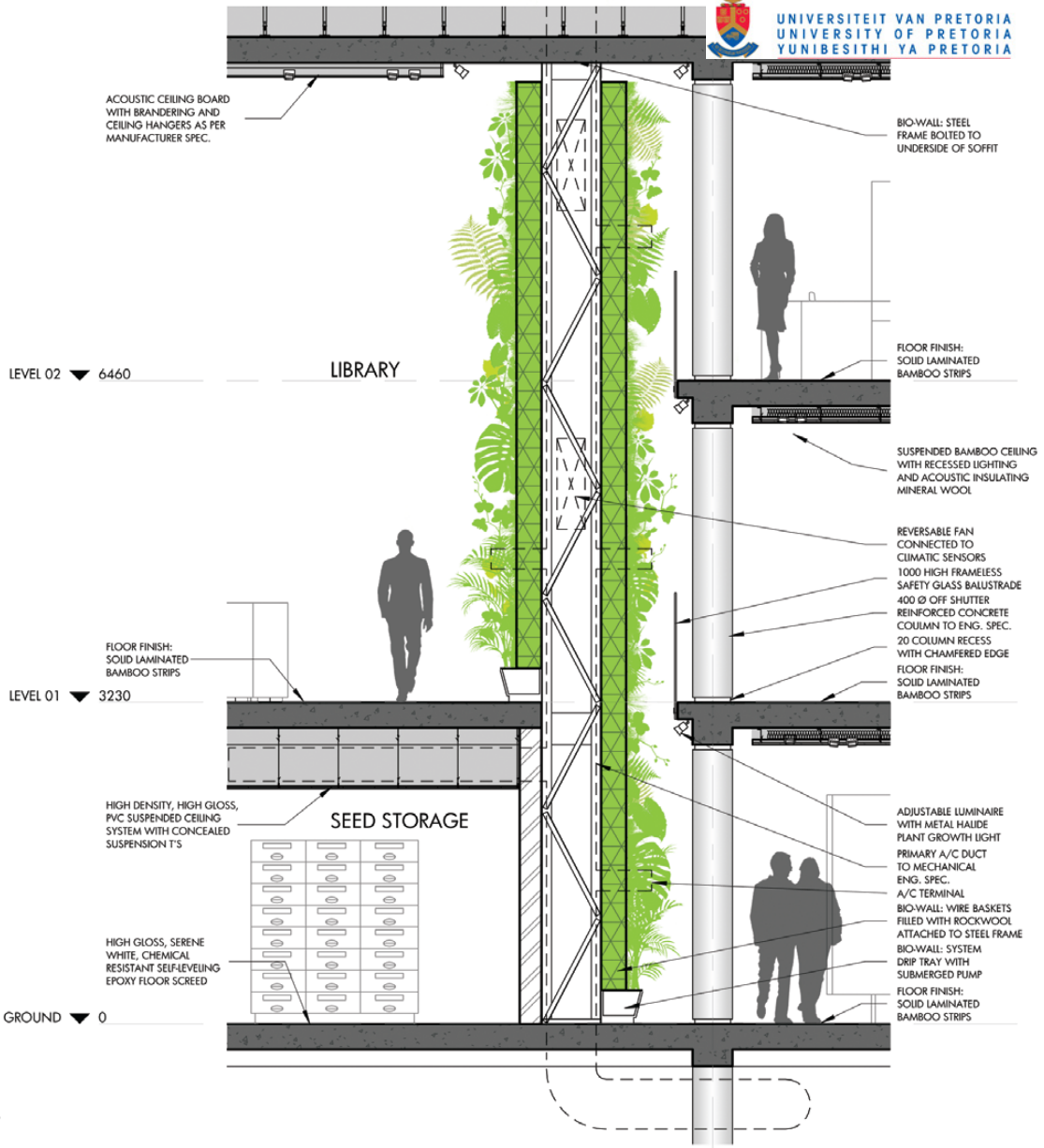
A planted wall or 'bio-wall' is chosen to separate the public zones (exhibition spaces and farmer support) and the semi-private zones (library and canteen) from one another in the building. The wall is chosen for its positive material properties and the symbolical link to plants and nature associated with the building program.

According to The Clean Air Partnership (CAP) (2009) a planted wall acts as a bio-filter, breaking down harmful chemicals found in the air. Microbes living on the plant roots can effectively break down indoor air pollutants such as formaldehyde, toluene, and benzine when air is circulated over the plant roots. CAP (2009) states that the system works most efficiently when integrated with the air conditioning system, which helps to circulate air over the plant roots. An integrated air conditioning and bio-wall system can significantly reduce energy usage of the air conditioning system, since fresh air is partially generated inside the building. Apart from the physical properties, a bio-wall will have positive psychological effects on the occupants, since indoor plants can significantly reduce absenteeism and increase productivity. (CAP, 2009)

Apart from the bio-wall's passive contributions, it will also actively contribute to energy savings for the air conditioning system. In summer, cool air from the Southern plinth (library and canteen areas) will be circulated through the bio-wall to the Northern plinth (exhibition spaces and farmer support). In winter the system will be reversed, pumping warmer air from the Northern plinth to the Southern plinth, to help maintain indoor temperature between 21-24 degrees centigrade.

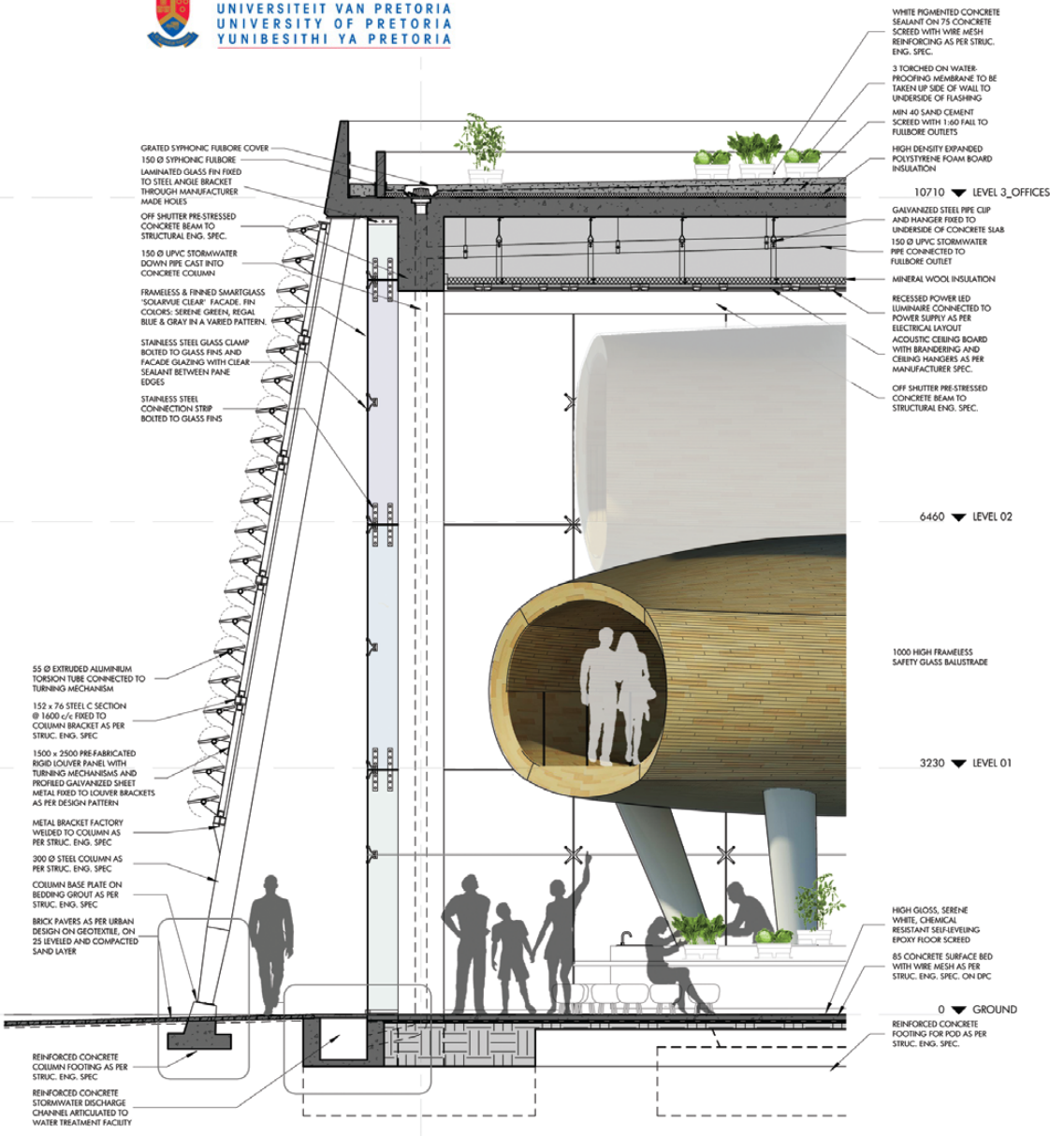
Typical plants include_ orchids, spider plants, cordyline, verigated ficus and schleferas.

fig. 84_ concept sketch of the bio-wall, as seen from the library



0 500 1m 2m

section_ bio-wall



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section_ plinth façade

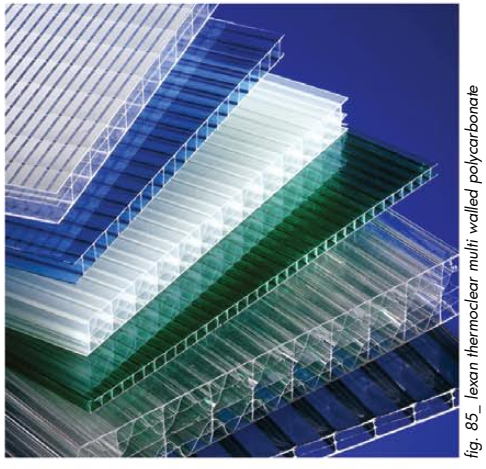


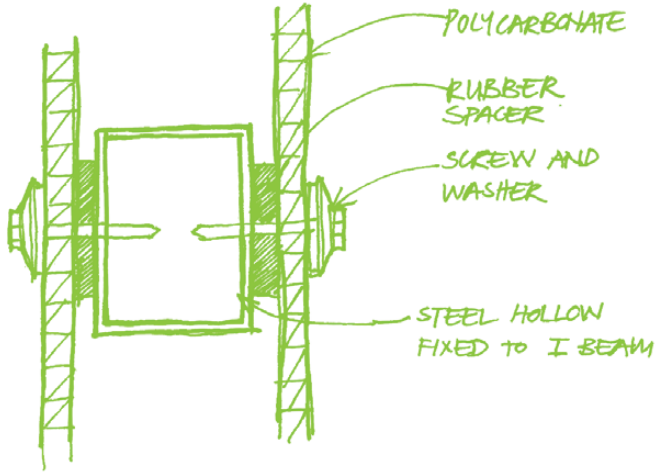
fig. 85_ lexan thermoclear multi walled polycarbonate

polycarbonate_

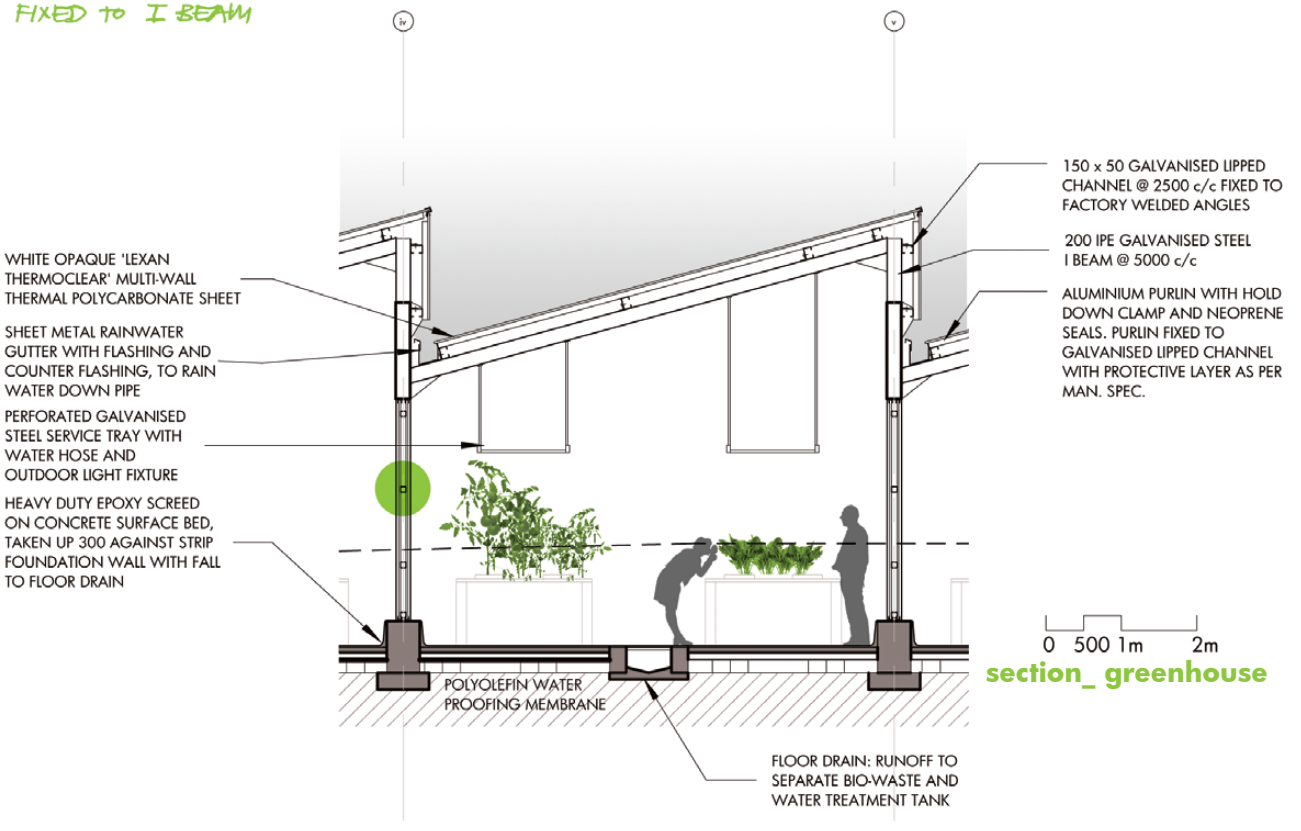
According to Greenhouse Product News (GPN) (2009), there are three types of covering materials for greenhouses. **1.** Thin films, typically polyethylene or EVA (ethylene vinyl acetate). Thin films are the least expensive to install, has good thermal and solar protection values for plants, but needs to be replaced after 4-6 years. **2.** Flexible plastics, typically polycarbonate or acrylic composites. Cellular polycarbonate panels are less expensive than glass, weigh less, and are virtually un-breakable. Modern polycarbonate has a UV-resistant film that prevents the panel from discoloration and becoming brittle, with most manufacturers extending a 10 to 20 year warranty. Most types of polycarbonate can be recycled. **3.** Rigid glazing materials such as glass. Glass has the highest light-transmission value of the materials and has the longest life-span, although laminated glass types resistant to hail and impact are expensive.

A five-walled, opaque polycarbonate is chosen as primary cladding material for the greenhouse, based on its superior strength, good light transmission, insulation properties and because it is lightweight. The polycarbonate panel also has an internal layer that prevents the formation of condensation droplets. Panels are 1200 x 5800 x 25 in size.

The greenhouse will be primarily constructed out of a galvanized steel frame, with aluminum fixings as part of the polycarbonate patented system. To prevent a reaction between the two metals (although chances are small, it will be hot and humid in the greenhouse) the aluminum fixings will be separated from direct contact with the steel by a 5mm rubber strip as part of the polycarbonate fixing system.



DOUBLE GLAZING PARTITION.



section_ greenhouse

glass_

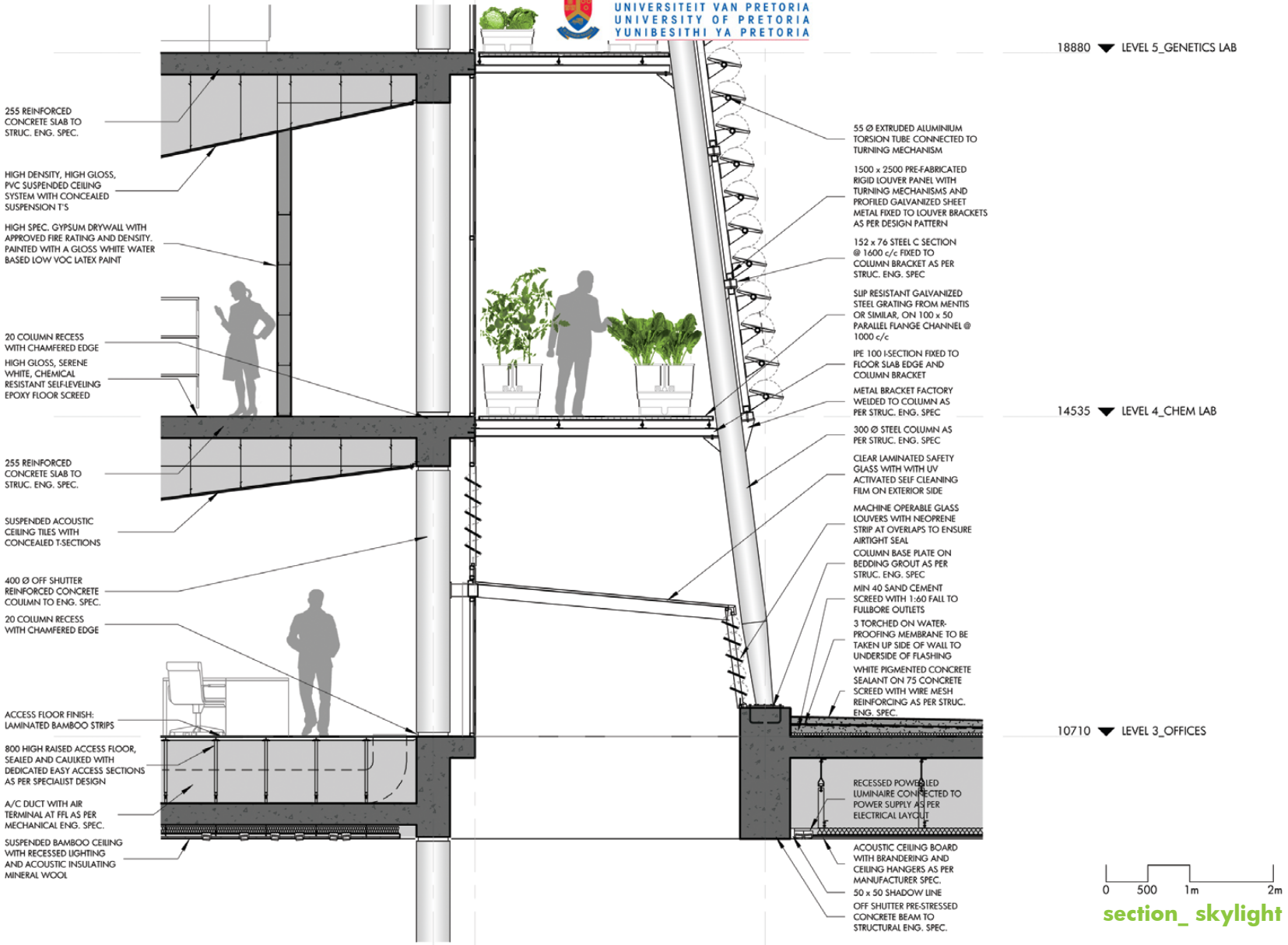
One of the primary objectives of the design is to allow as much possible natural light into the building, but without solar heat gain.

According to Patrick Köhler, from Spoormaker & Partners mechanical and electrical consulting engineers, the most effective design option is to use clear laminated glass in combination with external shading devices. Although high performance glazing types can effectively lessen solar heat gain, the glazing itself absorbs much of the heat and radiates this heat as infrared into the building. This will put negative strain on the facility's air handling system in summer, and will prevent controlled solar heat gain in winter.

Thus, an appropriate glazing type for the facility would be a clear laminate, as the facility has an adjustable external shading system. A suitable clear laminated glass is Coolvue from Smart Glass. According to the manufacturer Coolvue clear will transmit 70% of visible light into the building whilst only absorbing 37% of the solar energy.

construction_

Glazing on the lower, public levels of the building will be of a frameless system. The aim is to limit the divide between the external urban spaces and the ground floor of the exhibition space. The public area inside the facility should appear to be an extension of the surrounding urban spaces. The frameless system will consist of stainless steel spider clamps and colored glass fins in a varying pattern.



section_ skylight