



Design clarification

6.1 About the Centre.

The word “Siyotshala” means 'we plant' in Zulu. As mentioned, the Siyotshala Urban Agricultural Centre will serve as a generator for business, commercial and recreational activity and will seek to uplift and empower the people of the area. If the 50 members of the Co-operative, all have families consisting of 5 members, then the lives of 250 people will be directly impacted. The agricultural knowledge acquired at the centre can be passed on from father to son, and will impact many more lives.

The Centre will provide the following employment opportunities:

- Employment for 50 members of the Co-operative.
- The small bakery within the centre can be rented to the public or operated by members of the Co-operative.
- The market spills out into the informal trading and food area. In this area entrepreneurs that are not in direct competition to the market can earn an income.

The Siyotshala Urban Agricultural Centre is an attempt to provide a simple structure from local materials that will be aesthetically pleasing within the newly formed urban environment. It is also an attempt to put human contact back into the marketplace, where local people can meet and do their weekly grocery shopping within a buzz of activities.

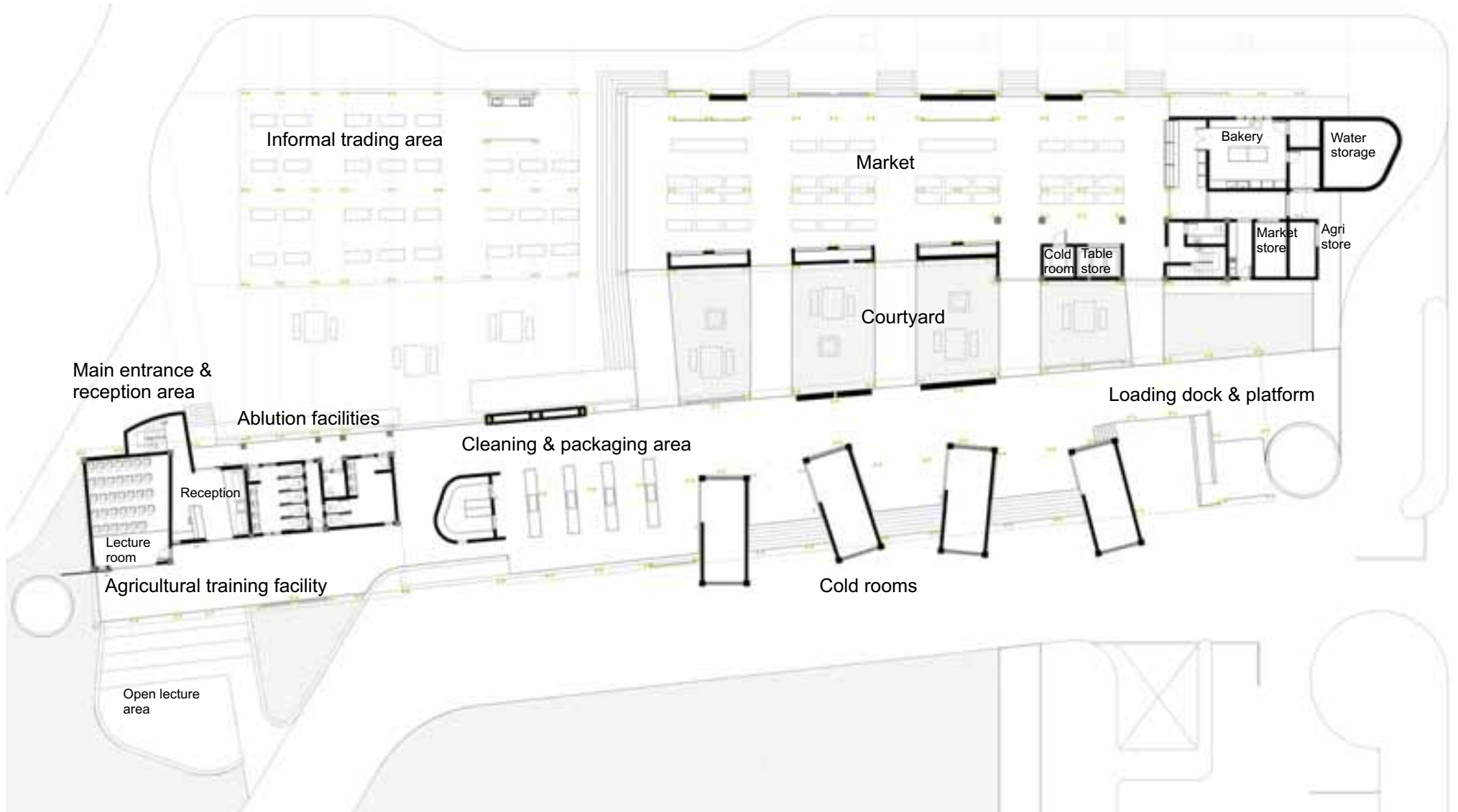
One of the main concepts behind the design is to provide a building that seems to grow out of the existing fabric of the area. The slightly off-access elements of the design open up vista's towards the surrounding agricultural fields and further emphasize the notion of “Archology”, where the city functions as a living system. We live in a world that worships celebrity and fame, and many architects design buildings to attract the attention of the world and for not much else. This dissertation attempts to provide a case for architecture that is raw and unrefined and will be constructed from simple cost effective local materials; however in the process generating a building that is fresh and that brings a sense of dignity and pride to the area. Architecture that acknowledges everyday domestic life, but still celebrates the potential for inventiveness within the ordinary as Joe Noero puts it. (NOERO 2004:16-24)



North elevation - Market



Site plan



Ground floor plan



First floor plan

6.2 Access and onsite parking

Private vehicles and taxi's access the site via Love Drive and Market Street. The newly designed public transport facilities at Eerste Fabrieke Station play a major role in the proposed urban framework of the study area. From the station people will have direct access to bus, taxi and transport by train at almost any time of day. Only a few people in this area own vehicles, and three taxi drop-off points were included in the design to promote public transport. The service road to the centre can be accessed from Love Drive. Formal parking is provided along Market Street and the parking bays at the back of the centre are reserved for co-operative members only.



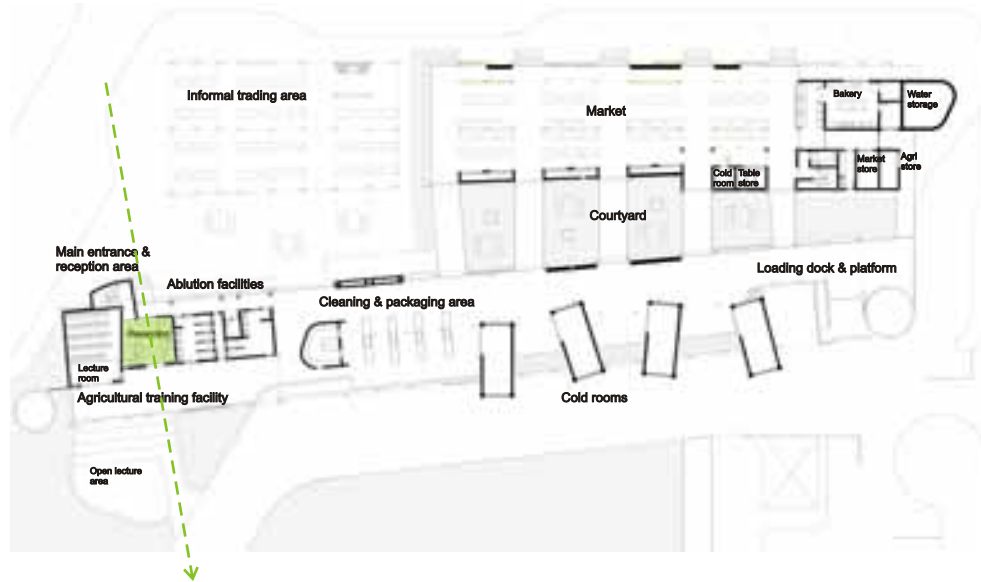
Agricultural outbuilding



Perspective view of market & informal trading area

6.3 Main entrance and reception area

The main entrance to the facility acts as a focal point upon arrival at the centre, and the visitor's eyes pass through the reception area towards the agricultural activities on the other side. From here visitors can either move to the agricultural training facility or to the office and administration area on the first floor. The reception area will be used for administration and registration purposes.

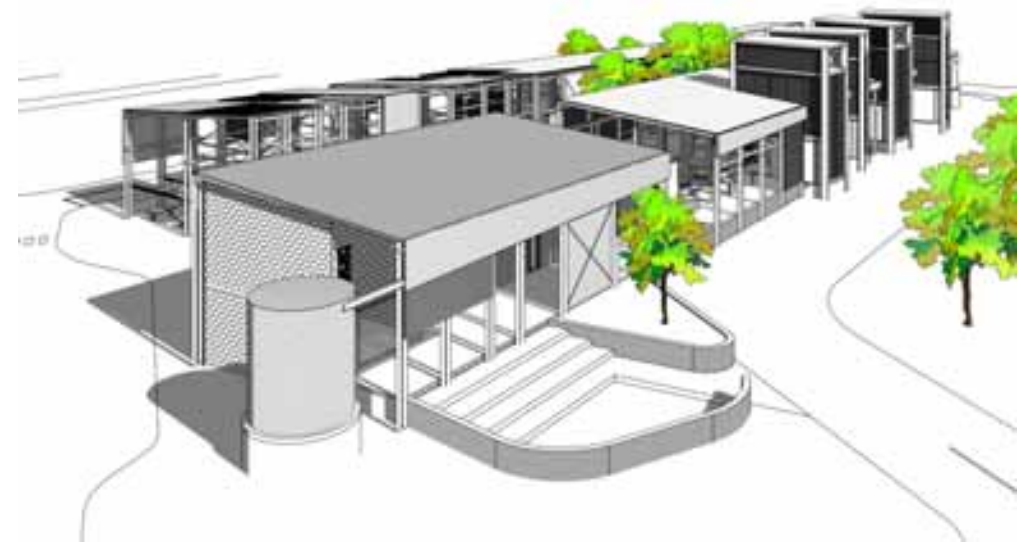


North elevation - Agricultural building

6.4 Agricultural Training Facility

Agricultural training forms the backbone of the Siyotshala Urban Agricultural Centre. The agricultural workers will be trained in all aspects related to farming, and the training will range from planting and harvesting techniques to crop irrigation. Although the training will mostly be done by hands-on practical experience in the field, two lecture areas form part of the design. The southern facade of the enclosed lecture room can slide open to expose the learners to the outside farming activities. The interior is furnished with desk chairs that can be easily removed in the event of small exhibitions and functions.

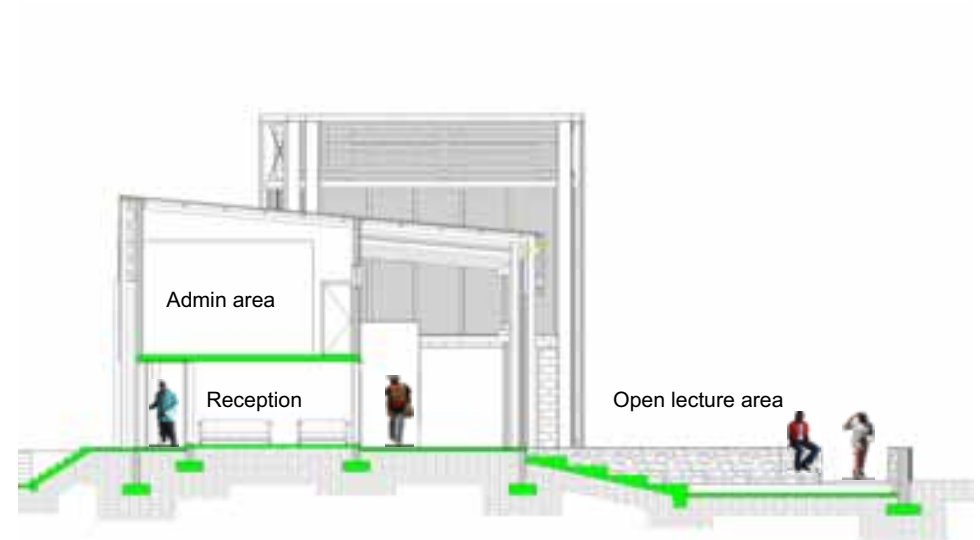
The open lecture area has a clear view towards all the agricultural activities and is located in close proximity to the crops for practical study.



Perspective view of training facility

6.5 Office and Administration area

The office and administration area of the Siyotshala Urban Agricultural Centre is located on the first floor of the agricultural building. This area contains offices for the directors, agricultural trainers and administrative personnel and will have a bird's eye view over activities around the centre.



Section through office and administration area



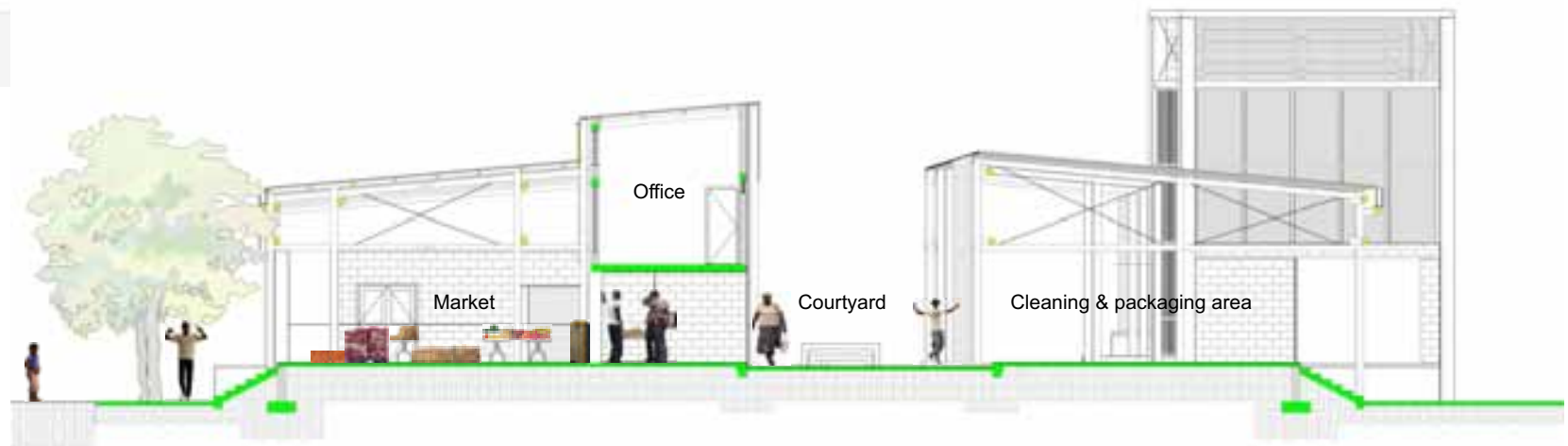
South elevation - Agricultural building

6.6 Cleaning and Packaging area

After harvesting, the vegetables will be taken to the cleaning and packaging area to be washed. From there the vegetables can be directly carried to the market, loading platform or cold rooms for storage. All the necessary packaging equipment and containers will be stored next to the packaging area. On the northern side, the cleaning and packaging area is screened off from the informal trading area by means of a concrete masonry wall.



Perspective view of cleaning & packaging area



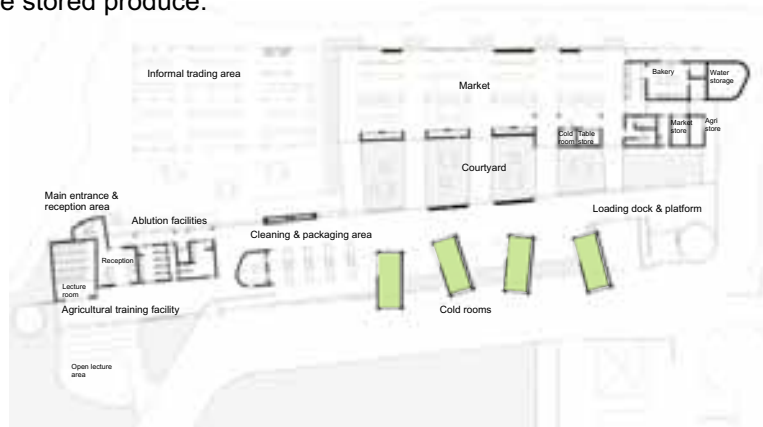
Section through market & agricultural building

6.7 Cold rooms

The cold rooms make use of evaporative cooling, and can reduce the internal temperature by up to 7 degrees Celsius during summer months. Although this temperature reduction will be sufficient for most produce, other fruit and vegetables like tomatoes, cabbage, lettuce and grapes need to be stored at optimum temperatures between 1 and 10 degrees Celsius. These products will be stored in cold rooms inside the market area.

The evaporative cooling cold rooms act as wind scoops and wind is directed through wire mesh skins that contain coal. Water is constantly dripped onto the coal to enable evaporative cooling to take place. Fresh produce will be stored in purpose-made designed wall crates that can be stacked on top of each other. The roof structure of the main agricultural building is overlaid with a few layers of geo-textile. Water is constantly dripped onto these layers to cool the roof underneath the protruding cold rooms.

Because fruit and vegetables are mostly composed of water, it is not surprising that the final product is relatively expensive. Water loss also equates to a loss of saleable weight and a direct loss in marketing. For this reason measures to minimise water loss after harvest must be taken. Evaporative cooling will enhance the moisture content on the inside of the cold rooms and inevitably also enhance the shelf life of the stored produce.



Volume of cold storage required

December (biggest harvest)

Harvested	Volume	Storage per ton	Total
Carrots	15.75 t	1.5 m3	23,63 m3
Butternut	9 t	1.6 m3	14.4 m3
Cabbage	27 t	1.6 m3	43.2 m3
Beetroot	8.1 t	1.8 m3	14.58 m3
Spinach	4 t	1.5 m3	6 m3
	63.85 t		101.8 m3

First week = 31.93 t (harvested)

Second week = 31.93 t (harvested)

Total = 63.86 t

Cold storage required (harvested produce for 1 week) = $101.8 / 2$
= 50.9 m3

Cold storage provided: 15.88 m3 per cold room (x4)
= 64 m3

Available storage (everyday) for produce obtained from fresh produce market:
 $64 - 50.9 = 13.1$ m3

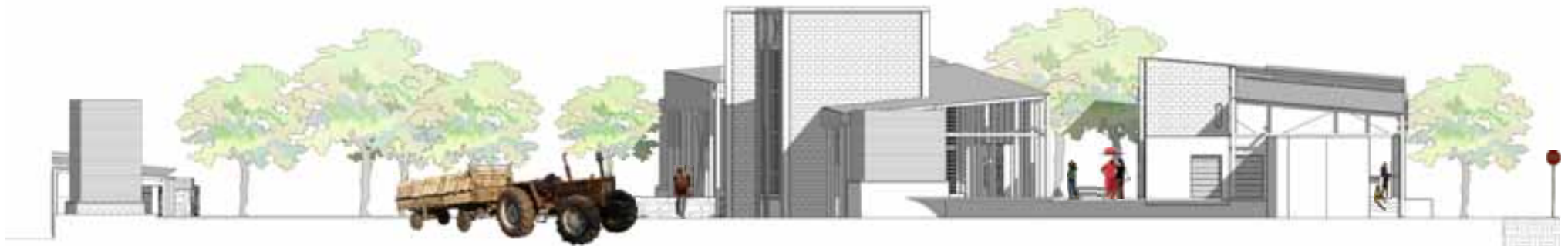
6.8 Loading dock and platform

Vegetables planted at Siyotshala will be limited to sweet potatoes, carrots, cabbage, butternut, beetroot and spinach. The biggest part of the harvest from Siyotshala will be sold to the Pretoria Fresh produce Market on a monthly basis. The centre will also purchase other fruit and vegetables from the Fresh Produce Market on a daily basis.

Delivery trucks will be able to reverse into the loading dock or offload at the platform, should the truck only open from the side. From this area the produce can be distributed to consumers throughout the city.



Perspective view of courtyard



East elevation - Urban agricultural centre

6.9 Market

During daytime the market becomes a vibrant trading area where fruit and vegetables are displayed in storage crates on fold up steel tables.

The main idea behind the design of the market area is to create a multi-functional space that may be used for other activities besides the selling of produce. After trading hours, the centre can be turned into a community centre where kids can do their homework and play volleyball. It can also function as a venue for conferences, weddings and even church services. The floor of the market is designed with the necessary surface drainage slopes and area drains and can easily be hosed-down and cleaned.

Five Concrete walkways link the market to the cleaning, packaging and cold room area for the produce to be moved from one area to the other.



Interior view of market area



South elevation - Market & informal trading area

6.10 Informal trading Area

Fold-up steel tables and allocated space for trading can be rented by informal traders for a minimal amount. From underneath the overhead roof structure, traders can personalize their area of trading by fixing canvas screens to the cables that span from the gumpole structure. This way, many smaller stalls will be created under a common roof to humanize the whole experience.

6.11 Courtyard

The elongated courtyard area is located between the market and the main agricultural building. From here visitors will be able to see how the vegetables are being processed while enjoying a meal from the informal trading area. This grass filled area contains concrete tables with seating and will be filled with the flavour of food being prepared.



Perspective view of informal trading area

6.12 Ablution facilities

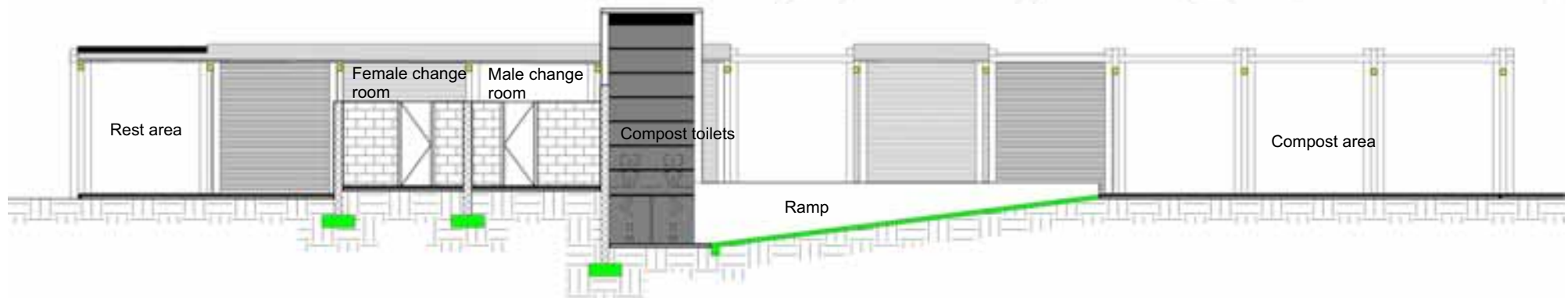
The ablution facilities for the centre are designed in accordance to the National Building Regulations for buildings with a low risk commercial service and are located next to the Agricultural Training Facility. These facilities can be accessed from the Informal Trading and Agricultural Training Area. The water closet toilets of the ablution facilities are connected to the municipal sewer.

6.13 Agricultural Outbuildings

The 10 agricultural Outbuildings are located at regular intervals along the 8.6 hectares of agricultural land. These outbuildings will contain a resting area, change rooms, compost toilets and an area for compost production. The composting toilets consist of a double pour flush system and enables alternative use of the two pits. When one of the pits is full, it can be closed and left for pathogen destruction to take place. After this period the decomposed content can be safely removed and mixed into the organic plant material waste.

6.14 Security

All agricultural workers will be trained in security matters and will perform security work on a rotation basis.



Section through agricultural outbuilding

6.15 Applied alternative energy

Although mainstream electricity will still be necessary, alternative methods of energy are being used to reduce the carbon footprint of the building and to make the centre more self-sustainable. These methods include the following: Evaporative cooling cold rooms, composting toilets, the reuse of gray water, hydraulic ram water supply and rain water harvesting for reuse. Photovoltaic panels will also be installed on the roof of the main agricultural building. These panels will be used to pump the evaporative cooled water back to the storage tanks on top.

10 Hydraulic Ram pumps will be installed at 2 meter working fall intervals. This implies that the gravity pump will be able to pump 165 litres of water to a vertical height of 10 metres at a rate of 24 hours / per. litre / per. Minute. The Pienaars River has a flow capacity of 10 litres per minute.

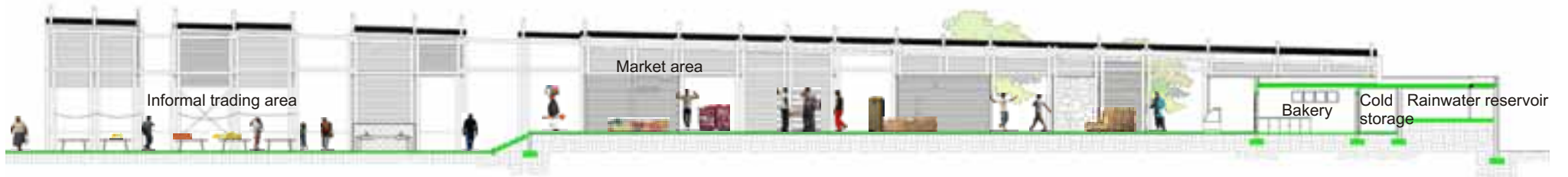
Calculation: $10 \times 165 = 1650$ litres. Thus, each of the installed gravity pumps will be able to pump 1650 litres of water over a period of 24 hours.



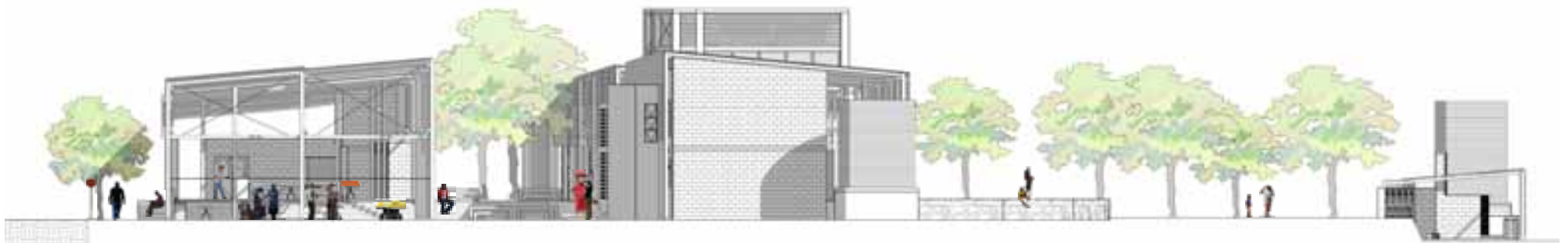
Perspective view of agricultural outbuilding



South elevation - Agricultural outbuilding



Section through market & informal trading area



West elevation - Urban agricultural centre

Harvested rainwater storage

Month	Rain(mm)	Roof area A	Roof area B	Roof area C	Accumulation: A	Accumulation: B	Accumulation: C	Tank size A	Tank size B	Tank size C
Jan	136	262 m2	555 m2	610 m2	39 (kl)	75.5	83	Max required: 39 kl	Max required: 75,5 kl	Max required 83 kl
Feb	75				21.5	41.6	45.8			
March	82				23.5	45.5	50			
April	51				14.6	28.3	31.1	Diam: 3.6 m	Diam: 5 m	l / h: 5m
May	13				3.7	7.2	7.9	Height: 4	Height: 4	Height: 3
Jun	7				2	3.9	4.3			
Jul	3				0.8	1.6	1.8	(0.7854 d2h)	(0.7854 d2h)	(l x w x h)
Aug	6				1.7	3.3	3.7	= 40.72 m3	= 78.54 m3	= 75 m3
Sept	22				6.3	12.2	13.42	= 40 720 L	= 78 540 L	= 75 000 L
Oct	71				20.3	39.4	43,3	= 40.72 kl	= 78.54 kl	= 75 kl
Nov	98				28.1	54.4	60			
Dec	110				31.6	61	67.1			
					January = 39 kl	75.5 kl	83 kl			

Attainable evaporative cooling

Month	Wet bulb	Dry bulb	Rel humidity	Attainable cooling	Area	Av. wind speed (m/s)	Factoring	Wind speed (m/s)	Volume of air flow (m3/s)
Jan	18.83	22.6	58 (%)	3.02 (deg C)	(50 m2)	1.9277	(0.5)	0.964	48.2
Feb	18.56	24.7	59.5	4.9		1.8837		0.942	47.1
March	16.9	21.6	60	3.76		1.78		0.89	44.5
April	13.26	18.76	59.5	4.4		1.7063		0.853	42.65
May	11.9	16.26	55	3.5		1.728		0.864	43.2
Jun	8.9	13.56	53	3.73		1.787		0.894	44.7
Jul	7.9	13.26	50	4.3		1.915		0.958	47.9
Aug	10.27	18.5	46	6.6		2.0603		1.030	51.5
Sept	12.47	22.3	45	7.9		2.2177		1.109	55.45
Oct	14.6	23.6	49.5	7.2		2.32		1.16	58
Nov	17.2	23.76	54	5.3		3.1241		1.062	53.1
Dec	17.8	25.16	56.5	5.9		1.99		0.995	49.75

6.16 Selected construction material

The Siyotshala Urban Agricultural Centre will be constructed from materials like concrete masonry blocks, gumpoles, Megaspan roof sheeting and Quartzite rock from the area. These cost effective materials are commonly used by the local community to construct houses in Nellmapius and refer to local building traditions in a very clear way.

Concrete masonry blocks will be purchased from Frans Tswai. This local entrepreneur from Nellmapius manufactures concrete masonry blocks and stock bricks, and is located a kilometre from the centre on the outskirts of Nellmapius.

The treated gum poles and laths will be obtained from Northern Poles, which is located about 12 kilometres west on Lavender road in Pretoria North.

Megaspan Composite Insulated Roof Panels from Sagex is used for the roof construction. These metal roof sheets are bonded to a core of expanded polystyrene and finished with a Chromadek steel ceiling board for maximum span and insulation.

Quartzite rock will be purchased from Willow Quarries at a cost of R120 per ton. The quarry is situated 14 kilometres south on Lynwood road in Zwavelpoort and transport cost amounts to R31-25 per ton.



001 (Photo collage by author)
Photo collage of selected construction material