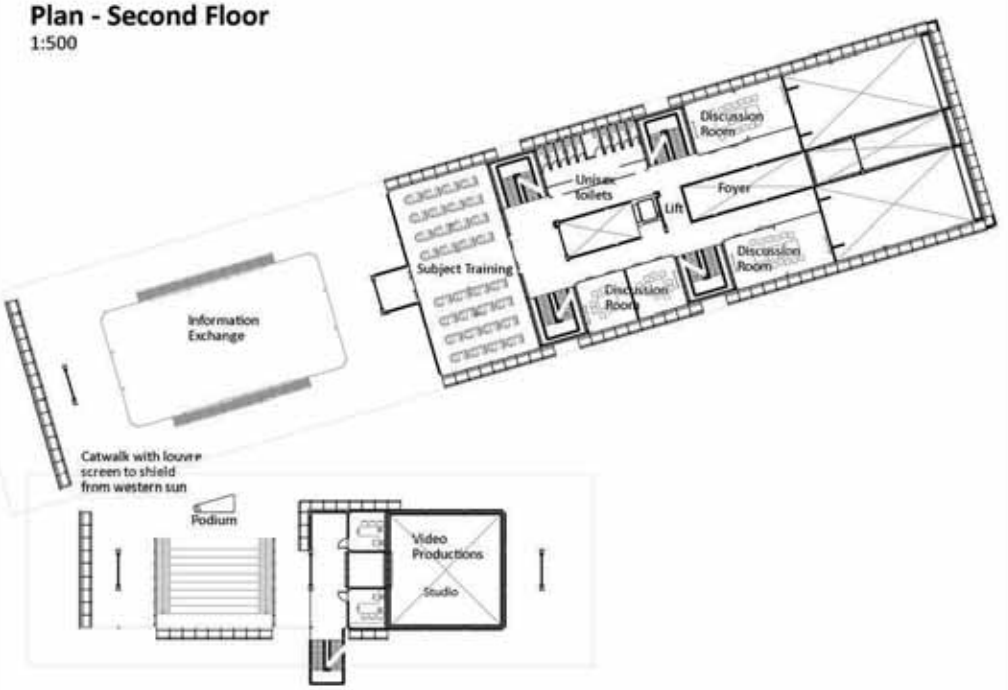
Plan - First Floor
1:500

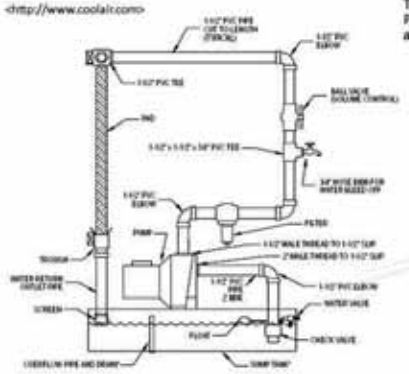
Plan - Second Floor
1:500



Evaporative Cooling Pads
Made of specially formulated cellulose paper, impregnated with insoluble anti-rot salts, stiffening saturants and wetting agents. It has cross fluted configuration that provides maximum cooling when warm air passes through the wet material.

- Natural way of cooling environment, water is not polluted in the process
- Pads will not sag, rot or develop holes
- Will last for 5 years with proper care and maintenance
- No carry-over of water droplets to enter the building
- Pads are self-supporting, and held in place by component parts of the system
- Pump and sump tanks situated in basement, only inlet and outlet pipes distributed along super-structure
- Pump supplies set of panels from ground to second floor. In event of breakdown, other sets of panels still working
- No central plant, no ducting required

<http://www.coolair.com>



Plan First Floor 1:400

Warmcel® 500 Insulation Fibre Soundcel® Acoustic Insulation

It is damp spray applied onto open panel walls, sheathed with vapour permeable external sheathing. Once sprayed, it is levelled off to depth of the studs, ensuring wall is completely filled, with no air pockets or voids, even around obstructions. The internal panel then put into place to cover it. Moisture naturally dries out through the sheathing within a few days.

Benefits

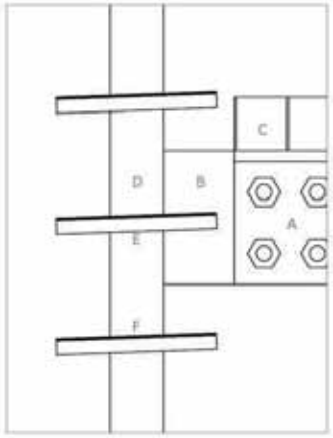
- 100% recycled waste newspaper
- extremely low embodied energy
- zero ODP (Ozone Depletion Potential)
- contain no added formaldehyde and is free from CFCs, volatile organic compounds (VOCs) or other toxic substances
- reducing heating demand, reducing CO_2 emissions.
- when removed from building, can be recycled at manufacturing facility or disposed of safely, without creating toxic waste or biodegradability problems.
- extremely resistant to fire (photograph). Performance achieved through addition of simple inorganic salts
- K value of 0.036 W/mK in walls
- Enhanced Vapour Transfer (EVT) - ensure natural moisture ingress always migrates safely and completely to the external atmosphere.
- Resistant to biological and fungal attack, treated against insects and unattractive to vermin.

The sound absorption properties of Warmcel provide an effective solution to noise pollution and can be further enhanced by the Soundcel® product. Optimised sound absorption is achieved by engineering the fibre used in Soundcel and determining its degree of 'openness'. Properties, such as fibre length, density and the capacity for interweaving, all contribute in determining the final insulation performance of the material.

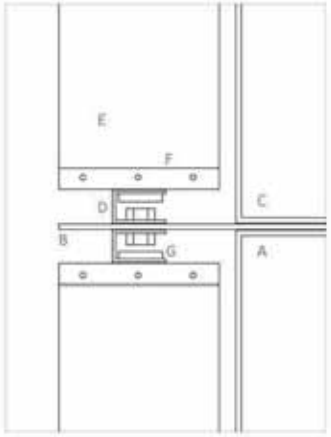
<http://www.excelfibre.com/downloads/files/Warmcel-brochure.pdf>

Control of Heat Gain and Heat Loss

Detail A
Section 1:5



Detail A
Plan 1:5



First a 10mm flat bar (B) is bolted between two 125x75x10 structural steel angles (A) that is bolted onto a structural steel bracket which is bolted onto the 203x102x25 structural steel I-section beam or column [where it coincides with the column grid]. This is not shown in this detail. Then the expanded metal grating (C) is bolted onto this support, stabilizing it horizontally. This support, that holds the grating and louvre screen in place, is spaced on 1200mm center lines.

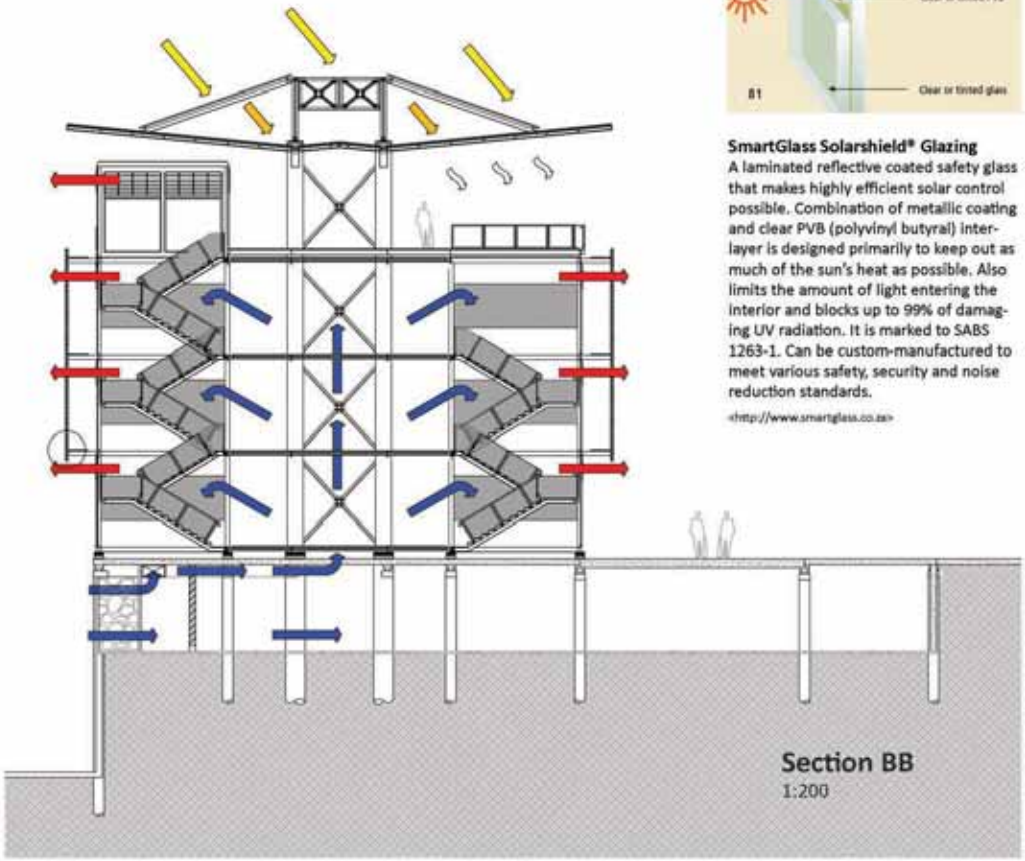
Then a 3mm hot-rolled steel sheet (D) that is bent in a U-shape is bolted onto the flatbar (B). The steel sheet has 'slits' cut into it from the inside (showing to the building) at 106.5 center spacings and at a 2° angle to aid moisture run-off. The louvres are slid into these 'slits' from the 'inside' (between the screen and the glazing). The design facilitates easy removal of louvres for regular maintenance.

The louvre consists of a 13x144x1130 PAR timber plank (E) that has been treated with hemp seed oil to render it water resistant. A 20x13 L-shaped 1.6mm hot-rolled steel sheet bracket (F) is attached onto each end. A 10mm wide 1.6mm hot-rolled steel sheet (G) is welded onto this bracket to enable it to be slid into the U-shaped steel sheet (D).

According to Boutet (1987), the movement of air is caused by two reasons. The bouyancy of heated air and pressure differentials - both of which is used in this building. He further describes the three functions of air movement, namely:
Air quality - reducing pollutants
Energy - reducing heat loads from solar access and equipment
Comfort - creating a comfortable interior environment

Cook (1989) notes that psychological elements also play a role in our perception of comfort. As an example he described how people (in an experiment) perceived two containers with same temperature, but different interior materials, as different in temperature. The timber interior were experienced as more comfortable.

Rock Bin
Section 1:100



SmartGlass Solarshield® Glazing
A laminated reflective coated safety glass that makes highly efficient solar control possible. Combination of metallic coating and clear PVB (polyvinyl butyral) interlayer is designed primarily to keep out as much of the sun's heat as possible. Also limits the amount of light entering the interior and blocks up to 99% of damaging UV radiation. It is marked to SABS 1263-1. Can be custom-manufactured to meet various safety, security and noise reduction standards.

<http://www.smartglass.co.za>

Services

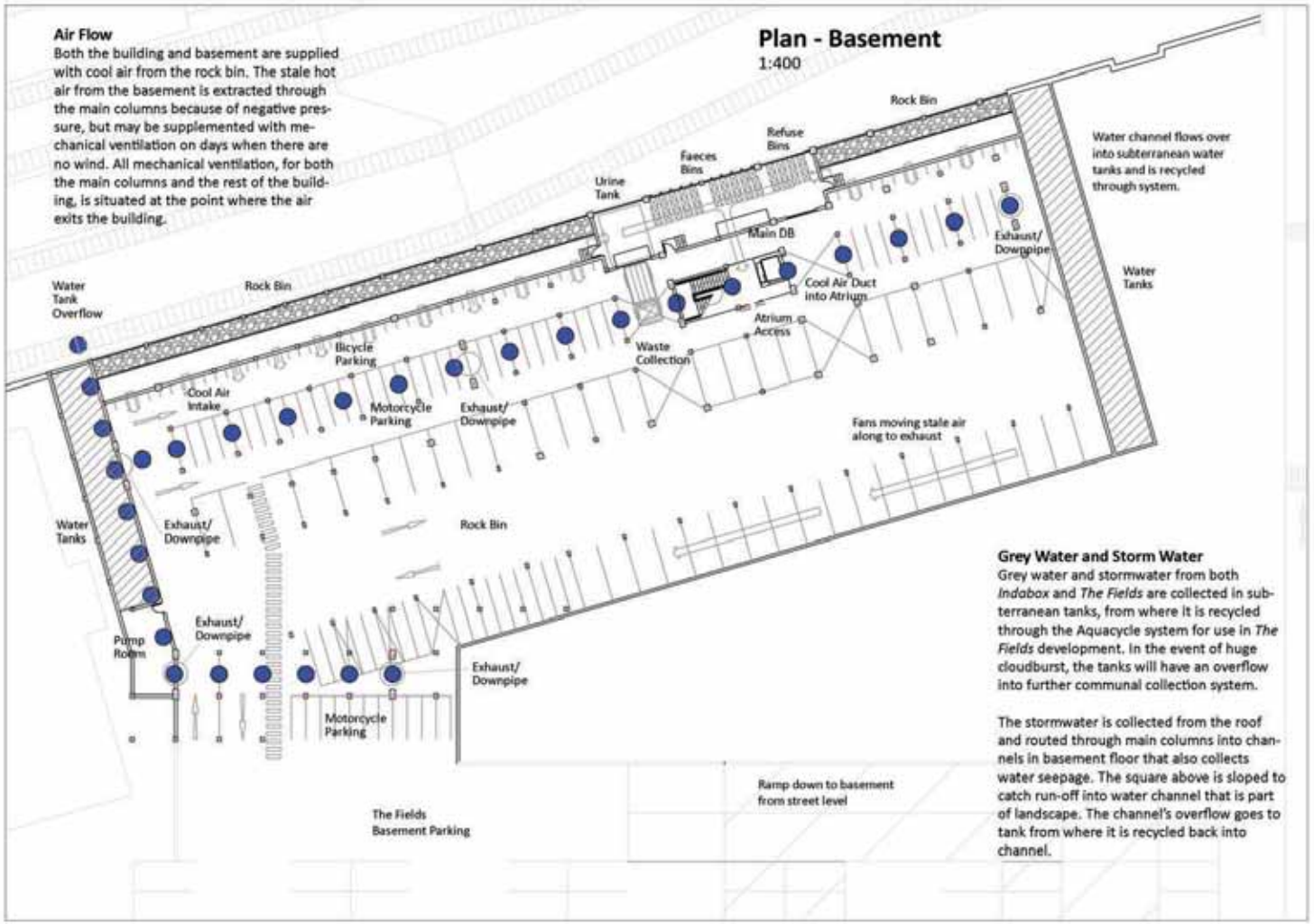
Dry Toilets
The faeces are collected without flushing water and fall straight down through gravity pipes of 200 mm diameter into individual ordinary plastic bins, and is replaced with another one when full. Urine is diverted to tanks in basement. A collection service empties the bins and transports the content to a central treatment facility. An extraction system draws air from the ventilation outlet of the bathrooms through the faeces collection area and to a vent pipe on the roof of the building. This keeps the faeces bins under negative pressure, improves their dehydration and removes odours even when the toilets are in use. The biggest obstacle to such a system is social acceptability.

Benefits
- As a sealed, properly managed, system it poses no negative impact to environment
- No introduction of pathogens into the water bodies due to the elimination of discharge of faecal material
- Only uses water during maintenance
- Faeces and urine used as compost after 12 month period on non-edible plants
- No chemicals needed to treat compost

<http://www.ecosanres.org>

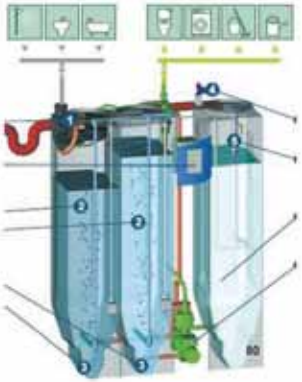
Air Flow
Both the building and basement are supplied with cool air from the rock bin. The stale hot air from the basement is extracted through the main columns because of negative pressure, but may be supplemented with mechanical ventilation on days when there are no wind. All mechanical ventilation, for both the main columns and the rest of the building, is situated at the point where the air exits the building.

Plan - Basement
1:400



Grey Water and Storm Water
Grey water and stormwater from both *Indabox* and *The Fields* are collected in subterranean tanks, from where it is recycled through the Aquacycle system for use in *The Fields* development. In the event of huge cloudburst, the tanks will have an overflow into further communal collection system.

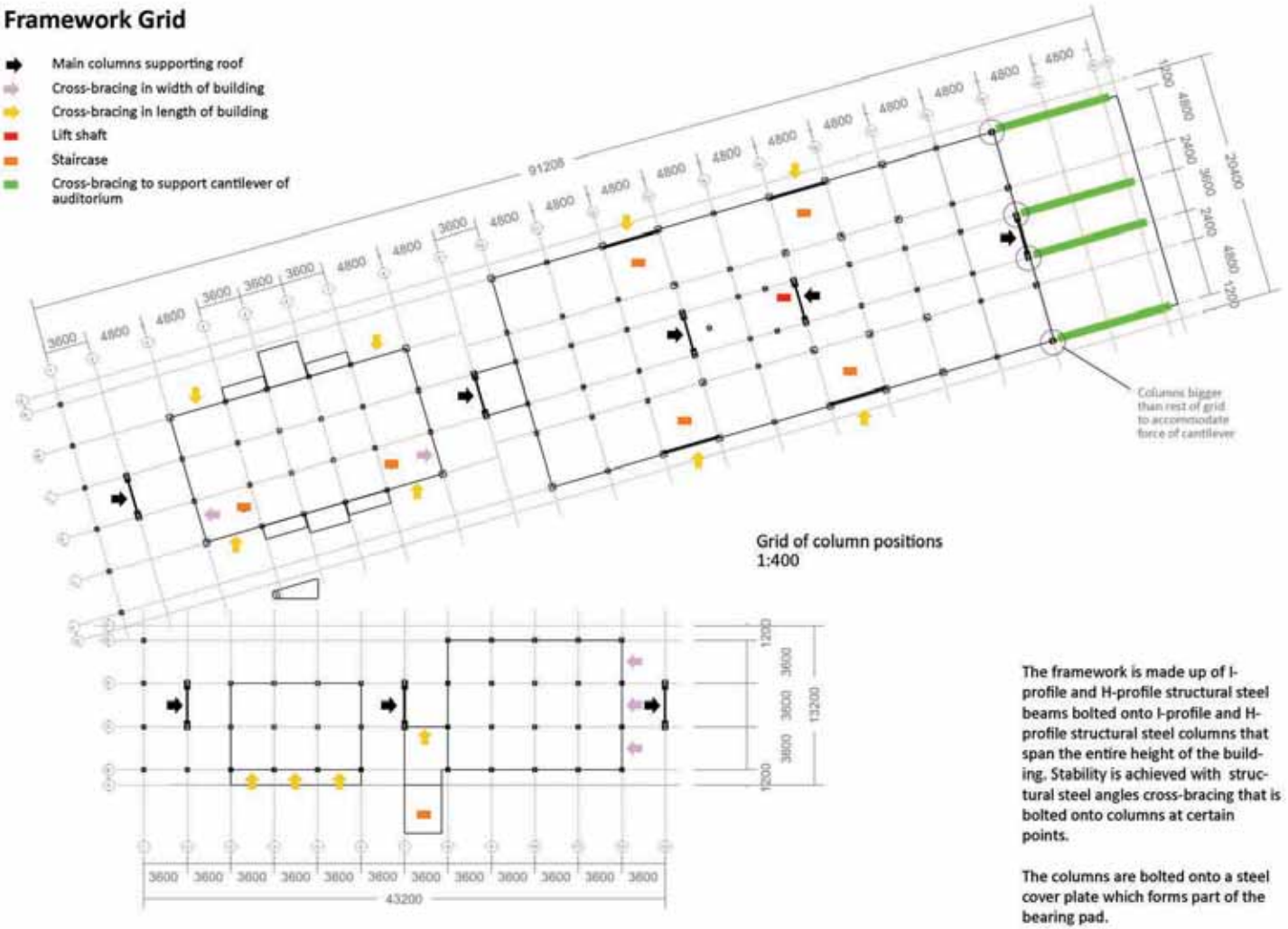
The stormwater is collected from the roof and routed through main columns into channels in basement floor that also collects water seepage. The square above is sloped to catch run-off into water channel that is part of landscape. The channel's overflow goes to tank from where it is recycled back into channel.



Aquacycle®
1 Pre-Filtration
Larger particles are collected. Filter is automatically flushed by pump - sediments washed away into wastewater drain.
2 Two-fold biological treatment
In main and secondary recycling chambers, dirt particles are decomposed by bio-cultures. Water is pumped to next station in intervals.
3 Sediment disposal
Organic sediments produced during recycling process are regularly sucked from chambers and diverted into wastewater drain.
4 UV-Sterilisation
On way to storage chamber the recycled water flows through a UV-light lamp which disinfects it. The high quality of the water now conforms to the E.U. Directive for Recreational Water.
5 Automatic freshwater feed
Should supply in storage unit drop, will be automatic freshwater supply for flushing toilets.
<http://www.akwadoc.co.za>

Framework Grid

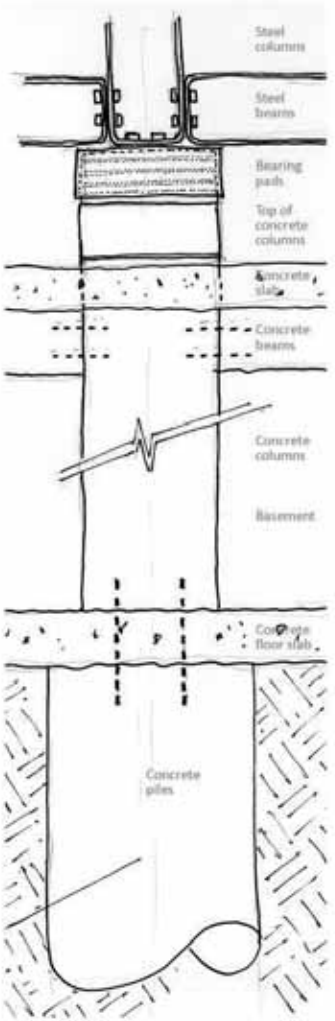
- Main columns supporting roof
- Cross-bracing in width of building
- Cross-bracing in length of building
- Lift shaft
- Staircase
- Cross-bracing to support cantilever of auditorium



Grid of column positions
1:400

The framework is made up of I-profile and H-profile structural steel beams bolted onto I-profile and H-profile structural steel columns that span the entire height of the building. Stability is achieved with structural steel angles cross-bracing that is bolted onto columns at certain points.

The columns are bolted onto a steel cover plate which forms part of the bearing pad.



The Elastomeric Bearing Pads transfer vertical loads from the superstructure to the substructure, while allowing limited horizontal movement, to absorb the vibrations caused by the train track and to allow for thermal expansion and contraction. It is made up of alternative layers of recycled natural rubber and steel reinforcement plates (shims). Bridge design engineers can specify the size and configuration of a bearing to accommodate the specific load, shear, and rotational requirements at each point.
<http://www.scougalrubber.com/bearingPads.html>

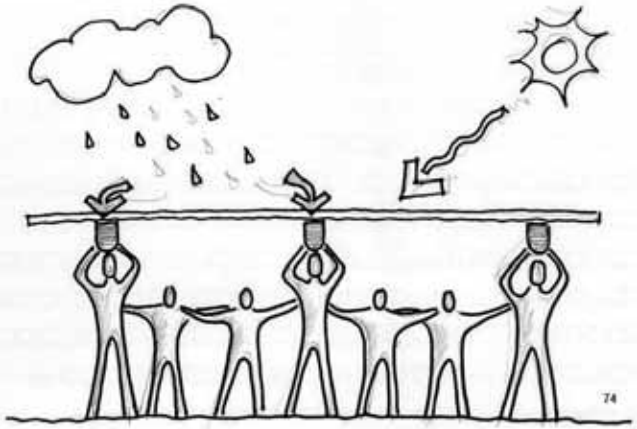
Bearing pads are attached with structural steel clamps onto the top of the concrete columns, which together with concrete beams form the substructure to carry both the building and the roof of the basement, which also serves as the floor surface of the square outside the building.

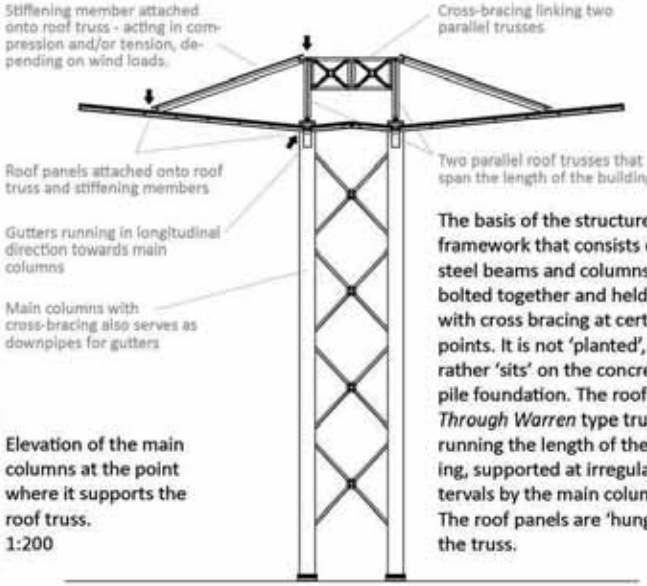
The roof of the basement (or floor of square) is made up of **BubbleDeck** pre-cast panels laid onto pre-cast concrete beams. They can thus be dismantled and re-used; leaving only the columns, basement floor and foundation piles as in-situ cast elements. These are reinforced with **Helix Steel Fibres.** The concrete columns are cast onto steel reinforcing protruding through the floor from the piles onto which the floor was cast.

All of the above structure will be designed according to engineer specifications.

Structural Concept

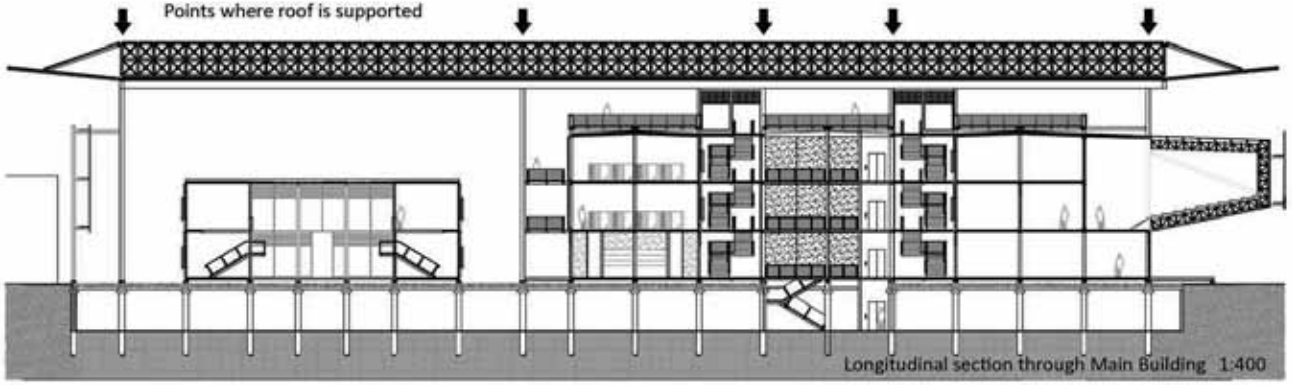
The following skecth is an analogy of the structure. The little guys help keep the big guys steady while the hold up the roof which protects all of them from the sun and rain. And the point where they hold the roof is also where they collect the water running down.





Elevation of the main columns at the point where it supports the roof truss.
1:200

The basis of the structure is a framework that consists of steel beams and columns bolted together and held rigid with cross bracing at certain points. It is not 'planted', but rather 'sits' on the concrete pile foundation. The roof is a *Through Warren* type truss running the length of the building, supported at irregular intervals by the main columns. The roof panels are 'hung' from the truss.



This photograph was taken in 2006 of the city block where the site is located. The structurally sound old buildings, had to make way for *The Fields* new development. Some of the embodied energy in the rubble might have been used for foundation fill, but most of it probably ended up as landfill. The demolition of 'outdated' buildings seems to be a prevailing trend in Pretoria, and is the main reason why the structure of *Indabax* was designed to enable dismantling for relocation or recycling of building parts.

BubbleDeck® Pre-cast Concrete Slab
Consists of five layers 'sandwich':
- Concrete 'biscuit' [60mm]
- Steel reinforcing mesh
- Recycled plastic hollow 'Bubble' void
- Steel reinforcing mesh
- Concrete 'biscuit' [60mm]

Benefits:
- Eliminates concrete from middle of slab not performing structural function, 35% reduction in own weight.
- More efficient construction:
  *Less weight, smaller foundations
  * Longer spans
  * Lighter volume to transport
  * Faster construction, no curing
- More sustainable product:
  * Component can be re-used
  * Absorbs recycled plastic
  * Reduce concrete usage up to 50%
  * Reduce carbon emissions

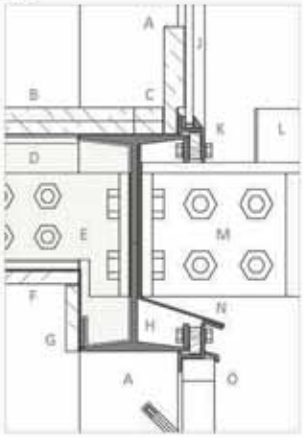
<http://www.BubbleDeck-UK.com>

Helix® Steel Reinforced Fiber
It is a high performance, optimized steel fiber for use in reinforcement of concrete. Helix fibers are short, twisted and polygonal shaped wires that are added to concrete during mixing. The shape and the twist maximize both the frictional and mechanical bonds between fiber and cement based matrix. The twist drives the fiber failure from a frictional pullout mechanism to a torsional or untwisting mode. Following the principle that a screw resists pullout far better than a nail.

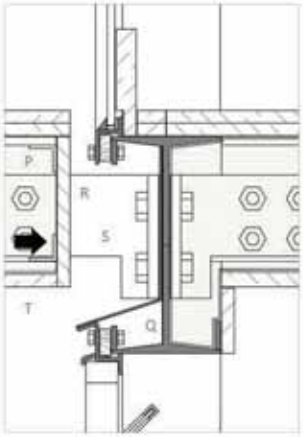
Benefits:
- Stronger and more ductile
- Crack prevention
- Post crack strength increase
- Overall cost reduction
- Weight reduction of slabs
- Eliminate rebar and mesh in virtually any reinforcement application.

<http://www.helixfiber.com/Info/DataSheet.pdf>

Detail A
1:5

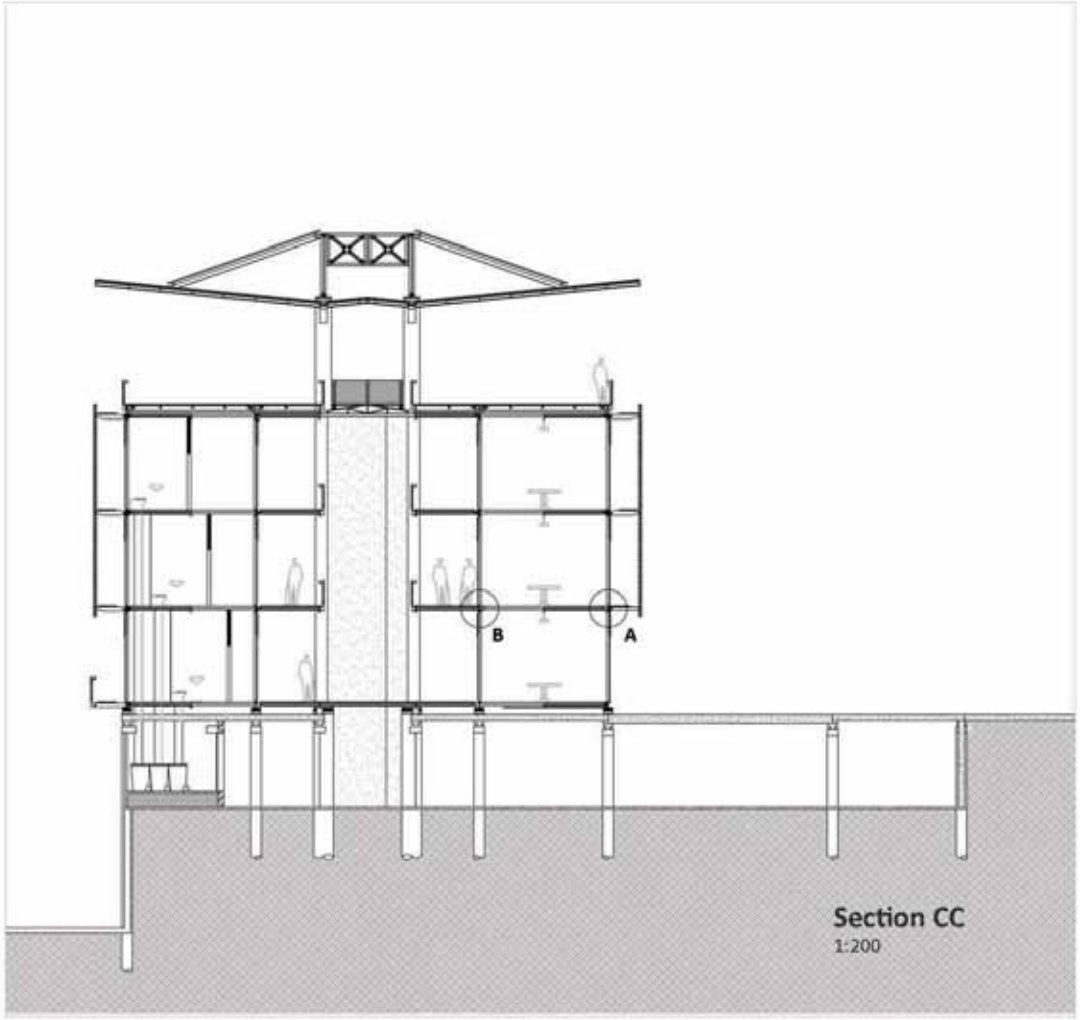


Detail B
1:5



First the 203x102x25 structural steel I-section column (A) is erected. Then the 203x102x25 structural steel I-section beam (H) is bolted onto column (A). Next the 127x76x13 structural steel I-section beam (D) is bolted onto a steel bracket (E), which is bolted onto beam (H) or onto the column (A) [where it coincides with the column grid]. One layer 12mm plywood (F) is fastened, with self-tapering screws, onto the bottom of beam (D). The ceiling is finished with 12mm plywood cornice (G) screwed onto 'lugs' welded onto beam (H) at 600mm intervals. The space between the beams is filled from the top with Warmcel 500 insulation Fibre (dotted hatching), by way of damp spray application onto open floor panels sheathed with vapour permeable external sheathing. Once sprayed, it is levelled off with the top of the beams. Two layers of 12mm plywood (B) laid at right angles (to strengthen load capacity) are fastened with self-tapering screws directly onto I-section beams. The beams are connected at 1200mm intervals, enabling standard size plywood sheets to be laid in both directions. The plywood skirting (to protect glazing from sctratching when sweeping floors) is screwed onto filler piece (C), which in turn is screwed onto I-section beam (H). The 6.76mm HPR Solarshield glazing (J) is fitted with putty into standard mild steel frame (K) which is bolted onto 'lugs' welded, at top and bottom, onto beam (H) with a rubber spacer inbetween. At the sides, the frame is bolted onto a flat steel bar that is welded onto column (A) for the entire height of frame. This is to grip the recycled rubber strip inbetween that prohibits water ingress. A steel metal sheet flashing is layered between the beam (H) and the steel bracket (M) that holds the catwalk (L) and louvre frame in place. The flashing protects the bottom window steel frame from water ingress. All welding work is done in the factory to enable construction on site to be done with bolting elements together.

Detail B assembly is similar except the following. After the beam (P) is bolted (via steel bracket) onto beam (Q), the 12mm plywood strip (R) is first cut to fit over steel bracket (S). It is then screwed into place from the arrow direction. Procedure is then repeated as above with one layer plywood (T) fastened to bottom of beam, etc.



Section CC
1:200