

Theoretical Investigation





Figure 2.1.1 :Gravity



Introduction

This following chapter investigates the development of an architectural language that is appropriate for the project. It discusses the value of the man-universe relationship in a Southern African context and explores the expressive qualities of architectural form with regard to this subject.

Boullée argues that: 'the most essential aspect of building is that: the images they offer our senses should arouse sentiments analogous to the use to which these buildings are dedicated'(Rosenau 1974 : 89).

The same is true for architects who consciously attempt to establish specific correlations between space and experience (Thijs-Evensen 1978: 15). As this project is dedicated to the education of astronomy, the objective of the architecture is to create a sequence of spaces that is based on a narrative that communicates concepts of the cosmos. By means of movement through these spaces, ties between mankind and the cosmos are consequently renewed. The exercise is therefore to understand the expressive characteristics of certain architectural forms and to choose those forms which are appropriate for the intended expression.

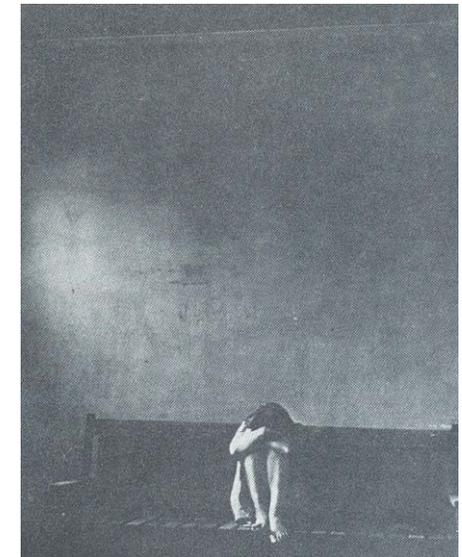


Figure 2.1.2 :Sorrow

A narrative picture will move the feelings of the beholders when the men painted therein manifest clearly their own emotions. It is a law of our nature...that we weep with the weeping, laugh with the laughing, and grieve with those who grieve.

(Alberti, 1979 : 35)





Figure 2.1.3 : The Enclosure at Great Zimbabwe

Archeo-astronomical examinations have led to the discovery that the Great Enclosure's Main Wall was used to define the backdrop of stars, with monoliths marking specific ascending stars and the vernal equinox, amongst other aspects. This makes the Great Enclosure function as a kind of observatory and thus confirming the astronomical traditions of these people (Wade 2007).



2.1 African Skies, African People

The cosmos has captivated the imagination of civilizations throughout the ages. The sky, our common and universal heritage, forms an integral part of the total environment that is perceived by mankind (Lazich et al, 1994: 4). Astronomy and interest in cosmic phenomena are of the oldest intellectual human activities. The rudiments of astronomy exist in all cultures and were evidently important in the concerns of early peoples all over the world (Bronowski 1973: 189).

Properties relating to astronomy stand as a tribute to the complexity and diversity of ways in which people rationalized the cosmos and framed their actions in accordance with that understanding (Lazich et al, 1994: 4). This close and perpetual interaction between astronomical knowledge and its role within human culture is a vital element of the outstanding universal value of these properties (ibid). These material testimonies of astronomy, found in all geographical regions, span all periods from prehistory to today.

The recognition and safeguarding of the cultural properties that transcribe the relationship between mankind and the sky are of particular importance in

Southern Africa. Africans paid attention to the sky and made it part of their story (Rogers 2002). Living close to the earth and the changing seasons, Africans naturally used the stars, the sun and the moon to keep track of time: the time to plant; the time to hunt and the time for ritual to renew the ties between people

and nature (Rogers 2002). Throughout the ages, however, cities and technologies have developed and these rituals have become virtually extinct. Capra argues that city dwellers are dissociated with the cyclical processes of nature, not recognising the interdependence of all phenomena (Capra 1982).



Figures 2.1.4 & 2.1.5 : Our stars today



2.2 Archetype, existential expression and shared experience

Thijs-Evensen discusses the way in which the communicative aspect of architecture is dependant on a number of changing experiential levels (Thijs-Evensen, 1987:23). He groups these in two major

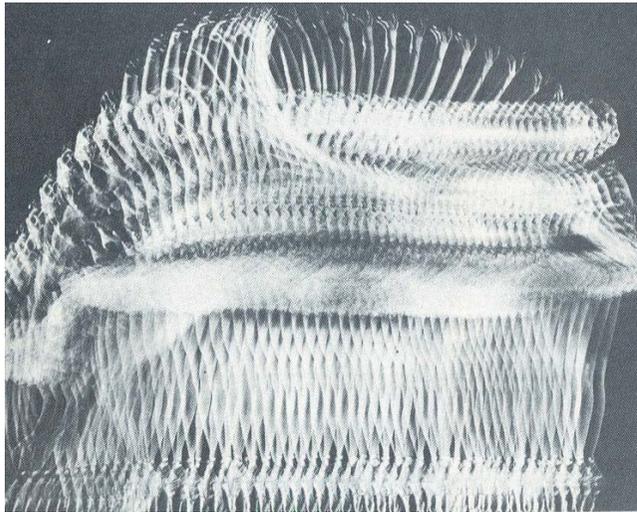


Figure 2.2.1: Man in motion

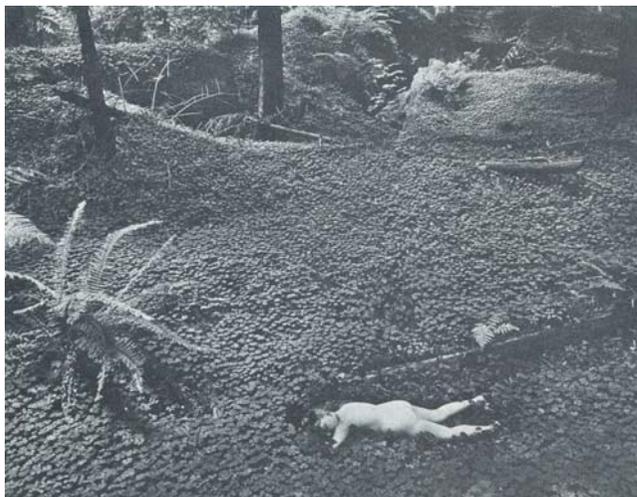


Figure 2.2.1 : Man and substance

categories, both related to conventions and based on recognition, namely: *private* experiences and social experiences. *Private experiences* are connected to personal experiences and individualities and *social experiences* are related to common cultural associations (Thijs-Evensen, 1987:25). Thijs-Evensen argues that this part of the teachings of expressionism, has been given more attention than any other areas of study within architectural theory. In addition he introduces a third level of experience alongside the private and social levels. This level, independent of personal or cultural determinants, is termed the *universal level* (ibid).

He argues that these *shared experiences* respond to our spontaneous and unconscious reaction to architecture, independent of their symbolic associations. *Shared experience*, like symbolic meanings, are also based on recognition, but this time with reference to our *bodily* experiences (ibid). These experiences can be described in terms of *motion*, *weight* and *substance* (ibid). Such experiences are common to all people and are gained through

confrontations with the physical phenomena which surround us, such as gravity and the forces of nature (ibid). As acting individuals we move in relation to a dynamic reference that is defined by gravity. Day and night provide experiences differentiated by light and dark. Tactile experiences teach us about the differences between hard and soft, coarse and fine, wet and dry (ibid). In other words, the existential expression of an architectural form, which is based on the form's motion, weight and substance, is recognised on the basis of our common experiences of natural phenomena. These experiences form a complex net of references to our place in the universe.

The following section will investigate the expressive qualities of certain architectural forms in order to choose forms which are appropriate for the intended expression needed in the design of the Astronomy Centre. These forms will subsequently be applied in the narrative of the design to create shared experiences on a *universal* level. The investigation categorises forms into three topics, namely the floor, the wall and the roof. It also discusses briefly the significance of making use of geometries in the project.

2.3 Geometries

In the paper *In dialogue with Geometry: The creation of 'Landscape'*, Ando discusses his reliance on the power of geometry (Ando 1988: 24). He argues that geometry is self-contained and informed by pre-established harmony. He argues that geometry has positioned itself through the ages as metaphoric of man's power to transcend nature through reason (ibid)

He discusses the figurative attributes of geometry as being those of simplicity, consistency and repetition and argues that these qualities underscore its character as a product of man's reason, therefore placing itself in contradistinction with nature (Ando 1988: 25). He adds that in the use of geometry that centres on circles and squares, the 'architectural place' will respond by becoming a new totality (ibid).

In addition, in the use of geometry that centres on a sphere and a square, one is able to communicate the relative qualities of an object in space as the horizontal and vertical sections of these forms are the same.

Ching asserts that a sphere is a centralised and highly concentrated form. Like the circle from which

it is generated, it is self-centered and normally stable in its environment. From any point of view, it retains its circular shape (Ching, 1996: 42). He describes the cube as a prismatic solid bounded by six equal square sides. Because of the equality of its dimensions, the cube is a static form that lacks apparent movement or direction (Ching, 1996: 43) In addition, The sphere, calls to mind the dome of the sky, the family of planetariums, the earth and heavenly objects (Pearson, 2000: 100).

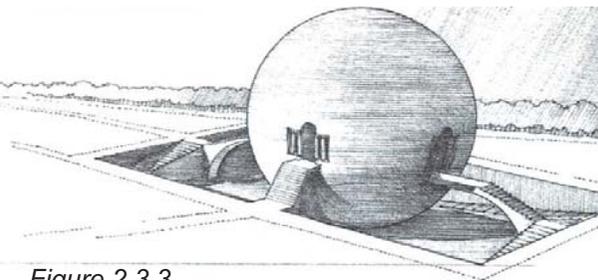


Figure 2.3.3

Figure 2.3.1 : Nahoshima Contemporary Art Museum, Tadao Ando

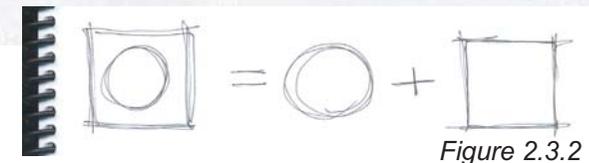
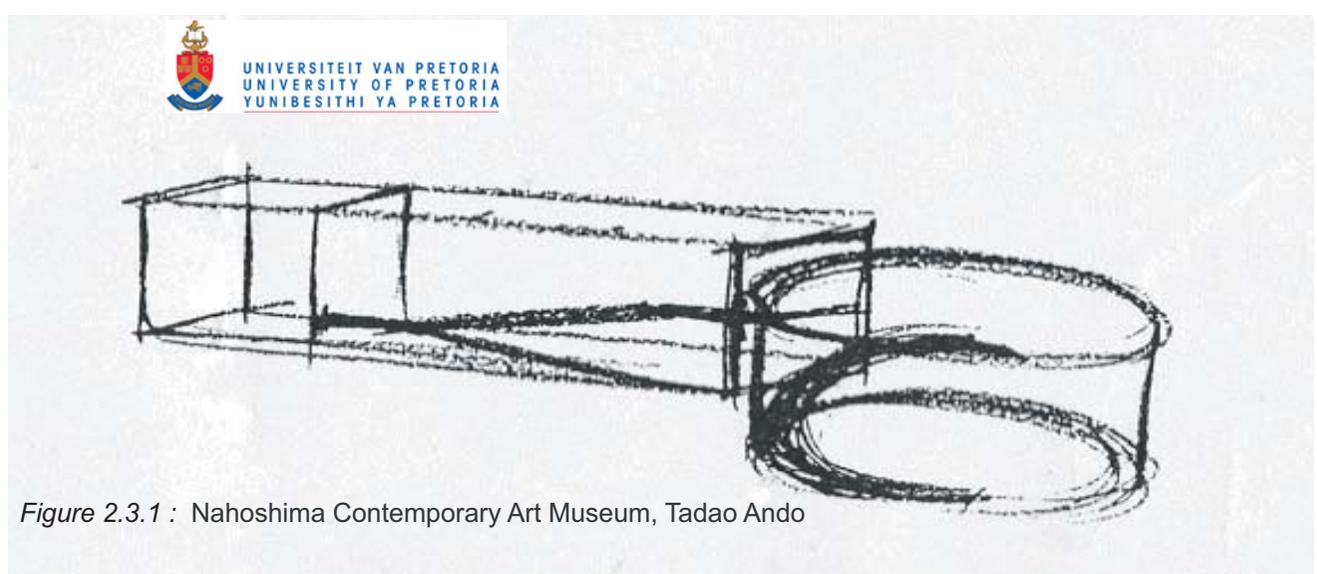


Figure 2.3.2

Design Influences

When considering the expressive qualities of geometrical forms as discussed above, it is submitted to make use of geometries in the design of the Astronomical Centre.

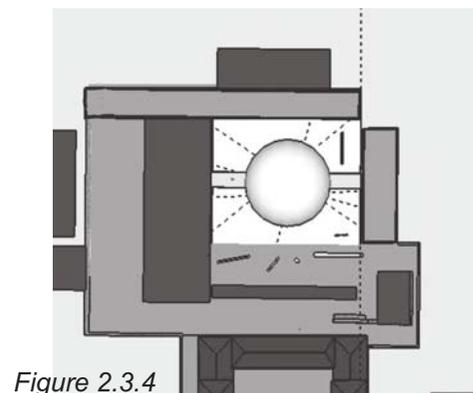


Figure 2.3.4

2.4 The Floor

As creatures of the universe we have *shared experiences* with nature's floor. These experiences determine our impression of the floor in architectural terms. The floor has three main functions in relation to our actions. It *directs us* from one place to another, it *delimits a space* from its surroundings and it *supports us* by providing a firm footing (Thijs-Evensen, 1987:36).

Nature's floor is experienced as a combination of two parts, a surface and beneath it a mass (ibid). It is the surface which illustrates that part of the ground which guides our movements and expresses regional variations. In contrast, the mass below has a far

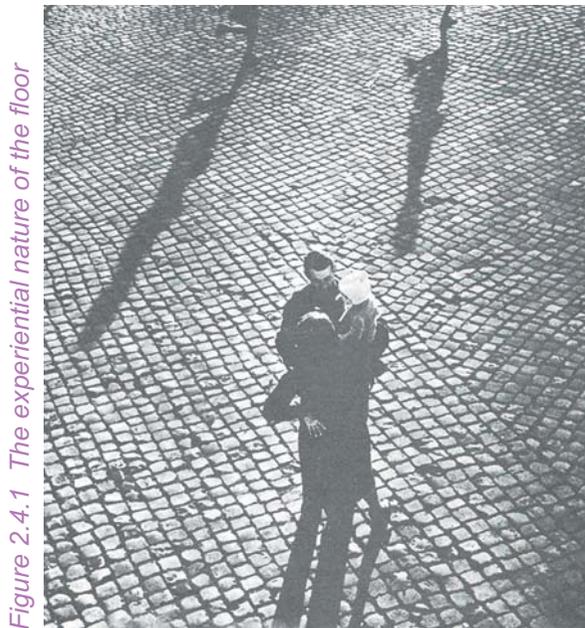


Figure 2.4.1 The experiential nature of the floor

more permanent meaning. As an existential reality it has meaning as it is firm and solid. Thijs-Evensen argues that this firmness is a precondition for our existence on earth, embedded in us as a fundamental background for our entire feeling of security (Thijs-Evensen, 1987:37). He argues that the mass can sink and 'we fall', it can rise up and thereby 'hinder us', or it can be level, giving us 'freedom' of action.

The expressive potentialities in nature's floor are derived through the interplay of surface and mass.

If our actions are above the ground we feel that we have a safe and firm foothold - the ground and we are as one (ibid).

If our actions take place below the ground we are faced with primordial forces as the lower region is unknown and confining. The way in which the surface leads us down into the ground is, however, decisive for our impressions, ranging from an experience to 'fall' or to be 'guided' (ibid).

If the level of our actions are above the ground, our spontaneous reaction is one of independence. We are in control of the ground and liberated from the depths beneath. A feeling of superiority may be the result (ibid).

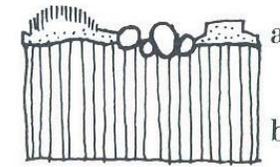


Figure 2.4.1 The parts of nature's floor : the surface and the mass.

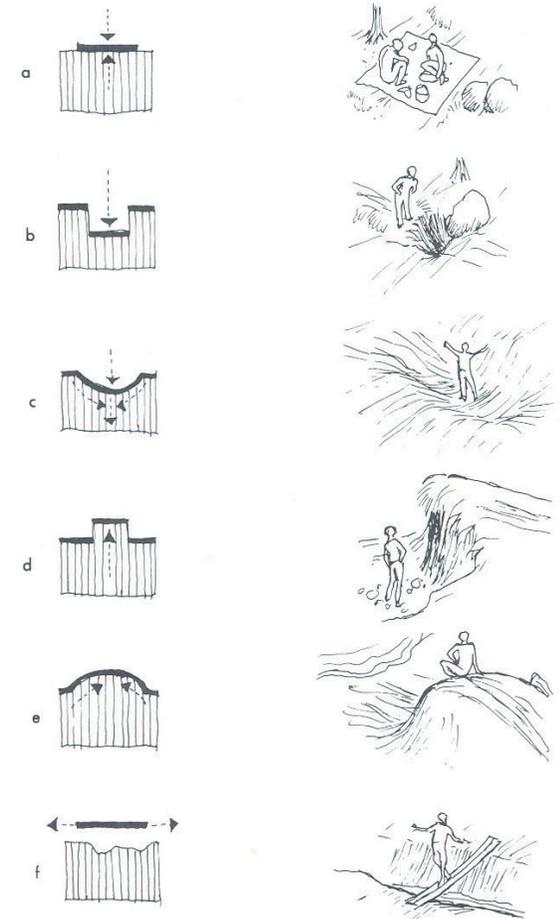


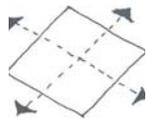
Figure 2.4.2 The expression of nature's floor : the relationship between surface and mass : a) the surface upon the mass, b,c) below the mass, d,e) up out of the mass and f) above the mass.

Design influences

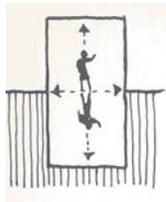
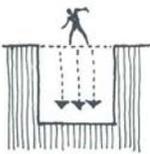
Make use of the following forms of floors that will form part of the narrative of the building.



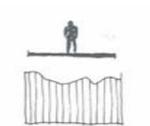
The attached floor - Emphasizes our conception of the ground as something firm and immovable and conveys the feeling of a solid footing. The floor must rest solidly on the ground and should resemble the ground (Thijs-Evensen, 1987:51)



The open floor – This is a floor that opens downwards. It is insecure from a psychological point of view. The depth has a magnetic effect - it sucks us downward – a phenomenon indicating that depth, just as all other types of space, is a potential sphere of activity which we can ‘try out’ by ‘falling’. Therefore the open floor conveys a spontaneous feeling of insecurity and danger (Thijs-Evensen, 1987:63)



The Mirror floor – This floor gives no main directional indication to the space – we find ourselves in its centre, like the centre of a ‘sphere’ in which all directions are equal. On such a floor we become the affected and ecstatic central point (Thijs-Evensen, 1987:65).



The detached floor – We find ourselves on a level divorced from the ground (Thijs-Evensen, 1987:57).



The sunken Floor – When faced with a downward slanting floor, one feels a spontaneous sensation of accelerating speed. When faced with a sunken floor a basic reaction occurs, dictated by various types of experience. Of particular importance in this regard is the conception of motion as governed by gravity. Here it is the ground itself that takes over, in both an upward and a downward slope. The result however, is exactly the opposite (Thijs-Evensen, 1987:75).

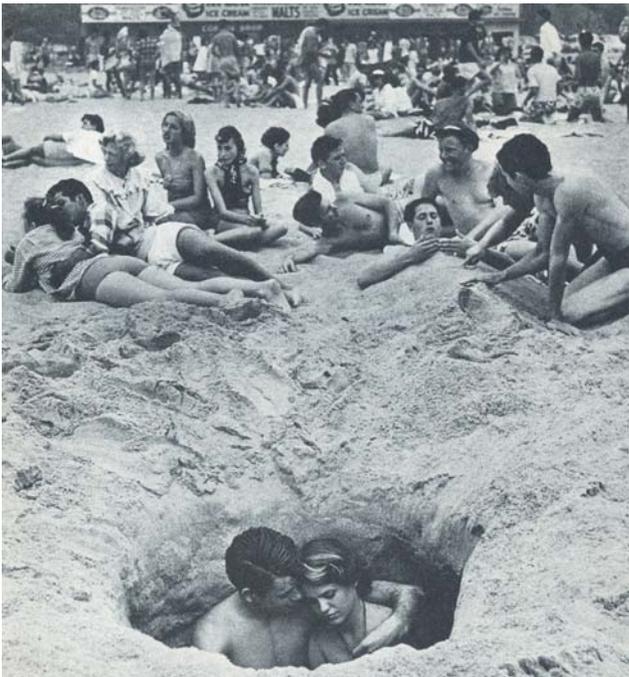
Figures 2.4.3-2.4.7



2.5 The Wall

The wall's architecture is a concrete realization of the existential struggle between an 'attacking' exterior and a 'secure' interior and thereby acquires expressive importance. It is important to understand what it is in the wall's appearance which conveys a message of comparative strength of interior and exterior space and in the way in which this relationship to strength affects its expression (Thijs-Evensen, 1987:116).

The background of our reactions to this relationship is again dependent upon the expressions of motion, weight and substance.



Figures 2.5 The experiential nature of the wall

The wall's relationship to *up* and *down* is reflected in the *theme of heights* (Thijs-Evensen, 1987:142). This involves the meeting between the wall and the earth and between the wall and the sky. In architecture, this is the same as the meeting between the floor and the roof. Down is the direction of the ground and the earth; up is the direction of the sky and air (Thijs-Evensen, 1987: 39). The force of gravity is an essential concept used in mankind's definition of the workings of the universe. It is therefore important to consider what it implies; up is light and free, down is heavy and bound (ibid).

A thick wall corresponds to something inert and closed. Thickness indicates compactness and thereby inner resistance (Thijs-Evensen, 1987: 191). On the other hand, a thin transparent wall, such as a glass wall, conveys a feeling of distance. Furthermore, the effects of such a wall, which include the visual relationship between outside and inside, are dependent upon day and night, lightness and darkness.

During the day the exterior can be drawn inwards and at night it is the interior that is drawn outwards. The shining interior becomes a 'gift' to the night (Thijs-Evensen, 1987: 191).

The vertical wall

The vertical wall is communicative. Firstly, it will always seem lighter because of its rising effect. This wall seems to lift itself upwards and open up vertically. Secondly, the wall itself illustrates the vertical, which marks point and line (Thijs-Evensen, 1987: 145). Horizontal walls draw attention to the corners at each end, while rising walls concentrate attention to the centre of the space. By exploiting this characteristic, one simulates the cosmic concept of the 'sacred centre'. The final reason for the vertical wall's communicative content is that it concerns us directly and personally as either something threatening or conversational, therefore having the potential to become a dominating landmark (ibid).

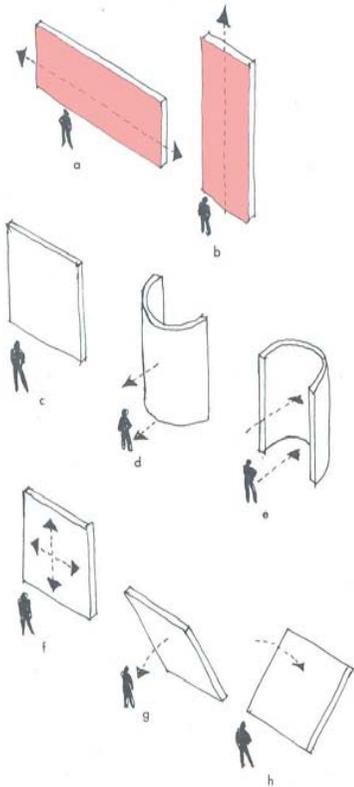
The horizontal wall

The horizontal wall expresses weight against the ground and has a closed and delimiting character. Because it stretches out horizontally, the impulse is to follow *along* beside it in either direction. Such a space conveys no urge to pause, to turn and enter. The directional space that is created by these walls invites us to enter through the ends (Thijs-Evensen, 1987: 143).

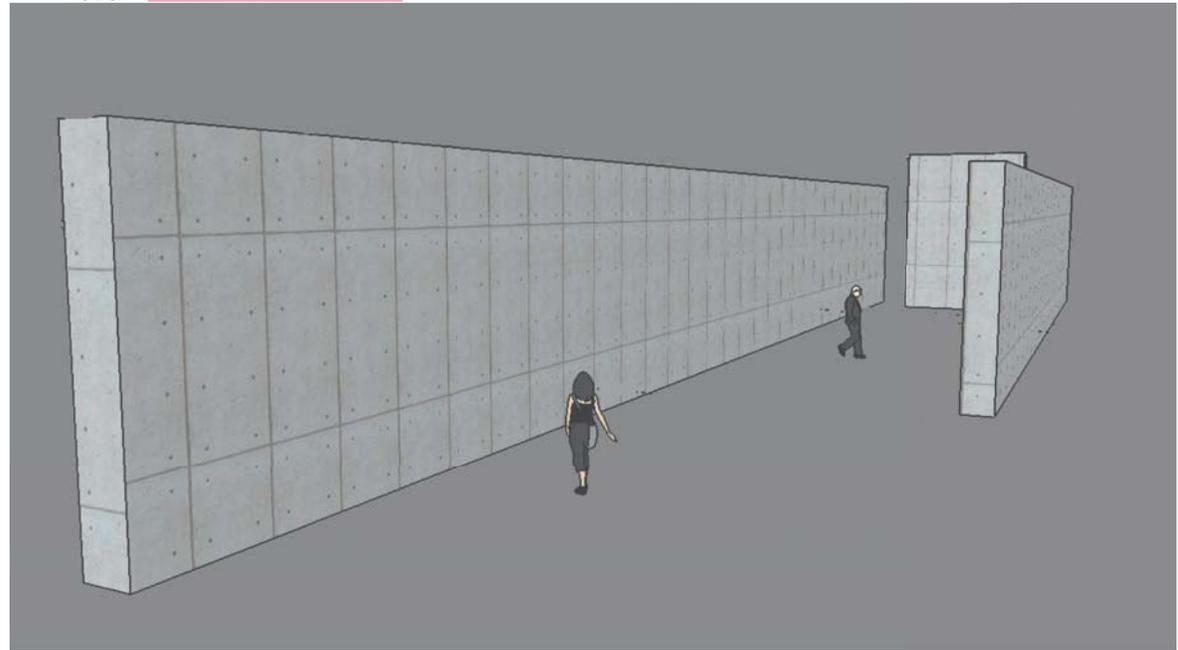
Design influences

Making use of thin vertical walls above the ground, at the entrance and restaurant, where people are intended to gather and linger.

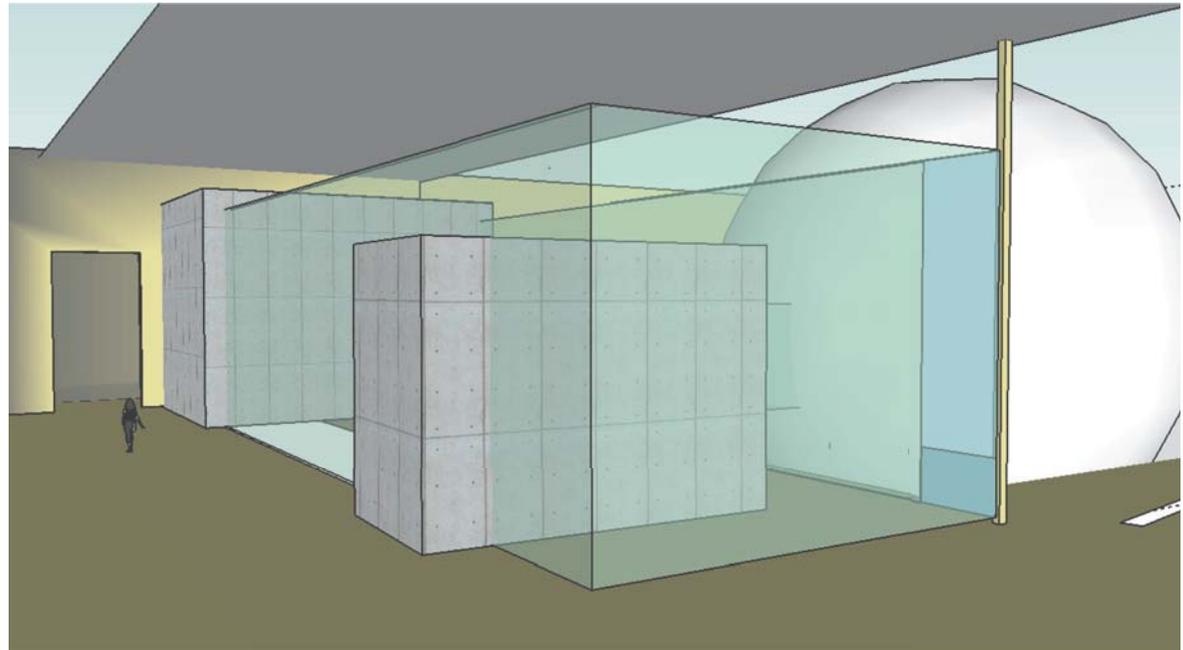
Making use of thick horizontal walls below the ground, in the route of the exhibition, where people are intended to move.



Figures 2.5.1 The main forms of the wall a) horizontal, b) vertical, c) flat, d) convex, e) concave, f) straight, g) leaning toward, h) leaning away



Figures 2.5.2 : Horizontal walls in the exhibition spaces



Figures 2.5.3: Vertical walls in the lobby



2.6 The Roof

The expressive qualities of the roofs in this project are of great importance as the exterior space that is bounded by the roof is the sky. Roofs also protect interior space from the surrounding space in the horizontal dimension (Thijs-Evensen, 1987: 301). Throughout history we find variations of shelter forms.



Figure 2.6. The experiential nature of the roof

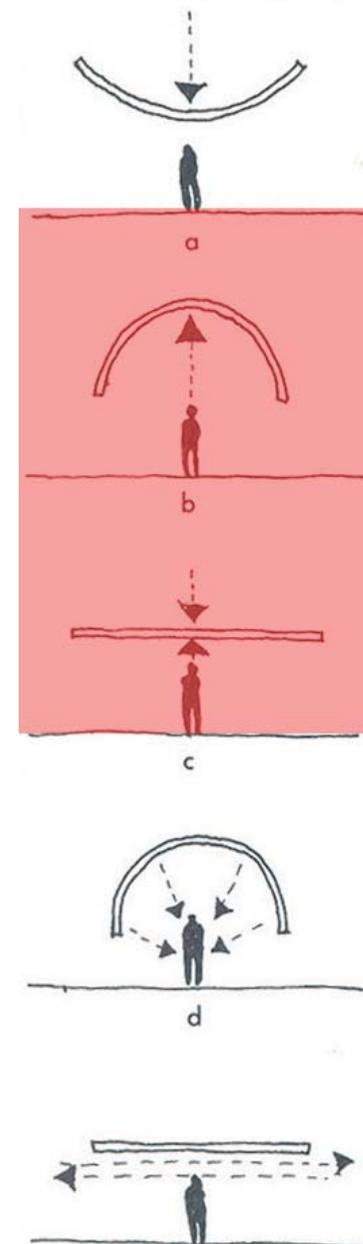
2.6.1 The Dome

The dome is associated with numerous conceptions and forms. Common to all of them is their reference to conceptions of the cosmos. The main reason for this is that a dome is the reminder of the sky and its very form a replica of the heavenly sphere we have above and around us (Thijs-Evensen, 1987:305). It is therefore an obvious choice of form for the interior of the star cinema, not only for its practicality, but also for its expressive qualities. Thijs-Evensen describes the spherical dome as follows:

'Here all forces are equalised in a perfect calm, completely in keeping with the intention of the space as a symbol of unity between spiritual and human power in an all encompassing universe' (ibid).

2.6.2 The flat roof

Seen from the inside, the flat roof will direct the space equally in all directions. Motion is spread horizontally and in the relationship of above and below the flat roof is like a rigid lid. A flat roof may seem raised or 'hovering' if the roof zone appears to be detached from the walls below. A flat ceiling may appear to be enlarged and expanded. The flat ceiling appears to open up and lighten the inside space beneath.

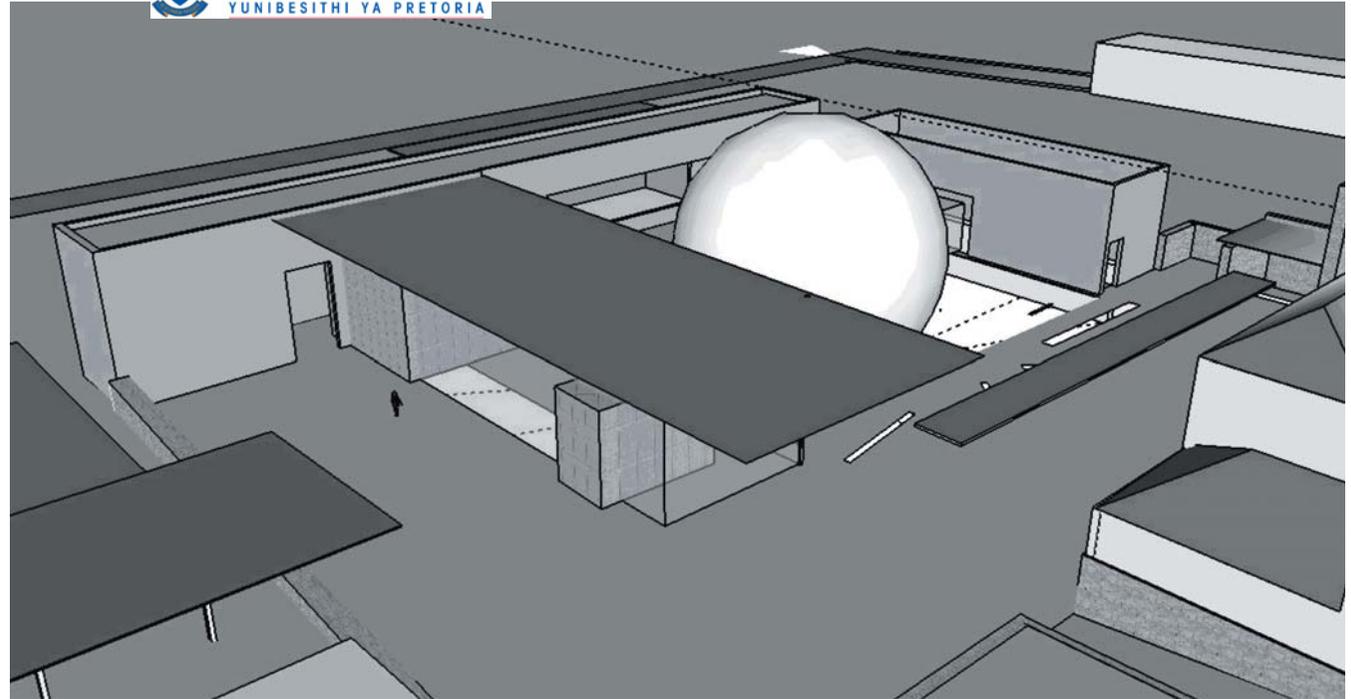


Figures 2.6.1: The roof and its relationship to the sky above: it is able to a) receive the sky, b) resist the sky, c) balance the sky. The roof and its relationship to its surroundings: it is able to a) close the space, excluding the surroundings, e) open the space, including the surroundings.

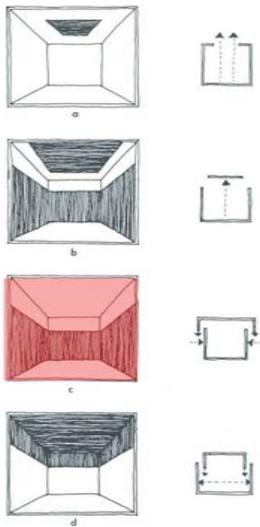
Design influences

As the project is dedicated to the education of the cosmos, it is logical to use the form of a flat roof as it directs space equally in all horizontal directions and thus communicated the concept of endless space. In addition it is logical to make use of vast vertically defined spaces by making use of form that expands and uplifts vertical space by means of the roof's articulation.

Make use of the form of the half spherical dome in the interior of the auditorium. Extend the form on the exterior into a full sphere. Make use of flat roofs throughout the rest of the facility.



Figures 2.6.3 : Perspective of the astronomy centre indicating the roofs



Figures 2.6.2 : Flat roof and the articulated transition between ceiling and wall : a) opening articulation, b) uplifting articulation, c) expanding articulation, d) sinking articulation

Conclusion

This chapter discussed the value of the man-universe relationship in the Southern-African context. It identified the problem that city dwellers have become dissociated with the cyclical processes of nature. In an attempt to re-establish this connection, this chapter analysed how architectural forms with specific expressive qualities can be used in the design to communicate concepts of the cosmos.

