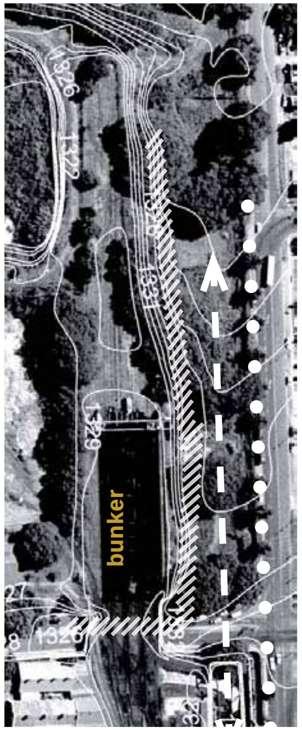
chapter five

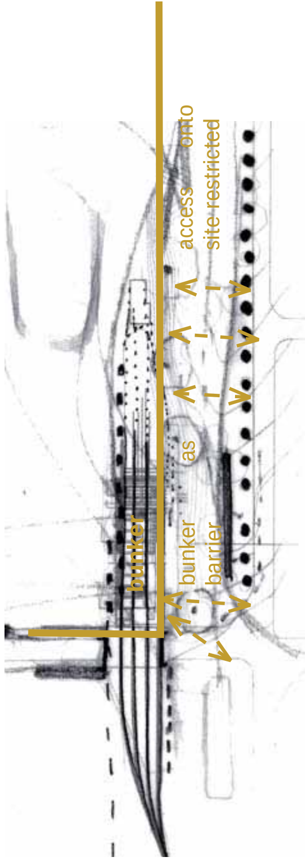
design development

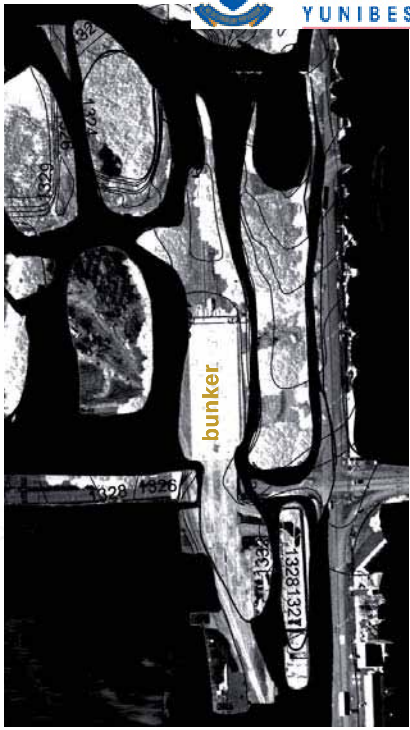
As mentioned in previous chapters, the aims of the project is to encourage a mutually beneficial relationship between an urban environment and an productive environment by developing a *Third Landscape* urban space within the production environment. The design development is first approached from the manipulation of the bunker. The bunker itself is a massive single frame concrete object, but it is a frame that cannot be easily manipulated - it is completely immobile and deterministic. Though, in its scale, it is a majestic object, and in that is its beauty. The new architecture aims to expose the quality of the object and the space that it creates by changing it from a barrier object into a public space. The bunker is opened up to the public and a public market area is introduced.

Next, the remaining site is referenced in the new design. Spatial references are made to the existing hidden conveyor system (south) and a physical reference is made to landmark characteristics of the surrounding buildings and site (west). Following this is a description of the various programs of the building and an accommodation schedule is provided. The strategies for a *Third Landscape* space are implemented. Following this is a description on how the program of hydroponics further determined building form and construction concepts; and lastly a material selection is given.

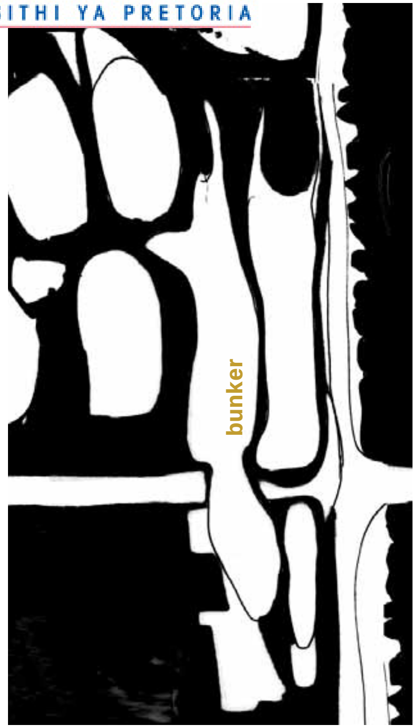


existing conditions

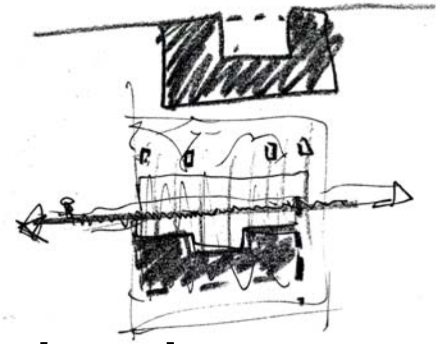




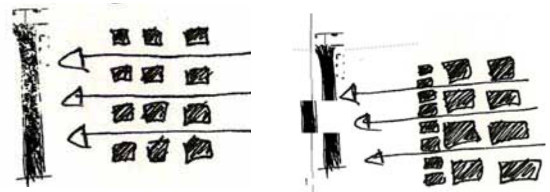
spaces and barriers



spaces

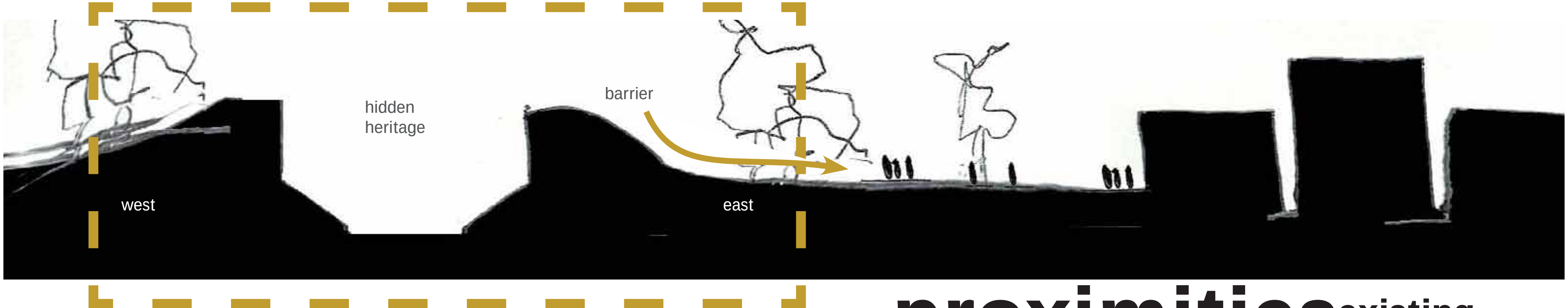


1 breach breaking the barrier



1 breach breaking the barrier

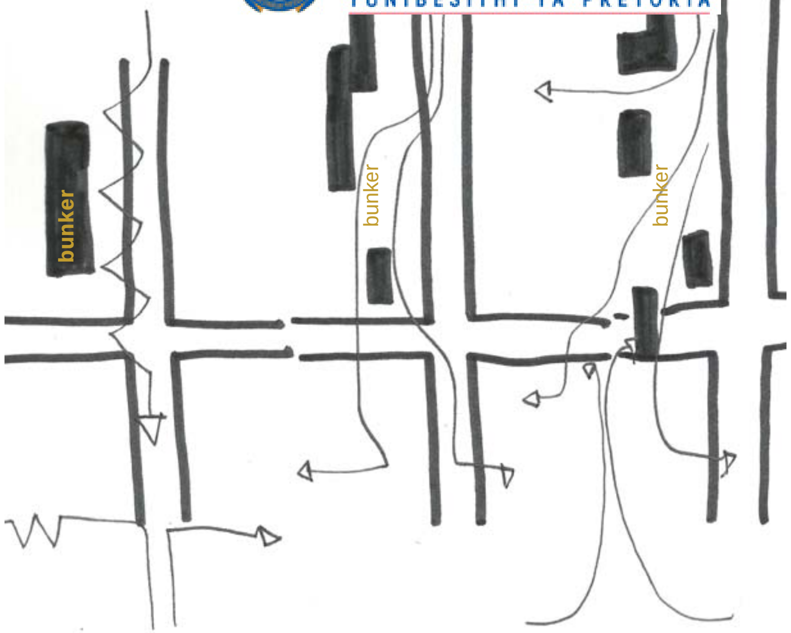
open up the bunker

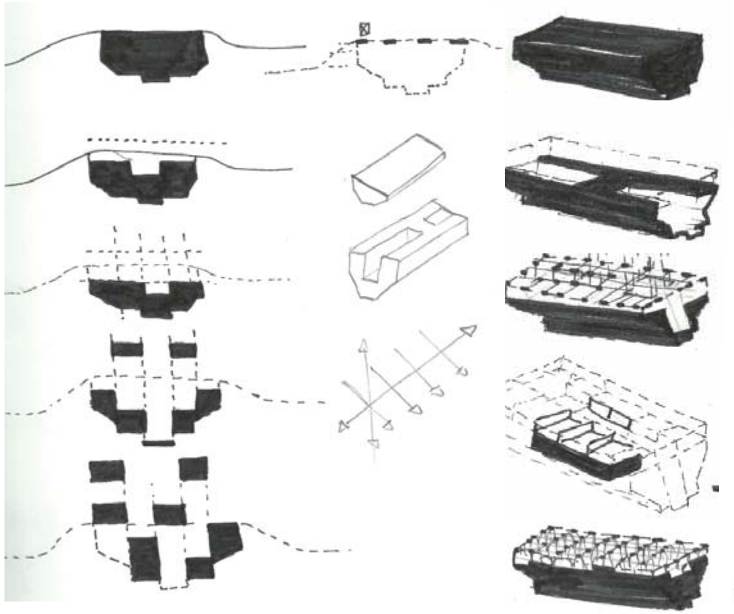


The old coal bunker - a barrier
Isolating landscape [west] from city [east]
Isolating production processes [underground] from the urban dweller [above ground]

proximities existing

Figure 94: Diagrams showing barrier condition [author, 2010]. Section illustrating the isolation of the bunker from the cit.





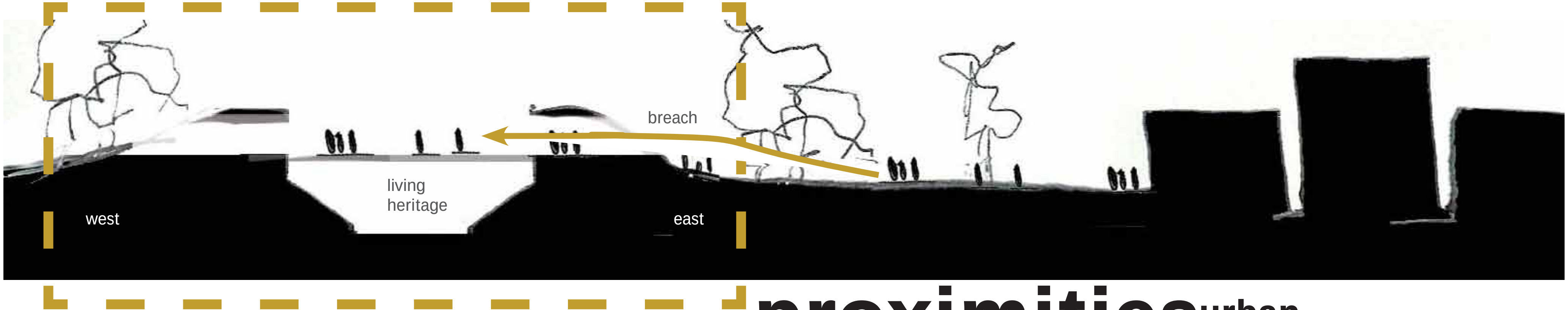
2turn into urban building

introducing free pedestrian flow across and through the bunker

3introduce pedestrian access

4strategies

exploring options for opening the old coal bunker, [author 2010]



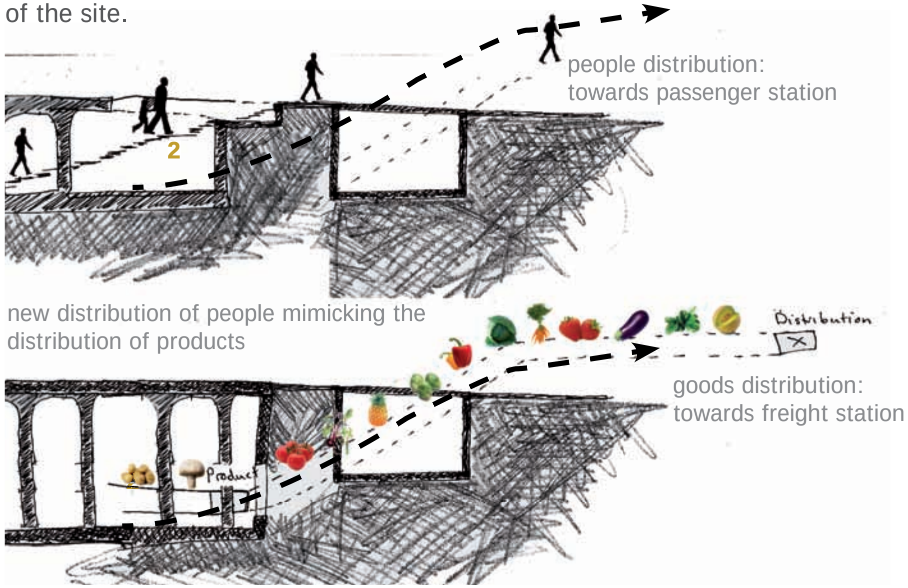
the intervention

Closing proximities with landscape [west] and city through heritage building [east]
Closing proximities of the production processes [underground] with the urban dweller [above ground] in a new middle ground.

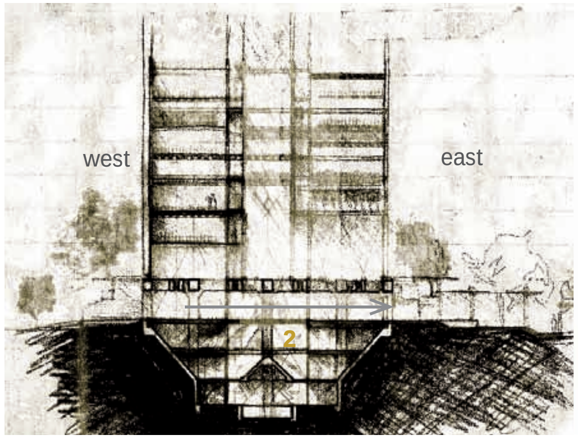
proximitiesurban

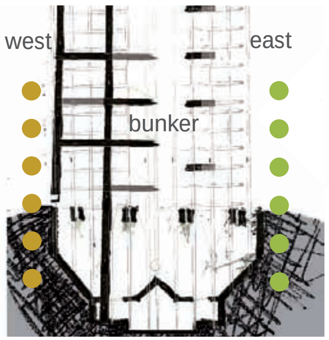
Figure 95: Diagrams showing the barrier condition removed [author, 2010]. Section showing the opening of the bunker and removing barrier condition to integrate it with the city

The existing coal conveyor system [3] is reconfigured to transfer packed pallets from the underground packaging areas to the larger distribution at the new proposed train station. It is also an informant to indicate how the public should be directed through the new hydroponic factory. This physical diagonal movement is very clear reference to the heritage of the site.



Figures 96,97 (bottom left, right): Referencing elements [author, 2010]. The power station and the palm trees inform a stereotomic and tectonic organisation, reinforced by the site orientation.

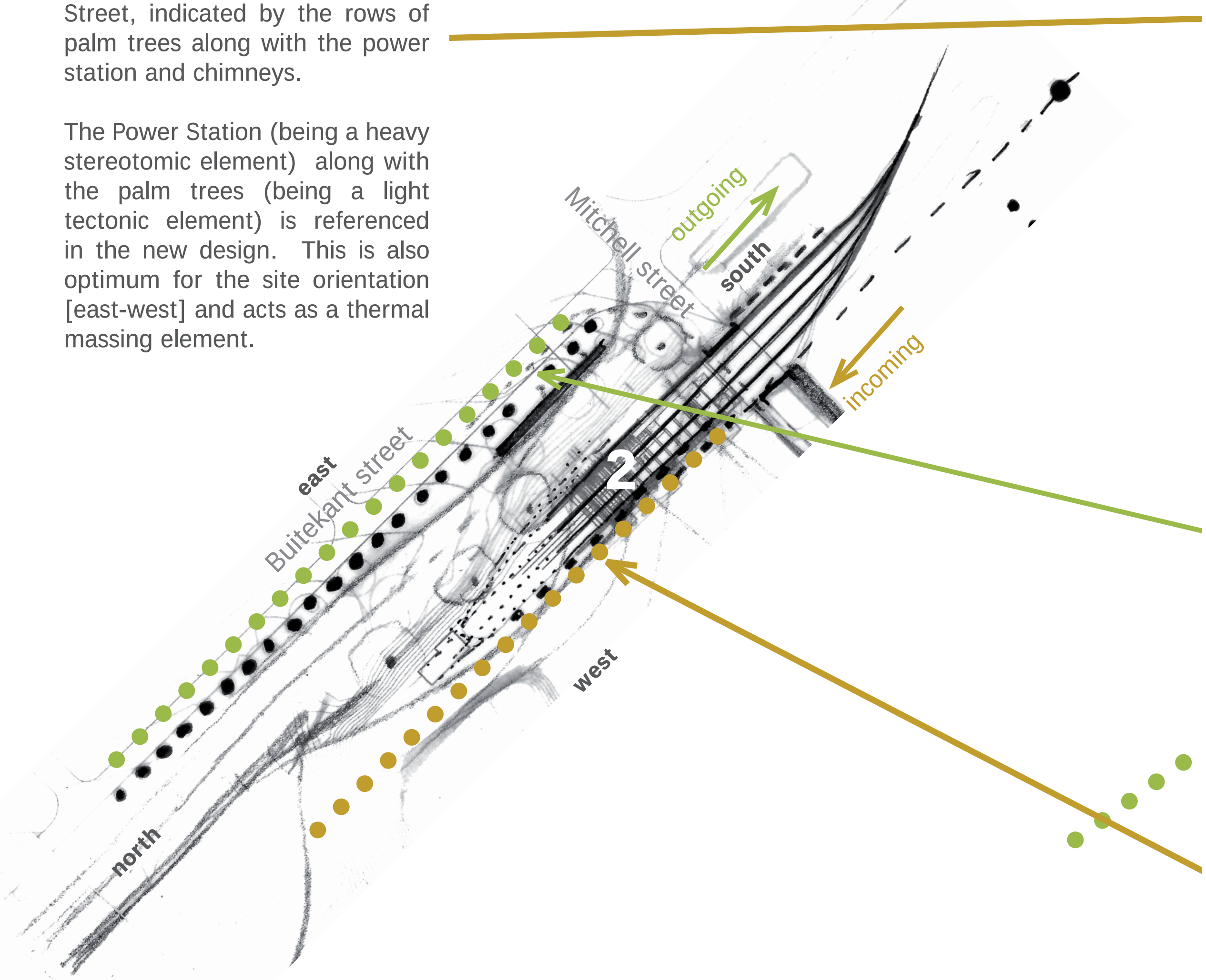




The palm trees [1] along Buitekant street created a historic definition of the urban edge. Upon exploration of the landscape, a rhythm can be picked up from the historic urban edge on Buitekant Street, indicated by the rows of palm trees along with the power station and chimneys.

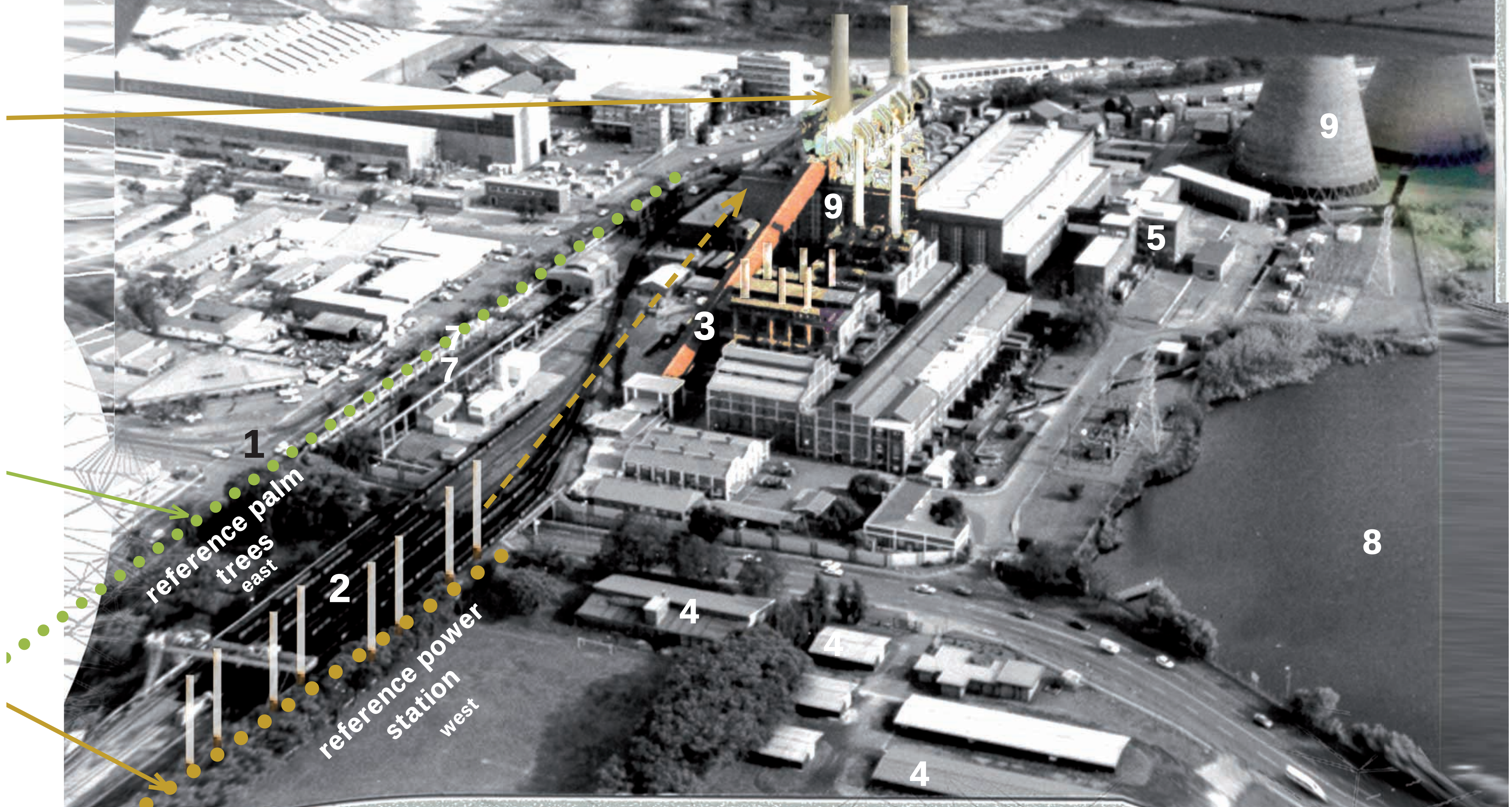
The Power Station (being a heavy stereotomic element) along with the palm trees (being a light tectonic element) is referenced in the new design. This is also optimum for the site orientation [east-west] and acts as a thermal massing element.

Figures 98,99 (below & opposite): Referencing movement [undated aerial photograph from Mr. Masut adapted by author, 2010]. The proximity of movement between people and products now becomes a physical and visual reference as informed by the heritage systems of the site.



proximityreferences

heritage reference using site elemental heritage to close proximities and create a tectonic and stereotomic order



1. palm trees
2. the coal bunker
3. conveyor
4. power station training facilities

5. administration block
6. 1952 station (Station B)
7. coal surplus store
8. evaporation lake
9. cooling towers

accommodation

As mentioned before, the determining factor for the building size was the crop production of the hydroponic factory. It was decided to produce commercially and therefore a target annual production of 2,000 tons of hydroponic crops is the goal. The model crop to calculate this was the tomato crop. Seedling growing space is also provided accordingly.

Underground, a mushroom crop was selected as the crop typology.

The two crop typologies create bio-mass wastes that can be used as composting material. The composting spaces were configured into compost tower elements on the west side of the building.

To run the various operations of the entire building (the hydroponic factory, the small plots, market and education), a central control room and administration offices are required, situated on the south of the building, next to the seedling growing rooms.

A small controlled greenhouse is also provided to perform tests and experiments with nutrient solutions or experiment with new cultivation methods. This controlled greenhouse is visible to the market space.

target 2,000 tons per year

tomatoes occupation
11,500 m² provided

seedlings occupation
grow rooms 100m² per floor provided

3,000 tons per year

Mushrooms
1000m² provided

35 tons a week

compost occupation
150m² total area provided
50m² packing and storage area provided

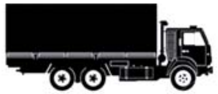
offices

65m² control room
160m² office space
20m² telecommunications server room

small controlled greenhouse

140m² greenhouse
180m² work areas

Packaging and refrigeration areas are provided in the lowest level of the existing coal bunker, where the existing coal conveyor system is also situated. This conveyor system has two belts and both can run upwards or downwards. Each belt is large enough (1,3m wide) and can be reconfigured to transport new incoming pallets (1m wide) or other goods from the freight station. Packed goods are packed in pallets and sent out via the conveyor system to the new proposed freight station (south) for distribution. According to Mr. Combrink [2010], refrigeration and distribution across provinces is a problem for small farmers, especially small fruit or dairy farmers of the nearby areas of Brits, Rustenburg, Hartebeespoort et cetera. Because the hydroponic factory aims to produce crops for local distribution, it does not need to refrigerate its own crops for long term storage (two or three days of the week maximum). This means that it can schedule its refrigeration and distribution to accommodate the crops from a couple of small farmers also and provide a means for them to extend their businesses. The building provides a means for these farmers to ship goods elsewhere. The farmers send their produce by truck to the hydroponic factory, where it is stored and refrigerated. A vehicular distribution and loading area is also provided. This distribution area is a double volume space, ramping down just below Mitchell Street. This double volume accommodates commercial trucks and increase stacking and storage space for pallets and pallet bins (which can be stacked 6 meters high comfortably).



distribution

170m² stacking space
170m² loading zone

pallet packing areas

400m² total packing areas
(no soil on crops - no washing required)
200m² general tools and small trolley store areas

refrigeration

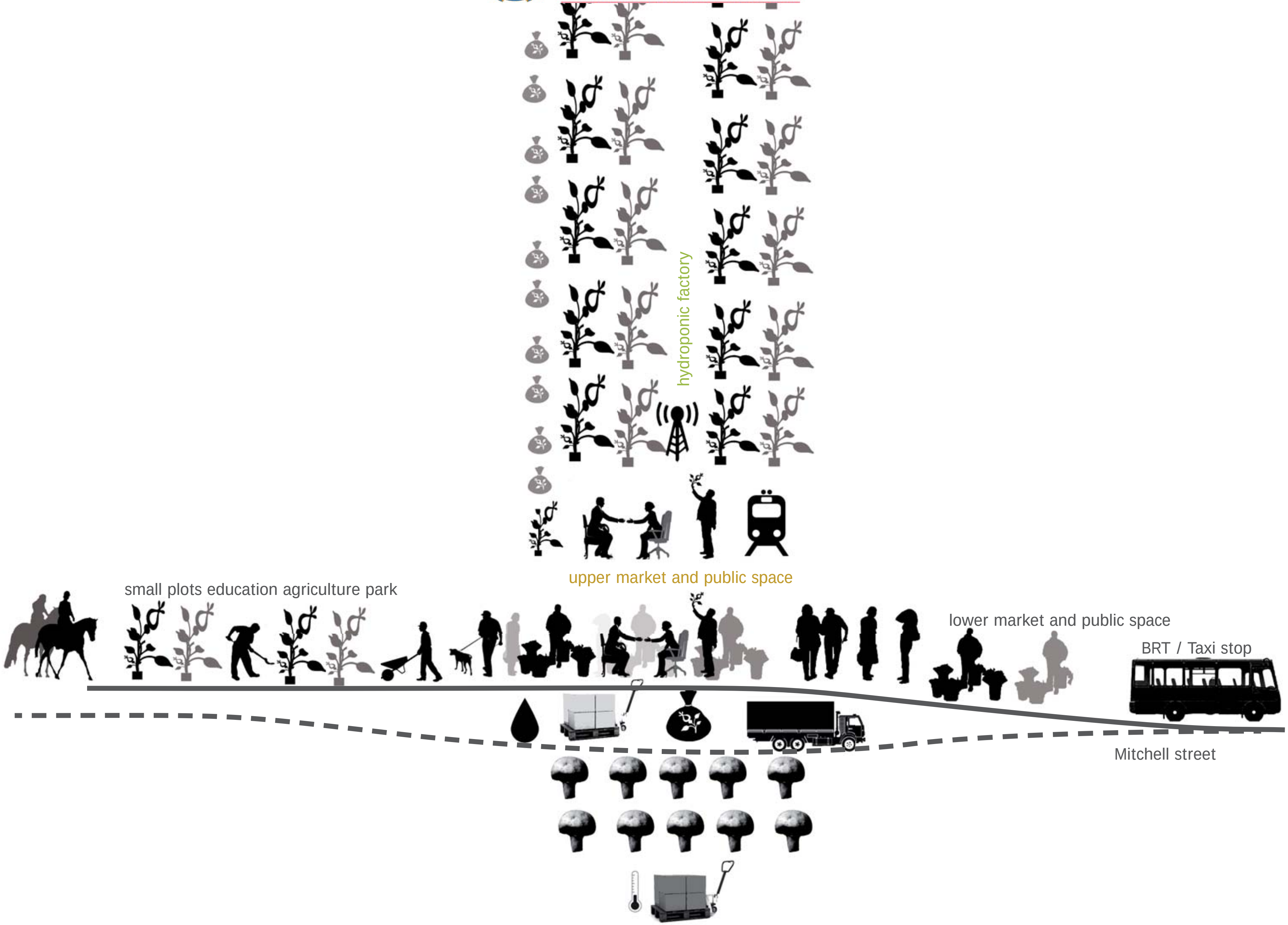
50m² refrigerated rooms
(approx. storage capacity of 125 tons)
55m² hvac room

conveyor

two conveyor belts:
1,3m wide belts each
pallet size: 1m wide
conveys incoming and outgoing goods from freight station

proximtiy accommodation

Figure 100: Typical cross-section [author, 2010]. The proximity of the various programs and accommodations.


hydroponic factory
upper market and public space
small plots education agriculture park
lower market and public space
BRT / Taxi stop
Mitchell street

accommodation

On the first floor of the new hydroponic factory, an incoming rail-line from the new framework freight platform, brings refrigerated containers that can be packed for distribution. The products from other farmers are packed and sent off to other provinces (for instance to Kwazulu-Natal, or Mpumalanga) for further distribution.

The market is introduced on the street level and public moves through the building towards the agriculture park on the west. The market is intended as weekly food or flower market. Tenants can either bring along their own tables, chairs or other furniture, or rent a table from the factory. A small furniture store room is provided nearby, under the public staircase. The market area is provided with taps at column spacings. This market space is a completely flexible, open and accessible public space and can therefore be manipulated for a range of other events also. The upper market space is a covered area within the hydroponic factory and can easily play host too activities ranging from holding a harvest festival, being a base for a city marathon, becoming a monthly community hall or even accommodating a church service or other functions. This increases its potential to develop community events and therefore increases the cultural value of the space. Offices are provided to manage the community space. A small restaurant / coffee shop and kitchen is provided, to increase the variety of activities that the market area can offer.

incoming refrigerated containers

7 ton containers
weekly refrigerated
storage space scheduled
accordingly

public space

300m² of covered
public space within the
hydroponic factory
60m² furniture store room
100m² small restaurant /
coffee shop
100m² restaurant kitchen

Education programs are also situate within the public space. Theses are aimed at training the staff of the hydroponic factory and educating school groups or other groups in hydroponic techniques. This provides an place to transfer knowledge and skills for indoor and urban agriculture.

From the market area, a public staircase on the east leads upwards towards the new proposed passenger and freight platforms towards the south. On the east there is a also new BRT bus stop and taxi waiting area.

Just immediately west of the bunker and the market there is the new public agriculture park. There are also existing masonry buildings, currently used as classrooms and boardrooms for staff training for the old power station. The largest of these buildings is empty at the present time. The northern part of the building's roof will be removed and structure will be converted into a greenhouse and a classroom for education on small plot developments on site. The small plot developments is introduced for public demonstration and education in urban agriculture, and is not necessarily a commercial enterprise.

It is proposed to turn the southern part of this existing building into stables for mounted police units who can patrol the large landscape and the immediate environment. A mounted police unit is a very friendly, yet effective public policing strategy. The horses will also be an attraction for the site as a whole.

hydroponic education
300m² covered
greenhouse classroom
150m² open classroom
venue

new BRT and Taxi stop

urban agriculture park

small plot
developments

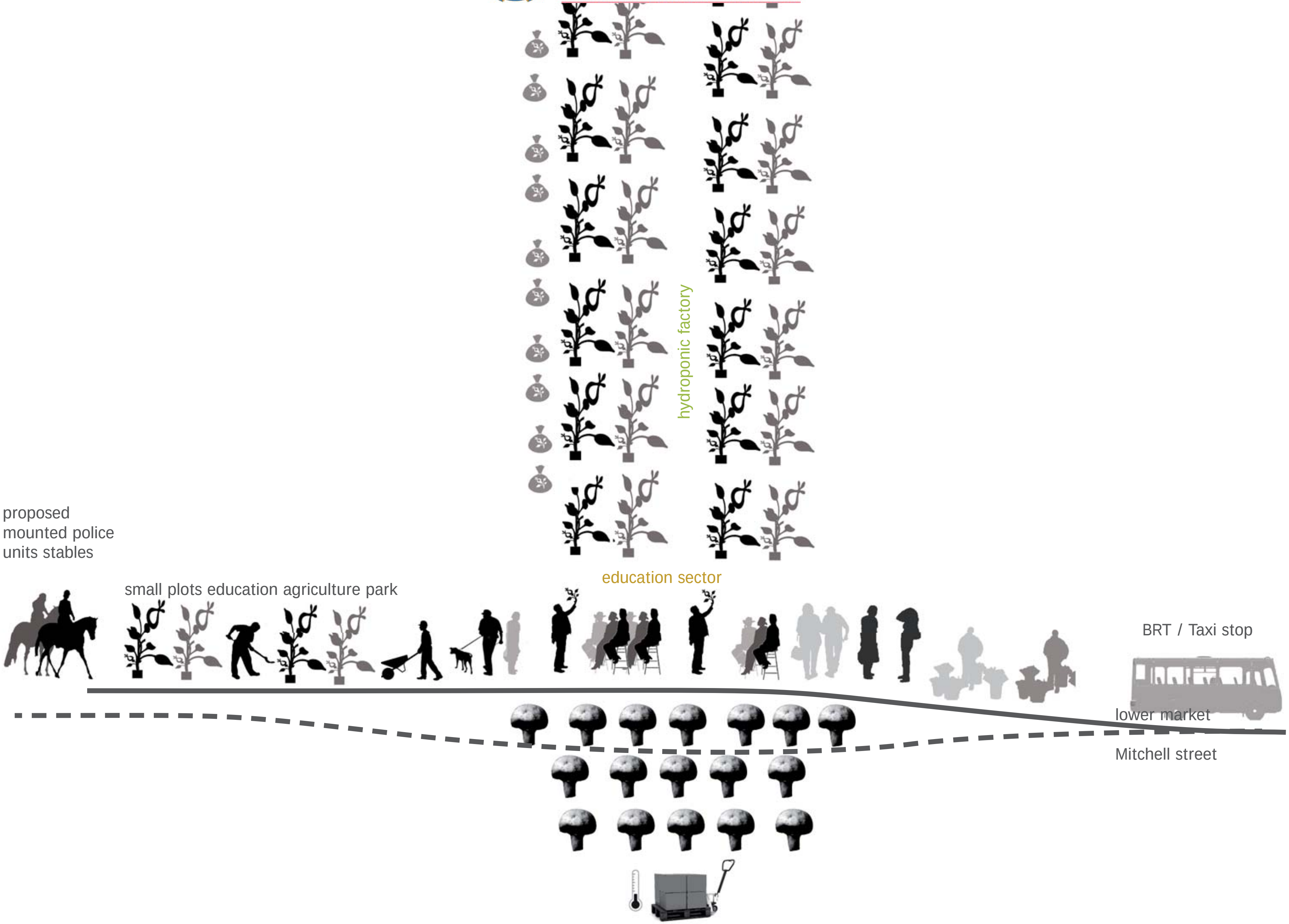
rework existing
buildings for proposed
small plots education
and greenhouse

proposed stables

rework existing
buildings for proposed
mounted police units
for the site

proximtiy accommodation

Figure 101: Typical cross-section [author, 2010]. The proximity of the various programs and accommodations.


hydroponic factory
proposed
mounted police
units stables
small plots education agriculture park
education sector
BRT / Taxi stop
lower market
Mitchell street

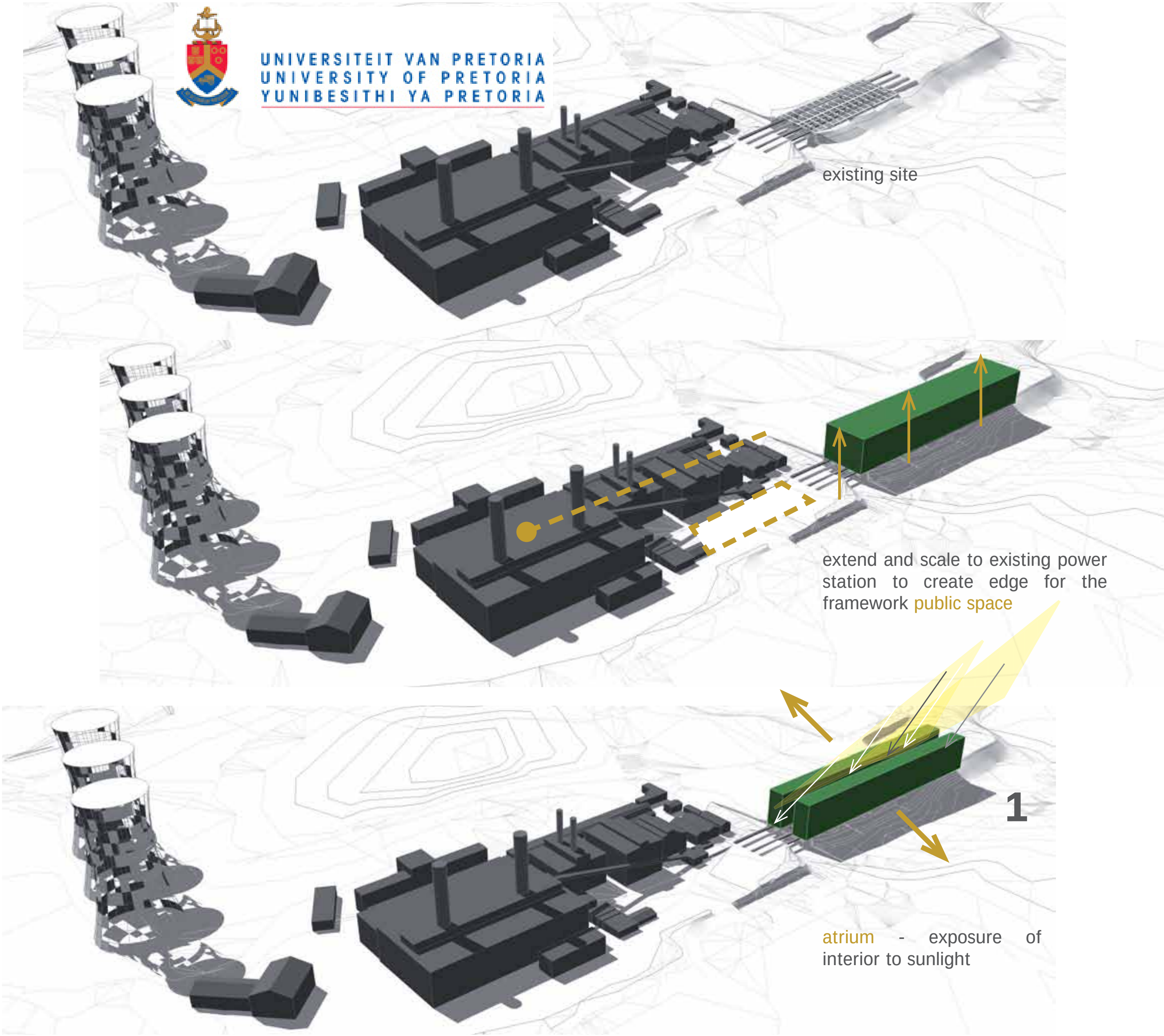
hydroponic food factory

The program of vertical agriculture can be applied virtually anywhere (underground, in space, in deserts or homes), but to maximise its energy potential, the new building exploits the use of natural daylight for the production of plants to its maximum.

The new building is split into two halves [1], creating a long atrium space which allows light to enter not only the edges, but also the centre of the building. These two halves join up again as a result of the limits of the topography.   As a result, the building form is a literal expression of proximity - where two become one. Next, the building is terraced [2] from the north, to expose yet more natural light to enter from the translucent greenhouse roofs.

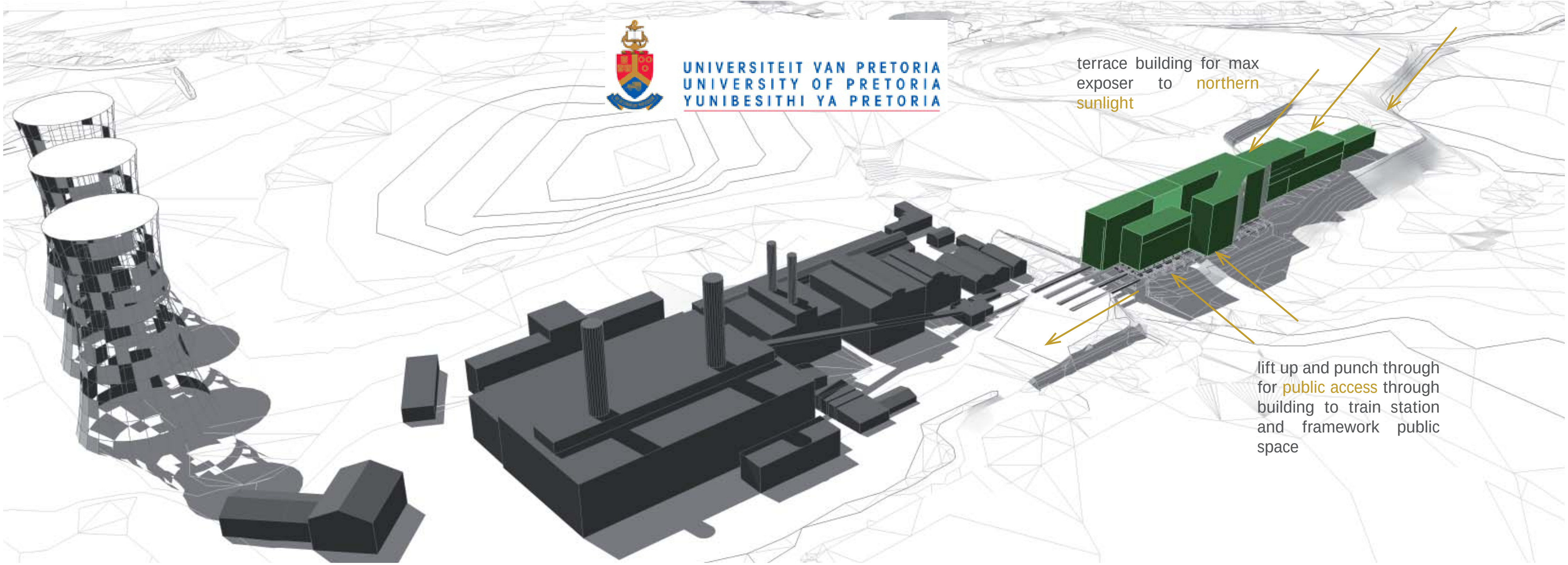
The building is as transparent as possible not only for the growing of plants, but also to reinforce the proximity of production program to the public.   A public interface [3] is introduced in the form of a market space and horticulture classrooms. As the new building is integrated with the existing bunker, so too will the market space integrate into the production program. This parameter makes it clear that the market space should be inserted within the both the bunker and the new building, and not form part exclusively of either of the two. Light from the transparent roofs filters below onto the market and educational spaces. For the same purpose, some of the existing concrete walls will be removed.

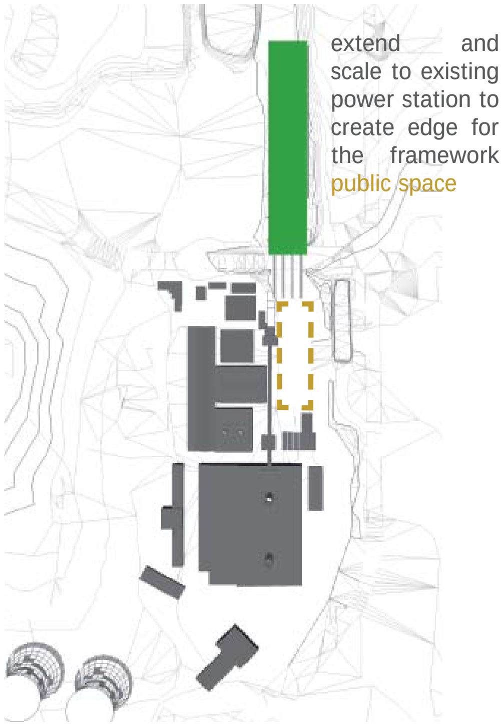
Finally, the new building conceptually mirrors the old power station, signifying the new age of 21st century urban industry.

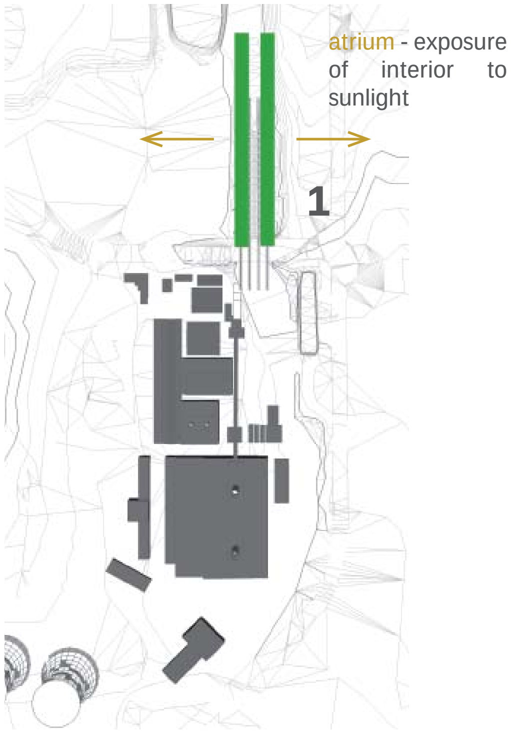


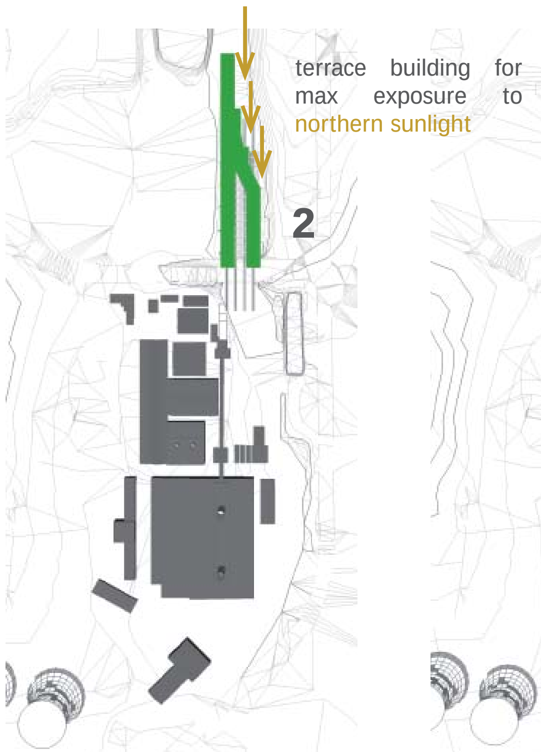
form in context to power station

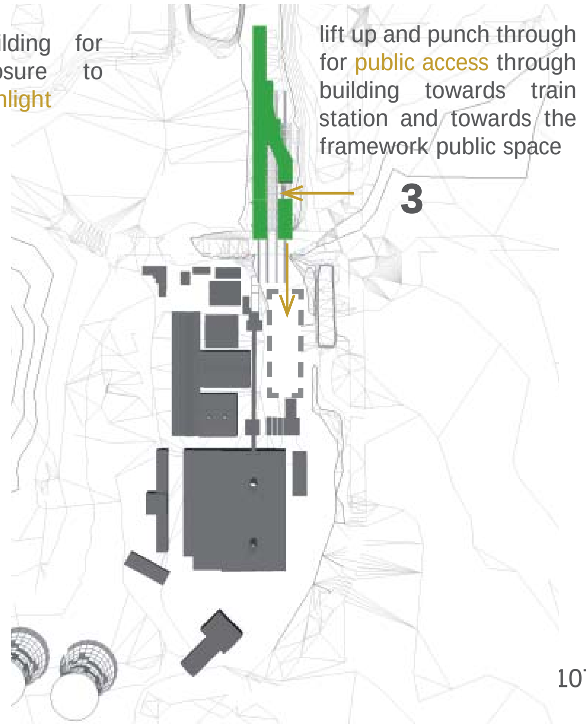
Figure 102: Building in context [author, 2010]. Design development of new building in relation to the power station and urban framework visions.

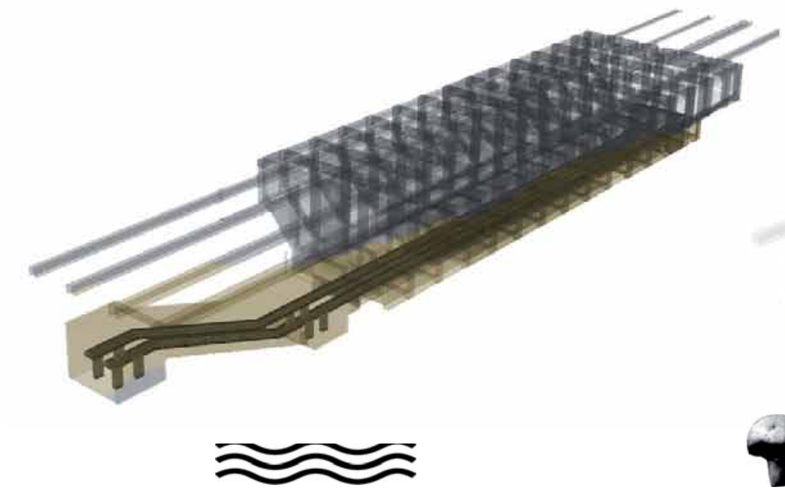

terrace building for max exposer to northern sunlight
lift up and punch through for public access through building to train station and framework public space


extend and scale to existing power station to create edge for the framework public space


atrium - exposure of interior to sunlight
1

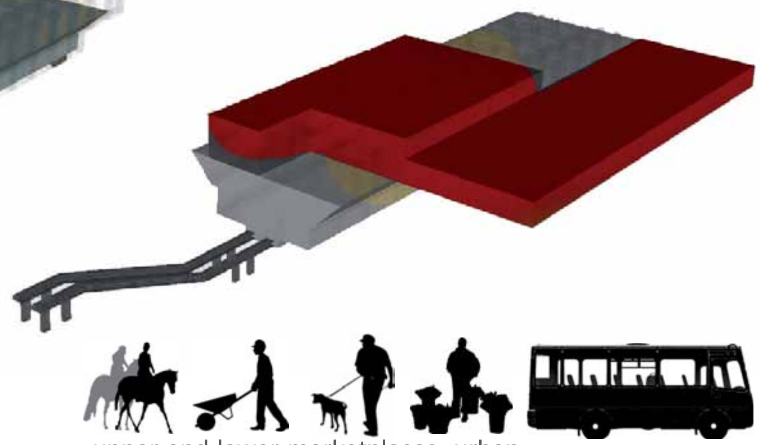

terrace building for max exposure to northern sunlight
2


lift up and punch through for public access through building towards train station and towards the framework public space
3

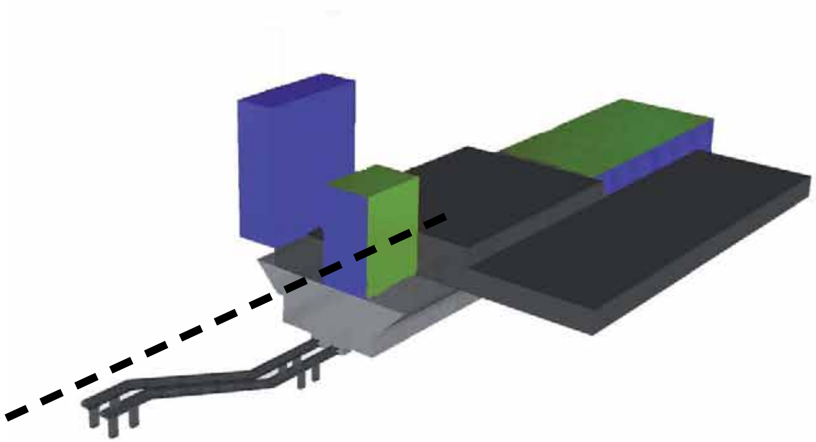


existing structure
and reconfigured conveyor system

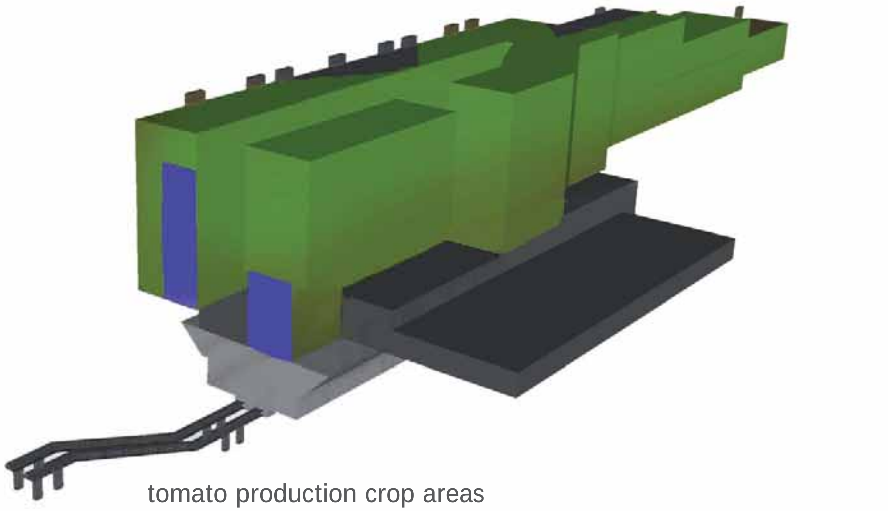
mushroom production, refrigeration, packaging,
distribution [all underground]



upper and lower marketplaces, urban
agriculture park (towards west)



offices, staff and public education, hydroponic
demonstration, incoming railway line



tomato production crop areas

form organisation in mass

Figure 103: Massing diagrams allocation of the various programs forming the first layering of filtering of the design

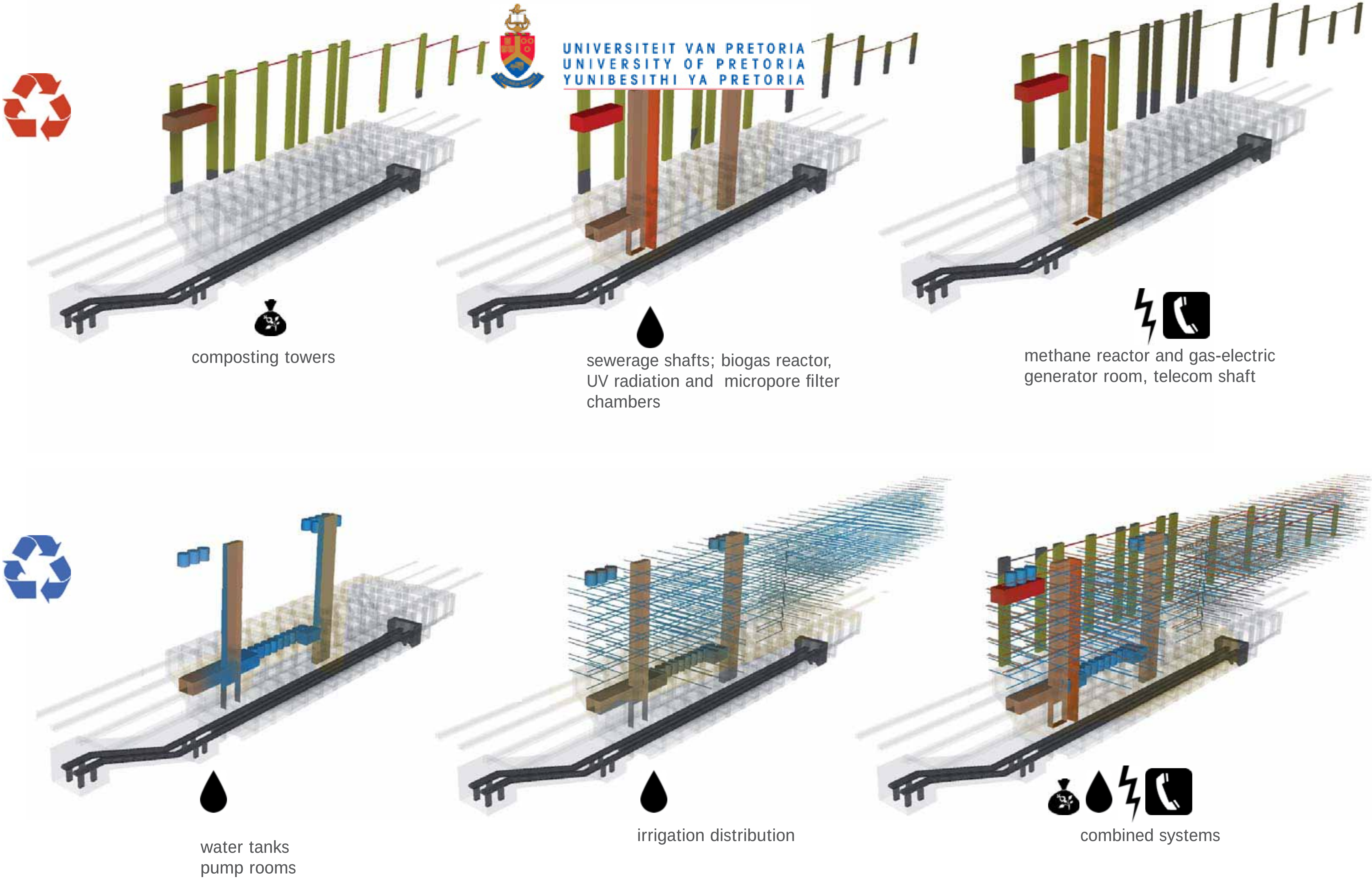


Figure 104 (top): Hydroponic food factory energy systems diagrams [author 2010]

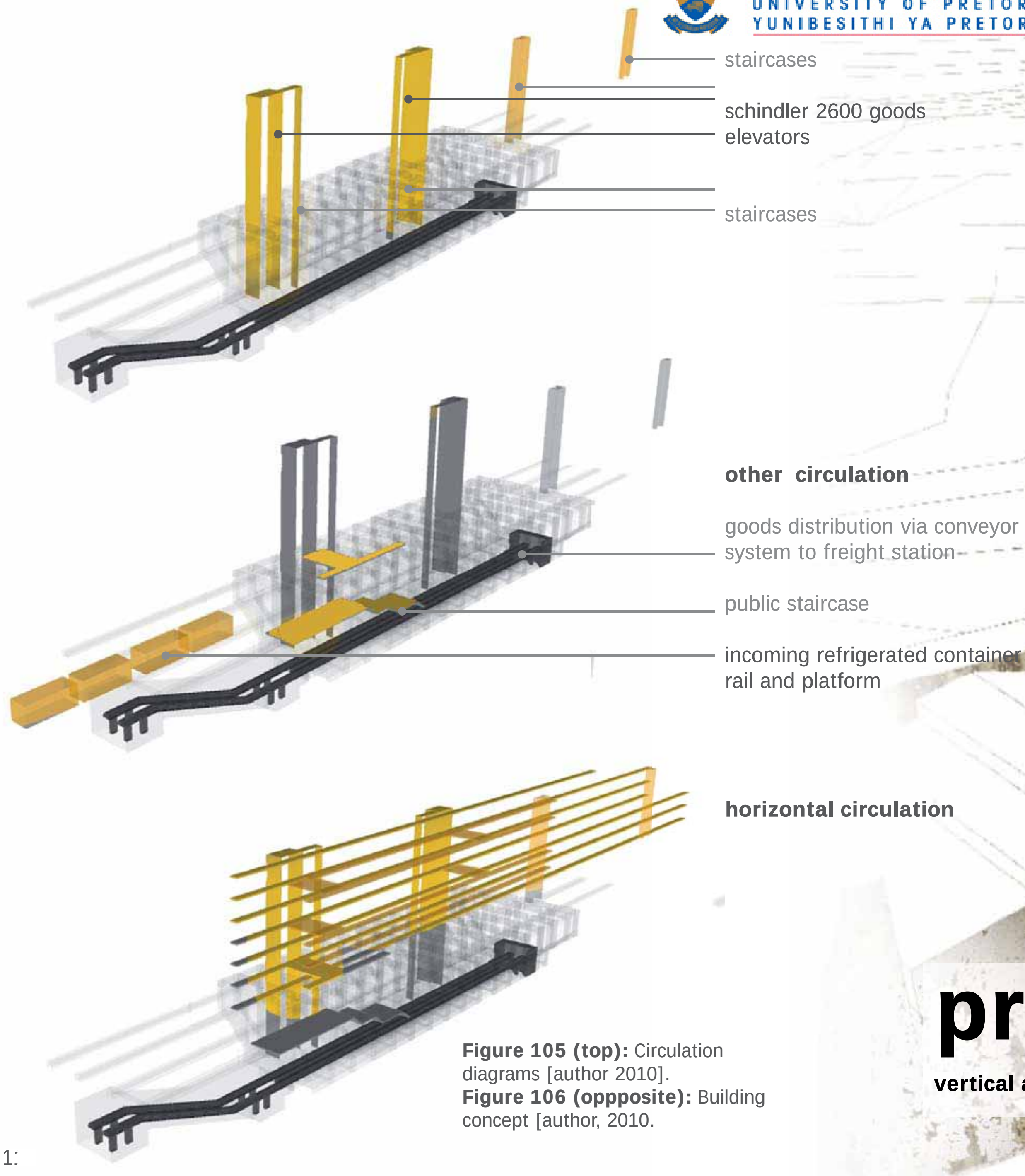


Figure 105 (top): Circulation diagrams [author 2010].
Figure 106 (oppposite): Building concept [author, 2010].

materials

The building has integral pragmatic needs: to optimise floor space and maximize natural light penetration and natural ventilation. This implies that the building must be as transparent as possible in as most directions possible. The design calls for a building of light and frame.

The materials and technologies for the design are chosen to meet the requirements of food production in ways that are functional, durable, sustainable and resource-efficient. Material choices are also based on the fact that the project as a whole is ecosystemic in nature, and so uses as much of on-site resources as possible in the construction materials or finishes. Lastly, the building has a great opportunity to explore and develop on alternative building and construction methods and materials.

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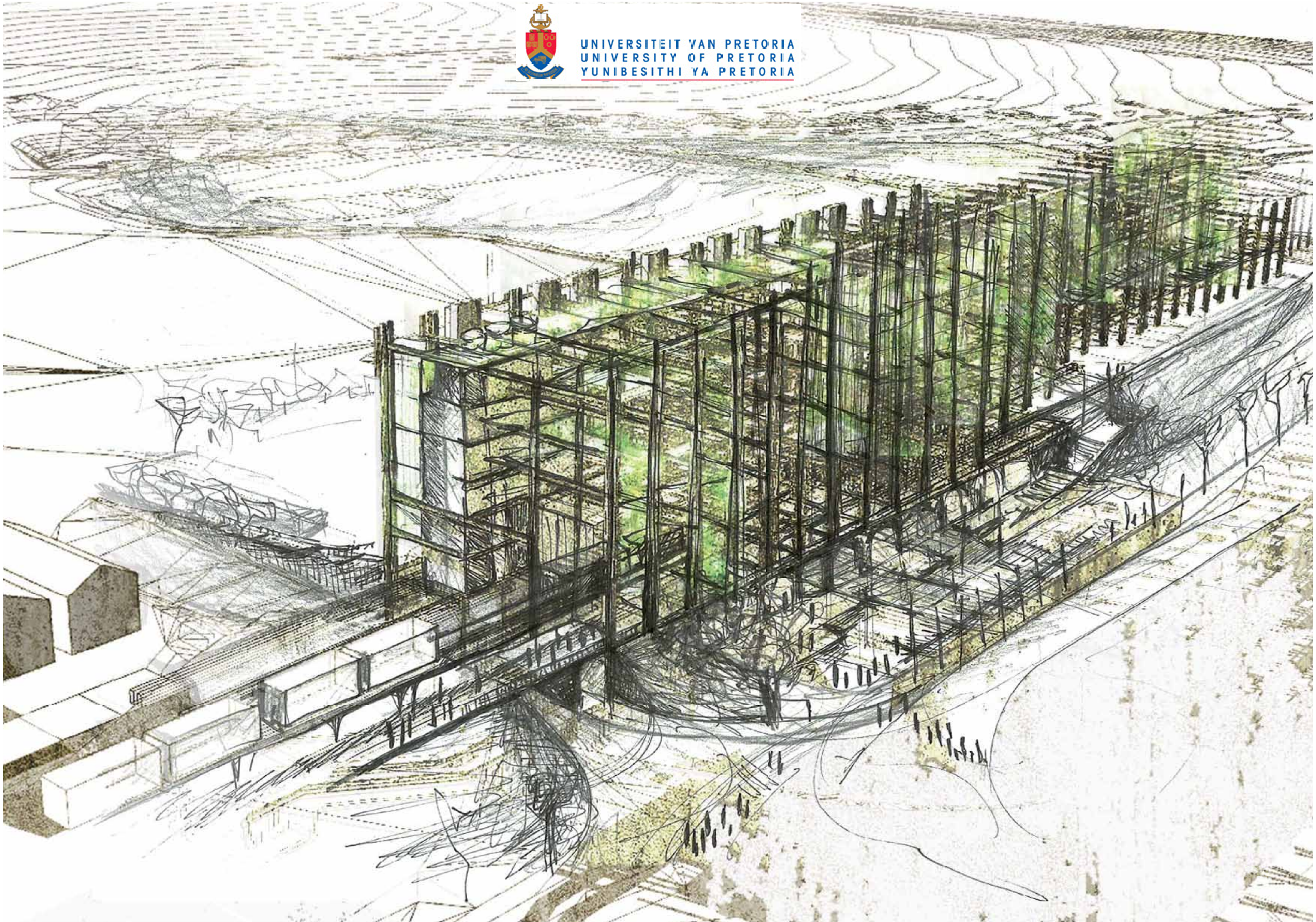
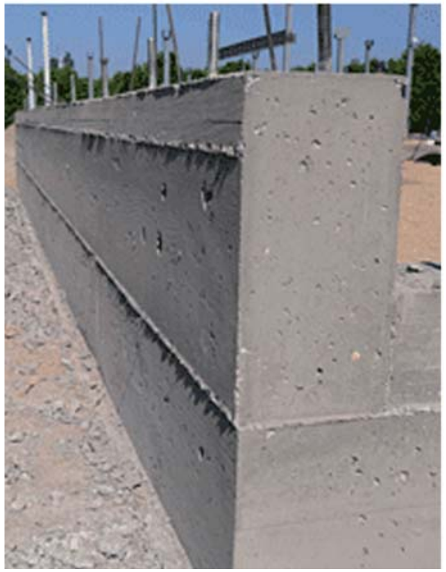




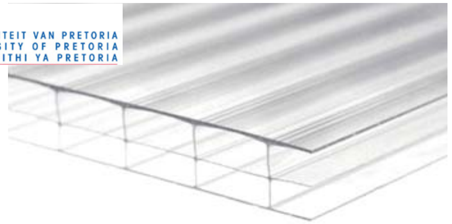
concrete
m a s o n r y

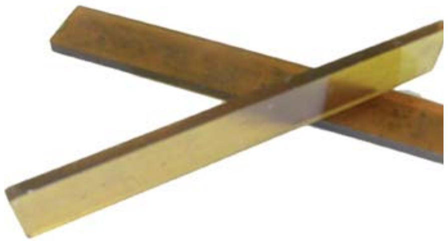
Fly ash is a product available in abundance on site because of the process of coal-fired power generation and the on site ash ponds. The substitution of cement in traditional building materials with fly ash significantly reduces carbon dioxide signatures and global carbon emissions [Ecosmart Foundation Inc, www.ecomsmart.ca]. The local community already collects fly ash from the site for masonry and concrete construction [Masut, 2010]. Another product that can be sourced from site is recycled glass. Consol Speciality Glass Factory is directly south of the Power Station. The factory produces glass bottles and glass packaging and the company has various recycling schemes in practice already. Glass is 100% recyclable [www.consol.co.za] and an effective substitution for traditional aggregates.

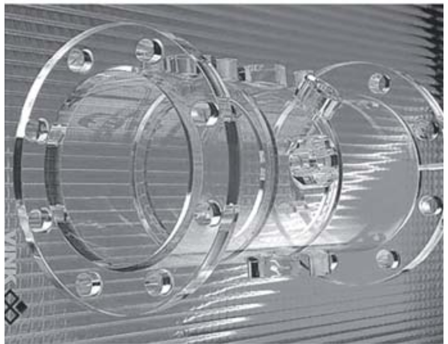
High carbon content fly ash cast in-situ concrete and precast reinforced masonry units are used for thermal mass and infill materials. The hydraulic lift shafts and other primary walls are cast in situ. High carbon content fly ash masonry is the primary non-bearing infill material. Precast concrete planks and masonry units are used at staircases, circulation and exterior landscape applications.

recycled glass aggregate precast concrete

Figure 107: Fly ash masonry.
Figure 108: Glass aggregate concrete.
Figure 109: Cast in-situ fly-ash concrete.







polycarbon
a c r y l i c s

Although laminated structural glass seems currently to be the best option as a skin for the building (because of its strength and transparency), it is also the most expensive option, and cannot compete with polycarbonate materials on thermal properties and impact resistance. Also, the structural components required to support glass are much more costly. Both the study on materiality for the Vertical Farm Project, and independent research indicate that polycarbonate, acrylic plastics and acrylic glass is the safest, sustainable, recyclable option as a alternative to glass [Fitzpatric et al, 2006:15; www.bwgreenhouse.com]. Not only will this give the opportunity for a transparent skin and roof, it is also possible for a transparent floor in the form of polycarbonate honeycomb structural suspended floor panels [www.bencore.co.uk].

Furthermore, research indicates advances in green plastics, or “bio-plastics”. Though this technology is still in its infant stages for building application, it can be used for building services and fixtures. However, when this technology proves to be feasible for use in building construction projects [Fitzpatric et al:2006:21], the new hydroponic factory would be able to shed its polycarbonate skin (as polycarbonate is fully recyclable and generally needs to be replaced in 10-20 years) and literary grow a new one. The bio-plastic product can be grown from the biomass wastes of the building. This product can then also add a new dimension of production and experimentation for the building.

Figure 110: Twin-wall polycarbonate.
Figure 111: Polycarbonate structural floor.
Figure 112: Bio-plastic panels, strips, tubes and fixtures.
Figure 113: Acrylic/bio-plastic plumbing fixtures.

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bamboo
structural

1. bamboo scaffolding & construction

2. bamboo instead of aluminium in greenhouses for structures or pipes

3. multi-story, load-bearing, low-cost, structural bamboo

1. bamboo scaffolding & construction

4. bamboo structure as durable lightweight, public exterior material

1. bamboo scaffolding & construction

5. bamboo as structure column

6. laminated structural bamboo

Bamboo is an accepted contemporary product for applications ranging from flooring, fixtures and roofing. The material has proven through many sporadic organizations and trial projects to be a successful structural element for larger scale building and construction. Many contemporary architects like Arata Isozaki, Buckminster Fuller, Frei Otto and Renzo Piano have already combined conventional contemporary elements (concrete, steel) with bamboo in the pursuit of a new, resource-efficient structural building material. The greatest advantage of bamboo is that it can be used almost exactly as a steel element and so is a great material for anything from columns to trusses and frames. It is also possible to grow it in South Africa and there are already plantations in the Cape provinces pursuing bamboo crops such as Brightfields and the Biomass Corporation. It is viable to grow crops in Gauteng also [Heinrich, 2010]. The Biomass Corporation has planted crops to rehabilitate mine-dumps and other industrial sites, develop bio-fuels from this product and release these sites from dependency of the electric grid [www.biomasscorp.com/southafrica]. The biggest challenge currently is that mind-set of the general population to accept that bamboo construction is durable [Habitat for Humanity, 2009:12]. This is a challenge for architecture. Bamboo is a very viable option for the hydroponic factory as it is an incredibly versatile new material for South Africa and can now be grown and sourced locally.

1. Figure 114: Scaffolding in China, Japan.
2. Figure 115: Greenhouses, Kyoto, Japan.
3. Figure 116: Staff Housing, India.
4. Figure 117: Hand-Made School, Bangladesh.
5. Figure 118: Structural columns.
6. Figure 119: German-Chinese pavilion, 2010 Shanghai World Architecture Expo.

p l a s t i c vs. glass

- Light-weight: plastics weigh on average 50% less than glass, are easier to install and simple to replaced when damaged.
- Impact resistant: plastics generally have a 6 to over 15 times greater impact resistance than glass.
- Safety: plastic products do not shatter when impacted beyond their resistance factor.
- Weather resistant: plastics can withstand the effects of weather, unaffected by sun or salts.
- Insulation: a standard 16mm Triple Wall Acrylic Panel has an R-Value of 0.44 where a Glass Triple Layer with 6mm air space only reaches an R- Value of 0.37.
- Dimensional stability: acrylic plastic expands and contracts with changes in temperature or humidity - the plastic will return to its original state when the temperature returns to normalcy.
- Transparency: acrylic plastic is as transparent as the finest optical glass. White light transmits at 92%, glass at 89% and clear acrylic only a few points lower at 86%, with polycarbonate plastics at 83%.
- Chemical Resistance: acrylic plastic has excellent resistance to most chemicals.
- Electrical Properties: it is an good insulator.
- Easily Fabricated: acrylic plastic can be sawed, drilled, and machined, much like wood or any soft metal, and does not require high skilled craftsmanship or complex tools. When its heated, it is completely malleable and can be prepared for any application.
- Environmentally safe: acrylic plastics have no harmful chemical solvents, do not emit VOC's, the plasitcs are non-corrosive, non-flammable and they have no harmful effects of any form on humans or animals.
- Recyclable: plastics are much easier to recycle and/or reapply than glass products.

[summary on Fitzpatric et al, 2006:15]

b a m b o o vs. steel and aluminium

- Tensile Strength: with members of the same weight, bamboo has a tensile strength of almost 200 kN/mm² where steel only has a tensile strength of 150 kN/mm².
- Allowable Force: with members of the same weight, bamboo has a allowable force of 25.6 KN and steel 27.6 KN.
- Cost: incredibly economical when compared to steel or timber.
- Can substitute steel: bamboo can replace steel (and timber) completely as scaffolding, trusses or space frames. Current research and design indicate that multistory buildings with only bamboo as vertical structural element can reach up to 3 levels, or 12-15 meters [www.architecturebrio.com] and lightweight buildings can reach even higher. Bamboo as cladding and roofing can also replace steel cladding or roofing.
- Substitute timber: Bamboo competes and beats timber in every way, and laminated bamboo beams are also available. [www.lamboo.com].
- Substitute aggregate: bamboo can be mixed in or replace aggregates in certain concrete applications.
- Renewable Resource: can be harvested annually, non-destructively; matures within 4 years (timber anything from 20 years), crops are available for growth in Gauteng, South Africa, [Heinrich, 2010] and does not require sophisticated farming methods.
- Recyclable Resource: bamboo structures is much more recyclable than steel, can be dissembled easily, reapplied or used to feed new crops, make bio-diesel or bioplastics.
- New skills and job opportunities: the training and development of this technology for South Africa can supply a countless amount of people with work.
- Variety of applications: Like steel, bamboo can and has been used in modern construction as scaffolding for very high structures (more than 50 storeys), columns, beams, trusses, spaceframes, roofs, floors and large bridges. It can also be used in greenhouses, as piping and irrigation, as gutters and downpipes, and as roof, floor or wall material in humid or dry environments.

[summary on De Groot:2010; Jansen, 2000]

why not south africa?

Yes, though South Africa has some commercial hydroponic systems, it is an undervalued practice and in general, our farmers are scared or sceptic to use it, favouring traditional resource-intensive agriculture. Our farmers expect that our seemingly boundless land and sunshine will sustain us in food security, yet we know that this is not possible - even for South Africa. Instead, it is exactly this issue that should encourage the idea of **urban** agriculture in African climates. Our boundless sunshine aids even more in the viability of vertical farming as it would reduce much of the energy needs in such a project, more so as in a countries like England, New Zealand or Japan for instance. Furthermore, more and more farmers are forced off lands for reasons other than agricultural malpractice - mostly socio-political reasons. Private ownership of a building for agricultural practice could provide a solution to this problem.

By not exploring the viable, working practices of growing commercial hydroponic or aeroponic crops indoors, African cities are wasting great opportunities on many, many levels.

morkel combrink
economist and professional in agricultural practice
[combrink, 2010]

b u i l d i n g
w o r k s h o p

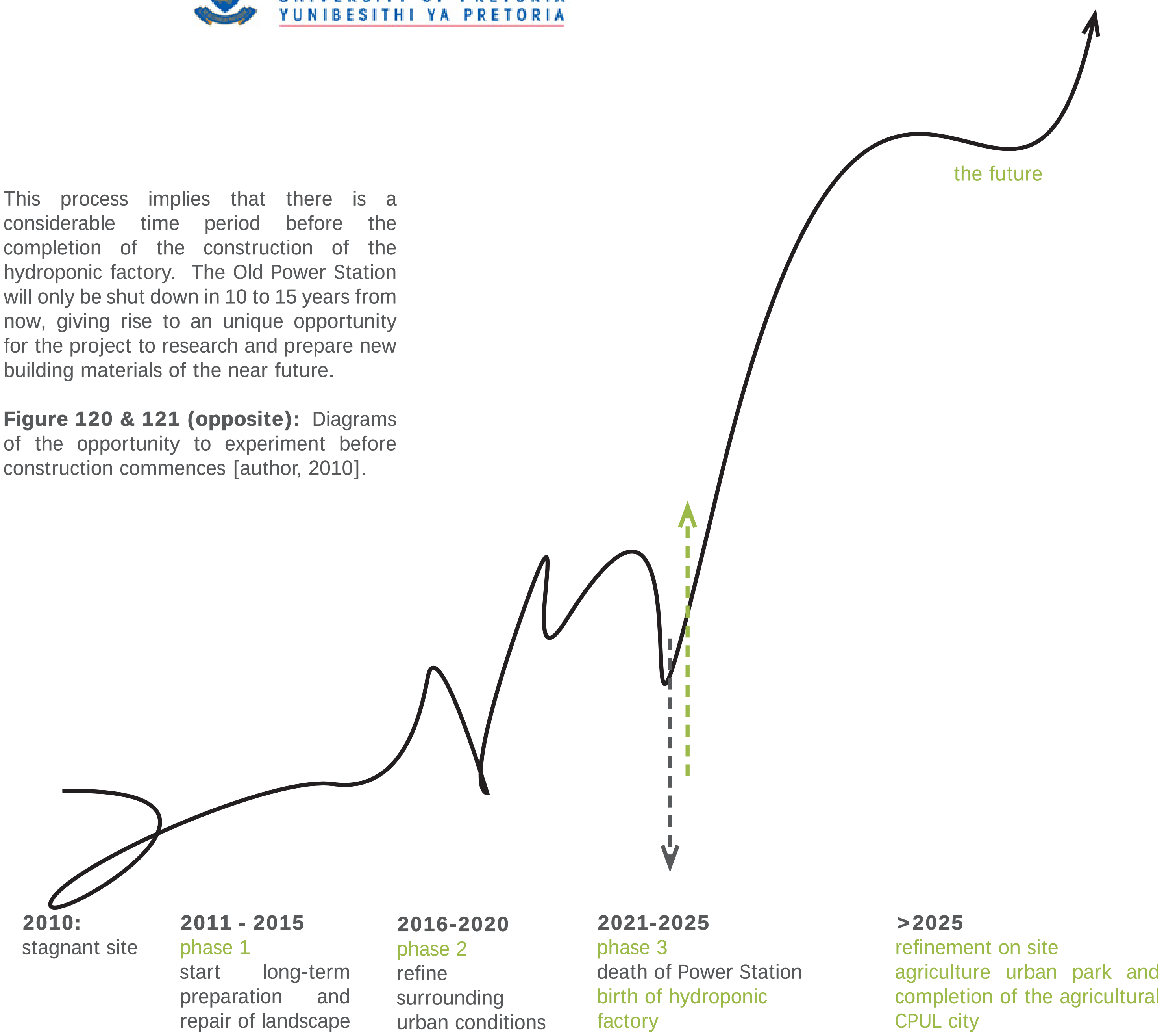
key concept:
future-orientated opportunity

The Pretoria West Power Station will not shut down immediately, but only in the next 10-15 years [Masut, 2010]. It was therefore decided that the greater framework development on site is divided into four phases. Phase One can start immediately. It is the phase that develops long-term solutions for the immediate environment and repairs the existing landscape and infrastructure in anticipation for the new developments. Phase Two, 3-5 years later, further refines the urban edge conditions on and around the site. This phase introduces housing and mixed-use developments around the site. This phase also introduces new productive programs within the existing building stock on site. The power station is used as an educational attraction throughout these phases to create awareness of the greater site as a destination point and so imprints the site into the memory of a greater urban population. During these two phases the power station is still operable and running.

Phase Three sees the death of the Old Power Station as it is shut down and the new production programs are introduced. It is during this phase that the hydroponic factory will be constructed. The immediate landscape around the bunker is to be designed as an urban agriculture park. During Phase Four and the completion of the entire development, detail design is carried on for the remainder of the site. This is the ultimate culmination of the urban agriculture CPUL city as it refines the newly established urban agriculture park and landscape.

This process implies that there is a considerable time period before the completion of the construction of the hydroponic factory. The Old Power Station will only be shut down in 10 to 15 years from now, giving rise to an unique opportunity for the project to research and prepare new building materials of the near future.

Figure 120 & 121 (opposite): Diagrams of the opportunity to experiment before construction commences [author, 2010].



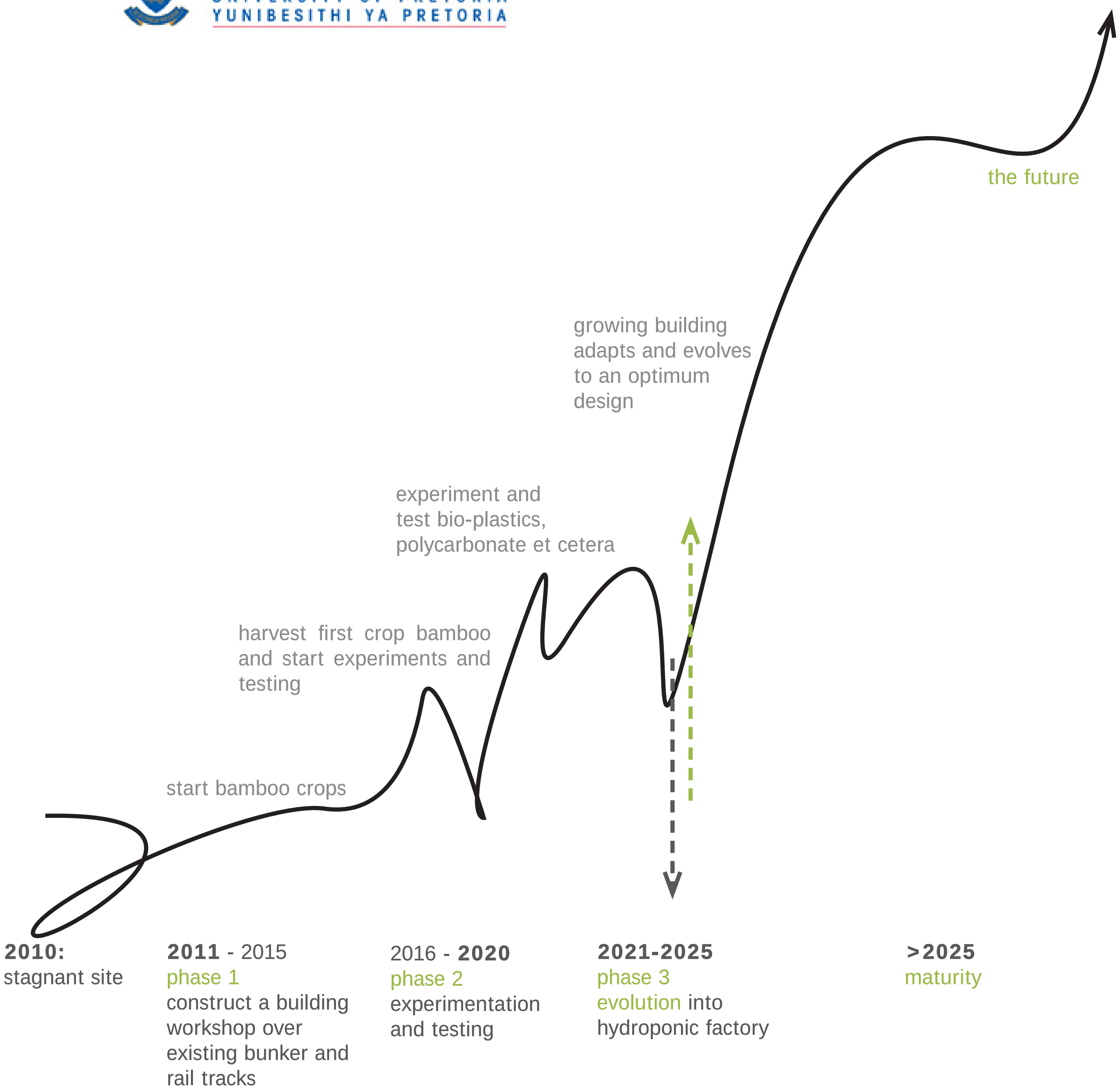
b u i l d i n g
w o r k s h o p

key concept:
testing and experimentation

The bunker itself will also therefore have 10-15 years to do real and actual experiments with materials such as bioplastics and bamboo **on site.** This window in time will be a unique opportunity to test the materials against weathering, on-site production (growing bamboo, nuts or beans for structure or creating bioplastics), testing structural stability or configurations, researching recycling potential of the materials and many other facets. This research has immense value, not only for the hydroponic factory itself, but for building technology for South Africa. A design proposal for this period in time is therefore a building technology workshop and studio. This structure will also be made of steel, bamboo and polycarbonate - a live mock-up - and it is placed over the existing bunker so as not to intrude on any on-going process while the power station is still active. This workshop will be transparent to the public, an educational platform formally and informally - a public laboratory and library for building technology, attracting visitors and researchers to the opportunities that new building technology can bring by exhibiting the experiments both in the nature of the constructed built object and also an evolving construction sculpture.

"Architecture is not just about making good buildings and solid, it's also about telling stories in some way."

Renzo Piano
The John Tusa Interviews, 2008
[Tusa, 2008]



b u i l d i n g w o r k s h o p

key concept:
making industry urban

Currently, the site is inactive and does not contribute or activate any part of its immediate or greater urban environment. The hydroponic food factory, however, is a building that wants to embrace the new idiom of urban living: a resource efficient **society** in productive buildings and landscapes. The 10-15 year window before the completion of the final building gives an opportunity for the hidden site to become part of the urban heritage by becoming a place of event and public art. It is suggested to invite artists to take part in sensational large scale urban artistic festivals with the building workshop as a home-base. When the final building is then built and the greater site and landscape opens up, the old coal bunker as a place of event will be established in the urban memory. When the bunker itself opens up, the design can naturally evolve into its intended program of becoming a permanent public market as the public can filter through it to the new adjacent park or towards the new train station. The new building workshop and the immediate urban landscape and surfaces are to be established first and the building front is to become public. Public Art and Event for the site's future development will also holds office in the new building, maintaining the closer relationship that industry and urban living should have towards each other. When the proximities of the creative industry and productive industry close in on each other, undiscovered exciting opportunities develop.



Figure 122, 123, 124: Live building workshop as testing ground for bamboo construction for South Africa.



Figure 125, 126,127: Public art as awareness for place.

Figure 128 (below): Existing site for the initial building workshop concept [author, 2010].

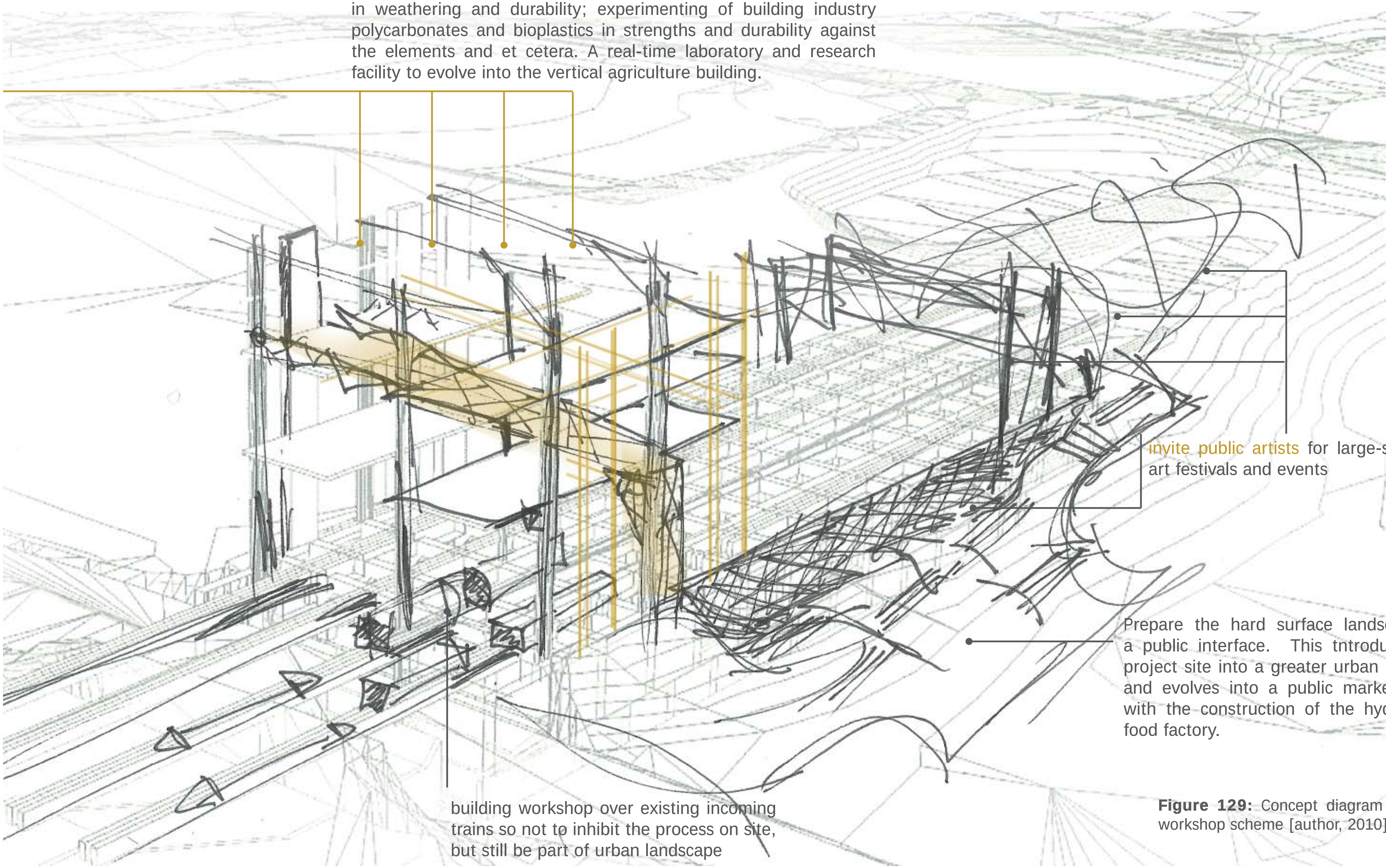


Figure 129: Concept diagram for building workshop scheme [author, 2010].

l i v i n g
b u i l d i n g

key concept:
optimum evolution

The building and project in its entirety is therefore a platform for experimentation and innovation, not only in the virtual realm of its program, but also in its physicality as a developing, growing built object. By maturing into its final form over time, the design is a learning organism and empirically develops itself and its purpose within the city. This strategy ensures that the building will ultimately evolve into a creature that understands itself, grows according to its own needs, adapts with the environment it is in and can incorporate exciting future technological developments into its built fabric.

"I've been thinking a lot about this lately. There must be a difference between things that change, and things that become.

Things that "become" are rare, exposed to misunderstanding, and possibly disappearance"

Jean Baudrillard
The Singular Objects of Architecture
[2002:45]

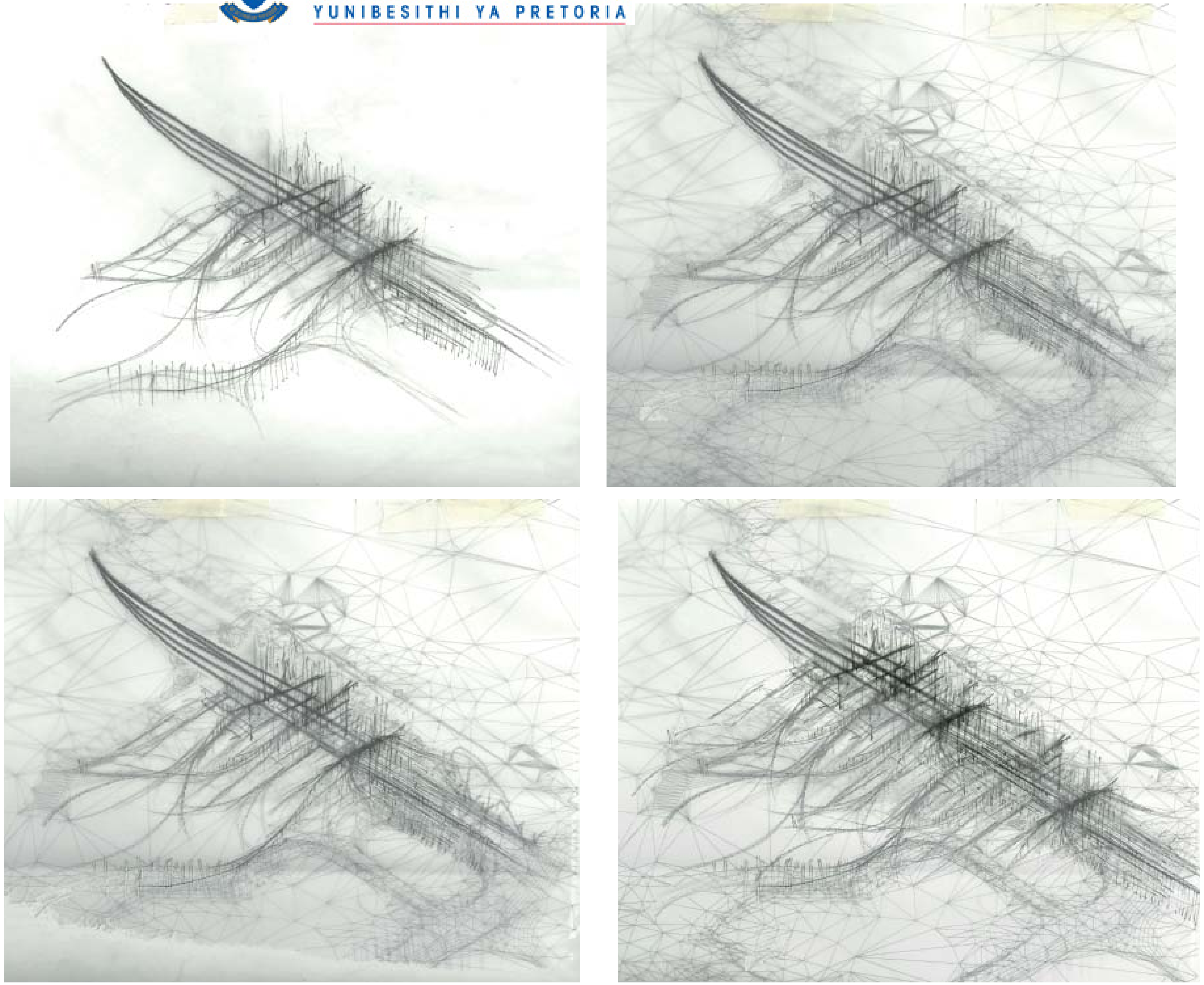


Figure 130 (left, opposite): conceptual sketches [author, 2010].
Building workshop over bunker and tracks (growing bamboo, testing materials, experimentation, education et cetera) grows into a mature design.

evolve growing to maturity

living building concept using site as a building workshop in experimentation and preparation for the final design

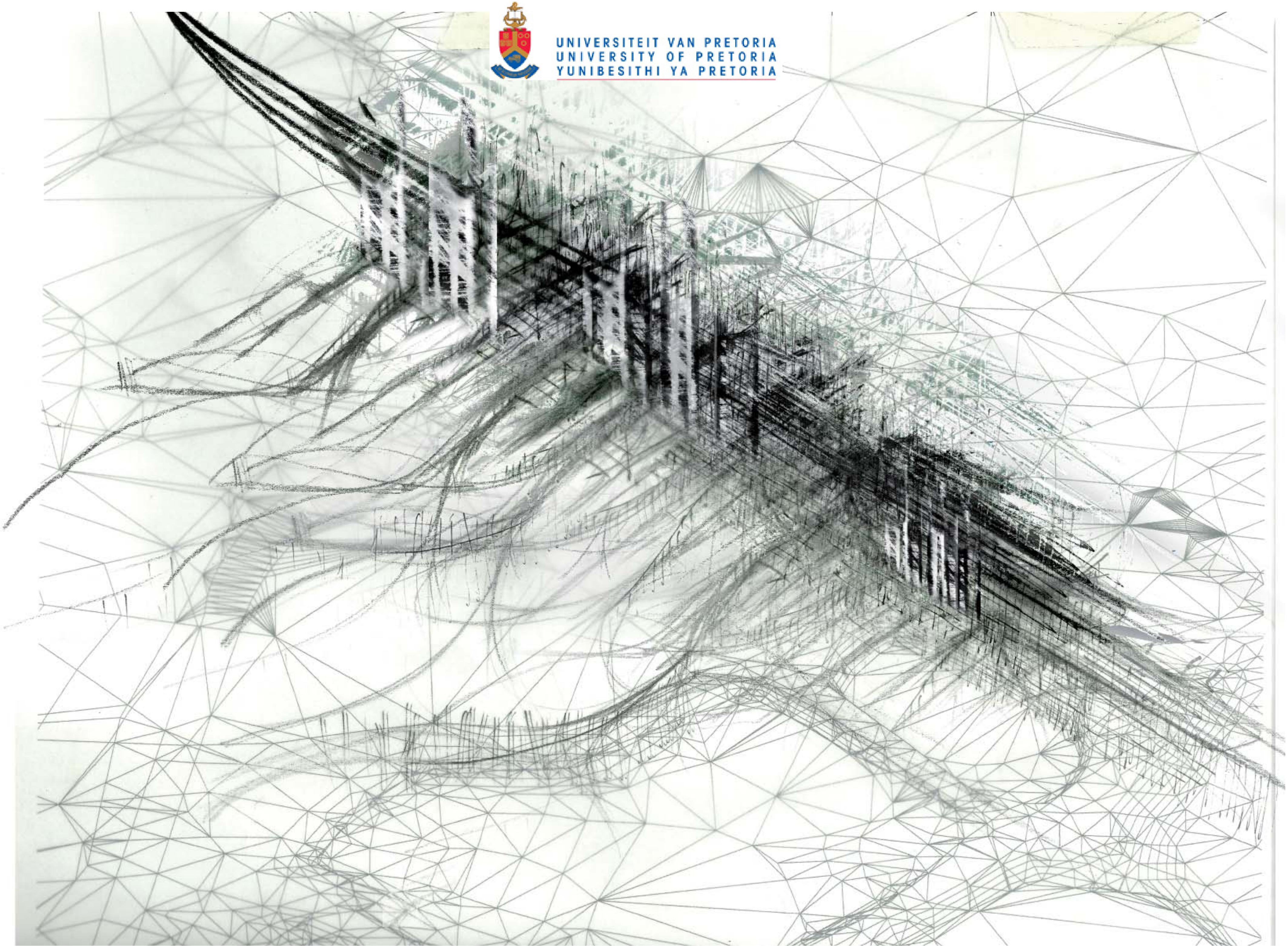


Figure 131 : Conceptual sketches [author, 2010].
Blurring the edge of public and industry