



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

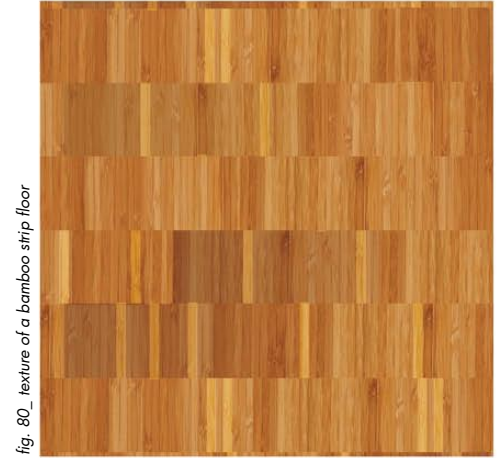


fig. 80\_ texture of a bamboo strip floor

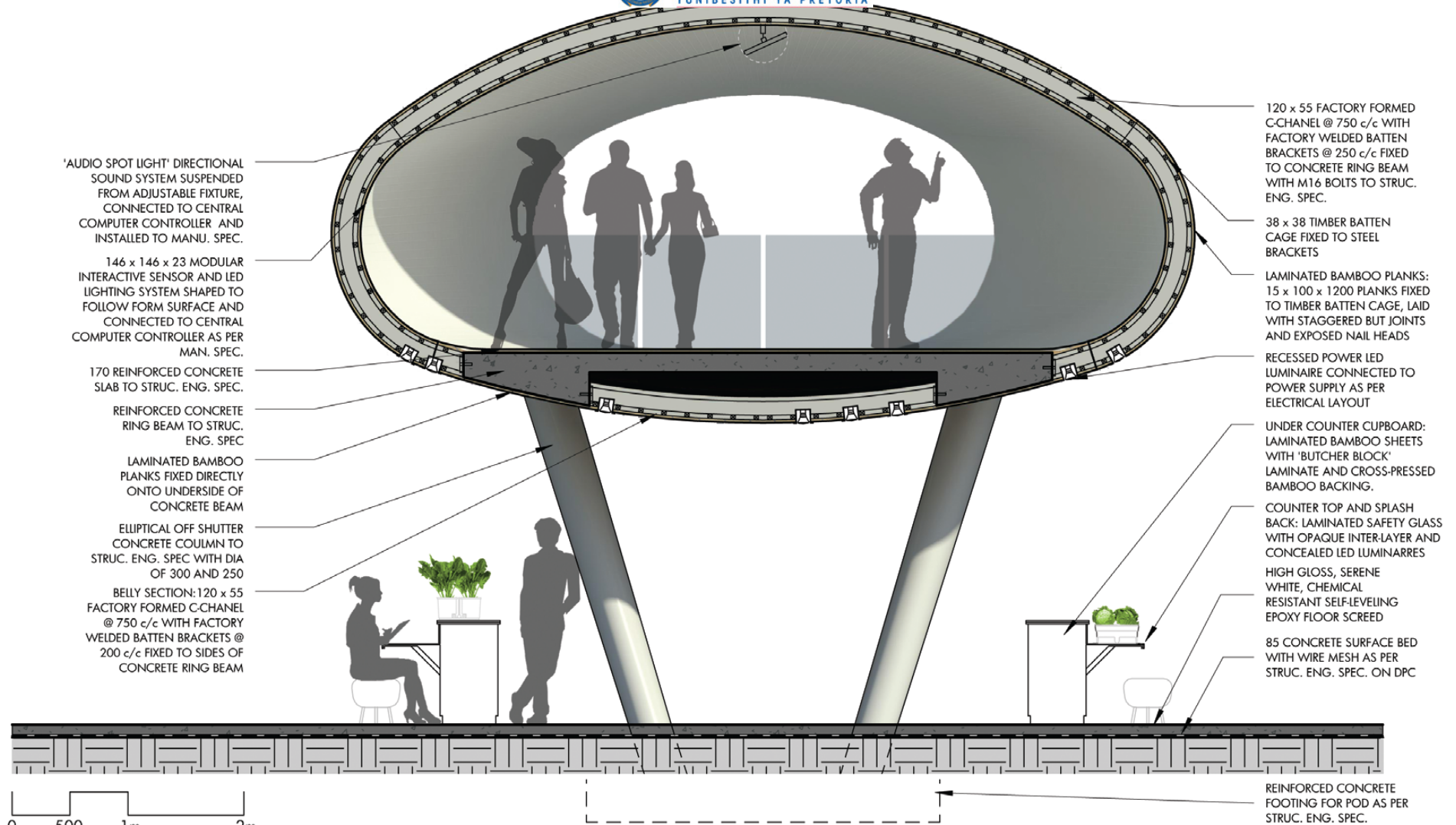
## bamboo\_

Bamboo is chosen for its versatility, strength, sustainable characteristics and fire retardation 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 after treatment. 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 forlune

## 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

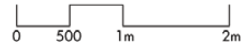
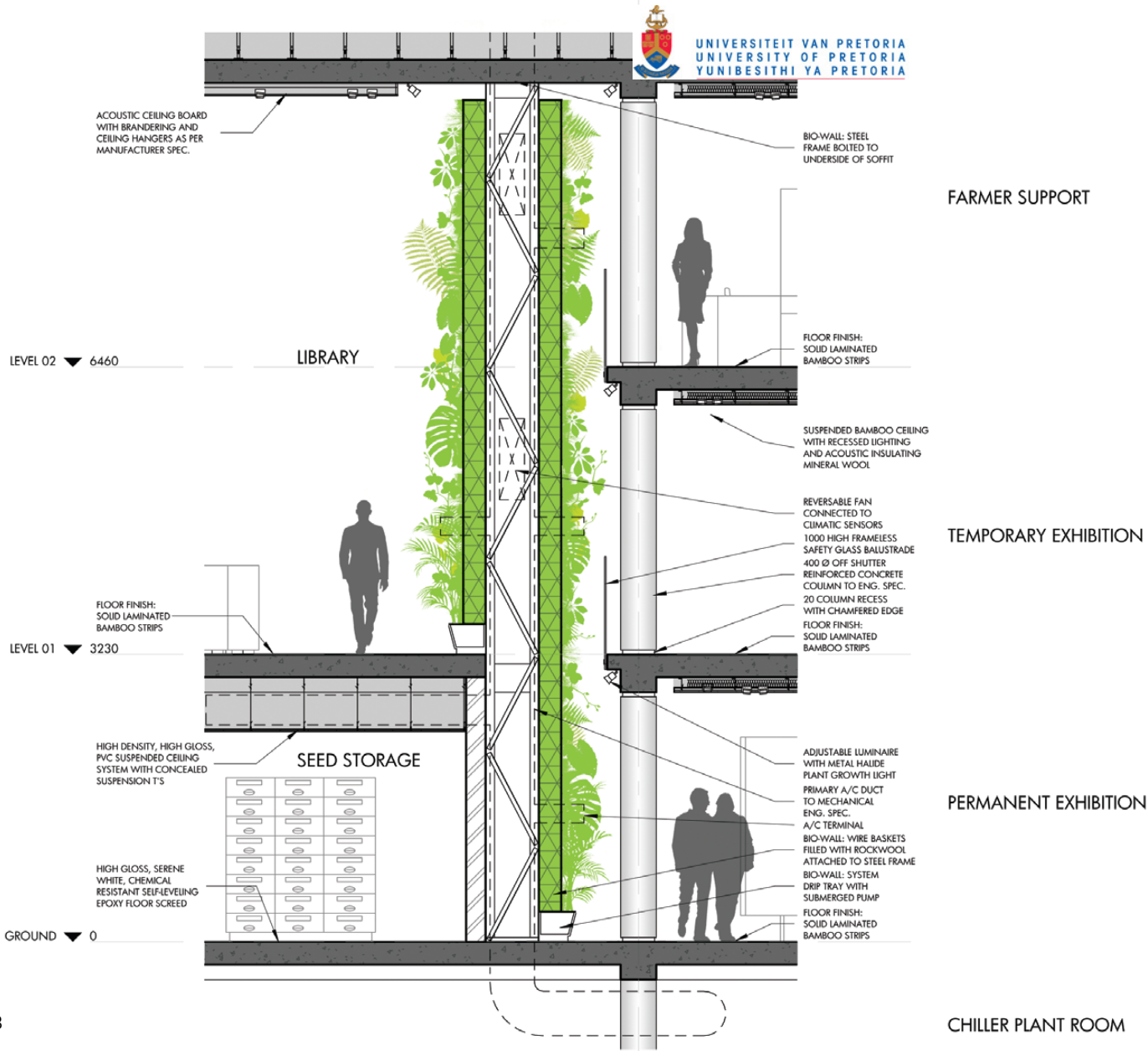
as formaldehyde, toluene, and benzene when air is circulated over the plant roots. CAP (2009) states that the system works most efficiently when integrated with the air conditioning system, which helps to circulate air over the plant roots. An integrated air conditioning and bio-wall system can significantly 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.

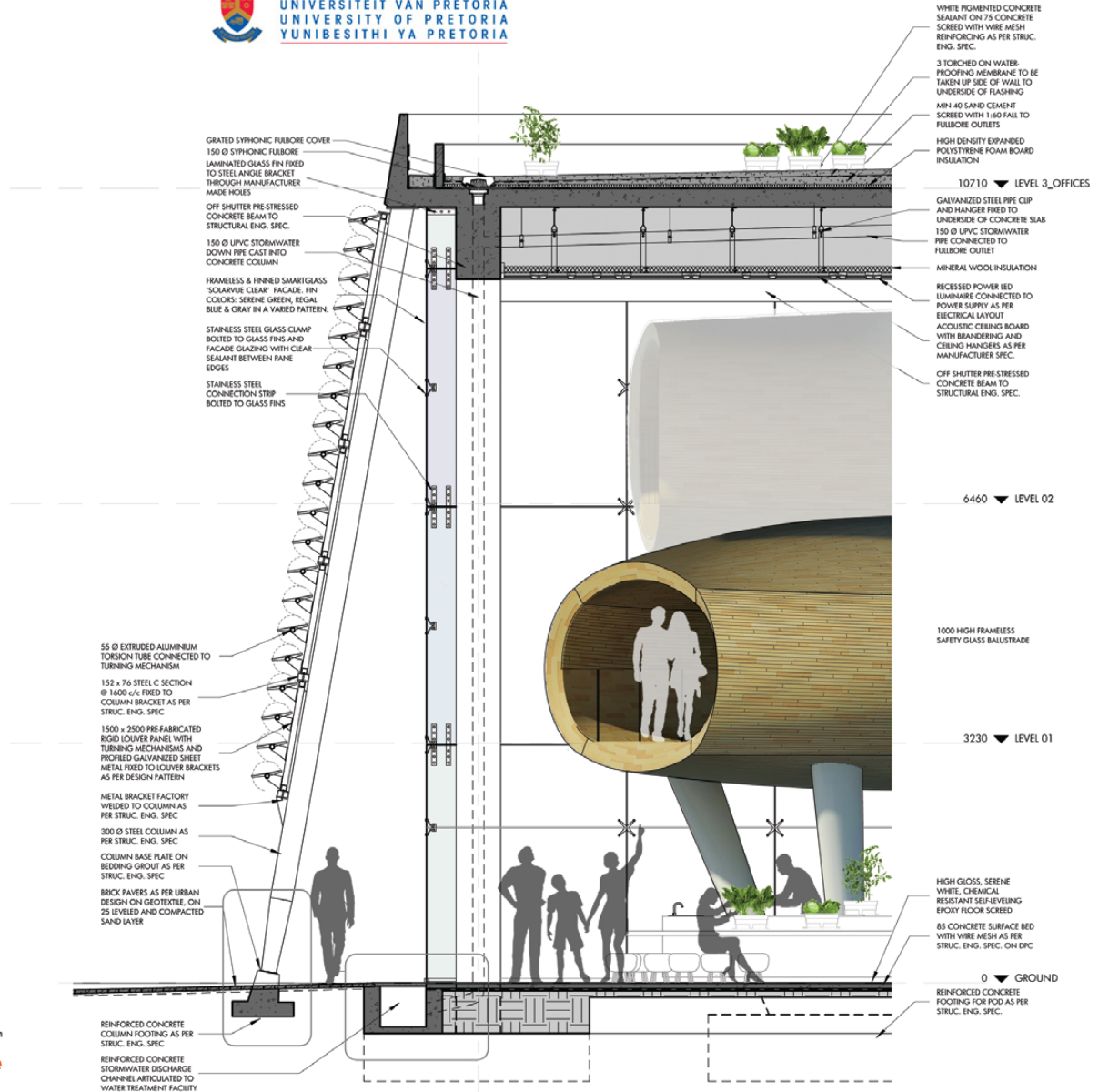
Typical plants include\_ orchids, spider plants, cordyline, variegated ficus and schleferas.



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



section\_bio-wall



section\_plinth façade



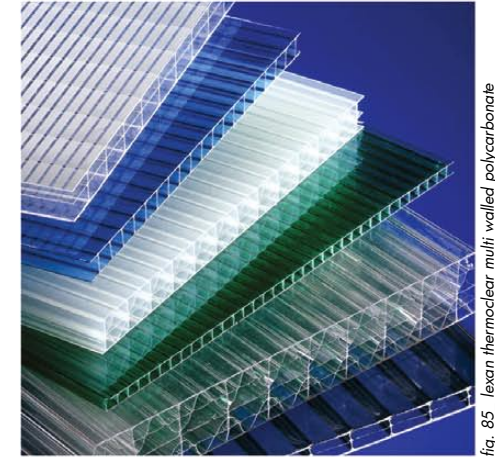


fig. 85\_ lexan thermoclear multi walled polycarbonate

## polycarbonate\_

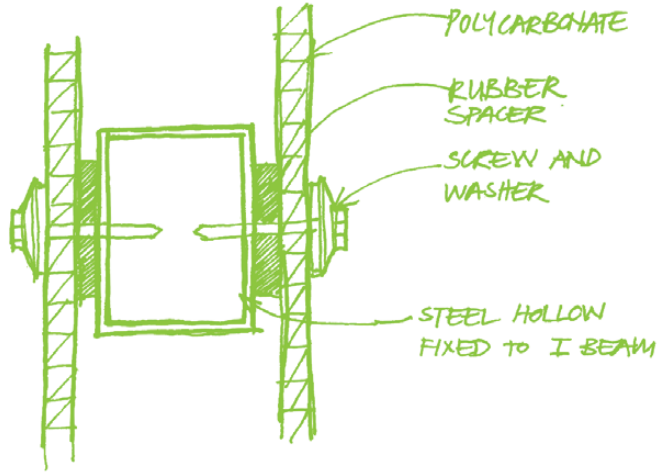
According to Greenhouse Product News (GPN) (2009), there are three types of covering materials for greenhouses. **1.** Thin films, typically polyethylene or EVA (ethylene vinyl acetate). Thin films are the least expensive to install, has good thermal and solar protection values for plants, but needs 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 unbreakable. 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

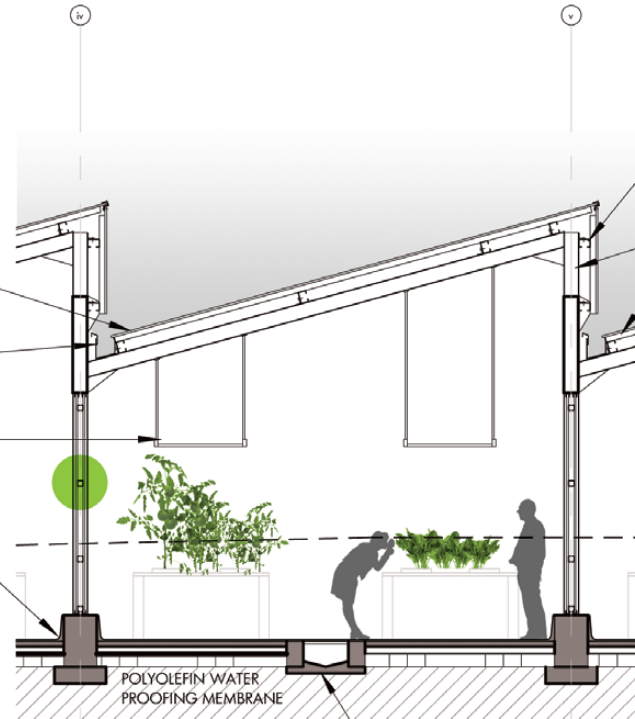
the formation of condensation droplets. Panels are 1200 x 5800 x 25 in size.

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.

- WHITE OPAQUE 'LEXAN THERMOCLEAR' MULTI-WALL THERMAL POLYCARBONATE SHEET
- SHEET METAL RAINWATER GUTTER WITH FLASHING AND COUNTER FLASHING, TO RAIN WATER DOWN PIPE
- PERFORATED GALVANISED STEEL SERVICE TRAY WITH WATER HOSE AND OUTDOOR LIGHT FIXTURE
- HEAVY DUTY EPOXY SCREED ON CONCRETE SURFACE BED, TAKEN UP 300 AGAINST STRIP FOUNDATION WALL WITH FALL TO FLOOR DRAIN



- 150 x 50 GALVANISED LIPPED CHANNEL @ 2500 c/c FIXED TO FACTORY WELDED ANGLES
- 200 IPE GALVANISED STEEL I BEAM @ 5000 c/c
- ALUMINIUM PURLIN WITH HOLD DOWN CLAMP AND NEOPRENE SEALS. PURLIN FIXED TO GALVANISED LIPPED CHANNEL WITH PROTECTIVE LAYER AS PER MAN. SPEC.

0 500 1m 2m

section\_greenhouse

FLOOR DRAIN: RUNOFF TO SEPARATE BIO-WASTE AND WATER TREATMENT TANK

## 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 Spoomaker & 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.



255 REINFORCED CONCRETE SLAB TO STRUC. ENG. SPEC.

HIGH DENSITY, HIGH GLOSS, PVC SUSPENDED CEILING SYSTEM WITH CONCEALED SUSPENSION T'S

HIGH SPEC. GYPSUM DRYWALL WITH APPROVED FIRE RATING AND DENSITY. PAINTED WITH A GLOSS WHITE WATER BASED LOW VOC LATEX PAINT

20 COLUMN RECESS WITH CHAMFERED EDGE  
HIGH GLOSS, SERENE WHITE, CHEMICAL RESISTANT SELF-LEVELLING EPOXY FLOOR SCREED

255 REINFORCED CONCRETE SLAB TO STRUC. ENG. SPEC.

SUSPENDED ACOUSTIC CEILING TILES WITH CONCEALED T-SECTIONS

400 Ø OFF SHUTTER REINFORCED CONCRETE COLUMN TO ENG. SPEC.

20 COLUMN RECESS WITH CHAMFERED EDGE

ACCESS FLOOR FINISH: LAMINATED BAMBOO STRIPS

800 HIGH RAISED ACCESS FLOOR, SEALED AND CAULKED WITH DEDICATED EASY ACCESS SECTIONS AS PER SPECIALIST DESIGN

A/C DUCT WITH AIR TERMINAL AT FFL AS PER MECHANICAL ENG. SPEC.

SUSPENDED BAMBOO CEILING WITH RECESSED LIGHTING AND ACOUSTIC INSULATING MINERAL WOOL

55 Ø EXTRUDED ALUMINIUM TORSION TUBE CONNECTED TO TURNING MECHANISM

1500 x 2500 PRE-FABRICATED RIGID LOUVER PANEL WITH TURNING MECHANISMS AND PROFILED GALVANIZED SHEET METAL FIXED TO LOUVER BRACKETS AS PER DESIGN PATTERN

152 x 76 STEEL C SECTION @ 1600 c/c FIXED TO COLUMN BRACKET AS PER STRUC. ENG. SPEC

SLIP RESISTANT GALVANIZED STEEL GRATING FROM MENTIS OR SIMILAR, ON 100 x 50 PARALLEL FLANGE CHANNEL @ 1000 c/c

1PE 100 I-SECTION FIXED TO FLOOR SLAB EDGE AND COLUMN BRACKET

METAL BRACKET FACTORY WELDED TO COLUMN AS PER STRUC. ENG. SPEC

300 Ø STEEL COLUMN AS PER STRUC. ENG. SPEC

CLEAR LAMINATED SAFETY GLASS WITH WITH UV ACTIVATED SELF-CLEANING FILM ON EXTERIOR SIDE

MACHINE OPERABLE GLASS LOUVERS WITH NEOPRENE STRIP AT OVERLAPS TO ENSURE AIRTIGHT SEAL

COLUMN BASE PLATE ON BEDDING GROUT AS PER STRUC. ENG. SPEC

MIN 40 SAND CEMENT SCREED WITH 1:60 FALL TO FULLBORE OUTLETS

3 TORCHED ON WATER-PROOFING MEMBRANE TO BE TAKEN UP SIDE OF WALL TO UNDERSIDE OF FLASHING  
WHITE PIGMENTED CONCRETE SEALANT ON 75 CONCRETE SCREED WITH WIRE MESH REINFORCING AS PER STRUC. ENG. SPEC.

RECESSED POWER LED LUMINAIRE CONNECTED TO POWER SUPPLY AS PER ELECTRICAL LAYOUT

ACOUSTIC CEILING BOARD WITH BRANDING AND CEILING HANGERS AS PER MANUFACTURER SPEC.  
50 x 50 SHADOW LINE OFF SHUTTER PRE-STRESSED CONCRETE BEAM TO STRUCTURAL ENG. SPEC.



section\_skylight