# GLOSSARY OF TERMS

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Context</strong></td>
<td>All the issues and circumstances that surround a design. The setting; all the factors that influence that design, eg. land form; surrounding buildings.</td>
</tr>
<tr>
<td><strong>Ergonomics</strong></td>
<td>The study of the physical relationship between the built environment and the human body. Good ergonomics aim for a comfortable fit.</td>
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<tr>
<td><strong>Existential space</strong></td>
<td>The basic relationship between man and his environment.</td>
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<tr>
<td><strong>Genius Loci</strong></td>
<td>The spirit of a place - the character or ‘feel’ thereof. From the Ancient Roman belief that every being has its genius – a guardian spirit. (Norberg-Schulz. 1979:18).</td>
</tr>
<tr>
<td><strong>Greyfield site</strong></td>
<td>An undeveloped site, usually paved or asphalted, usually previously used as a car-park. Archispeak</td>
</tr>
<tr>
<td><strong>Health</strong></td>
<td>The state of being free from illness or injury. <strong>Oxford Dictionary</strong> A state of well-being that takes into account an individual’s physical, mental, and emotional vitality and desires. <strong>Mosby’s Dictionary of Complementary and Alternative Medicine</strong></td>
</tr>
<tr>
<td><strong>Metaphysical</strong></td>
<td>The intangible. Those psychological aspects of space that cannot be quantified.</td>
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<tr>
<td><strong>Phenomenology</strong></td>
<td>Theory relating to the metaphysical aspects of architecture. The belief that spaces have connotative and emotional value. The idea that space is a relative concept based upon sensory experience.</td>
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<tr>
<td><strong>Pretoria</strong></td>
<td>Tshwane city centre, also referred to as the Pretoria CBD (Central Business District) or the ‘inner city’.</td>
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<tr>
<td><strong>Self/being</strong></td>
<td>Individuality or nature of person. <strong>New International Webster’s Dictionary</strong></td>
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<tr>
<td><strong>Sick building syndrome</strong></td>
<td>Ailments associated with a specific building, usually a place of work. Ailments include eye, nose and throat irritation; headaches; dizziness. Usually related to indoor air quality.</td>
</tr>
<tr>
<td><strong>Spirit</strong></td>
<td>In this context, spirit does not refer to any specific religion; rather, it refers to each individual’s personal growth, be it within or unrelated to religion.</td>
</tr>
<tr>
<td><strong>Tshwane</strong></td>
<td>Greater metropolitan municipal area within which Pretoria falls.</td>
</tr>
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<td>-------------</td>
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</tr>
<tr>
<td><strong>Wellness</strong></td>
<td>A holistic view of health, which refers to health of the body, mind and spirit.</td>
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</tbody>
</table>
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2 SECONDARY SOURCES

BOOKS/ARTICLES


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1 HISTORY OF CHURCH SQUARE

+- 1600 Area now known as Pretoria occupied by the Ndebele tribe
1840 First Boers settle in the Fountains Valley and Elandspoort regions
1855 Pretoria proclaimed on the farm Elandspoort, big square set out at the heart of the city (to become Church Square)
1857 First church in Church Square inaugurated
During this time, Church Square was used as ‘uitspan plek’ during Holy Communion; as sports fields and as informal post office once a week. A market was also held on the southern border of the Square.
1860 Pretoria declared the capital of the Zuid-Afrikaanche Republiek (ZAR)
1860s Bigger church built to accommodate more people
1877 Union Jack hoisted on Church Square to signal the British Occupation of Pretoria
1880-1 First Boer War
1882 Church stuck by lightning and burns down; new one built in 1884
1883 Paul Kruger sworn in as first president of the ZAR on Church Square
1889 Two new government buildings, the Raadsaal and the Palace of Justice built to signify the ZAR’s prosperity
1891 The Law Chambers are completed
1897  Queen Victoria’s diamond jubilee celebrated on Church Square
       Old Nederlands Bank completed
       Work starts on the Palace of Justice
1899  Start of the Anglo Boer War
1902  British win the Anglo Boer War
       Palace of Justice completed, after being used as a military hospital during the Anglo-Boer War
1903  National Bank and Government Mint built
1904  Church demolished
       Tudor Buildings built
1905  Cafe Riche built using materials from the demolished church
1906-10 Bank of Africa (a.k.a. Kirkness building) erected
1910  Pretoria becomes the administrative capital of the Union of South Africa
       Cornerstone laid for the General Post Office building
1928  Reserve Bank built
1930  Ons Eerste Volksbank building built
1931  Pretoria achieves official city status
       Additions to Reserve Bank built
1939  First National Bank building completed
1954  The statue of Paul Kruger finally takes its intended place in the centre of Church Square
1961  Charles Robbert Swart sworn in as the first president of the Republic of South Africa on Church Square
1974-75 Provincial administration plans to demolish the Old Nederlands Bank building; the Law building; the Post Office building and Cafe Riche to make place for ‘modern’ office blocks. This proposal is met with great resistance and a mass meeting attended by 10 000 people, and these plans are stopped.
1994  First democratic elections take place; Nelson Mandela sworn in as president
2000  Municipal structures change, Pretoria falls in the Greater Tshwane municipality

Church Square was first known as ‘Market Square’.
PRINCIPLES:

- make pretoria a destination:
  - enhance its unique identity
  - orientate the user
  - enhance movement on a pedestrian scale
- create gateways to the inner city
- define cbd precinct & unique character
- define main routes and create new pause spaces
- enhance visual clarity
APPENDIX B: TECHNICAL INVESTIGATION

1  U VALUES

220mm BRICK:

<table>
<thead>
<tr>
<th>Material</th>
<th>k (W/mk)</th>
<th>R (m²·k/W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXT BRICK SKIN</td>
<td>0.84</td>
<td>0.13</td>
</tr>
<tr>
<td>INT BRICK SKIN</td>
<td>0.62</td>
<td>0.177</td>
</tr>
</tbody>
</table>

U-VALUE = 1/Rtotal
= 1/(0.13 + 0.177) = 3.25 W/m²·k

110 BRICK - 50 CAVITY - 110 BRICK:

<table>
<thead>
<tr>
<th>Material</th>
<th>k (W/mk)</th>
<th>R (m²·k/W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXT BRICK SKIN</td>
<td>0.84</td>
<td>0.13</td>
</tr>
<tr>
<td>AIR CAVITY</td>
<td>0.18</td>
<td>0.18</td>
</tr>
<tr>
<td>INT BRICK SKIN</td>
<td>0.62</td>
<td>0.177</td>
</tr>
</tbody>
</table>

U-VALUE = 1/Rtotal
= 1/(0.13 + 0.18 + 0.177) = 2 W/m²·k

2  REFUSE AREA

F(g) = FA/100 = volume per week (www.pickitup.co.za)

Offices (1050 m²):
F = 0.2258

Shops (450 m²):
F = 0.92353

Offices 0.2258 x 1050 / 100 = 2.4
Shops 0.92353 x 450 / 100 = 4.1
Total 6.5 m³/week

Number of bins = 4 x 6.5 = 26 bins
Total area required = 26 m²
This is divided into 5 categories:
_ Paper - for recycling
_ Plastic - for recycling
_ Glass - for recycling
_ Tin - for recycling
_ Non-recyclables - to municipal dumping site
3 SIZES OF STRUCTURAL MEMBERS


STRUCTURAL GRID

Northern building: Max bays = 4950mm x 5640mm
Southern building: Max bays = 9900mm x 5640mm

FLOORS (CAST IN-SITU CONCRETE)

Northern building: Two-way flat plate system
125 - 305mm slab depth
Spans 3.6 - 7m
Depth = span/33
= 5640/33
= 170mm
Brick modules: 170mm

By recommendation from engineer, slabs are 255mm thick, as 170mm slabs allow for small amounts of deflection which causes floor tiles and other hard finishes to crack.

Rule of thumb for cantilevers (C. von Geiso) - 1/3 of span
Thus 1m to 1.7m (see roof overhang on section).

Southern building: Two-way flat slab plate + beam system
Span 9900mm
Slab thickness = 255mm

Beam depth:
L/d = 14 - 20
d = 495 - 707mm
d = 550mm brick modules

4 COLUMNS (CAST IN-SITU CONCRETE)

Northern building: Tributary area = 27.918m² per floor (x 3 floors + roof)
= 111.7m²
According to Ching (2001: 5.05), a 305 column can support up to 185m² of floor and roof area
Brick modules: 330 x 330mm column

Columns in the vicinity of the water tanks (columns E2,E3,F2,F3) increased in size to 440 x 330mm to accommodate the heavier load, by recommendation from the engineer.

Southern building: Tributary area = 55.836m² per floor (x2 floors + roof)
= 168m²
Thus the same as for the northern building: 330 x 330mm column

Below square and reflection pond: By recommendation from engineer, also 330 x 330mm columns.
5  BASEMENT CAST IN-SITU CONCRETE RETAINING WALLS

Height of walls  +4.3m
Thickness  205 (Ching, 2001: 1.28)
Brick modules:  220
Footing  = 0.6H
            = 2.6m

CONCRETE ROOF BEAMS

Northern building  Span 3650mm
L/d = 14 - 20 (Ching, 35)
\( d = 182 - 260\)mm
\( = 255 \) brick modules

Main beam span 5600mm
L/d = 14 - 20
\( d = 280 - 400\)mm
\( d = 425\)mm brick modules

Transverse beams  Span 9900mm
L/d = 14 - 20
\( d = 495 - 707\)mm
\( d = 550\)mm brick modules

Southern building  Span 4600mm
L/d = 14 - 20 (Ching, 35)
\( d = 230 - 328\)mm
\( = 340\)mm brick modules

6  FACADE PANELS

Northern building  Corten panels

Standard brick sizes, to coordinate with sizes of openings - 330 x 680mm
Size of corten flat sheet - 2500 x 1225 x 1.6mm

9 panels out of one sheet

Pre-oxidised steel T-section substructure, fixed to equal iron to floor slabs

7  T SECTION SIZE

1.1m span (northern facade, both buildings)

\( \frac{l}{d} = 18 - 28 \)  Take most conservative value, as it has to carry the facade
\( d = 1100/18 \)
\( = 61\)mm

Rounded to 127 x 76mm standard steel T section (South African Steel Construction Handbook)
2.2m span (western facade, northern building)
\[ \frac{l}{d} = 18 \]
\[ d = \frac{2200}{18} = 122 \]
Rounded to 127 x 76mm standard steel T section

3m span (north - canopy)
\[ \frac{l}{d} = 18 \]
\[ = \frac{3000}{18} \]
\[ d = 167mm \]
Rounded to 178 x 171mm steel T section

Southern building - skin
Span 600mm
\[ \frac{l}{d} = 18 \]
\[ d = 33mm \]
Rounded to 60 x 40 x 4.5mm rectangular tube

Vertical structure - northern skin - Light gauge pre-oxidised steel studs
= Lipped channel 100 x 50 x 3mm profile

Height - 3485, thus needs horizontal channel bracing @ midlevel

8 OPERABLE PANELS SUB-STRUCTURE

2x ANGLES WELDED TOGETHER - 60 x 60 x 4mm hot rolled for operable panels
\[ 25 \times 25 \times 2mm \]

‘WINDOW’ PANEL \[ 50 \times 50 \times 2mm \] square tubing

MASONRY CAVITY WALLS
Ching p. 5.22
At changes in wall height or thickness
At columns, pilasters, and wall intersections
Near corners
On both sides of openings > 1830mm
On one side of openings < 1830

9 MOVEMENT JOINTS

Control joints in floor @ 3300mm C/C and around columns
Isolation joints at joints

Expansion joints between buildings + square (see Chapter 6)

10 BRIDGE

Span 18m
Open web joists \[ \frac{L}{d} = 15 - 25 \]
\[ d = \frac{18000}{15} = 1200mm \]

Joist spacing < 24 x depth = 2880mm

Floor covering - 22mm plywood can span 1220mm
11  FIRE PROTECTION

According to SABS0400, section T:

- TT35.2: One fire hose reel per floor
- TT37.4: Portable fire extinguishers - 1 per 200m²
- TT37.5: Size - 4.5kg
- TT31.2: Service shafts - 120 minutes fire resistance
- TT45.1: Lift - 30 minutes fire resistance

- TT16.2: Southern building 3 storeys high, less than 25 people on top floor - only one fire route needed.
  Northern building - two needed - skin acts as second route.

12  RAINWATER HARVESTING

Annual rainfall: 674mm

Area of roof (north): 380m²
Amount of water harvested: 380 x 0.674 x 0.9
= 230kl per year

Area of roof (south): 380m²
=230kl per year

This means (230/12) = 20kl per month
= 600l per day
= (600/6) WC flushes per day
= 100 WC flushes per day

Rainwater from the square: 390m²
= 390 x 0.674 x 0.9
= 236kl per year

Two 500l water tanks will be provided for the storage of collected rainwater in the northern building, and one for the southern building. A 39kl storage tank will be located in the basement to hold additional water.

13  SOLAR WATER HEATING

For each 400l water tanks, two 200l Kwiksol 200i collectors will be needed. The northern building will house four collectors, while the southern building will house two.

Sizing of tanks - 1 low flow shower uses 40% less than a normal shower, which is (36 x 60%) 22l per shower. 8 showers can be used at once, which is 176l. A 400l tank will thus cater to 2 series of showers. Two 400l tanks will be provided, which will cater to 4 series of showers (which is 32 consecutive showers).

200l panels of the size 1.5 x 2.5m supply heat for 200l of water. Two 400l geysers will need four panels. Another geyser will be supplied for heating in winter, which will need an additional 2 panels.
SIZING OF GUTTERS + DOWN PIPES

Building roof (southern and northern buildings have the same roof area)

DOWNPIPES (SABS0400 RR3.2) 100mm² per 1m² per roof area
380m² roof area
  = 38 000mm² needed

Cross sectional area of 100 diameter down pipe
  = \( \pi r^2 \)
  = 8500mm²

Number of down pipes needed
  = 38 000/8500
  = 5 down pipes needed

Canopy
  87m²
  = 8700mm² needed
Cross sectional area of 80 diameter down pipe
  = \( \pi r^2 \)
  = 5024mm²

Number of down pipes needed
  = 8700/5024
  = 2 down pipes needed

GUTTERS (SABS0400 RR3.1) 140mm² per m²

Northern building
  Area A = 126m²
  Gutter size = 126 x 140
  = 17640mm²
  = 170mm x 110mm gutter
  = 205 x 85mm

  Area B = 200m²
  Gutter size = 200 x 140
  = 28000mm²
  = 140 x 200mm gutter
  = 330 x 85mm gutter

Southern building
  Area = 340m²
  Gutter size = 340 x 140
  = 47600mm²
  = 85 x 550mm gutter
APPENDIX C: QUESTIONNAIRE

A questionnaire was devised to determine what people associate with ‘healthy’ environments. This questionnaire was distributed to 100 people, and a conclusion was made.

QUESTIONNAIRE:

QUESTIONS:

1. On average, how many hours per day do you spend in your work environment?
2. Where do you go to take breaks?
3. Why do you go to the place in [2]? What about it is better than your work environment?
4. How does your work environment in make you feel? Healthy/Unhealthy
5. Does the building support your emotional wellbeing? Yes/No
6. Does the building envelope make you feel connected to your surroundings? Yes/No
7. If yes, what type of connection? Audio/Visual/Tactile/Smell
8. What do you think detracts from the health/emotional quality of this building environment?
9. What do you think contributes to the health/emotional quality of this building environment?

FINDINGS:

90% of people feel their work environment is unhealthy, and does not contribute to their emotional wellbeing. Of these, 80% think it is because of fluorescent lighting, air conditioning and no visual connection to the outside. The other 20% think it is because of low ventilation rates and noise. 43% of people reported having symptoms relating specifically to their internal work environment, among others sneezing, coughing, dry eyes and chronic cold symptoms.

Only 10% of people feel that their work environment is healthy. They attribute this to natural light, high ceiling heights, and a quiet environment.

Everyone answered that they go outside to relax; to either “sit beneath a tree”, sit in the sunlight (get in contact with nature) or for social contact.

The results of this questionnaire support the hypothesis, and provide a quantitative base for the principles of the design.