Cooling, Ventilation

- Due to the fact that building has a deep floor plan and there are a lot of spaces that need to be closed off, the building makes use of mechanical ventilation as its primary means of cooling. The system is aided by means of a rock storage system in the basement. This is filled with Rubble from the demolition of the SITA building which should have up to 70 percent similar mass properties of granite.
- Fresh air well mechanically sucked in from above the building where vehicle emissions are at a minimum and drawn in a long distance and over the rubble in the rock store in order to cool the air a few degrees before passing through the hvac system. This will cut down considerably on mechanical running costs.
- The system will be specified by an engineer however ample space has been allocated to provide for this facility.
- For the restaurant square below ground, there is an evaporative cooling pond with trees around it to aid localized cooling.

Fig. 7.1 Basement plan showing cooling and ventilation
Fig. 7.2 Section showing cooling and ventilation
Rainwater Collection

The total run-off capacity that can be harvested from both roof structures is 53000L which will be stored in 5000L Tanks as indicated. There are 61 w/c’s and 26 Urinal’s which would justify the collection and re-use of rainwater through these wet services. According to the calculations (appendix A) with the storage capacity there will only be four months of the year where the building will have to make use of municipal water to supplement the system.
Fig. 7.4 Section showing storage tanks
Fire Safety and Evacuation

Provision of Fire hose reels has been made on every level each servicing a maximum of 30m radius. Due to the large open volumes and the possibility of fire jumping between floors, it is proposed that a sprinkler system be installed. There is also Provision for evacuation by means of fire stairs at every level. The exit of these stairs is close to the buildings exit on Ground Floor.
Fig. 7.6 Perspective showing auditorium lobby space with view to square and Synagogue.

Fig. 7.7 Perspective showing public square and the connection to the intervention.
Structure and Enclosure
Concrete

- The main load bearing structure is a column and beam concrete structure. It is a very heavy structure as there are large spans and high columns.
- Off-shutter concrete is a very honest material. It is strong yet elegant. The adjacent photo shows the ceiling in the entrance lobby of Constitutional Court in Johannesburg where a similar finish has been used with long openings cast in to bring in light. The Eastern side of the building will be treated in a similar manner.
Rehearsal
Gym
Distributed water tanks in adjacent storage

3 Layers of bitumin fire on waterproofing
Fullbore drain with waterproofing, folded and fixed in 150mm diam. rainwater pipe to storage facility
Screed to slope to floor drain
Openings cast into concrete (Polystyrene cast with concrete and punched out to reveal openings)
300x1200x20mm strand woven bamboo ceiling fixed to 100x50x20 lipped channels with nail gun at 350 centres
Exposed heat extraction to duct
Double glazed aluminium window frame with top hung operable window to manufacturers specifications
Sprung floor with high density foam pads to absorb impact sound (by Specialist)
150mm diam. rainwater pipe to storage facility
Acoustic mineral wool insulation
Ceiling panels and hangers to manufacturers specifications

AA/1 Wrapping Connection Detail
Roofing

Standing seam aluminium

In order to give a smooth finish to the wrapping structure, a standing seam jointed aluminium sheeting will be used. This will emphasize the verticality of the roof rising up from the ground. It also provides stability to span between the steel supports. Aluminium has a high corrosion resistance, gives a clean homogenous appearance and is low on maintenance as it does not oxidize. Recycled powder coated aluminium will be used as recycled aluminum has very low embodied energy and powder coating in this specific angled application is smoother than anodizing and therefore will retain less dirt.
In order for the Threshold wall to appear as light and transparent as possible, a glass curtain wall supported by as little structure as possible is employed. The glazing panels are held in place by stainless steel spider clamps suspended by high tensile steel cables which brace both the curtain wall and the round columns that carry the load. The glazing is shaded by a louver system explained earlier in this section. Due to the fact that the curtain wall is very high and will need to therefore withstand wind loads, even though Pretoria is not very windy, as well as contribute to reducing the solar light transmission, the following laminated glass was chosen.

Armourlam:
Armourlam toughened glass from Smart glass will be used with a cool blue low E laminate allowing only 68 percent of light in, thus reducing glare.
- Armourlam is with polyvinyl butyral between 2 layers of glass. As it is toughened it can be supplied with factory drilled holes for fitting of spider clamps in this application.
- It is best suited for bolted assemblies where solar performance is required.
- It works well where additional strength is needed for high wind loads.
2500 x 2000 x 11.52 mm silicone jointed Armourlam Laminated Glass panels with factory drilled holes at corners.

300 diameter spider clamp bolted to glass panels with neoprene pads in between.

650 mm off-shutter concrete columns bear glass load.

High tensile steel cables fastened to threaded rod cast into concrete to:
- Stabilise steel spider clamps
- Cross brace the round concrete columns

Rectangular off-shutter concrete beams from the primary structure project out to brace and shorten the effective length of the round columns.

Fig. 7.18 Showing Isometric breakdown of Curtain wall structure

Fig. 7.19 showing glass curtain wall down public arcade.
Fig. 7.20 Showing Intervention in context from the North West.

Fig. 7.21 Image showing intervention in context from the South.
- Bicycle parking
- Beam running through
- Heat extraction to duct
- Beam running through
- Beam running through

Parking (See Parking below Square layout)

- Couriers service
- Book store

- View Balcony
- Concrete footings to
  engineers specifications
- Hvac
- Space provision for rock store
  filled with building rubble from demolished SITA
  (details and maintenance to specialist)
- Retail arcade
- Storeroom
- Public address
- Podium
- Restaurant spill out
- Road access to basement

- Gym and Creche
- Beam running through

- Floor Sloped toward drain

- Winter sun
- 41.03°
- Summer sun
- 98°
- Inbetween Angle

- Section B-B Scale 1:250

- NGL
- 135
- 32300
- 23800
- 18500
- 15000
- 9800
- 4500
- 9800
- 15000
- 18500
- 23800
- 32300

- -3750
- 4500

- 135
Skin Louvre Structure

In order to shade the Northern glass curtain wall from direct sun a louvre system has been employed. This creates an intermediate threshold and is designed to cast dappled light onto the glass during the winter months both for small heat gains as well as effect. The louvre frames carry their own weight and are connected to the underside of the composite wrapping structure supported by the beams at the same interval. These frames are large trusses turned on their sides (90 degrees), with the bend of the frames alternating with each consecutive frame system. Each louvre frame system is braced and supports perforated aluminium louvre fins which are held in place by tensioned threaded rod.

Fig. 7.24 Louvre spacing

Fig. 7.25 Perspective showing the Northern view from Struben street
254x254x73 Galvanised mild steel column bolted at ends to detail

260x90x38 Galvanised Mild steel Channel section

260x90x38 Galvanised Mild steel Channel section running horizontal between louvres as compression spacer

260x90x38 Galvanised Mild steel Channel section bolted to inside of H-section with connector plate welded to base of channel (Intermediate bracing members to same detail)

8mm purpose made connector flange bolted to angle sections with Stainless steel M12 bolts

Matt signal white, perforated powder coated recycled aluminium curved louvres fixed to C Section (See detail EE/3)

250 wide perforated natural anodised aluminium fin fixed to galvanised mild steel to detail

Mild steel channel louvre frames

125x75x10 Galvanised steel angle connector bolted to column and louvre frame

M10 Stainless steel nut

3mm spacer

M10 stainless steel nut with locknut

12mm stainless steel threaded tension rod

260x90x38 Galvanised Mild steel Channel section bolted to inside of H-section with connector plate welded to base of channel (Intermediate bracing members to same detail)

8mm purpose made connector flange bolted to angle sections with Stainless steel M12 bolts

Matt signal white, perforated powder coated recycled aluminium curved louvres fixed to C Section (See detail EE/3)
• Bamboo is a very sustainable material. It grows very quickly and the mature stem is more rigid than a lot of hard woods. Solid timber like oak, cherry or teak take 40-50 years to grow, whereas the Moso bamboo stems take 4 years to reach mature hardness. Bamboo plantations require no pesticides or fertilizers.

• Although strand woven panels are more expensive than the solid bamboo panels, it gives a darker finish with a softer grain and is more hard wearing. Standard size of 2.44 x 1220 will be used as ceiling panels. (www.pandabamboo.co.za)
Lipped channel bolted to column
80x80mm mild steel
bangle bolted to column
and louvre frame with M12 Hex bolts

533 x 210 x 109 Steel I-section
Main bearer

1200x350x20mm Strand woven
Laminated Bamboo Ceiling panels
fixed with nail gun to lipped channels

80x80x10 Angle Support
Site welded to main Section

200x75x20x30 lipped channel
as structure for bargeboard

“bargeboard” edge capping out of
1.6mm aluminium sheet fixed to
lipped channel with 10mm
flat head square drive sheet metal screw

purpose made mild
steel connector bracket
bolted to main bearer with
m12 Stainless steel bolts

356x171x45 Steel I-Section
Secondary member
bolted to steel connector bracket
with m12 Stainless bolts

standing seam, matt light grey
powder coated recycled aluminium
sheeting to manufacturers specifications

Aluminium Sheet as insulation barrier

300diameter spider clamp fixed to glass panels
with neoprene pads inbetween
held in place by High tensile cable fastened
to threaded rod cast into columns

Vapour barrier

100x50x20 cold formed z-channel as
secondary structure for roof sheeting

300x200x11.52 silicone jointed
laminated glazing panels

Column Flange bolted to main steel beam with stainless steel M12 Bolts
soft board under
beam on columns

Aluminium extruded 80x40 edge section
Column capping with flange plates
bolted to main bearer with M12 Bolts

Column Flange bolted to main steel beam with stainless steel M12 Bolts

Detail EE/1
In order for the facade of the Eastern portion of the building to appear as an homogeneous haze, in line with the conceptual approach of it being “solid, but not quite” it will be clad with circular punched Corten steel with 60 percent coverage. This will be enough to give a virtually solid haze with the effect that the operable windows behind to appear as shadows during the day and hazed light at night. Corten steel is a high strength low alloy structural steel that forms a protective oxide layer under regular atmospheric conditions. This means that the steel can be left unpainted. It has a reddish brown colour.
254x254x72.9 Galvanised Mild steel Section Bolted to column with M12 Expansion bolts through factory drilled holes

Detail Section CC/1

Scale 1:20

Screed to fall toward full bore drains running into ceiling vid

80x40 Stainless steel channel bolted to Concrete with expansion bolt with corten sheet fitting inside

100x50x20 Corten steel lipped channel with factory drilled holes bolted to H-section with M10 Stainless steel bolts

Aluminium Casement windows

1500x1000x2mm thick Corten sheet attached to C-section with a flat head square drive corten sheet metal screw

300x1200x20mm strand woven bamboo ceiling fixed to 100x50x20 lipped channels with nail gun at 350 centres

Reference Section CC

Scale 1:500
Conclusion
The creation of a spatial milieu that contributes favorably to the urban fabric is possible through interpretation of the context, historical, present and future. People’s experience of the built environment should be an over-arching design informant. This being that the user’s first impression and interaction with his/her environment as well as lasting impressions and greater social implications should be taken into account in public orientated design.

People perform multiple task during a single day and therefore the built environment should supply these needs within localized precincts to cut down on excessive travelling distances an ensuing frustrations and sustainabilities. This is all possible through mixed used precincts and buildings. Considering that the informants to this thesis have proposed a building with multiple uses layered hierarchically according to various privacy needs.

The validity of individuals in their social context can be enforced through the creation of spaces that are clearly express their given function. It is possible therefore to have transparency within government buildings whilst still maintaining effective control.

Social satisfaction and inclusion can be encouraged through a government building model that has private functions but also invites the public into closely situated intermediate realms where communication, interaction and dialogue can happen.
Rainwater Harvesting and tank size

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<th>Area of roof (m²)</th>
<th>Annual rainfall (mm)</th>
<th>Potential rainfall harvesting capacity (L)</th>
<th>Actual rainfall harvesting capacity (L)</th>
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Table 1

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<th>Total number devices</th>
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<th>Number of uses per day per device</th>
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x 23.5 days active per month average for building (Monthly consumption) 47800

Table 2

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Table 3