figure 50:01
North-east perspective as seen from the proposed tram station
“The chef knows not only from which region come the finest petits pois (small, young green peas), but from which town” (French Cuisine: 1998).

During the design process, four main design components emerged:

1. The urban context, where the site’s surface was manipulated into usable public space
2. The idea of the exhibition box
3. The service block (with all the administration, ablution and back of house facilities)
4. A circulation tower with bridges and viewing platforms developed to link the other components
figure 50:02
00 Open-Air level, indicating different entrances and floor finishes to distinguish between different hierarchy levels
1. Urban Context

The 00 Open-Air level forms the public space of the building, extending between the street level and pavement. Three layers were chosen for this overlapping medium between public street space and the buildings.

Paving

To allow for minimal maintenance, hard surfaces were chosen over soft, which is an important consideration for the context of the Pretoria CBD. The public surface material type varies with hierarchy level of usage. The busier primary entrance and secondary entrance 1 are represented by 500x150x150 precast concrete paving blocks. Secondary entrances 2 and 3 are paved with brown facebrick in a basket-weave pattern, accompanied by custom-made mosaic tiles. The intimate quieter paved areas for restaurants and kiosks are represented by grey rectangular slate tiles with mosaic tiles. The elevated platforms and their ramps are cast-in-situ concrete.

The green zones are cast-in-situ sculptural planters and vegetation. Type of vegetation range from cornfield and sunflower pods, in the areas exposed to abundant sunlight, to vegetable and herb planters in the semi-shade, to a range of mushroom species covering the shaded areas.

Street furniture

Cast-in-situ sculptural concrete seating has mosaic patterns placed in the concrete surface and is accompanied by concrete drinking and hand washbasins.
NOTE: Paint on steelwork

1. All steelwork to be treated with factory primer.

Paint on steel:
   - Apply two coats of zinc phosphate primer.
   - Finish with two coats of structural steel intumescent paint, to have a three-hour fire resistance.

2. All base plates to be galvanized.
2. The exhibition box

As a design idea, inspired by the forces of gravity working on a structure, steelwork must be tapered to indicate where the forces are transported through one element to the next, working from the idea of water (forces) in a bathtub (the structure). The water flows towards the drain, indicating where the forces meet and where they are transported or converted to the next medium.

The same principal applies to the horizontal service ducts, with end points tapered to indicate less intake of air.
Quick calculations for structure

**Bracing Element for Floor**

Safety factor due to end bracing

\[ L/d = 1/3(l/d_{\text{min}} - l/d_{\text{max}}) + L/d_{\text{min}} \]

\[ = 1/3 (10) = 18 \]

\[ = 21 \]

\[ L/d = 21 \]

Safety factor because of cantelever

\[ S_f = 2 \]

\[ S_{ft} = 2 \times (0.8) = 1.6 \]

\[ S_f = 0.8 \]

\[ L/d = 18/S_f \]

\[ d = 17000/18 \times 1.6 \]

\[ = 1511 \text{mm} \]

\[ = 1500 \text{mm} \]

**Ring Element**

Safety factor due to end bracing

\[ L/d = 1/3(l/d_{\text{min}} - l/d_{\text{max}}) + L/d_{\text{min}} \]

\[ = 1/3 (10) = 18 \]

\[ = 21 \]

\[ L/d = 21 \]

**Vertical Element**

\[ h/d \geq 7 - 18 \]

Min: \[ h/d = 7 \]

\[ h = 4.0 \]

\[ d = 4000/7 = 571 \text{mm} \]

\[ = 571 \text{mm} \]

Max: \[ h/d = 18 \]

\[ h = 4.0 \text{m} \]

\[ d = 4000/18 \]

\[ = 222 \text{m} \]

Take Min: \[ h/d = 7 \]

Add Safety Factor (sf)\[ S_f = 3 \]

\[ h/d = 7/sf \]

\[ d = 4000/7 \times 3/1 \]

\[ = 1714 \text{mm} \]

**Bracing:**

\[ L/dp = 18/S_f \]

\[ d = 14000/21 \times 1.6 \]

\[ = 666 \text{mm} \]

\[ = 680 \text{mm} \]

**Top Roof:**

\[ L/d = 21/sf \]

\[ L = 18 \text{ m} \]

\[ L/dp = 18/S_f \]

\[ d = 17000/21 \times 1.5/1 \]

\[ = 1300 \text{mm} \]

\[ = 1300 \text{mm} \]

\[ d = 14000/18 \]

\[ = 778 \text{ mm} \]

\[ = 780 \text{ mm} \]

Safety factor due to middle support system


The internal structure is built up with seven main elements:

- **The vertical elements**, two massive tapered 3000x600x150 hot-rolled steel columns, welded together on site. Segments are to be aligned horizontally and clamped together before welding. The vertical elements are to be hoisted and placed into position to be bolted with custom-made bolts, with nominal bolt size larger than M36, to the 2 x 2000x450x150 custom-made tapered steel base. After the vertical elements are bolted to the base connections, they are to be spot welded. The base connections are to be anchored via 25mm steel base plates resting on grout and epoxy layers fixed with threaded rods into reinforced concrete foundations with minimum strength to 45MPa.

- **The top roof beams**, consisting of 2 x 1300x600x150 custom-made castellated I-beams resting on the vertical elements.

- **Ring elements**, consisting of 2x 762 X 267 X 25 I-Beam @ 14000 cc, tapered towards cantilevering edges and bolted to steel columns.

- **Cross bracing** for the ring elements, cross braced with castellated 610 x 305 x 16 @ 4000 cc steel beams, cut away to achieve a flush surface with the tops of ring beams.

- **The floors**, 45 x 183 x 0.6 ribbed metal floor sheets bonded to 100 reinforced concrete slab with 12mm Powerscreed floor, finished to manufacturer’s specifications.

- **Triangular aluminium glass wall**, consisting of double glazed manually-operable windows fixed to the edge of each floor slab.

- **The roof**, insulated against heat gain/loss, consisting of Woolblock panels placed 50mm away from the exterior cladding, creating an air cushion. The depth of the trusses is also used as a second layer of insulation placed right above the ceiling plane, creating an air cushion between the outer skin of the building and the interior ceiling.
The external structure is built up with three elements:

- **Cross bracing**, 102 x 4 hot-rolled circular hollow sections supporting the external screen and the main structure against wind loads.

- **Perforated Sun Louvers**, with Celoscreen Sun Louvre System vertically and horizontally curved perforated louvres fixed to the cross bracing steel hollow sections.

- **Fluorescent lights**, T12 30 watt tubes with differentiating colors to be fixed to perforated sun louvres.
figure 50:07
Photograph collage of the Swiss Tower’s use of triangular window frames in London

figure 50:08
Image collage of Luxalon’s Architectural Products: perforated sun louvres

figure 50:09
Powerscreed floors, for a durable low-maintenance floor finish
figure 50:10
Eastern perspective, showcasing the solid service block and the lighter exhibition box structure
3. The Service Block

As a design principle, the exhibition box is lifted from the ground with two massive vertical steel feet. The function of the service block is thus to supply all services (power and water) to the main building, and to accommodate all the ablution facilities with service shafts connecting to the municipality network. The building is a rational concrete column and beam system with infill brickwork and an expanded steel mesh skin. In contrast to the exhibition box, the service building is firmly grounded and the structural system is quite conventional.

The main columns are rectangular 440 x 260 x 400 concrete columns at 6000 cc, with 110x75x220 non-face bricks, plastered with skim plaster to a thickness of 3mm. The column thickness was chosen to line up with the brickwork.

A weight-bearing skin system is attached to the brickwork and columns. The system consists of 30x30x3 galvanized expanded steel mesh screens welded to 10mm steel plate and connected to a 50x50x3 hollow steel section network.

The idea is to communicate a firmly grounded, conventional structure, framed appropriately to accentuate this idea, in contrast to the 'dancing' structure of the exhibition box.
Figure 50:11
Northern perspective of circulation tower, with connecting bridges to exhibition box
4. Circulation Tower

The tower is mainly identified with a freestanding public elevator shaft. The shaft is cast-in-situ concrete and is aligned with four columns. The shaft is to be painted red. The concrete is to be prepared with one coat of bonding liquid and one coat of alkali-resistant plaster primer, and finished with two coats of alkyd Super Universal enamel paint, colour Signal Red to manufacturer’s specifications.

The public circulation and viewing platforms of cast-in-situ concrete with steel and expanded metal balustrades wrap around the elevator shaft.

The tower has a four flight public staircase with a steel frame structure with timber decking at landings and expanded metal stairs. There is a viewing deck at the end of each flight, directly orientated towards the longitudinal view of the exhibition box and the spiral service shaft. Concrete blocks are inserted into the steel framing structure.