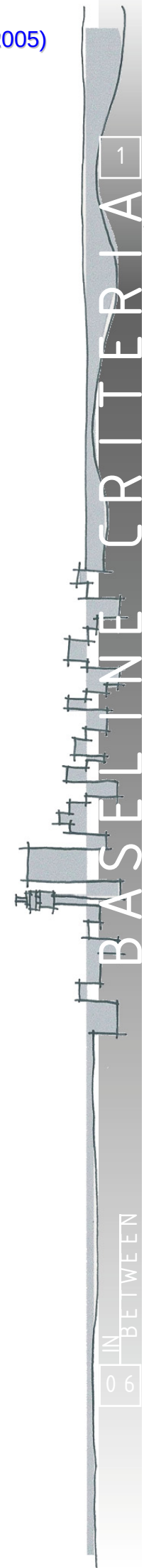
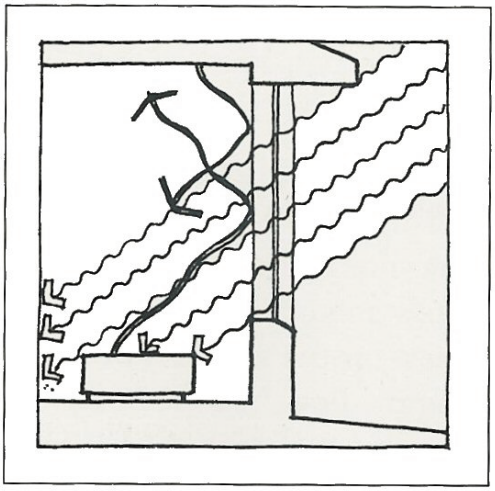
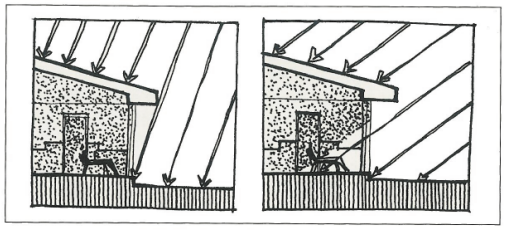
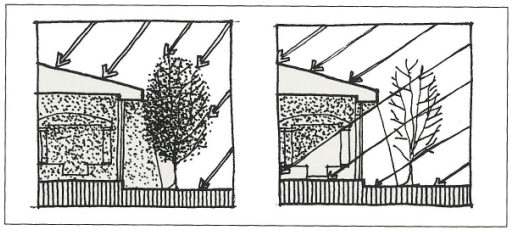




06.01. the greenhouse effect



06.02. Overhangs



06.03. Deciduous vegetation

OCCUPANT COMFORT

The objective is to create light and airy spaces reminiscent of exterior spaces. The spatial understanding of the project is intended to be in contrast to crowded, gloomy living conditions within the high-rise structures of Hillbrow and Berea.

For user quality people must feel physically comfortable; the building must not be too cold, too hot, dirty, dark or noisy. The building must be sufficiently in harmony with human perceptions (the way it looks, smells, sounds, and feels)

1.1. Thermal comfort

Maximum use is to be made of passive systems to eliminate the need for mechanical ventilation systems, thereby cutting on costs and maintenance. Exaggerated vertical dimensions improve thermal comfort by means of the stack effect's removing excessive heat from spaces.

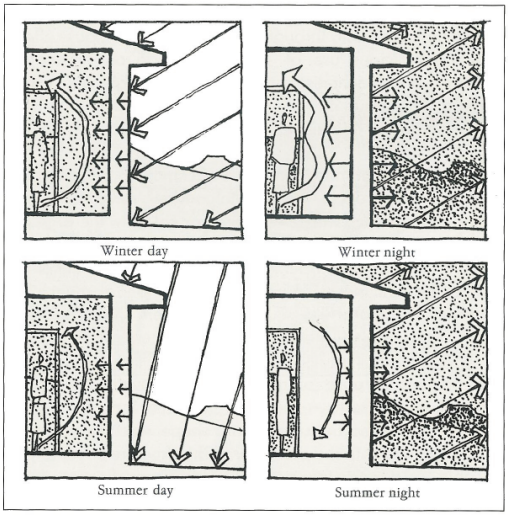
The greenhouse effect is illustrated in fig. 06.01. is the phenomenon where shortwave radiation (sunlight) penetrates glass and heats up interior spaces and objects, which, in turn, radiate long-wave radiation, most of which cannot pass through glass, leading to a heating effect (Marshall 2000: 78).

Marshall (2000: 78) explains that this can be prevented by means of large overhangs to north-facing structures (fig. 06.02). This allows for sun protection in summer and penetration in winter.

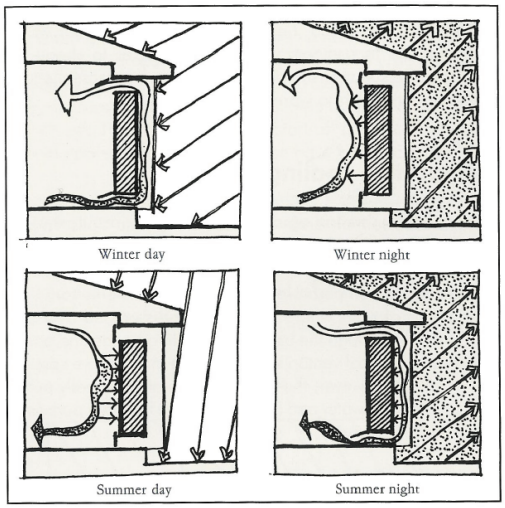
Fig. 06.03 illustrates how trees and plants may be used selectively to provide shade in summer and to permit sunlight in winter (Marshall 2000: 78).

The thermal flywheel effect, as illustrated in fig. 06.04 will be incorporated in the design, therefore the buildings are intended to have thick, well-insulated walls with high thermal mass. Thermal mass, which slows the transmission of heat, creates a thermal flywheel effect in the buildings. Roof overhangs should allow radiation to reach the walls during winter months and protect the walls during summer months.

In winter, the heating of the wall takes place during the day; after sunset, the wall continues to loose radiation both inwards



06.04. The thermal flywheel effect

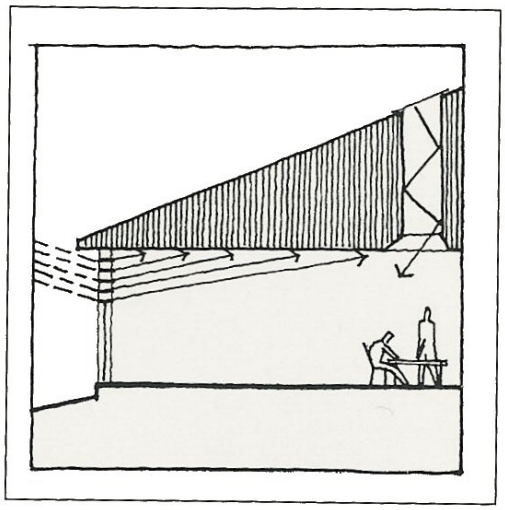


06.05. The Trombe-Michel wall system

and outwards, offsetting a drop in night time ambient temperature.

In summer, the same process takes place, but now the inward radiation may be problematic if the ambient temperature does not drop substantially, therefore roof overhangs should protect walls from excessive heat gain (Marshall 2000: 80).

Trombe-Michel wall system (fig. 06.05)
Solar radiation passes through a glass or translucent skin, and, by the greenhouse effect, heats up a heavyweight masonry wall behind it. Air from the interior is then drawn through the intervening space and across the warm surface and back into the interior for winter warming. The process may be reversed during summer nights to utilize ongoing radiation losses and to provide a source of cool air. It is basically a heat-pump system to draw warm air from large spaces (Marshall 2000: 84).



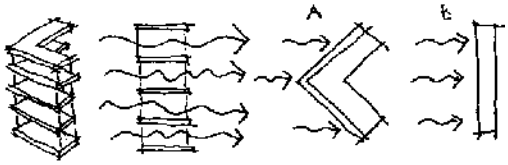
06.06. Day lighting

1.2. Visual comfort

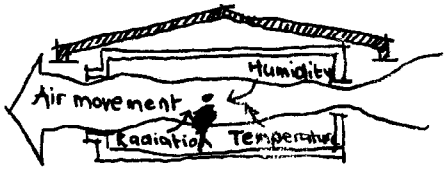
Visual comfort depends on sufficient light, avoidance of glare and visual contact with the exterior.

The building's northern orientation will maximize the use of day lighting. Adequate screening and roof overhangs will prevent unwanted heat gain and glare. To maximize the use of natural day lighting, direct lighting will be supported by diffused and reflected light to illuminate the entire space.

In accordance to SABS 0114 – 1973, artificial lighting will be provided where the necessary lighting levels are not achieved by means of day lighting.



06.07. The Givoni cross ventilation effect



06.08. Window opening sizes

1.3. Ventilation

Building placement and orientation will be according to the prevailing wind direction for optimal natural ventilation. Maximum building width will not exceed 12 m for ventilation. The stack effect is to be implemented for enhanced air movement throughout the building. The amount of ventilation is user-adaptable by means of moveable screens and windows.

According to the Givoni cross-ventilation, or suction, effect illustrated in Fig., airflow through a building is improved by placing openings under 45° to the wind direction. A vacuum is created on the leeward (southern) side of the building, which sucks in cool fresh air from the northern side, thereby increasing cross ventilation (Dierkx 2002: 145). Fig. 06.00 depicts the layout of airflow at 90° and 45°: in A, the suction effect is increased and indoor airflow is improved.

If the outlet openings are larger than the inlet openings, wind velocity will increase slightly as it moves through the space, therefore providing better through flow (Dierkx 2002: 145).

06.09. Acoustics: By author 2005

1.4. Acoustic comfort

Houghton Drive is a very busy road; vehicular noise is attenuated by means of topography and vegetation. The development is to be placed within the acoustic basin that is formed by the topography. The attenuation of traffic noise will enhance the sensation of a green sanctuary within the park. Structures will be placed in such a way that they screen the development even further from noisy roads.

Because functions are envisioned to be openly flowing into one another, acoustic isolation is not a critical aspect. The flow of music and noise from different facilities is encouraged to expose the functions and activities taking place both visually and audibly. The development should evolve from noisy and active spaces to the north, to quieter, contemplative functions to the south.

1.5. Views

Ramp

The ramp is viewed as an exhibition space, and the exhibition is the surrounding context. Viewpoints on the pedestrian ramp are placed in such a way that they frame views of the surrounding segregated urban fabric and visually link the site with its surroundings. The elevated position of the viewpoints should clear the treetops to provide unobstructed views.

From viewpoints, the view on certain landmarks and areas is framed, and a description of the area and landmarks should be supplied. This visual connection grounds the user to the context by means of education and exposure.

Buildings

Building occupants should always be within 6 m of windows to have a clear view of the park setting, play areas, sports facilities and exterior conditions. Building functions will be scattered to maximize exposure to the landscape, therefore creating fissures and openings towards the context.

1.6. Interior–exterior connection

Both visual and physical links with green outside spaces should exist.

The development is planned as a place of meeting and interaction with the landscape.

Therefore, permeable facades provide easy access to green spaces.

2. INCLUSIVE ENVIRONMENT

A democratic approach to the building is followed, and therefore the structure aims at being open and inviting.

2.1. Public transportation and routes

Louis Botha Avenue and Houghton Drive are well-used public transportation routes.

A transportation node is suggested on the corner of Louis Botha Avenue and Tudhope Avenue. Thereby creatina a gateway from urban to natural through a transportaion and trade node, from here users can easily move across the proposed pedestrian bridge into the park.

2.2. Parking

The number of users are foreseen to increase substantially over weekends and after hours; therefore, to avoid big, bleak paved parking facilities, the parking provision will be integrated into the residential development. Most of the time, a vast number of parking bays are not required, because the user base will mostly be using public transportation or arriving on foot or by bicycle.

However, enough parking facilities should be provided throughout the development to accommodate the demand during peak times. It is intended that the residential blocks be provided with basement parking, this will reduce need of surface parking, thereby allowing more park and public space. On street parking will be reserved for visitors and park users.

2.3. Building entrance

The building entrance and foyer should be open, legible and articulated. The entrance should have landmark qualities and thereby orientate users towards the access and information points.

2.4. Routes

All routes in and around buildings should have smooth surfaces and be handicap-friendly. Level changes are important considerations.

2.5. Circulation zones

Circulation zones within the development will be visually and physically well connected with different functions for legibility.

2.6. Toilets

Ablution facilities are placed centrally to achieve maximum usage. This implies that the facilities are placed in circulation zones to maximize usage and monitoring of the spaces. Ablution facilities will be placed within or near circulation zones to increase the numbers of the user group. The prominent position will ensure passive monitoring of the facility.

3. ACCESSIBILITY AND CIRCULATION

Building should appear accessible and inviting to the public. The entrance should be easily identifiable and accessible. Quick and easy exit is required in case of emergency. People must be able to see how parts of the building fit together and be able to find their way around

Psychological needs to be met:

- Need for privacy
- Social contact
- Freedom of choice
- Autonomy

3.1. Psychological accessibility

This term refers to the extent to which a building invites the user inside.

The cognitive legibility of the building should be increased by means of visual connection between functions and landmarks. Psychological barriers should distinguish between private and public domains instead of imposing physical barriers. Because this building is a social structure and not a bank or prison, it should be easily accessible and inviting.

3.2. Usability

This term refers to the ease with which people are able to move through the building and use the facilities.

3.3. Inclusivity

The built environment should be accessible to all, regardless of physical or mental capacity. Because of the topography, level changes are inevitable but these changes

should be executed with caution to ease and accessibility. All ramps will be at a 1: 12 inclination, and all spaces on all levels should be accessible to wheelchairs. The design should be user-friendly and ergonomically sound.

3.4. Circulation within development

Pathways through the park should be wide enough to accommodate a variety of users. The surfaces should be smooth, and levels changes should be appropriately addressed.

4. ACCESSIBILITY TO AMENITIES

4.1. Retail

Three retail nodes are located within 1,5 km of the site: Killarney Mall, Killarney; Kotze Street and Pretoria Street, Hillbrow; and Rockey Street, Yeoville. These facilities are easily accessible on account of the extensive public transport system servicing the area.

4.2. Residential

The densification of the inner city for the sustainability of the country's urban environments depends on the provision of inner-city living to reduce the vehicular dependency of South Africans. This leads to easier intensification of public transportation. Therefore, the development of the area needs to address the merging of urban working with urban living.

5. PARTICIPATION AND CONTROL

Spaces should allow the user control of ventilation, thermal comfort, lighting levels and visual exposure to surrounding functions. To allow for user adaptation of spaces, adjustable internal partitioning is provided.

Seating is to be provided along public routes and at circulation points. The creation of interaction spaces will allow users to sit and observe or to chat while enjoying the atmosphere.

6. PRIVACY

According to Van der Voort (2005, 188) the built environment plays an important role in maintaining or avoiding social contact. An environment can stimulate contact by providing favourable physical and social conditions. Although this is the aim of the project, caution should be placed to avoid spaces being perceived as too crowded or where too little contact generate feeling of isolation. Spaces can be perceived as 'sociopetal' (encouraging contact) of 'sociofugal' (encouraging contact-avoiding behaviour) (Ibid.).

In this Paris metro station the space between the seats literally distances people from one another (fig. 06.11.). Users create extra space by occupying alternate seats, a form of behaviour which illustrates an underlying need for privacy and territoriality. Conversely, the probability of contact decreases. (Van der Voort 2005, 189)

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Design principals:

Recognisable distinction between Public, semi-public and private

Available spaces for private interaction

Private areas has sufficient visual and auditory and territorial screening without becoming unsafe

Private storage lockers

Meeting places for communal activities

Places whose design, location and arrangement encourage accidental, and spontaneous interaction

7. PERSONAL SPACE AND TERRITORIAL BEHAVIOUR

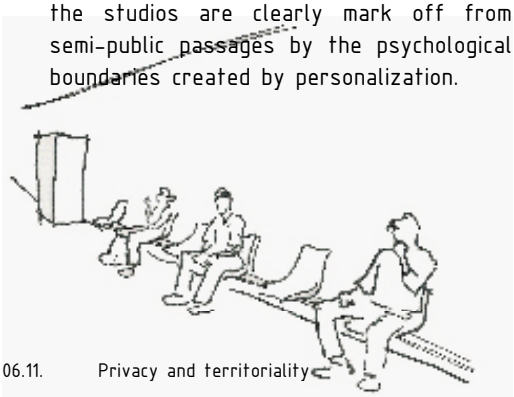
Territoriality and personal space is closely related. Territoriality is visible, reasonably static and tied to a location, while personal space is mobile and invisible.

Territorial behaviour is described as the regulation of the boundaries between one's own space and space belonging to another. An example of territorial behaviour the way studios in the Boukunde building, at the University of Pretoria main campus, are occupied, used, and taken ownership of by the students.

Although Boukunde is an open access building and the physical barriers (doors) to the studios are usually open, there are very strong psychological barriers keeping intruders out.

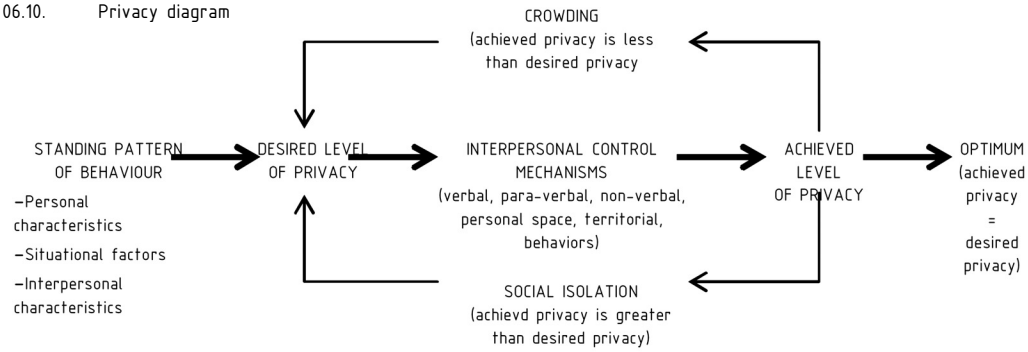
These studios are large open spaces with only structural and boundary fixtures; within these spaces students create smaller 'defendable' spaces by means of moveable boxes, screens, drawing boards and tables. These studios are claimed as private territories by the way the different year groups in the way they take ownership of their studios.

In addition to this private spaces within the studios are clearly mark off from semi-public passages by the psychological boundaries created by personalization.



06.11. Privacy and territoriality

06.10. Privacy diagram



8. EDUCATION, HEALTH AND SAFETY

Smoking areas should be provided outside. Natural materials should be used in the raw form to prevent harmful effects on the human condition.

8.1. Education

Clear signage and information boards should be provided.

8.2. Security

Security No dark alleys should exist around buildings.

8.3. Public safety

Presence of protective eyes (social control): Social control means the actual presence of people who take ownership of a space and would probably get involved if the need arises (Van der Voort 2005: 184). Therefore, increased visibility and activity throughout the park by means of the elevated ramp and the public route running through it, implies increased activity in and through the space. This provides passive surveillance of the area. Residential structures are orientated to face the park for 'eye-on-the-park' surveillance.

Visibility: Seeing and being seen increases the chances that offenders will be caught, therefore reducing the feeling of insecurity. Visual linkages are important for safe, monitored spaces.

According to Van der Voort (2005: 184) an attractive environment and the involvement of users in 'their' environment, are important factors in designing psychological thresholds.

Accessibility and escape routes relate to physical thresholds by restricting undesirables and creating escape routes for potential victims. This demands a careful balance between accessibility and enclosure (Van der Voort 2005: 184).

8.4. Fire protection

Fire regulations should comply with SABS 0400.

Prevention
Prevention of rapid spreading
Safe and quick escapes

8.5. Constructional safety: Load bearing structure has sufficient strength, rigidity and stability

1. LOCAL ECONOMY

Local economic development is to be supported by using local skills, expertise and materials and by employing local contractors. The reduction of transportation distance helps to reduce the embodied energy of a building. Maintenance will also be awarded to local contractors.

2. EFFICIENCY OF USE

Efficiency is the degree to which building serves its purpose The management of multi-use and shared spaces will ensure the maximum use of facilities by increasing the user base and by ensuring that spaces are adaptable; hereby, possible under-usage will be eliminated.

3. ADAPTABILITY AND FLEXIBILITY

The floor-to-ceiling height of spaces should be a minimum of 3 m to accommodate easy conversion of function. The minimum ceiling height in the multi-use hall should be 7 m to accommodate recreational basketball and gymnastics.

4. CAPITAL COSTS

Although capital costs should be limited, quality should not be compromised. To produce a robust, loose-fit building, high quality materials and detailing should be specified.

Promote environmental consciousness throughout the building.

1. WATER

1.1. Rainwater and water use

Water will be harvested from the corrugated iron roof and stored in rainwater tanks for use in toilets and for irrigation of the park.

Water will be filtered and used in the flushing systems of toilets during the rainy season. During the dry season, municipal water will be used as supplementary source. Overflow water will be directed to the green spaces.

1.2. Water usage

Water-efficient devices are to be used, for instance double-flush toilets.

1.3. Run off

The sites northward slope changes from a 45% (next to Houghton Drive) to a 1% (development site) therefore runoff can be considerable. Run-off after characteristic Highveld thundershowers will be minimized by means of pervious or absorbent surfaces within the development. This will minimize the loss of valuable topsoil and prevent erosion.

1.4. Vegetation

According to an environmental management plan established by the landscape architect, a sustainable approach will be taken in accordance to vegetation, top soil utilization and water consumption. Endemic species will replace invasive alien species, resulting in a reduction in water consumption by vegetation.

2. ENERGY

Use energy-efficient lighting and make effective use of day lighting. In addition, reduce the need for mechanical ventilation by means of passive climate systems.

Material choice should be environmentally conscious. Locally sourced or recycled materials are preferred. Materials with a relatively low embodied energy, such as rock, concrete, wood and steel, should be considered. Minimize the use of non-renewable materials. Construction processes and detailing should enable the re-use of components.

3. WASTE

3.1. inorganic waste

Recycle to reduce inorganic waste.

3.2. Organic waste

If possible, use site compost in the green areas of this urban environment.

3.3. Sewerage

Compost toilets would not be feasible in this urban environment because of possible tapping into the infrastructure surrounding the site.

Careful design and management should minimize waste. Where possible, materials will be re-used.