



NKANGALA DISTRICT MUNICIPALITY



PROJECT No: 52408

UPGRADING OF DR J.S. MOROKA (FIRE STATION) FIRE TOWER

SCOPE OF WORK

Tenderer

Witness 1

Witness 2

Employer

Witness 1

Witness 2



C3 SCOPE OF WORK

- C3.1 Description of the Works
- C3.2 Engineering
- C3.3 Procurement
- C3.4 Construction
- C3.5 Management
- C3.6 Annexes

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Employer

Witness 1

Witness 2



C3.1 DESCRIPTION OF THE SCOPE OF WORKS

DESCRIPTION OF THE SCOPE OF WORKS

C.3.1.1 Employer's objectives

The employer's objectives are:

- To deal with the challenges faced by Dr. JS Moroka Fire Station by providing training facilities for the fire fighters and leaders that ensure a controlled environment and replicates actual conditions.
- To comply with EPWP requirements regarding labour intensive construction methods to create job opportunities and to develop skills.
- To comply with the Occupational Health and Safety act.

C.3.1.2 Overview of the works

- The purpose of this project is to upgrade the Dr JS Moroka (Fire Station) Fire Tower
- All work will be carried out for the Nkangala District Municipality according to the by-laws of the Nkangala District Municipality.
- Labour-intensive works comprise the activities described in SANS activities which are to be performed by hand, and its associated specification data. Such works shall be constructed using local workers who are temporarily employed in terms of this Scope of Work.

C.3.1.3 Extent of the works

The Works to be carried out by the Contractor under this Contract entail, but is not limited to, the following:

- Establishment of plant on site
- Accommodation of supervisory staff
- Dealing with Community Liaison Officer and local Projects Steering Committee
- Location, exposing and demarcation of existing services present in the area to be protected and/or relocated
- Setting out of the works
- Clearing and grubbing
- Excavations
- Steel reinforcement
- Concrete works
- Brickwork
- Steel balustrading
- Mechanical works
- Installation of pump
- Erection of water tank
- Paving

This description of the Works is merely a summary and shall not limit the work to be carried out by the Contractor under this Contract.

Approximate quantities of each type of work are given in the Schedule of Quantities.

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C.3.1.4 Location of the works

The project is located on the Farm Portion 342 of the Farm Kameelrivier 160-JR in the area of the townships of Kameelrivier, Wolwekraal & Allemansdrif, located on the North-Western part of the Mpumalanga province of the Republic of South Africa. It was established under the Jurisdiction of Dr JS Moroka Local Municipality MP306, Ward 15. Dr JS Moroka Local Municipality is part of Nkangala District Municipality.

Longitude	Latitude
28° 54' 39.32" E	25° 8' 51.87" S

See annex for Locality Plan

C.3.1.5 Temporary works

The construction and design of any temporary works will be the responsibility of the Contractor. However, the Contractor is to take cognizance of the fact that during construction the activities of the contractor may not hinder or limit the owner of the property's access to their property

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C3.2 ENGINEERING

C3.2.1 Design Services

- (a) The Employer is responsible for:
- The detail design of all structures and civil engineering components to be built into the permanent works as reflected in the Contract Documents, unless otherwise stated;
 - Approval of designs by the Contractor.
- (b) The Contractor is responsible for:
- Detail design of the temporary Works (if applicable) and their compatibility with the permanent Works.
 - Supply of all design drawings and/or calculations and/or literature and/or any other information required by the Principal Agent to review and approve the Contractor's design.
- (c) All information in possession of the Contractor, required by the Principal Agent to complete the as-built/record drawings, must be submitted to the Principal Agent before a Certificate of Completion will be issued.

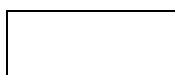
C3.2.2 Employer's Design

The Employer will be responsible for the design of the work to be executed under this project, except where it is explicitly stated in the Project Specification that another party is responsible for any portion of the design.

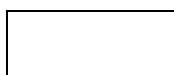
C3.2.3 Drawings

The drawings listed below are attached in order to give an overview of the project.

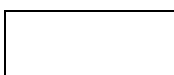
<u>DRAWING NO.</u>	<u>DRAWING TITLE</u>
<u>GENERAL AND LAYOUT DRAWINGS:</u> L365_01 / DL-000 / 00 L365_01 / GL-001 / 00 L365_01 / CN-002 / 00	DRAWING INDEX AND LOCALITY SITE LAYOUT CONTRACT NAMEBOARD
<u>STRUCTURAL DETAIL DRAWINGS:</u> L365_01 / D-010 / 00 L365_01 / D-011 / 00 L365_01 / D-012 / 00 L365_01 / D-013 / 00 L365_01 / D-014 / 00 L365_01 / D-015 / 00	STRUCTURAL DETAILS STRUCTURAL DETAILS STRUCTURAL DETAILS STRUCTURAL DETAILS STRUCTURAL DETAILS STRUCTURAL DETAILS



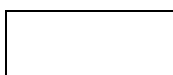
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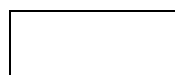
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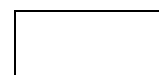
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Employer



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<u>DRAWING NO.</u>	<u>DRAWING TITLE</u>
<u>CONSTRUCTION SPECIFICATION DRAWINGS:</u> L365_01 / D-100 / 00 L365_01 / D-101 / 00	CONSTRUCTION SPECIFICATIONS CONSTRUCTION SPECIFICATIONS
<u>ARCHITECTURAL DRAWINGS:</u> SHEET / -01 / 00 SHEET / -02 / 00	SITE PLAN FLOOR PLANS, SECTIONS, ELEVATIONS

The Contractor shall use only the dimensions stated in figures on the Drawings in setting out the Works, and dimensions shall not be scaled from the Drawings, unless required by the Principal Agent. The Principal Agent will, on the request of the Contractor in accordance with the provisions of the Conditions of Contract, provide such dimensions as may have been omitted from the Drawings.

The Contractor shall ensure that accurate as-built records are kept of all infrastructure installed or relocated during the contract. The position of pipe bends, junction boxes, duct ends and all other underground infrastructure shall be given by either co-ordinates or stake value and offset. Where necessary, levels shall also be given. A marked-up set of drawings shall also be kept and updated by the Contractor. This information shall be supplied to the Principal Agent on a regular basis.

All information in possession of the Contractor, required by the Principal Agent to complete the as-built/record drawings, must be submitted to the Principal Agent Representative before a Certificate of Completion will be issued.

The Drawings prepared by the Employer for the permanent Works are listed and bound into this volume. The drawings bound into the tender document are for tendering purposes only. Construction drawings will be issued to the successful tenderer/s upon the site handover.

C3.2.4 Design Procedures

Designs have been concluded by the Principal Agent and the construction drawings are to be issued to the Contractor on the day of the official site handover. The designs shall be approved by the local authority before construction commences. The contractor shall be liable for capturing all the relevant changes to the design on the as-built drawings, thereafter the drawings shall be submitted to the Principal Agent for capturing. Under no conditions will the contractor deviate from the issued drawings unless the Principal Agent formally approves thereof in writing.

This project has been designed, as far as possible:

- In close co-operation with beneficiaries
- To address specific needs.
- To be environmentally acceptable.
- To be aesthetically acceptable.

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C3.4 CONSTRUCTION

C3.4.1 STANDARD SPECIFICATION

C3.4.1.1 Applicable Standards

C3.4.1.1 Applicable SANS 1200 Standards

The applicable SANS 1200 Standardised Specifications will entail, but not limited to:

- SANS 1200 A
- SANS 1200 AA
- SANS 1200 AB
- SANS 1200 AH
- SANS 1200 C
- SANS 1200 DA
- SANS 1200 GB
- SANS 1200 H
- SANS 1200 HA
- SANS 1200 HC
- SANS 1200 HD
- SANS 1200 M
- SANS 1200 MJ

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PSA GENERAL (SANS 1200 A)

PSA 3 MATERIAL

PSA 3.1 QUALITY

All material used in the Works shall, where such mark has been awarded for a specific type of material, bear the official mark of the SANS (SABS).

Written approval shall be obtained from the *Principal Agent* for any materials not bearing the official mark of the SANS (SABS).

The handling, storage, transport and erection of equipment, machinery and materials shall be strictly in accordance with the requirements of the supplier and/or manufacturer.

PSA 4 PLANT

PSA 4.3 PLANT CONDITION AND OPERATION

All vehicles used on the Works are to be in sound mechanical condition and shall conform to and be operated in accordance with the applicable legislation. Items of plant which leak oil or which, in the opinion of the *Principal Agent*, generate excessive noise, smoke or other nuisance shall be removed from the Works.

Any rock or debris falling from trucks onto roads in use by the public shall be removed immediately. Precautions shall be taken to prevent fouling of public roads by trucks transporting muddy material. The *Principal Agent* may require the *Contractor* to broom off and clean roads where the mud, or falling debris from trucks, may constitute a danger, or nuisance, to the travelling public.

No separate or additional payment shall be made for dust prevention measures or for cleaning of roads, etc and suitable allowance for this work must be made in the appropriate Schedule Rates.

PSA 5 CONSTRUCTION

PSA 5.1 SURVEY

PSA 5.1.1 Setting Out of the Works

Setting out of the works is the sole responsibility of the *Contractor* and shall be done from survey pegs and from benchmarks, as indicated on the drawings. The *Contractor* shall, within two (2) weeks after the site has been handed over to him, ascertain himself of the correctness of all pegs and benchmarks. Any discrepancy shall immediately be reported in writing to the *Principal Agent*. Any costs or subsequent costs arising from discrepancies that had not been reported to the *Principal Agent* within the aforementioned period shall be the sole responsibility of the *Contractor*.

In addition to the above, without reducing the responsibilities and liability of the *Contractor*, a registered surveyor will set out the *Works*. It is the responsibility of the *Contractor* to verify the correctness of the *Works*. Any discrepancies are to be reported to the *Principal Agent* in writing within seven days after it was noted.

The *Principal Agent* may alter any part of the works to suit local conditions. The *Contractor* must therefore contact the *Principal Agent* immediately after the preliminary setting out of any part of the works before starting with detail setting out, or construction. Only after the *Principal Agent* has approved a specific site or part of the *Works*, may the detail setting out and construction commence.

PSA 5.3 PROTECTION OF STRUCTURES

The *Contractor* must contact house owners at least two weeks prior to working in close proximity to existing buildings and to inspect buildings before and after work had been completed.

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PSA 6 TOLERANCES

PSA 6.2 DEGREE OF ACCURACY

Degree of Accuracy II shall apply to this contract.

PSA 7 TESTING

The *Contractor* shall be responsible for the completed installation passing any tests specified or required by the relevant Local Authority or ACT. The *Principal Agent* will be entitled to be present at such test and the *Contractor* shall give the *Principal Agent* reasonable notice of the dates of the test. Where test certificates are required in terms of any clause of the Specifications or ACT, such certificates shall be submitted to the *Principal Agent* immediately.

PSA 7.2 APPROVED LABORATORIES

The *Contractor* may employ outside agencies, but subject to the approval of the *Principal Agent* to do the necessary design as required. All tests has to be done according to the number of tests per lot as prescribed in the SANS 1200 under the relevant section.

Unless otherwise stated in a specification that forms part of this Contract, only the testing laboratories of South African Bureau of Standards, the Council for Scientific and Industrial Research, the relevant Government Departments and Local Authorities will be accepted as approved laboratories in which tests or design work required in terms of a specification may be carried out.

The sum bid under pay-items shall be deemed to cover the full cost for doing all the required testing by an outside agency or the *Contractor's* own facilities.

PSA 7.5 FACTORY TESTS

The *Contractor* shall carry out tests in accordance with the requirements of the recognised SANS, IEC or BS standards. Comprehensive details of the standards used, and to which equipment applicable, shall be supplied. Such additional tests in the manufacturer's Works, which in the opinion of the requirements of the Specification, whether under test conditions or in normal service, may be called for at no additional cost to the Employer.

PSA 7.6 TESTS ON SITE

All site tests shall normally be carried out in the presence of, but always to the satisfaction of the *Principal Agent*. At least 24 hours notice should be given the *Principal Agent's* Site Representative of any intent to conduct such tests on site.

All equipment must be tested to ascertain whether it performs its intended duties in a manner as specified.

These tests will form part of the Acceptance Tests on completion as defined under the Conditions of Contract.

PSA 8 MEASUREMENT AND PAYMENT

PSA 8.2 PAYMENT

PSA 8.2.1 Fixed-Charge and Value-Related Items

The bid sums for the fixed-charge and time related items in the P&G Section of the Schedule of Quantities shall not be subject to any variation if the actual value of the work done exceeds or falls short of the accepted bid amount within the limit stated in Contract Data.

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PSA 8.2.2 Time-Related Items

The bid amount for a time-related item will be increased if an extension of time for the completion of the works is awarded on the condition that the activity related to the item bid for must be sustained during the extended period.

The ratio between the increased amount for a time related item and the bid amount must be the same as the ratio between the extension of the time period for the completion of the works and the original time period allowed for completion of the works.

PSA 8.2.5 Setting out of the Works and Protection of Land Surveyor's Pegs

No setting out of the Works has been done by the *Principal Agent*, and it is the *Contractor's* responsibility to set out the Works.

Special attention is drawn to the need for accurate setting out of the Works by the *Contractor* according to the positions shown on the drawings. The *Contractor* shall employ a competent surveyor to set out the Works accurately, he shall check the values of the bench marks and the invert levels of all existing Works into which the proposed Works must tie, and he shall notify the *Principal Agent* of any discrepancies and differences before work commences.

No claims for extension of time for incorrect setting out or checking of bench marks or invert levels will be considered.

PSA 8.3 SCHEDULED FIXED-CHARGE AND VALUE-RELATED ITEMS

PSA 8.3.2 Establishment of Facilities on the Site

PSA 8.3.2.1 Facilities for Engineer

PSA 8.3.2.1(c) Nameboards

The Contractor shall provide and erect a project nameboard in accordance with the drawing bound at the end of the document or similar and approved by the *Principal Agent*. This nameboard shall be erected on a site to be approved by the *Principal Agent* and the Client and shall be maintained for the full contract period.

The exact wording will be finalised at the start of construction.

The project nameboard shall be removed at the end of the maintenance period.

PSA 8.3.2.2 Facilities for Contractor

Unit: Sum

Only one item is listed in the schedule to cover the provision of facilities for the Contractor. This shall cover all costs related to providing, establishing and commissioning on the site all the facilities as listed in the bid document and any other facilities that the Contractor may deem necessary to allow the Works to Commence and proceed to completion in terms of the Contract.

PSA 8.4 SCHEDULED TIME-RELATED ITEMS

PSA 8.4.2 Operation and Maintenance of Facilities on Site, for duration of construction

PSA 8.4.2.1 Facilities for Engineer

PSA 8.4.2.1(a) Furnished office for the Engineer

The *Contractor* shall provide 1 lockable office (min 12 m²) with at least two electrical plug points, one desk having a top of at least 0,9 x 1,5 m and at least one lockable drawer, two chairs, shelving of total length 3 m and of nominal width 300 mm and acceptable lighting and 2 lean-to garages or carports for the *Principal Agent's* Representative and the staff of at least 25 m² in covered area and a floor consisting of

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a layer of broken stone, or concrete, or any other approved material, which shall provide a reasonably compact, dust free and self-draining surface.

The *Contractor* shall provide within his own site establishment facilities, a suitably furnished office or other venue capable of comfortably accommodating a minimum of twenty (20) persons at site meetings. The *Principal Agent* shall be allowed free use of such venue for conducting any other meetings concerning the Contract at all reasonable times.

The office/s and/or meeting room shall have provision for heating in winter and cooling in summer to ensure comfortable working conditions.

PSA 8.4.2.1(b) Telephone/Cell phone

The *Contractor* will be responsible to make arrangements for the provision of communications systems for Engineer or his representative.

PSA 8.4.2.1(d) Survey Equipment and Assistants

The Contractor shall provide the following survey equipment on the site from the commencement to the completion of the works.

- (a) 1 x 100 m steel measuring tape;
- (b) Steel pegs, shovels picks etc that the *Principal Agent's* Representative may require during the contract; and
- (c) 1 Theodolite with tripod and 5 m staff.

The Contractor shall provide all pegs, concrete, tools and other necessary items as well as all necessary labour for excavation, bush clearing, mixing and placing of concrete, as and when required for the control of the setting out of the Works

PSA 8.4.2.1(e) Living Accommodation for Engineer

The Contractor shall provide suitable living accommodation for the engineer during the duration of the contract. This accommodation must be regarded as safe and must also not be located an unreasonable distance from site.

If Contractor has not provided accommodation for Engineer, Engineer is permitted to find his/her own accommodation. The fee for this accommodation will be regarded as the Contractors responsibility.

PSA 8.4.2.2 Facilities for Contractor

Unit: Sum

Only one item is listed in the schedule to cover the operation and maintenance of facilities for the Contractor. This shall cover all costs related to operation and maintenance on the site all the facilities as listed in the bid document and any other facilities that the Contractor may deem necessary to allow the Works to Commence and proceed to completion in terms of the Contract.

PSA 8.5 SUMS STATED PROVISIONALLY BY ENGINEER

PSA 8.5.1 Political Riot and Malicious Damage Insurance

Unit: Prov Sum

The Contractor will be paid in increments agreed upon in terms of Clause 45 of the General Conditions of Contract under the Prime Cost Sum provided in the P&G Section of the Schedule of Quantities for the actual cost of such insurance premium for the relevant year or portion of a year (as the case may be) plus an allowance of ten percent to cover his own cost. Payment will be effected in the intern certificate that follows

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upon the Contractor's submission of a receipt for the payment of the required insurance premium.

PSA 8.5.2 Percentage allowance on cost for Contractor's cost and profit

Unit: %

The percentage tendered for charges and profit on the cost of Sums Stated Provisionally by the *Principal Agent* shall include full compensation or all cost, profit, charges, handling and transport related to the service.

PSA 8.5.3 Employment of Community Liaison Officer

Unit: Prov Sum

The CLO will be employed from within the local community in conjunction with local structures. A provisional sum of R6 000-00 per CLO per month has been allowed for the remuneration for the employment of a Community Liaison Officer and will be paid by the Contractor to the CLO.

PSA 8.7 DAYWORK

Rates for day work items shall be given in the Schedule of Quantities. The rates shall include all costs including profit and escalation. The rate shall remain fixed for the duration of the Contract.

Day works will commence at the sole discretion of the *Principal Agent* and only after receipt of a written instruction to commence.

The following process shall be followed:

- (i) Identification of work to be done through day works by the Client, *Principal Agent* or *Contractor*.
- (ii) *Principal Agent* to define scope of day work required and request from *Contractor* an estimate of duration (hours or days) that will be required to complete the day works.
- (iii) *Principal Agent* to approve and give written instruction to *Contractor* to commence.
- (iv) Accurate actual time duration measurements shall be kept by the *Contractor* and submitted to the *Principal Agent* for approval and payment.

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Employer

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PSA 8.8 TEMPORARY WORKS

PSA 8.9 Health and Safety

In the event of any individual being employed for construction work, the *Contractor* must ensure potential employee has a medical certificate of fitness specific to the construction work the individual will be employed for.

If the individual is not in possession of such a document, he/she must be sent or be taken by the *Contractor* to any of the following persons for evaluation before he/she can be employed for construction work:

- An occupational health practitioner
- A person who holds a qualification in occupational health recognized by the South African Medical and Dental Council or the South African Nursing Council.

Individual must be in possession of a medical certificate of fitness before employment for specific construction work is permitted.

PSAB ENGINEER'S OFFICE (SANS 1200 AB)

PSAB 5 CONSTRUCTION

PSAB 5.6 SITE INSTRUCTION BOOK

Throughout the construction period, the *Contractor* shall supply an A4 carbon triplicate book as a site instruction book.

This book shall be kept on Site and shall be accessible to both the *Contractor* and the *Principal Agent* at all times. It shall be used:

- by the *Contractor* for providing the *Principal Agent* with any information regarding the construction of the Works which may be requested and giving notification in writing of inspections, drawings, etc, required by the *Contractor*; and
- by the *Principal Agent* for the purpose of writing day-to-day instruction and confirming any verbal information or instructions given to the *Contractor*.

One copy of each site note issued shall remain in the book.

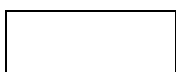
PSC SITE CLEARANCE (SANS 1200 C)

PSC 5 CONSTRUCTION

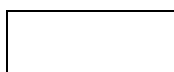
PSC 5.9 EPWP STANDARD TASK RATES

The Site Clearance is to be done by labour intensive methods. The following task rates, based on the task output experienced on similar projects has been set for this specific project1:

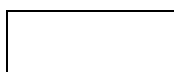
Activity	Task rates m ² /man-day (Minimum task)
Bush clearing	250 – 750
Stripping and grubbing	100 – 200



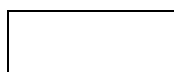
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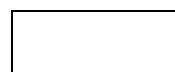
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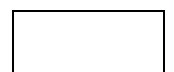
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PSD EARTHWORKS (SANS 1200 D)

PSD 3 MATERIALS

PSD 3.1 CLASSIFICATION FOR EXCAVATION PURPOSES

PSD 3.1.2 Classes of Excavation

Refer to PSDB 3.1.

PSD 3.3 SELECTION

PSD 3.3.1 General

The *Contractor* shall deal in such a way with materials from all excavations to ensure that usable material is not contaminated with unsuitable material. If usable material is contaminated, such contaminated material shall be removed and replaced with suitable material, all at the *Contractor's* expense. No additional payment shall be made in respect of this and all relevant costs shall be deemed to be included in the bid rates.

The *Contractor* shall deal in such a way with materials from all excavations for pipe trenches to ensure that usable material is not contaminated with unsuitable material. If usable material is contaminated, such contaminated material shall be removed and replaced with suitable material, all at the *Contractor's* expense. No additional payment shall be made in respect of this and all relevant costs shall be deemed to be included in the bid rates.

All unsuitable material shall be removed prior to importing fill material in such areas.

PSD 5 CONSTRUCTION

PSD 5.1 PRECAUTIONS

PSD 5.1.2 Existing Services

PSD 5.1.2.2 Detection, Location and Exposure

If existing services are not shown on the drawings but the existence thereof can be reasonably expected, the *Contractor* shall, in conjunction with all relevant authorities, determine the exact depth and location of such services before the commencement of construction. After locating the exact position of services, whether indicated on the drawings or not, such services shall be deemed to be known services and the *Contractor* shall be liable for all costs and subsequent costs arising from the damage thereof as a result of the *Contractor's* activities. These services must also be indicated on the "As Built" drawings.

All services must be located and opened for inspection by the *Principal Agent* before commencing trench excavation. Any costs or losses suffered by the *Contractor* as a result of not abiding by this specification will be for the *Contractor's* account.

PSD 5.1.4 Nuisance

PSD 5.1.4.1 Dust Nuisance

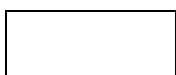
The *Contractor* is responsible for dust control and is liable for all claims that may result from dust nuisance on all parts of the site and at all times from the date of handing over of the site to the completion date of the contract. No payment regarding the above-mentioned will be made and all costs shall be deemed to be covered by the bid rates.

PSD 5.2 METHODS AND PROCEDURES

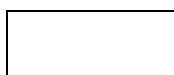
PSD 5.2.5 Transport for Earthworks

PSD 5.2.5.1 Freehaul

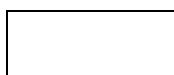
All haul of material within the boundaries of the Site of Works shall be regarded as freehaul.



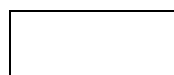
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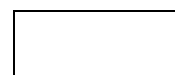
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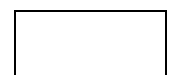
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PSDA EARTHWORKS (SMALL WORKS) (SANS 1200 DB)

PSDA 3 MATERIALS

PSDA 3.1 CLASSES OF EXCAVATION

Material excavated will be classified as either soft or rock. All intermediate material will be classed as soft. Only material removed by blasting will be classified as rock.

The *Contractor* must make provision for this in the relevant rates.

PSDA 3.2 EMBANKMENTS AND BACKFILL

PSDA 3.2.1 General

The *Contractor* shall deal selectively with material from general excavation.

The *Contractor* shall deal in such a way with materials from all excavations to ensure that usable material is not contaminated with unsuitable material. If usable material is contaminated, such contaminated material shall be removed and replaced with suitable material, all at the *Contractor's* expense. No additional payment shall be made in respect of this and all relevant costs shall be deemed to be included in the bid rates.

All unsuitable material shall be removed prior to importing fill material in such areas.

PSDA 5 CONSTRUCTION

PSDA 5.1 PRECAUTIONS

PSDA 5.1.4 Stormwater and groundwater

The *Contractor* shall properly deal with and dispose of water to ensure that the works are kept sufficiently dry for their proper execution.

PSDA 5.1.5 Excessive Pollution

The *Contractor* shall take all reasonable measures to minimize excessive dust nuisance, pollution, noise and inconvenience with the public.

PSDA 5.3 EPWP STANDARD TASK RATES

The Earthworks is to be done by labour intensive methods. The following task rates, based on the task output experienced on similar projects, has been set for this specific project2:

EXCAVATION	TOOLS	Task rates m ³ /man-day	
		Throwing distance	
		Up to 4 m	4 to 6 m
Loose soil	Shovel	5 – 6	4,5 – 5
Sticky soil	Spade, fork, forked hoe	2 – 3	1,5 - 2
Firm soil	Pick, shovel, spade hoe	3 – 4,5	2,5 – 4
Hard stony gravel	Pick, shovel, crowbar	1,5 – 2	1 – 1,5

Tenderer

Witness 1

Witness 2

Employer

Witness 1

Witness 2



The Backfilling is to be done by labour intensive methods. The following task rates, based on the task output experienced on similar projects, has been set for this specific project:

Activity	Task rates m/man-day Distance to material (m)		
	0 – 4	4 – 6	6 – 8
Backfill trench excavation and compact with hand compactor in layers of 150 mm	5,0	4,5	4,0

PSDB EARTHWORKS (PIPE TRENCHES) (SANS 1200 DB)

PSDB 3 MATERIALS

PSDB 3.1 CLASSES OF EXCAVATION

Material excavated will be classified as either soft or rock. All intermediate material will be classed as soft. Only material removed by blasting will be classified as rock.

The *Contractor* must make provision for this in the relevant rates.

PSDB 3.6 MATERIALS FOR REINSTATEMENT OF ROADS AND PAVED AREAS

PSDB 3.6.1 Sub-base and Base

Where trenches cross or run adjacent to surfaced roads and paved areas of which the surfaces are scheduled to be reinstated, the material excavated from the existing base and/or sub-base pavement layer(s) shall be set aside and used in the reconstruction of the sub-base layer. Where applicable, new material complying with the requirements of SANS 1200 MF shall be used in the reconstruction of the base layer. Any shortfall in material for the reconstruction of the sub-base layer shall be made up by the use of material complying with the requirements of SANS 1200 ME.

PSDB 3.7 SELECTION

If the excavation of a pipeline damages an existing road surface, the *Contractor* must stockpile material from the top 200 mm of such a road surface in order to reuse it as sub-base for the repairing of the road crossing.

If necessary gravel material that is suitable for the reparation of road surfaces must be imported.

The *Contractor* must make provision in his tariffs for compaction in road reserves for the selection of excavated material as specified above.

PSDB 5 CONSTRUCTION

PSDB 5.1 PRECAUTIONS

PSDB 5.1.2 Stormwater, Seepage and Dewatering of Excavations

PSDB 5.1.2.4 Water in Trenches

Water in pipe trenches may cause movement of the pipes as a result of flotation, and backfilling must therefore be executed as quickly as possible. If movement of the pipes do occur the *Contractor* must, unless otherwise instructed by the *Principal Agent*, remove the pipes from the trench and reinstall it at his own expense.

Tenderer

Witness 1

Witness 2

Employer

Witness 1

Witness 2



PSDB 5.6 BACKFILLING

PSDB 5.6.1 General

Backfilling in road reserves must be compacted in 100 mm layers up to natural ground level.

Where prescribed by the *Principal Agent* all surplus material must be neatly piled over the real trench width to a height not more than 150 mm higher than the adjoining level.

PSDB 5.6.3 Disposal of Soft Excavation Material

All surplus and unsuitable material shall be disposed of at the spoil site, and levelled.

PSDB 5.6.9 Temporary Stockpiling of Material

The *Contractor* must obtain written approval from the *Principal Agent* for the removal of any excess material or unsuitable material for backfilling, as well as the temporary stockpiling of selected excavated material. Excavated surplus material and material temporarily stockpiled must be in areas approved by the *Principal Agent*.

PSDB 5.9 REINSTATEMENT OF SURFACE

PSDB 5.9.2 Private Property and Commonage

Gardens and lawns shall be repaired to the original standard where they were crossed. Grass and plants shall be taken out of the ground, temporarily planted, watered during construction and replanted after backfilling.

PSDB 5.11 EPWP STANDARD TASK RATES

The Earthworks is to be done by labour intensive methods. The following task rates, based on the task output experienced on similar projects, has been set for this specific project:

EXCAVATION	TOOLS	Task rates m ³ /man-day Throwing distance	
		Up to 4 m	4 to 6 m
Loose soil	Shovel	5 – 6	4,5 – 5
Sticky soil	Spade, fork, forked hoe	2 – 3	1,5 - 2
Firm soil	Pick, shovel, spade hoe	3 – 4,5	2,5 – 4
Hard stony gravel	Pick, shovel, crowbar	1,5 – 2	1 – 1,5

The Backfilling of the trenches is to be done by labour intensive methods. The following task rates, based on the task output experienced on similar projects, has been set for this specific project:

Activity	Task rates m/man-day Distance to material (m)		
	0 – 4	4 – 6	6 – 8

Tenderer

Witness 1

Witness 2

Employer

Witness 1

Witness 2



Backfill trench excavation and compact with hand compactor in layers of 150 mm	5,0	4,5	4,0
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PSDB 8 MEASUREMENT AND PAYMENT

PSDB 8.2 COMPUTATION OF QUANTITIES

PSDB 8.2.4 Shoring

All trench excavations must comply with the safety regulations for shoring. It is the responsibility of the *Contractor* to inform the *Principal Agent* where Shoring is required.

Shoring will only be measured and paid for if the *Principal Agent* gives written approval before it is installed.

PSG CONCRETE STRUCTURAL (SANS 1200 G)

PSG 2 INTERPRETATIONS

PSG 2.3 DEFINITIONS

(a) Quality

Recording of all quality control measures must be done on a daily basis with information regarding batch no, position in structure and date to be specified.

(c) Strength

The required concrete strength will be the strength specified. No test result less than 90% of specified 28 day concrete strength would be accepted. The maximum percentage of tests to fall below the specified level may be 5%.

PSG 3 MATERIALS

PSG 3.2 CEMENT

Portland blast furnace cement and rapid hardening cement shall not be used on the Works.

PSGA 3.2.2 Applicable Specification

Portland cement that conforms to SANS 50197-1 (SABS EN 197-1).

PSG 3.2.3 Storage of Cement

Replace this Sub-Clause with the following:

Consignments of cement shall be used in the same sequence as that in which they are delivered to site.

Cement, which is stored on the Site, shall be kept under a cover that provides adequate protection against moisture and other factors that may aggravate deterioration.

Where the cement is supplied in bags, the bags shall be closely and neatly stacked to a height not exceeding 12 bags, and they shall be so arranged that they can be used in the order in which they were delivered to the Site. Different brands and/or types of the same brand shall be stored separately.

Cement shall not be kept in storage for longer than 6 weeks from the date of manufacture without the Engineer's permission.

The Engineer may order the removal of cement, which is older than 6 weeks, from the Site or the alteration of the design mix if he does allow its use. All cement damaged in any way, and all cement which does not comply with the specification, shall be removed immediately and permanently from the site.

Tenderer

Witness 1

Witness 2

Employer

Witness 1

Witness 2



PSG 5 CONSTRUCTION

PSG 5.5 CONCRETE

PSG 5.5.1 Quality

a) Consistency

Add the following under Sub-Clause 5.5.1 (a):

The slump for concrete to be used in water retaining structures shall not be less than 30 mm and not more than 60 mm.

b) Workability

Add the following to this Sub-Clause:

The concrete mix to be used in water retaining structures shall have a water/cement ratio not exceeding 0,5.

c) Durability

Add the following to this Sub-Clause:

All water retaining structures shall be deemed to be exposed to severe conditions. The water/cement ratio shall be determined by the strength of concrete specified but shall not exceed 0,48.

d) Strength concrete

Add the following to this Sub-Clause:

Unless specified differently the grade of concrete to be used shall be as follows:

- (i) Grade 35/20: All reinforced concrete structures;
- (ii) Grade 20/20: All paving slabs and floor slabs;
- (iii) Grade 15/20: Non-reinforced foundations and Pipe encasement;
- (iv) Grade 10/40: Mass concrete and concrete filling;
- (v) Grade 15/10: Screeds and benching.

The concrete mix design by the Cement & Concrete Institute or other approved independent laboratory is to be approved by the Engineer prior to commencement of the works.

e) Use of Ready mixed Concrete

Ready-mixed concrete may be used on the works, subject to the following conditions:

- (a) Mix design requirements as specified for strength concrete is applicable.

On site quality control is required same as for mixing at the construction site. Full details of the quality control system of the ready mix supplier are to be provided.

f) Placing

Add the following:

In circular sections concreting shall be carried out in both directions from a point on the circle in order to close the gap with fresh concrete from both sides.

g) Construction Joints

Add the following:

- (b) On horizontal joints in the structures wall joint preparation shall comply to the following requirements:

- Prepare joint while the concrete is still "green".

Tenderer

Witness 1

Witness 2

Employer

Witness 1

Witness 2



- Remove the surface skin by means of an air-and-water jet to expose the aggregate and provide a sound coarse surface.
- Joints shall be thoroughly cleaned and all excess water shall be removed to provide a saturated but surface-dry condition prior to placing of concrete.

No vertical joints will be permitted in the structures walls.

h) Watertight Concrete

Add the following to this Sub-Clause:

All structures shall be deemed to be water-retaining unless otherwise specified.

PSG 7 TESTS

PSG 7.1 FACILITIES AND FREQUENCY OF SAMPLING

PSG 7.1.1 Facilities

Add the following:

The Contractor shall provide the facilities necessary to test the concrete cubes made at the frequency specified in Sub-Clause 7.1.2.

The facilities shall consist of sufficient storage capacity and the testing of the cubes:

- a) by means of an approved, calibrated cube testing press installed on site in a manner approved by the Engineer, or
- b) by an approved independent laboratory.

The cost of all the testing including the cost of sampling, storage and transport of samples shall be included in the rate tendered for concrete work.

PSGA CONCRETE (SMALL WORKS) (SANS 1200 GA)

PSGA 3 MATERIALS

PSGA 3.2 CEMENT

PSGA 3.2.1 Applicable Specification

Portland cement that conforms to SANS 50197-1 (SABS EN 197-1).

PSGA 3.2.2 Storage of Cement

Consignments of cement shall be used in the same sequence as that in which they are delivered to site. No cement shall be used which has been stored on site for a period longer than 8 (eight) weeks. All cement so stored for a longer period than 6 (six) weeks, all cement damaged in any way, and all cement which does not comply with the specification, shall be removed immediately and permanently from the site.

PSGA 5 CONSTRUCTION

PSGA 5.2 FORMWORK

PSGA 5.2.1 Classification of Finishes

The following surface conditions are required in the various portions of the finished concrete.

(a) Rough

Concealed surfaces and surfaces lower than 100 mm below ground level.

(b) Smooth

All surface finishes not classified as "rough" in paragraph (a) shall be classified as "smooth". All exposed edges unless otherwise indicated on the drawings, shall be chamfered 20 mm x 20 mm by means of triangular fillets fixed to the formwork.

Tenderer

Witness 1

Witness 2

Employer

Witness 1

Witness 2



PSGA 5.4 CONCRETE

PSGA 5.4.1 Quality

PSGA 5.4.1.7 Slump

The slump of concrete used in water retaining structures may not be less than 30 mm and not more than 60 mm.

PSGA 5.4.1.8 Durability

Concrete shall be so proportioned to ensure that the water/cement ratio does not exceed 0.5 and, to ensure workability, water-reducing admixtures of approved manufacture shall be used in preference to increasing the cement content.

PSGA 5.4.8 Concrete Surfaces

Concrete surfaces under screeds, granolithic finishes or benching shall be brought up to a plane, uniform surface with a suitable screed board.

PSGA 5.4.11 Adverse Weather Conditions

No material having a temperature of below 5 °C shall be used for concrete, and no concrete shall be placed when the ground or air temperature is below 2 °C. Furthermore, if the air or ground temperature is likely to fall below 2 °C within 12 (twelve) hours after placing of concrete, no concreting shall be done without the written consent of the *Principal Agent*. If such consent is given, the *Contractor* shall heat the aggregate stockpiles and mixing water, and defrost the formwork and reinforcement.

PSL MEDIUM PRESSURE LINES (SANS 1200 L)

PSL 3 MATERIAL

PSL 3.7 OTHER TYPES OF PIPES

PSL 3.7.1 HDPE Pipes

For all HDPE pipes of 75 mm and larger diameter the following specifications are preferred:

- Pipe – HDPE: Type PE 100, PN 12.5 (or higher pressure class if required) to SABS ISO 4427.
- Supply lengths: Supply pipe in 12 m (minimum) lengths.
- Joints: Butt-welded joints (SABS 0268 – Part 1) in general or electro-fusion welding (SABS 0268 – Part 2) where butt-welding is impossible.
- Fittings: Manufactured from HDPE: Type PE 100, PN 12.5 (or Higher) to SABS ISO 4427.
- Welding: all welding to relevant SABS 0268, SABS 0269, SABS method 1269, SABS 0270, SABS 1655 and SABS 1671 codes.
- Special and Fittings: HDPE: Type PE 100, PN 12.5 (or higher pressure class if required) to SABS ISO 4427.

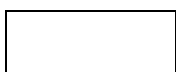
PSL 3.7.3 PVC Pipes

All pipes for the Reticulation network and the Rising pipeline shall be PVC class 9 pipes, complying with SANS 966, as set out in the Schedule of Quantities.

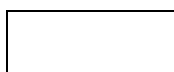
PSL 3.10 VALVES

PSL 3.10.1 Isolation Valves

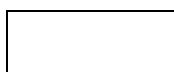
All valves on the main network must be of the waterworks type class 16 complying with SANS 664. The end shall be flanged, socketed or plain ended in accordance with the



Tenderer



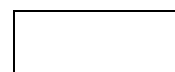
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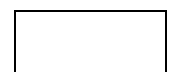
Witness 2



Employer



Witness 1



Witness 2



Schedule of Quantities and suitable for the application required. The closing direction of the valves must be left-hand closing. Valves must be supplied in a cast iron headpiece. All spindles must be non-rising.

PSL 3.10.2 Gate Valve

Supply and install a 15 mm diameter "Brass full way gate valve" just downstream of the water meter. The tariff includes the 110 mm ø sleeve pipe for the gate valve and complete installation.

PSL 3.10.3 Surface Box for Valve

The surface boxes for Valves shall have a cast iron lid with black primer and yellow markings. No separate or additional payment shall be made for the surface box, the lid or the markings, etc. and suitable allowance for the additional requirements must be made in the appropriate Scheduled Rates.

PSL 3.10.4 Kerb Marking

A marking, as detailed on the typical engineering drawings, is to be painted on the kerb opposite the Valve to indicate the position. No separate or additional payment shall be made for the marking and suitable allowance for the additional requirements must be made in the appropriate Scheduled Rates.

PSL 3.12 FIRE HYDRANTS

PSL 3.12.1 Fire Hydrant

All fire hydrants must be London V threaded outlet type, must be installed underground and be anti-clockwise closing. All fire hydrants are to be painted red.

PSL 3.12.2 Surface Box for Fire Hydrant

The surface boxes for Valves shall have a cast iron lid with black primer and red markings. No separate or additional payment shall be made for the surface box, the lid or the markings, etc. and suitable allowance for the additional requirements must be made in the appropriate Scheduled Rates.

PSL 3.12.3 Kerb Marking

A marking, as detailed on the typical engineering drawings, is to be painted on the kerb opposite the Fire Hydrant to indicate the position. No separate or additional payment shall be made for the marking and suitable allowance for the additional requirements must be made in the appropriate Scheduled Rates.

PSL 5 CONSTRUCTION

PSL 5.1 LAYING

PSL 5.1.1 General

Where connecting to the existing pipeline the position of the existing pipeline must be established by excavating test holes (hand excavation) before any trench excavation to the planned connection point is undertaken. The Contractor will not be compensated for excavation and any other work that is executed and proves to be unnecessary because this specification was not followed.

PSL 5.1.4 Depth and Cover

PSL 5.1.4.1 The minimum cover required is 1 000 mm.

PSL 5.4 CONCRETE ENCASING

Concrete encasing with concrete with min strength of 20 MPa / 19 mm, must be provided at positions indicated by the *Principal Agent*. Provision must be made to keep the pipe in position during the placement of the concrete encasing. The length of

Tenderer

Witness 1

Witness 2

Employer

Witness 1

Witness 2



concrete encasing will be determined by means of site instructions from the *Principal Agent*.

PSL 5.4.1 Soilcrete Encasing

A mixture of Portland cement and gravel of base quality that is mixed in a ratio of 1:10 must be provided at positions indicated by the *Principal Agent*. Provision must be made to keep the pipe in position during the placement of the soilcrete encasing. The length of soilcrete encasing will be determined by means of a site instruction from the *Principal Agent*.

PSL 5.11 PROVISION OF A STANDING TAP

The standing tap must be installed downstream of the water meter and the gate valve as indicated on the engineering drawings. The tap shall be manufactured of yellow copper and should be complete with hosepipe fitting.

PSL 5.12 CONNECTION WITH EXISTING NETWORK

The new water supply network must be connected to the existing network as indicated on the engineering drawings. The drawings indicate more or less the position of the existing pipes. The exact position will have to be found by hand excavations.

The existing pipe will have to be isolated in order to make the new connection. All residents that will be affected by this operation must be informed three days in advance that their water will be cut. The connection must take place as fast as possible and after completion and the water supply must be restored by opening the relevant valves.

PSL 8 MEASUREMENT AND PAYMENT

PSL 8.2 SCHEDULED ITEMS

PSL 8.2.16 Above ground fire hydrant assemblies complete as detailed drilled to suit hydrant and hydrant tee Unit: No

Payment under this item is as detailed on drawings and includes 25/19 MPa concrete footing and 80 mm dia. flanged galvanised steel pipe, drilled to suit hydrant and hydrant tee. The hydrant tee is measured elsewhere.

PSL 8.2.17 Connection with existing pipe network (Schedule of Quantities will indicate diameter of existing pipe)..... Unit: No

Payment under this item must include labour, material, equipment and supervision to make the connection with the existing pipe.

PSLB BEDDING (PIPES) (SANS 1200 LB)

PSLB 5 CONSTRUCTION

PS LB 5.3 PLACING AND COMPACTING OF FLEXIBLE PIPES

Pipes in the network must be placed and protected according to the specifications as on the engineering drawings. No special bedding is required for 20 and 25 mm diameter HDPE pipes. These pipes must however be encased with 100 mm selected backfill material before the trench is closed. No extra compensation will be paid for this and all costs must be included in the tariff for groundwork.

PSLB 5.4 EPWP STANDARD TASK RATES

The construction of bedding and selected fill blanket is to be done by labour intensive methods. The following task rates, based on the task output experienced on similar projects, has been set for this specific project:

Tenderer

Witness 1

Witness 2

Employer

Witness 1

Witness 2



Activity	Task rates m/man-day Distance to material (m)		
	0 – 4	4 – 6	6 – 8
Construct Bedding Cradle at least 100 mm thick and compact by hand covering the full width of the trench	40,0	35,0	30,0
Construct Selected full blanket in layers of 100 mm over the full width of the trench up to a height of at least 300 mm above the crown of the pipeline	15,0	12,0	10,0

PA: EPWP LABOUR INTENSIVE SPECIFICATION

PA 1 LABOUR INTENSIVE COMPETENCIES OF SUPERVISORY AND MANAGEMENT STAFF

Table 1: Skills programme for supervisory and management staff

Personnel	NQF level	Unit standard titles	Skills programme description
Team leader / supervisor	2	Apply Labour Intensive Construction Systems and Techniques to Work Activities	This unit standard must be completed, and
		Use Labour Intensive Construction Methods to Construct and Maintain Roads and Stormwater Drainage	any one of these 3 unit standards
		Use Labour Intensive Construction Methods to Construct and Maintain Water and Sanitation Services	
		Use Labour Intensive Construction Methods to Construct, Repair and Maintain Structures	
Foreman/ supervisor	4	Implement labour Intensive Construction Systems and Techniques	This unit standard must be completed, and
		Use Labour Intensive Construction Methods to Construct and Maintain Roads and Stormwater Drainage	any one of these 3 unit standards
		Use Labour Intensive Construction Methods to Construct and Maintain Water and Sanitation Services	
		Use Labour Intensive Construction Methods to Construct, Repair and Maintain Structures	

Tenderer

Witness 1

Witness 2

Employer

Witness 1

Witness 2



Personnel	NQF level	Unit standard titles	Skills programme description
Site Agent / Manager (i.e. the contractor's most senior representative that is resident on the site)	5	Manage Labour Intensive Construction Processes	Skills Programme against this single unit standard

PA 2 EMPLOYMENT OF UNSKILLED AND SEMI-SKILLED WORKERS IN LABOUR-INTENSIVE WORKS

PA 2.1 Requirements for the sourcing and engagement of labour

PA 2.1.1 Unskilled and semi-skilled labour required for the execution of all labour intensive works shall be engaged strictly in accordance with prevailing legislation and SANS 1914-5, Participation of Targeted Labour.

PA 2.1.2 Tasks established by the *Contractor* must be such that:

- the average worker completes 5 tasks per week in 40 hours or less; and
- the weakest worker completes 5 tasks per week in 55 hours or less.

PA 2.1.3 The *Contractor* must revise the time taken to complete a task whenever it is established that the time taken to complete a weekly task is not within the requirements of (3).

PA 2.1.4 The *Contractor* shall, through all available community structures, inform the local community of the labour intensive works and the employment opportunities presented thereby. Preference must be given to people with previous practical experience in construction and / or who come from households:

- where the head of the household has less than a primary school education;
- that have less than one full time person earning an income;
- where subsistence agriculture is the source of income.
- those who are not in receipt of any social security pension income

PA 2.2 Specific provisions pertaining to SANS 1914-5

PA 2.2.1 Definitions

Targeted labour: Unemployed persons who are employed as local labour on the project.

PA 2.2.2 Contract participation goals

- There is no specified contract participation goal for the contract. The contract participation goal shall be measured in the performance of the contract to enable the employment provided to targeted labour to be quantified.
- The wages and allowances used to calculate the contract participation goal shall, with respect to both time-rated and task rated workers, comprise all wages paid and any training allowance paid in respect of agreed training programmes.

PA 2.2.3 Terms and conditions for the engagement of targeted labour

Further to the provisions of clause 3.3.2 of SANS 1914-5, written contracts shall be entered into with targeted labour.

PA 2.2.4 Variations to SANS 1914-5

- The definition for net amount shall be amended as follows:
- Financial value of the contract upon completion, exclusive of any value added tax or sales tax which the law requires the employer to pay the *Contractor*.

Tenderer

Witness 1

Witness 2

Employer

Witness 1

Witness 2



- c) The schedule referred to in 5.2 shall in addition reflect the status of targeted labour as women, youth and persons with disabilities and the number of days of formal training provided to targeted labour.

PA 2.2.5 Training of targeted labour

- a) The *Contractor* shall provide all the necessary on-the-job training to targeted labour to enable such labour to master the basic work techniques required to undertake the work in accordance with the requirements of the contract in a manner that does not compromise worker health and safety.
- b) The cost of the formal training of targeted labour will be funded by the provincial office of the Department of Labour. This training should take place as close to the project site as practically possible. The *Contractor*, must access this training by informing the relevant provincial office of the Department of Labour in writing, within 14 days of being awarded the contract, of the likely number of persons that will undergo training and when such training is required. The employer must be furnished with a copy of this request.
- c) The *Contractor* shall be responsible for scheduling the training of workers and shall take all reasonable steps to ensure that each beneficiary is provided with a minimum of six (6) days of formal training if he/she is employed for 3 months or less and a minimum of ten (10) days if he/she is employed for 4 months or more.
- d) The *Contractor* shall do nothing to dissuade targeted labour from participating in training programmes.
- e) An allowance equal to 100% of the task rate or daily rate shall be paid by the *Contractor* to workers who attend formal training, in terms of (d) above.
- f) Proof of compliance with the requirements of (b) to (g) must be provided by the *Contractor* to the Employer prior to submission of the final payment certificate.

PLI: PARTICULAR SPECIFICATION FOR GENERIC LABOUR-INTENSIVE SPECIFICATION

PLI 1 Scope

This specification establishes general requirements for activities which are to be executed by hand involving the following:

- a) trenches having a depth of less than 1,5 metres

PLI 2 Precedence

Where this specification is in conflict with any other standard or specification referred to in the Scope of Works to this Contract, the requirements of this specification shall prevail.

PLI 3 Hand excavatable material

Hand excavatable material is material:

Granular materials:

- a) *whose consistency when profiled may in terms of table 1 be classified as very loose, loose, medium dense, or dense; or*
- b) *where the material is a gravel having a maximum particle size of 10 mm and contains no cobbles or isolated boulders, no more than 15 blows of a dynamic cone penetrometer is required to penetrate 100 mm.*

Cohesive materials:

- a) *whose consistency when profiled may in terms of table 1 be classified as very soft, soft, firm, stiff and stiff / very stiff; or*

Tenderer

Witness 1

Witness 2

Employer

Witness 1

Witness 2



- b) where the material is a gravel having a maximum particle size of 10 mm and contains no cobbles or isolated boulders, no more than 8 blows of a dynamic cone penetrometer is required to penetrate 100 mm;**

- Note: (1) A boulder, a cobble and gravel is material with a particle size greater than 200 mm, between 60 and 200 mm.
- (2) A dynamic cone penetrometer is an instrument used to measure the insitu shear resistance of a soil comprising a drop weight of approximately 10 kg which falls through a height of 400 mm and drives a cone having a maximum diameter of 20 mm (cone angle of 60° with respect to the horizontal) into the material being used.

Table 1: Consistency of materials when profiled

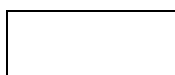
Granular materials		Cohesive materials	
Consistency	Description	Consistency	Description
Very loose	Crumbles very easily when scraped with a geological pick.	Very soft	Geological pick head can easily be pushed in as far as the shaft of the handle.
Loose	Small resistance to penetration by sharp end of a geological pick.	Soft	Easily dented by thumb; sharp end of a geological pick can be pushed in 30 - 40 mm; can be moulded by fingers with some pressure.
Medium dense	Considerable resistance to penetration by sharp end of a geological pick.	Firm	Indented by thumb with effort; sharp end of geological pick can be pushed in up to 10 mm; very difficult to mould with fingers; can just be penetrated with an ordinary hand spade.
Dense	Very high resistance to penetration by the sharp end of geological pick; requires many blows for excavation.	Stiff	Can be indented by thumb-nail; slight indentation produced by pushing geological pick point into soil; cannot be moulded by fingers.
Very dense	High resistance to repeated blows of a geological pick.	Very stiff	Indented by thumb-nail with difficulty; slight indentation produced by blow of a geological pick point.

PLI 4 Trench excavation

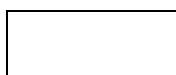
All hand excavateable material in trenches having a depth of less than 1,5 metres shall be excavated by hand.

PLI 5 Compaction of backfilling to trenches (areas not subject to traffic)

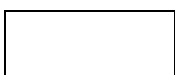
Backfilling to trenches shall be placed in layers of thickness (before compaction) not exceeding 100 mm. Each layer shall be compacted using hand stampers



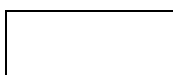
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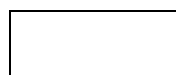
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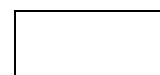
Witness 2



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- a) to 90% Proctor density;
- b) such that in excess of 5 blows of a dynamic cone penetrometer (DCP) is required to penetrate 100 mm of the backfill, provided that backfill does not comprise more than 10% gravel of size less than 10 mm and contains no isolated boulders, or
- c) such that the density of the compacted trench backfill is not less than that of the surrounding undisturbed soil when tested comparatively with a DCP.

PLI 6 Excavation

All hand excavateable material including topsoil classified as hand excavateable shall be excavated by hand. Harder material may be loosened by mechanical means prior to excavation by hand.

The excavation of any material which presents the possibility of danger or injury to workers shall not be excavated by hand.

PLI 7 Clearing and grubbing

Grass and small bushes shall be cleared by hand.

PLI 8 Shaping

All shaping shall be undertaken by hand.

PLI 9 Loading

All loading shall be done by hand, regardless of the method of haulage.

PLI 10 Haul

Excavation material shall be hauled to its point of placement by means of wheelbarrows where the haul distance is not greater than 150 m.

PLI 11 Offloading

All material, however transported, is to be off-loaded by hand, unless tipper-trucks are utilised for haulage.

PLI 12 Spreading

All material shall be spread by hand.

PLI 13 Compaction

Small areas may be compacted by hand provided that the specified compaction is achieved.

PLI 14 Grassing

All grassing shall be undertaken by sprigging, sodding, or seeding by hand.

PLI 15 Stone pitching and rubble concrete masonry

All stone required for stone pitching and rubble concrete masonry, whether grouted or dry, must to be collected, loaded, off loaded and placed by hand.

Sand and stone shall be hauled to its point of placement by means of wheelbarrows where the haul distance is not greater than 150 m.

Grout shall be mixed and placed by hand.

PLI 16 Manufactured elements

Elements manufactured or designed by the *Contractor*, such as manhole rings and cover slabs, precast concrete planks and pipes, masonry units and edge beams shall not individually, have a mass of more than 320 kg. In addition, the items shall be large enough so that four workers can conveniently and simultaneously acquire a proper handhold on them.

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PU: BUILDING WORKS

PU 1 SCOPE

This section of specification deals specifically with the building work associated with the Works.

Other works including brickwork, concrete work, steelwork, mechanical and electrical equipment's, etc, forming part of the building erected in terms of this specification shall conform to the requirements of the relevant standardised or particular specifications referred to in the Project Specification.

PU 2 INTERPRETATIONS

The relevant SANS 1200 Standardised Specifications such as Site Clearance, Earthworks, Earthworks (Pipes Trenches), Concrete (Structural) and Concrete (Small Works) shall also apply to the work under this section. The Standardised Specification for Corrosion Protection and Painting for Civil Engineering Works will also be relevant.

All works to be carried out in accordance with the SABS 10400 and the National Building Regulations Act.

PU 3 MATERIALS

PU 3.1 BRICK AND PLASTERWORK

All materials used for the Building Works shall, where such mark has been awarded for a specific type of material, bear the SANS (SABS) mark.

The contractor will supply all the material required to complete the works.

(a) Bricks

Bricks shall comply with SANS 227 and shall be classified according to their intended use as defined below.

Stock bricks shall be suitable for general building work and shall have a minimum compressive strength of 7 Mpa. Special stock bricks shall have a minimum compressive strength of 17 Mpa. The water absorption of stock bricks shall not exceed 10%.

Satisfactory proof of the load-bearing capacity of the bricks offered shall be submitted before deliveries are made to the Site.

Air bricks shall be well-burnt terracotta and shall be free from cracks and blemishes and lined with copper mosquito gauze.

Three samples of each type of brick shall be submitted to the Engineer for approval. All subsequent deliveries shall be of a standard equal to or better than that of the approved samples.

(b) Cement

Cement shall comply with the requirements of SANS 471 and shall be stored under cover. The use of Portland blast-furnace cement (PBFC), which complies with the requirements of SANS 626 will only be allowed if so specified in the Project Specifications.

(c) Sand

Building sand must comply with SABS 1090 and be well graded and should not contain an excess of dust or other fine material.

(d) Aggregate

Fine aggregate shall be naturally occurring sand or shall consist of crushed rock or gravel, and shall be hard, clean and free from adherent coatings or other deleterious matter. Sand for plaster and mortar shall comply with the requirements of SANS 1090, whereas the aggregates for normal and granolithic floor screeds shall comply with the requirements of BS 1199 and BS 1201 respectively.

(e) Water

Water shall be clean and free from clay, silt, oil, acid, alkali, organic or other matter, which would impair the required strength and durability of the mortar, plaster or floor screed.

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(f) Cement Mortar

Cement mortar will be mixed to a ratio of 1:5 proportion by volume of two bags cement (1 wheelbarrow). Thus 1 wheelbarrow of cement for five builder's wheelbarrows sand.

(g) Wall ties

Wall ties shall be of the galvanised, crimped, single wire type with a 3,5 diameter, and shall comply with the requirements of SANS 28.

(h) Damp-proof sheeting

Damp-proof sheeting shall comply with SANS 248, type FV for fibre felt, or SANS 952, type B for embossed polyethylene sheeting.

PU 3.2 PAINTWORK

(a) Primers

Plastered surfaces must be cleaned down and have one coat of alkali resisting primer of any approved brand applied in strict accordance with the manufacturer's instructions before any undercoat is applied.

Galvanised metal surfaces must be treated with one metal Etch Primer complying with the requirements of SABS 723.

Steel surfaces and doors and steel door frames, before being built in, must have all loose primer together with all rust spots, dirt, etc. removed and be treated with one red oxide zinc chromate primer complying with requirements of SABS 909.

Wood surfaces to receive paint finish must be cleared down, all knots treated with knotting and be primer with Type 1 primer externally and Type 3 wood Primer internally, both complying with the requirements of SABS 678

(b) Emulsion Paints

Emulsion paint for interior use must be Grade 1 Emulsion paint complying with the requirements of SABS 663. Emulsion paint for exterior use must be of the Synthetic Polymer Base Type complying with the requirements of the SABS 634

(c) High Gloss Enamel Paint

High gloss Enamel Paint shall be used on all surfaces other than specified above. High Gloss enamel paint must be Grade 1 paint complying with the requirements of SABS 630 for decorative High Gloss Enamel Paints with a non-Aqueous Solvent Base, for interior and exterior use.

Undercoats for paints, except Emulsion paints, must be Type 1 undercoat paint complying with requirements of SABS 663.

PU 3.3 DOORS, WINDOWS AND GLAZING

(a) Solid Hardwood Doors

Unless it is indicated otherwise on the drawings, all doors shall be solid hardwood doors, manufactured from hardwood complying to SABS 1099.

(b) Pressed steel door frames

If not indicated on drawings the following specifications must be used.

Pressed-steel doors shall be manufactured from 1,6 mm thick steel plate. The doors shall be of standard design, pressed to shape with 40 mm reveals all round. The doors shall be strengthened with full-length vertical V-shaped or other approved sectional strengthening ribs projecting to the outer face. Two horizontal stiffening rails shall also be welded to the inner face of the doors.

A door shall be hung on a pair of 100 mm long steel butt hinges with loose pins. The leaves of the hinges shall be welded to both the door and the door frame, and a 1,6 mm thick steel plate shall be welded to the inner face of the door to protect the lock.

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One leaf of double doors shall be fitted at the top and bottom with approved 150 mm cast brass barrel bolts in an approved manner and the other leaf shall be fitted with a lock, the striking plate of which shall be fixed to the first leaf.

Where indicated on the Drawings, doors shall be fitted with louvred ventilation grills of approved design, backed with insect and vermin-proof gauze screening.

(c) Windows

All steel window frames shall comply with SANS 727 and shall be of the types and sizes shown on the Drawings.

Standard industrial types of steel window frames shall be constructed from rolled mild-steel industrial sections, 35 mm wide by 3 mm thick, with opening sections constructed from standard residential sections, 25 mm wide by 3 mm thick, welded at angles and properly jointed at intersections.

Window frames shall be formed perfectly flat, truly square and properly jointed at all angles, and the opening portion shall fit properly on all faces and shall open and close freely.

Glazing bars shall be continuous with jointed intersections, the ends being neatly tenoned into the frame and securely welded in position.

Frames shall be fitted with standard fixing lugs.

Opening sections shall open as indicated on the Drawings, and shall be fitted with steel hinges with brass pins. Pivots shall be fitted with bronze ring centres.

Side hung or top hung opening sections shall be fitted with brass handles and friction stays. Bottom hung sections shall be fitted with friction pivots and spring catches.

Weather bar drips shall be attached to the fixed frames for the complete width of the window at the head of outward opening sections.

Composite windows may either be delivered completely assembled with mullions and transoms or as separate units for assembly on the Site, but "one-piece" construction is preferred. Cliso type steel window Frames (1.3mm) or similar approved will be used.

(d) Door locks and handles

All door locks shall comply with the requirements of SANS 4 and shall be of approved manufacture and pattern. All locks shall be supplied with two keys. Keys shall be distinctly numbered with consecutive numbers and each key shall be stamped with the same number as that of the lock which it controls. No two locks in any one building may have the same key.

External doors shall be fitted with four-lever heavy-duty mortise locks, which shall be master-keyed.

All locks shall be properly installed and, after completion, striker plates shall be adjusted and the locks serviced.

Door handles shall be of cast zinc of approved manufacture and pattern.

(e) Miscellaneous fittings

All retaining devices for doors and windows as well as fittings such as coat hooks, retaining hooks, etc. shall be of solid brass. All fittings shall be secured by screws or set screws of the same material and finish as the fitting.

Fittings to be fixed to plastered walls, masonry or floors shall be fixed direct by means of patent plastic or fibre plugs fitted into drilled holes.

Door stops shall be provided at every door and shall be 40 mm diameter rubber stops.

(f) Glazing

- Glass area of less than 0.75m² must be 3mm thick;
- All glass more than 0.75m² to be 4mm thick;
- Glass bathroom must be 4mm obscured glass;

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- Glass must comply with SABS 0137;
- Putty shall comply with requirements of SANS 680;
- Defective putty shall be cut out and replaced by the *Contractor's at his/her own expense. Likewise, any broken glass shall be replaced by Contractor's own expense.*

PU 3.4 IRONMONGERY

(a) General

All steel and iron work shall be delivered clean and free from rust, pitting or other defects. Shop priming shall be applied before delivery and shall consist of a coat of red oxide paint, or any other approved anti-rust paint on all surfaces.

Unless otherwise specified, all materials shall conform at least to the appropriate SANS or BS standards where such standards apply to ironmongery, steel, cast iron or any other related materials.

PU 3.5 CARPENTRY AND JOINERY

(a) Materials

All timber used for structural purposes shall be of merchantable grade and shall comply with the requirements of SANS 563 and SANS 1245. Structural timber shall be carefully selected and of the best quality, free from large or dead knots, shakes, wavy edges or other defects. Purlins and bracing shall comply with the requirements of SANS 653. Finger-jointed structural timber shall comply with the requirements of SANS 10096 and laminated timber with the requirements of SANS 1089.

Hardwoods and softwoods for joinery shall comply with SANS 1099 and SANS 1359 respectively and suitable species shall be used for the various purposes.

Unless otherwise specified, all materials shall conform to the appropriate SANS or BS specification where such standards exist for nails, screws, bolts, adhesives, etc.

(b) Preservative treatment

All structural timber shall be given a preservative treatment suitable for the duty for which the timber is intended in accordance with SANS 10005, and no untreated timber shall be used. The preservative treatment shall not impair the final finish. The timber shall be impregnated throughout. When surface coating is specified, the compounds applied on the surfaces of the timber shall form an unbroken film.

(c) Priming

The jointing surfaces of all joints exposed to the weather and built-in portions of frames shall be thickly primed except where adhesives are specified.

Carpentry and joinery items, which are prepared for painting by the manufacturer, shall be knotted and primed before being dispatched to the Site.

Primes surfaces shall be touched up where necessary during the progress of the work or where Site adjustments have been made.

PU 3.6 ROOF SHEETING AND ACCESSORIES

(a) Roof sheeting

Concrete roof tiles or similar approved with SABS (SANS 1783-20). Samples of concrete roof tiles shall be submitted to the Engineer for his/her prior written approval.

(b) Fasteners

Fasteners and washers shall comply with the requirements of SANS 1273, shall be durable, and shall be protected against corrosion to a standard at least equal to the standard of corrosion protection of the

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sheeting material with which they are to be used. Fasteners to be used with fibre-cement sheeting shall be hot-dip galvanised fasteners.

Bolts and rivets used with galvanised sheeting shall be at least 4 mm in diameter, and those used with fibre cement sheeting, at least 6 mm in diameter.

Self-tapping screws and blind rivets may be used for side-stitching and as fasteners for ridging, flashings, etc.

(c) Rain-water goods and flashings

Rain-water goods such as launders, gutters, down pipes, etc. and flashings shall be of the size and materials as scheduled or shown on the Drawings, and the materials shall, if similar, comply with the same requirements as specified for the sheeting. All rain-water goods shall be supplied complete with adequate quantities of suitably shaped brackets and fasteners.

(d) Sealants

Sealants shall comply with the requirements of SANS 110, SANS 1254 or SANS 1305 as applicable or with the sheeting manufacturer's recommendations as approved by the Engineer.

PU 3.7 WATERPROOFING OF CONCRETE ROOFS

Waterproofing for concrete roof slabs shall be approved synthetic rubber or plastic sheet roof covering capable of being fusion welded at joints to provide a homogenous layer over the whole roof area. The sheeting must have fibreglass or similar stretch-resistant backing fully bonded to the sheeting and to be capable of withstanding extreme climatic conditions and to be manufactured in the RSA. It shall furthermore be biologically neutral, resistant to ultra-violet rays and heat, compatible with bitumen and be of a thickness of not less than 2 mm.

PU 3.8 ELECTRICAL CONNECTIONS

Electrical wiring and fittings are to comply with the requirements laid down by:

- (i) The latest issue of the "Standard Regulations for wiring of premises" issued by the South African Institute of Electrical Engineers;
- (ii) The Factories, Machinery and Building Works Act of 1941;
- (iii) The local authorities By-laws and special requirements of the local supply Authority.

PU 3.8 SANITARY EQUIPMENT

(a) Pedestal Water Closet Pans

Pedestal water closed pans shall be of wash-down type approximately 450mm high, of white glazed fireclay or vitreous china, complying with the requirements of the relevant SABS specification.

Pans shall be bedded on the floors in 3:1 cement mortar. Pans shall ne fitted with approved wooden seats with double flap of size and shape required to fit the pans and each attached to pan with non-ferrous metal fixing bolts.

(b) Flushing Cisterns

Closed coupled vitreous china cisterns, no less than 12mm thick in any part, shall be provided complying with the relevant SABS specifications and shall have a capacity of 12 litres and shall be of the valve less symphonic type of approved manufacture.

(c) Hand wash basin

Hand wash basin shall be of the bracket type of white vitreous china, complying with the requirements of the relevant SABS specifications and having overflow, fitted with chromium plated grid.

Unless other wised specified, basins shall be 585 x 430 mm, each fitted with a 38 mm plug and chromium-plated chain, and with 12 mm chromium-plated brass easy clan pattern screw down pillar taps.

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Basins shall be fixed on concealed wall hangers fixed to walls with 6mm brass bolts, 150 mm long.

PU 4 PLANT

Plant, equipment, tools, scaffolding, etc. utilised in building work shall be of suitable capacity, condition and design to ensure the satisfactory and timeous completion of the Works within the specified period and in terms of these specifications and good building practices.

PU 5 CONSTRUCTION

PU 5.1 BRICKWORK, PLASTER WORK AND FLOOR SCREEDS

PU 5.1.1 CONSTRUCTION OF BRICKWORK

(a) Cement mortar

Cement mortar shall consist of 1 part of Portland cement to 5 parts of sand by volume for normal brickwork and 1 part of Portland cement to 3 parts of sand by volume for reinforced brickwork (unless specified otherwise). The ingredients for cement mortar shall be measured in proper gauge boxes on a boarded platform and thoroughly mixed. Alternatively, mixing may be by means of an approved mechanical batch mixer. Only when the dry ingredients have been thoroughly mixed and a mixture of uniform colour has been obtained may the water be added in sufficient quantity to obtain mortar with the required consistency.

Cement mortar shall be used within two hours of adding water to the mix and shall not be used after two hours or if it has begun to set. Mortar shall be turned over frequently until it is used to prevent it from setting.

(b) Brickwork

Dimensions of all the brickwork shall be set out and built as shown on the Drawings. Bricks shall be kept wet before laying and the top of brickwork shall be wetted before any further bricks are laid. Bricks shall be well buttered with mortar before being laid and all joints shall be thoroughly flushed up as the work proceeds. All joints to faced brickwork shall be neatly made and key drawn with a 6 mm key.

Brickwork shall be carried up in a uniform manner with no portion being raised more than 1 m above an adjacent portion. All perpend, quoins, etc. shall be kept strictly true and square and the whole properly bonded together.

Brickwork shall be built in stretcher bond or English bond as shown on the Drawings and bats shall not be used except where required for the bond. All joints shall be 10 mm wide and four courses shall measure 340 mm.

(c) Key for plaster

Joints of all brickwork receiving plaster shall be raked out, or the brick surfaces shall otherwise be prepared with an acrylic slurry or any other approved bonding agent.

(d) Damp-proofing

A damp-proof course shall be laid over the full width of all the walls at a minimum height of 150 mm above the final ground level or wherever else it may be required, and it shall be lapped for at least 150 mm at angles and joints.

Horizontal DPC shall be laid with mortar above and below the membrane, which extends over the full width of the wall including plaster thickness.

(e) General

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Rough and fair cutting shall be performed as required, and the brickwork shall be fitted around any steel work. Face brickwork shall be carefully cut and fitted to suit fittings.

Chases shall be left or formed for edges of concrete flows, staircases, etc. Chases shall also be provided wherever they may be required for pipes, conduits, switch boxes, distribution boards, and the like. Joints shall be raked out for flashings.

PU 5.1.2 Plaster work

(a) A plastered finish may consist of a combination of one or more of the following:

- (i) A single coat or first coat, comprising one application of a 1 : 5 cement : sand mixture with a wood or steel-float finish.

If a first coat, the plaster shall be wood-floated and then scratched, raked or otherwise roughened to provide a mechanical key for the second coat, which shall be applied within 24 hours. Should it be impossible to apply the second coat within 24 hours, the first coat shall be kept moist until the second coat is applied.

- (ii) A second coat comprising one application of a 1 : 5 cement : sand mixture with a wood-float finish.

- (iii) A finishing coat comprising a 1 : 1½ gypsum : sand mixture with a steel-float finish.

(b) Thickness

The total thickness of the plaster finish shall be 10 mm minimum and 20 mm maximum.

(c) Workmanship

All plaster work shall be finished smooth and ready to receive paint. Plaster shall be flush with the faces of all switch and plug boxes, the interiors of which shall be kept free from plaster. Plastered surfaces shall be plumb and jambs and reveals shall be formed square.

The plasterer shall cut out and make good all cracks, blisters and other defects and leave the plaster work, on completion, in a state, which is acceptable to the Engineer.

PU 5.1.2 Floor screeds

Floors are to be power-floated or have a smooth steel-trowelled finish.

(a) Normal screeds

Normal screeds shall have a mix proportion by mass consisting of 1 part of Portland cement and 3 parts of fine aggregate. A minimum amount of water is to be used but it shall be sufficient to allow adequate compaction.

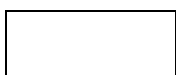
Screeds shall be laid on clean hardened bases, prepared as for granolithic screeds, in panels not exceeding 14 m and shall be steel-trowel led to a true and smooth finish. In monolithic construction the panels shall not exceed 30 m. Joints in screeds shall coincide as closely as possible with joints in the bases. The thickness of screeds shall be as shown on the Drawings or as directed by the Engineer.

The entire screed surface shall be free from loose or raised particles of aggregate, trowel marks or from any irregularities, humps or depressions exceeding 5 mm when measured from a 3 m long straight-edge.

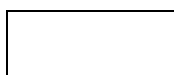
Screeds shall be cured for 3 to 7 days as may be directed by the Engineer, and shall be protected from damage.

No moisture-sensitive floor finish shall be laid on screeds unless a reliable moisture test shows that the screed is sufficiently dry to receive the covering.

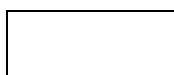
(b) Granolithic screeds



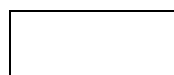
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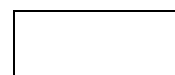
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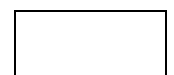
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Granolithic floor screeds shall be composed of 2 parts of Portland cement to 3 parts of aggregate with sufficient water added to obtain a consistency as dry as may be practicable. The screed shall be rendered with a wood float and struck off with a steel trowel after set has commenced.

The granolithic mixture shall be floated onto the concrete floor slab within 12 hours of the latter having been laid. Where this cannot be done within 12 hours, the concrete surfaces shall be thoroughly hacked, cleaned, watered and treated with an approved cement slurry or with an approved bonding agent, as may be directed before the granolithic screed is laid.

Where a tinted granolithic screed is specified, it shall be placed in two layers, a lower layer placed to within 6 mm of the finished level and an upper layer into which the pigment has been mixed. No dusting on of colouring material will be allowed.

The surface of all granolithic screeds shall be kept damp for a period of at least 7 days after laying by covering it with polyethylene sheeting or by thickly covering it with wet sand, sawdust or Hessian kept moist by frequently sprinkling it with water.

The granolithic screeds shall be not less than 20 mm thick, finished to falls as shown on the Drawings, and shall be laid in panels not exceeding 6,0 m. Thresholds shall be finished with granolithic screeds 25 mm thick, treads 25 mm thick, and risers 20 mm thick, including rounded nosing and readings.

Edges next to walls shall be finished with projecting skirting, 75 mm high, with rounded top edges, unless otherwise specified or instructed by the Engineer.

PU 5.2 INSTALLATION OF DOORS AND WINDOWS

(a) General

All built-in door and window frames shall be set straight, plumb and level, and shall operate to the satisfaction of the Engineer after fixing has been completed.

Fittings shall be either removed, or wrapped and protected from damage, until all rough trades have been completed.

(b) Reinforced Brick Lintols

Brick lintols are to be built of normal, sound, well burnt, good quality bricks, similar to be facing where exposed properly bonded longitudinally, bedded and pointed in cement mortar as described. Special care must be taken to ensure solid bedding, particularly where the reinforcement occurs.

The Lintols are to be reinforced with straight continuous mild steel rods of the size and number scheduled. The rods must each extend 300mm on each side of the opening and are to be evenly spaced across its thickness in the first horizontal joint above the soffit.

PU 5.3 GLAZING

Glass shall be cut in panes to suit all glazed openings with sufficient clearance all round to prevent cracking by expansion, contraction or vibration.

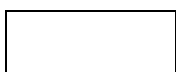
In all cases the glass shall be well bedded and back-puttied and installed as specified in SANS 10137.

All putty shall be carefully trimmed, cleaned off and neatly finished off straight with smooth surfaces and sharp mitres. A paint primer shall be applied as soon as the putty has dried out sufficiently to prevent shrinkage cracks from forming.

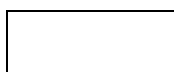
The entire glazing operation shall be cleaned before the premises are handed over for occupation.

PU 5.4 ROOFING

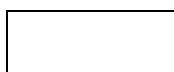
(a) Timber roof construction



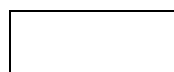
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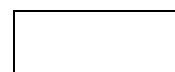
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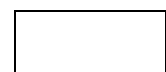
Witness 2



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The plates, joists, rafters, purlins, brandering and other pieces used for the construction of the roof and trusses shall be of the dimensions, spacing and construction, as shown on the Drawings.

All the joints in the framework shall be of the most appropriate type, accurately formed and adequately secured with fasteners as specified.

Roof will consist of six prefabricated timber(or similar approved) trusses at 20 degrees, at max 760mm centres on 114x38mm timber wall plates fixed with approved 40mm serrated galvanised clout nails.

(b) Roof tiles

Tapered ridge tiles to have 1:3 cement mortar mix at over laps and to be laid in full (cutting is not allowed)

Matching tapered verge tiles or barge boards to the gable ends and fascia boards to the eaves end of roof and nailed with 40 mm serrated galvanized clout nails.

(c) Securing of roofing

Trusses to be tide down with 2 strands of 4 mm galvanized roof wire anchors built-in 6 courses deep into walls tied over a nail in purlin.

Storm clips on the bottom 2 rows on both eaves

(d) Waterproofing of concrete roofs

The sheeting shall be properly glued down and shall be turned up against parapets and properly flashed, sealed and dressed down into outlets and flashed around all protrusions all as shown on the Drawings.

On completion the entire surface area of the waterproofing shall be given two coats of a reflective paint compatible with the waterproofing material.

The entire waterproofing installation must be carried out by specialists, who have been appointed by the manufacturer and the work must be guaranteed against any defects in material and/or workmanship for a period of ten years. Should any leaks become apparent during this time, the Contractor must undertake to have same repaired without delay.

PU 5.5

JOINERY WORKS

(a) Scope of work

Joinery work shall consist of the manufacture, delivery to the Site, and fixing in the buildings, of all joinery shown on the Drawings.

Except where a special finish is specified, the Contractor shall have all stairs, landings, doors, shelves and other joinery work cleaned and scrubbed down and shall leave all his work in a good order to the satisfaction of the Engineer.

(b) Dimensions

All “wrought” timber shall be sawn, planed, drilled or otherwise machined or worked to the correct sizes and shapes shown on the Drawings.

Reasonable tolerance shall be provided at all connections between joinery works and the building structure to compensate adequately for any irregularities, settlements or any other movements.

(c) Joints

Where joints are not specifically indicated, they shall be the recognised forms of joints for each position. The joints shall be so made as to comply with Part 2 of BS 1186.

(d) Doors and frames

Door frames, linings, panel doors, framed, ledged and braced doors, flush doors, sliding doors, etc. shall be supplied or made by the joiner and shall be installed, fitted or hung as detailed on the Drawings.

All timber shall be “wrought” and prepared for oiling, staining, varnishing or painting.

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(e) Skirting, cornices, etc.

Skirting, cornices, etc. shall not be installed until after the wall coverings have been applied, the flooring laid and ceilings installed, unless otherwise specified.

(f) In situ joinery

In situ joinery work shall not be executed until after all floor, wall and ceiling surfaces have been formed or constructed, unless otherwise instructed.

(g) Ceilings

Ceilings will be constructed with the following specifications

- Ceilings as per SANS 10400XA will be installed.
- A minimum of 2.5m ceiling height
- 6.4mm Gypsum board ceiling with aerolite insulation to be fitted on 38x38mm, SA pine branderling at 450mm C/C, painted white, with 75mm standard cornice painted white fitted with Rhino bed.
- Will include a 900x900mm standard trap door.

PU 5.5 PAINTWORKS

All surfaces not being painted, such as face brickwork, sills, floors and stained woodwork, must be covered up and protected against paint and distemper spots before any painting is commenced. All floors must be swept clean and walls dusted down before any paintwork is commenced and sweeping of dusting must be done while painting is in progress.

All plastered wall; ceiling and similar surfaces must be perfectly dry and in a fit state to receive the finishing, before the work is put in hand.

All coats of paints, etc. must be thoroughly dry before subsequent coats are applied, and rubbed down where necessary.

All work must be finished to colours approved by Engineer.

The tints of undercoats must approximate those of the finishing colour and in order to indicate the number of coats applied and to avoid misses when applying a succeeding coat with a slight difference shall be made in the tint of each coat.

The *Contractor* must provide all necessary dust sheets, covers, etc. and shall exercise all necessary care to prevent marking the surfaces of joinery, walls, floors, glass and electrical fitting, etc. and must keep all parts of the work perfectly clean and free at all times from spotting, accumulating of rubbish, debris or dirt arising from the painting operations. Any surface disfigured or otherwise damaged must be completely renovated or replaced as necessary, by the *Contractor* at his own expense. The premises must be left clean and fit for occupation at the completion of the Work.

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PU 6 TOLERANCES

Where tolerances are not specified in the clauses above those generally accepted at representing good workmanship in the building trades shall apply.

PU 7 TESTING

The Engineer reserve the right to order any tests, whether at place of manufacturing or on site, necessary to evaluate the quality of the work and to ensure the finished building conforms to all the specified requirements.

PU 8 MEASUREMENT AND PAYMENT

The Total amount payable for each structure will be received at four different milestones. At the completion and engineer approval of this milestone a certain percentage will be paid to the *Contracture*. The milestone are as follows:

- Milestone one: For the construction of foundations the *Contractor* will receive 20% of the total unit cost.
- Milestone two: For the construction of wall plates the *Contractor* will receive 30% of total unit cost.
- Milestone three: For the construction of roofing the *Contractor* will receive 20% of the total unit cost.
- Milestone four: For the completion of top structure the *Contractor* will receive 30% of the total unit cost.

C3.4.1.1 Certification by recognized bodies

No certification by any body other than the *Principal Agent* will be accepted for any work to be included in the permanent works.

C3.4.2 PLANT AND MATERIALS

C3.4.2.1 Plant and materials supplied by the *Employer*

No plant or material will be supplied by the *Employer*. It is the responsibility of the *Contractor* to supply all plant and material required to complete the scope of work.

C3.4.2.2 Materials, samples and shop drawings

All material used in the *Works* shall, where such mark has been awarded for a specific type of material, bear the official mark of the SABS (SANS). Written proof shall be obtained from the *Principal Agent* for any materials not bearing the official mark of the SABS (SANS).

Samples shall not be submitted in support of tenders unless called for in the tender specifications. The *Contractor* shall furnish without delay, such samples and/or certificates as called for or may be called for by the *Principal Agent*. Materials and/or workmanship not corresponding with approved samples may be rejected.

Such samples shall be supplied by a bidder at his own expense and risk and the *Employer* shall not be obliged to pay for such samples. The *Employer* reserves the right no to return such samples and to dispose of them at its discretion.

C3.4.3 CONSTRUCTION EQUIPMENT

C3.4.3.1 Requirements for equipment

The *Contractor* has to supply all the necessary tools and equipment to complete the work as set out in the scope of works and insure that all tools and equipment comply with the safety standard in order to ensure that equipment can be used safely by employees.

C3.4.3.2 Equipment provided by the *Employer*

No equipment will be provided by the *Employer*.

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C3.4.4 EXISTING SERVICES

C3.4.4.1 Known services

Existing services that may be affected by the *Works* are indicated on the general layout drawings. The information regarding existing services given on the drawings are given in good faith without any guarantee.

The *Contractor* shall take all the necessary steps to ascertain the location of existing services before commencing any section of the *Works* and shall exercise the greatest care when working in the vicinity of such services.

The *Contractor* shall complete his investigations and submit his report as provided for in Clause 5.2 SABS 1200 AA not less than one week before commencing his operations in any particular area.

The *Contractor* shall take all necessary steps to protect any existing services and works against damage, which may arise as a result of his operation on Site. The *Contractor* shall bear the cost of the repair of damage to any service, the possible existence of which could reasonably have been ascertained by him in good time.

C3.4.4.2 Treatment of existing services

After locating the exact position of services, whether indicated on the drawings or not, such services shall be deemed to be known services and the *Contractor* shall be liable for all costs and subsequent costs arising from the damage thereof as a result of the *Contractor's* activities. These services must also be indicated on the "As Built" drawings.

All services must be located and opened for inspection by the *Principal Agent* before commencing trench excavation. Any costs or losses suffered by the *Contractor* as a result of not abiding by this specification will be for the *Contractor's* account.

Where work is to commence in the vicinity of main services (Electrical, G.P.O. etc.) an excavation certificate must be obtained from the Local authority prior to any excavations starting.

C3.4.4.3 Use of detection equipment for the location of underground services

The *Contractor* may make use of any means deemed necessary to locate underground services. The *Contractor* may liaise with the owner of the service to ascertain the availability of detection equipment for the location of underground services.

C3.4.4.4 Damage to services

The *Contractor* will be responsible to repair and reinstate services and structures damaged during the construction process.

The *Contractor* shall take all the necessary steps to ascertain the location of existing services before commencing any section of the *Works* and shall exercise the due diligence when working in the vicinity of such services.

C3.4.4.5 Reinstatement of services and structure damaged during construction

The *Contractor* shall reinstate the service and/or structure damaged during construction to its original state. Any disruption in service caused by the damage shall be restored before 4pm on the day of damage.

Where the *Contractor* is responsible for the cost of repairs carried out by the *Employer* or an outside Authority, the costs will be recovered by means of a deduction from the *Contractor's* monthly payment certificate. The *Employer* will attend to the payment of monies due to outside authorities.

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C3.4.5 SITE ESTABLISHMENT

C3.4.5.1 Service and facilities provided by the *Employer*

A specific area in close proximity to or on the Site of the Works will be made available by the *Employer* to the *Contractor* for the *Contractor's* site establishment. The specific area for the *Contractor's* site establishment will be identified to the *Contractor* by the *Principal Agent* and the *Contractor* shall have sole use of such area, free of charge, for the duration of the Contract. The *Contractor* shall use this area only for the purposes of erecting his site offices, workshops, stores and other facilities required for the execution of the Contract. The *Contractor* shall not use the area nor allow it to be used for any purposes not directly associated with the execution of the Contract.

The *Contractor* shall be responsible for arranging, at his own cost, for the provision of all services he may require in the area, as well as elsewhere on the Site.

Should the *Contractor* deem the area made available by the *Employer* to be inadequate or unsuitable for the *Contractor's* particular needs, then the *Contractor* shall be at liberty to make his own arrangements with the owners of other sites which he considers are better suited to his needs; provided always that the use by the *Contractor* of any area other than that made available to him by the *Employer* shall be subject to the prior written approval of the *Principal Agent*, which approval shall not be unreasonably withheld; and provided further that the *Contractor* shall have no claim against the *Employer* in respect of any costs incurred by him, either directly or indirectly in consequence of utilising any area other than that made available to him by the *Employer*, and which costs exceed those costs allowed for by the *Contractor* in his Bid.

C3.4.5.2 Facilities provided by the *Contractor*

(a) Facilities for the *Principal Agent*

The *Contractor* shall provide on the Site, for the duration of the Contract and for the exclusive use of the *Principal Agent* and/or his Representative (as applicable), the various facilities described hereunder. All such facilities shall be provided promptly on the commencement of the Contract and failure on the part of the *Contractor* to provide any facility required in terms of this specification shall constitute grounds for the *Principal Agent* to withhold payment of the *Contractor's* bid Preliminary and General items until the facility has been provided or restored as the case may be.

(i) Office accommodation

Office accommodation for the *Principal Agent* is required. The minimum requirements for this office is prescribed in PSA 8.4.2.1(a).

The *Principal Agent* may elect to provide his own offices, in which case the amount provided in the bill of quantities will be payable to the *Principal Agent* by the *Contractor*.

The *Principal Agent* and his Representative shall be allowed free use of all the *Contractor's* site facilities.

(ii) Site meeting venue

The *Contractor* shall provide within his own site establishment facilities, a suitably furnished office or other venue capable of comfortably accommodating a minimum of twenty (20) persons at site meetings. The *Principal Agent* shall be allowed free use of such venue for conducting any other meetings concerning the Contract at all reasonable times.

(iii) Contract nameboards

One contract nameboard shall be erected for this contract. Due to the nature of this project the *Principal Agent* shall take responsibility for the erection of the contract nameboard, which nameboard shall, unless otherwise specified elsewhere in the Contract, comply with

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the recommendations for the standard board of the South African Association of Consulting Engineers, with regard to size, painting, decorating and detail, and the requirements described hereunder. Payment for this item will be according to PSA 8.3.2.1(c) in the Particular Specification.

Each nameboard shall be made of tempered hardboard with a thickness of at least 12 mm, so braced on the reverse side as to prevent warping and shall be mounted on two or more, as necessary, firmly planted poles. The painting of the boards shall comply with the relevant requirements of CKS 193 and the colours of the paints shall be an acceptable match to the applicable colours given in SABS 1091.

The *Contractor* shall remove the contract nameboard on completion of the contract.

(iv) *Survey equipment and assistants*

The *Contractor* shall provide for use during this contract to the *Principal Agent* Survey equipment and assistants for the duration of the Contract. Payment for this item shall be according to the provisions of Clause B1406 in the Particular Specification.

The *Contractor* shall provide all pegs, concrete, tools and other necessary items as well as all necessary labour for excavation, bush clearing, mixing and placing of concrete, as and when required for the control of the setting out of the *Works*.

(v) *Telephone facilities*

The *Contractor* shall provide on Site for the duration of the Contract, the following telephone facilities for the use of the *Principal Agent* and his Representative:

⊕ Telkom telephones

Telkom telephones are not required for this contract.

⊕ Cell phones

The *Principal Agent* and his representatives will make their own arrangements for the provision of a cell phone for the duration of the Contract. A provisional sum will be allowed in the bill of quantities for the provision of a cellular phone based communication system for the use between the *Principal Agent's* personnel and the contractor's personnel by the *Principal Agent's* personnel.

The provision of the cellular phone based communication system for the Contractor's personnel should be included in the amount tendered for 13.01(c)

(vi) *Site instruction book*

Each *Contractor* shall keep a triplicate book for site instructions on the Site at all times.

(b) Water

The *Contractor* shall, at his own expense, be responsible for obtaining and distributing all water as may be required for the purposes of executing the Contract, including water for both construction purposes and domestic use, as well as for making all arrangements in connection therewith. The *Contractor* shall further, at his own expense, be responsible for providing all necessities for procuring, storing, transporting and applying water required for the execution of the Contract, including but not limited to all piping, valves, tanks, pumps, meters and other plant and equipment, as well as for all work and superintendence associated therewith.

The sources of all water utilised for the purposes of the Contract shall be subject to the prior approval of the *Principal Agent*, which approval shall not be unreasonably withheld.

The *Contractor* shall comply with all prevailing legislation in respect of drawing water from natural and other sources and shall, when required by the *Principal Agent*, produce proof of such compliance. The distribution of water shall be carried out by the *Contractor* strictly in accordance with the applicable laws and regulations.

All water provided by the *Contractor* for construction purposes shall be clean, free from undesirable concentrations of deleterious salts and other materials and shall comply with any

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further relevant specifications of the Contract. The *Contractor* shall, whenever reasonably required by the *Principal Agent*, produce test results demonstrating such compliance. Water provided by the *Contractor* for human consumption shall be healthy and potable to the satisfaction of the health authorities in the area of the Site.

No separate payment will be made to the *Contractor* for the obtainment, distribution and consumption of water, the costs of which will be deemed to be included in the Contractor's bid rates.

(c) Electricity

The *Contractor* shall, at his own expense, be responsible for obtaining and distributing all electricity as he may require for the purposes of executing the Contract, including electricity for both construction purposes and domestic use, as well as for making all arrangements in connection therewith.

The distribution of electricity shall be carried out by the *Contractor* strictly in accordance with the applicable laws and regulations.

No separate payment will be made to the *Contractor* for the obtainment, distribution and consumption of electricity, the costs of which will be deemed to be in the Contractor's bid rates and prices.

(d) Excrement disposal

The *Contractor* shall, at his own expense, be responsible for safely and hygienically dealing with and disposing of all human excrement and similar matter generated on the Site during the course of the Contract, to the satisfaction of the responsible health authorities in the area of the Site and the *Principal Agent*. All such excrement shall be removed from the Site and shall not be disposed of by the *Contractor* on the Site.

The *Contractor* shall further comply with any other requirements in this regard as may be stated in the Contract.

No separate payment will be made to the *Contractor* in respect of discharging his obligations in terms of this sub clause and the costs thereof shall be deemed to be included within the Contractor's bid Preliminary and General items.

C3.4.5.3 Storage and laboratory facilities

It is within the Contractor's discretion to erect suitable storage and laboratory facilities.

A separate laboratory for the *Principal Agent* will not be required. The *Contractor* must provide facilities to execute all test required in terms of the SANS Specification or any test prescribed in the Project Specification.

All site facilities provided must conform to the Occupation Health and Safety Act.

It will be to the Contractor's advantage to make provision for security control of his campsite and Site Works, as no claims for loss or damage to property or constructed work will be considered.

C3.4.5.4 Vehicles and equipment

No specific requirement for vehicles, computers or office furniture for the use by the *Employer* or his agents. Cognisance should be taken of the requirement as described under Item C3.4.5.2.

C3.4.5.5 Advertising rights

The *Contractor* shall not be allowed to erect any advertisement board other than the official contract notice board on site.

C3.4.5.6 Notice boards

Cognisance should be taken of the requirement as described under Item C3.4.5.2.

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C3.4.6 SITE USAGE

The Site allocated to the *Contractor* may be used for the duration of the Contract. The *Contractor* shall return the site in the same condition as obtained at the point of taking possession of the site. Please take note that no construction debris may be disposed of on site.

C3.4.7 PERMITS AND WAY LEAVES

The *Contractor* shall be responsible to obtain all the permits required under this Contract. Payment in this regard shall be deemed covered in the preliminary and general items.

C3.4.8 ALTERATIONS, ADDITIONS, EXTENSIONS AND MODIFICATIONS TO EXISTING WORKS

The *Contractor* shall use only the dimensions stated in figures on the Drawings in setting out the *Works*, and dimensions shall not be scaled from the Drawings, unless required by the *Principal Agent*. The *Principal Agent* will, on the request of the *Contractor* in accordance with the provisions of the Conditions of Contract, provide such dimensions as may have been omitted from the Drawings.

C3.4.9 INSPECTION OF ADJOINING PROPERTIES

Sufficient photos of existing structures, walls and areas that have to be crossed must be taken by the *Contractor* and handed over to the *Principal Agent* before such operations commence. No payment will be made in this regard and it shall be deemed covered in the preliminary and general items.

C3.4.10 SURVEY CONTROL AND SETTING OUT OF THE WORKS

Setting out of the *works* is the sole responsibility of the *Contractor* and shall be done according to the provisions of B1206.

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