“Trading-Up”
A prototype for training centres at Builders Warehouse Stores
Lallie C.F. Oosthuizen
“They harass our clients but we can’t chase them away as other clients do use them.”
- Builders Warehouse Employee (Johanneburg, 2012)
Fig 1 Two unemployed workers waiting next to the road at the Montana Builders Warehouse (By Author, Pretoria, 2012)
Abstract

Many unemployed construction workers, some with years of trade experience, often travel vast distances to the city and congregate daily at certain places in the city, hoping to earn a day’s wages and. Some have to sleep on the street and in parks, only to wait, hope and believe that the following day an employment opportunity will arise. The study addresses unemployment and the physical, metaphysical and socio-economic boundaries which exists around building supply stores. This dissertation aims at uplifting the unemployed who do not have formal qualifications and are willing to work with acquired trades on site. The prospective workers claim to be skilled in trades such as painting, brick laying, plumbing and plastering. The study investigates how architecture can diffuse the boundaries between the possible employees and the unskilled workers by advertising how skills are being taught and transferred to the workforce.

Using the Builders Warehouse franchise chain, three different training centre typologies are proposed in the parking areas of the stores based on size, number of unemployed gathering in the area and available parking bays. The programme focuses on providing proper training based on the training programme of the Atteridgeville Campus of the Tshwane Technical College where the workers can obtain a skill with an associated qualification as determined by CETA (Construction Education Training Authority). Training provided will also focus on new technologies and materials as well as energy efficient building materials.

Ultimately the Training Centre should become a threshold, to foster mutually beneficial relationships to be formed between the building supply store, clients and unskilled or unemployed workers gathering around the store.

The investigation of the problem of unemployed construction workers initiated the development of a architectural typology, termed “trade architecture”.

IV
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Research Field: Housing and Urban Environments

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A dissertation as part of the requirements for a MArch(Prof) degree, in the Faculty of Engineering, Built Environment and Information Technology, 2012
Declaration of originality

The Department of Architecture of the University of Pretoria, places great emphasis on emphasis upon integrity and ethical conduct in the preparation of all written work submitted for academic evaluation.

I, Charl Frederick Oosthuizen, am a student in architecture of the University of Pretoria for the course Masters of Architecture (Professional) in the year 2012. I am aware of the University of Pretoria's policy regarding plagiarism. I declare that this dissertation is my own original work and where other people's work has been used, it is fully acknowledged and referenced using the Harvard style of referencing.

I have not used work previously produced by another student or any other person to hand in as my own. I have not allowed, and will not allow, anyone to copy my work with the intention of passing it off as their own work.

Signed Charl Frederick Oosthuizen

__________________
Date
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1.1 Background to the study

The theme for the study developed after becoming aware of the unemployed, semi-skilled construction workers who stand around the building supply stores throughout Pretoria, waiting for an opportunity to work. Investigation led to the realisation that many sleep under newspapers and cardboard on the pavements and in parks nearby.

A survey completed by the researcher indicates that the workers often do not work for days and therefore it is very difficult and sometimes impossible to afford housing or to travel home, as some of them travel vast distances. The result is that they are left without shelter and sleep on the pavements near the vicinity where they wait for a job opportunity. From here they are lured into the culture of substance abuse within the homeless community (Du Plessis & Swartz, 2012).

According to Louw (2011: 2), there are currently 886,665 households in Tshwane without any income. Research by the Construction Education Training Authority (CETA) focusing on a skills development plan (2009/10: 6) estimate that there are currently over 600,000 workers in the construction industry who are unemployed in South Africa.

According to CETA (2009: 6) 40% of the construction workers’ education is below level 1 of the National Qualification Framework (NQF). Henry Janeke, skills development practitioner of the Hydro Training Academy in Benoni, states that this can be compared to having a secondary education lower than grade 10. The diagram in fig 2 indicates the current education levels of the South African population.

Three major reasons (CETA, 2009/10: 11) for the high unemployment rate in the construction industry have been identified:

1. 80% of companies are small to medium sized and the duration of 90% of the projects is less than three months.
2. Many construction companies make use of sub-contractors rather than to employ their own staff on site.
3. The lack of skills and training of the work force results in unemployment.

The most important aspect of working with the unemployed is to empower them to do something for themselves (Du Plessis & Swartz, 2012).
Current skills in the construction industry in South Africa

It is important for new training centres to not only cater for the current skills needed in the construction industry, but also for the skills that will be required in the future. STATSSA (CETA, 2009: 10) gives the following tables (below) on the current employment of workers in a specific trade on site (left) and with administration, working in offices (right). In conclusion, the following skills are accommodated on the respective sites: wet works, painting and carpentry.

![Diagram indicating current number of employed workers in the construction industry in SA (CETA, 2009/10)]
Fig. 5 The current situation and the aim of the study (By Author, Pretoria, 2012)
1.2 Introduction

The study proposes an architectural typology, termed “trade architecture”. The term originated from studying the elements of the “trade sculptures” (fig 4) erected by the unemployed construction workers around building supply stores.

According to Hannah Arendt (1998: 22), there are certain “things” which form the environment for activities to happen. It is important to familiarise oneself with the environment and the participants before initiating any form of upliftment. The “things” in this context include the workers waiting for an opportunity, the contractors buying supplies, representatives from production companies marketing new products, companies who want to invest in upliftment and educated or skilled people who want to invest their time toward moral and social good.

There are currently three types of participants within this context:
1. The building supply store,
2. The client or contractor and
3. The unemployed worker,

But the social structures are not necessary beneficial to any of the parties. The context of the store is a place where the workers can find a potential job. Some clients might use the workers, but others are harassed and the workers become an irritation. The building supply store, however, is faced with a dualistic problem: the workers harass the clients, but they cannot be chased away as they do not gather on private property.
The building should be designed in such a way that it can change over time and to suit its changing context. The research is aimed at discovering the aspects or “things” as referred to by Arendt that form the mutualistic relationships between the unemployed workers, the supply stores and clients.

Trade architecture develops in the form of skills training centres in conjunction with building supply stores and focusses on training the unskilled and the unemployed. The training should not only serve as an upliftment project, but also establish trust in the capabilities of the workers from the prospective employers. The training centres act as catalysts for interaction between the unemployed workers congregating around building supply stores, the contractors and clients of these stores.

The study area is narrowed down to the parking areas of the Builders Warehouse stores. The reason for using the Builders Warehouse stores as the preferred building supply store is that Builders Warehouse has a company policy that 1% of the company's turnover after tax has to go for upliftment projects (www.bwhouse.co.za, April 2012). Design guidelines are formulated from a variety of existing conditions regarding the stores:

1. retail area (Builders Warehouse operates similar to a retail store where the products can be bought from a shelf and are not only displayed in the store)
2. existing number of parking bays
3. utilization of parking space
4. views to the store
5. number of unemployed workers
6. congregation areas of the workers, and the typology of “trade sculptures”

The guidelines inform the design of the three Builders Warehouse stores in Pretoria, located in Gezina, Montana and Faerie Glen. The design will consist of modular units which can be duplicated or moved to other building supply stores all over South Africa.
Teaching at the centre will start on a voluntary basis. The students in the faculty of the built environment, engineering and IT of the University of Pretoria all need to complete a module, JCP 201 as part of their studies, which requires of the student a community based project.

According to the Engineering, IT and Built Environment faculty guide (2011: 14) this module is worth 4 credits, which means that 40 hours of community service should be done. In the past engineering students have participated in assisting school children from disadvantaged communities with additional maths and science classes, IT students contributed by installing network systems and teaching the basics of using a computer and architecture students have revamped rooms in a children's home in Mamelodi. The JCP module can ultimately include teaching at the centre or helping out with activities there. In order to remain a registered professional with SACAP, one must earn 25 CPD (Continuing Professional Development) points over a period of five years.

The categories are set up as follows (SACAP, 2008: 07-02):

Category 1:
The professional can earn up to 4 credits a year by attending conferences and workshops.

Category 2:
The professional can earn 2 credits through working or full time lecturing. Another point can be earned by mentoring candidate professionals.

Category 3:
This is the important category where the voluntary work in the centre can be beneficial to a professional if approved by SACAP. Under existing SACAP legislation the professional can earn up to 2 points per annum for 10 hours work at recognised voluntary associations.

By teaching at the centre, CPD points can be earned allowing the centre to benefit from a mutual relationship with SACAP, while helping to build the new training centre. Through this program the unemployed workers are not only educated in a certain skill, but are given the opportunity to improve their lives.
1.3 Problem Statement

"As long as the current training institutional setup stays the same, it is likely to reach only a few beneficiaries, leaving the poor and vulnerable people without formal skills”
- CETA
(CETA, 2009: 5)

Everyday many unemployed workers gather around building supply stores, such as Builders Warehouse, hoping for an opportunity to be hired by the clients of the store and earn a day's wages. The workers sometimes possess valuable skills, acquired through many years working on various construction sites (See Appendix A). Investigation indicates that very few of them, have formal training or a qualification in a specific trade, which not only brings the quality of workmanship into question, but statistics also indicate that only 14% of unschooled people in South Africa have some form of income (Schussler, 2012:22).

The construction sector employs more than 1 million people in South Africa with the sum of the salaries estimated to be R52 billion, but unemployment is still a major problem. The crux of the problem identified is the many people in the Gezina area, who at night sleep on the pavements of Voortrekker Road and during the day stand in front of the Builders Warehouse and other building material supply stores, waiting for an opportunity to work. The unemployed workers claim to be skilled in a trade, but most of them don’t have any formal qualification to add to a Curriculum vitae. (as in Appendix A)
The lack of training and obtaining a certain qualification is a fundamental problem in unemployment when considering the following statistics (Schussler, 2012:22):

- In South Africa, there are currently 7.7 million unemployed people.
- Only 14% of unschooled workers earn a salary mostly by selling articles next to the road.
- Only 41% of people with a matric qualification are employed.
- Only 17.5% of South Africans are employed.

From the above mentioned statistics the assumption is made that proper education and training is directly related to being employed.

Recent universal example of the impact of unemployment among young people

In 2011 the world witnessed the riots among young people in London. A major reason for the conflict, as described by Rowan Williams (2011, www.guardian.co.uk), is that the victims became the victimizers. These young people where told from a very young age that they had no serious career opportunities, which resulted in riots, rebelling against authorities.

Will the high unemployment rate in South Africa result in the same negative actions?

The employment of the unskilled workers standing next to the road may be unattractive to a prospective employer due to a number of reasons:

1. The employer has no insurance regarding the quality of work.
2. The employer may distrust the reason why the worker might be unemployed.
3. Trust regarding the safety of possessions by allowing a stranger on one’s property.
4. Because of poverty and homelessness some of the workers do not present themselves well to the prospective employer.

According to Du Plessis and Swarts (2012), a big problem with poverty is that people are exploited. Due to the eagerness to get money, the workers are exploited, being paid minimum wages and become part of a homeless community where alcohol abuse is at the order of the day.
Fig. 10 Indicates the proposed new educational system in a diagram that compares the new training system against current educational systems (By Author, 2012)
1.3.2 Architectural problem

Just like the metaphysical boundaries which exist within the real world problem, the architectural problem is created by physical boundaries. Although the building supply store provides a context for the unemployed to gather, there is no place provided for the unemployed job seekers. The study argues that the unemployed workers form part of the context of building supply stores. The architectural problem exists in the exclusion of the unemployed worker to adequately advertise the skills that they possess as part of the building supply store, by the existing boundaries. Exclusion of the unemployed workers is a problem related to programme on the specific site and is dealt with in an architectural way in the study.

The stores under investigation are either fenced off, e.g. the Gezina branch of Builders Warehouse, part of another building in the form of a shopping mall and the job seekers have to sit on the pavements outside the property, e.g. the Faerie Glen store, or the workers are hidden by the large store and the waiting area is outside of the public eye, e.g. the Montana store.

The unemployed are currently unwanted on the premises. The study deals with this problem in an architectural way in not only providing training, but also waiting areas, congregation space and advertising opportunities.

Massey (2005: 66), argues that different spaces should be defined through connections and not barriers, which is not the current condition around the building supply stores.

A-contextual spaces, such as parking lots, don’t have to be strictly programmed for the vehicular dominated city, but provide the opportunity to become dynamic, to be utilised in more ways than a sterile parking environment. In the current condition at the Builders Warehouse stores, vendors have informal stalls in the parking area, but there are no place or space provided for the unskilled workers.
The images below indicate the figure ground study as well as the Nolli-map of the context of the Builders Warehouse in Gezina. The inaccessible space is shown in black and the grey indicate open spaces which are fenced off and also becomes private space. The Nolli-map shows that physical boundaries prevent people from entering open space, which make the architecture exclusive. The intervention aims at not only diffusing socio-economic boundaries, but also the physical, making the area around the building supply store more inclusive.
Fig. 16 Indicates a figure ground study of the Montana Builders Warehouse and the surrounding context (By author, 2012)

Fig. 17 Indicates the areas with physical boundaries of the Montana Builders Warehouse and the surrounding context (By author, 2012)
Fig. 18 Indicates a figure ground study of the Gezina Builders Warehouse and the surrounding context (By author, 2012)

Fig. 19 Indicates the areas with physical boundaries of the Gezina Builders Warehouse and the surrounding context (By author, 2012)
1.4 Research Hypothesis

Architectural design can become a catalyst for the interaction of different socio-economic groups within the construction industry, allowing for new mutual beneficial relationships to be formed.

There is a large gap between rich and poor, educated and uneducated in South Africa. In the construction industry there is a high number of unemployed workers, with the majority being uneducated. From the viewpoint of the unemployment workers gathering in front of the Builders Warehouse, while clients, being contractors, private homeowners or builders, visit the stores and don’t hire them for a day’s work, can leave them with a feeling of displacement and of being looked down upon. There is another way: rather than to separate people by boundaries, to include society, rich and poor, through architectural design, allowing architecture to be uplifting.

If David Adjaye’s (Allison, 2006: 12) statement is true that the sidewalk represents the welcome mat into the idea store, a negative image is portrayed about the store and society. This becomes evident with the large number of unemployed workers standing on South Africa’s sidewalks. The physical context of the study provides certain dualities which include:
- educated and uneducated
- wealthy and poor
- employed and unemployed
- consumers and producers
- permanent buildings and informal temporary structures

The architectural intervention, “Trade Architecture” can bridge the boundaries, physical and metaphysical, between the unemployed and possible employers, being contractors or private home builders. The unemployed workers are given a chance to be trained in a certain skill which should establish a trust and belief in the quality of the workmanship by the clients of the supply store.

The building supply store, the clients and workers are fragmented entities in a specific context. These entities create the opportunity to intervene and the intention is to test whether an architectural intervention can reconcile these physical and metaphysical entities through connections and thresholds, diffusing the boundaries. The intervention aims to prove that “trade architecture” can act as a catalyst to combine the unemployed workers, the store and the clients into a mutualistic relationships within the built environment. The study contests exclusion of the unskilled and unemployed workers by isolated building supply stores and targets a real world problem in a local context by including people from seemingly different economic and social backgrounds.
Fig. 20 Indicates a symbolic image of a trained worker addressing current social problems involved in this study (Beeld, 2012).
1.5 Research Assumptions

The following assumptions were made for the study:

- Unemployed workers are willing to be educated within a certain trade and they are willing to be educated in new skills which develop from new technologies and new regulations.
- Unemployed workers will be able to complete their training and remain willing to work.
- Contractors, sub-contractors, builders and private builders want their employees to be educated.
- The data provided by CETA in the background to the study, which was published in 2009/10, is still valid, considering that the 2011/12 data had not been published by the time the research was done.
- The information as provided by Builders Warehouse, regarding parking and store sizes, is accurate.

To validate the study, specific research assumptions have been made at the onset of the study. Interviews were held, and amongst others, these include having discussions with building contractors, social workers and unemployed workers. Training and educational centres were visited to gain an understanding of the existing educational programmes.

1.6 Research Methodology and results

1.6.1 Analytical survey study

The first part of the research involved meeting with 35 randomly selected workers waiting for possible employment at different sites on 20 February 2012. It was necessary to introduce this research methodology very early in the design process in order to better understand the main beneficiaries of the project.

Seven questions were asked during the individual interviews (See Appendix A):

1) How old are you?
2) Where are you from?
3) Where do you reside in Pretoria?
4) What is the trade that you specialize in?
5) How many years experience do you have?
6) Do you have any formal training or qualifications?
7) Did you finish matric?

These interviews assisted in determining the various training categories to be provided for in the specific designs.
Results of interview with unemployed workers

Programme Informants

Fig. 21 Indicates a series of diagrams giving the results of the interviews with the unemployed workers.
1.6.2 Interviews

An interview was arranged with Mr Henry Janeke, Skills Development Practitioner, of Hydro Training Academy in Benoni where approximately 100 trainees are trained in skills such as welding, boiler making, fork lift operating and painting every year.

The important knowledge gained from the interview is about the relationship with an accredited body. The applicable accredited body in the construction sector is the Construction Education Training Authority (CETA). The skills assessments and training are moderated by CETA, which results in the administration sector of the training centre to be one of the most important divisions. Each trainee has to have a file with an undersigned contract and must be registered at CETA. Moderation by CETA takes place by evaluating 10% of the students’ files picked randomly. This means that the design will cater for storing the files of the trainees. The interview informed a way of approaching the design regarding its relationship with an accredited body. The decision is made that Builders Warehouse would be the accredited body. The trainee will get a Builders Warehouse certificate after completing the training, which means that the worker has completed training and are capable of applying the skills on a construction site. The workers’ work on site will be judged and approved in order to retain his/her accreditation.
1.6.3 Case Studies

The case studies includes:
1. The Tshwane Technical College's training programme in construction.
2. Hydro Training Academy in Benoni.
3. The Jerusalem Children's home in Midrand.
2. Case Studies
2.1 Introduction

Case studies chosen for this dissertation encompass the activity of training. It is important for the researcher to understand how current training facilities operate and how these facilities are spatially arranged to provide activities involved in training for a specific skill.

Research of programmes at training centres investigated study modules and ways they can cater for the unemployed who do not have the financial means to pay tuition fees.

Some parts of the centres should be temporary structures due to the availability of parking at the building supply stores (as will be explained in the guidelines). The study also investigates into container architecture as a temporary element used in architectural design to create space.

The case studies involves four projects:

1. The “Sweat equity” principle used in the projects by Habitat for Humanities
2. Tshwane Technical College civil training centre
3. Hydro Training Centre in Benoni
4. Jerusalem Childrens’ Home in Midrand
2.2 Habitat for Humanity

The motivation for choosing this case study is that the dissertation involves the poor and unemployed, working together with a company supplying building supplies and the clients using the store with the aim of training the unskilled in the built environment, creating opportunities for employment to better the quality of workmanship on site.

Habitat for Humanity (habitat.org.za), is an organisation that builds houses in disadvantaged communities, using local labour. In this case study, it is not the spatial composition of architectural form, but the underlying principles of the organisation that is important in successfully establishing an upliftment programme, while training unskilled workers.

Habitat for Humanity (habitat.org.za) states that the poor do not need charity or people arguing their case. The poor and disadvantaged need capital and partnerships with educated people in order to better their lives.

The concept of “Sweat Equity”:

While the workers from the local community build houses, they are also educated in construction. This is where the concept of “sweat equity” is introduced, where a worker has to help to build a certain number of houses before he/she can qualify to build his/her own house with help from other workers and the organisation.

There are three components in the structure of Habitat for Humanities:
1. The investor,
2. a builder and
3. a social transformer.

Similarly, the existing elements for “trade architecture” are already established:
1. The supply store,
2. an unskilled/unemployed workforce and
3. The client or contractor

The relationships between these three role players in the context environment only needs the social transformer in a training centre as a catalyst. The new training centres address the relationships and boundaries between the three role players binding the other elements together in a harmonious whole.
2.3 Tshwane Technical College

The Tshwane Technical College is the only institution in Tshwane that provides training for people in civil works or a qualification in a trade within the construction industry to go on and become artisans. The college is situated in Atteridgeville, west of the CBD of Pretoria.

The problem with tertiary institutions like these is the tuition fees, which the unemployed, gathering around building supply stores, cannot afford. According to acting HOD, Pierre Joubert (2012: 2), three levels of training need to be completed before a worker can do the trade test to become an artisan. The fee works out to a sum of R12 375 per level. This, however, makes it impossible for the unemployed next to the road to become qualified artisans without a sponsor or bursary.

This case study provides a training program with which the new training centres at building supply stores can align themselves to make sure all aspects of training are covered.

It also gives a clear understanding of the spatial arrangements (Fig 29) necessary to cater for training skills in the construction industry.
The College specializes in training future artisans in a variety of skills used in the construction industry:

- Carpentry
- Wet Works
- Painting
- Plumbing

Each skill has its own designated space facilitated in a large shed. There is also outdoor space for training in wet works. The proposed new training centres should also facilitate indoor and outdoor training spaces, not only as functional approach, but also to advertise the activity of training and education to the public.
The plan of the Tshwane Technical College's training area allows the researcher to understand how the functional spaces should be arranged to allow for the activity of training skills used in the construction industry. It is understood that there are functional pockets, each facilitating a specific skill, arranged around a communal training area. These functional pockets are made up of a workshop and a store room. The communal training area contains mock units on which the trainees can practise the skills which are simulated in a unit.

Fig. 27 Shows the spatial arrangements of functional space within the training centre (By author, 2012)
The spatial arrangement allows the trainees of different skills to be separated and then to congregate again so that the different skills in the built environment can be seen as a whole. The diagram below indicates the functional pockets, separated around the communal training space. Outdoor space is also required for training especially in the training skills required in wet works. Therefore the bricklaying workshop is in proximity to the outdoor training area.

Fig.28 Indicates the relationship between the communal training area and the smaller functional spaces (By author, 2012)
2.4 Hydro Training Academy

The Hydro Training Academy is situated in Benoni on Gauteng’s East Rand where approximately 100 trainees are trained annually in building and mechanical skills each year. This academy focuses its training on skills in the field of mechanical engineering, but as a case study provides information on how to structure a training course and how functional spaces are arranged within the system.

Access to funding

Janeke (Benoni, 2012) also explained that funds can be obtained through discretionary grants from CETA. Registered companies pay a fee each year which accumulate as mandatory grants, which these companies can claim to send their employees for training. The mandatory grants that are not claimed are transferred to the discretionary grants which can be claimed by training facilities to educate and train the work force.

This also allows the new training centres to access funding from the accredited body, CETA, when training the unemployed. Funding can also be obtained from the building supply stores where the training takes place, eg. Builders Warehouse.

Critique

The Hydro Training Academy operates from an existing industrial complex and proves that learning facilities can be accommodated and adapted within an existing building. The existing buildings are large inclosures where the interior can be adapted to accommodate the training activity.

The new training centres provide interior and exterior spaces for training. Instead of creating a large interior space which can be adapted, the approach to the design of the new training centres is the adaptability of the building itself.

The architectural problem of exclusion and separation through boundaries that are contested in this study is also evident at this training centre. There are strict access control to the facility training is not visible to the public.
Fig. 29 Shows the physical boundaries of the Hydro Training Academy (By author, 2012)
Large Factory Type Sheds Adapted to Accommodate Training in a Certain Skill

Fig. 30 Shows the layout of the Hydro Training Academy (By author, 2012)
2.5 Jerusalem Children's Home

The Jerusalem Children’s Home’s new dormitory, designed by 4d+a Architects and is situated in Midrand and was completed in December 2011.

The dormitory has been constructed with 28 shipping containers (Taylor, 2012: 29). As two of the elements of “Trade Architecture” are temporary and adjustable elements (to be explained in the following chapter), the study into container architecture informs the way in which recyclable materials can be used to create architectural space.

Working with containers implies a modular layout, a valuable investigation for the proposed new training centres as it will follow the modular grid of an a-contextual parking lot.

Fig. 31 Shows an Image of the Jerusalem Children's Home (By author, Midrand, 2012)
Lessons learned from Jerusalem Childrens' Home

Shipping containers are structural entities and only a ground support is required to place the containers on. Concrete columns are used to provide a single level on ground floor. This also allows the containers to appear as if floating over the landscape, contributing to the temporary image of the design.

When working on parking lots with different slopes, the concept of providing a level on which the new training centre can be placed through the use of columns is applicable to the study. By raising the new training centre from the ground, contributes to the concept of an imposed structure, making the light weight structure appear as if floating over the parking area.

Furthermore, the spaces are not restricted to one container size as the containers can be cut and welded to form larger spaces, evident in the recreation area of the dormitory. (see alongside)

Fig. 32 Indicates how the modular units are place on columns to make the ground floor level (By author, Midrand, 2012)

Fig. 33 Gives an internal view of how units are joint together to create a larger space (By author, Midrand, 2012)
Above the containers is a lightweight corrugated sheet roof to provide shading from direct sun. There is a cavity between the top of the container and the roof to allow for air-flow, contributing to a cooling effect.

There are three ways in which shading is achieved:
1. The use of the lightweight roof,
2. screens over the openings on the northern facade, and
3. by cantilevering first floor containers on the northern side to shade the ground floor.

The concept of cantilevering first floor elements to shade the ground floor becomes evident in the design of the new training centres.

Though the containers are steel structures, with little thermal mass, the architects created a comfortable interior by insulating the container with Isotherm foam made from recycled plastic (Taylor, 2012: 33)
3. Mapping
Fig. 36 Shows an image of unemployed workers waiting at the Gezina Builders Warehouse (By author, Pretoria, 2012)
3.1 Training Centres in Pretoria

There are currently various tertiary training centres in Pretoria, although only one, the Tshwane Technical College in Shoshanguve, trains artisans in a skill used in the construction industry.

- Automotive industry development centre (Technical training in industry)
- ACPD (Tertiary training in management)
- Power Flight training centre (Helicopter pilot training)
- Tourism Empowerment Council SA (Training in tourism to reflect demographics)
- Municipal Training centre
- Self Help Training Centre (Adult basic education)
- JT Training and skills development centre
- DPA Computer Training
- LJ Publishers (Life coaching)
- EDUTAK (Pre-school training centre)

Learning for performance improvement (Human resource development strategies)

Fig. 37 Gives a map of existing tertiary training centres in Pretoria (GIS, 2012)
3.2 Macro Context

The context for the intervention is the parking area of certain building supply stores. The researcher identified Builders Warehouse stores as an urban laboratory for the intervention of training centres. There are currently 25 stores of different sizes in South Africa. The focus will be on the three Pretoria stores namely in Montana, Gezina and Faerie Glen.

Fig. 38 Gives a map indicating the location of the three Builders Warehouse stores in Pretoria (GIS, 2012)
The three Builders Warehouse Buildings in Pretoria have different architectural typologies and the investigation lead to the following classifications:

A new building designed for the Builders Warehouse store.

Builders Warehouse as a “Decorated Shed”. The semiotics of Builders Warehouse is reflected on an old factory building.

The “Store” typology. Builders Warehouse adapts to fit within the store structures of a retail mall.

Fig. 39 Shows a series of images of the three Builders Warehouse stores in Pretoria (By author, Pretoria, 2012)
3.3 Micro Context

Montana Branch

The site is situated next to the busy Zambesi road in Montana. The one way traffic to the west does not allow for much of a view towards the store, although advertising boards provide a visual connection.

Gezina Branch

The site is situated on the main route to and from the CBD to Pretoria north. The store is in an existing building. Other businesses are also on the same site which creates a rich variety in building functions and typologies.

Faerie Glen Branch

The site is situated on Atterbury road. It forms part of a shopping mall where the store is hidden under the first floor parking.

Fig. 40 Shows a series arial photographs of the micro context of the three stores (GIS, 2012)
The unemployed workers are hidden by the large store and are only visible when clients use the western exit.

The unemployed workers mostly gather on the southern boundary on the one way Jacobs Street and in the parking lot of Builders Warehouse.

The unemployed workers are visible when driving north along Voortrekker Road, as well as east on Jacobs Street on both sides of the road. The topography hides the store when approaching from the north, but the many workers are evident.

The unemployed workers congregate outside the mall boundaries next to the street and at the intersection.

There is a view into the parking from both sides of Atterbury Road. The workers are visible as they congregate along the street.
3.4. Contextual Design Generators

There are three site informants that influence the design regarding the location of the new training centre on the specific sites.

Builders Warehouse Branch

Superimpose design generators related to context

Fearie Glen Branch

3. Advertising The Training Opportunities

The aim of the scheme is to advertise training of the unskilled workers. It is important to find the best visual connection of training the unskilled workers and the Builders Warehouse clients.

2. Parking and Location for Intervention

It is important to place the new training centre in such a place that it will not become an obstacle in the parking area for the Builders Warehouse clients.

1. Congregation of Workers

The current place on and around the site where the workers congregate is important to understand. It influences the place where the training centre will be placed.

Existing Site Conditions

Fig. 43 indicates a series of design generators on the Fearie Glen Builders Warehouse site
Fig. 44 Indicates a series of design generators on the Montana Builders Warehouse site

Fig. 45 Indicates a series of design generators on the Gezina Builders Warehouse site
5. Architectural language of “trade architecture”
Speaking a similar architectural language

Although the three types of training centres are different in permanence and size, the three design proposals should speak a similar architectural language. Clients of the building supply store should be able to read the relationships between the three typologies belonging to “trade architecture”.

In order to establish a single architectural language, the design process followed a pattern of working on all three design proposals simultaneously. This allowed the design decisions on the three structures to influence each other and generate a certain architectural language that can relate to “trade architecture”.

The three elements of “trade architecture”, imposed structure, temporary elements and adjustable elements are applied on the fourth element, the context. The imposed structure of all three structures are of the same material and construction methods. The study proved that the architectural language will be mostly read in the temporary elements.

The temporary elements are the construction elements added to the imposed structure to enclose space. The materials used and the way in which the space are created should be constant throughout the three structures. It is with the use of the temporary elements that the theory of architecture palante is applicable. The use of timber at the carpentry training area, masonry at the wet works training area and tiles and colours at the painting training area in determined forms allows for a universal language in any arrangement.

Borrowing from “Trade sculptures”

Existing trade sculptures and the forms that are created by the workers next to the road to advertise their trades, are translated into architectural forms to create space, as indicated in the diagrams below.

Fig. 64 Gives an illustration of how the architectural elements in “trade architecture” are borrowed from “trade sculptures” (By author, 2012)
The roof structure is an important element in the architectural language as it binds the other elements together. It was important to use a roof structure that can be applied to all three types.

The series of images indicate the process in designing the appropriate roof for the training centres. It shows the influence of the different types of training centres and how the different roofs were tested.

The major considerations is:
1. Maximum rain water harvesting,
2. ability to transfer runoff to a central point,
3. overhangs to define outdoor space, and provide shading and
4. consistent linear structure to bind the building as a whole.

Fig. 65 Gives a series of illustrations showing the development of an architectural language for the training centres
Faerie Glen Branch

Fig. 66 Shows the conceptual models for the Faerie Glen Training Centre (By author, 2012)

Montana Branch

Fig. 67 Shows the conceptual models for the Montana Training Centre (By author, 2012)
Fig. 68 Shows the conceptual models for the Gezina Training Centre (By author, 2012)
6. Generic Design Guidelines

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6.1 Size of intervention

For the purpose of this dissertation, the Builders Warehouse stores were selected to test the hypothesis. An existing social policy is in place at Builders Warehouse. In accordance with this, 1% of nett yearly profit will be allocated to social upliftment (2012). Furthermore, the idea of establishing a training centre, that produces certified tradesmen, could benefit the store, the client and the unemployed worker. According to Elzette van Niekerk, regional manager, this could provide a competitive edge for Builders Warehouse (Pretoria, 2012).

The proposed training centres are located in the parking areas of existing Builders Warehouse stores. Therefore it became important to establish the sizes of the intervention in order to limit the possible loss of parking bays and therefore clients.

The sizes of the stores and the number of parkings of all the Builders Warehouse stores in Gauteng, Limpopo, Mpumalanga and Northwest were calculated to determine the average store area for every parking bay. The results of the analysis and calculation is that on average, a parking bay is required for every 26.54 sqm of retail area within a Builders Warehouse Store. Using this weighted average, the required number of parking bays were compared with the actual number provided at each store.

The result is that some stores have extra parking bays, where others are under provided. During the next stage of the investigation, Builders Warehouse stores were categorised according to the parking requirements:

Category 1
These stores have more than 50 extra parking bays and could therefore accommodate a permanent structure. An example of such a store is the Gezina branch of Builders Warehouse.

Category 2
These stores have between 1 and 50 extra parking bays and could facilitate a semi-permanent structure. This implies that certain parts could be detached and stored when there are no training activities. An example of such a store is the Montana branch of Builders Warehouse.

Category 3
Parking at these stores is under provided. If the design is constructed on an existing parking lot, it should be a temporary structure. This approach will allow the parking bays to be utilised for their original intention, especially on Saturdays and month-ends. The Faerie Glen branch of Builders Warehouse is an example of such a store.

Example of the Builders Warehouse Gezina Branch

Total retail floor space = 5586 m²
Actual number of parkings = 300 parkings
Weighted average retail area covered by a single parking bay = 26.54 m²

The number of required parking bays is the actual retail area of the store divided by the average retail area

= Actual retail area/ average retail area for a single parking bay
= 5586/26.54
= 210.47
thus, 211 parking bay required for the Gezina branch.

The available extra parkings are then
= Actual number of parking bays - the required parking bays
= 300 - 211
= 89 available extra parking bays.

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6.2 Programme and functional requirements

The matrix on the following page indicates the functional design guidelines which informed the new training centres to facilitate certain programmes, the users associated with it and the functional spaces required for the three categories of training centres.

The users and functional spaces are based on information from a case study on the Tshwane Technical College's South Campus' functional arrangement of space and the users it can accommodate. According to Joubert (2012), training coordinator at the college, it has been proven that each training instructor can accommodate a maximum of 15 trainees, but need at least 8 trainees to be effective in training. The numbers indicated in the user column are based on these figures.

The sizes and floor areas of the interventions in the three categories are based on the parking grid, availability of parking and the number of users. The aim is to design the functional areas around a communal outdoor area where trainees can congregate and the disperse to be trained in the different trades.

The surveys and research identified certain trades, mostly wet works, painting, tiling and carpentry that the workers desire to be trained in. The result of the survey determines the trades for each intervention in a category. Most respondents want to be skilled in wet works and painting. Thereafter other trades such as carpentry are accommodated, where in most cases it will only be applicable in categories 2 and 3 training centres.

The functional design guidelines within the three categories and the predetermined size of the new training centres make it possible to generate a practical spatial layout, where the response to the context is the only unknown generator.
<table>
<thead>
<tr>
<th>Category</th>
<th>Skills</th>
<th>Floor area</th>
<th>Users</th>
<th>Functional requirements</th>
<th>Spatial Arrangement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category 1</td>
<td>1-2 Skills Wet works Painting</td>
<td>110-150 sqm</td>
<td>2 Practitioners/Instructors 16-30 Students</td>
<td>1 Class 1 Training Shed 2 Outdoor Spaces 2 Stores 1 First Aid Temporary Ablutions</td>
<td><img src="image1" alt="Diagram" /></td>
</tr>
<tr>
<td>Category 2</td>
<td>2-3 Skills Wet works Painting Tiling General</td>
<td>350-500 sqm</td>
<td>4 Practitioners/Instructors 24-60 Students</td>
<td>1 Class 2 Training Sheds 3 Outdoor Spaces 3 Stores 1 First Aid 1 Admin Temporary Ablutions</td>
<td><img src="image2" alt="Diagram" /></td>
</tr>
<tr>
<td>Category 3</td>
<td>3-4 Skills Wet works Painting Tiling General</td>
<td>650-800 sqm</td>
<td>6 Practitioners/Instructors 48-72 Students</td>
<td>2 Class 3 Training Sheds 4 Outdoor Spaces 3 Stores 1 First Aid 1 Admin Ablutions</td>
<td><img src="image3" alt="Diagram" /></td>
</tr>
</tbody>
</table>
7. Design Development
7.1 Evolution of the design of the training centres

Fig. 69 The images give a graphic indication of how the training centres evolved over time. The given example is the centre at the Gezina branch of Builders Warehouse (By author, 2012)
7.2 Design Process

7.2.1 Spatial arrangement and hierarchy

Faerie Glen Branch

The iterative process followed in the development of the design of the training centres allowed for the three typologies of “Trade architecture”, the permanent structure, semi-permanent structure and temporary structure, to inform design decisions for each other. It was a process of applying the design guidelines to each of the three typologies, testing it and reworking decisions from the one to the other. The diagrams in fig 73-75 indicates the design generators relating to the site that influenced the plan.

At the Faerie Glen Builders Warehouse Branch, the training centre will be a temporary structure and needs to be able to be totally dismantled.

The solid edges of the spatial fabric were established by defining functional spaces, screening the building from the sun and as a panel where advertisements can be painted or placed on a two dimensional surface. The solid edges are usually placed on the western facade of the centre. It is important that the centres cater for advertising, not only training, but also products in the building supply store. The western edge forms screen for the late afternoon western highveld sun and allows for advertising to be displayed on the screens.
A communal courtyard is formed by the edges of the functional space. The courtyard is the place where all the users congregate and is also used as an outdoor training area. The courtyard displays training activities towards the parking area and the Builders Warehouse store, advertising the training activities.

In this dissertation, the functional indoor training spaces are referred to as “functional pockets”. The functional pockets, consisting of two training sheds with the respective tool and material stores, are arranged around a communal courtyard.

These spaces separate other outdoor training areas from the communal courtyard, but not as barriers, but rather connections between the outdoor spaces.

The service core is consciously established later in the design process of the training centre as the primary focus is on the arrangement of the functional pockets. It is placed leading from the communal courtyard and consists of a space where the ablution facilities are situated.

The service core is situated where rainwater harvesting and recycling of water can take place. For privacy, the staircase to the first floor screens the view from the parking and store to the ablution area. The staircase has a multi-functional purpose as it forms a space under the staircase for trainees to store their possessions during the day.
Montana Branch

The training centre at the Montana Builders Warehouse branch is a semi-permanent structure. This implies that part of the structure should be able to moved or be dismantled.

The solid edges are on the western side, acting as a sun screen as well as an advertising opportunity. At the Montana Builders Warehouse, the western edge screens the training activities from the larger part of the parking area, but it does not obstruct the view to the training activities from the store.

The communal courtyard is framed by the functional areas. The structure of the training centre is placed in such a way that the courtyard is completely open to the south, where training activities can be viewed from the entrance and exit points of the store.

Views from the north into the courtyard in this case, are not important as vehicular traffic goes by at 80km/h and viewing is very limited towards the point where the centre is situated.
The communal courtyard is formed by the training spaces around it. The workers can disperse from the courtyard to the training sheds and out to the outdoor training areas.

There is a north-south axis emphasized by east and west wings, creating views from the store to the training activities.

The “functional pockets” are again arranged around the communal courtyard. At this centre, being semi-permanent, a reception area is placed on the north-south axis through the courtyard.

The service core is situated on the east where it can be easily serviced and screened from the public. The roof is designed in such a way that rain water will be accumulated and transported to the point near the service core. The service core, where the ablution facilities are situated, leads from the reception area and the stairs in the reception area can act as storage place for the trainees’ possessions.
The training centre at the Gezina Builders Warehouse branch is a permanent structure. It is a larger centre and accommodates more activities. The permanence of the structure can allow for the services from the centre to connect to the municipal service lines.

The functional pockets are again arranged around the communal courtyard. The outdoor spaces are connected through three training sheds.

The training area is viewed from the road on the south, the store on the west and the parking area on the east.

The service core is situated on the east as the western ground floor edge should be open. This is the most private area of the site and becomes appropriate for ablution facilities, leading from the communal courtyard.
The series of drawings indicates the layering of information to generate the plan of the Gezina training centre. Firstly, the study determined the edges and the axis through the communal courtyard. Secondly, the study determines how training activities will spill out into the outdoor training areas from the training sheds. The third image combines these two generators. The fourth image layers the edges of the outdoor training areas and looks at the implication of advertising the training. The fifth image investigates space created by the existing site boundary and the new training centre. The sixth image investigates the movement by the clients of the Builders Warehouse store. Through this, the study seeks not to create an obstacle for the clients. Lastly, the seventh image is the result of the layering, giving a two-dimensional form to the new training centre. This becomes the initial layout to be developed.
7.2.2 Training activities as a generating layer

The analytical survey study on the skills of the workers proves that most workers want to work as painters and tilers, carpenters and masons. The new training centres cater for the workers to be trained in these specific skills. The adjustable nature of the centres also allow for other skills to be taught, but for the purpose of the study the focus remains on these specific skills.

The training is a concise version based on the training programme of the Tshwane Technical College's civil works training programme and is indicated in the matrix below.

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<th>Day 4</th>
<th>Day 5</th>
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<td>Interpret drawings and set out structure</td>
<td>Erecting Scaffolding</td>
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<td>Mixing and preparation different bonds</td>
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<td></td>
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<td>Evaluation and correction of mistakes</td>
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<td>Build cavity walls and learn about insulation</td>
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© University of Pretoria
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The training programme is applied to the layout of the different types of training centres to accommodate adequately for the training activities to take place. The following pages indicate the different layers of training activities as generators of the design.
Activities involved in training wet works

Fig 89 Indicates a diagram superimposed on the plan to show how training in wet works occurs (By author, 2012)
Activities involved in training painting

Fig. 90 Indicates a diagram superimposed on the plan to show how training in painting and tiling occurs (By author, 2012)
Montana Branch

Ground Floor Layout
Scale 1:200
Activities involved in training painting

Fig 91 Indicates a diagram superimposed on the plan to show how training in painting and tiling occurs (By author, 2012)
Activities involved in training wet works

Fig 92 Indicates a diagram superimposed on the plan to show how training in wet works occurs (By author, 2012)
Activities involved in training wet works

Fig 93 Indicates a diagram superimposed on the plan to show how training in wet works occurs (By author, 2012)
Activities involved in training painting

Fig 95 Indicates a diagram superimposed on the plan to show how training in painting and tiling occurs (By author, 2012)
Activities involved in training carpentry

Fig. 96 Indicates a diagram superimposed on the plan to show how training in carpentry occurs (By author, 2012)
8. Trade Architecture in built form
Fig 97 Indicates a perspective of the new training centre in Faerie Glen (By author, 2012)
Fig. 99 Model Of the Faerie Glen Training Centre
Fig. 100 Indicates a perspective of the new training centre in Montana (By author, 2012).
Fig. 101 Model Of the Montana Training Centre
Fig. 102 Model Of the Montana Training Centre
Fig 102 Indicates a perspective of the new training centre in Gezina (By author, 2012)
Fig. 104 Model Of the Gezina Training Centre
9. Technical Resolution
9.1 Approach to “Trade Architecture” Technology

There are five considerations that influence the technology used in the design of the new training centres:
1. The environmental conditions,
2. the materiality of three of the four elements of “trade architecture” being the imposed structure, temporary elements and adjustable elements and the articulation in the way it is joint,
3. raising the structure from the ground with minimum disturbance of the parking area,
4. the availability of building elements and materials from Builders Warehouse to be used in the new training centres, and
5. ease and time of construction as the new training centres need to be erected in a short time.

9.2 Environmental Conditions

The approach to the environmental conditions and sustainable design in the design of the training centres are addressed through:
1. Minimum disturbance of the site,
2. passive strategies by designing the spaces in such a way that they are shaded from the summer sun,
3. re-use of construction materials and the ability to move or alter the structures,
4. narrow spaces for natural ventilation, and
5. rainwater harvesting and the reuse of grey water.
9.2.1 Rainwater Harvesting System

0.47 mm IBR Roof Sheeting, BW Code 23703, Fixed to Purlin with M10 Self Drill Roof Screws, Painted with Grey Plascon Nuroof Paint, BW Code 11834001

75 x 100 x 20 x 3 mm Galvanised Steel Channel Bolted to 50 x 50 x 3 mm Galvanised Steel Angle with M10 Steel Bolt and Nut, BW Code 283206, Painted with Duram NS 8 Primer, BW Code 277874, and Painted with Grey Dulux Gloss Enamel, BW Code 11356002

0.25 White Polyolefin Membrane

0.5 mm Purpose Made Gutter from Galvanised Steel Plate, BW Code 317693, Painted with Bitumen Tile Waterproof Coating, BW Code 458564

60 x 120 x 3 mm Rectangular Hollow Core Steel Beam, Bolted to 100 x 75 x 3 Steel Angle with 5.5 x 25 Self Drill Tek Screws, BW Code 352579, Painted with Duram NS 8 Primer, BW Code 277874, and Painted with Grey Dulux Gloss Enamel, BW Code 11356002

200 x 75 x 7 mm Steel Channel Bolted to Steel Column with 3 X M10 Steel Bolts and Eureka Hexagon Nuts, BW Code 35549, Painted with Duram NS 8 Primer, BW Code 277874, and Painted with Grey Dulux Gloss Enamel, BW Code 11356002
Faerie Glen Training Centre

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Fig. 105 Indicates the rainwater harvesting strategy and reuse of grey water (By author, 2012)
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9.3 Articulation of “trade architecture” elements

The imposed structure
The imposed structure is a steel structure based on the shelving of Builders Warehouse stores (See Appendix B for the engineer’s report). It is a column and beam structure placed on the grid of the existing parking lots, fixed to the Helical piles (as explained later).

Fig. 106 Shows the structural system of Builders Warehouse shelving (By author, Pretoria, 2012)
Temporary elements

The theory of “speaking architecture” as explained in the theoretical approach is applied to the technology used in the design. The carpentry training area will reflect the use of timber, the wet works training area will reflect the uses of bricks and concrete as will the painting training area reflect the use of tiles and colours.

Fig. 107 Shows exploded axonometrics of the generic compositions of the three different training sheds (By author, Pretoria, 2012)
152 x 3.5 Steel Square Tube Welded to Base Plate, Painted with Duram NS 8 Primer, BW Code 277874, and Painted with Grey Dulux Gloss Enamel, BW Code 11356002

100 x 75 x 3 mm Steel Unequal Angle Fixed to Steel Tube with 5.5 x 25 mm Tek Screws @ 20 mm Spacing, Painted with Duram NS 8 Primer, BW Code 277874, and Painted with Grey Dulux Gloss Enamel, BW Code 11356002

32 x 140 mm PAR Hardwood Timber Planks, BW Code 6603, Treated with Woodgard Timber preservative, BW Code 25349, with 10 mm DIA Holes Drilled @ 500 mm centres

50 x 50 x 2 mm Steel Equal Angle with 2 x 10 mm Holes on Both Sides, Painted with Duram NS 8 Primer, BW Code 277874, and Painted with Grey Dulux Gloss Enamel, BW Code 11356002, Screwed to Timber with 4 x 5.5 mm DIA Self Drill Tek Screws, BW Code 35421

10 mm Galvanised Steel Rod Fixed to Timber with M10 Eureka Hexagon Nuts and Washers, BW Code 35549, on Both Sides
Tile Wall Detail
Scale 1:20

- Helical Pile by Screwfast bolted to Galvanised Steel Base Plate with M10 Eureka Hexagon Nuts and Washers, BW Code 35549
- 350 x 350 Phiri Range Terracotta Tile, BW Code 449860, Placed in Position Between Top Hat Sections with Tylon Tile Adhesive, BW Code 26093
- 70 mm Polystyrene Panel Placed between the Top Hat Sections
  (2 x 25 + 20 mm Polystyrene Sheet Thicknesses, BW Code 5065 + 5070)
- 75 x 75 x 3 mm Galvanised Steel Stud, Fixed to Beam at Top and Bottom With 50 x 50 x 3 mm Galvanised Steel Angle and 5.5 x 38 mm Brass Self Drill Tek Screws, BW Code 3542, Painted with Grey Dulux Gloss Enamel, BW Code 11356002
- 100 x 75 x 20 x 2.5 mm Galvanised Top Hat Steel Section, Fixed to Steel Column 5.5 x 38 mm Brass Self Drill Tek Screws, BW Code 35421, Painted with Grey Dulux Gloss Enamel, BW Code 11356002
- 6 mm Plaster Board Fixed to 4.8 x 100 mm #10 Eureka Dry Wall Screws, Plastered, Painted with Yellow Plascon Double Velvet Paint, BW Code 11550
9.4 Raising the structure from the ground

By raising the structure from the ground, minimum disturbance of the parking area occurs. This also allows for the structure to be placed on a level without altering the slope of the site. A third motivation is to allow for water runoff on the existing slope to continue as before.

The approach is to use steel Helical piles by Screwfast, which screws into the ground and become the foundation for placing the unto a specific level which can be adjusted.
**Detail 1**

- 38 x 228 mm Timber SAP, BW Code 9490, Treated with Woodgard Timber Preservative, BW Code 25349, Screwed to Steel Angle with 5.5 mm Self Drill Tek Screws, BW Code 35421
- 75 x 60 x 6 mm Unequal Steel Angle Welded to Steel Channel, Painted with Duram NS 8 Primer, BW Code 277874, and Painted with Grey Dulux Gloss Enamel, BW Code 11356002
- Existing Paving/Tarmac

**Detail 2**

- 150 x 3.5 Steel Square Tube, Welded to Base Plate, Painted with Duram NS 8 Primer, BW Code 277874, and Painted with Grey Dulux Gloss Enamel, BW Code 11356002
- 280 x 280 x 7.5 mm Steel Base Plate Bolted to Flat Plate with 4 x M10 Steel Bolts and Eureka Hexagon Nuts, BW Code 35549, Painted with Duram NS 8 Primer, BW Code 277874, and Painted with Grey Dulux Gloss Enamel, BW Code 11356002
- 250 x 250 x 7.5 mm Steel Plate Plate with 4 x 10mm DIA Holes Drilled @ Corners, Welded to Top of Helical Pile, Painted with Duram NS 8 Primer, BW Code 277874, and Painted with Grey Dulux Gloss Enamel, BW Code 11356002
- 76.1 mm DIA Helical Pile by Screw Fast
9.5 Drawings Faerie Glen Training Centre
9.6 Drawings Zambesi Training Centre
10. Design Synthesis
The design of training centres at building supply stores, creates an opportunity for the unemployed and unskilled workers to be trained. The training is sponsored by the building supply store, in this study, Builders Warehouse, and is, other than existing training facilities, displayed to the public.

The design concept of the training centres are borrowed from the way in which the elements of of “trade sculptures” are arranged next to the road by the unemployed workers. The elements are translated to architectural form and is termed “trade architecture” consisting of four elements:
1. The context,
2. imposed structure,
3. temporary elements and
4. adjustable elements

The permanence of the structure depends on the availability of parking bays at a specific Builders Warehouse store. A set of generic design guidelines evolved in the design development and allow for the structures to be duplicated on other Builders Warehouse sites.

These training centres, not only diffuse the social boundaries between the unwanted workers, the clients and the building supply store, but also establish a programme on site to include the workers and allow for mutual beneficial relationships to be formed.
Fig. 107 A trainee ready to be trained in the skill (By author, Pretoria, 2012)
References

Books

Journals

Newspaper Articles
Internet


Interviews


Other

Appendix A

Results from interviews with the unemployed workers
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<th>Experience</th>
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Appendix B

Engineer's results from testing the structure
173

19 October 2012

Attention: Mr Lallie Oosthuizen

STRUCTURAL ENGINEER’S REPORT:

Please find the attached information below as requested as per the new drawings received on the 10/10/2012.

1. Analysis & design of structural steel columns & beams.

   The elements in question have been analysed & designed towards testing for allowable bending, shear- and axial stresses pertaining to the load conditions as per your request. All calculations are show in the accompanying calculation sheets.

2. Deflections

   The allowable deflection for a beam in this configuration is:

   \[
   \frac{6PL}{24EI} = 20 \text{mm} \quad \text{[SABS 0162-1]}
   \]

   Actual deflection at ultimate limit state (factorized loads) is 19.95mm.

Kind Regards

Vasco Brits

P 086 540 6297

www.vh-consulting.co.za

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Member Design for Combined Stresses

Task: Task 1

Combine Ver 3.5.29
Element 3-3

- Critical load Case: 1

Section Name 2

- Overall member strength

- Lateral torsional buckling strength

Slenderness Ratio: L/r = 18

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## Member Design for Axial Force - Strut Ver W2.5.07

**Task Title:** Task 1  
**Frame input file:** C:\Users\Da Laptop\Desktop\Lally\Beam & Column.A03  
**Data read from:** C:\Users\Da Laptop\Desktop\Prokon\Sf.out  
**Code of practice:** SABS 0162 - 1993  
**Design approach:** Evaluate current sections

### Design parameters

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<th>Kx factor</th>
<th>Ky factor</th>
<th>Ane/Ag</th>
<th>Fy MPa</th>
<th>Fu MPa</th>
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<td>0.85</td>
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<td>1.00</td>
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### Maximum L/r ratios

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### Design elements

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<tr>
<td>12-13</td>
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<td>50.13</td>
<td>51</td>
<td>Y</td>
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<td>222.9</td>
<td>19.7</td>
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**Group mass = 120.1 kg**

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<td>11-12</td>
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**Group mass = 121.3 kg**

**Total mass for task = 241.4 kg**

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