

DESIGN DISCOURSE



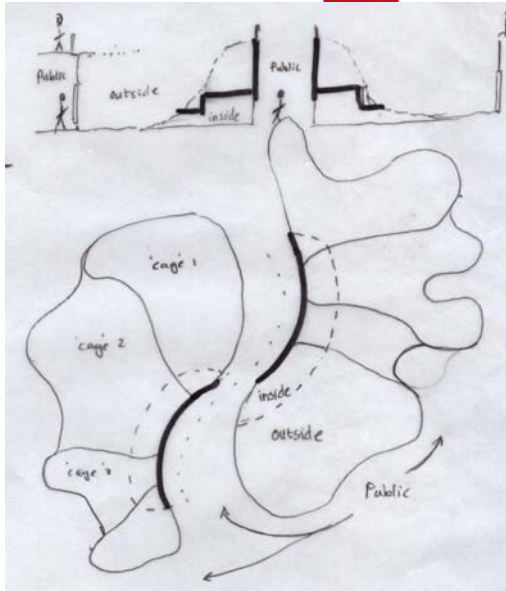


Fig. 37-Wildlife holdings concept sketches

The struggle between nature and human development takes place daily, as designers are constantly confronted by this interface. Man has become very conscious of the earth's finite support capacity and all fields of design have turned their focus to the preservation and the appreciation of our natural surroundings. A search has developed for an approach to balance these two forces. Conflicting needs and interests make design a constant challenge and, no perfect solution exists although there are many opinions on the subject.

Contemporary literature on the subject and the research of precedent studies (pg.18 - pg.23) has laid the basis for the site development for the Wildlife Research and Rehabilitation Facility. The driving question behind the project is: should man-made artefacts mimic nature and do simulated environments need to look natural in order to sustain a healthy ecosystem? Decisions made were based on two important dynamics that occur within such a facility. First is the effect simulated natural environments have on animals in captivity as opposed to more prominently artificial environments. The second is the educational approach to wildlife and their natural environments.

For the welfare of the wildlife, it was decided that wildlife be retained in environments similar to their natural ecosystems. This approach has also proved itself good for educational purposes, presenting the animal in its 'natural surroundings'. People need to get close to the wildlife without disturbance and changes in behavioural patterns. The wildlife enclosures are to be naturally developed as far as possible. No decorative artifice mimicking nature is to be used, and where human construction is added, the additions are to look man-made, but where possible, be constructed out of natural materials readily found in nature such as wood and stone.

The conceptual designs for wildlife holdings suggest means of developing the interface between wildlife environments and connected human space (Fig.37 & Fig.38). Landscaping can be used for segregating spaces, controlling traverse movement. Screens could allow people to see the animals while shielding them from animal view. The rehabilitated habitation is not confined to the wildlife holdings, but natural vegetation continues out into human spaces of movement, connecting the physically separated spaces.

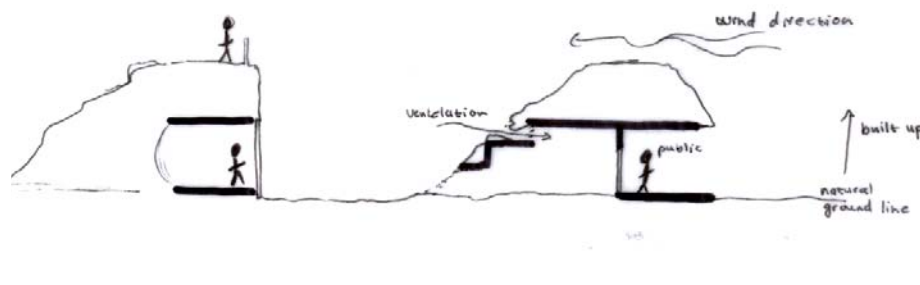


Fig. 38 - Wildlife holdings concept sketches



The unique characteristics of the Experimental Farm as site have a direct impact on the architectural decisions made in the development of the project and moulded the design approach. The strong existing axes generated by the design of the main buildings on site, influenced the formation of a new order around which new development is structured. The rigid rectangular shape of these separate, symmetrical buildings, inspired the shape of new spacial development that flows from, penetrates into, and forms between existing structure and links them. The new order, spacial approach, and material choice, are distinct from the primary buildings to which they respond, and are influenced by the new functions that are accommodated, visually conveying that there has been a change in use.

Finding a structural aesthetic - DESIGN PROCESS

The structures on site all have distinctive visual impacts and bring a variety of materials and connotations to the overall experience.

The pivotal point of departure is the unmistakable Gerhard Moerdijk approach to a Cape Dutch derivative architecture, and demands attention, establishing the farm building as the focal point. One is humbled by the presence of the building and the significance of the old architecture (Fig. 39). The building exudes a sense of history and provokes feelings of nostalgia, hinting at times past and what the building was used for. Important and defining elements of the original architecture are to be maintained and restored as close to the original design as possible. This approach shows respect for the existing and upholds the dignity of the original building.

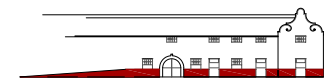
Changes and additions made to the main building and the associated structures immediately behind it are to be acknowledged. This is achieved through the use of a contrasting architectural approach, making use of design elements to create a sense of juxtaposition playing old against new, light against heavy, light against dark. The heavy concrete architecture of the old is accentuated by light transparent façades of the new, creating a dynamic, which evokes the contemplation of space and experience.

The functional shed type structures on the site are the inspiration for the newly developed architectural language of the project extensions. As examined in the context study, the shed structures were added to the site after the development of the original structures and explore an alternative approach to structure and construction. The original architecture relies on thick-load bearing walls and numerous heavyset concrete columns, whereas the sheds use of a steel skeletal structure frees the façades and reduces the amount and size of support columns needed. The shed structures also influenced the choice of material and material use. Referring back to the context study (pg. 015), the existence of a material hierarchy can be deduced, and the materials used in the construction of the 'secondary type' structures are predominantly used in the new architecture. The concrete of the primary existing buildings, is painted, as well as the wooden doors and windows. The roof of the main building is tiled but the related structures of less importance have painted corrugated iron roofs. Looking at the shed structures, steel and corrugated iron is extensively used and left visually in its 'raw' state. This is also true of the use of concrete. When materials are joined, the joints are also left exposed and convey the function of the different elements, promoting and honesty with regard to structure.

A direction of progression in structural development is thus already established on site, and points to a more hi-tech approach as the possible next step. The intended effect is for the new architecture to establish a relationship with the old, where the new does not detract from the old by overpowering it. Conversely, the new should not be submissive to the point at which the importance of the new function of the building is lost or undermined. The new architectural language should establish its own sense of space and place while relating to and complementing the old architecture through means of contrast.



Fig. 39 - Gable of the main farm building



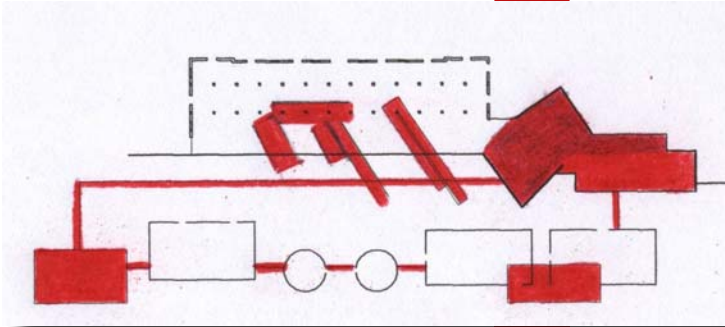


Fig. 40 - Moulded rectangular spaces of new construction

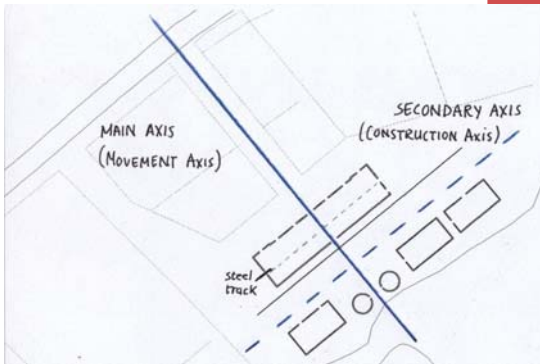


Fig. 41 - Existing axes

The main farm building and the three small buildings right behind it are all separately developed boxes of rectangular shape. In order to maintain a connection between the special experience of the old and new, newly developed spaces are based on this geometrical shape. The repetition creates rhythm and ease in recognition. In keeping with the less rigid approach of the new structural aesthetic, some of the new rectangular spaces are subtly deformed, stretched and moulded to relate to each other and the functions they house (Fig.40).

The Cape Dutch architectural style embraces symmetry and is prominent in the plan and façades of the main building. As established, a very strong axis runs up to the front façade of the main building and out between the two silos establishing a line of movement. The rectangular form of the main building and the related structures behind it are orientated perpendicular to this line forming a secondary axis. The secondary or 'construction' axis is emphasised within the main building by its elongated shape and a steel track embedded in the concrete floor, right in the centre, running from one end of the building to the other (Fig.41). To establish a new identity for the new architecture, and help distinguish old from new, a new axis is established to order construction.

Approaching the site on the main access road from the established western entrance of the Farm, the first visual encounter with the building is on a west-east orientation. Having moved past a shield of trees, you are confronted with this unexpected architectural node. A gravel road branching off the tarred main road leads the eye up to the centre of the short end of the main building, lining up with a silo protruding from behind the roof (Fig.42). One is drawn down this path. This line establishes the direction of the new 'movement' axis. As with the old axes, a new secondary axis line or 'construction' axis is established perpendicularly to the new movement axis (Fig.43). The new movement axis takes reference from the past, acknowledging the original entrance and access to the site while the new construction axis makes reference to the future, acknowledging the new entrance to the Farm and progression in the development of the Experimental Farm.



Fig. 42 - Visual of building along new movement axis

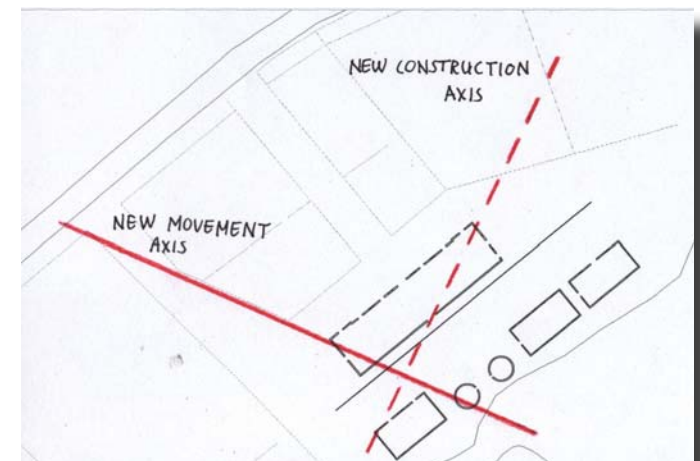
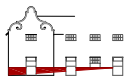


Fig. 43 - New axes



By establishing the new set of axes a new order is developed within the architecture, which not only distinguishes itself from the old but also emphasises the old order through contrast.

zones of interaction and use - DESIGN PROCESS

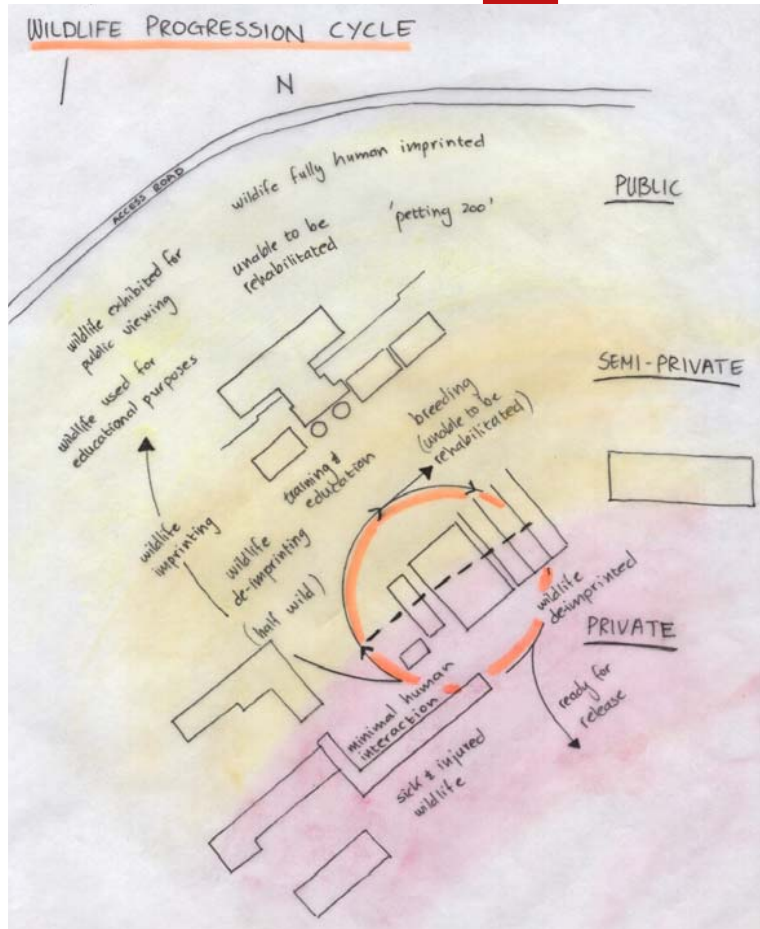


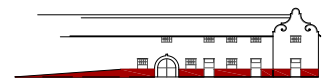
Fig. 44 - Access zones and movement of the wildlife

The project requires three main functions: retention of wildlife in healthy environments; education, medical care and research development; and public education and entertainment. The idea behind the centre is to help educate the public through exposing them to some of the working facilities that are the basis of the project, while taking into consideration the specific needs of the wildlife. In order to regulate the extent of interaction between visitors to the Centre and the people who work on the premises, and the interaction between wildlife and humans, three zones of interface are established (Refer to user profiles in the Appendix A (p. 095) for information on the needs of the human user as linked to the zones).

The first zone is the public zone where visitors move freely through areas of educational entertainment, positioned on the north end of the site closest to the main access road. The main farm building falls within the periphery of this zone, functioning as a point of transition to the next. The wildlife housed in this zone are animals and birds that have come to the Facility but are unable to be fully rehabilitated back into the wild. This wildlife is familiar with human interaction and used for educational purposes.

The second zone is a semi-private zone. This zone acts as a buffer between the public and private areas. The zone includes the formal educational areas and the start of practical working areas associated with animal care, and related research. It is an interface between visitors to the Centre and people who have functions to perform at the Facility. This interface allows an extent of interaction between the two groups and gives the visitor insight into the functioning of the Facility and the realities that surround it. Access to wildlife in this zone is controlled, granted only to specific groups of visitors. Viewing of wildlife demands distance than in the public zone to shield the wildlife from excessive human interaction. Wildlife in these zones are animals and birds undergoing rehabilitation in its earlier phases and wildlife that are unable to be fully rehabilitated and are in a breeding program.

The third zone is the private zone. This zone is under strict control and not to be accessed by any visitor to the Centre and only open to workers who have been granted access. This sector includes working areas related to the medical care of the wildlife and research. The wildlife that is held in this area, are animals and birds that are sick or injured and in need of intensive care and observation, or quarantine. Wildlife in final phase rehabilitation and ready for release are also held here, as they require as little human interaction as possible. The zone is positioned on the southern end of the site, furthest away from the main access route but next to a secondary access road for the movement of wildlife to and from the site, and for the delivery of medical and food supplies (Fig.44).



Wildlife Research and Rehabilitation Facility – DESIGN

overview of concept development - DESIGN

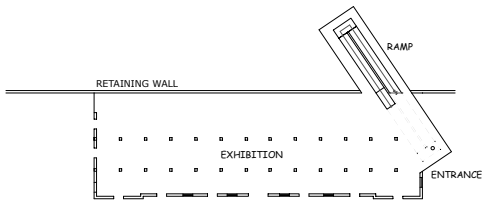


Fig. 45 - Concept
- entrance at side of building, defined by ramp



Fig. 46 - Arched entrance to main building

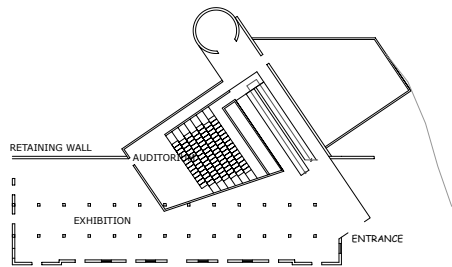


Fig. 47 - Concept
- auditorium cut in behind retaining wall

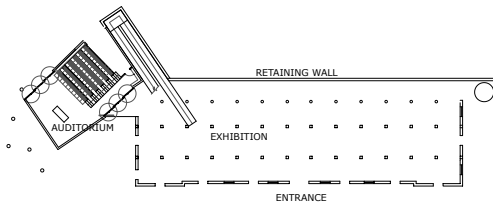


Fig. 48 - Concept
- Shift of ramp and auditorium

The main farm building was immediately established as the Facility's Visitor's Centre. The building is closest to the main access road, and together with the structures right behind it, has cumulatively the most space to offer for the Centre's extended needs. The building is visually the most important as it is a focal point on site. The existing structure is already an established visual icon identified with the farm and used to create an identity for the new facility. The Centre becomes a public interface where visitors are introduced to the facility and its workings.

The main building and the related structures right behind it were developed to house the following functions: an exhibition space, an auditorium, lecture rooms, laboratories, administration facilities and a refreshment area. The functions to be accommodated by the existing structures to the south of the site were the practical and medical care facilities for the wildlife, the wildlife kitchen and a wildlife drop-off area where sick and injured animals are admitted.

As the design developed, certain functional spaces were moved to adapt to a more informed design. The main entrance to the farm building initially remained as the main entrance to the new facility, but with the development of the new axis that approach the building at an angle, the access changed and a new entrance was punctured through the side of the building on the angle of the new movement axis (Fig.45). Further examination showed that, although the entrance was adequate when approaching the building from the original western entrance to the Farm, it has little impact when approached from the east, which is likely to become established as the main direction of approach in the future. This new entrance was also undermined by the visual impact of the original large arched doorway, which screams ENTRANCE (Fig.46). For these reasons the decision was taken to maintain the original point of entry, and a double story glass box encloses the arch doorway, defining a 'new' entrance to a new building function.

The large size of an auditorium made the space hard to place. If placed inside the old farm building, the largest existing volume, it would take up too much space. The auditorium is zoned as semi-private and not for use by general visitors. This makes placement of the auditorium in the main structure inappropriate, as the main building is primarily a visitor's centre. Finding placement for this function led to experimental utilisation of the 'space' behind the retaining wall, below the retained ground level (Fig.47). The auditorium finally punctured out the northeast end of the old farm building, separating itself from the building and the public space, yet maintaining easy access for the public from this structure (Fig.47). The placement of the auditorium ignited the development of other semi-private functions around it.

A ramp was decided upon as means of moving between ground level and 'first floor' on the elevated ground level behind the retaining wall. This decision was made in direct response to the need for disability access. The ramp was formed on the order of the new movement axis. Working at an angle made it easier to handle the substantial required length of the ramp in such a narrow space. Initially positioned on the southwest end of the building (Fig.48), the ramp helped define the side entrance before the entrance changed back to its original place. The ramp was settled on the opposite side of the building (Fig.48), influenced by encouraged movement patterns. The ramp visually starts to separate public zone from semi-public area. As you enter the building, the functions to the right of the ramp are orientated towards public interaction and entertainment. The facilities developed to the left of the ramp are more educationally orientated towards student lecturing, practical work and educational visitor programs.



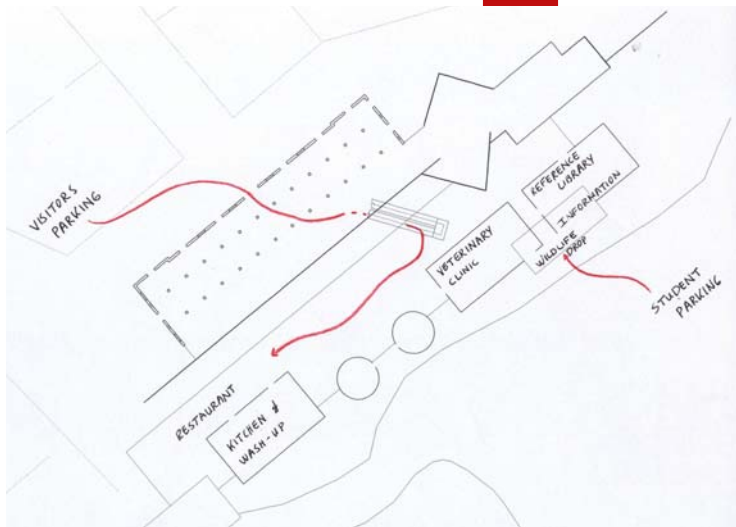


Fig. 49 - Movement Diagram

Limited space and the need for the laboratories to be close to the medical care facilities saw the shift of the laboratories up to the southern end of the site. Alternatively the access of the public to the south of the site to deliver injured wildlife was inappropriate. An animal drop-off for use by facility workers was kept at the south end, but there was a need for the inclusion of a wildlife drop accessible to the public within a semi-privately zoned area. The drop developed behind the auditorium as a student practical area along with a temporary holding and veterinary clinic. The drop is accessed from the employee parking area (Fig.49). The refreshment area moved with the shifting of the other facilities and elements in the design. This area was finally established behind the main building on the southwest corner of the first floor level. The facility falls within the developed public zone and looks out over the children's educational playground so that parents can keep an eye on their children while relaxing. The Facility is easily accessed from the visitors parking either through the main building or from the outside. When accessed from inside the building, visitors are drawn up the ramp where a visual connection is made with the veterinary clinic, encouraging visitors to have a look before moving on (Fig.49).

experiencing the final product- DESIGN

EXTERNAL IMPRESSION

Approaching the Wildlife Research and Rehabilitation Facility from the new eastern entrance to the Experimental Farm, the old Cape Dutch farm building comes into view. Although focus falls upon the main building, one's eye is drawn to the closest end of the building where a familiar yet foreign structure protrudes out the side, its form broken by a cluster of old pine trees (Fig.50 & Fig.51). Moving closer, the façade of a new building starts to clarify.



Fig. 50- Cluster of Pine Trees

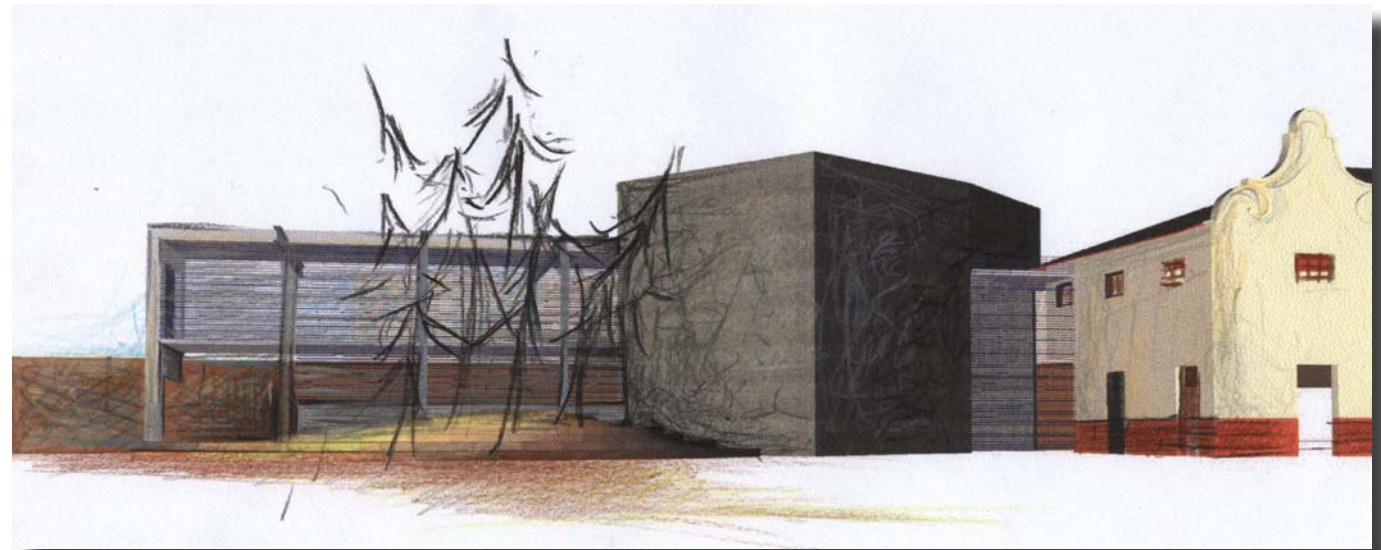


Fig. 51 - Perspective of exterior of building

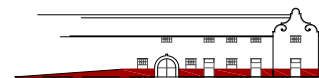




Fig. 52 - Concrete columns and beams as seen from outside



Fig. 53 - Steel cocopan track as seen from end of building

Lightweight and almost transparent, the façades seem to hang from a pronounced steel structure. Large steel I-beams relate to the load-bearing concrete walls of the old building by forging an impression of raw strength and stability while remaining comparatively light in weight. The repeated steel columns find extended rhythm in the repetition of tall pine tree trunks. A glass-front façade creates the impression of a volume open to the outside. Aluminium sun louvers soften the sleek glass plane and minimise glare. The steel support structure and use of corrugated iron in the façades connect visually with the typical farm shed structures further up the site. The beams carry a concrete slab roof, as if drawn out of the concrete wall of the old building, which lies across the top of the steel beams and turns 90 degrees towards the ground to form a load-bearing wall. A reinforced concrete edifice protrudes at an unexpected angle defining the light steel structure on the one side from the old heavy building on the other. The concrete connects back to the walls of the old building, but with the concrete surface left unfinished, the new structure establishes a connection with the raw concrete feed troughs and shed construction on site.

A grass-topped outcrop of earth leads up to the front of the glass façade of the new structure. Large swivel glass doors open up onto this grassed area, and although this entrance to the building is inviting, the entrance is not pronounced, and is sheltered by the cluster of trees. This communicates a feeling of privacy. One's attention is thus drawn back to the old farm building as one moves towards its prominent red brick arch entrance.

TRANSFORMATION OF THE OLD FARM BUILDING

Entering through the double wooden doors of the arched entrance, the building opens up into double volume. Concrete support columns and beams define a grid that structures the ground floor volume, although no longer supporting the concrete floor slab that used to separate it from first floor (Fig.52). The roof is entirely supported by the load-bearing external walls, leaving a large open space. Drifting into this volume, foreign boxes lightly settle on retained sections of the original concrete floor slab. The sides and tops of the boxes consist mostly of glass and some corrugated iron. Visual access into these spaces is controlled with horizontal louvers. The spaces connect aesthetically and structurally to the architecture encountered outside the building (Fig. 55).



Fig. 54 - Stone retaining wall behind main building

The old, polished concrete ground floor is retained, fragmented by marks left by the demolished internal walls. A transparent liquid epoxy is poured over the existing floor surface to level the walking surface while preserving the original flooring. A cavity in the centre of the floor houses the rail of a steel cocopan (Fig.53). Also filled with transparent epoxy, the rail is conserved in a solid cast while forming an even walking surface. The roof trusses are left exposed, while interior walls, concrete beams and columns are repainted in the original white paint finish.

Reducing the surface of first floor and creating a double volume, light quality is significantly improved in the new space due to light penetration previously separated, collectively illuminating the space. The back wall of the ground floor is replaced by steel columns, exposing the stone clad retaining wall behind it (Fig.54). The use of steel I-beams to support the concrete façade of first floor connects to the new architecture, and visually conveys that this is a change made to the original building. The newly created space behind the columns is covered by glass running at an angle from the façade of the first floor to the retaining wall that is the new back wall. Natural light floods into the building through the new glass roof, increasing lux levels and



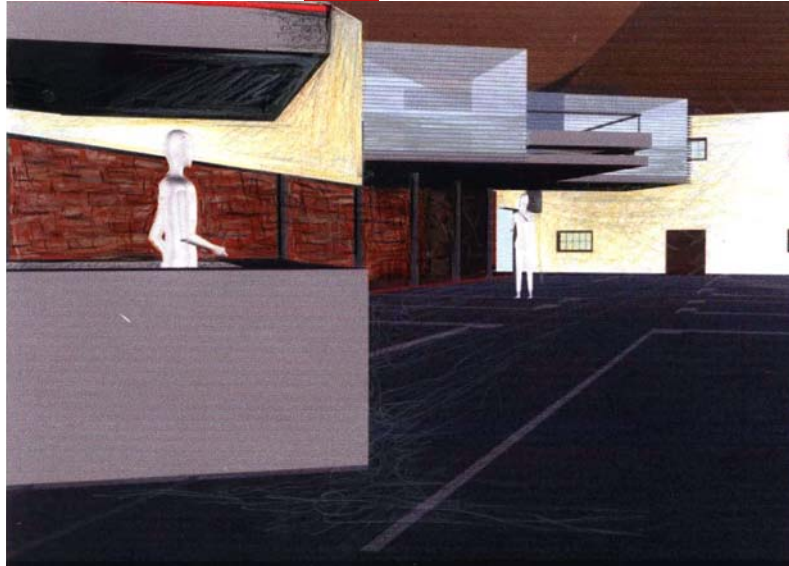


Fig. 55 - Floating glass boxes

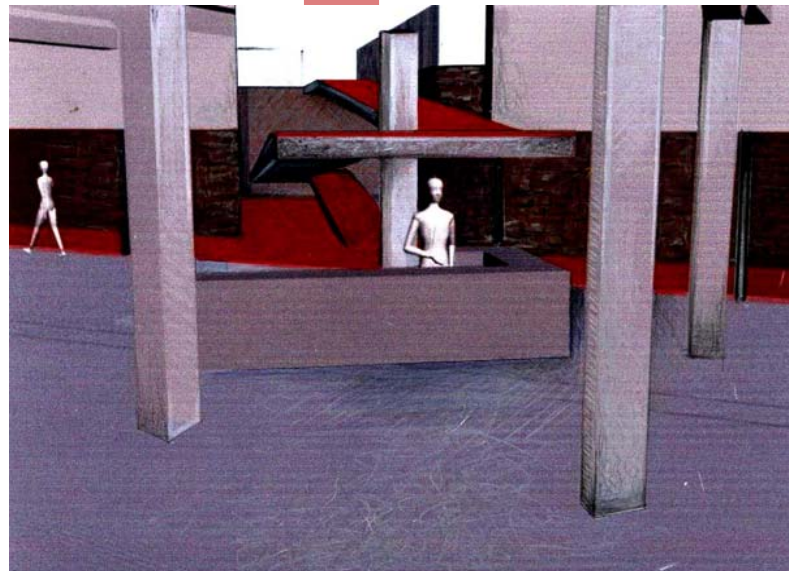


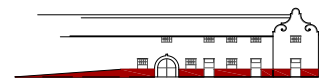
Fig. 56 - Ramp inside building interior

illuminating the stonewall which is a defining feature. The decision to open ground floor right up to the retaining wall will help cool the air temperature within the main building. Ventilation grills are introduced at this interface to facilitate natural airflow through the building, effectively increased by the prominent air circulation that forms within a double volume.

The main building houses the educational exhibition space. Exhibition material can be suspended from, attached to or stretched between the concrete columns and beams, engaging the old with the new. Large boards could swivel on central axes, directing flow of movement in different directions. Full advantage should be taken of the created double volume. It is proposed that interactive television screens form part of the display. Live video feed could be shown from inside wildlife cages inaccessible to the public and controlled via display panels. Cameras could be placed inside laboratories and the medical care facilities to give visitors a look into the functioning of the Facility.

Dichroic reflector lamps are to be used as spotlights for the exhibition where additional illumination is needed, for example, on reading material, and for night time illumination. These small lamps can run across the bottom of the concrete beams and be suspended on cable between the outer walls running in the same direction but placed above the spaces between the beams. The same lamps are used in floor fittings placed along the base of the stone retaining wall to light it up at night. Air conditioning is exposed and runs along the middle of roof, suspended from the roof trusses (Refer to Technical Resolution p.044 for information on the air conditioning system).

The ramp is a prominent feature in the building, and is orientated at an angle in the direction of the entrance. On entering the space, the ramp is situated to your left with the exhibition running from the right, up to the ramp. To the left of the ramp a foyer space for the auditorium unfolds drawing a line between entertainment orientated and serious educational facilities as previously examined (Fig.56). Symbolic of the rehabilitation process, the ramp starts by puncturing into the earth behind the retaining wall. Gabions are used for the new retaining wall and are formed close around the ramp. The triple twist wire used for the gabions connotes the wire cages traditionally used to hold animals and birds. The walk up to the first landing, into this 'cage' represents the admitting of the injured or sick wildlife to the Facility, and its medical treatment and initial recovery in intensive care. One of the walls consists of panelling for pictures and photographs. The next rise is the longest and symbolises the road to full recovery. The ramp leads out into the double volume to the second landing suspended in the space between building walls. From intensive care, the creature is placed in a larger holding close to its natural habitat but still confined. The last rise symbolises the final phase of rehabilitation, which involves weaning the creature off human dependence and releasing it back into the wild. This can be seen in the movement of the ramp out of the main building and ending alongside an external landscaped area. The ramp consists of unfinished reinforced concrete which links to the raw concrete floors in animal cages and the feeding troughs on the site. The walking surface of the ramp is a bright red liquid epoxy, which hints at the floors and work surfaces in laboratories and animal clinics.



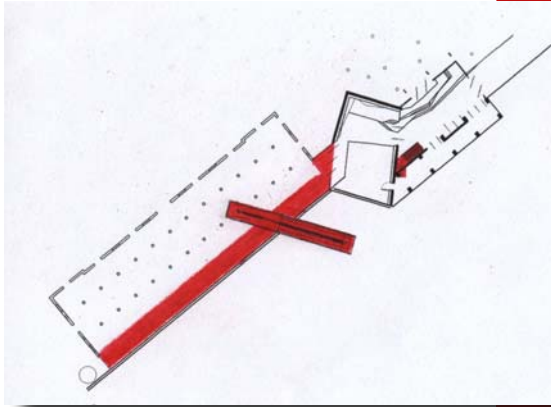


Fig. 57 - Placement of colour

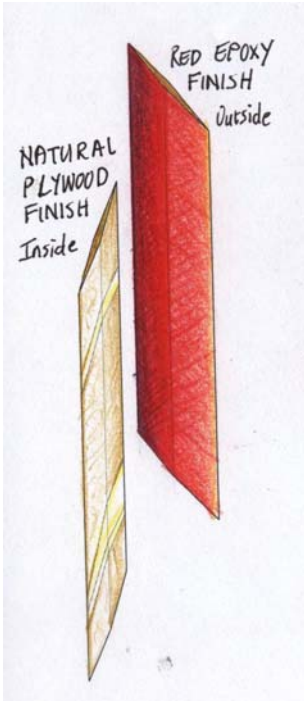


Fig. 58 - Door concepts

SYMBOLISM OF COLOUR

Just beyond the far corner of the eastern façade, two storey high doors announce the beginning of a new space. The doors are finished in a brilliant, shiny red epoxy that links to the ramp. Just like its use on the ramp, the red becomes an indicator of transition across boundaries or the movement into a different zone classification (refer to p29, zones of interaction and use). The ramp cuts through the stone retaining wall and creates a path of movement from the one side to the other, symbolising a new path of transition across an old boundary (Fig.57). The doors separate the public exhibition space and foyer from the semi-private zone of the auditorium and lecture room beyond. The red liquid plastic looks like it has run off the vertical surface of the doors and onto the floor. A red floor surface lies between the red façade of the doors and the concrete floor finish of old building. The red floor becomes an indicator of transition across the old façade into the new space or auditorium. Red epoxy flooring then runs along the stone retaining wall, between the retaining wall and demolished back wall of the building, again showing movement across a previously existing boundary into newly created space.

FUNCTIONAL DESIGN FOR DRAMATIC IMPACT

As the transition between spaces is such an important design point of departure, the doors have become more than just functional objects but have developed into design elements of orientation, and the separating and merging of spaces. The doors leading to and from the auditorium are the boldest example (Fig.58). The height of the doors, which range between 2.5m and 6m, makes them look narrow although they are 1.8 metres wide. Their narrow appearance is also due to the refined fin shape, as seen on plan, with the door narrowing to its ends and a seam line created down the middle where the door is at its widest. The doors swivel on a central mechanism and can move along a track. The swivel mechanism allows for the doors to be opened separately, as many and as wide as required. Directional rotation of the doors can be used to direct traffic flow in smooth lines or the doors can be moved to the sides to open up the façade totally. When closed, the door panels overlap for acoustic sound insulation purposes, and the tapering of the doors allows for a smooth, wavelike façade finish.



Fig. 59 - Perspective view into auditorium

THE AUDITORIUM

When the doors are swivelled open, a warm, natural, wood clad auditorium is revealed. Natural light floods the space through the glass façade that joins the old building and the auditorium (Fig.59). Finished in wood, linking to the finishes of the auditorium, the inside of the doors contrasts with their external red plastic finish. As you move into the auditorium, a steel I-beam structure supports raked seating for 60 people. The beams and columns join together in a manner that visually recalls the steel support structure in the new architecture. The old stone retaining wall that runs along the back of the main building, slices through the middle of the auditorium as the seating structure starts to climb over it on long steel legs. The open structure of the raked seating contrasts the solidity of the thick, clad walls that surround it.



Three air-conditioning ducts push through the stonewall and curve 90 degrees upward ending in ventilation grills. The exposed ducting communicates well with the steel in the space and the exposed joints of the structure. The colours that come together in the auditorium are the ochre yellows of the wood, the yellow, brick-red and blue-grey in the stone of the retaining wall (Fig.60), and the steel-grey of the steel from the seating structure. A new concrete floor runs through the auditorium and the adjoining lecture room. Where a section of the old retaining wall was removed to make space for the raked stairs and movement between the spaces, stone has been laid into the concrete, flush with the walking surface, as a reminder.



Fig. 60 - Stone of old retaining wall

COMMUNICATING AN IDENTITY

The auditorium itself is a space of transition and integrates design elements of the old with elements of the new architectural language and functions of the facility. The visual solidity and thickness of the auditorium wall connects back to the concrete load-bearing walls of the original architecture. The use of plywood planks as wall cladding brings a sense of nature into the interior, which is an important concept behind the new architecture. Although wood has been used in the existing building, the wood product and its application in the auditorium is new. The old wooden doors and windows are painted in a dark brown, hiding its natural qualities while the plywood is treated to maintain the colour and texture of the wood. The comparatively light steel seating structure speaks more clearly of the new construction and choice of materials beyond. Epoxy flooring is chosen for the horizontal surfaces that cover the seating structure. Previous use of epoxy in red, and its transparent form maintains continuity in the finishes. The surface looks textured and is a light wood colour.

METAPHORIC INTERPRETATION

The lecture room adjoining the auditorium cuts away a section of an existing outcrop of earth. The cluster of pine trees takes root in the raised piece of ground, and is of great aesthetic influence. The trees are old and have a historic link to the identity of the old farm building. Cutting into this mound raises the level at which movement between the inside and outer landscape can take place. As the natural contour of the land was disturbed, metaphoric contours developed in interpretive horizontal planes. The abstracted contours move down into the building, symbolically pulling nature into the building without using imitation. This approach links to conclusions drawn from the debate about whether an artificial creation should be made to look like nature. Horizontal planes occur in 200mm thick layers and create steps that rise to the same level as the apex of the earthy mound. Among the stairs, planes stretch out to form larger landings and edges join to create vertical drops. The 'contour stairs' go beyond their function as an aesthetic feature or means of movement between internal and external space, by becoming a space of potential congregation and interaction where people stand and sit on the different levels. The stairs are clad in wood, indicative of their origin in nature. The contours are not retained in the lecture room but flow into the auditorium. The contours form steps up to a 'plateau' that is a stage. Top horizontal planes join to define a stage that juts out as bottom layers under-cut (Fig.61). Halogen tube lights are to be placed in a void under the cantilevering stage to create the illusion of a floating stage.

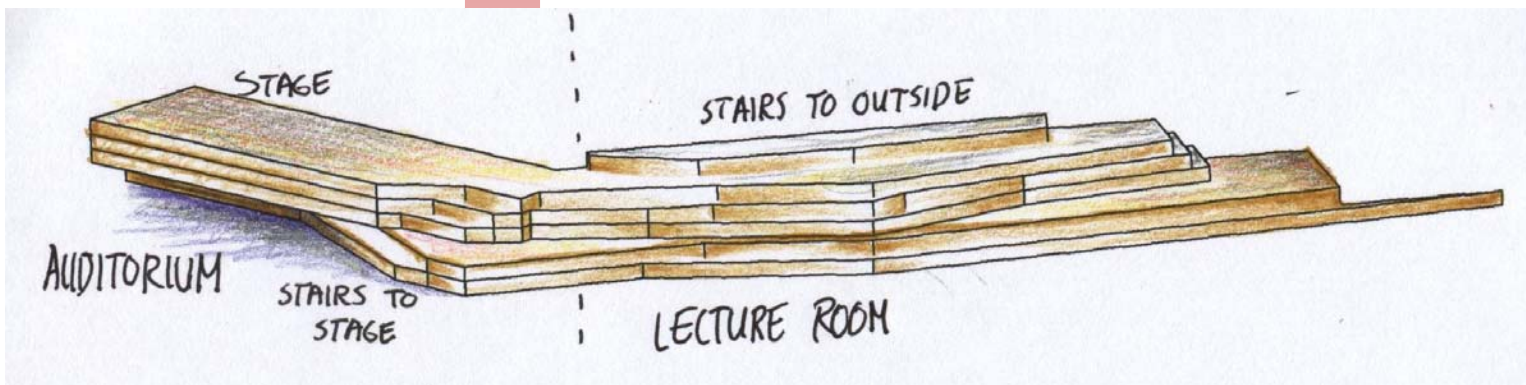


Fig. 61 - Perspective of stairs and stage

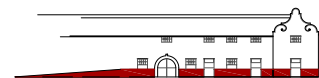




Fig. 62 - Inside auditorium, walls become one with stage

The stage/stairs that flow into the auditorium are embraced by the room, and the contours do not remain isolated but spread up the walls and cocoon around the space. Crevices cut into walls and run from the front of the auditorium down the sides in lines that emulate the stylised contours of the stairs and stage. Horizontal wall surfaces separated by crevices move out of the straight plane into the auditorium volume and angle back into the walls, as can be seen on plan, and form the projection surface where a hidden screen pulls out. The walls are clad in wooden planks, becoming one with the stairs and stage (Fig 62). The flow of line and directional change in planes stimulates a feeling of movement, bringing the inner shell of the auditorium to life. The auditorium walls are made up of 200mm wide concrete structural walls to which a specially designed steel frame is attached. The frame forms the contours of the wall that is then clad in plywood planks. The crevices are formed into the wall at different depths, emphasising the thickness of the walls. Florescent tube lights are positioned within the crevices, out of view. The voids in the walls are brightly lit while indirect light filters out into the auditorium creating atmospheric lighting (Fig.63).

RELATIONSHIPS BETWEEN ELEMENTS

The stairs/stage structure and the wall cladding structure are designed to relate to each other structurally and visually, and communicate as one. This is visible in the detailed interface where stage meets wall (Fig 64). At the back of the stage the floor plane meets the wall at a right angle where the wall cladding extends straight up for 200 mm and then cuts horizontally into the wall, forming the first contour crevice. The wall cladding then proceeds to move vertically upwards for another 200mm before cutting horizontally deeper into the wall. The steps that form the stage look as if they continue into the wall, becoming one entity. On the left side of the stage, the protruding stage platform slips straight into one of the contour crevices in the sidewall. The two structures fit together perfectly and the wall looks as if it had formed around the stage over time. In the same way the walls accommodate the

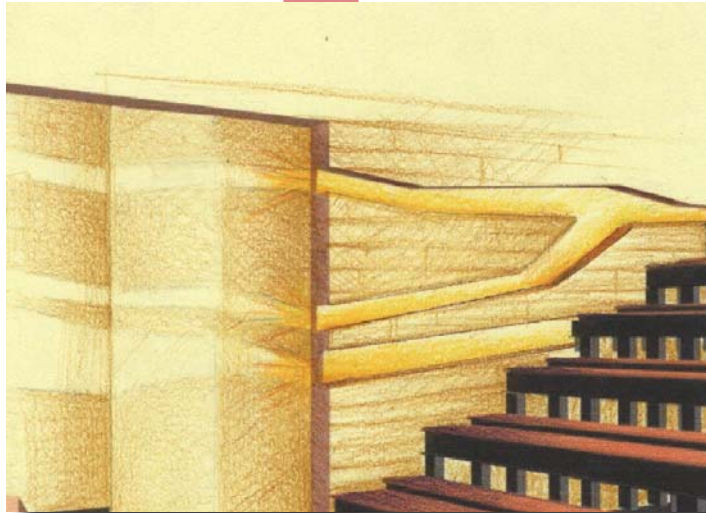


Fig. 63 - Contour wall lighting

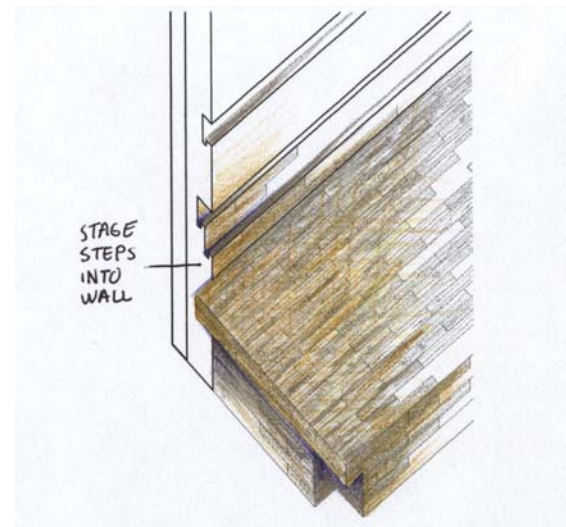


Fig. 64 - Joining detail of stage and wall



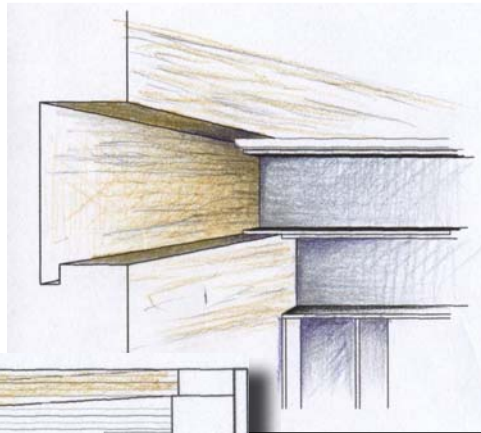


Fig. 65-Wall detail and I-beam connection

presence of the foreign, steel seating structure (Fig.65). Where contour crevices run perpendicular to steel beams, the beam extends into the cavity. These two very different elements thus begin to communicate.

The door surfaces that face the inside of the auditorium have the same plywood finish as that of the walls, but the plywood boards are used in large sheets. The fin shape of the doors and choice of material link them to the walls, but visual differences help maintain a separate identity. Where crevices in the walls meet the surface of closed doors, laminated plywood of a lighter colour is layed into the door finish, continuing the contour. Where walls make space for doors, wall ends expose the ends of the tube lamps placed inside, spilling light subtly out the sides, illuminating the contours on the doors like they do the contours of the wall (Fig.66). This detail shows the relationship that exists between adjoining doors and walls.

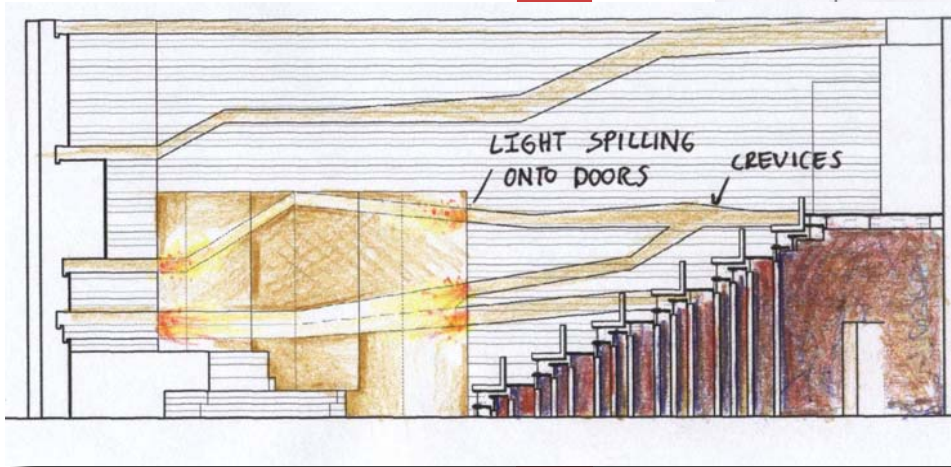


Fig. 66 - View inside auditorium of crevice light spilling onto doors

The steel seating structure does not communicate the same concept as the rest of the space that encapsulates it. The structure looks as if it was lightly placed into the auditorium and did not developed out of its surroundings. Slightly rotated within the space, the front of the seating structure is not parallel to the front wall or line of the stage but angled. This unusual shift assists flow of movement from the old building to the lecture room beyond, and has an impact on one's experience of it (Fig.67 & Fig.68). This twist encourages contemplation of the space.

Constructed of steel I-beams, the seating structure visually connect to the steel support structure of the roof and suspended floor in the adjoining lecture room. The steel structure is comparatively lighter than a visually solid seating structure,

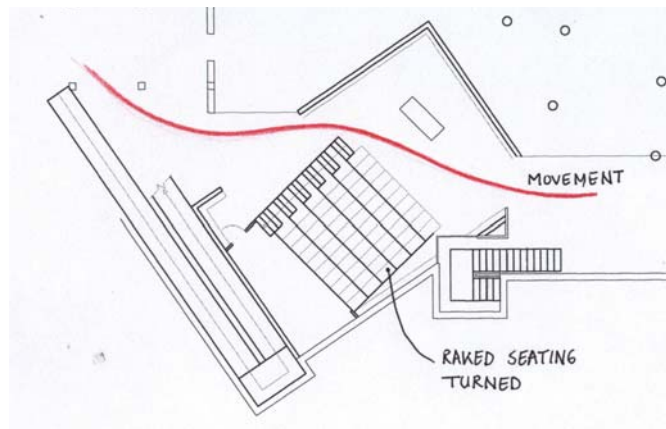


Fig. 67 - Movement in auditorium after rotation

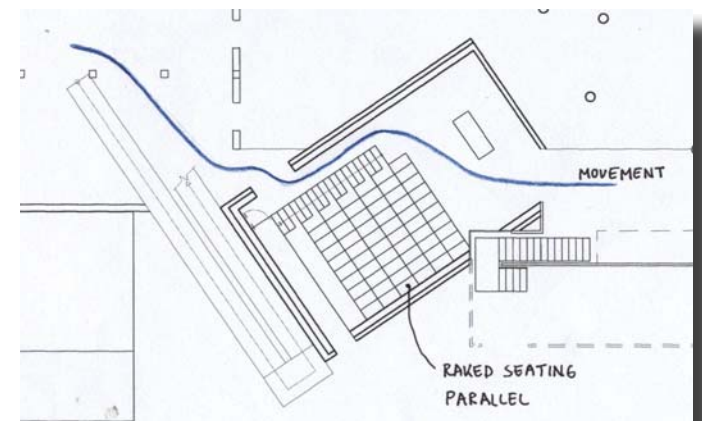
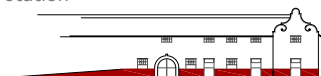


Fig. 68 - Movement in auditorium before rotation



yet heavy in design (Fig.69). It conveys an impression of strength and stability and is not overwhelmed by the thick surrounding walls and heavy retaining wall. The epoxy finish on the horizontal surfaces that cover the structure relates to the new architecture in that it is a relatively technologically advanced material not ordinarily used for this application. Added silica sand gives the epoxy a granular, slip resistant finish, and the subtle grey colour does not detract from the importance of the structure but links to the concrete floor. Connected to the seating surfaces are the bases of the seats, made of blonde plywood (Fig.70). Attached to this is sponge cushioning, covered in textile. The fabric is the colour of the surrounding wood but in a darker tone that does not show dirt as easily. The sponge cushions are easily detached from their plywood base for ease of cleaning or re-upholstery. Small foldaway writing surfaces can be folded out for note taking during lectures or seminars, and store away at the side of the chair.

Halogen tube lights placed within the walls provide the soft, atmospheric lighting for the auditorium, as previously discussed. The dichroic, sunken floor fittings used along the retaining wall in the old building, run right through into the auditorium, lighting the wall that disappears under the raked stairs. Cables suspending dichroic reflector lamps are spun across the auditorium from the one side to the other. One string of lamps runs above the stage while one runs in front of and another one behind the raked seats, illuminating the paths of movement. The number of lamps and the height at which they are strung is determined by quality of lux needed at these points and by the safety regulations for public movement 'corridors' according to the SABS 0400. Mini halogen tube lights are strategically attached to the raked seating structure, softly illuminating the treads of the stairs and walking surfaces in front of the chairs (Fig.71).

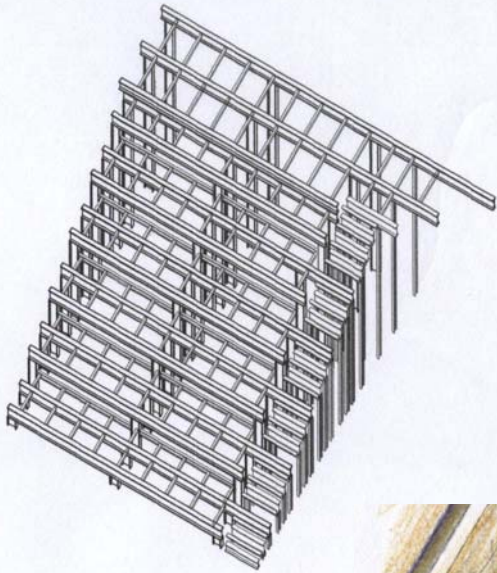


Fig. 69 - Steel seating structure

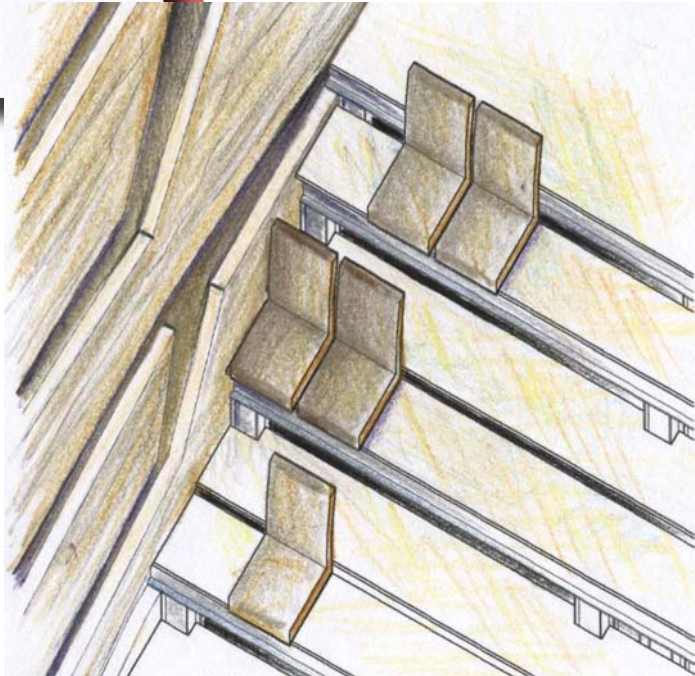


Fig. 70 - Chairs attached to seating surface

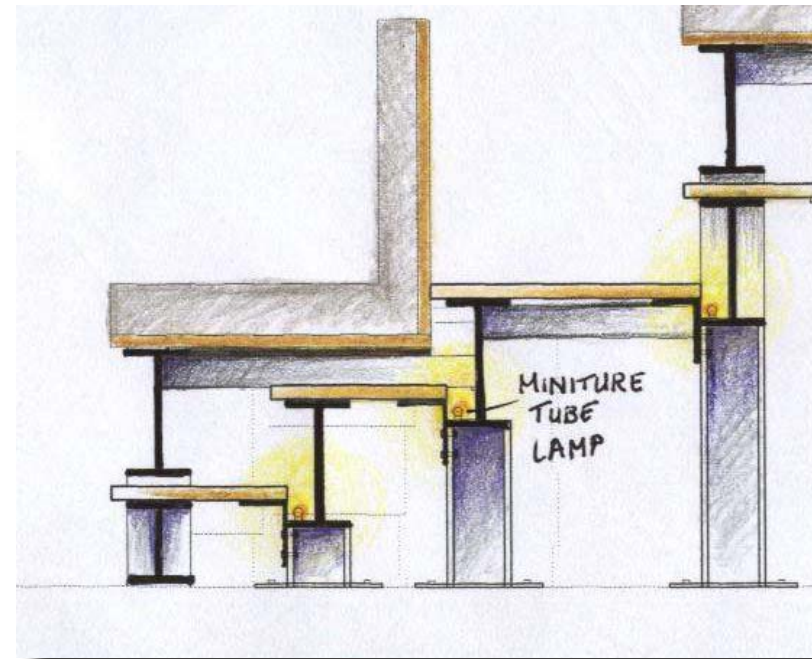


Fig. 71 - Stair illumination

LECTURE AND CONFERENCE ROOM

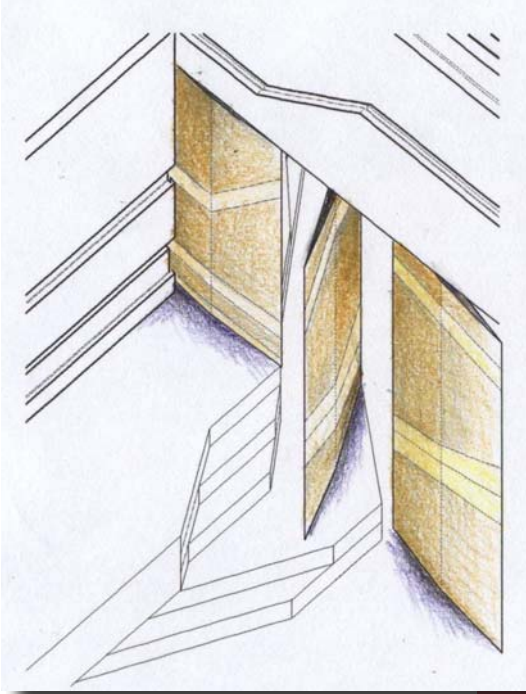


Fig. 72 - Pivoting doors between lecture room and auditorium

The threshold between the auditorium and lecture room consists of three of the fin shaped, swivelling wood panel doors (Fig.72). The first door sits on ground level and opens up the primary path of movement between the spaces. The second door is on a landing of the stair structure and the third door on stage level but is fixed and completes the façade. Opening up the façade establishes visual connection between the spaces and facilitates airflow. The lecture room can accommodate 14 people when used for educational purposes and more when used for conferencing or entertainment space for the auditorium. The structural space is double volume with the first floor cutting into the space like a mezzanine, suspended from the I-beams that support the slab concrete roof. The floor space can be arranged according to requirements.

The contoured stairs move up to the base of a double storey glass façade, while on the opposite side of the room, corrugated iron doors fill in, between concrete columns. The use of corrugated iron explores the use of an industrial material, ordinarily used for roofs or temporary structures, as a flexible finish able to move into the interior, blurring the boundary between inside and outside. Three of the doors swing open and slide into an audiovisual cupboard that houses a television, video machine/DVD player and storage space for audiovisual recordings or other visual aids. The remaining doors swivel on a central axis and shift along a track to reveal a large storage space. The storage area will serve the lecture room as well as the auditorium and exhibition space if necessary. Large objects can be stored due to the ability of the doors to move, and adjustable shelves between columns provide storage for smaller objects. The storage area links to a storage area under the raked stairs in the auditorium.

Glass pane doors, maintain a link with the outside while closing off the furthest end of the room. The doors also swivel and move along a track, opening up the façade to the outside, encouraging unhindered movement and free airflow. Moving out of the room through the open façade the first floor continues overhead for a short distance, forming a sheltered outside area. The protruding first floor shields the doors from direct sunlight.

The suspended first floor in the lecture room is lifted higher than the retained first floor behind the retaining wall to allow natural ventilation to penetrate through to ground floor from the east facing side of the building. The suspended first floor is accessed from the retained floor level by an I-beam step structure. Air moves through the open structure of the stairs into the building through adjustable ventilation grills (Fig.73). The cool air is then pulled from the back of the lecture room to the front as hot air rises through the double volume and escapes through the high positioned windows (Fig.64). The stimulation of natural airflow through the new building decreases dependency on air-conditioning. As in the old farm building, the cool groundmass from behind the new retaining wall will assist in maintaining a cool inside temperature in the new building. An exposed air-conditioning duct runs lengthwise across the roof of the double volume and vents distribution air down into the lecture room, and into the student studio next to it (Fig.74).

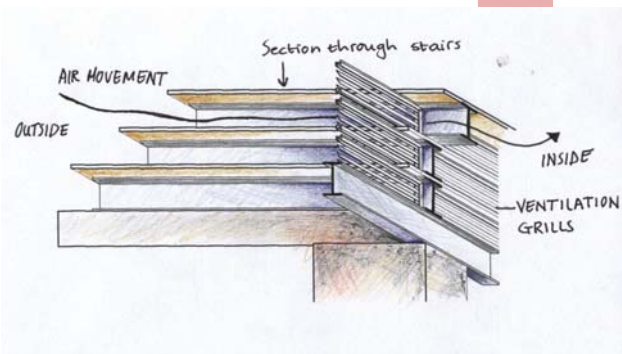


Fig. 73 - Ventilation grill detail

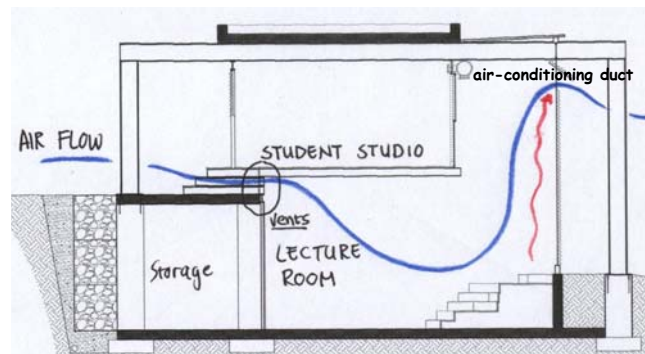
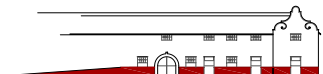


Fig. 74 - Airflow diagram



University of Pretoria etd – Lippi, N (2005)



Fig. 75 - Adjustable louvres used together with corrugated iron

The double storey frontal glass façade allows for a panoramic view to the outside, visually drawing the landscape into the building and giving the feeling of being outside. The façade contains a strip of celestial windows across the very top that pivots horizontally, linking back to the idea of swivel door. The glass allows plenty of natural light into the building, illuminating both ground and first floor. The glass panes need to be shielded from direct sunlight to stop excessive heat gain into the building through heat radiation from the glass. Although the cluster of large pine trees outside does shade the façade, the shade provided is not enough and sun louvers are added to the exterior of the building. The louvers are installed across the front of the glass, on the outside of the building. They filter direct sunlight while maintaining a view to the outside. Fine aluminium louvers are spaced to visually harmonise with the horizontal peaks and dips of the corrugated iron sheeting used elsewhere on the building (Fig 75). The louvers are fully adjustable from the inside and can be shut to block out all light. Closing the louvers will block out glare when making use of the audiovisual equipment in the lecture room. Louvers up to the first floor level function separately from the first floor level louvers, to allow the bottom set to be closed when needed while light still illuminates the top floor and filters down to the bottom without creating glare problems.

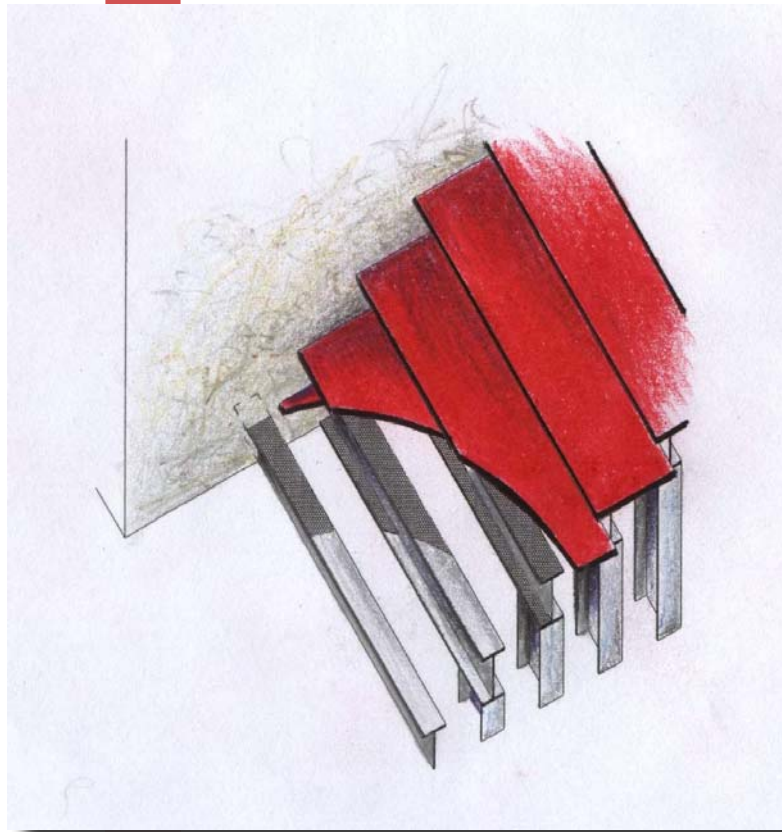


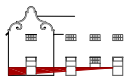
Fig. 76 - Stair perspective detail

Artificial illumination inside the lecture room consists of dichroic reflector lamps spun lengthwise across the room. The lighting is intended for visually intensive work such as writing. Dichroic lamps of lower lux and less in number are spun above the contoured stairs, high up in the double volume. These lamps are for atmospheric light. The staircase is well lit from above by dichroic lamps sunk into the ceiling, following the centre line of movement.

Stairs lead out from the lecture room up to first floor level, ending in a circulation area from which the auditorium, student studio, animal drop-off and clinic can be accessed. As the stairs cross the boundary between ground floor and first floor the staircase turns, emphasising the transition. Steel I-beams are cast perpendicularly into concrete wall along the back of the room. At the other end of the beam, steel I-beams are used as support columns, the same end detail that can be seen in the raked seating structure and the roof support structure (Fig.76). The treads of the stairs have a red epoxy floor finish like that of the ramp which again defines the stairs as a new and important link across the change in level.

STUDENT STUDIO

The student studio is accessed from outside and the semi-private circulation area, which links all the educational facilities. The boundary between the circulation area and social outside area right next to it is a glass façade. The façade includes two large glass swivel doors that open up the entire path of movement. The use of glass visually connects to the landscape and re-affirms the new buildings awareness of the natural surroundings, including it where possible. Sunk back between the two structures and facing an easterly direction, there is no need for louvers. The stairs that lead up to the slightly elevated studio floor run along the entire length of the studio both outside and in, blurring the boundary.



The student studio is a space intended for students participating in practical modules to sit and do theoretical work. It is a study room that encourages students to interact with each other and share knowledge. The studio is furnished with worktables and chairs and numerous power points with Internet connections for laptops. A small reference library with permanent computers for work and research purposes forms part of the animal drop-off and information building right across from the studio. The façade above the strip of stairs that access the studio consists entirely of swivel doors. A track allows the entire façade to open up, creating free movement and airflow between inside and outside, studio and circulation area. The ends of the doors are shaped at an angle to allow the door to overlap at the ends when closed while maintaining a flush surface. When the doors are closed, horizontal sliding windows allow in natural light and controlled amounts of natural ventilation, while adjustable louvers keep out direct sunlight (Fig.77). Where studio space meets the double volume of the lecture room, a glass division separates the two spaces for deterrence of noise transfer. Frosted glass panels run along the bottom half, while transparent glass panels, inspired by a Louis Kahn design (Fig.78), slide down like large sliding window panes, forming a hand railing (Fig.79). Air prompted by the natural wind direction thus moves into the studio through the doored façade, past the glass divide and out the windows in the opposite façade (Fig.80).

The floor of the studio is epoxy flooring and is the same finish used in the auditorium for the raked seating surfaces. The finish cleans very easily which makes it ideal for the space because of all the movement between inside and out, and the colour does not show dirt easily. The same finish moves outside of the studio where it is used for the treads of the steps that lie across the steel I-beams, and as a floor finish in the wildlife drop-off and clinic areas.

Two rows of dichroic lamps are spun lengthwise across the studio, emitting enough light for visual intensive work. Above the stairs leading to and from the studio, dichroic lamps are recessed into the roof, clearly lighting the change in level.

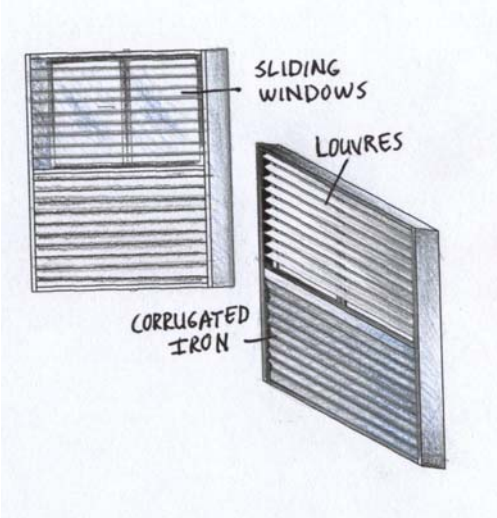


Fig. 77 - Swivel doors, type E

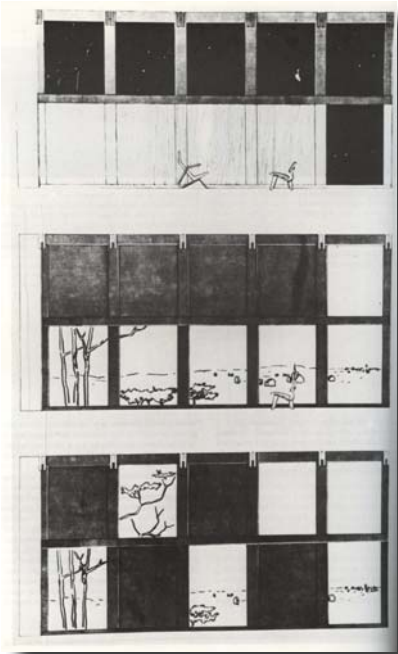


Fig. 78 - Window system by Kahn

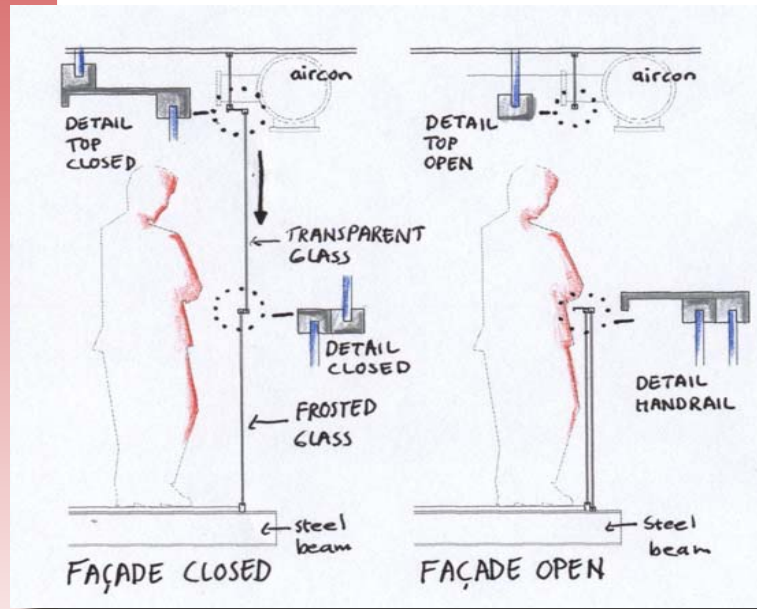


Fig. 79 - Sliding window/handrail concept

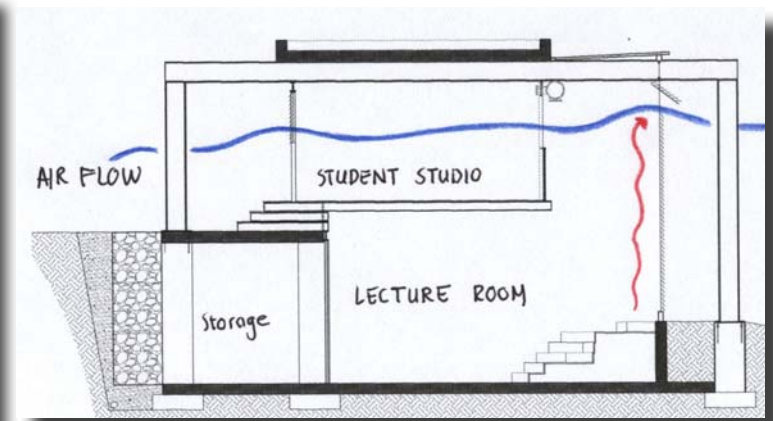
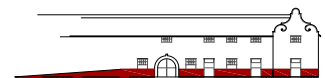


Fig. 80 - Airflow diagram



REST OF THE CENTRE

A covered space stretches lengthwise behind the main building and links the freestanding buildings and silos behind it. The distribution area outside the studio, reference library, and auditorium, is on the one end while a coffee shop is on the other. The space allows movement between public and private and is the interface where visitors interact with staff and students. From this transitional space there is visual access into a veterinary clinic, access to water closet facilities, and an administration sector that juts back into the main building at first floor level. Glass and corrugated iron boxes rest on the concrete beams inside the building and house a reception area, two offices and a boardroom. Across from this a steel I-beam structure breaks through and wraps around one of the silos, with steps leading to the top of the silo where a lookout allows views of the entire facility (Fig.81). Small windows also puncture through the concrete cylinder, allowing specific glimpses of the terrain. Between the main building and the new space, there is an outside space, hard landscaped as a social area. The façade between the new and outside space again opens up to allow for free movement between the spaces, and movement of air to the inside. The end section of the coffee shop also opens up entirely to offer a covered outside area during good weather and a completely sheltered area with views to the outside for use during bad weather conditions. A separate water closet structure is linked to the coffee shop for use by customers and also opens outwards for use by employees working outside.

All new additions to the site are designed to encourage the integration of inside and outside through the manipulation of façades that separate them. The materials and makeshift type structures allow for further development and ease of functional changes of spaces. The new and the old relate through juxtaposition, and together create a whole new visual impact and dynamic spacial experience.



Fig.81 - Inside of silo



DESIGN INVESTIGATION TREATISE



Acoustics had a direct influence on design decisions and development of the auditorium. The slight deformation of the initial rectangular space and the internal rotation of the stage and seating structure within the space prevent the formation of unwanted flutter echoes that occur between parallel surfaces. For good sound enhancement the front of the auditorium and the sidewalls are clad in plywood which constructively reflect the high frequencies that carry information into the audience and absorbs low base sounds that generate noise. The addition of glass wool in the cavity between the plywood surface and the concrete wall enhances the low frequency absorption. The back wall needs to be highly absorbent of all frequencies and should consist of a high-density material. There are many foam products on the market, aesthetically designed for such uses. Due to the small size of the auditorium, the ceiling need not be raked and does not require sounding boards but should consist of a reflective material, except for the section above the stage and at the back of the space which need to be absorbent (Fig.82). A loudspeaker system is not necessary for such a small space.

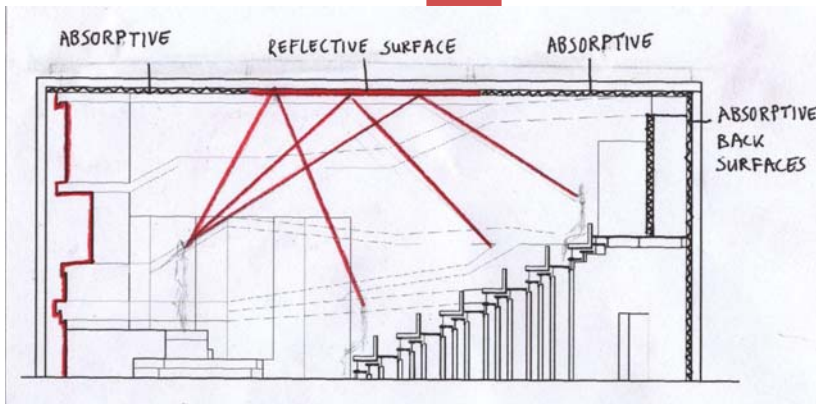


Fig. 82 - Acoustic reflection

The shape of the interior space is between 1.2 and 2 times as long as it is wide, which is generally the suited proportion for auditoria. The raked seating places all listeners in the direct sound path of the source, and avoids sound shadows cast when seated behind another person. The chair surfaces are of an absorbent material to ensure a constant level of sound absorption whether the auditorium is full or empty, thus limiting the effect on sound quality. Acoustic material is also used inside the storage space under the raked stairs in order to insulate any air-conditioning noise from the ducts inside.

Source: Acoustics notes. JP Nel, Building Plan DNA

Although passive temperature control is included in the building design, an additional HVAC (Heating, Ventilation and Air-Conditioning) system is still required because of the classification of the building uses. The air conditioning system suggested is the chilled water fan-coil unit. It provides excellent air quality and individual temperature control for multiple zones while running at a comparatively low operational cost. Air is not circulated between zones as in variable air volume (VAV) systems. This is imperative due to the air supply to laboratory and clinic areas, which needs to be regulated.

Source: HVAC notes. P Kulher, Spoomaker & Partners Inc.

The air-conditioning plant is positioned on top of the roof of the auditorium. The auditorium is rather central to the Visitors Facility and on top of the roof the plant is out of sight. In an auditorium, it is preferred for air-conditioning to cool the space from below the raked seating for optimum user comfort. For this reason air conditioning ducts move down from the roof through the projection room into the storage area below the seating structure. The air conditioning ducts can be seen pushing through the old retaining wall where the storage space ends and the steel structure is exposed.



A sustainable approach is taken throughout the development of the project and construction of the Facility. Sustainability is promoted on several levels, setting an example of conservation and sustainable living through the incorporation of sustainable and environmentally sensitive design and technologies. Jeoff Lockward from Delta Environmental Centre emphasises how important it is that the design of an educational facility conveys the same message as that which it teaches (Personal Interview).

The design of the Wildlife Research and Rehabilitation Facility is to be based on the following criteria set up with regard to the context of the project and a sustainability approach. Refer to baseline document (p.098) for outline of goals set up for the project with regard to designing responsibly and sustainably.

occupant comfort - SOCIAL CRITERIA

Maximising natural light while controlling light ray penetration and glare is a very important aspects to the design with regard to user comfort. The existing architecture makes use of thick load-bearing walls with small sized windows to maintain a moderate inside temperature (Fig.83). The set back is that the small, high positioned windows hinder views to the beautiful surroundings, and a lack of sufficient natural light brings about a high dependency on the provision of supplementary artificial lighting for creating appropriate human environments that comply with SABS 0400 standards. By replacing the main building's ground floor back wall with columns, and opening space up to the retaining wall roofed by glass, allows natural light to flow in and illuminate ground level. Reducing the surface area of first floor, double volumes are created, allowing for further light distribution and stimulation of natural airflow. Passive climate control is incorporated into refurbishment as extensively as possible. Such an approach is ecologically friendlier and economically more viable long term than dependency on artificial provisions. The development of the Visitor's Centre up against a retaining wall passively cools the inside temperature, due to contact of air inside the building with the cool underground mass, of a constant 19 degrees Celsius, through the retaining wall.

The new architectural language used for structural additions to the site is contrasted by the existing architecture in that it aims to create airy, light spaces with thin façades that make maximum use of views, natural ventilation and natural light. Accommodating users that constantly move between inside and outside, the façades are designed to open up, increasing ease of access to outside activity and external social areas. The approach takes advantage of a climate not regularly prone to extreme conditions, and emphasises the natural surroundings that form the basis of the Facility. Ample windows and doors allow for temperature regulation by occupants during warmer or colder weather conditions and relatively narrow shaped spaces ensure that users are within 6m of a window. Glass is used extensively for appreciation of views and light penetration. A louver system shades glass exposed to direct sunlight to minimise light ray penetration and internal heating due to radiation. The louvers also minimise glare that affects the wildlife retained adjacent to the Visitors Centre. The louvers are adjustable and can be manipulated by the user from the inside to increase occupant interaction and comfort.

Various tasks are separated by barriers to prohibit the carry of unwanted noise, with several of the barriers able to open up where connection between areas is sought, as, for example, between the auditorium and lecture room.

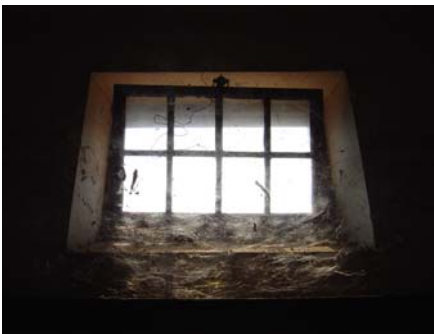
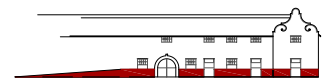


Fig. 83 - Small, high window of main building



The user is considered in the adaptation of the building although design is restricted by the existing structures. Opportunities are created for occupants to control their personal environments in the older structures, and user control with regard to natural and artificial ventilation and temperature control, natural and artificial lighting, and furniture arrangement in flexible spaces are important design influence in the new architecture (Fig.84). Adjustable barriers and façades that open up, and either link or separate spaces and activities inside and outside, provide an added degree of flexibility.

Activity placement was generated by their functions in relation to one another and the movement of the intended users with regard to their needs. Sanitary facilities are provided on both floors for use by students and visitors, and placement was determined by accessibility and the number of sanitary provisions demanded per capita by the SABS 0400 standards. Refreshment is provided by an eatery and take-away accessible form both inside and outside. Situated on the first floor, the eatery is close to ground floor, and the closest point to the rest of the facility just south of the main building. The eatery is for use by the workers on site and visitors to the Centre.

In an attempt to educate and create awareness while establishing a source of income to help maintain the Facility and fund projects, a primary goal is to attract the public and encourage community involvement. Interactive educational experiences that are informative and entertaining, as well as more serious educational lectures and seminars are offered to the public in venues designed for visitors and students.

inclusive environments - SOCIAL CRITERIA

The Visitors Centre or main building of the Facility is the interface between the public and the personnel or students, and is designed with consideration to disabled persons visiting the Centre. A ramp with an incline of 1 /12 links ground and first floor exceeding all minimal SABS 0400 standards in its design. Provision has been made for disabled water closets on ground floor and first floor, designed to satisfy all necessary requirements. Floor surfaces include concrete and industrial liquid plastic flooring that are even and easily navigable by wheelchair, while all door thresholds have a minimum width of 1 metre. There is provision made for wheelchairs in the auditorium and parking for disabled close to the Centre.

Braille is included in the design of the exhibition and on information-bearing boards outside wildlife holdings. There is clear definition of spaces and surfaces throughout the building to assist the visually impaired although the contour steps that lead outside from the lecture/ conference room and up to the stage are not standard and can cause a problem if a visually impaired person is unassisted. These stairs are not situated in the critical path of movement and do not necessarily need to be used by such parties.

(For extended information on the regulations complied to in the design of facilities for disabled persons, refer to Appendix C, p.103)

access to facilities - SOCIAL CRITERIA

The site is situated in an urban environment and very closely located to a range of services. Close to both residential and business districts, the Wildlife Care and Rehabilitation Facility offers easy access to retail, banking and childcare services within a 3km to 5km radius. The construction of the Industrial Hub on the Experimental Farm could also provide certain services in future.



Fig.84 - Ventilation fan, existing architecture



Although current access to the site is through the University of Pretoria sports grounds to the west of the Farm, an on and off ramp connection to the N1 is currently under construction to provide the Innovation Hub with an additional and easily accessible entrance at the east end of the Farm.

The position of the site places the Facility close to students that attend the University of Pretoria's main campus and staff that work there. Situated within Hatfield, many of the people intended to work at the facility are likely to reside within 12km of the site, except for students residing at Onderstepoort hostels.

The facility itself provides access to telephones and computers for easy communication.

education, health and safety - SOCIAL CRITERIA

The Wildlife Research and Rehabilitation Facility is an educational facility, backed by the positive reputation of the University of Pretoria, who provides constant and efficient educational support and stimulation. Additional educational association stems from the fact that the Facility is situated within the developing knowledge axis (Refer to the Innovation Hub p.012)

The University provides for security on the Experimental Farm but with the current development of the Innovation Hub on Farm grounds, security is likely to be reassessed and increased.

No smoking areas are provided within the Visitors Centre but there is constant access to the outside where bins are in adequate supply. A section of the eatery opens up to form a roofed outside area where users of the Centre can smoke. Sufficient external lighting is added to illuminate appropriate areas without the disturbance of the retained wildlife.

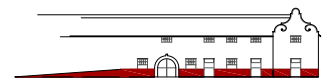
local economy - ECONOMIC ISSUES

Constructors, manufacturers and material suppliers utilized in the construction and maintenance of the Facility are mainly local, sourced within close distances. This is made possible in the project by a choice of readily available material. Manufacturing of the materials and building products is widespread, such as the standard sized steel I-beams, corrugated iron sheeting, concrete and glass (Fig.85). Local contractors and workers are all likely to be familiar with these materials and building products, and their application. The choice of Gabions for soil retention provides labour intensive work for unskilled people.

Involving various companies on an outsourced basis enables parties to benefit from an agreement of exchange, lowering additional costs for all parties involved. Stakeholders who have a vested interest in its success thus sustain the project. The Facility establishes outsourcing opportunities in the form of an eatery to be run by a sourced company, and by hiring out its various facilities, such as those connected with conferencing and entertainment, as well as laboratory and practical areas. Security on the Farm is currently provided by an outsourced company and additional security provision could be acquired if deemed necessary.



Fig.85 - Site example of proposed material use



The construction of a shared educational and training facility benefits several departments of the University. Study directions focus on different aspects of the Facility, combining efforts and sharing knowledge and equipment. The range of expertise allows for the Facility to function without outside assistance and permits the centre to sustain itself.

With all existing structures earmarked for new use, space use efficiency is raised to a maximum. The new facilities make rather effective use of space by creating additional space right in front of the old retaining wall, and behind it, under the existing constructed first level area (Fig.86). Additional space is thus acquired without increasing the footprint of the building. The Facility is in constant use seven days a week and over public holidays. The wildlife at the Facility needs constant supervision and daily feeding while the wildlife drop-offs and related care facilities are continuously on standby for patient admittance. As school holidays will be the busiest time for the Visitors' Centre, most of the facilities at the Centre will be in use throughout the year. Occupancy of the buildings on site is thus very high.

At the Visitors' Centre, little circulation space is needed to move between facilities because of the rather flexible, open plan design and placement of related facilities together. The plantroom for the air-conditioning system is placed on top of the roof of the auditorium and does not use up otherwise usable space.

adaptability and flexibility - ECONOMIC ISSUES

The existing building has thick load-bearing walls that support the roof, and it has concrete columns on ground floor to support the first floor slab, freeing internal partitions for removal. All new structures have been designed with relative flexibility and non load-bearing partitions within the interior to increase the lifespan of the building through adaptability of use over the long term. The exterior façades are also non load-bearing and flexible. The steel structural skeleton and the very light weight and relatively inexpensive corrugated iron and glass façades allow for easy addition to the structure and change in design, or replacement of the façades.

In the design, new construction breaks through existing structure where there is a lack of space, or space appropriate for a certain required activity - such as space to accommodate the auditorium without taking up most of the main building. A load-bearing wall at the back of the main building gives way to support columns that open up the space behind them and similarly the construction of a new retaining wall allows the use of 'wasted' space behind the old one. Areas of first floor floor-slab in the main building give way for the opening up of double volume space from below, accommodating the requirements of the ground floor activity.

ongoing costs - ECONOMIC ISSUES

The project provides for several uses within the Facility and thus several groups of people make use of different areas at different times. The wildlife intensive care unit provides accommodation for persons on over night surveillance of critical wildlife patients. This constant occupation of the Facility provides additional security at no additional cost.

While keeping within the established design context and developed architectural language, many of the primary materials selected for use are relatively inexpensive to purchase and easy to work with. The materials require very low maintenance and minimal cleaning at low cleaning costs. The choice of materials and finishes are all hard wearing and have long life spans, which saves on costly replacement of refurbishment over an extended period of time. The air-conditioning system is left exposed and thus offers easy access for maintenance,



Fig.86 - Area between retaining wall and back wall of building



while the plantroom is situated on top of the roof of the auditorium and creates minimal disturbance when maintenance is required. Water and energy consumption is well regulated within the Visitors Centre building, and users are instructed in this regard. Concerning the rest of the facility, working with animals requires large amounts of water and consumes large amounts of energy. These costs are to be minimised through the use of alternative energy and water sources, and by making use of low energy and water usage equipment as discussed below.

capital costs - ECONOMIC ISSUES

By sharing building costs between two parties: The University of Pretoria and a pharmaceutical company, capital costs are reduced. Contracting a Sponsor into the project makes the realisation of the project more feasible. Lowering the required monetary expense of the University allows the initially expensive sustainable approaches to be explored. Sharing of facilities between parties also reduces maintenance costs, encouraging proper upkeep. The Facility meets the requirements of both parties, which negates the need for two separate facilities and prevents unnecessary development.

The use of existing structures cuts down on construction expenses significantly. Refurbishments and additions to the existing buildings make use of materials relatively low in cost, which allows more money to be spent on the wildlife sector and technologies that support a more extensive sustainable approach. Less expense on the physical facility allows more community programs to be funded that admit lower income community members into otherwise costly educational programs.

Choice of material and products for extensive use include the following:

Façades of the newly constructed sections consist of corrugated iron and safety glass; concrete and industrial epoxy is used for floor finishes, and plywood for floor surface and wall cladding. These materials carry low costs. The usage of steel on the outside and inside is likely to be the most costly. Purchasing of the adjustable louvers can greatly increase expenditure, but will recover the initial cost over the long-term, by minimising extensive use of artificial cooling. A gabion retaining wall is opted for instead of the more expensive concrete construction alternatives.

To reduce capital and ongoing costs, consultant fees are not to be calculated as part of the total but are to make use of incentives.

water - ENVIRONMENTAL ISSUES

Water efficiency devices are to replace old water facilities in all the buildings to reduce water consumption. Rainwater is to be harvested off the roofs of the practical and training facilities to the southern end of the site, and grey water from these facilities will be recycled and used for watering vegetation and flushing toilets.

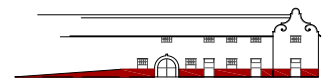
The abundance of natural vegetation will reduce water runoff over the gradually sloped site, and the indigenous vegetation required for the housing of wildlife is lower on water consumption than exotic species that are to be removed.

energy - ENVIRONMENTAL ISSUES

The urban location of the Centre places the facility within walking distance of public transport. With new façades designed to open up to various degrees, considerable manipulation of natural airflow through the buildings is achieved. This natural ventilation system is to be used



Fig.87 - Calf holding



for the regulation of air temperature inside the buildings for a large part of the year, although an alternative heating and air-conditioning system is needed for periods of harsher weather conditions and for use in the auditorium.

Energy efficient light fittings are used wherever possible, and solar panels could possibly be installed on the roofs of the buildings on the southern end of the site in order to produce energy for electrical and heating purposes (Fig.88).

recycling and reuse - ENVIRONMENTAL ISSUES

Appropriate arrangements are made for the disposal of hazardous or inorganic waste along with the waste of the rest of the Experimental Farm. Organic animal waste is to be recycled on the Farm and used for fertilisation purposes. Construction waste should be minimal due to the use of existing buildings, and due to the fact that additional structures are constructed of materials that leave minimal rubble. All sewerage is to be connected to a French-drain system suited to the agricultural terrain.

site - ENVIRONMENTAL ISSUES

The chosen site is a sustainable start to an ecologically sensitive project, as it is classified as a brownfield site and does not intrude on any undisturbed ecosystems. Existing and, for the most part, currently unused structures are to be utilised and refurbished to house required facilities. Naturally vegetated sections of land are essential to the project and the current footprint should shrink due to rehabilitation of land. The structures on site are at a relative distance from one another and have no direct, negative effect on each other.

Landscaping on site is determined by wildlife needs, which results in dynamic, natural habitats. The planting of indigenous vegetation encourages further eco-systemic growth and self sustained environments. Minimal human intervention is required, except when possible harm could come to the retained wildlife, for example harmful insects, ticks and other pests that need to be eradicated.

materials and components - ENVIRONMENTAL ISSUES

The effect that the construction process has on the environment is minimised by developing the project on an already disturbed ecosystem, and by the use of existing structures. The amount of construction required is thus also minimised.

Materials with low embodied energy are specified for use due to their more sustainable nature and their connection to the already existing 'secondary' structures. Materials sourced from renewable resources include wood, glass and concrete, which can in future be reused. Stone is used for the construction of the retaining wall and, although it is not a renewable source, it is a natural material that occurs in great abundance, which can be collected on site, and requires no manufacturing process. Steel and aluminium have high embodied energy and sourced from a non-renewable source but can be recycled. The epoxy finish is the most unsustainable material although used in small quantity and has many advantages. All materials removed during demolition and refurbishment of the old structures that could possibly be reused should be recycled and reincorporated.



Fig.88 - South end site structures



CONCLUSION



Designing a wildlife research and rehabilitation facility, the underlying criteria for this thesis evolved out of the functional needs of such an endeavor. The landscape is important, as it becomes the interface to which design for human use and the design for wildlife react, linking them.

The design project centers on the refurbishment of an old building and its development into a centre for education and entertainment. The objective is for the new building to react to the old architectural style and the natural landscaping that supports it. The final design enhances the qualities of the old architecture through restoration and the contrast of new additions to the building. The new structures are qualitatively in juxtaposition to the solidity and permanency of the old, and make a connection with the outside through permeability and a more sensitive and temporary type of architecture. The internal spaces of new additions developed along with the exterior shell, shaping the new architectural language and drawing it into the interior as design resolution and aesthetic influence. This influence was then drawn into the existing structures, connecting the spaces visually.

The design focuses on the primary educational area of the Visitor's Centre as a pivotal point of user interaction, from which movement patterns develop and influence the growth of the rest of the Centre. The final product is a blueprint of a single development phase in the project, and the design allows for ease of further development and expansion as the needs of the Facility change.

