

STAGE **D.1**
BASELINE / TECHNICAL ANALYSIS





D - DETAILED PROPOSAL

This stage of works involves the presentation of a design concept that responds to the Brief. The baseline criteria, in moving towards a sustainable design proposal, will be established at this point. Including the location of the design proposal, the orientation thereof, a schedule of accommodation and the long-term objectives of the construction and its site.

D.1 INTRODUCTION

At this point, I would like to clearly point out the key driver of this project - that of SUSTAINABILITY, and what the key issues are within this approach:

Firstly

Sustainable development is simply about ensuring a better quality of life for everyone, now and for generations to come.

There have been many attempts to produce formal definitions of sustainable development. The most widely used, refers to:

'DEVELOPMENT THAT MEETS THE NEEDS OF THE PRESENT WITHOUT COMPROMISING THE ABILITY OF FUTURE GENERATIONS TO MEET THEIR OWN NEEDS.'

BRUNDTLAND, 1987.

Perhaps more important than formal definitions are the key objectives which underlie sustainable development. A vision of sustainable development can be based on a basic sustainability assessment tool, the 'Sustainability Building Assessment Tool (SBAT)', which is based on three broad objectives set out for opportunities for change (triple bottom line):

- Social Issues: Social progress which recognises the needs of everyone.
- Economic Issues: Maintenance of high and stable levels of economic growth and employment.
- Environmental Issues: Effective protection of the environment through prudent use of natural resources.

Achieving sustainable development means addressing all of these objectives equally, both for present and future generations. Sustainable development means maintaining economic growth without consuming or exploiting natural resources (renewable or non-renewable) whilst limiting the amount of pollution and waste.

SPACE PLANNING

ACCOMMODATION SCHEDULE:

ABBREVIATIONS:

NMHB:
NEW METRIC HANDBOOK 1998

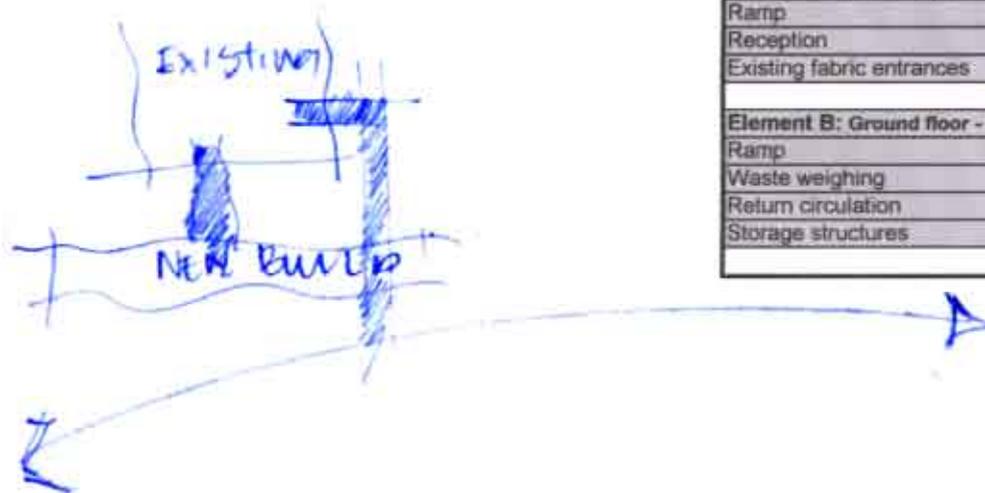
SABS O400 - 1990:
NATIONAL BUILDING REGULATIONS 1990.

LIGHTING REQUIREMENTS - NMHB: 413 - 415

AIR REQUIREMENTS - SABS O400 - 1990: 112 - 113
UNITS IN μ S PER PERSON WITHIN NON-SMOKING ENVIRONMENTS

Eco-systemic AWARENESS	
SCHEDULE OF ACCOMODATION	
DESCRIPTION	AREA PER SPACE
Element A: First floor - entrance level	
Public Concourse	50
Security desk	5
Informal enviro-canteen - Internal	80
Informal enviro-canteen - External	50
Office	10
Storage	3
Stairs	71
Ablutions	30
Circulation	40
Ramp	150
Total	489
Element A: Ground floor - Green exchange level	
Reception	10
Trolley concourse	50
Circulation	130
Overnight accom	35
Ablutions	50
Formalised canteen	100
Kitchen / serving	55
External deck	65
Storage	3
Total	498

Element B: First floor - Linkage circulation	
Conflict zone	65
Info center - circulation	110
Ramp	50
Reception	6
Existing fabric entrances	80
Total	311
Element B: Ground floor - Linkage circulation	
Ramp	20
Waste weighing	170
Return circulation	100
Storage structures	20
Total	310



Element C: First floor Boiler 1 - Conference	
Awareness corridor	25
Circulation	230
Stairs core	10
Lift core	6
Conference	60
Auditorium	140
Abutions	30
Total	501
Element C: Second floor Boiler 1 - Office	
Open plan office	120
Circulation	35
Stairs core	10
Lift core	6
Total	171
Element C: Ground floor Boiler 1 - Waste sorting	
Waste sorting arena 1	350
Waste sorting arena 2	285
Stairs core	25
Lift core	6
Office	15
Waste circulation 1	340
Total	1021
Element C: First floor Boiler 2 - Awareness	
Awareness corridor	55
Entrance	35
Awareness A.V. Morph	70
Seminar	100
Boiler house linkage	25
Circulation	40
Total	325
Element C: Ground floor Boiler 2 - Awareness	
Waste sorting arena 3	100
Waste sorting arena 4	220
First Aid	35
Waste circulation 2	240
Total	595
Total area (sqm)	4221
Average cost per sq m	
TOTAL COST OF PROJECT	

STRUCTURE: EXISTING

TURBINE HOUSE / WORKSHOP

FUTURE CONCEPTS

D.2 HISTORIC ANALYSIS

Platform on which to intervene.

Heritage, as a baseline criterion, is guided by the Burra Charter 1999 and the South African Heritage Resources act, to assist in the decision making process in relation to the structures of Power 'A' on the Pretoria West power station site.

This scheme recognises the need to involve people through opening a historic building, with a degree of cultural significance, to be utilised as a semi-public building. Through giving opportunity in South Africa's high unemployment environments, the proposed project may have a large impact in changing the Cultural significance of the site.

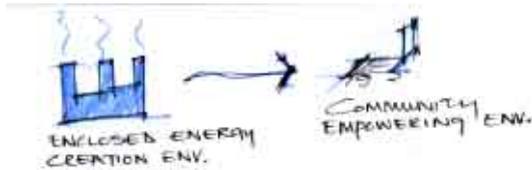


Figure D.2.1
Change of use

“CULTURAL SIGNIFICANCE IS EMBODIED IN THE PLACE ITSELF, ITS FABRIC, SETTING, USE, ASSOCIATIONS, MEANINGS, RECORDS, RELATED PLACES AND RELATED OBJECTS. IT MEANS AESTHETIC, HISTORIC, SCIENTIFIC, SOCIAL OR SPIRITUAL VALUE FOR PAST, PRESENT OR FUTURE GENERATIONS. IMPORTANTLY, PLACES MAY HAVE A RANGE OF VALUES FOR DIFFERENT INDIVIDUALS OR GROUPS.”

BURRA CHARTER, 1999: ARTICLE 1.2

D.2.1 WHY CONSERVE

“CONSERVATION MEANS ALL THE PROCESSES OF LOOKING AFTER A PLACE SO AS TO RETAIN ITS CULTURAL SIGNIFICANCE.”

BURRA CHARTER, 1999: ARTICLE 1.4

The Power 'A' [existing fabric] cultural significance serves as historical record in the history of Energy production in Pretoria's context. It is significant in that it was located within the historically industrial zoning of Pretoria, namely Pretoria West, and although adding little social interaction, has had an impact on the aesthetics of the Pretoria West precinct. This tangible expression of South African energy, currently vacant, is a huge opportunity to change the identity of the site, through offering an environmental awareness experience.

“THE BURRA CHARTER ADVOCATES A CAUTIOUS APPROACH TO CHANGE: DO AS MUCH AS NECESSARY TO CARE FOR THE PLACE AND TO MAKE IT USEABLE, BUT OTHERWISE CHANGE IT AS LITTLE AS POSSIBLE SO THAT ITS CULTURAL SIGNIFICANCE IS RETAINED.”

BURRA CHARTER, 1999: PREAMBLE

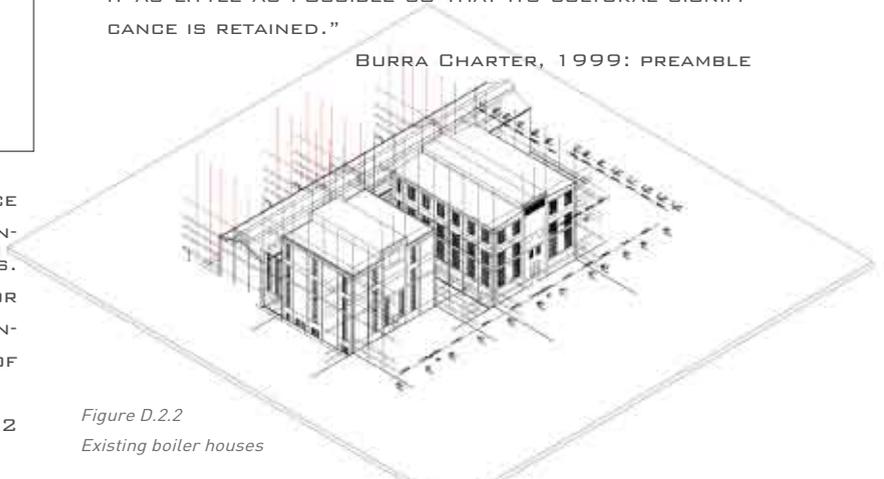


Figure D.2.2
Existing boiler houses



D.2.2 PROPOSED CONSERVATION PROCESS

Through the combination of a number of principles, a change of use will be conceptualised to the existing structure. These conceptual alterations will incorporate **adaptation**, as a conservation process, where the existing structures will be preserved, with the intrusion of the conference facility, awareness centre and waste sorting elements to incorporate the 'change of use'.

D.2.2.1 PRINCIPLES UTILISED

Adaptation:

Modifying a place to suit the existing use or a proposed use. This may include the need for part demolition, which is debatable in terms of a conservation principle and generally not accepted. However, in some cases minor demolition may be appropriate as part of the conservation process. The impact of the demolition process should be carefully assessed, in that minimal culturally significant elements of the structure are not removed and should be reinstated when circumstances permit.

Preservation:

Maintaining the fabric of a place in its existing state and retarding deterioration.

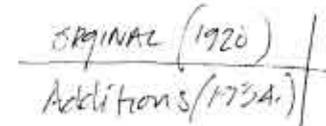
Conservation:

There is a need to discuss the methodology of not touching the existing structures --- seeing as a major criterion of sustainable development is that of recycling.

In response to the above statement, the proposed intervention will not rely on the existing structures, as a structural platform, but the existing envelope will be utilised. This method is due to the age of the existing structures, the nature of the conceptualised project and the cost of restoring the structure - the principle of preservation is therefore utilised.

D.2.3 SURVEY INFORMATION

Through the analysis of the acquired limited hardcopies of the existing drawings for the Power Station 'A', it is illustrated that additions were made to the original structure:



[Assess survey drawings]

Due to the un-availability of the majority of the original drawings, the structure has been surveyed and drawn as a complete construction, with the 60-year heritage clause pertaining to the whole Power 'A' structure.

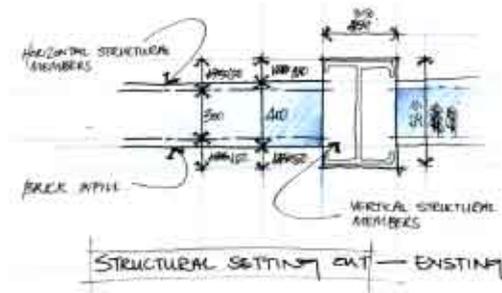


Figure D.2.3

Existing structure analysis

Refer to:

- Survey drawings
- Site development plan
- Proposed drawings
- Contextual photographic analysis [Appears along bottom of document]
- Historical background information [Stage B.5.2]



D.3 BASELINE CRITERIA

The 'Sustainability Building Assessment Tool' (SBAT) as a guideline, has been designed to be particularly appropriate for the use in developing countries. It includes aspects such as the impact of the building on the local economy, as economic issues are often a priority. The tool also enables a building to be rated in terms of its sustainability, which enables buildings to be relatively compared.

Within this conceptual analysis (As the accommodation schedule), the centre is experienced through three main criterion divisions:

A - Functions within proposed structure.
(Enviro-canteen, info centre, overnight accommodation)

B - Interventions within existing structures.
(Waste sorting arenas, segregated awareness environments, kitchen, conference)

C - Functions within existing structures. [Future concepts]
(Bio-diesel centre, retail centre)

These criterion divisions can further be broken up into the experience of:

Stakeholder groups:

- Facility utilisers [Client - value based project, conference facility],
- Centre visitors [Educational experience],
- Waste deliverers [Empowering scheme].

Design elements:

- Entrance element,
- Linkage element,
- Awareness / conference elements [within boilers houses].

Design elements:

- Functional,
- Sensory,
- Aesthetic.

Design members:

- Structural make-up / construction of the design components.



D.4 SOCIAL ISSUES

D.4.1 INCLUSIVE ENVIRONMENTS

An essential criterion for a sustainable development is that buildings must be designed to accommodate everyone; to avoid the need for specially designed buildings. Ensuring that buildings are inclusive supports sustainability, as replication is avoided and 'change of use' is supported.

Criteria:

Approach

- Spatial frameworks
- Public transport
- Public access

Awareness Centre

- Routes
- Edges
- Changes in levels
- Ablutions

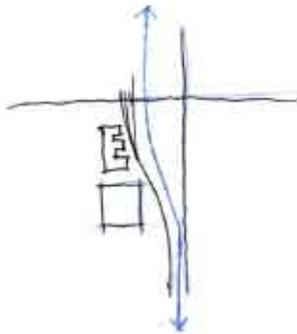


Figure D.4.1
Concept E in
development framework

Through the urban analysis in Stage B, a spatial framework has been set up to guide development within the Pretoria West precinct (stage A.1 theory), based on local planning, zoning and design controls. The selected 'concept E' within this framework extends from Pretoria itself through to the outlying areas of Pretoria, by generating waste recycling programs and integrated crop farming programs to ensure the empowerment of the 'lesser privileged' and the production of recycling and



bio-diesel (stage C.2.5) programs [later phase], for the benefit of our environment.

[The concept is debatable in that people may not travel the distance to deliver waste. This could be beneficial in that a hierarchical system can be set-up, where waste managers can set-up local delivery centres before they deliver to the Pretoria West waste centre].

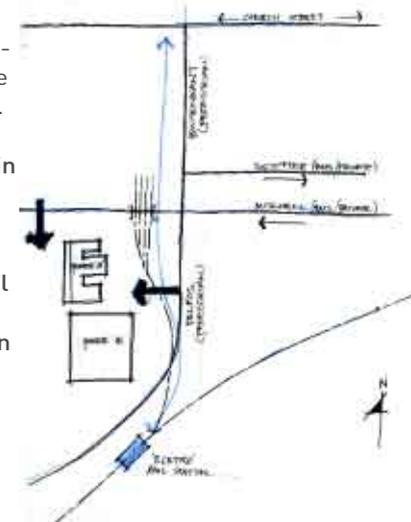


Figure D.4.2
Public transport
routes and site access

The conceptualised urban framework has aimed to minimize reliance on privately owned mechanical means of people movement and increase the utilisation of the existing transportation infrastructure through developing concepts within the framework that rely on this public transport (Stage B.4.9). To ensure efficient use of public transport, building [concepts] are [will be] located within 100metres, or less to accessible public transport routes (With disabled support).

When analysing public access to the conceptualised centre, the location of accessible transport routes within 100m will be met by introducing a pedestrian route connected to Church Street, existing bus stops, rail access through the existing 'Electro' rail station (which is less than 500m from the pedestrian centre entrance along Delfos street) and private vehicle access that has been purposefully segregated from pedestrian access so as to create a hierarchy of public approach, starting with the pedestrian.

With the design concept of a conference facility and a waste centre to assist in the **awareness program**, there will be different criteria, which will have to be satisfied for the introduction of the **waste deliverers** with their trolleys, and then the introduction of people wanting to partake in the awareness experience.

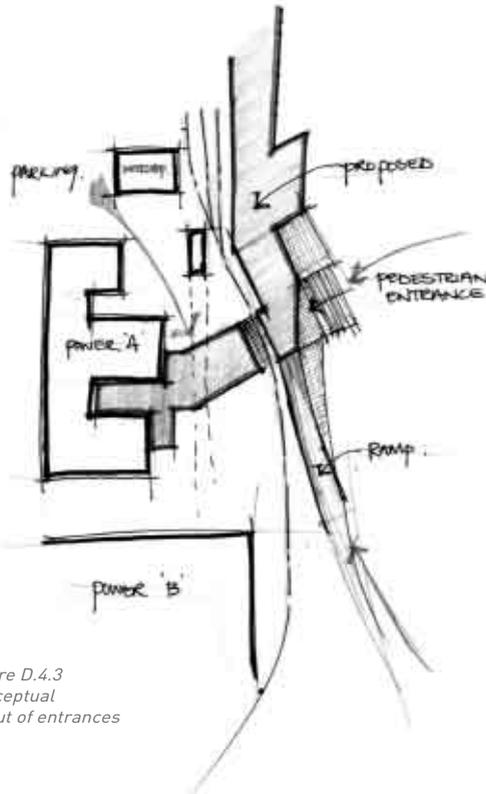


Figure D.4.3
Conceptual
layout of entrances

These entrances and circulation routes will provide for:

- The same basic requirements of disabled access (i.e. easily navigable by wheelchair).
- Edges that are durable (i.e. resist deterioration through trolley usage), edges between walls and floors, and stair nosings clearly distinguished through the use of contrasting colour for visually impaired visitors (Although the design approach towards the awareness concept is that of a visual sensory experience, the requirements should be satisfied for the conference facility).
- Even surfaces that allow for ease-of-use of trolleys and wheelchairs.
- Appropriate ramps (Of 1:12max fall) or lifts catering for changes in levels.
- Ablutions accessible by awareness centre visitors (disabled) and waste deliverers (Allowing view over trolley to avoid theft of collected items).



SANITARY INSTALLATIONS [DRAINAGE]

AREA APPROXIMATION FOR 100 PERSON OCCUPANCY OF A RESTAURANT OR PUB → 20m².
[METRIC HB: 356 PP 58.1]

→ CARE FOR THE 'FORMAL CANTEN', & THE 'INFO CENTRE'

PLANNING OF SPACE:

- PLACES WHERE ~~UNDESIRABLE~~ IS OBLIGED TO PROVIDE THE MOST PRIVATE FUNCTIONS IN PUBLIC SPACE.
- PLACING OF FITTINGS IN ORDER OF USE SIMPLIFIES CIRCULATION.
- PATRONS SHOULD BE ENCOURAGED BY PLACING WASHING & DRYING BETWEEN WC/URINALS AND THE ENT.

[METRIC HB: 536]

TABLE X.1 → RESTAURANTS, PUBLIC HOUSES & CANTENS [FITTING NUMBERS]

WCs → MALE: 1 PER 10 MEN OR 4 FOR 66-100 MEN.

AC → UPPER CANTEN & INFO CENTRE
2 NO. WCs

→ A MORE SATISFACTORY PROVISION - METRIC HB: 599; 540

→ FEMALE: 2 PER 100 WOMEN.
AC → 5 NO. WCs

URINALS → 1 PER 25 MEN.

WVES → 1 FOR EACH WC + 1 FOR EVERY 5 URINALS. } MALE

→ 1 FOR EVERY 2 WCs. } FEMALE

TABLE X.1, METRIC HB, 1999: 540

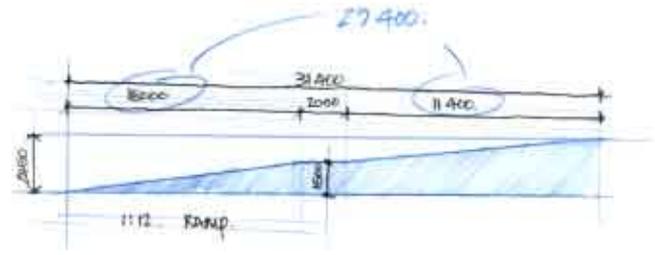
RAMP → WASTE TRUCKS & WHEELCHAIR CIRCULATION.

'GUIDED BY SABS 0400' REGULATIONS, PART 5, 'FACILITATED FOR DISABLED PERSONS, PAGE 02'



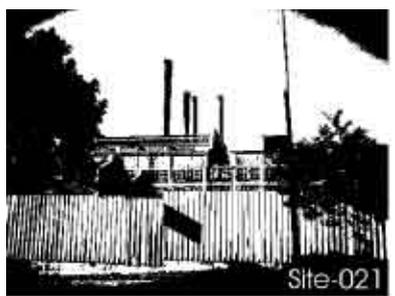
ANY RAMP PROVIDED FOR THE USE OF PERSONS IN WHEELCHAIRS SHALL HAVE:

- 1:12 GRADIENT (WHERE THE DIFFERENCE IN LEVEL OF THE ENDS OF THE RAMP IS MORE THAN 100MM) - MEASURED ON CENTRE LINE;
- CLEAR TRAFFICABLE SURFACES NOT LESS THAN 1.1M WIDE;
- SLIP RESISTANT MATERIAL;
- LANDING FOR EVERY 1.5M OF VERTICAL RISE, OF 1.2M IN LENGTH & WIDTH AS RAMP;
- EDGE HANDRAIL ON THE SIDE WHERE THE CHANGE OF LEVEL OCCURS AND POSITIONED BETWEEN 850-1000MM ABOVE THE SURFACE OF THE RAMP; AND FOLLOW THE GRADIENT OF THE RAMP FOR THE FULL LENGTH.



DISABLED TOILET FACILITIES. [PART 555: 15A SABS 0400]

- MIN AREA → 2,7 m²
- MIN PLAN DIMENSION → 1,6m
- HINGED DOOR → OUTWARDS OPENING
- WC PAN 1600mm MAX & 1800mm MAX ABOVE FLOOR
- WVB BOUNDER WITHOUT LEGS → 850mm MAX ABOVE FLOOR
- 800mm CLEARANCE UNDER BOUND
- WATER TAPS & FLUSHERS WILL BE OPERATED BY LEVERS, & COLD WATER TAP SHALL BE WITHIN REACH OF PERSON IN



D.4.2 ACCESS TO FACILITIES

The proposed concept 'E' within the spatial framework (stage A.1 theory), supports the conventional living and working patterns of the average South African by allowing regular access to a range of services, increasing efficiency and reducing environmental impact:

Criteria:

- Childcare
- Banking
- Retail
- Communication
- Residential

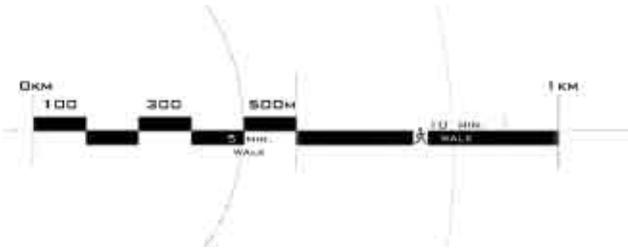


Figure D.4.4
Scale indicating 400m in
5min and 800m in 10min

The basic criteria for the access to facilities is that they are all within a 3km range to the proposed development, with the exception of the residences of building occupants being within a 12km range.

Through the contextual analysis (stage B.4), it is clear that the awareness concept is being developed within an existing urban structure, ensuring that the basic criterion for the access to facilities is satisfied.

D.4.3 PARTICIPATION, CONTROL AND OCCUPANT COMFORT

Within the concept of the **green exchange** program (waste collection for reuse or recycling), the control over aspects of the urban environment and the local environment (site specific) enables personal satisfaction and comfort. Both support sustainability by promoting proper management of urban waste systems and building systems.

Criteria:

Urban

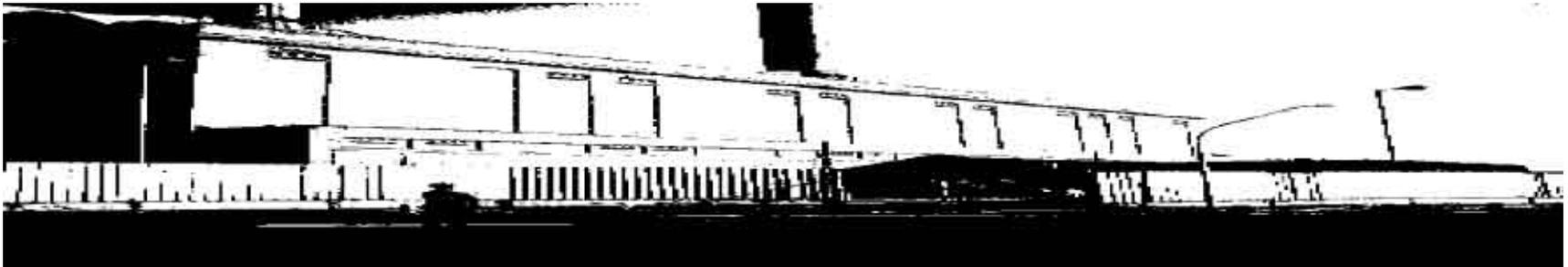
- Environmental awareness

Awareness Centre

- Environmental control (Lighting, Ventilation, heating, Acoustic)
- Views
- User adaption
- Social spaces
- Amenities
- Community involvement

Through the introduction of the **green exchange** program on an urban scale, user participation is the tool for creating or raising the general environmental awareness amongst local and neighbouring communities. The management of this program will be through control of the delivered items, and through this, subtly enforcing methods of environmentally more beneficial waste management systems within these communities.

With the nature of the awareness centre comprising of different accommodation typologies, there is the need to divide the conceptual criteria into three sections:



A - FUNCTIONS WITHIN PROPOSED STRUCTURE

Enviro-canteen

The enviro-canteen is a social space open to the public for informal interaction and ease of access to refreshments or further amenities (ablutions - which will ensure that the general public utilising this function will not be allowed access into the centre without passing through a security check point).

Environmental control

- Natural Ventilation requirements (Appendix)
- Lighting requirements (Appendix)

Info centre

The info-centre is a social space to fulfil a fundamental criterion of sustainability - that of transparency, by increasing the community involvement on related environmental projects, and by offering an opportunity for interested and affected parties to comment on any schemes presented. Access to amenities within this function will be to ablutions shared with the Enviro-canteen and access to the canteen itself. Environmental control will be ensured through natural ventilation, lighting, heating and acoustic details.

Overnight accommodation

The private spaces will accommodate long distance **waste deliverers** of the program for a night, utilising the 'coupons' gained from the waste delivery program to pay for the facility. This accommodation will allow access to basic amenities (WCs, showers and access to healthy eating facilities in the enviro-canteen). The accommodation spaces will ensure space for a trolley and a sleeping area for a single individual. Environmental control will be ensured through natural ventilation, lighting, heating and acoustic details, with a degree of control.

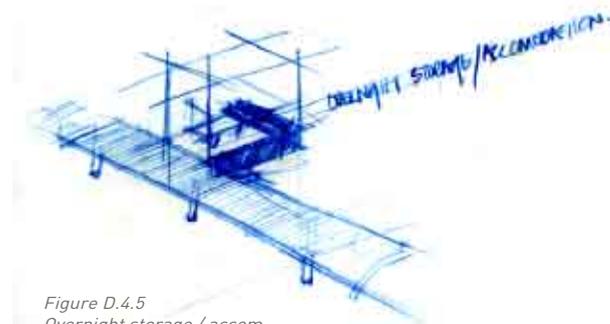


Figure D.4.5
Overnight storage / accommodation



B - INTERVENTIONS WITHIN EXISTING STRUCTURES

Waste sorting arenas

These arenas will effectively perform as exterior spaces, with the windows of the existing power station 'A' fabric being preserved as they are. This will give minimal environmental control within these areas except for odour extract through the existing (boiler house 2) and proposed (boiler house 1) chimney ducts and a heating detail for winter months. Access to amenities within this function will be limited to ablutions, which will allow for trolley accessed WCs to deter illegal transfer of collected waste.

Segregated awareness environs

Within these segregated environs, views will be offered over the waste sorting arenas, effectively to expose visitors of the centre to the waste impact of people on their environment.

- Members of local communities,
- Environmentally concerned individuals,
- Members of high-powered business organisations visiting the conference facility, etc.

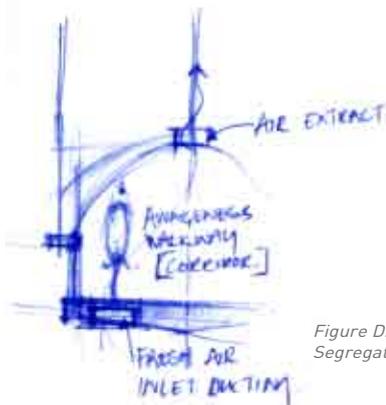


Figure D.4.6
Segregated environ

This visual experience within these segregated environs is to create a conflict of elements (Physical and psychological), where environmental control within the waste sorting arenas is mostly of natural resources and that of the segregated environs, mechanically controlled. This mechanical system will be acceptable on a sustainability scale (to illustrate that within a 'environmentally best practise' project, mechanical means of environmental control can be utilised - stage D.6.2.3).

- Ventilation requirements (appendix)
- Lighting requirements (appendix)
- Heating requirements (appendix)
- Acoustic requirements (appendix)

These segregated environs will all be interventions within the existing fabric of the Boiler Houses 1 and 2 of the power 'A' station and the functions will include access to the:

- Awareness corridors
- Audiovisual awareness auditorium [Morph]
- Administration offices
- Conference facilities
- Ablutions
- Office

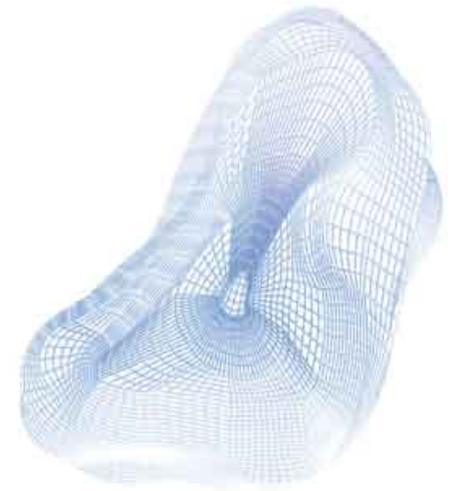


Figure D.4.7
Segregated
AV Morph environ



C - FUNCTIONS WITHIN EXISTING STRUCTURES

Bio-diesel centre

The introduction of the bio-diesel plant (power 'A' - Turbine house) offers a process of recycling specific waste on site which is delivered to the centre by the public. The opportunity for the public to briefly view the bio-diesel process taking place and introducing the environmental benefits of that process, will increase the community involvement with the waste program through raising their awareness of the benefits of a changed way of life. The environmental control within the bio-centre will be specific in nature, and is discussed in stage C.2.6. Access to amenities will be specific for the bio-diesel plant occupants, offering ablution, shower, emergency shower (encase of toxic spillage) and kitchen facilities.

Retail centre

The retail centre (power 'A' - workshop) will be utilised to increase the awareness of energy saving and environmentally non-degrading products. Access to amenities will be limited to the retail centre employed occupants and access to the enviro-centre, ablutions and info centre for the public.

D.4.4 EDUCATION, HEALTH AND SAFETY

Criteria:

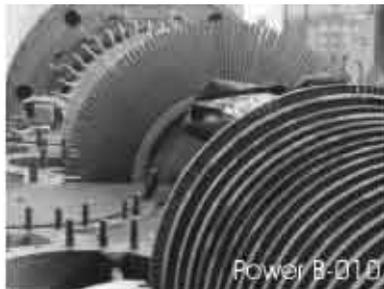
- Education
- Security
- Health
- Smoking
- Safety
- Cultural differentiation

These factors contribute to sustainability, by helping ensure that people remain healthy and economically active. This will result in reduced unemployment and ill health. Reducing the cost on society, the environment and the economy.

The awareness centre assists in creating an awareness of these factors amongst its users. The target group for these educational, health and safety factors is the 'lesser privileged'. The **green exchange** program introduces these people into an educational environment as an opportunity to improve their standard of living.

This increases the opportunity to offer support for learning (through the possibilities of internet access, structured courses or the provision of learning material such as books, journals, newspapers or a well-serviced notice board), which will expose them to an education base in terms of health and safety. Health and safety measures will have to comply with the requirements set by the norms and standards, and due to the nature of the centre functions they will have to be regularly checked to ensure these measures remain in place.

Security in a South African context remains an important factor to consider, for the **waste deliverers** safety, the safety of their personal belongings and the security of the centre functions and occupants utilising those functions. Measures taken could include well-lit routes, routes and



spaces overlooked by occupied areas or clear visual links between spaces. The use of smoking zones will have to be carefully examined because of the nature of the functions on site and not to affect other centre users (away from air intakes).

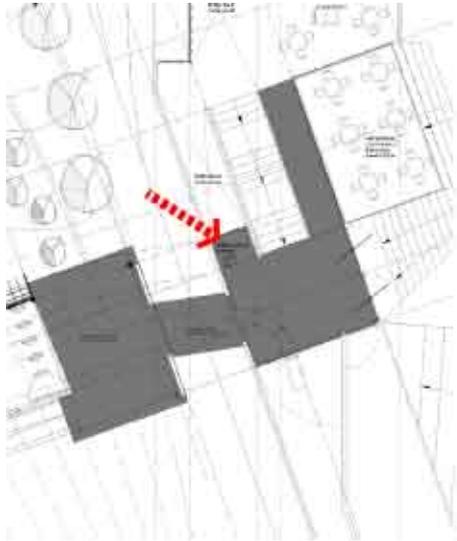
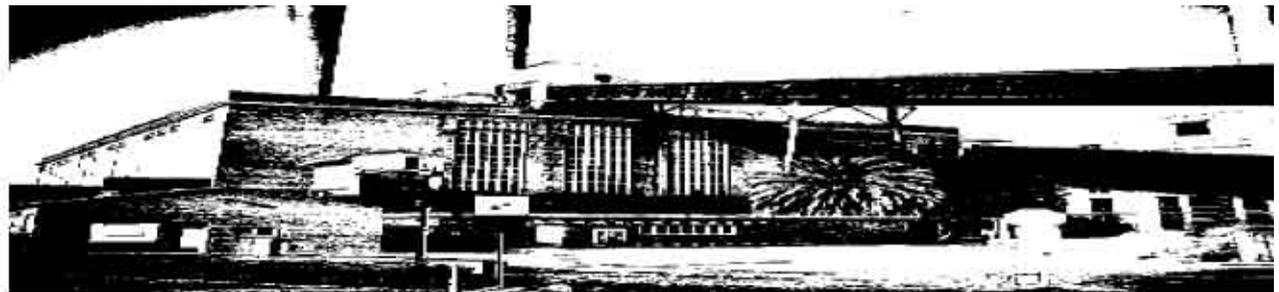


Figure D.4.8
Security measures

Cultural differentiation is an important factor to consider within the entire framework as well as in the awareness centre concept. With the introduction of people from a range of surrounding areas of Pretoria, the cultural diversity, if managed correctly can be a great source of urban energy and offer people further awareness and acceptance of different cultural groups.



D.5 ECONOMIC ISSUES

D.5.1 LOCAL ECONOMY

Criteria:

- Local contractors
- Local building material supply
- Local component manufacture
- Outsource opportunities
- Repairs and maintenance

When discussing the term LOCAL, the SBAT tool advises that the criteria discussed must be resourced within 200km of the site. For the awareness concept, the term LOCAL will refer to the Pretoria, Pretoria-West, Atteridgeville and Valhalla precincts, with the effects that it supports the community who will be mostly influenced by the centre.

The goals of the construction and management of the awareness centre, are to stimulate and sustain a part of the local economy. This could be achieved by offering opportunities to local contractors, suppliers and component manufactures to establish themselves and to offer opportunities for future tenders. Outsource opportunities can be created to link into the awareness centre program:

- Delivery systems to recycling companies
- Emergence of small recycling business
- Specific security measures of the centre
- Catering in enviro-canteen for specific cultural cuisine
- Education programs
- Cleaning services
- Repairs and maintenance of non-specialised building functions, Etc.

The conflict achieved through the introduction of stakeholder groups within the centre concept, effectively assists in creating awareness, and results in a conflict when discussing local contractors, local component manufacturers and repairs and maintenance. The materials and skills evolved in the construction (or assembly) of the segregated environs, may need to be specialised and resourced from sources outside the selected local precincts, but will add to its success if the process can take place within the specified 200km radius.



Figure D.5.1
10km radius of Pretoria surrounding site



D.5.2 EFFICIENCY OF USE

Criteria:

- Useable space
- Mixed development
- Occupancy
- Space management
- Use of technology

Due to the nature of the design scheme, the efficiency of use will differ somewhat from a standard non-residential scheme. The efficiency of the existing power 'A' structure, will be somewhat lower than that of the proposed structure. This is due to the scale of the existing buildings and the functions located within them.

The high efficiency of use of the proposed works will ensure a really high percentage of useable space according to floor area, due to the scale and opportunity to design for natural means of environmental control (orientation for natural ventilation, lighting and thermal gains) with non-usable space being limited to circulation routes and ablutions.

The introduction of the design interventions within the existing power 'A' fabric and the proposed design, will ensure that the potential for mixed development on the site has been realised (amenity, commercial, environmental education, production, retail, accommodation). An important factor to consider when discussing mixed functions is if the building is occupied for an average of 30 hours per week. The predicted occupancy of the awareness centre will stretch far beyond that benchmark because of the nature of the mixed functions within the whole concept. The occupancy within the design concept will require intensive design and a space management approach to accommodate the different mixed functions:

- Access of 'waste deliverers', awareness centre, canteen, retail & conference visitors
- Security and control of access over occupants of accommodation function
- Security and control of access to bio-diesel centre
- Ensuring access to different functions of the concept
- Delivery access (including existing rail delivery route)
- Vehicular access
- Pedestrian access

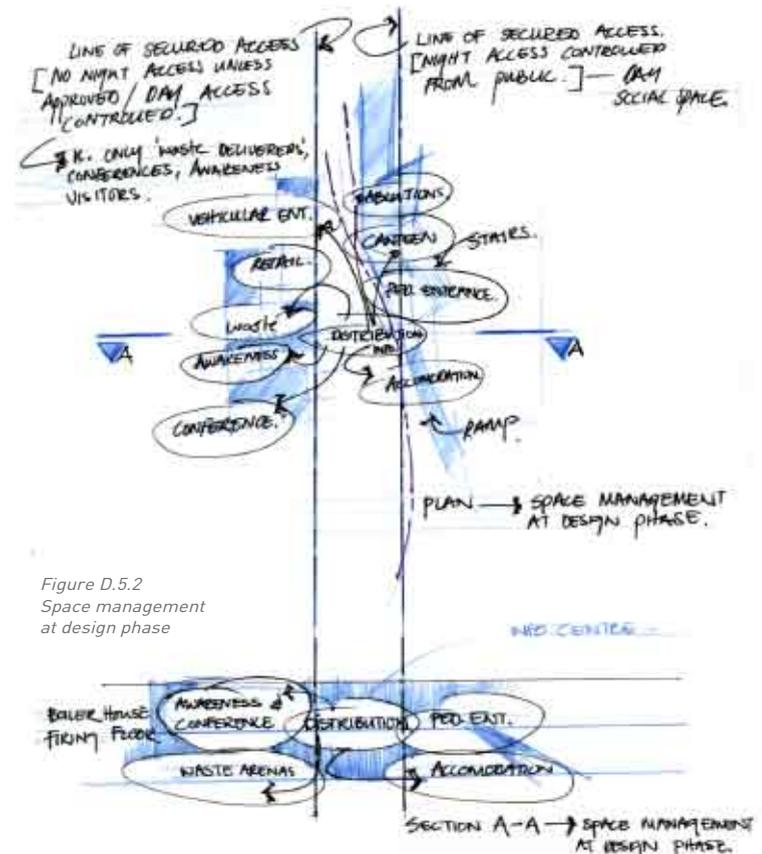


Figure D.5.2
Space management
at design phase



D.5.3 ADAPTABILITY AND FLEXIBILITY

Criteria:

- Vertical dimension
- Internal partitions
- Glazing partitions
- Services

With the realisation that the function of a building will have a life span of approximately 50 years, proved by the previous use of the now vacant Power 'A' structures. Through the support of sustainability, these existing structures are being re-used. The large scale of the interior spaces can easily accommodate a change of use, eradicating the need for new structures to be built to fulfil the requirements of the awareness concept. Most of the interventions within the existing power 'A' fabric will therefore have to be reversible (i.e. not rely on existing structural elements).

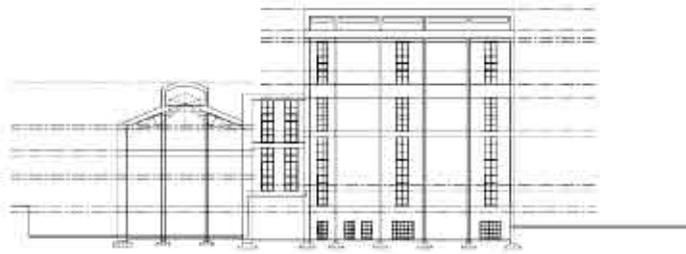


Figure D.5.3
Boiler house 2
South Elevation

Within the proposed development, the vertical dimension of the entrance level is determined by the height of the Boiler house firing floor level (2450mm). The floor to ceiling height on the entrance level will be a minimum of 3000mm (to maximise future opportunities for change of use).

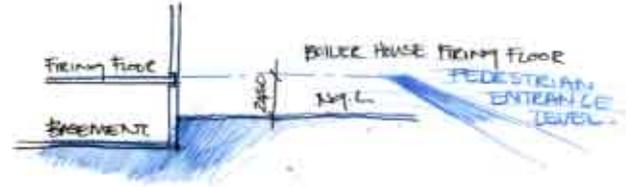


Figure D.5.5
Boiler house firing floor level

Within the existing fabric, many of the design interventions will be prefabricated elements with all internal partitions, Glazing partitions and services to be manufactured off site and assembled on site. This will offer the possibilities of relocating the elements if another change of use does occur. The elements within the proposed structure will be more of a permanent nature, with these elements being resourced from local manufactures. The provision will allow for easy modifications, with the internal partitions being non-load bearing and the services providing for easy access to electrical, communication, heating and ventilation elements, enabling easy modifications of the systems (addition and subtraction of outlets).



Figure D.5.4
Boiler house 1 internal space



D.5.4 ONGOING COSTS

Criteria:

- Maintenance
- Cleaning
- Disruption and 'downtime'
- Insurance / water / energy

Maintenance within the existing fabric will be a continuous process according to the heritage policies that will be set in place for the structures. The specification of the design intervention elements will be of low maintenance, in terms of the structural elements (i.e. curtain walling frames, doors, plant, ironmongery, etc.), with details to ensure access to these elements within the large-scale space for cleaning of glazed partitions of the segregated environs. The nature of the design interventions will mean that there will be a requirement for access to the electrical, communication, HVAC and sewerage systems, meaning that details will have to be designed to ensure access for maintenance and cleaning purposes without any disruption of the daily functions of the centre. To avoid any 'downtime' occurring due to electrical 'cut-offs', diesel backup generators will assist in feeding the building with an adequate quantity of power.

The maintenance and cleaning demands on the proposed structure will be somewhat less demanding than that of the existing fabric. The design elements will be simpler in nature, with the reduction of scale and the vertical dimensions of the glazing systems far less, allowing simpler cleaning methods to be utilised.

In line with producing a sustainable concept, the issue of transparency is a factor when discussing resource consumption. The consumption and costs of water and energy need to be monitored and regularly reported to the building occupants, to promote the awareness of

resource wastage. It is therefore recommended that the awareness centre should present this information to the occupants and visitors of the centre (in terms of a digitally operated board or manually operated board). Within the management of this aspect, a policy will assist in reducing the natural resource consumption of the building itself and through creating this awareness it will assist in the management of further buildings (could offer savings on water and energy consumption on an incentive bases).

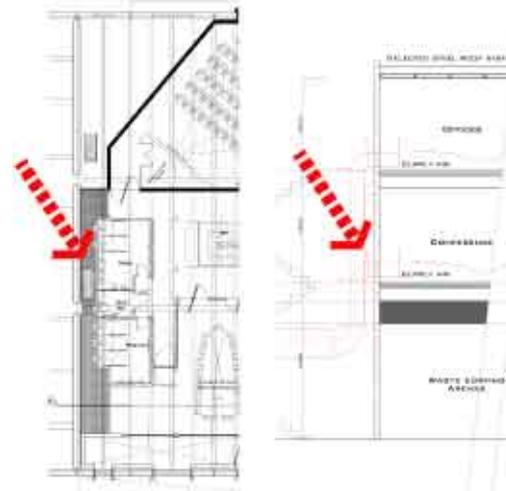


Figure D.5.6
Boiler house 1
Service zones of proposed works



D.6 ENVIRONMENTAL ISSUES

D.6.1 WATER



Figure D.6.1
Existing dam on site

In supporting sustainability, it is important that the water consumption of a development is kept to a minimum, to reduce the environmental impact required to deliver water and dispose of it after use.

A large water resource exists on the site of the Pretoria West power stations, with its main purpose being that of assisting in the Power station 'B' cooling process. The resource is currently linked to the Dasport sewage plant. The treated water is pumped into the dam to keep its level at a constant, with the overflow returning to the natural water streams.

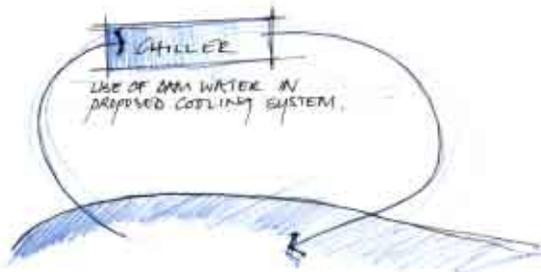


Figure D.6.2
Use of dam water



Importantly, this water storage system can be utilised as a major resource within the awareness concept as well as in the future residential concept within the framework.

Criteria:

- Rainwater
- Grey water
- Water use
- Water reuse
- Runoff
- Planting

With the knowledge of the existing dam as a water storage resource for rainwater and recycled grey water (through the existing sewage treatment process), through early strategic decisions, water re-use can become a prominent feature of the awareness concept - being utilised for flushing of WCs, cistern flushing (both with reduced flushing volumes) and through further research, for the use in showers (if heat source can be used to purify water to reach acceptable levels so as to be utilised for human contact).

Even though this water re-use resource is in place, the important factor of water use remains an issue to recognise as the building occupants still need to be aware of the water quantities utilised by the building.

A further concern lies in the design of runoff systems, for the collection of rainwater in the dam and to feed a landscape design that consists of indigenous species with low water requirements (hard surfaces need to be minimised or runoff directed).

The roof structure of the **entrance** building, has been structured around a rain water collection system. The box gutter component forms the spine of the system - supporting the roof structure and channelling the water to a collection tank, where the water is distributed through the building for toilet flushing. A wind pump has been set up to pump water from the dam and ensure the storage tank remains at the required level.



Figure D.6.3
Rain water collection



D.6.2 ENERGY

It is of great importance to minimize building load requirements wherever possible. A consideration for alternative means of energy production needs to be assessed (i.e. solar, wind, biomass etc.) and energy usage needs to be reduced to a minimum by planning of areas, buffer zones, use of insulation and use of sustainable and renewable resources with considerations being made to create management strategies and policies for regulation of energy use.

Criteria:

- Lighting system
- Ventilation system
- Heating and cooling systems
- Appliances and fittings
- Renewable energy

A major concern with all the passive details within the design of the awareness concept is the east / west orientation of the existing and proposed buildings. Details will therefore have to be designed to accommodate for the existing orientation.

[Refer to the basic requirements for lighting, ventilation, heating and cooling energy saving systems are discussed in appendices.]

D.6.2.1 VENTILATION SYSTEM

Details will consider natural ventilation strategies over and above mechanical means, but due to the nature of the scheme being that of waste collection, the 'conflicting sensory' experience will be limited to a visual experience, requiring the need for mechanical ventilation (prevent odours due to the quality of the ambient air) within the segregated zones of the centre. It is important to utilise mechanical ventilation methods that are limiting in environmental impact and the design of these zones will therefore investigate these different methods.

Based on the basic requirements for ventilation, conceptual details have been set-up to give a basic understanding of the design approach specific to the awareness concept.

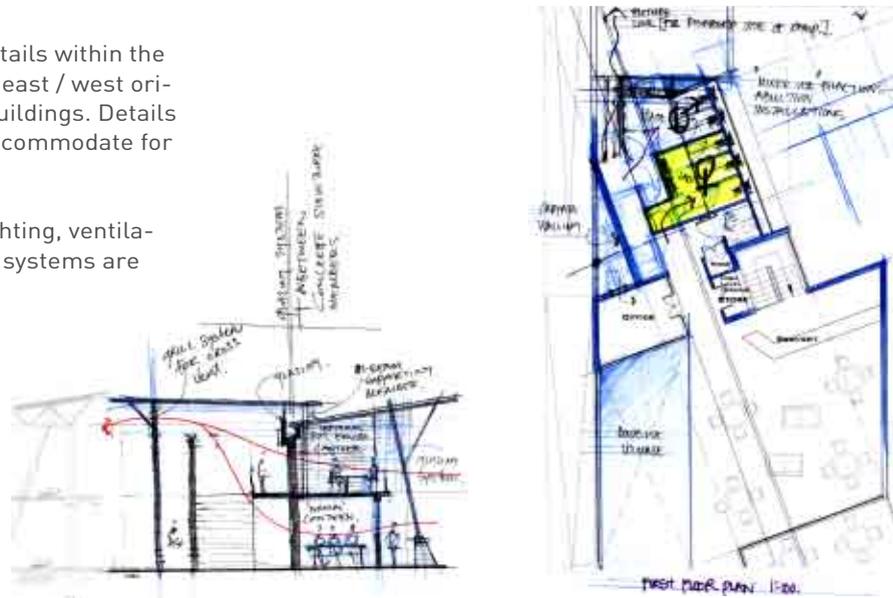


Figure D.6.4
Naturally ventilated zones



D.6.2.2 LIGHTING SYSTEM

Details within the awareness concept will differ somewhat from the proposed structure and the details of the design interventions within the existing fabric of the power 'A' station. Both do give the opportunity for imaginative concepts of passive control systems, such as brise-soleil, over-sailing canopies, ventilated light wells, etc.

Based on the basic requirements for lighting, conceptual details have been set-up to give a basic understanding of the design approach specific to the awareness concept.

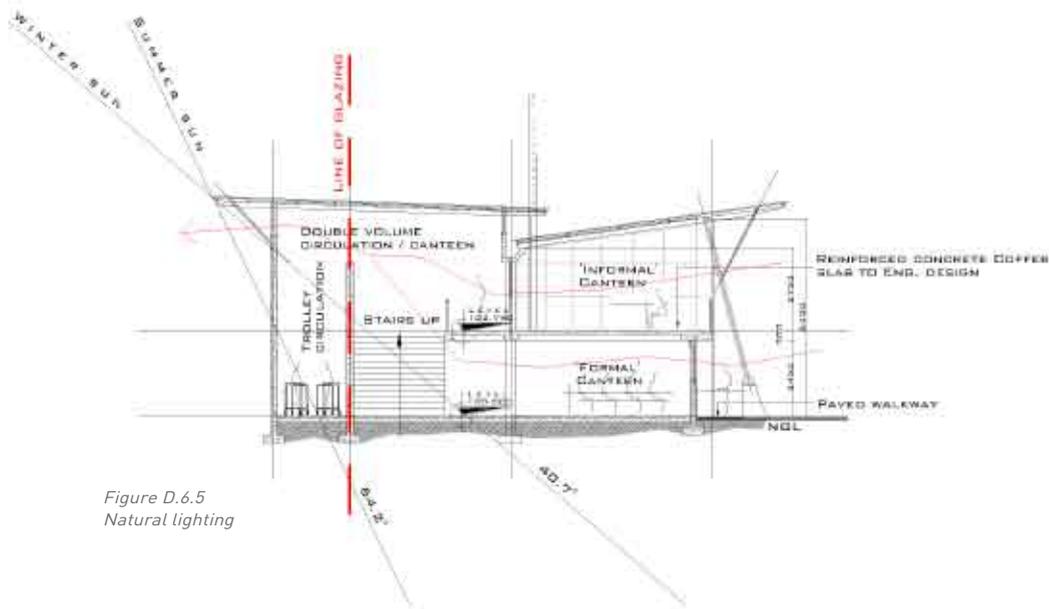


Figure D.6.5
Natural lighting



Boiler 1-013



Boiler 1-014



Boiler 1-015



Boiler 1-016

D.6.2.3 COOLING SYSTEMS

Cooling systems will consider the use of thermal mass, solar shading, night cooling, openable windows giving passive ventilation and effective airflow strategies, to reduce the reliance on mechanical cooling. The areas requiring cooling will be effectively zoned into areas of higher internal gains (computer and plant) and segregated zones, for awareness and conference visitors.

Air intake:

Intake ducts will be located on southern facade, within a proposed landscape for further shading and further cooling through evaporative means

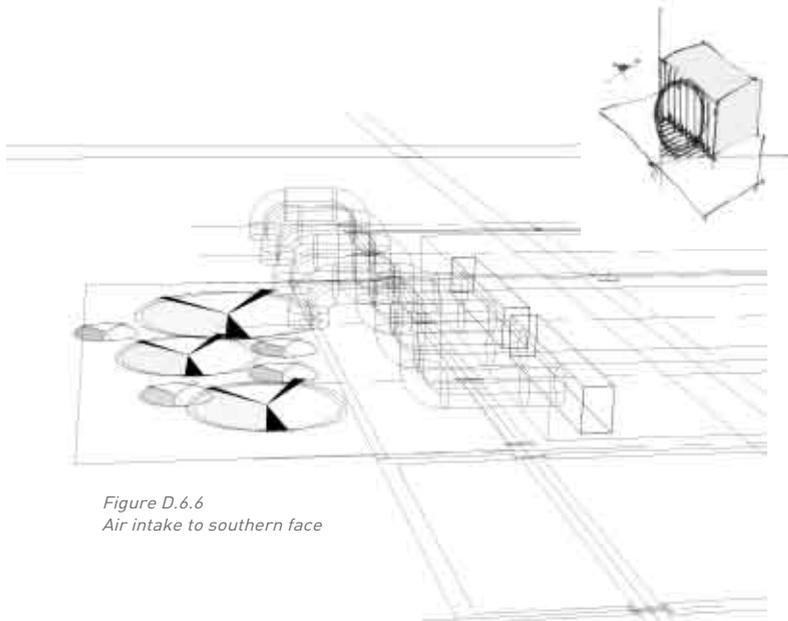


Figure D.6.6
Air intake to southern face

GABION

WALL CONSTRUCTION

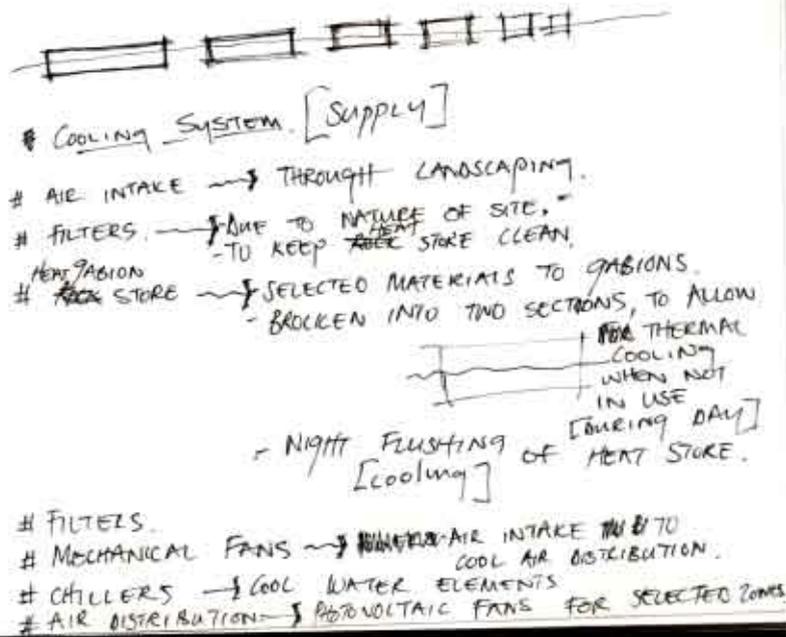
'THE GABION IS A RECTANGULAR BASKET STOUTLY MADE STEEL-WIRE STRENGTHENED BY SELVEDGES OF HEAVIER WIRE. SUPPLIED AS A FLAT PACK, IT IS ASSEMBLED ON SITE AND NORMALLY FILLED IN SITU WITH QUARRIED STONE OR LARGE ROUNDED SHINGLE. SECTIONS OF GABIONS ARE SECURELY WIRED TOGETHER IN POSITION TO FORM THE REQUIRED RETAINING AND ANTI- EROSION STRUCTURES.

SABS 1580: 1993

The proposed use of the Gabion walls in the air-cooling system is that of a thermal mass heat store. Meaning that the gabion structures will act as a pre-cooling system with the supply air passing through the rock store before passing through a chiller plant and a mechanical cooling system for extreme temperature conditions.

[A selected material within the gabions is selected with high thermal absorbtione properties, so as to retain heat. Think corabrick straps]





AHU -> FURTHER COOLING DURING EXTREME TEMP.
 MOISTURE CONTROL SYSTEM -> REPLACE WATER LOST DURING CHILLER PHASE.

[EXTRACT.]

- # EXISTING CHIMNEYS AS 'THERMAL BUCYANCY' STACKS.
- # SLACK HEATING OF WATER CIRCULATED TO BOTTOM OF STACK TO INDUCE AIRFLOW.
- # DIFFUSERS TO CONTROL THE EXTRACT THROUGH STACK.

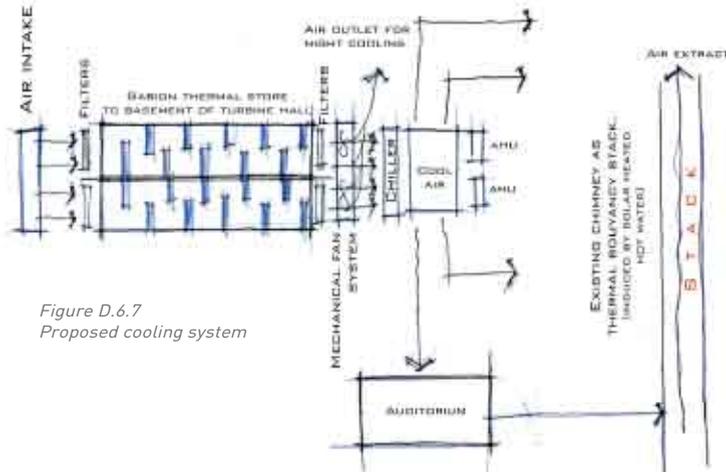


Figure D.6.7 Proposed cooling system

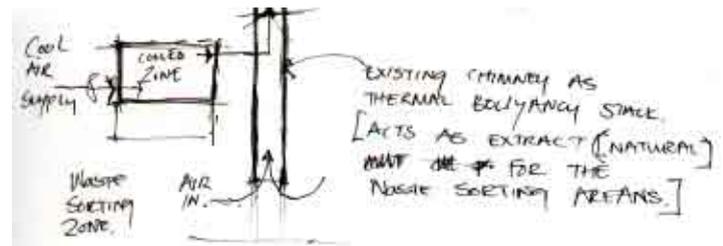


Figure D.6.8 Cooling system extract



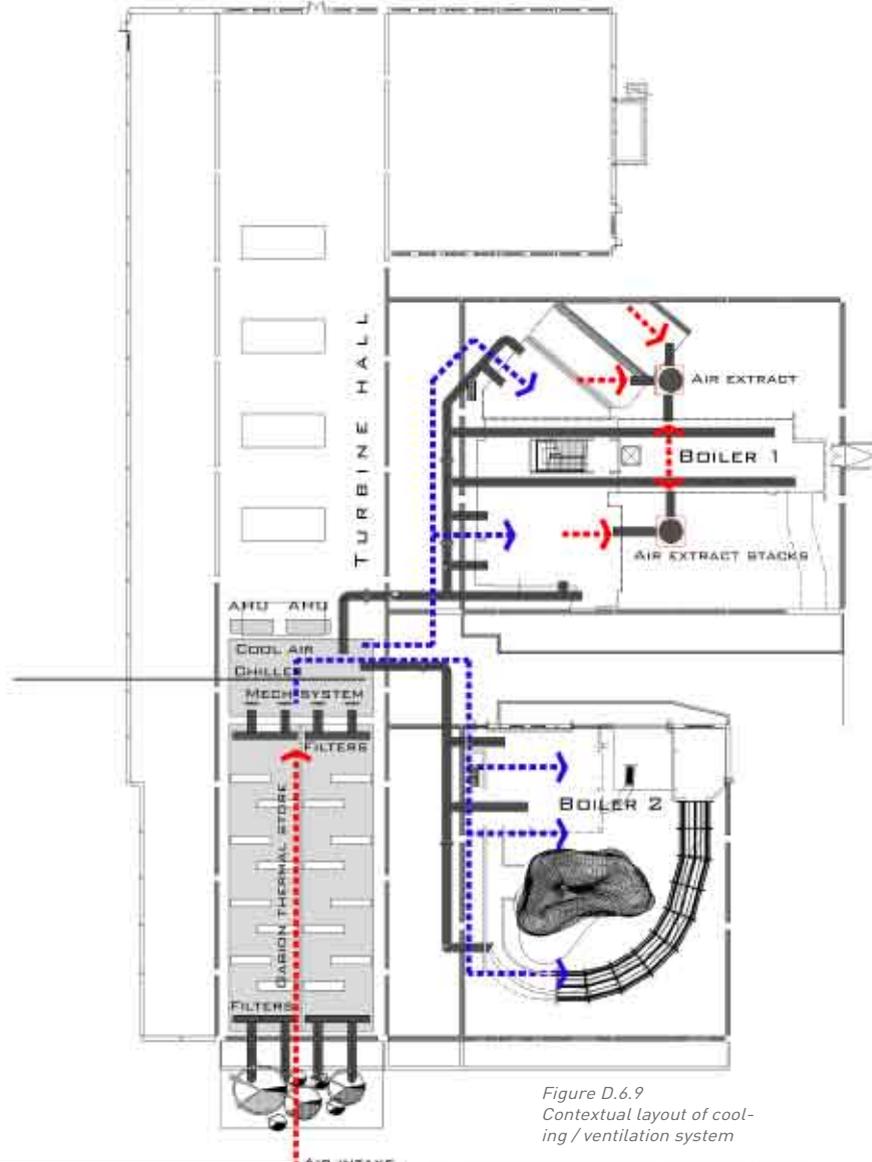
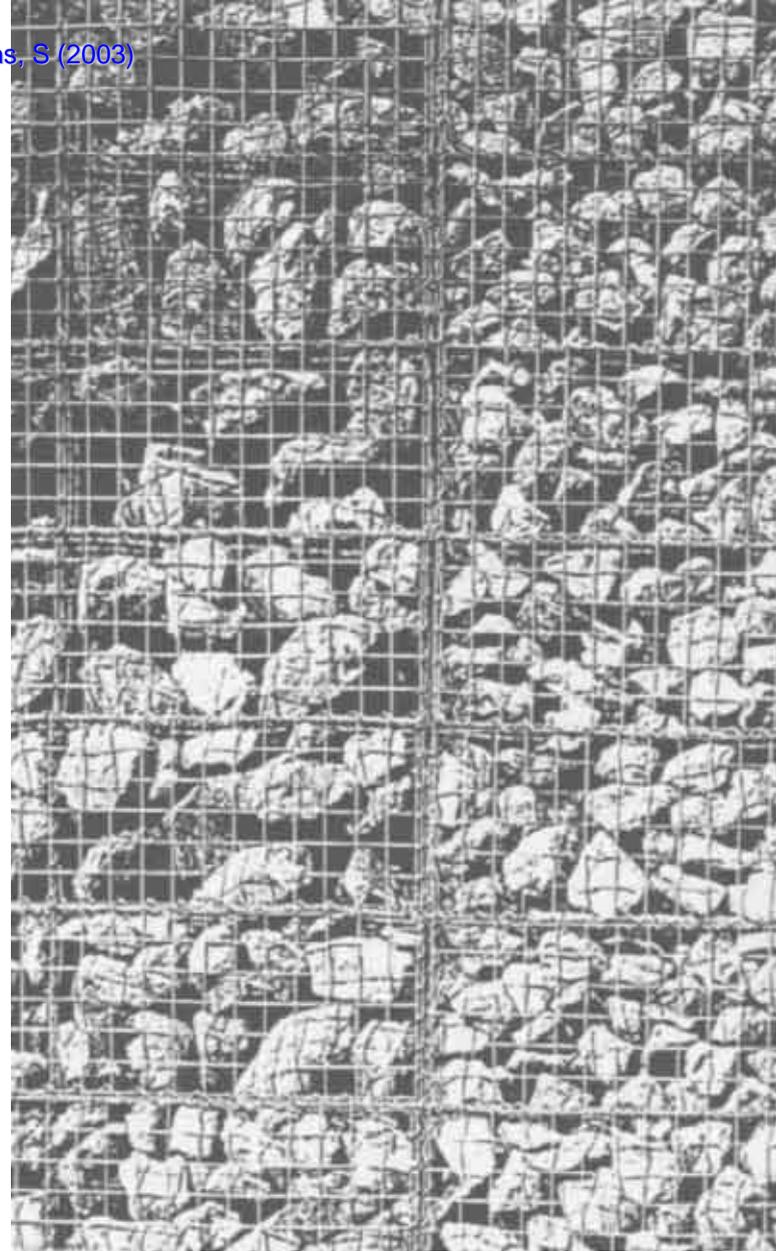
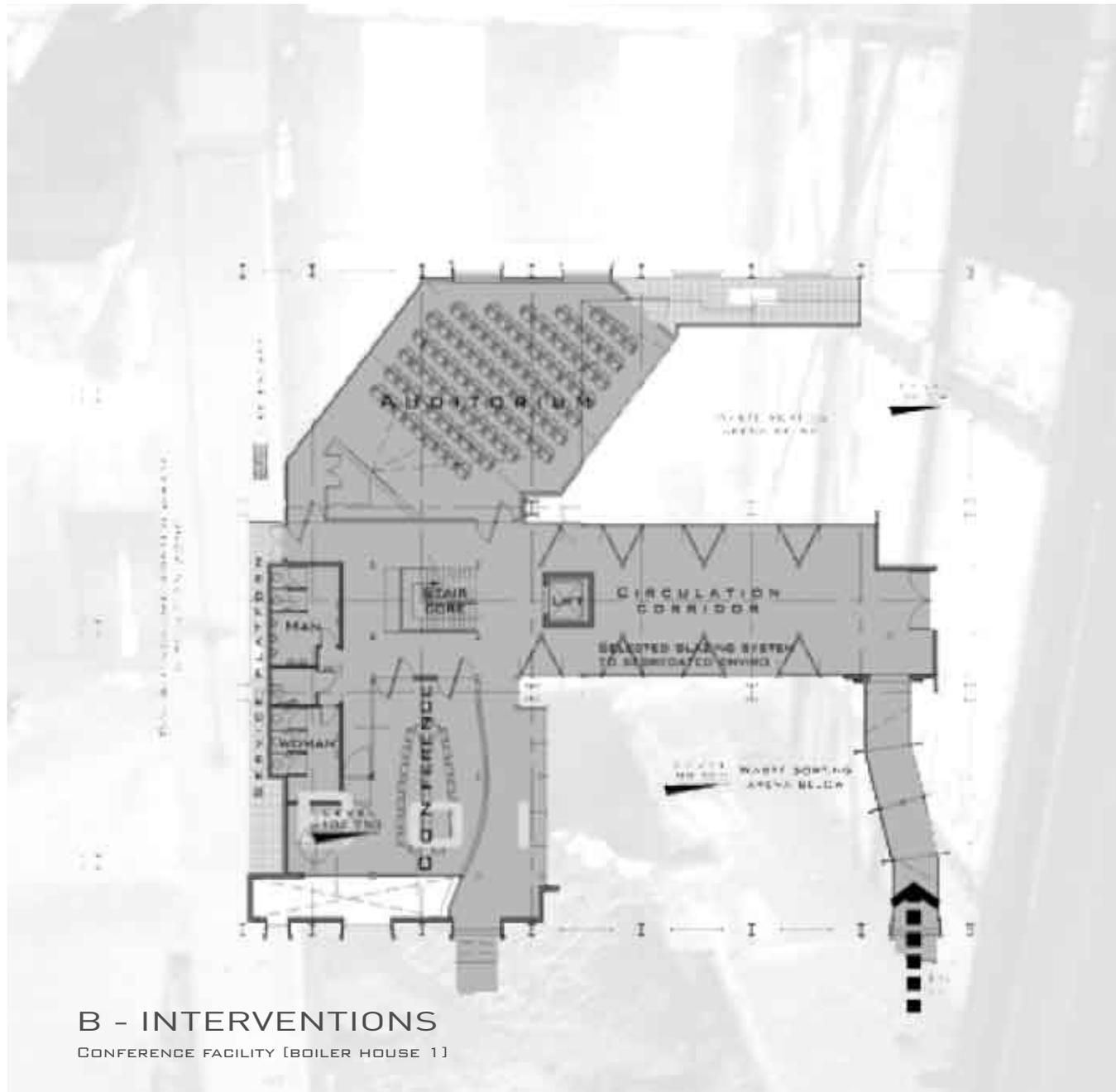


Figure D.6.9
Contextual layout of cooling / ventilation system





B - INTERVENTIONS

CONFERENCE FACILITY [BOILER HOUSE 1]

AUDITORIUM

AUDITORIUM REQUIREMENTS:# GENERAL REQUIREMENTS:

- 1) UNOBSTRUCTED VIEW OF THE ENTIRE PICTURE AREA WITHOUT VISUAL OR/AND PHYSICAL DISCOMFORT & WITHOUT ~~AND~~ PICTURE DISTORTION, FOR EVERY MEMBER OF THE AUDIENCE;
- 2) THE AUDITORIUM MUST BE SUITABLE FOR THE SOUND REPRODUCTION USED, WHICH MUST BE FREE FROM DISTORTION & COLOURATION ARISING FROM ARCHITECTURAL DEFICIENCIES.

→ # SHAPE & NATURE OF THE SURFACES PLAY AN IMPORTANT PART:

- 1) OPPOSITE SURFACES OF WALLS;
- 2) ~~AND~~ FLOOR & CEILING SHOULD NOT BE PARALLEL.

1) DESIGN CALLS FOR A REASONED BALANCE BETWEEN:

- 1) SCREEN SIZE;
- 2) VIEWING CONDITIONS;
- 3) SEATING CONDITIONS;
- 4) CIRCULATION REQUIREMENTS."

NEW METRIC HANDBOOK, 1979: 199.

VIEWING CONDITIONS:

- 1) THE SIZE & POSITION OF THE SCREEN MUST RELATE TO THE SIZE & SHAPE OF THE AUDITORIUM, & UPON THE RAKE OF THE FLOOR [IF ANY]

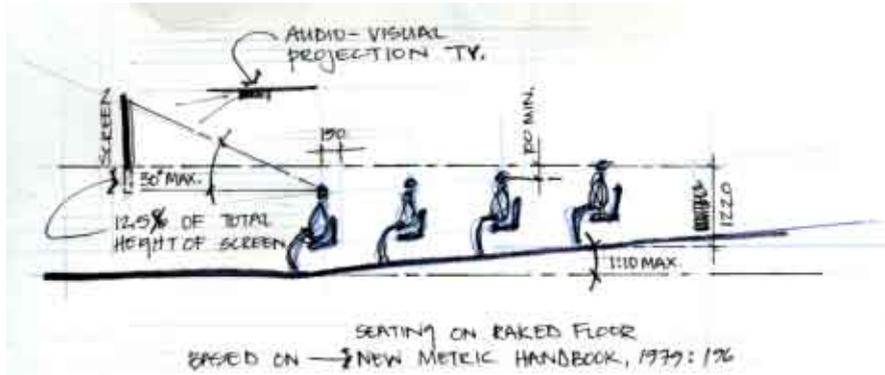
→ THE SCREEN MUST BE RAISED ~~AND~~ HIGHER WHEN THE FLOOR IS FLAT.

- 2) SIGHTLINES FROM THE REARMOSEST TWO ROWS MUST BE CHECKED TO ENSURE THAT THE BOTTOM OF THE SCREEN IS VISIBLE FROM THOSE SEATS.

[AT MOST, THE HEADS OF PEOPLE IN FRONT SHOULD NOT OBSCURE MORE THAN 12 1/2 % OF THE TOTAL HEIGHT OF THE SCREEN]

- 3) WHEN THE SCREEN IS SET HIGH, THE FRONT ROW OF SEATS MUST BE SET BACK TO PRESERVE THE 30° SIGHTLINE TO THE TOP OF THE SCREEN."

NEW METRIC HANDBOOK, 1979: 199



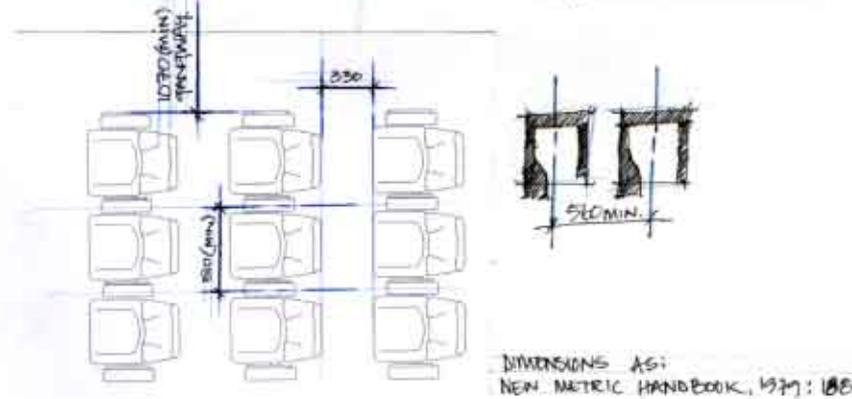
SEATING:

BASED ON LECTURE THEATRE SEATING.

"LECTURE THEATRES ARE EXPENSIVE FACILITIES WHICH ARE OFTEN UNDER USED. INVESTIGATION HAS ~~##~~ SHOWN THAT THE COMMON LECTURE GROUP IS BETWEEN 30 & 60, SO THE LARGER THEATRES [500 PEOPLE] ARE APPROPRIATE FOR CONFERENCE FACILITIES, ETC."

NEW METRIC HANDBOOK, 1979: 270.

THE SEATING LAYOUT IS BASED THE PROVISION FOR WRITING NOTES, WITH THE USE OF THE "HINGED TABLET ARM" LECTURE SEATING TO MEET THE ACCOMMODATION REQUIREMENTS FOR THE AWARENESS CENTRE AUDITORIUM.



CONTRACT SEATING -> MODEL SK2000.

AUDITORIUM - STRUCTURE

Two options have been selected to enclose the proposed auditorium space:

Option 1 - Reinforced concrete shell with timber cladded infill panels supported by steel framework.

Option 2 - Reinforced concrete floor and ends, with timber clad supported by a steel system for the roof and sides.

Conclusion:

Option 1 has been selected over option 2 because of the complexity of a steel frame and the financial implications of the different members as a result of the auditorium shape.

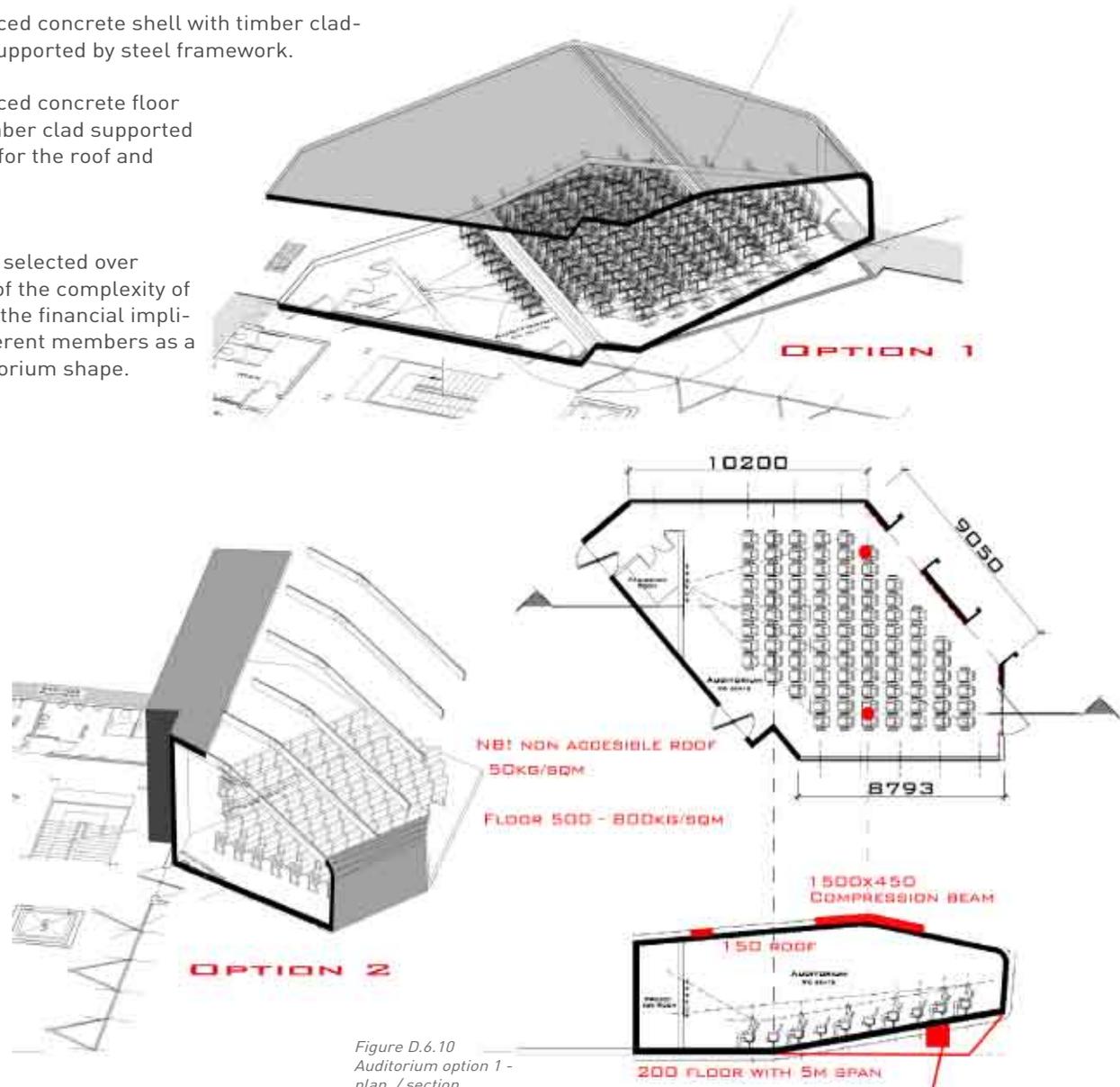
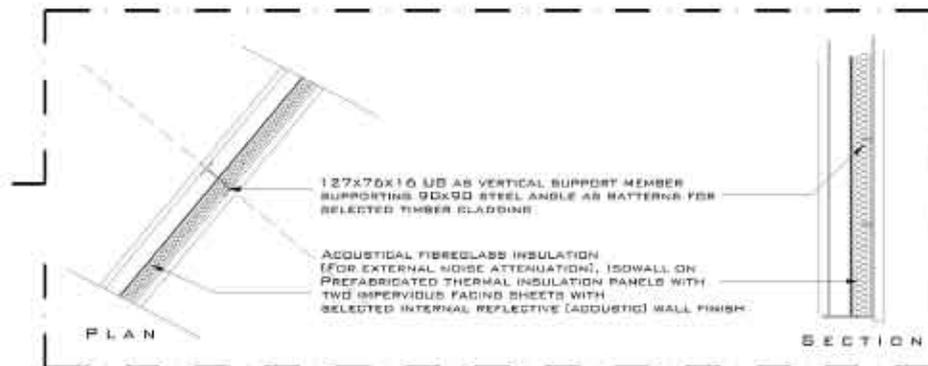
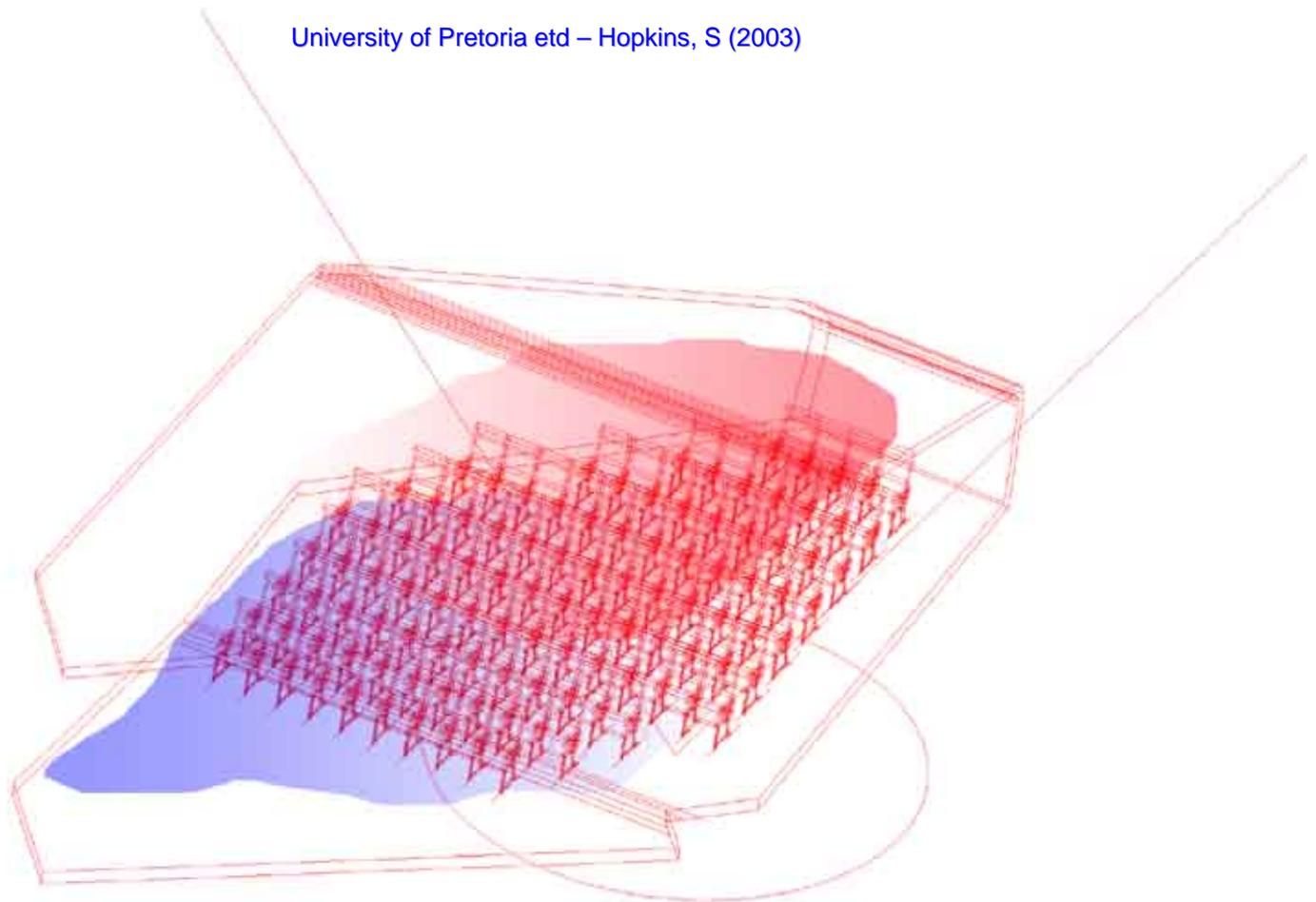
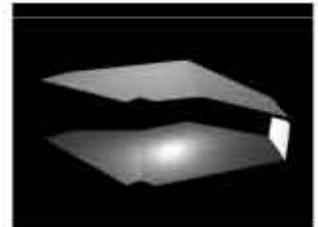
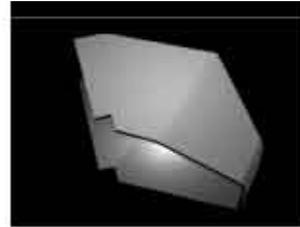
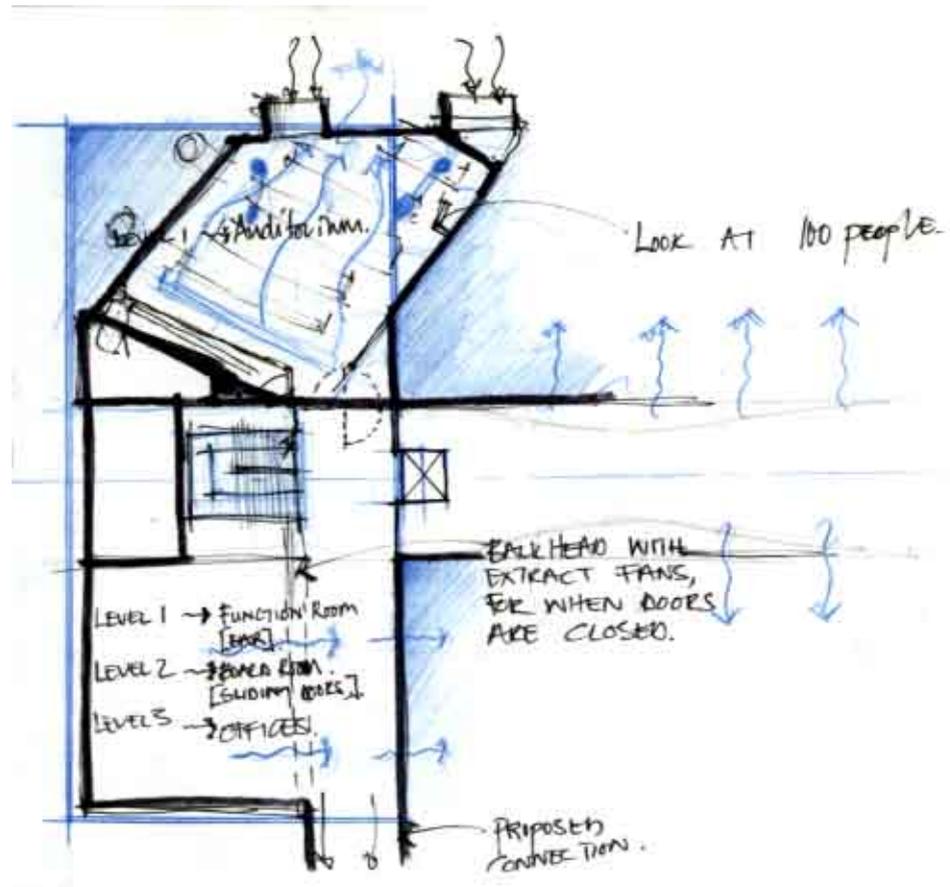
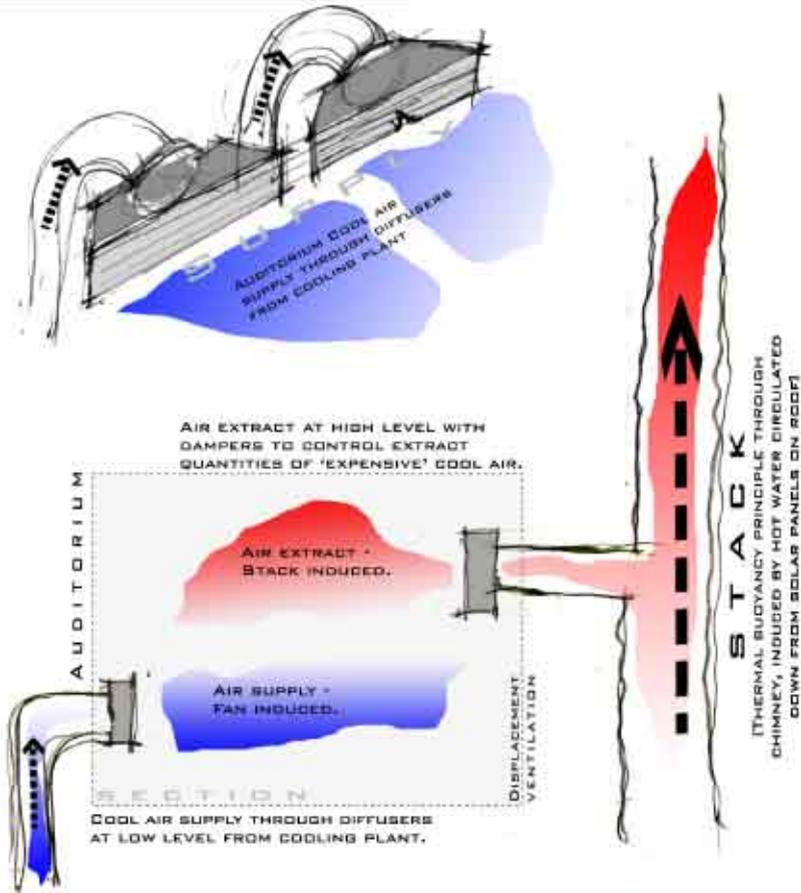


Figure D.6.10
Auditorium option 1 -
plan / section





AUDITORIUM VENTILATION SYSTEM



Air Requirements

Auditorium

Equipment → 200000

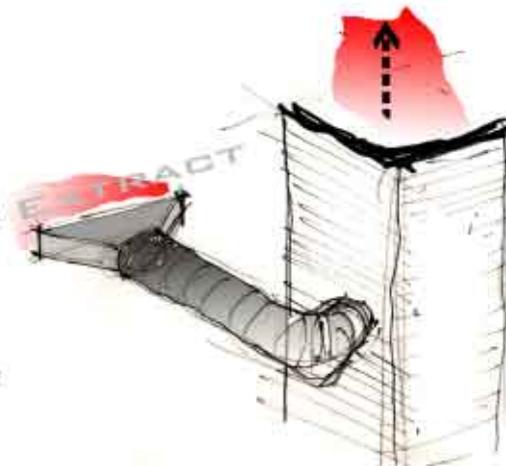
Min Air Requirement → 250% [Air supply per person]

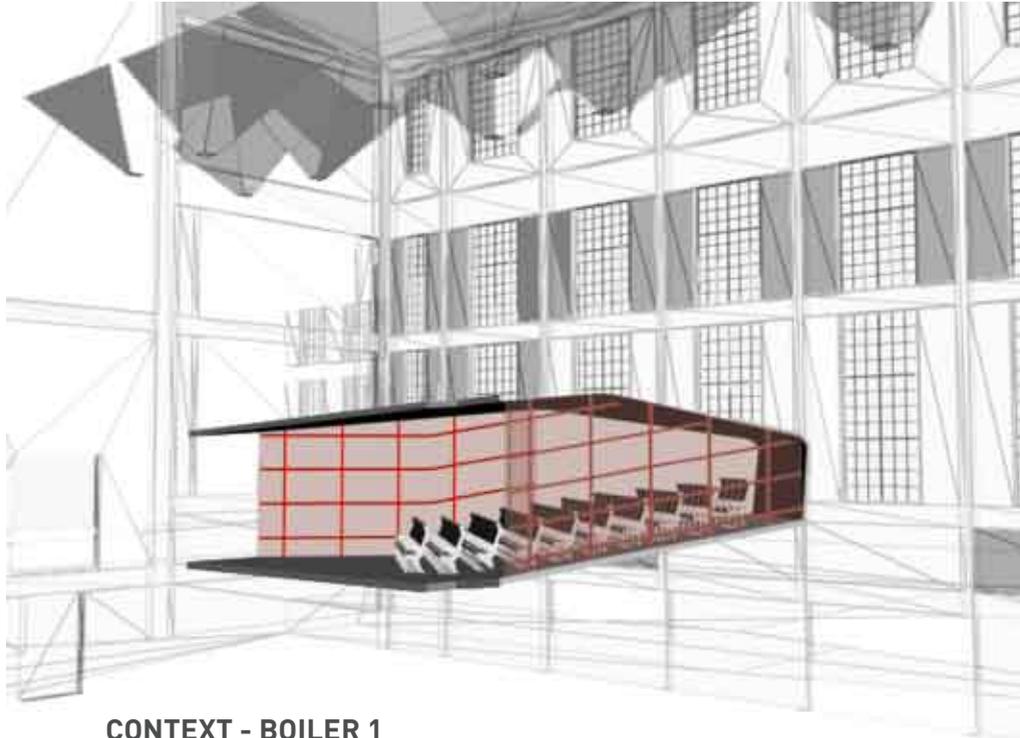
No of people → 2000

$2000 \times 250\%$

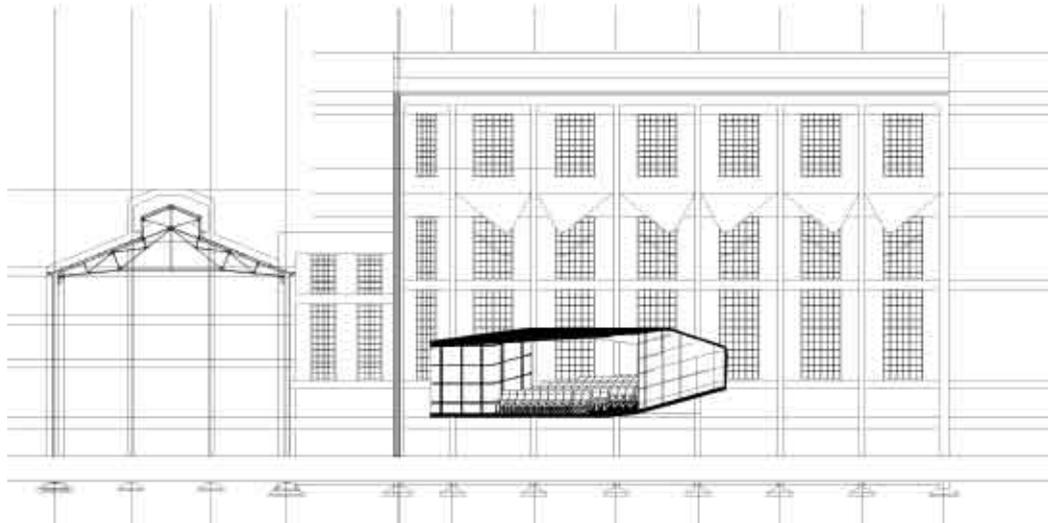
$= 500000$

SMS 0000-10





CONTEXT - BOILER 1



D.6.2.4 HEATING SYSTEMS

The use of heating systems will consider appropriate orientation, form, massing, layout and placement of areas of glazing and insulation to assist in minimising the heating needs.

A local opportunity [Drawing 002] has been considered for an energy source. Although this heat source is resourced from a non-renewable source (coal burning process in 'B' power station), the aim is to increase the efficiency of that process through reusing the heat in the awareness concept, rather than releasing it straight into the atmosphere.

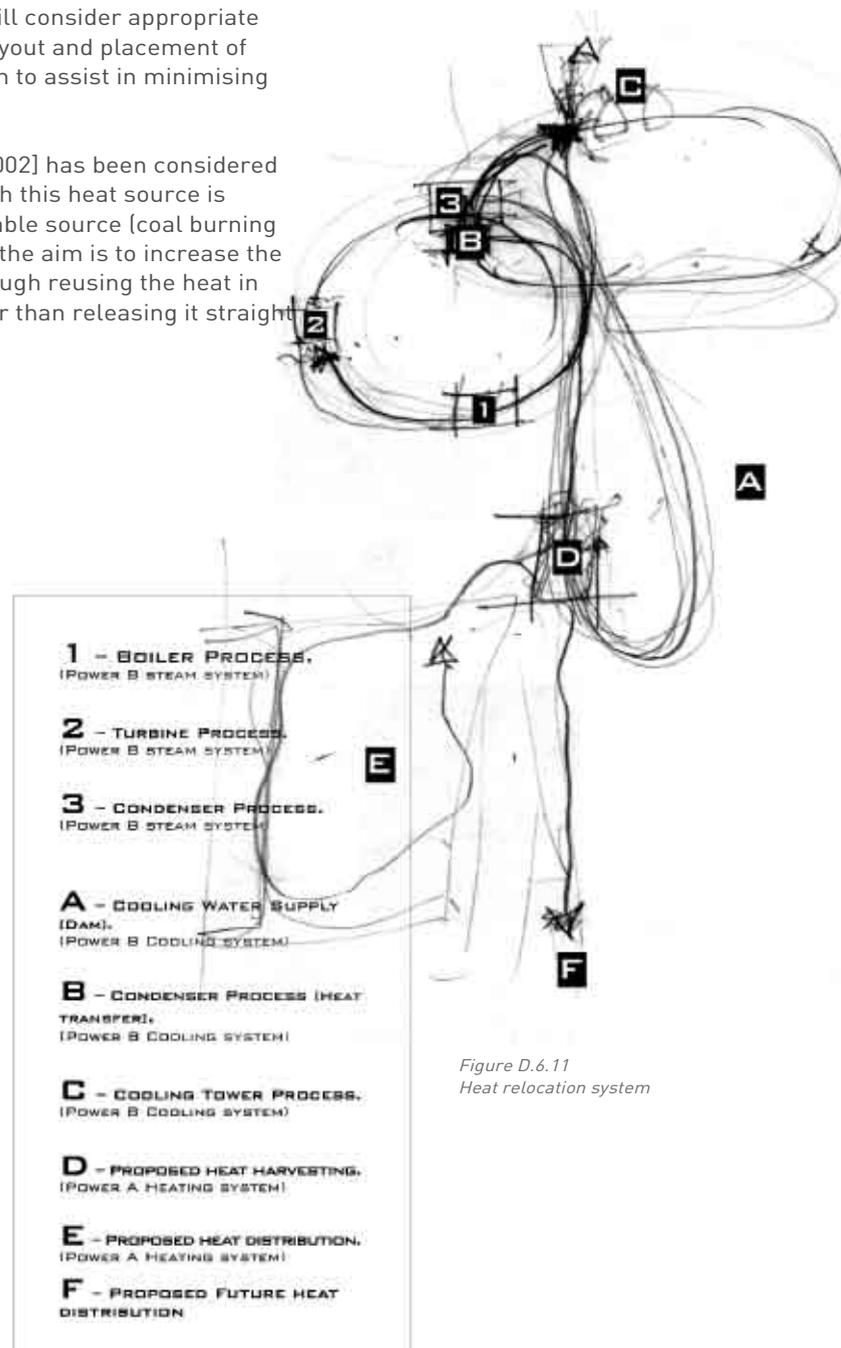


Figure D.6.11
Heat relocation system

D.6.3 RECYCLING AND REUSE

Criteria:

- Toxic waste
- Inorganic waste
- Organic waste
- Office waste
- Sewerage
- Construction waste
- Re-use of existing buildings

With one of the awareness concept's major functions being that of waste collection, considerations for the opportunities of the reuse / recycling of materials will have to be designed for or analysed. Importantly, systems will have to be put in place that will deal with the nature of the waste.

Toxic waste will be kept from the site, but the production of a bio-diesel product will have the same implications as many toxic wastes. The diesel product will be dealt with in an environment segregated from the public enviro through controlled access, and storage will be within transportable tanks on the rail system and within a tank that supplies a single fuel pump, available to the public (to strengthen the awareness campaign).

With inorganic waste being the main concern of the waste sorting system, for reuse / recycling purposes, an organic waste system will only be offered to deal with the organic waste generated by the centre itself and used for landscape fertilisation purposes - increasing the awareness for people to effectively utilise their own organic waste. It is important to realise that contacts with re-cycling companies should be made, to collect the selected / sorted waste and opportunities should be given to the community to initialise waste recycling or waste delivery systems.

With the local sewerage waste system already in place and effectively returning that waste as recycled water to the site, a decision has been made to utilise the existing Pretoria-West mains waste system.

Opportunities for reusing construction waste during the construction and demolition processes will have to be

considered. These considerations must be made within the design process and one must ensure that contractors and clients have bought into a waste management process. Any construction waste that cannot be reused in the construction process will pass through the waste sorting system and be reused (or recycled) on another site.

The re-use of existing buildings is discussed in the heritage stage [stage D.2]

D.6.4 SITE

Criteria:

- Brownfield site
- Neighbouring buildings
- Amenity
- Vegetation
- Habitat
- Landscape input
- Appropriate density for building location

The Brownfield site selected for the awareness concept, supports sustainability through offering the development of a design concept on a site that has already been disturbed. The concept further supports sustainability by opening up a portion of the site to the neighbouring buildings, offering access to amenity facilities for these building occupants.

The use of vegetation will have to be considered within the car parking area, pedestrian routes and in or around the proposed and existing buildings. This should include a coordinated landscaping strategy (drawing 005) that takes into account the existing planting, water and habitat surrounding the dam. The support of this vegetation strategy may require a degree of landscape inputs, consisting of fertilisers (from the organic waste system), due to the soil conditions (industrial typology of site) from the existing land use.

D.6.5 MATERIALS AND COMPONENTS

Criteria:

- Material component resources
- Embodied energy
- Manufacturing process
- Recycled / reuse of materials and components
- Construction processes
- Fire

With the building form and aesthetics being intrinsically linked with material selections, the choices of these materials for the design scheme are often made on an economic platform. In the support of sustainability, the purely financial implications of selected materials and components needs to be revisited and a move towards the selection of these materials and components being made on an environmental platform, with 90% of the material and component resources being from verifiable and renewable resources.

Within the selection of these materials and components, lies the issue of the embodied energy, with 80% of the building's materials and components being of a low embodied energy. This effectively means that an analysis of any materials involved in the selection, should be assessed on a life cycle or on a 'cradle to grave' basis - on the environmental effects from extraction, through the manufacturing process (assess possibilities of the creation of building elements from the 'B' Power Stations coal ash treatment facility) to the possibilities of reusing / recycling the materials or components.

(re-use / re-cycle / re-source)

Similarly with the construction processes - all these processes should be assessed on their environmental impact and should be designed and performed with a minimal environmental impact.

Through the eradication of the asbestos within the existing structures, it would make sense to consider proactive fire engineering that allows for innovation design possibilities and avoids the use of PVC based materials. It is also important to remove the reliance on the need for highly maintainable applied fire protective measures.

THE TRANSFORMABLE ACCOMODATION

There is a huge material resource existing within the concept, through the waste collection program, that leads to a design response where those materials are not actually specified, but the opportunity is rather given for them to be used.

The existing function of the site [Coal power generation] and the waste generated from those functions, gives rise to the opportunity to re-use the Fly-ash generated from burning coal, in creating a permanent Fly-ash concrete producer.
