TENDER DOCUMENT

FOR

BID NO: NDOHF01/2019-2020 – SILOAM HOSPITAL UPGRAADING OF MENTAL HEALTH WARD AND MORTUARY PHASE 2

TENDERING PROCEDURES

VOLUME 2

PREPARED FOR:
National Department of Health
Civitas Building
222 Thabo Sehume Street
Pretoria
0001

PREPARED BY:
Sakhiwo Health Solutions
980 Jan Shoba,
Brooklyn,
Pretoria,
0181

NAME OF TENDERER: ______________________________________

CRS NUMBER: ____________________________________________

__________________________________________________________

MAY 2019

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C1.3 CONSTRUCTION GUARANTEE
NATIONAL DEPARTMENT OF HEALTH

SILOAM HOSPITAL UPGRADING OF MENTAL HEALTH WARD AND MORTUARY PHASE 2

C1.3 Construction Guarantee

GUARANTOR DETAILS AND DEFINITIONS

Guarantor means ....................................................................................................................

... Physical address .................................................................................................................

... Guarantor's signatory 1 ............................ Capacity ............................................................

... Guarantor's signatory 1 ............................ Capacity ............................................................

Employer means Government of the Republic of South Africa in its National Department of Health

Contractor means ..................................................................................................................

... Agent means Sakhiwo Health Solutions

Works means SILOAM HOSPITAL UPGRADING OF MENTAL HEALTH WARD AND MORTUARY PHASE 2

Site means Portion 1 of the farm Siloam No. 199 – MT, Siloam Village, Makhado

Agreement means the JBCC Series 2000 Principal Agreement

Contract Sum i.e. the total of prices in the Form of Offer and Acceptance inclusive of VAT

Amount in figures R ..................................................

Amount in words ....................................................................................................................

(Rand) Guaranteed Sum means the maximum aggregate amount of R ..................................

Amount in words ....................................................................................................................

(Rand)
The Guarantor's liability shall be limited to the amount of the Guaranteed Sum as follows:

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<td>Maximum Guaranteed Sum (not exceeding 10% of the contract sum) in the amount of:</td>
<td>From and including the date of issue of this Construction Guarantee and up to and including the date of the only practical completion certificate or the last practical completion certificate where there are sections, upon which this Construction Guarantee shall expire.</td>
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The Employer shall have the absolute right to arrange his affairs with the Contractor in any manner which the Employer deems fit and the Guarantor shall not have the right to claim his release from this Guarantee on account of any conduct alleged to be prejudicial to the Guarantor.

The Guarantor chooses the physical address as stated above for all purposes in connection herewith.

This Guarantee is neither negotiable nor transferable and shall expire in terms of clause 1, or payment in full of the Guaranteed Sum or on the Guarantee expiry date, whichever is the earlier, where after no claims will be considered by the Guarantor. The original of this Guarantee shall be returned to the Guarantor after it has expired.

This Guarantee, with the required demand notices in terms of clauses 3 or 4, shall be regarded as a liquid document for the purpose of obtaining a court order.

Where this Guarantee is issued in the Republic of South Africa the Guarantor hereby consents in terms of Section 45 of the Magistrate's Courts Act No 32 of 1944, as amended, to the jurisdiction of the Magistrate's Court of any district having jurisdiction in terms of Section 28 of the said Act, notwithstanding that the amount of the claim may exceed the jurisdiction of the Magistrate's Court.

Signed at .................................................. Date ...........................................

Guarantor’s Signatory 1 ....................................... Guarantor’s Signatory 2 ..................................

Identity number ............................................. Identity number ..................................

Witness 1 .................................................. Witness 2 ........................................

Guarantor’s seal or stamp
PART C2: PRICING DATA
C2.1: PRICING INSTRUCTIONS

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C2.1 Pricing Instructions

1. The Bills of Quantities have been drawn up in accordance with the Standard System of Measuring Building Work as amended) published and issued by the Association of South African Quantity Surveyors (Sixth Edition (Revised)), 1999. Where applicable the:
   a) civil engineering work has been drawn up in accordance with the provisions of the latest edition of SABS 1200 Standardised Specifications for Civil Engineering Works.
   b) mechanical work has been drawn up in accordance with the provisions of the latest edition of SABS 1200 Standardised Specifications for Mechanical Engineering Works.
   c) electrical work has been drawn up in accordance with the provisions of the latest edition of SABS 1200 Standardised Specifications for Electrical Engineering Works.

2. The agreement is based on the JBCC Series 2000 Principal Building Agreement, prepared by the Joint Building Contracts Committee, Edition 4.1, 2005. The additions, deletions and alterations to the JBCC Principal Building Agreement as well as the contract specific variables are as stated in the Contract Data. Only the headings and clause numbers for which allowance must be made in the Bills of Quantities are recited.

3. Preliminary and general requirements are based on the preliminaries for the use of JBCC Series 2000 – Third Addition – January. Only the headings and clause numbers for which allowance must be made in the Bills of Quantities are recited.

4. It will be assumed that prices included in the Bills of Quantities are based on Acts, Ordinances, Regulations, By-laws, International Standards and National Standards that were published 28 days before the closing date for tenders. (Refer to www.stanza.org.za or www.iso.org for information on standards).

5. The drawings listed in the Scope of Works used for the setting up of these Bills of Quantities are kept by the Principal Agent or Engineer and can be viewed at any time during office hours up until the completion of the works.

6. Reference to any particular trademark, name, patent, design, type, specific origin or producer is purely to establish a standard for requirements. Products or articles of an equivalent standard may be substituted.

7. The bills of quantities forms part of and must be read and priced in conjunction with all the other documents forming part of the contract document, The Standard Conditions of Tender, Conditions of Contract, Specifications, Drawings, “Department of Public Works: Specifications of Materials and Methods to be used – PW371” and all other relevant documentation.

8. Where any item is not relevant to this specific contract, such item is marked N/A (signifying "not applicable")
The Contract Data and the standard form of contract referenced therein must be studied for the full extent and meaning of each and every clause set out in Section 1 (Preliminaries) of the Bills of Quantities.

The Bills of Quantities is not intended for the ordering of materials. Any ordering of materials, based on the Bills of Quantities, is at the Contractor's risk.

The amount of the Preliminaries to be included in each monthly payment certificate shall be assessed as an amount prorated to the value of the work duly executed in the same ratio as the preliminaries bears to the total of prices excluding any contingency sum, the amount for the Preliminaries and any amount in respect of contract price adjustment provided for in the contract.

Where the initial contract period is extended, the monthly charge shall be calculated on the basis as set out in 11 but taking into account the revised period for completing the works.

The amount or items of the Preliminaries shall be adjusted to take account of the theoretical financial effect which changes in time or value (or both) have on this section. Such adjustments shall be based on adjustments in the following categories as recorded in the Bills of Quantities:

a) an amount which is not to be varied, namely Fixed (F)
b) an amount which is to be varied in proportion to the contract value, namely Value Related (V); and
c) an amount which is to be varied in proportion to the contract period as compared to the initial construction period excluding revisions to the construction period for which no adjustment to the contractor is not entitled to in terms of the contract, namely Time Related (T).

Where no provision is made in the Bills of Quantities to indicate which of the three categories in 13 apply or where no selection is made, the adjustments shall be based on the following breakdown:

a) 10 percent is Fixed;
b) 15 percent is Value Related
c) 75 percent is Time Related.

The adjustment of the Preliminaries shall apply notwithstanding the actual employment of resources in the execution of the works. The contract value used for the adjustment of the Preliminaries shall exclude any contingency sum, the amount for the Preliminaries and any amount in respect of contract price adjustment provided for in the contract. Adjustments in respect of any staged or sectional completion shall be prorated to the value of each section.

The tender price must include Value Added Tax (VAT). All rates, provisional sums, etc. in the bills of quantities must however be net (exclusive of VAT) with VAT calculated and added to the Total Value thereof in the Final Summary.
C3.1: SCOPE OF WORKS
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C3.1 SCOPE OF WORKS

The works will consist of the reconfiguration and renovations, including electrical, mechanical and external works on a number of existing buildings as listed below:

1. **Temporary Female Mental Health decanting facility**
   
   Minor renovations to a section of an existing building (± 110m²).

2. **Temporary Male Mental Health decanting facility**
   
   Minor reservations and alterations of an existing building (± 170m²) and new addition of ± 60m².

3. **Existing mortuary block and temporary cold room**
   
   Temporary steel structure canopy to accommodate temporary container tyre cold room. Renovations and upgrading of existing mortuary including cold room electrical, mechanical installation.

4. **Existing Mental Health Block**
   
   Major renovations and upgrading of existing buildings (±1290 m²) and new addition of (± 60 m²) including electrical, Mechanical and IT and Security installation.

5. **External work**
   
   Demolition of two houses with outbuildings.
   Minor earthworks and paving.
   Minor upgrading of external sewer, water and stormwater.

A. **Sequence of construction**

The tenderer shall notice the following will apply:

**A.1 Mortuary and Temporary Cold Room:**

The temporary cold room shall be constructed and commissioned first before the work can commence on the mortuary building.

**A.2 Mental Health Ward, Male Decanting facility and Female Decanting Facility:**

It is a requirement that work on both the temporary male and female decanting facilities shall be completed and commissioned, the patients moved out of the Mental Health Facility before renovations of the Main Mental Health building can start.
B. Programming

The programming of the project must take into account that the temporary facilities must be completed and commissioned before work can commence on the existing buildings.

C. Restrictions and Constraints

C.1 Noise completion of the project is urgent and work shall be executed during normal working hours i.e. 7h00 until 17h00 daily including weekends. Work required to be executed outside of these hours must be arranged with the Facilities Manager and the Chief Executive of the hospital, in advance.

C.2 Noise must be kept to a minimum and within acceptable levels at all times. All shut-offs and tie/cut-ins to existing services must be arranged in advance with the Facilities Manager and a methodology with appropriate mitigation of risks must be prepared by the contractor and submitted to the relevant Professional discipline in advance, for approval.

C.3 Dust emanating from the work site must be controlled.

D. Operational Protocols

D.1 Security is a priority and the site shall be kept safe at all times.

D.2 The approved Health and Safety plan shall be adhered to at all times.

D.3 All staff members of the contractor shall wear PPE at all times.

D.4 All staff members of the contractor shall be specifically identifiable at all times and to this end shall wear a predetermined colored overall to be able to enter and work on the site.

D.5 Regular meetings, the frequency of which is to be determined, shall be held with the management of the hospital to ensure a cohesive spirit of co-operation at all times.

Access

Prospective bidders are to fully familiarize themselves with the site and access to the site.

List of drawings used to compile the Bill of Quantities

Architect drawings:

Q-010-001 + 004; Q-011-001; Q-013-001; Q-014-001; Q-020-001 + 002; Q-030-001; Q-060-001; Q-070-001; Q-100-001; U-010-001 + 003; U-011-001; U-013-001; U-014-001; U-020-001; U-030-001; U-060-001; W-010-001 + 002; W-011-001; W-013-001; W-014-001; W-020-001; W-030-001; W-060-001; X-010-001; X-011-001; X-013-001
C3.2: PROJECT SPECIFIC HEALTH AND SAFETY SPECIFICATION
National Department of Health

Occupational health and safety specification for the Siloam District Hospital: Phase 2 – Upgrade of Mortuary and Psychiatric Ward

Proudly prepared by

EMPOWERisk (Pty) Ltd

October 2018
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OCCUPATIONAL HEALTH AND SAFETY SPECIFICATION FOR THE SILOAM DISTRICT HOSPITAL: PHASE 2 – UPGRADE OF MORTUARY AND PSYCHIATRIC WARD

1. Definitions

In this document the following expressions shall bear the meanings assigned to them below:

1.1 **Client** means any person for whom construction work is being performed and/or undertaken [i.e. National Department of Health for purposes of this specification];

1.2 **Construction Regulations** means the Occupational Health and Safety Act’s, No 85 of 1993, new Construction Regulations that came into effect on 01 March 2014;

1.3 **Occupational health and safety plan** means a sufficiently documented plan to the standards of the Client, which addresses hazards identified and includes safe working procedures to mitigate, reduce or control the hazards identified;

1.4 **Occupational health and safety specification** means a documented specification of all health and safety requirements pertaining to the associated works on a construction site, so as to ensure the health and safety of persons working, visiting, passing, staying and/or working close to the construction site and/or other applicable areas such as site camp;

1.5 **OHSACT** means the Occupational Health and Safety Act, No 85 of 1993, as amended; and

1.6 **Principal Contractor** means an employer, as defined by Section 1 of the OHSACT who performs construction work and is appointed by the Client to be in overall control and management of the construction site and works.

2. Introduction

In terms of Construction Regulation 5(1)(b) of the OHSACT, the Client is required to compile an occupational health and safety specification for any intended project and provide such specification to prospective tenderers/bidders.

This specification has as objective to ensure that the principal contractor entering into a contract with the Client achieves and maintain an acceptable level of occupational health and safety performance and compliance. This document forms an integral part of the contract between the Client and the principal contractor and the principal- and other contractors should make it part of any contract/s that they may have with other contractors and/or suppliers as far as this project is concerned.

Compliance with this document does not absolve the principal contractor from complying with any other minimum legal requirements and the principal contractor remains responsible for the health and safety of his employees, those of his mandatories as well as any persons coming on site or on adjacent properties as far as it relates to the construction activities.
3. **Scope**

To develop a project specific occupational health and safety specification that addresses the reasonable and foreseeable risks, exposures and aspects of occupational health and safety as affected by the abovementioned contract work.

The specification will provide the requirements that the principal contractor and other contractors will have to comply with in order to reduce the risks associated with the abovementioned contract work and that may lead to incidents causing injury and/or ill health, to a level as low as reasonably practicable and possible.

Any contractor interested in submitting a bid in response to the Client’s formal tender for any construction project, has to prepare and include a draft occupational health and safety plan based on this specification and the OHSACT in its tender submission. The Client will evaluate this plan as part of its formal tender adjudication processes to ensure compliance with Construction Regulation 5 that stipulates that the Client may only appoint a contractor who has the necessary competencies and resources to carry of the work appointed for safely.

4. **General occupational health and safety provisions**

4.1 **Hazard identification and risk assessment (Construction Regulation 9)**

4.1.1 **Risk assessments**

Annexure 5 of this specification contains a list of risk assessment headings that have been identified by the Client as possibly applicable to the abovementioned contract work. It is, by no means, exhaustive and is only offered as assistance to the contractors intending to tender for the applicable works. It therefore remains the overall responsibility of the principal contractor to consider all applicable risks and proactively undertake risk assessments and implement appropriate risk mitigation measures.

4.1.2 **Development of risk assessments**

Every principal contractor performing construction work shall, before the commencement of any construction work or work associated with the aforesaid construction work and during such work, ensure that risk assessments are undertaken by a competent person, appointed in writing, and the risk assessments shall form part of the occupational health and safety plan and be implemented and maintained as contemplated in Construction Regulation 9(1).

The risk assessments shall include, at least:
- The identification of the current as well as emerging risks and hazards to which persons may be exposed to;
- The analysis and evaluation of the risks and hazards identified;
• A documented plan of safe working procedures (SWP) and any method statements to mitigate, reduce or control the risks and hazards that have been identified;
• A plan to monitor the application of the SWPs; and
• A plan to review the risk assessments as the work progresses and changes are introduced or incidents occurred which requires the re-evaluation of the processes/risk mitigation.

Based on the risk assessments, the principal contractor must develop a set of site-specific occupational health and safety rules that will be applied to regulate the occupational health and safety aspects of the construction.

The risk assessments, together with the site-specific occupational health and safety rules, must be submitted to the Client before mobilisation on site commences.

Despite the risk assessments listed in Annexure 5, the principal contractor is required to conduct a baseline risk assessment and the aforesaid risk assessments must be incorporated into the baseline risk assessment. The baseline risk assessment must further include the SWPs and the applicable method statements based on the risk assessments.

Hazard identification and risk assessments must be undertaken whilst SWPs must be developed for all out-of-scope work.

4.1.3 Review of risk assessments

The principal contractor is to review the hazards identified, the risk assessments and the SWPs at each production planning and progress report meeting as the contract work develops and progresses and each time changes are made to the designs, plans and construction methods and/or processes.

It is also proposed that should an incident occur the SWPs and all other applicable processes be re-evaluated to ensure that the mitigation measures are still applicable and appropriate and if not a revision of the risk assessments be undertaken.

The principal contractor must provide the Client, other contractors and all other concerned or affected parties with copies of any changes, alterations or amendments as soon as possible but within 14 calendar days of such changes.

4.2 Legal Requirements

All Contractors entering into a contract with the Client shall, as a minimum, comply with the -
• OHSACT and a current, up-to-date copy of the OHSACT and its Regulations must be available on site at all times; and
• Compensation for Occupational Injuries and Diseases Act, No 130 of 1993 (COIDAct) as amended. The principal contractor will be required to submit a letter of registration and “good-standing” from the Compensation Commissioner or compensation insurer before being awarded the contract. A current, up-to-date copy of the COIDAct must be available on site at all times.

4.3 Structure and responsibilities

4.3.1 Overall supervision and responsibility for occupational health and safety

a. The principal contractor [appointed in terms of Construction Regulation 5(1)(k)] is responsible to implement and maintain the occupational health and safety plan approved by the Client.

b. The Chief Executive Officer (in terms of Section 16(1) of the OHSACT) of the principal contractor is to ensure that the Employer (as defined in the OHSACT) complies with the OHSACT. Annexure 1 “Legal Compliance Checklist” may be used for this purpose and assistance.

c. The principal contractor’s Chief Executive Officer may appoint any person reporting to him/her as Designated Person in terms of Section 16(2) of the OHSACT. Such Designated Person is responsible to assist the Chief Executive Officer to ensure that the Employer complies with the requirements of the OHSACT.

d. The construction manager, assistant construction manager, construction supervisor and assistant construction supervisor(s) appointed in terms of Construction Regulation 8 are responsible for supervising the construction work and in specific to ensure that all work undertaken comply with the requirements of the OHSACT, its Regulations and the Client’s specifications.

4.3.2 Operational responsibilities for occupational health and safety

The principal contractor shall appoint designated competent employees and/or other competent persons as outlined in the following list to assist with the operational responsibilities for occupational health and safety. This list is only the minimum requirement and is therefore in no way exhaustive.

<table>
<thead>
<tr>
<th>Appointment description</th>
<th>Appointment required in terms of</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assistant construction manager</td>
<td>Construction Regulation 8(2)</td>
</tr>
<tr>
<td>Assistant construction supervisor</td>
<td>Construction Regulation 8(8)</td>
</tr>
<tr>
<td>Construction health and safety officer</td>
<td>Construction Regulation 8(5)</td>
</tr>
<tr>
<td>Construction manager</td>
<td>Construction Regulation 8(1)</td>
</tr>
<tr>
<td>Construction supervisor</td>
<td>Construction Regulation 8(7)</td>
</tr>
<tr>
<td>Appointment description</td>
<td>Appointment required in terms of</td>
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<tr>
<td>-------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Construction vehicle supervisor</td>
<td>Construction Regulation 23</td>
</tr>
<tr>
<td>Demolition supervisor</td>
<td>Construction Regulation 14</td>
</tr>
<tr>
<td>Drivers of construction vehicles</td>
<td>Construction Regulation 23</td>
</tr>
<tr>
<td>Electrical installation and appliances inspector</td>
<td>Construction Regulation 24</td>
</tr>
<tr>
<td>Emergency, security and fire coordinator</td>
<td>Construction Regulation 29</td>
</tr>
<tr>
<td>Excavation supervisor</td>
<td>Construction Regulation 13</td>
</tr>
<tr>
<td>Fall risk protection supervisor</td>
<td>Construction Regulation 10</td>
</tr>
<tr>
<td>First-aiders</td>
<td>General Safety Regulation 3</td>
</tr>
<tr>
<td>Fire fighting equipment inspector</td>
<td>Construction Regulation 29</td>
</tr>
<tr>
<td>Hazardous chemical substances supervisor</td>
<td>Hazardous Chemicals Substances Regulations 10</td>
</tr>
<tr>
<td>Incident investigator</td>
<td>General Administrative Regulation 9</td>
</tr>
<tr>
<td>Ladder inspector</td>
<td>General Safety Regulation 13(a)</td>
</tr>
<tr>
<td>Occupational health and safety committee</td>
<td>OHSACT Section 19</td>
</tr>
<tr>
<td>Occupational health and safety representatives</td>
<td>OHSACT Section 17</td>
</tr>
<tr>
<td>Risk assessor</td>
<td>Construction Regulation 9(1)</td>
</tr>
<tr>
<td>Scaffolding supervisor</td>
<td>Construction Regulation 16</td>
</tr>
<tr>
<td>Stacking and storage supervisor</td>
<td>Construction Regulation 28</td>
</tr>
<tr>
<td>Structures supervisor</td>
<td>Construction Regulation 11</td>
</tr>
<tr>
<td>Traffic management supervisor</td>
<td>OHSACT Section 9(1)</td>
</tr>
<tr>
<td>Traffic safety officer</td>
<td>OHSACT Section 9(1)</td>
</tr>
<tr>
<td>Pressure equipment supervisor</td>
<td>Pressure Equipment Regulations</td>
</tr>
<tr>
<td>Welding supervisor</td>
<td>General Safety Regulation 9</td>
</tr>
</tbody>
</table>

These appointments must be in writing and the responsibilities clearly stated together with the period for which each appointment is made. This information must be communicated to and agreed with the appointees.

Copies of appointments must be submitted to the Client together with concise CV’s of the appointees as part of the principal contractor’s health and safety plan and if appointed copies of the appointments included in the occupational health and safety file. All appointments must be approved by the Client and any changes of appointees or appointments must be communicated to the Client and agreed upon before being implemented.

The principal contractor must, furthermore provide the Client with an organogram of all contractors that he/she has appointed or intends to appoint and keep this list updated on a weekly basis.

### 4.3.3 Construction health and safety officer

This project requires the appointment of a full-time construction health and safety officer, appointed in terms of Construction Regulation 8(5).
This appointee should be duly registered and in good standing with a statutory body approved by the Chief Inspector as is required by Construction Regulation 8(6).

The South African Council for Project and Construction Management Professions (SACPCMP) is currently the statutory body responsible for the professional registration of construction health and safety officers and a copy of the appointee’s SACPCMP’s registration certificate should be submitted as part of the principal contractor’s health and safety plan and also be readily available in the health and safety file to be kept and maintained on site.

4.3.4 Designation of occupational health and safety representatives (Section 17 of the OHSACT)

Where the principal contractor employs more than 20 persons [including the employees of other contractors (sub-contractors) and its supervisors] he has to appoint one occupational health and safety representative for every 50 employees or part thereof. General Administrative Regulation 6 requires that the election, appointment and subsequent designation of the occupational health and safety representatives be executed in consultation with employee representatives or employees. (Section 17 of the OHSACT as well as General Administrative Regulation 6 and 7 refer).

Occupational health and safety representatives have to be designated in writing and the designation must include the area of responsibility of the person and term of the designation.

4.3.5 Duties and functions of the occupational health and safety representatives (Section 18 of the OHSACT)

a. The principal contractor must ensure that the designated occupational health and safety representatives conduct a weekly inspection of their respective areas of responsibility, using a checklist, and report thereon to the principal contractor.
b. Occupational health and safety representatives must be included in accident and/or incident investigations.
c. Occupational health and safety representatives must attend all occupational health and safety committee meetings.

4.3.6 Appointment of occupational health and safety committee (Section 19 of the OHSACT)

The principal contractor must establish an occupational health and safety committee consisting of all the designated occupational health and safety representatives together with a number of management representatives that are not allowed to exceed the number of occupational health and safety representatives on the committee and
a representative of the Client who shall act as the chairperson without voting rights. The members of the occupational health and safety committee must be appointed in writing and copies of the appointments included in the occupational health and safety file.

The occupational health and safety committee must meet as a minimum on a monthly basis and consider, at least, the following agenda items:

1. Opening and welcome.
2. Members present, apologies and absent.
3. Minutes of previous meeting.
4. Matters arising from the previous meeting.
5. Occupational health and safety representatives’ reports.
6. Incident and/or accident reports and investigations.
7. Incident, accident and/or injury statistics.
8. Other matters.
9. Endorsement of registers and other statutory documents by a duly authorised representative of the principal contractor.
10. Close and next meeting.

4.4 Mandataries

It is a requirement that the principal contractor, when he appoints contractors or sub-contractors in terms of Construction Regulations 7(1)(c) includes an OHSACT Section 37(2) agreement (i.e. Agreement with Mandatary) in his agreement with such contractor.

4.5 Administrative controls and the occupational health and safety file

4.5.1 The occupational health and safety file [Construction Regulation 7(1)(b)]

As required by Construction Regulation 7(1)(b), the principal contractor and other contractors will each keep an occupational health and safety file on site containing the following documents as a minimum:

1. Copy of the construction work permit (for applicable projects) (Construction Regulation 3)
2. Updated copies of the OHSACT and its Regulations as well as the COID Act (General Administrative Regulation 4.).
3. Proof of registration and good standing with the Compensation Commissioner or a COID Insurer [Construction Regulation 5(1)(j)].
4. Occupational health and safety plan agreed with the Client including the underpinning risk assessment(s) and method statements [Construction regulation 7(1)].
5. Copies of occupational health and safety committee meetings and other relevant minutes.
6. Designs and/or drawings [Construction Regulation 7(1)(b)].

7. A list of contractors (sub-contractors) including copies of the agreements between the parties, proof of good standing with the Compensation Commissioner or COID Insurer, and the type of work to be undertaken by each contractor (Construction Regulation 7).

8. Appointment and designation forms as per paragraphs 4.3.1 and 4.3.2 above.

9. Copy of the construction health and safety officer’s SACPCMP registration certificate.

10. The following registers:
    - Accident and/or incident register (Annexure 1 of the General Administrative Regulations);
    - Occupational health and safety representatives inspection register;
    - Construction vehicles inspections by controller;
    - Daily inspections of vehicles other equipment by the operator and/or user;
    - Designer’s inspections and structures record;
    - Inspection of electrical installations (including inspection of portable electrical tools, electrical equipment and other electrical appliances);
    - Fall risk protection inspections;
    - First-aid box content;
    - Record of first-aid treatment;
    - Fire equipment inspections and maintenance;
    - Record of hazardous chemical substances kept and used on site;
    - Ladder inspections;
    - Machine safety inspections (including machine guards, lock-outs etcetera);
    - Inspections of scaffolding;
    - Inspections of stacking and storage;
    - Inspections of structures;
    - Pressure equipment inspections; and
    - Inspections of welding equipment.

12. All other applicable records.

The Client will conduct and evaluation of the principal contractor’s occupational health and safety file from time to time.

4.6 Occupational health and safety goals and objectives and arrangements for monitoring and review of occupational health and safety performance

The principal contractor is required to maintain a casualty incident frequency rate (CIFR) of not more than four (See Annexure 2 to this document: “Measuring Injury Experience”) and report on this to the Client on a monthly basis.
4.7 Notification of construction work (Construction Regulation 4)

The principal contractor does not need to notify the Department of Labour of its intention to carry out construction work as the Client, due to the value of the construction work, needs to apply for a construction work permit in terms of Construction Regulation 3. The principal contractor may not commence with any construction work until a site specific permit number was issued by the Department of Labour and the principal contractor must display this site specific permit number conspicuously at the entrance to the main site camp.

4.8 Medical certificates of fitness (Construction Regulation 7)

As required by Construction Regulation 7(1)(g), the principal contractor must ensure that all employees have a valid medical certificate of fitness specific to the construction work to be performed. These certificates must be issued by an occupational health practitioner in the form of Annexure 3 (i.e. Annexure 3 in the Construction Regulations).

4.9 Training, awareness and competence

The contents and syllabi of all training required by the OHSACT and Regulations must be included in the principal contractor’s occupational health and safety plan.

4.9.1 General induction training

All members of the contractor’s site management as well as all the persons appointed as responsible for occupational health and safety in terms of the Construction and other Regulations will be required to attend a general induction session.

All employees of the principal and other contractors must be in possession of proof of general induction training.

All subsequent and newly appointed employees must also be subjected to the induction training as soon as possible after the appointment but prior to starting working on site.

4.9.2 Site-specific induction training

The principal contractor will be required to develop a contract work project specific induction training course based on the risk assessments for the contract work and train all employees and other contractors and their employees in this.

All employees of the principal and other contractors must be in possession of proof that they have attended a site-specific occupational health and safety induction training at all times.
4.9.3 Other training

1. All drivers and users of construction vehicles and other equipment must be in possession of valid proof of training and where applicable licenses or proof of competency.

2. All employees in jobs requiring training in terms of the OHSACT and Regulations must be in possession of valid proof of training.

3. Occupational health and safety training requirements [as required by the Construction Regulations and as indicated by the occupational health and safety specification and the risk assessment(s)] i.e. -
   a. General induction (Section 8 of the OHSACT);
   b. Site and job specific induction, including visitors (Sections 8 and 9 of the OHSACT);
   c. Site and project manager;
   d. Construction manager;
   e. Construction supervisor;
   f. Occupational health and safety representatives [Section 18 (3) of the OHSACT];
   g. Training of the appointees indicated in paragraphs 4.3.1 and 4.3.2;
   h. Drivers of construction vehicles (Construction Regulation 23);
   i. Basic fire prevention and protection (Environmental Regulations 9 and Construction Regulation 29);
   j. Basic first-aid (General Safety Regulations 3);
   k. Storekeeping methods and safe stacking (Construction Regulation 28); and
   l. Emergency, security and fire coordinator.

4.9.4 Awareness and promotion

The principal contractor is required to have a promotion and awareness programme in place to create an occupational health and safety culture within employees as well as sub-contractors. The following are some of the methods that may be used:

- Toolbox talks
- Posters
- Videos
- Competitions
- Suggestion schemes
- Participative activities such as employee “occupational health and safety circles”.

4.9.5 Notices and signs

The following notices and signs are, where applicable, compulsory on the construction site as well as the contractors’ yards:
### Area and/or activity where notice or sign is required

<table>
<thead>
<tr>
<th>Notice or sign required in terms of</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display of notices and signs</td>
</tr>
<tr>
<td>Entry</td>
</tr>
<tr>
<td>First-aid</td>
</tr>
<tr>
<td>Toilets and change rooms</td>
</tr>
<tr>
<td>Storage of flammable materials</td>
</tr>
<tr>
<td>Grinding wheels</td>
</tr>
<tr>
<td>Machinery</td>
</tr>
<tr>
<td>Prohibition on smoking and eating or drinking at the workplaces where high risk substances [FR5 (1)] are stored or handled</td>
</tr>
<tr>
<td>Non-potable water</td>
</tr>
<tr>
<td>Construction Works Permit</td>
</tr>
</tbody>
</table>

#### 4.9.6 Competence

The principal contractor shall ensure that his and other contractors’ employees appointed are competent and that all training required to undertake the work safely and without risk to health of their or other persons, has been successfully completed before work commences.

The principal contractor shall ensure that follow-up and refresher training is conducted on a regular basis as well as the contract work progresses and the work situation or requirements changes.

Records of all training must be kept on the occupational health and safety file for auditing purposes.

#### 4.10 Consultation, communication and liaison

The following arrangements will apply:

4.10.1 Occupational health and safety liaison between the Client, the principal contractor, the other contractors, the designer and other concerned parties will be through the occupational health and safety committee. In the absence of a health and safety committee, the Client and principal contractor will agree on an alternative communication forum to be implemented.

4.10.2 In addition to the above, communication may be directly to the Client or his appointed Agent, verbally (followed up in writing within 14 calendar days) or in writing, as and when the need arises.
4.10.3 Consultation with the workforce on occupational health and safety matters will be through their supervisors, occupational health and safety representatives, the occupational health and safety committee and their elected trade union representatives, if any.

4.10.4 The principal contractor will be responsible for the dissemination of all relevant occupational health and safety information to the other contractors, for example design changes agreed with the Client and the designer, instructions by the Client and/or his Agent, exchange of information between contractors, the reporting of hazardous and/or dangerous conditions and/or situations etcetera.

4.10.5 The principal contractor will be required to do site safety walks with the Client and/or his Agent on a basis to be determined and agreed between the parties.

4.10.6 The principle and other contractors will be required to conduct toolbox talks with their employees on at least a weekly basis and records of these including the topics discussed must be kept on the occupational health and safety file. Employees must acknowledge the receipt of toolbox talks which record must, likewise be kept on the occupational health and safety file.

4.10.7 The principal contractor’s most senior manager on site will be required to attend all the Client’s occupational health and safety meetings.

4.10.8 The Client or his Agent and the principal contractor will agree on the dates, times and venues of the occupational health and safety meetings.

4.11 Checking, reporting and corrective actions

4.11.1 Monthly compliance assessment by Client [Construction Regulation 5(1)(0)]

The Client will be conducting a periodic assessment to comply with Construction Regulation 5(1)(o) and to confirm that the principal contractor has implemented and is maintaining the agreed and approved occupational health and safety plan.

4.11.2 Other assessments and inspections by the Client

The Client reserves the right to conduct other ad-hoc assessments and inspections as deemed necessary. This could include among others site safety walks.

4.11.3 Conducting an assessment

A representative of the principal contractor must accompany the Client on all assessments and inspections and may conduct his/her
own inspection at the same time. Each party will, however, take responsibility for the results of his/her own assessment and/or inspection.

4.11.4 Contractor’s assessments and inspections

The principal contractor is to conduct his own internal assessments and inspections to verify compliance with his own occupational health and safety plan and management system as well as the requirements of this specification and the compliance of other contractors under his/her control.

4.11.5 Inspections by occupational health and safety representatives and other appointees

Occupational health and safety representatives must conduct weekly inspections of their areas of responsibility and report thereon to their foreman or supervisor whilst other appointees must conduct inspections and report thereon as specified in their appointments for example vehicle, plant and machinery drivers, operators and users must conduct daily inspections before start-up.

4.11.6 Recording and review of inspection results

All the results of the abovementioned inspections must be in writing, reviewed at occupational health and safety committee meetings, endorsed by the chairperson of the meeting and placed on the occupational health and safety file.

4.11.7 Reporting of inspection results

The principal contractor is required to provide the Client with a monthly report in the format as per the attached Annexure 3: “Safety, Health and Environment Risk Management Report”.

4.12 Incident reporting and investigation

4.12.1 Reporting of accidents and incidents (Section 24 and General Administrative Regulation 8 of the OHSACT)

The principal contractor must report all incidents where an employee is injured on duty to the extent that he/she:

- dies
- becomes unconscious
- loses a limb or part of a limb
- is injured or becomes ill to such a degree that he/she is likely either to die or to suffer a permanent physical defect or likely to be unable for a period of at least 14 days either to work or continue with the activity for which he/she was usually employed
or where -
- a major incident occurred
- the health or safety of any person was endangered
- where a dangerous substance was spilled
- the uncontrolled release of any substance under pressure took place
- machinery or any part of machinery fractured or failed resulting in flying, falling or uncontrolled moving objects
- machinery ran out of control

to the Client within two calendar days and to the Provincial Director of the Department of Labour within seven calendar days from date of incident (Section 24 of the OHSACT and General Administrative Regulation 8), except that, where a person has died, has become unconscious for any reason or has lost a limb or part of a limb or may die or suffer a permanent physical defect, the incident must be reported to both the Client and the Provincial Director of the Department of Labour forthwith by telephone, telefax or e-mail. All other reports should still be completed and provided as required.

The principal contractor is required to provide the Client with copies of all statutory reports required in terms of the OHSACT within seven calendar days of the incident occurring.

The principal contractor is required to provide the Client with copies of all internal and external accident/incident investigation reports, including the reports contemplated in 4.11.2 (3) and (4) below, within seven calendar days of the incident occurring.

4.12.2 Accident and incident investigation (General Administrative Regulation 9)

1. The principal contractor is responsible for the investigation of all accidents and/or incidents where employees and non-employees were injured to the extent that he, she and/or they had to be referred for medical treatment by a doctor, hospital or clinic.

2. The results of the investigation to be entered into the accident and/or incident register.

3. The principal contractor is responsible for the investigation of all minor and non-injury incidents as described in Section 24 (1) (b) and (c) of the OHSACT and keeping a record of the results of such investigations including the steps taken to prevent similar accidents/incidents in future.
4. The principal contractor is responsible for the investigation of all road traffic accidents, related to the construction activities, and keeping a record of the results of such investigations including the steps taken to prevent similar accidents in future.

5. The Client reserves the right to hold its own investigation into an incident or call for an independent external investigation.

5. Operational control

5.1 Emergency preparedness, contingency planning and response

5.1.1 The principal contractor must appoint a competent person to act as emergency controller and/or coordinator.

5.1.2 The principal contractor must conduct an emergency identification exercise and establish what emergencies could possibly develop. He/she must then develop detailed contingency plans and emergency procedures, taking into account any emergency plan that the Client may have in place.

5.1.3 The principal contractor and the other contractors must hold regular practice drills of contingency plans and emergency procedures to test them and familiarise employees with them.

5.2 First-aid (General Safety Regulation 3)

5.2.1 The principal contractor must provide first-aid equipment and have qualified first-aider(s) on site as required by General Safety Regulation 3 of the OHSACT.

5.2.2 The contingency plan of the principal contractor must include arrangements for the speedily and timeously transportation of injured and/or ill person(s) to a medical facility or getting emergency medical support to person(s) who may require it.

5.2.3 The principal contractor must have firm arrangements with his contractors in place regarding the responsibility of these contractor's first-aid arrangements as well as treatment of injured and/or ill employees.

5.3 Security

5.3.1 The principal contractor must establish site access rules and implement and maintain these throughout the construction period. Access control must, among others, include the rule that non-employees will not be allowed on site unaccompanied.
5.3.2 The principal contractor must develop a set of project applicable security rules and procedures and maintain these throughout the construction period.

5.4 Accommodation of traffic

When construction work impacts on either internal or external traffic, such as when construction material is delivered, construction debris is removed etcetera, the principal contractor must ensure that:

5.4.1 A competent traffic safety officer is appointed to take responsibility for the accommodation of all traffic.

5.4.2 A detailed risk assessment is undertaken to ensure that all traffic related risks are identified and appropriate risk mitigation measures be established, implemented and maintained. This risk assessment should be kept on the health and safety file and also duly communicated to all employees and especially operators and drivers of construction vehicles and plant.

5.4.3 A comprehensive traffic accommodation plan is developed to provide for traffic entering the site as well as traffic on site, i.e. internal roads and construction areas.

5.4.4 Appropriate and a sufficient number of road signs be posted as per Chapter 13, Volume 2 of the South African Road Traffic Signs Manual (SARTSM) and these signs also be actively maintained to protect employees against traffic and to warn road users of the presence of construction activities and related risks next to and in the road surface. These signs should be repeated as actual construction work and risk are approached.

5.4.5 The maintenance of all signage and especially those that is suitable after dark shall be duly managed.

5.4.6 When trucks are entering or leaving site duly trained flag persons are deployed a good distance ahead of areas where traffic is deviated or lanes closed off. These flag persons to be managed assertively to ensure that they add optimal value and should they not do so they should be retrained and if necessary replaced.

5.4.7 The community liaison officer (CLO) shall also be sensitised on the optimal management of traffic and the risks involved and then be instructed to increase community awareness through talking to all stakeholders including the distribution of suitable information brochures.
5.5 Work in fall risk positions [Fall protection (Construction Regulation 10)]

5.5.1 Although the risk posed by working in a fall risk position is as far as reasonable possible mitigated by the project design, a pre-emptive risk assessment is required for any work to be carried out from a fall risk position.

5.5.2 As far as is practicable, any person working in a fall risk position will work from a stable platform, ladder or other device that is at least as safe as if he or she is working at ground level and whilst working in this position be wearing suitable fall arrest equipment to prevent the person falling from the platform, ladder or other device utilised. This fall arrest equipment will be, as far as is possible, secured to a point away from the edge over which the person might fall and the lanyard must be of such a length and strength that the person will not be able to move over the edge.

Alternatively any edge over which a person may fall shall be fitted with suitable guard rails at two different heights as prescribed in SANS 10085 code of practice for the design, erection, use and inspection of access scaffolding.

5.5.3 Where the requirement in paragraph 5.5.2 is not practicable, the person will be provided with a full body harness that will be worn and attached above the wearer’s head at all times and the lanyard must be fitted with a shock absorbing device or the person must be attached to a fall arrest system that is approved by the Client.

5.5.4 Employees working in fall risk positions must be trained to do this safely and without risk to their or other person’s health and safety.

5.5.5 Where work on roofs is carried out, the risk assessment must take into account the possibility of persons falling through fragile material and openings in the roof.

5.5.6 Updated records confirming the physical and psychological fitness of employees working in fall risk positions should be kept on the health and safety file at all times.

5.6 Structures (Construction Regulation 11)

The principal contractor must ensure that:

5.6.1 Only skilled employees are allowed to erect structures and that the skills of these employees are being verified at regular intervals.

5.6.2 Steps are taken to ensure that no structure becomes unstable or collapses due to construction work being performed on it or in the vicinity of it.
5.6.3 No structure is overloaded to the extent where it becomes unsafe.

5.6.4 He or she has received from the designer the following information:
   - Information on known or anticipated hazards relating to the construction work and the relevant information required for the safe execution of the construction work.
   - A geo-scientific report (where applicable).
   - The loading the structure is designed to bear.
   - The methods and sequence of the construction process.
   - Any other applicable information.

5.6.5 All drawings pertaining to the design are on site, utilised and available for inspection.

5.7 Access scaffolding (Construction Regulation 16)

Access scaffolding must be erected, used and maintained safely in accordance with Construction Regulation 16 and SA Bureau of Standards Code of Practice, SANS 10085 entitled, “The Design, Erection, Use and Inspection of Access Scaffolding”.

Detailed consideration must be given to all scaffolding to ensure that it is properly planned to meet the working requirements, designed to carry the necessary loadings and maintained in a sound condition. It must also be ensured that there is sufficient material available to erect the scaffolding properly and safely.

Scaffolding must be erected, altered, maintained or dismantled by person(s) who has/have adequate training and experience in this type of work or under the continuous and direct supervision of such a person.

5.8 Construction vehicle drivers

The following requirements will apply to construction vehicle operators:

a. Only certified and/or competent employees may be allowed to drive any construction vehicle.

b. Only employees duly authorised to do so may drive any construction vehicle.

c. Only employees physically and psychologically fit, i.e. in possession of a medical certificate of fitness, may be allowed to drive any construction vehicle.

5.9 Construction vehicles (Construction Regulation 23)

Construction vehicles should be formally and duly inspected by a competent person appointed by the principal contractor prior to being allowed on a project site and suppliers of hired vehicles and equipment must be required to comply with this specification as well as the OHSACT and Regulations.
Construction vehicles must be:

a. Maintained in good working order;
b. Used in accordance with their design and intention for which they were designed;
c. Driven by trained, competent and authorised drivers. No unauthorised persons to be allowed to drive construction vehicles;
d. Provided with safe and suitable means of access;
e. Fitted with adequate signalling devices to make movement safe including reversing;
f. Inspected daily before start-up by the driver and/or user and the findings recorded in a register/log book and any defects addressed as matter of urgency; and
g. Used for transporting persons must have seats firmly secured and sufficient for the number of persons being transported.

No loose tools, material etcetera is allowed in the driver compartment/cabin nor in the compartment in which any other persons are transported.

No person may ride on construction vehicles and mobile plant except for in a safe place designed and provided for this purpose.

The construction site must be organised to facilitate the movement of construction vehicles in such a manner that pedestrians and other vehicles are not endangered. Traffic routes to be suitable, sufficient in number and adequately demarcated.

All construction vehicles and mobile plant daily inspection records must be kept in the occupational health and safety file.

5.10 Electrical installations (Construction Regulation 24)

Any electrical work undertaken as part of the project, including the installation of temporary electricity for construction use shall be in accordance with Construction Regulation 24 and the Electrical Installation Regulations.

The principal contractor must ensure that:

a. Existing services are to be located and clearly marked before construction commences and during the progress thereof;
b. Where the abovementioned is not possible, employees with jackhammers etc. will be protected against electric shock by the use of suitable protective equipment e.g. rubber mats, insulated handles etcetera;
c. Electrical installations and machinery are sufficiently robust to withstand normal working conditions on site;
d. Temporary electrical installations must be inspected at least once per week by a competent person and a record of the inspections kept on the occupational health and safety file;
e. Electrical machinery used on a construction site must be inspected daily before start-up by the competent driver/operator or any other competent person and a record of the inspections kept on the occupational health and safety file; and
f. A competent person appointed in writing must control all temporary electrical installations.

5.11 Electrical and mechanical lockout

An electrical and mechanical lockout procedure must be developed by the principal contractor and submitted to the Client for approval before construction commences. All contractors on site must be informed of and adhere to this lockout procedure.

5.12 Use and storage of flammables (Construction Regulation 25)

The principal contractor must ensure that:

a. No person is required or permitted to work in a place where there is the danger of fire or an explosion due to flammable vapours being present unless adequate precautions is taken;

b. Flammables stored on a construction site are stored in a well-ventilated, reasonably fire-resistant container, cage or room that is kept locked with consistent access control measures in place and sufficient fire fighting equipment installed and fire prevention methods practiced for example proper housekeeping;

c. Only one day’s quantity of flammable is to be kept in the workplace;

d. Containers (including empty containers) to be kept closed to prevent fumes/vapours from escaping and accumulating in low lying areas; and

e. Welding and other flammable gases to be stored segregated as to the type of gas and empty and full cylinders.

5.13 Hazardous chemical substances

The principal contractor must ensure that:

a. Employees receive the necessary information and training to be able to use, handle and store hazardous chemical substances safely;

b. The risk assessments required in terms of Construction Regulation 9 include employee exposure to hazardous chemical substances and that the necessary measures be taken to protect persons from being detrimentally affected by hazardous chemical substances present or used in the workplace;

c. Suppliers provide the necessary information in the form of material safety data sheets regarding hazardous chemical substances required to ensure the safe use, handling and storage of these substances;

d. An up-to-date list is kept on site of hazardous chemical substances stored and used together with the material safety data sheet of the said hazardous chemical substances;
e. Hazardous chemical substances containers be clearly marked as to the contents and main hazardous category e.g. “Flammable” or “Corrosive” and the reference number of the hazardous chemical substances on the list indicated above;
f. No person eats or drinks in an area where hazardous chemical substances are stored or utilised; and
g. Hazardous chemical substances waste is disposed of safely in terms of hazardous waste disposal requirements.

5.14 Storage of flammable and hazardous chemicals (Hazardous Chemical Substances Regulations)

See paragraphs 5.12 and 5.13 above.

5.15 Fire prevention and protection

The principal contractor must ensure that:

a. The risk of fire is avoided;
b. Sufficient and suitable storage of flammables is provided;
c. All employees are instructed in the use of the firefighting equipment and know how to attempt to extinguish a fire;
d. A sufficient number of employees are appointed and trained to act as an emergency team to deal with fires and other emergencies;
e. Employees are informed regarding emergency evacuation procedures and escape routes;
f. Emergency escape routes are kept clear at all times and clearly marked;
g. Evacuation assembly points are demarcated and made known to employees;
h. Evacuation is regularly practiced to ensure that all persons are evacuated timeously and;
i. Roll call is held after evacuation to account for all employees and to ensure that no-one including visitors and disabled persons have been left behind; and
j. A clearly audible, to all persons on site, siren or alarm is fitted and regularly tested.

5.16 Housekeeping (Construction Regulation 27)

The principal contractor must ensure that:

a. Housekeeping is continuously implemented and maintained;
b. Materials and equipment is properly stored;
c. Scrap, waste and debris is removed off site regularly;
d. Materials placed for use are placed safely and not allowed to accumulate or cause obstruction to the free-flow of pedestrians and vehicular traffic;
e. An unimpeded work space is maintained for every employee;
f. Every workplace is kept clean, orderly and free of tools and the likes that are not required for the work being done;
g. As far as is practicable, every floor, walkway, stair, passage and gangway is kept in good state of repair, skid-free and free of obstruction, waste and materials; and

h. The walls and roof of every indoor workplace be sound and leak-free.

5.17 Stacking and storage (Construction Regulation 28)

The principal contractor must ensure that:

a. A competent person is appointed in writing to supervise all stacking and storage on a construction site;

b. Adequate storage areas are provided and demarcated;

c. The storage areas are kept neat and under control;

d. The base of any stack is level and capable of sustaining the weight exerted on it by the stack;

e. The items in the lower layers can support the weight exerted by the top layers;

f. Cartons and other containers that may become unstable due to wet conditions are kept dry;

g. Pallets and containers are in good condition and no material is allowed to spill out;

h. The height of any stack does not exceed 3 times the base unless stepped back at least half the depth of a single container at least every fifth tier or the approval of an inspector of the Department of Labour has been obtained to build the stacks higher with the aid of a machine. (The operator of the machine must be protected against items falling from overhead or off the stack and no items may overhang);

i. The articles that make up a single tier are consistently of the same size, shape and mass;

j. Structures for supporting stacks are structurally sound and able to support the mass of the stack;

k. No articles are removed from the bottom of the stack first but from the top tier first;

l. Anybody climbing onto a stack can and does do it safely and that the stack is sufficiently stable to support him or her;

m. Stacks that are in danger of collapsing are broken down and restacked;

n. Stability of stacks are not threatened by vehicles or other moving plant and machinery;

o. Stacks are built in a header and stretcher fashion and that corners are securely bonded; and

p. Persons climbing onto stacks do not approach unguarded moving machinery or electrical installations.

5.18 Eating, changing, washing and toilet facilities (Construction Regulation 30)

5.18.1 Toilets

a. The provision of toilets for each sex is required in terms of the National Building Regulations and Construction Regulation 30.
b. Chemical toilets are allowed instead of the water borne sewerage type. Toilets have to be provided at a ratio of at least 1 toilet per 30 employees.

5.18.2 Showers

At least cold-water showers of some sort for each sex have to be provided at a ratio of at least 1 shower per 15 employees.

5.18.3 Change rooms

Some form of screened off changing facility must be provided separately for each sex.

5.18.4 Eating facility

Some form of eating facility sheltered from the sun, wind and rain must be provided.

5.19 Personal and other protective equipment (Sections 8, 15 and 23 of the OHSACT)

The principal contractor is required to proactively identify the hazards in the workplace and deal with them on an ongoing basis. He/she must either remove them or, where impracticable take steps to protect employees and make it possible for them to work safely and without risk to health under the hazardous conditions.

Personal protective equipment should, however, be the last resort and there should always first be an attempt to apply re-engineering and other solutions to mitigating hazardous situations before the issuing of personal protective equipment is considered.

Where it is not possible to create an absolutely safe and healthy workplace the principal contractor is required to inform employees regarding this and issue, free of charge, suitable equipment to protect them from any hazards being present and that allows them to work safely and without risk to health in the hazardous environment.

It is a further requirement that the principal contractor maintain the said equipment, that he/she instructs and trains the employees in the use of the equipment and ensures that the prescribed equipment is used by the employee/s in a consistent and correct manner.

Employees do not have the right to refuse to use and/or wear the equipment prescribed by the employer and, if it is impossible for an employee to use or wear prescribed protective equipment through health or any other valid reason, the employee cannot be allowed to continue working under the hazardous condition(s) for which the equipment was prescribed but an
alternative solution has to be found that may include relocating the employee.

The principal contractor may **not charge any fee** for protective equipment prescribed by him or her but **may charge for equipment under the following conditions**:

- Where the employee requests additional issue in excess of what is prescribed;
- Where the employee has blatantly abused or neglected the equipment leading to early failure; and
- Where the employee has lost the equipment.

**Please note:** Bullet points two and three above should form part of a formal disciplinary process, i.e. following a disciplinary hearing.

### 5.20 Portable electrical tools and equipment (Electrical Machinery Regulation 9)

Portable electrical tools and equipment includes every unit that takes electrical power from a 15 ampere plug point and is moved around for use in the workplace i.e. drills, saws, grindstones, portable lights, etcetera. In addition electrical appliances such as fridges, hotplates, heaters, etcetera must be inspected regularly but at least on a weekly basis and maintained to the same standards as portable electrical tools and appliances.

The use, inspection and maintenance of portable electrical tools and equipment must be governed by the following:

- Regular inspections by a competent person appointed in writing;
- Inspection results must be recorded in a register;
- Only competent authorised persons are allowed to use portable electrical tools and equipment; and
- The correct protective equipment is worn/used whilst operating portable electrical tools and equipment.

This equipment -

- Must be maintained in good condition at all times to prevent an electrical shock to the user;
- The main source should incorporate an earth leakage protection device or receive power through a double wound transformer or be double insulated and clearly marked as such; and
- All equipment must be fitted with a switch to allow for safe and easy starting and stopping.

### 5.21 Public health and safety (Section 9 of the OHSACT)

The principal contractor is responsible for ensuring that non-employees affected by the construction work are made aware of the dangers likely to arise from said construction work as well as the precautionary measures to be observed to avoid or minimise those dangers. This includes among others:
a. Non-employees entering the site for whatever reason;
b. The surrounding community; and
c. Passers by the site.

Appropriate signage must be posted to this effect and all employees on site must be instructed to ensure that non-employees are protected at all times.

All non-employees entering the site must receive site applicable induction into the hazards and risks and the control measures for these.

5.22 Demolition Work

5.22.1 Demolition work must be carried out under the supervision of a competent person who has been appointed in writing.

5.22.2 A detailed structural engineering survey of the structure to be demolished must be carried out and a method statement on the procedure to be followed in demolishing the structure must be developed by a competent person, before any demolition may be commenced.

5.22.3 As demolishing progresses the structural integrity of the structure must be checked at intervals as determined in the method statement by the appointed competent person in order to prevent any premature or uncontrolled collapse.

5.22.4 Steps must be taken to ensure that where a structure is being demolished:
   a. precautions are taken to prevent the collapse of the structure when any frame, support or reinforcement is cut or removed;
   b. shoring or propping is applied where necessary;
   c. no employee is required or allowed to work under unsupported overhanging material; and
   d. the stability of an adjacent building, structure, road or services is maintained at all times.

5.22.5 The location and nature of any existing services such as water, electricity, gas etcetera must be established before any demolition is commenced with and any service that may be affected by the demolition must be protected and made safe for employees and other persons.

5.23 Welding, flame cutting or similar operations

Should any welding work be undertaken as part of the construction activities, such as the erection of the fence, erection of new canopy etcetera, the principal contractor must ensure that:

5.23.1 A competent person will be appointed to supervise welding, flame cutting or similar operations on site.

5.23.2 The following rules will govern all welding and flame cutting or similar operations:
a. The welder will be trained regarding the safe use/operation of the equipment.
b. The welder and his assistant will be provided with effective and appropriate personal protective equipment and/or clothing.
c. Cables and electrode holders will be effectively insulated.
d. The workplace will be effectively screened off to prevent bystanders from being affected by the welding rays or they will be provided with personal protective equipment.
e. No welding, flame cutting, grinding, soldering or similar work shall be undertaken in respect of any drum, vessels or similar object or container where such object or container-
   • is completely closed, unless the rise in internal pressure cannot render it dangerous; or
   • contains any substance which, under the action of heat may explode or react to form dangerous or poisonous substances.
f. Where pressure vessels/welding cylinders containing oxygen or acetylene are transported or used, the proper precautionary measures will be taken against bumping, falling, rolling etcetera.
g. Gas welding hoses may only be joined with approved connectors and clamps.
h. No oil or grease may be applied to oxygen valves and fittings.
i. It is a sound practice to store pressure vessels and/or welding cylinders vertically and to secure them by means of a chain.
j. Acetylene cylinders may never be inclined in excess of 45°.
k. Proper and adequate fire prevention measures will be instituted and maintained for as long as the welding continues.

5.24 Transportation of employees

5.24.1 Any vehicle used to transport employees must have seats firmly secured and adequate for the number of employees to be carried.

5.24.2 Regulation 247 of the National Road Traffic Act, Number 93 of 1996 (NRTA) stipulates that the principal contractor shall not allow employees to be transported in a vehicle unless the portion of the vehicle in which the employees are being conveyed is enclosed to a height of –

   a. at least 350 mm above the surface on which employees are seated; or
   b. at least 900 mm above the surface on which employees are standing,

   in a manner and with a material of sufficient strength to prevent employees from falling from such vehicle when it is in motion.
5.24.3 Regulation 247 of the NRTA also stipulates that the principal contractor shall also not allow any employees to be conveyed in the goods compartment of a vehicle together with any tools or goods, except their personal effects, unless that portion in which the employees are being conveyed is separated by means of a partition, from the portion in which such goods are being conveyed.

5.25 Working in inclement weather

The principal contractor shall implement an early warning system to identify inclement weather and to prevent such weather from posing negative implications on the safety of employees and other persons visiting.

The early warning system shall as a minimum provide for the following:

5.25.1 Construction work done during electrical storms

a. The principal contractor shall ensure that all employees are removed from heights and all employees are as safe as possible, in inclement weather conditions.

b. No work is allowed on the construction site during electric storms where employees cannot be protected from it. Protection involves employees being restricted to:
   • eating area fitted with a lightning mast
   • workshops
   • inside buildings

c. No work is allowed in electrical storms on top of open structural steel, even when earthed.

d. No work is allowed on heights when the lightning is within a 10 kilometre radius.

e. After inclement weather on-site risk assessments will be reviewed to include wet conditions.

5.25.2 Construction work done during rain

a. During rainy conditions all work on steel structures will stop.

b. No electrical tools will be used during rainy weather in open areas.

c. Work can be done in water proof areas where there is a zero risk for electrocution.

d. Areas that may be cleared for work during rain includes:
   • workshops
   • offices
   • work on ground level with the provision that the area is maintained in a safe dry condition

5.25.3 Scaffolding activities during inclement weather conditions

During inclement weather only limited scaffolding actions will be permitted i.e. erecting and dismantling activities.
Guidelines for safe choices:

<table>
<thead>
<tr>
<th>Weather type</th>
<th>Building and dismantling of scaffolding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lightning</td>
<td>Stop all activities</td>
</tr>
<tr>
<td>Light rain</td>
<td>Stop all activities</td>
</tr>
<tr>
<td>Heavy rain</td>
<td>Stop all activities</td>
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<tr>
<td>Wind &lt;28 km/h</td>
<td>Full use</td>
</tr>
<tr>
<td>Wind &gt;40 km/h</td>
<td>Stop all activities</td>
</tr>
<tr>
<td>Light mist</td>
<td>Full use</td>
</tr>
<tr>
<td>Heavy mist</td>
<td>Full use</td>
</tr>
<tr>
<td>Hail</td>
<td>Stop all activities</td>
</tr>
</tbody>
</table>

All scaffold users will:

a. Ensure that scaffolding is inspected immediately after inclement weather conditions.

b. Ensure that the risks associated with working at heights during inclement weather are identified and reasonably mitigated.

c. Be cautious of slip/trip hazards when performing activities during inclement weather.

d. Take note of the weather when completing the daily safe task instructions on site, where applicable.

5.25.4 Driving in inclement weather

The principal contractor shall ensure that the danger of driving in wet conditions is adequately covered in a risk assessment.

The risk assessment will include, but not limited to:

a. route planning
b. speed reduction
c. planning for emergency situations
d. driving precautions for slippery surfaces
e. visibility hazards

6. Health and safety policy

The principal contractor has to provide the Client, as an annexure to the health and safety plan, with a detailed health and safety policy outlining the principal contractor's stance on and principles adopted for health and safety.

7. Cost for health and safety measures during the construction process

To enable the Client to comply with Construction Regulation 5(1)(g), all potential principal contractors submitting tenders/bids have to demonstrate to the Client that sufficient provision has been made for the cost to implement and maintain the health and safety plan proposed by the principal contractor to meet the requirements of this
health and safety specification as well as that of the OHSACT and its Regulations.

A detailed schedule of costs has to be included in the health and safety plan submitted as part of the potential principal contractor’s tender document. Failure by the principal contractor to adhere to this requirement will force the Client to reject the tender/bid in terms of Construction Regulation 5(1)(h).

8. **Project specific risk assessment requirements**

   See Annexure 5.

9. **Overview of annexures**

   Annexure 1: Legal compliance assessment.
   Annexure 2: Measuring injury experience.
   Annexure 3: SHE risk management report.
   Annexure 4: Guide to risk assessments.
   Annexure 5: List of risk assessments.

10. **Enquiries**

    For any enquiries regarding this occupational health and safety specification, please contact –

    Name: Bertie Viljoen Pr CHSA
    EMPOWERisk
    Tel: 012 819 1600
    Cell: 082 415 3714
    Fax: 086 672 9573
    E-mail: bviljoen@empowerisk.co.za
Annexure 1

Legal compliance assessment

Proudly prepared by

EMPOWERisk (Pty) Ltd

October 2018
Occupational health, -safety and environment: Risk assessment checklist

(Based on the Construction Regulations of the Occupational Health and Safety Act)

* Denotes items applicable to both construction sites, contractor plant and storage yards

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<th>REMARKS</th>
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<td>3. Public safety, security measures and emergency preparedness</td>
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<td>4. Personal protective equipment</td>
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<td>5. Housekeeping</td>
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<td>6. Working at heights (including roof work)</td>
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<td>7. Scaffolding and temporary work</td>
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<td>8. Ladders</td>
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<td>11. Excavations and demolition</td>
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<td>15. Transport and materials handling equipment</td>
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<td>16. Site plant and machinery</td>
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<td>17. Plant and storage yard or site workshop specifics</td>
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<tr>
<td>18. Workplace environment, health and hygiene</td>
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</tbody>
</table>

1. **Administrative and Legal Requirements**

<table>
<thead>
<tr>
<th>OHSACT Section or Regulation</th>
<th>Subject</th>
<th>Requirements</th>
<th>Yes/No</th>
</tr>
</thead>
</table>
| Construction Regulation 3   | Application for construction work permit | Should the project qualifies to trigger this requirement -  
- Application for permit lodged;  
- Copy of construction permit in the OHS file; and  
- Is the site specific permit number conspicuously displayed at the main entrance. | |
<table>
<thead>
<tr>
<th>OHSACT Section or Regulation</th>
<th>Subject</th>
<th>Requirements</th>
<th>Yes/No</th>
</tr>
</thead>
</table>
| Construction Regulation 4   | Notice of carrying out Construction work | For construction projects where no permit is required -  
- Was the Department of Labour notified; and  
- Is a copy of notice available on site. |        |
| General Admin. Regulation 4 | Copy of OHSACT | Updated copy of the OHSACT and Regulations on site. Readily available for perusal by all employees. |        |
| COID Act Section 80 and Construction Regulation 5(1)(j) | Registration with Compensation Commissioner or other approved compensation insurer | Written proof of registration/Letter of good standing available on site. |        |
| Construction Regulation 4 and 5(1) | OHSACT specification, plans and program | OHSACT spec received from NDoH. OHSACT plan developed. OHSACT program implemented. Plans and program updated regularly. |        |
| Section 8(2)(d) Construction Regulation 9 | Hazard identification and risk assessment | Competent risk assessor appointed in writing  
Proof of risk assessor's competence available on site  
Risk assessment and –plan drawn up and updated.  
Baseline risk assessment undertaken prior to commencement of construction work.  
Copy of baseline risk assessment available on site.  
Continued risk assessments undertaken and recorded.  
Copies of ongoing risk assessments available on site.  
Employees and sub-contractors informed and trained by a competent person in the risk assessment before work commences and an ongoing basis thereafter.  
Health and safety committee or employee representatives consulted on the monitoring and review of the risk assessments. |        |
<p>| Section 16(2) | Assigned duties (Managers) | Responsibility of complying with the OHSACT assigned to other person/s by CEO. |        |
| Construction Regulation 8(1) | Designation of person ultimately responsible for occupational health and safety on site | Competent person appointed in writing as construction manager. |        |
| Construction Regulation 8(2) | Designation of assistant for construction manager | Competent person appointed in writing as assistant construction manager. |        |</p>
<table>
<thead>
<tr>
<th>OHSACT Section or Regulation</th>
<th>Subject</th>
<th>Requirements</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Regulation 8(7)</td>
<td>Designation of person responsible for ensuring occupational health and safety compliance</td>
<td>Competent person appointed in writing as construction supervisor.</td>
<td></td>
</tr>
<tr>
<td>Construction Regulation 8(8)</td>
<td>Designation of assistant for responsible person</td>
<td>Competent person(s) appointed in writing as assistant construction supervisors.</td>
<td></td>
</tr>
<tr>
<td>Section 17 &amp; 18 and General Administrative Regulations 6 and 7</td>
<td>Election and designation of occupational health and safety representatives</td>
<td>More than 20 employees - one representative and one additional representative for each 50 employees or part thereof. Designation in writing, period and area of responsibility specified. Meaningful reports. Reports actioned by management.</td>
<td></td>
</tr>
<tr>
<td>Section 19 and 20 and General Administrative Regulations 5</td>
<td>Occupational health and safety committee/s</td>
<td>Committee/s established. Members appointed in writing. Meetings held monthly. Minutes kept. Actioned by management.</td>
<td></td>
</tr>
<tr>
<td>Section 37(1) and (2)</td>
<td>Agreement with mandataries, contractors and sub-contractors</td>
<td>Written agreement with contractors and sub-contractors. Updated list of contractors and sub-contractors displayed. Proof of Registration with Compensation Commissioner or Compensation Insurer as well as Letter of Good Standing. Construction Supervisor designated. Written arrangements regarding representatives and committee. Written arrangements regarding first-aid.</td>
<td></td>
</tr>
</tbody>
</table>
| Construction Regulation 7(1)(c) and 7(2)(a) | Management of sub-contractors | Has the principal contractor –  
- provided all sub-contractors with relevant sections of the client's OHS specification  
- formally evaluated and approved all sub-contractors’ OHS plans.  
- ensured that the sub-contractors appointed made sufficient provision for the costs to be incurred to implement and maintain their OHS plan. |        |
<p>| Construction Regulation 7(1)(g) | Medical certificates of fitness | Are medical certificates of fitness (issued by an occupational health practitioners) specific to the construction work performed available for all employees on site |        |
| Section 24 and General Administrative Regulation 8 COID Act Section 38, 39 and 41 | Reporting of incidents (Department of Labour) | Incident reporting procedure displayed. All incidents in terms of section 24 reported to the Provincial Director, Department of Labour, within 3 days (Annexure 1 and/or WCL 1 or 2). Cases of occupational disease reported. |        |</p>
<table>
<thead>
<tr>
<th>OHSACT Section or Regulation</th>
<th>Subject</th>
<th>Requirements</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Administrative Regulation 9</td>
<td>Investigation and recording of incidents</td>
<td>Copies of reports available on site. Record of first-aid injuries kept.</td>
<td></td>
</tr>
<tr>
<td>Construction Regulation 10</td>
<td>Fall protection</td>
<td>Competent person appointed to draw up and supervise the fall protection plan. Proof of appointees’ competence available on site. Risk assessment carried out for work at heights. Fall protection plan drawn up and updated. Plan available on site.</td>
<td></td>
</tr>
<tr>
<td>Construction Regulation 10(5)</td>
<td>Roof work</td>
<td>Competent person appointed to plan and supervise roof work. Proof of appointees’ competence available on site. Risk assessment carried out. Roof work plan drawn up and updated. Roof work inspect before each shift and inspection register kept. Employees medically examined for physical and psychological fitness and written proof on site.</td>
<td></td>
</tr>
<tr>
<td>Construction Regulation 12</td>
<td>Temporary works</td>
<td>Competent person appointed in writing as temporary works designer to inspect and approved any erected temporary works before use. Proof of appointees’ competence available on site. Competent person appointed in writing as temporary works supervisor. Proof of appointees’ competence available on site. Risk assessment carried out for work on temporary works structures. Temporary works drawings approved by temporary works designer and available on site. Other relevant documentation that includes construction sequence and method statements available on site. Competent person(s) appointed in writing to: * erect, move or dismantle temporary works structures; and * examine and check all temporary works structures before being used; Written proof of competence of above</td>
<td></td>
</tr>
<tr>
<td>OHSACT Section or Regulation</td>
<td>Subject</td>
<td>Requirements</td>
<td>Yes/No</td>
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<tr>
<td>Construction Regulation 16</td>
<td>Scaffolding</td>
<td>Competent persons appointed in writing to:</td>
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<td>• erect scaffolding (scaffold erector/s);</td>
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<td>• act as scaffold team leaders; and</td>
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<td>• inspect scaffolding weekly and after inclement weather (scaffold inspector/s).</td>
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<td>Written proof of competence of above appointees.</td>
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<td>Appointees available on site.</td>
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<td>Copy of SANS 10085 available on site.</td>
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<td>Risk assessment carried out.</td>
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<td>Inspected weekly and/or after bad weather. Inspection register/s kept.</td>
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<tr>
<td>Construction Regulation 17</td>
<td>Suspended platforms</td>
<td>Competent persons appointed in writing to:</td>
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<td>• control the erection of suspended platforms;</td>
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<td>• act as suspended platform team leaders; and</td>
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<td>• inspect suspended scaffolding weekly and after inclement weather.</td>
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<td>Risk assessment conducted.</td>
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<td>Certificate of authorisation issued by a registered professional engineer available on site and copy forwarded to the Department of Labour.</td>
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<td>The following inspections of the whole installation carried out by a competent person</td>
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<td>• after erection and before use;</td>
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<td>• daily prior to use; and</td>
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<td>• inspection register kept.</td>
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<td>The following tests to be conducted by a competent person:</td>
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<td>• load test of whole installation and working parts every 12 months; and</td>
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<td></td>
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<td>• hoisting ropes, hooks and load attaching devices quarterly; and</td>
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<td>• tests log book kept.</td>
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<tr>
<td>OHSACT Section or Regulation</td>
<td>Subject</td>
<td>Requirements</td>
<td>Yes/No</td>
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<tr>
<td></td>
<td>Employees working on suspended platforms should be medically examined for physical and psychological fitness. Written proof available.</td>
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<tr>
<td>Construction Regulation 13</td>
<td>Excavations</td>
<td>Competent person/s appointed in writing to supervise and inspect excavation work. Written proof of competence of above appointee/s available on site. Risk assessment carried out. Excavations inspected: before every shift; after any blasting; after an unexpected fall of ground; after any substantial damage to the shoring; and after rain. Inspections register kept. Method statement developed where explosives will be and/or are used.</td>
<td></td>
</tr>
<tr>
<td>Construction Regulation 14</td>
<td>Demolition work</td>
<td>Competent person/s appointed in writing to supervise and control demolition work. Written proof of competence of above appointee/s available on site. Risk assessment carried out. Engineering survey and method statement available on site. Inspections to prevent premature collapse carried out by competent person before each shift. Inspection register kept.</td>
<td></td>
</tr>
<tr>
<td>Construction Regulation 19</td>
<td>Materials hoist</td>
<td>Competent person appointed in writing to inspect the material hoist. Written proof of competence of above appointee available on site. Materials hoist to be inspected weekly by a competent person. Inspection register kept.</td>
<td></td>
</tr>
<tr>
<td>Construction Regulation 26</td>
<td>Water environments (including caissons and cofferdams)</td>
<td>Competent person appointed in writing to supervise, control and inspect work on or over water and the construction, installation, and dismantling of caissons and/or cofferdams. Written proof of competence of above appointee available on site. Risk assessment carried by a competent person on a daily basis. Inspection register kept.</td>
<td></td>
</tr>
<tr>
<td>Construction Regulation 21</td>
<td>Explosive actuated fastening devices</td>
<td>Competent person appointed to control the issue of the Explosive actuated fastening devices and cartridges as well as the service, maintenance and cleaning. Register kept of above. Empty cartridge cases, nails and fixing</td>
<td></td>
</tr>
<tr>
<td>OHSACT Section or Regulation</td>
<td>Subject</td>
<td>Requirements</td>
<td>Yes/No</td>
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<td>bolts returns recorded.</td>
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<td>Cleaned daily after use.</td>
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<tr>
<td>Construction Regulation 20</td>
<td>Bulk mixing plant</td>
<td>Competent person appointed to control the operation of the bulk mixing plant as well as the service, maintenance and cleaning of this plant. Register kept of above. Risk assessment carried out. Bulk mixing plant to be inspected weekly by a competent person and inspections register kept.</td>
<td></td>
</tr>
</tbody>
</table>
| Construction Regulation 22 Driven Machinery Regulations 18 and 19 | Cranes and lifting machines equipment | Competent person appointed in writing to inspect cranes, lifting machines and equipment. Written proof of competence of above appointee available on site. Cranes and lifting tackle identified and numbered. Register kept for lifting tackle. Logbook kept for each individual crane. Inspection:  
  - **All cranes:** Daily by operator.  
  - **Tower cranes:** After erection and thereafter 6 monthly.  
  - **Other cranes:** Annually by competent person.  
  - **Lifting tackle (slings, ropes, chain slings etcetera):** Three monthly. |        |
| Construction Regulation 24 Electrical Machinery Regulations 9 and 10 Electrical Installation Regulations | Inspection and maintenance of electrical installation and equipment (including portable electrical tools) | Competent person appointed in writing to inspect/test the installation and equipment. Written proof of competence of above appointee available on site. Inspections:  
  - Electrical installation and equipment inspected after installation, alterations and quarterly thereafter. Inspection registers kept.  
  - Portable electric tools and -lights and extension leads identified/numbered. Monthly visual inspection by user, issuer or storeman. Register kept. |        |
<p>| Diving Regulations | Diving operations | Competent person appointed in writing to supervise diving operations and ensure maintenance, statutory inspection and testing by an approved inspection authority of equipment used. Written proof of competence of above appointee available on site. Proof of registration of all divers present on site available. Risk assessment carried out. |        |</p>
<table>
<thead>
<tr>
<th>OHSACT Section or Regulation</th>
<th>Subject</th>
<th>Requirements</th>
<th>Yes/No</th>
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<tbody>
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<td></td>
<td>Diving manual produced and available on site. Record of voice communications kept. Diving operations record kept. Each diver keeps a personal logbook and entries countersigned by the diving supervisor. Decompression tables available on site. Records of any decompression illness kept. Certificate of manufacture of any compression chamber or diving bell in use available on site.</td>
<td></td>
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</tr>
<tr>
<td>Construction Regulation 28</td>
<td>Designation of stacking and storage supervisor</td>
<td>Competent persons with specific knowledge and experience designated to supervise all stacking and storage. Written proof of competence of above appointee available on site.</td>
<td></td>
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<tr>
<td>General Safety Regulation 8(1)(a)</td>
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<tr>
<td>Construction Regulation 29</td>
<td>Designation of a person to coordinate emergency planning and fire protection</td>
<td>Person/s with specific knowledge and experience designated to coordinate emergency contingency planning and execution and fire prevention measures. Emergency evacuation plan: • Developed and available on site; • Drilled and practiced; and • Records of drills and practices available on site. Fire risk assessment carried out. All fire extinguishing equipment: • Identified and on register; • Inspected weekly and inspection registers kept; • Replaced after use; and • Serviced annually.</td>
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<tr>
<td>Environmental Regulation 9</td>
<td></td>
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<tr>
<td>General Safety Regulation 3</td>
<td>First-aid</td>
<td>Every workplace provided with sufficient number of first-aid boxes (required where 5 persons or more are employed). First-aid boxes freely available. Content of boxes as per the minimum requirements of the OHSACT. One qualified first-aider appointed for every 50 employees (required where more than 10 persons are employed). List of First-aiders and competency certificates available on site. Name and contact details of person in charge of first-aid box clearly displayed. Location of first-aid boxes clearly demarcated. Signs instructing employees to report all injuries and/or illness including first-aid injuries.</td>
<td></td>
</tr>
<tr>
<td>OHSACT Section or Regulation</td>
<td>Subject</td>
<td>Requirements</td>
<td>Yes/No</td>
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<tr>
<td>General Safety Regulation 2</td>
<td>Personal protective equipment (PPE)</td>
<td>PPE risk assessment carried out. Items of PPE prescribed and use enforced. Records of issue kept. Undertaking by employee to use and/or wear PPE.</td>
<td></td>
</tr>
<tr>
<td>General Safety Regulation 9</td>
<td>Inspection and use of welding and/or flame cutting equipment</td>
<td>Competent person/s with specific knowledge and experience designated to inspect electric arc, gas welding and flame cutting equipment. Written proof of competence of above appointee available on site. Equipment identified/numbered and entered into a register. Equipment inspected monthly. Inspection register kept.</td>
<td></td>
</tr>
<tr>
<td>Hazardous Chemical Substances (HCS) Regulations</td>
<td>Control of storage and usage of HCS and other flammables</td>
<td>Competent person/s with specific knowledge and experience designated to control the storage and usage of HCS (including flammables). Written proof of competence of above appointee available on site. Risk assessment carried out. Register of HCS kept and/or used on site.</td>
<td></td>
</tr>
<tr>
<td>Pressure Regulations</td>
<td>Pressure (PV)</td>
<td>Competent Person/s with specific knowledge and experience designated to supervise the use, storage, maintenance, statutory inspections and testing of PVs. Written proof of competence of above appointee available on site. Risk assessment carried out. Certificates of manufacture available on site. Register of PVs on site. Inspections and testing by approved inspection authority (AIA): • after installation, re-erection or repairs; • every 36 months; and • register or log kept of inspections, tests, modifications and repair on site.</td>
<td></td>
</tr>
<tr>
<td>Construction Regulation 23</td>
<td>Construction vehicles and earth moving equipment</td>
<td>Operators or drivers appointed to: • Carry out a daily inspection prior to use; and • Drive the vehicle or plant that he/she is competent to drive or operate. Written proof of competence of above appointee available on site. Record of daily inspections kept on site. Medical assessments.</td>
<td></td>
</tr>
<tr>
<td>OHSACT Section or Regulation</td>
<td>Subject</td>
<td>Requirements</td>
<td>Yes/No</td>
</tr>
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<tr>
<td>General Safety Regulation 13A</td>
<td>Inspection of Ladders</td>
<td>Competent person appointed in writing to inspect ladders. Ladders inspected at arrival on site and monthly thereafter. Inspections register kept on site.</td>
<td></td>
</tr>
<tr>
<td>General Safety Regulation 13B</td>
<td>Ramps</td>
<td>Competent person appointed in writing to supervise the erection and inspection of ramps. Inspection register kept on site.</td>
<td></td>
</tr>
</tbody>
</table>

2. **Education, training and promotion**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Requirement</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>*Occupational Health and Safety Policy as per OHSACT Section 7(1)</td>
<td>Policy signed by CEO and published and communicated to employees. Policy displayed on employee notice boards. Management and employees committed.</td>
<td></td>
</tr>
<tr>
<td>*Company and site health and safety rules as per OHSACT Section 13(a)</td>
<td>Rules published. Rules displayed on employee notice boards. Rules issued and explained to employees with written proof hereof. Follow-up to ensure employees understand and adhere to the rules.</td>
<td></td>
</tr>
<tr>
<td>*Induction and task safety training as per OHSACT Section 13(a)</td>
<td>All new employees receive health and safety induction training. Training includes task safety instructions. Employees acknowledge receipt of training. Follow-up to ensure employees understand and adhere to instructions.</td>
<td></td>
</tr>
<tr>
<td>*General health and safety training as per OHSACT Section 13(a)</td>
<td>All employees receive basic health and safety training. Written proof kept. Operators of plant and equipment receive specialised training. Follow-up to ensure employees understand and adhere to instructions.</td>
<td></td>
</tr>
<tr>
<td>*Occupational health and safety promotion</td>
<td>Incident experience board indicating among others - • Number of hours worked without an injury; and • Number of days worked without an injury. Safety grading - Board kept up to date. Relevant safety posters displayed and changed regularly. Employee notice board for health and safety notices. Site health and safety competitions. Company health and safety competition. Participation in regional health and safety competitions. Suggestion scheme.</td>
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</tr>
</tbody>
</table>

3. **Public safety, security measures and emergency preparedness**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Requirement</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>*Notices and signs</td>
<td>Notices and signs at entrances along perimeters indicating “No unauthorised entry” and “Entry at own risk”. Notices and signs at entrance instructing visitors and non-employees what to do, where to go and where to report on</td>
<td></td>
</tr>
</tbody>
</table>
## Subject Requirement

<table>
<thead>
<tr>
<th>Subject</th>
<th>Requirement</th>
<th>Yes/No</th>
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</thead>
<tbody>
<tr>
<td>Site safeguarding</td>
<td>Net, canopies, stilts, fans etcetera to protect members of the public passing and/or entering the site.</td>
<td></td>
</tr>
<tr>
<td>*Security measures</td>
<td>Access control measures and register in operation. Security patrols after hours and weekends. Sufficient lighting after dark. Guard has access to telephone or other means of emergency communication.</td>
<td></td>
</tr>
<tr>
<td>*Emergency preparedness</td>
<td>Emergency contact numbers displayed near telephone. Emergency evacuation instructions posted up on all notice boards (including employees’ notice boards). Emergency contingency plan available on site or in yard. Doors open outwards and unobstructed. Emergency alarm audible all over (including in toilets).</td>
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</tr>
<tr>
<td>*Emergency drill and evacuation</td>
<td>Adequate number of employees trained to use fire equipment. Emergency evacuation plan available, displayed and practiced. <em>(See Section 1 for designation and register).</em></td>
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### 4. Personal protective equipment (PPE)

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<tr>
<th>Subject</th>
<th>Requirement</th>
<th>Yes/No</th>
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<tbody>
<tr>
<td>*PPE needs analysis</td>
<td>Need for PPE identified and prescribed in writing.</td>
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<tr>
<td>*Head protection</td>
<td>It is compulsory for all persons on site to wear safety helmets including sub-contractors and visitors (where prescribed).</td>
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<tr>
<td>*Foot protection</td>
<td>All persons on site have to wear safety footwear including gumboots for concrete or wet work and non-slip shoes for roof work.</td>
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</tbody>
</table>
| *Eye and face protection | Eye and face protection (such as goggles, face shields, welding helmets) to be used when operating the following:  
- Jack or kango hammers;  
- Angle or bench grinders;  
- Electric drills (overhead work into concrete, cement and bricks);  
- Explosive actuated fastening devices;  
- Concrete vibrators or pokers;  
- Hammers and chisels;  
- Cutting or welding torches;  
- Arc welding equipment;  
- Skill or bench saws; and  
- Spray-painting equipment etcetera. |        |
| *Hearing protection | Hearing Protectors (such as muffs, plugs) used when operating the following:  
- Jack or kango hammers;  
- Explosive actuated fastening devices; and  
- Wood or aluminium working machines such as saws, planers, routers. |        |
| *Hand protection | Protective gloves to be worn by employees handling or using:  
- Cement, bricks, steel or chemicals;  
- Welding equipment;  
- Hammers and chisels; and  
- Jack or kango hammers etcetera. |        |
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<th>Subject</th>
<th>Requirement</th>
<th>Yes/No</th>
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</table>
| *Respiratory protection         | Suitable and efficient respirators to be worn correctly by employees handling or using:  
• Dry cement;  
• Dusty areas;  
• Hazardous chemicals;  
• Angle grinders; and  
• Spray-painting etcetera. |        |
| *Fall Prevention Equipment      | Suitable fall arrest equipment correctly used by persons working on or in unguarded, elevated positions such as:  
• Scaffolding;  
• Riggers;  
• Lift shafts;  
• Edge work; and  
• Ring beam edges etcetera.  
Other applicable methods of fall prevention should all be applied such as catch nets. |        |
| *Protective clothing            | All jobs requiring protective clothing (such as overalls, rain wear, welding aprons etcetera) to be identified and clothing worn.                  |        |
| *PPE issue and control          | Identified equipment to be issued free of charge.  
All PPE should be maintained in good condition (i.e. regular checks).  
Workers instructed in the proper use and maintenance of PPE.  
Commitment obtained from wearer accepting conditions and to wear the PPE.  
Record of PPE issued kept on file. |        |
| 5. Housekeeping                 |                                                                                                                                                |        |
| *Scrap removal system           | All items of scrap, unusable off cuts, rubble and redundant material removed from working areas on a regular basis.  
Scrap and/or waste removal from heights by chute, hoist or crane (i.e. nothing thrown or swept over sides).  
Scrap disposed of in designated containers or areas.  
Removal from site or yard on a regular basis. |        |
| Stacking and storage            | Stacking:  
• Stable;  
• On firm level surface or base;  
• Not leaning and/or collapsing;  
• Irregular shapes bonded;  
• Not exceeding 3 times the base;  
• Stacks accessible; and  
• Removal from top only.  
Storage:  
• Adequate storage areas provided;  
• Functional for example demarcated storage areas, racks, bins etcetera;  
• Special areas identified and demarcated for example flammable gas, cement etcetera:  
• Neat, safe, stable and square:  
• Store and storage areas clear of superfluous material;  
• Storage behind sheds etcetera should be neat and under |        |
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<th>Subject</th>
<th>Requirement</th>
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<td>control; and</td>
<td>• Storage areas free from weeds, litter etcetera.</td>
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<tr>
<td>*Waste control or reclamation</td>
<td>Re-usable off cuts and other re-useable material removed daily and kept to a minimum in the work areas. All re-useable materials neatly stacked or stored in designated areas (i.e. nails removed or bent over in re-useable timber). Issue of hardware, nails, screws and cartridges etcetera should be controlled and return of unused items monitored.</td>
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<tr>
<td>Sub-contractors</td>
<td>Sub-contractors required to comply with the site or yard’s housekeeping requirements.</td>
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6. **Working at heights (including roof work)**

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<tr>
<th>Subject</th>
<th>Requirement</th>
<th>Yes/No</th>
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<tbody>
<tr>
<td>Openings</td>
<td>Unprotected openings adequately guarded, fenced and barricaded with catch nets installed where necessary. Covers over openings in roof of robust construction and secured against displacement.</td>
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<tr>
<td>General requirements</td>
<td>Roof work discontinued when bad or hazardous weather prevails. Fall protection measures (including warning notices) when working close to edges or on fragile roofing material.</td>
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</tbody>
</table>

7. **Scaffolding and temporary work**

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<th>Subject</th>
<th>Requirement</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access and system scaffolding</td>
<td>Foundation firm and stable. Sufficient bracing. Tied to structure and secured from side or cross movement. Platform boards in good condition and secured. Sufficient platform boards to be used. Handrails and toe boards provided. Access ladders or stairs provided. Area/s under scaffolding tidy. Safe and unsafe for use signs to be used. Complying with OHSACT and SANS 10085.</td>
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<tr>
<td>(See Section 1 for designation and register)</td>
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<tr>
<td>Free Standing Scaffolding</td>
<td>Foundation firm and stable. Sufficient bracing. Platform boards in good condition and secured. Sufficient platform boards to be used. Handrails and toe boards provided. Access ladders or stairs provided. Area/s under scaffolding tidy. Safe or unsafe for use signs to be used. Height and base ratio correct. Outriggers used and tied to structure where necessary. Complying with OHSACT and SANS 10085.</td>
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</tr>
<tr>
<td>*Mobile scaffolding</td>
<td>Foundation firm and stable. Sufficient bracing. Platform boards in good condition and secured. Sufficient platform boards to be used. Handrails and toe boards provided. Access ladders or stairs provided.</td>
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</tbody>
</table>
### Subject | Requirement | Yes/No
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Area’s under scaffolding tidy. Safe and unsafe for use signs to be used. Wheels and swivels in good condition Brakes working and applied. Height to base ratio correct. Outriggers used where necessary. Complying with OHSACT and SANS 10085.  
**Suspended scaffolding** Outriggers securely supported and anchored. Correct number of steel wire ropes used. Platform as close as possible to the structure. Handrails on all sides. All winches, ropes, cables and brakes inspected regularly. Inspection registers kept on site. Scaffolding complies with OHSACT. Winches maintained by competent person.  
**Temporary works** All components in good condition. Foundation firm and stable. Adequate bracing and stability ensured. Good workmanship, uprights straight and plum. Good cantilever construction. Safe access provided. Areas under support work tidy. Same standards as for system scaffolding.  
**Special scaffolding** Special scaffolding for example cantilever, jib and truss-out scaffolds erected to an acceptable standard and inspected by specialists. Inspection registers to be kept on site.  
**Edges and openings** Edges barricaded to acceptable standards. Manhole openings covered and/or barricaded. Openings in floor and other openings covered, barricaded or fenced. Stairs provided with handrails. Lift shafts barricaded or fenced off.

### 8. Ladders

<table>
<thead>
<tr>
<th>Subject</th>
<th>Requirement</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical condition, use and storage (See Section 1 for designation and register)</strong></td>
<td>Stepladders – hinges, stays, braces and stiles in order. Extension ladders – ropes, rungs, stiles, safety latch and hook in order. Extension or straight ladders secured or tied at the bottom or top. No joined ladders used. All ladders stored on hooks or racks and not on ground. Ladders protrude 900 mm above landings, platforms or roof. Fixed ladders higher than 5 m have cages or fall arrest system.</td>
<td></td>
</tr>
</tbody>
</table>

### 9. Electrical safeguarding

<table>
<thead>
<tr>
<th>Subject</th>
<th>Requirement</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Electrical distribution boards and earth leakage</strong></td>
<td>Colour coded, numbered and symbolic sign displayed. Area in front kept clear and unobstructed. Fitted with inside cover plate, openings blanked off and no</td>
<td></td>
</tr>
</tbody>
</table>
1. Subject | Requirement | Yes/No
--- | --- | ---
exposed “live” conductors or terminals. Door kept close. Switches and/or circuit breakers identified. Earth leakage protection unit fitted and operating. Tested with instrument - test results within 15 – 30 milli-amps. Aperture openings provided for the plugging in and removal of extension leads without the need to open the door.

*Electrical installations and wiring | Temporary wiring or extension leads in good condition with no bare or exposed wires. Earthing continuity and polarity correct: “Brown is live, Blue is neutral, Green and Yellow earth the lot” Cables protected from mechanical damage and moisture. Correct loading observed for example no heating appliance used from lighting circuit etcetera. Light fittings and lamps protected from mechanical damage/moisture.

*Physical condition of electrical appliances and tools | Electrical Equipment and Tools (includes all items plugging in to a 15 Amp supply socket):
- Insulation and casing in good condition.
- Earth wire connected or intact where not of double insulated design.
- Double insulation mark where no earth wire.
- Cord in good condition/no bare wires/secured to machine & plug.
- Plug in good condition, connected correctly and correct polarity.

10. Emergency, fire prevention and protection

| Subject | Requirement | Yes/No
--- | --- | ---
*Fire extinguishing equipment (See Section 1 for designation and register) | Fire Risks Identified and on record. Fire Extinguishing Equipment available for:
- Offices;
- General stores;
- Flammable store;
- Fuel storage tanks;
- Gas welding or cutting operations; and
- Where flammable substances are being used or applied.

*Maintenance | Fire equipment serviced minimum annually, but preferably 6 monthly.

*Location & Signs | Fire Extinguishing Equipment:
- Clearly visible;
- Unobstructed; and
- Sign posted including "No Smoking" and "No Naked Lights" where required i.e. (flammable store, gas store, fuel tanks etc.).

* Storage issue and control of flammables (incl. gas cylinders) | Storage area provided for flammables with suitable doors, ventilation, bund etcetera. Flammable store neat and tidy with no Class A combustibles. Decanting of flammable substances carried out in ignition free and adequately ventilated area. Container bonding principles applied. Only sufficient quantities issued for one day’s use.
<table>
<thead>
<tr>
<th>Subject</th>
<th>Requirement</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Special gas cylinder store or storage area.</strong></td>
<td>Special gas cylinder store or storage area. Gas cylinders stored, used and transported upright and secured in trolley, cradle or structure that is well ventilated. Types of gas cylinders identified and stored separately. Full cylinders stored separately from empty cylinders.</td>
<td></td>
</tr>
<tr>
<td><em>Storage, issue and control of Hazardous Chemical Substances (HCS) (See Section 1 for designation and register)</em></td>
<td>HCS storage principles applied i.e. products segregated. Provision made for leakage and spillage containment. Emergency (serviceable) showers and eye wash facilities provided. HCS under lock and key as well as controlled by designated person. Decanted or issued in containers with information and warning labels. Disposal of unwanted HCS by recognised disposal agent.</td>
<td></td>
</tr>
</tbody>
</table>

11. **Excavations and demolition**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Requirement</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excavations deeper than 1.5 m. (See Section 1 for designation and register)</td>
<td>Shored or braced to prevent caving or falling in. Provided with an access ladder. Excavations guarded, barricaded or lighted after dark in public areas. Soil dumped at least 1 m away from edge of excavation. On sloping ground soil dumped on lower side of excavation.</td>
<td></td>
</tr>
</tbody>
</table>

12. **Tools**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Requirement</th>
<th>Yes/No</th>
</tr>
</thead>
</table>
| *Hand tools                                                            | Shovels, Spades and Picks:  
  • Handles free from cracks and splinters;  
  • Handles fit securely; and  
  • Working end sharp and true.  
Hammers:  
  • Good quality handles, no pipe or reinforcing steel handles;  
  • Handles free from cracks and splinters; and  
  • Handles fit securely.  
Chisels:  
  • No mushroomed heads or heads chamfered;  
  • Not hardened; and  
  • Cutting edge sharp and square.  
Saws:  
  • Teeth sharp and set correctly; and  
  • Correct saw used for the job. |        |
| *Explosive actuated fastening devices (See Section 1 for designation and register)* | Only used by trained and authorised personnel. Prescribed warning signs placed or displayed where tool is in use. Inspected at least monthly by competent person and results recorded in on site register. Issue and return recorded including cartridges or nails and unused cartridges, nails, empty shells recorded. Cleaned daily after use in on site register. |        |
### 13. Cranes

<table>
<thead>
<tr>
<th>Subject</th>
<th>Requirement</th>
<th>Yes/No</th>
</tr>
</thead>
</table>
| **Tower crane**  
*(See Section 1 for designation and register)* | Only operated by trained authorised operator with valid certificate of training.  
Certificate available on site.  
Structure - no visible defects.  
Electrical installation good and safe.  
Crane hook - throat pop marked, safety latch fitted and functional.  
SWL/MML displayed.  
Limit switches fitted and operational.  
Access ladder fitted with backrests or fall arrest system installed.  
Lifting tackle in good condition and inspection colour coding current. |  |
| **Mobile crane**  
*(See Section 1 for designation and register)* | Only operated by trained authorised operator with valid certificate of training.  
Certificate available on site.  
Rear view mirrors and windscreen visibility good.  
Windscreen wipers operating effectively.  
Indicators operational.  
Hooter working.  
Tyres safe with sufficient tread and pressure visibly sufficient.  
No missing wheel nuts.  
Headlights, taillights operational.  
Grease nipples and grease on all joints.  
No visible oil leaks.  
Hydraulic pipes visibly sound with no leaks.  
No undue corrosion on battery terminals.  
Boom visibly in good condition with no apparent damage.  
Cable and sheaves greased with no visible damage, split wires or corrosion.  
Brakes working properly.  
Crane hook - throat pop marked, safety latch fitted and functional.  
SWL/MML displayed.  
By-pass valves operational.  
Deflection chart displayed and visible to operator or driver.  
Outriggers functional used. |  |
| **Gantry crane** | Only operated by trained authorised persons.  
Correct slinging techniques used.  
Recognised displayed on chart signals used.  
Log book kept up to date.  
Prescribed inspections conducted on crane and lifting tackle.  
“Crane overhead” signage, where applicable.  
Crane hook - throat pop marked, safety latch fitted and functional.  
SWL/MML displayed and load limiting switches fitted and operational. |  |

### 14. Builder’s hoist

<table>
<thead>
<tr>
<th>Subject</th>
<th>Requirement</th>
<th>Yes/No</th>
</tr>
</thead>
</table>
| **Builder’s hoist**  
*(See Section 1 for designation and register)* | “Hoist in operation” - sign displayed.  
General construction strong and free from latent defects.  
Tower: |  |
### 15. Transport and materials handling equipment

<table>
<thead>
<tr>
<th>Subject</th>
<th>Requirement</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site vehicles</td>
<td>All site vehicles, dumpers, bobcats, loaders etcetera checked daily before used by driver or operator. Inventory of vehicles used/operated on site. Inspection by means of a checklist and results recorded. No persons riding on equipment not designed for passengers. Site speed limit posted and not exceeded. Drivers and operators trained and licensed. Licenses available on site. No unauthorised persons allowed to drive or operate equipment.</td>
<td></td>
</tr>
<tr>
<td>Conveyors</td>
<td>Conveyor belt nip points and drive guarded. Emergency stop and lever brake fitted, clearly marked and accessible.</td>
<td></td>
</tr>
</tbody>
</table>

### 16. Site plant and machinery

<table>
<thead>
<tr>
<th>Subject</th>
<th>Requirement</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brick cutting machine</td>
<td>Operator trained and only authorised persons use the machine. Emergency stop switch clearly marked and accessible. Area around the machine dry and slip or trip free as well as clear of off cuts. All moving drive parts guarded. Electrical supply cable protected. Operator using correct PPE i.e. eye, face, hearing, foot, hands and body.</td>
<td></td>
</tr>
<tr>
<td>Electric arc welder</td>
<td>Welder trained. Only authorised and trained persons use welder. Adequately earthed. Electrode holder in good condition and safe. Cables, clamps, lugs and connectors in good condition. Area in which welding machine is used is dry and protected from wet. Welder using correct PPE i.e. eye, face, foot, body and respiratory. Screens and warning signs placed.</td>
<td></td>
</tr>
<tr>
<td>Woodworking machines</td>
<td>Operator’s trained and only authorised persons use machines. Provided with guards and guards used. Operators using correct PPE i.e. eye, face, foot and hearing.</td>
<td></td>
</tr>
<tr>
<td>Compressors</td>
<td>Relief valves set, locked and sealed.</td>
<td></td>
</tr>
<tr>
<td>Subject</td>
<td>Requirement</td>
<td>Yes/No</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
<td>-------</td>
</tr>
<tr>
<td>Maximum safe working pressure (MSWP) indicated on face of pressure gauge face and not on glass cover. All drives adequately guarded. Receiver and lines drained daily. Hoses good condition and clamped, not wired.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concrete mixer and bulk mixing plant</td>
<td>Top platform provided with guardrails. Dust abatement methods in use. Operators using correct PPE i.e. eye, hands and respiratory. All moving drive parts guarded. Emergency stops identified, indicated and accessible. Area kept clean, dry and free from tripping and slipping hazards. Banksman identified and crane signals displayed and used.</td>
<td></td>
</tr>
<tr>
<td>Only authorised and trained persons use the equipment. Torches and gauges in good condition. Flashback arrestors fitted at cylinders and gauges. Hoses in good condition, correct type and all connections with clamps. Cylinders stored, used and transported in upright position, secured in trolley or cradle. Fire prevention control methods applied. Hot work permits.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

17. **Plant and storage yard or site workshop specifics**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Requirement</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>OHSACT, Section 8(2)(1) General Machinery Regulation 2(1) Supervision of the use and maintenance of machinery</td>
<td>Persons with specific knowledge and experience designated to supervise the use and maintenance of machinery. Critical items of machinery identified, numbered and placed on register or inventory. Inspection or maintenance schedules for abovementioned. Inspections or maintenance carried out to above schedules. Results recorded.</td>
<td></td>
</tr>
<tr>
<td>General Machinery Regulation 9(2) Notices regarding operation of machinery</td>
<td>Schedule D notice posted in work areas.</td>
<td></td>
</tr>
<tr>
<td>Pressure Equipment Regulations Supervision of the use and maintenance of pressure equipment such as pressure vessels (PV)</td>
<td>Persons with specific knowledge and experience designated to Supervise the use and maintenance of PVs. PVs identified, numbered and placed on register. Manufacturers plate intact. Inspection or maintenance schedules for abovementioned. Inspections or maintenance carried out to above schedules. Results recorded and test certificates available.</td>
<td></td>
</tr>
<tr>
<td>Lock-out procedure</td>
<td>Lock-out procedure in operation.</td>
<td></td>
</tr>
<tr>
<td>Ergonomics</td>
<td>Ergonomics survey conducted. Results on record. Survey results applied.</td>
<td></td>
</tr>
<tr>
<td>Demarcation and colour coding</td>
<td>Demarcation principles applied. All services, pipes, electrical installation, stop-start controls, emergency controls etcetera colour coded to own published or SABS standard. Employees trained to identify colour coding.</td>
<td></td>
</tr>
<tr>
<td>Portable and bench grinders</td>
<td>Area around grinder clear and trip/slip free. Bench grinders mounted securely and grinder generally in good condition.</td>
<td></td>
</tr>
<tr>
<td>Subject</td>
<td>Requirement</td>
<td>Yes/No</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>--------</td>
</tr>
<tr>
<td><strong>No excessive vibration.</strong></td>
<td>On and off switch or button clearly demarcated and accessible. Tool rest – secure, square and maximum 2 mm gap. Stone or disk - correct type and size, mounted correctly and dressed. Use of eye protection enforced.</td>
<td></td>
</tr>
<tr>
<td><strong>Ancillary lifting equipment</strong></td>
<td>Chain blocks, tirfors, jacks and mobile gantries etcetera identified and numbered on register. Chains in good condition and links no excessive wear. Lifting hooks – throat pop marked and safety latch fitted. SWL/MML marked or displayed.</td>
<td></td>
</tr>
<tr>
<td><strong>Presses, guillotines and shears</strong></td>
<td>Only operated by trained and authorised persons. PPE used by operators Interlocks or lockouts fitted.</td>
<td></td>
</tr>
</tbody>
</table>

18. **Workplace environment, health and hygiene**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Requirement</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lighting</strong></td>
<td>Adequate lighting in places where work is being executed for example stairwells and basements or after sunset. Light fittings placed and installed causing no irritating or blinding glare.</td>
<td></td>
</tr>
<tr>
<td><strong>Ventilation</strong></td>
<td>Adequate ventilation, extraction and exhausting in hazardous areas for example where chemicals and adhesives are stored, welding takes place and where petrol or diesel motors are running in confined spaces or basements.</td>
<td></td>
</tr>
<tr>
<td><strong>Noise</strong></td>
<td>Tasks identified where noise exceeds 85 dBA. All reasonable steps taken to reduce noise levels at the source. Hearing protection used where noise levels could not be reduced to below 85 dBA.</td>
<td></td>
</tr>
<tr>
<td><strong>Heat stress</strong></td>
<td>Measures in place to prevent heat exhaustion in heat stress problem areas e.g. steel decks, when the WBGT index reaches 30 (see Environmental Regulation 4). Cold drinking water readily available when extreme temperatures are experienced.</td>
<td></td>
</tr>
<tr>
<td><strong>Ablution facilities</strong></td>
<td>Sufficient toilets provided for men and women separately i.e. 1 per 30 employees (National Building Regulations prescribe chemical toilets for Construction sites). Toilet paper available. Sufficient showers provided for men and women separately. Facilities for washing hands provided. Soap available for washing hands. Means of drying hands available. Changing facilities or area provided for men and women separately. Ablution facilities hygienic and clean.</td>
<td></td>
</tr>
<tr>
<td><strong>Eating and cooking facilities</strong></td>
<td>Adequate storage facilities provided. Weather protected eating area provided, separate from changing area. Refuse bins with lids provided. Facilities clean and hygienic.</td>
<td></td>
</tr>
<tr>
<td><strong>Pollution of environment</strong></td>
<td>Measures in place to minimize dust generation. Accumulation of empty cement pockets, plastic wrapping or bags, packing materials etcetera prevented.</td>
<td></td>
</tr>
<tr>
<td>Subject</td>
<td>Requirement</td>
<td>Yes/No</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
<td>--------</td>
</tr>
<tr>
<td></td>
<td>Spillage or discarding of oil, chemicals and dieseline into storm water and other drains prevented.</td>
<td></td>
</tr>
<tr>
<td><em>Hazardous chemical substances</em>&lt;br&gt;(See Section 1 for designation and register)</td>
<td>All substances identified and list available e.g. acids, flammables, poisons etc. Material Safety Data Sheets (MSDS) indicating hazardous properties and emergency procedures in case of incident on file and readily available. Substances stored safely.</td>
<td></td>
</tr>
</tbody>
</table>

Name of person who have undertaken the assessment

________________________________________

Signature

________________________________________

Date

________________________________________

Received by

________________________________________

Designation

________________________________________

Date

________________________________________

Tabled at health and safety committee

________________________________________
Annexure 2

Measuring injury experience

Proudly prepared by

EMPOWERisk (Pty) Ltd
Measuring injury experience

1. Background

Injury experience has traditionally been measured by the use of a disabling injury frequency rate, the so-called “DIFR”. The DIFR is calculated by multiplying the number of disabling injuries by 1 million and dividing by the number of person-hours worked.

The DIFR has recently been replaced internationally with a disabling injury incidence rate (DIIR). The only difference between the two rates are that the 1 million in the calculation is replaced with 200 000 (200 000 purported to be the number of hours and average person works in a lifetime).

The use of the two rates above has proved to be somewhat problematical as they are open to manipulation and disabling injuries are often “hidden” by returning the injured employee to the workplace so as not to lose a shift and therefore having to register a disabling injury.

The construction industry recently decided to promote the use of a new frequency rate based on the number of compensation injury claims, as these are more difficult to hide or manipulate because the reporting of compensatable injuries is a legal requirement.

The industry is hoping that adoption of this new measurement of injury experience will enable the industry to monitor itself as far as work related injuries are concerned.

2. Compensation Incidence Frequency Rate (CIFR)

2.1 Formula

\[
\frac{\text{No of compensation claims} \times 200 \, 000}{\text{220 person hours} \times \text{No of employees}}
\]

2.2 Definitions

No of compensation claims: The number of claims lodged with the Commissioner or COID insurer for the period under review.

200 000: The fixed factor to align the rate with other rates used internationally.

Person hours worked Include: Hourly paid employees

Sub-contractors (No of employees \(*220\) each)

Staff (No of employees \(*220\) hours each)
<table>
<thead>
<tr>
<th><strong>220 person-hours:</strong></th>
<th>The <em>average number of hours worked by one employee in one month in the construction industry.</em></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Note:</strong> * Overtime, absence on leave or sick leave, unrecorded after hours time worked by senior and middle management factored into this average.</td>
<td></td>
</tr>
<tr>
<td><strong>No of employees:</strong></td>
<td>The actual or average number of employees employed for the period under review.</td>
</tr>
</tbody>
</table>
Annexure 3

Safety, Health and Environment: Example of risk management report

Proudly prepared by

EMPOWERisk (Pty) Ltd

October 2018
Safety, Health and Environment (SHE): Example of risk management report

Please note that this is an example only and all information is fictitious.

XYZ Construction

SHE risk management report for the period January 2014 to March 2014

1. Introduction

We trust that this quarterly SHE Risk Management report will provide a clear picture of the company’s performance as far as occupational health, safety and environment is concerned.

The first quarter of 2014 generally reflected an improvement in injury experience and indicates a decline in the number of injuries. Although Building was the only division where there was an increase in compensation claims, figures are still well down from the average 2013 figures. A sub-contractor experienced one fatality.

All divisions are eagerly awaiting the final implementation during May 2014 of the new electronic SHE Management system that will provide the tools to implement the SHE programme and make it available to all management and supervisory staff.

2. Incident statistics

2.1 Compensation Incident Frequency Rate (CIFR)

\[
\text{CIFR} = \frac{\text{No of compensation claims} \times 200\,000}{220\,\text{person hours} \times \text{No of employees}}
\]

![Graph showing CIFR, XYZ average, and Industry average from July to March 2014]
2.2 Disabling Injury Incidence Rate (DIIR)

\[
\text{DIIR} = \frac{\text{No disabling injuries} \times 200\,000}{\text{Person hours worked}}
\]

2.3. Other major incidents

Three other major incidents were experienced in the period under review:

2.3.1. A major trench collapsed at Job. 00123: XYZ Head Office, Braamfontein: No personnel injured, extensive damage to foundations: 3 days delay.

2.3.2. A concrete dumper ran away when its brakes failed. It smashed into the glass façade of the building on Job 00332: McDonalds, Randburg. The driver jumped off and was not injured. Cost of damage to façade: R45 000.

2.3.3. A storage hut on Job 00567: BP Petrol Station, Swartruggens was demolished by fire when the night watchman made a fire inside the storage hut which contained concrete vibrators and leveling machines. Cost of replacing the hut and machines: R30 000.

3. Risk areas

The following items of concern need priority consideration by management:

3.1. New employees must undergo pre-employment medical examinations to:
   - protect XYZ from possible claims at a later stage
   - ensure that only capable persons are employed
   - prevent injuries and illness in the workplace
   - enhance XYZ image

3.2. Vehicle drivers and plant operators must be instructed to inspect their vehicles daily before start-up using the prescribed checklists to ensure that these are safe to operate and in good condition.
4. **Risk assessments**

Three SHE risk assessments were conducted in February and March:

<table>
<thead>
<tr>
<th>Job No.</th>
<th>Location</th>
<th>Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>00432</td>
<td>Gilooly's Mall</td>
<td>56%</td>
</tr>
<tr>
<td>00786</td>
<td>Cullinan Head Office</td>
<td>83%</td>
</tr>
<tr>
<td>00589</td>
<td>Cleveland Station</td>
<td>76%</td>
</tr>
</tbody>
</table>

5. **Training**

One hundred and forty two employees, representing 7% of employees, attended nine training courses. *Our objective is to train 5.5% of employees on a quarterly basis.*

<table>
<thead>
<tr>
<th>Month</th>
<th>No. of Employees Trained</th>
<th>Course</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>26</td>
<td>Induction</td>
<td>Internal</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>OH&amp;S Reps</td>
<td>Consultant</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Crane Drivers</td>
<td>External</td>
</tr>
<tr>
<td>February</td>
<td>23</td>
<td>Induction</td>
<td>Internal</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>OH&amp;S Reps</td>
<td>Consultant</td>
</tr>
<tr>
<td>March</td>
<td>43</td>
<td>Induction</td>
<td>Internal</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>OH&amp;S Reps</td>
<td>Consultant</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Bomag Rollers</td>
<td>Supplier</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>First Aiders</td>
<td>St. John's</td>
</tr>
</tbody>
</table>

6. **Legal matters**

6.1. An inspector of the Department of Labour issued an improvement notice on Job 00987: Gilooly's Mall. The notice requires that all scaffolding comply with the SABS standards for the Erection and Maintenance of Access Scaffolding (SANS 085). This is currently being attended to and the inspector will return on 15 April 2014 to ascertain if the notice has been complied with.

7. **Occupational health matters**

7.1 **HIV Aids**

The proposed clinic will soon be operational and we will then be able to send our employees who have tested positive for HIV/Aids to the clinic for counseling and eventual treatment when necessary.

The mobile clinic attended to and tested fifty employees on a voluntary basis at 3 sites this month. Eighteen of them tested positive.
7.2 Tuberculosis (TB)

The mobile clinic will be calling at Gillooly’s Mall and Cleveland Station on 15 and 16 April 2014 respectively to screen employees for TB.

7.3 Noise

All suspected noise pollution areas have been identified and tested and the results are awaited. Employees working in areas testing over 85dBa will be issued with suitable hearing protectors.

8. Environmental measures

Inspectors from the Botswana Department of Environment visited Djwaneng and inspected the site and yard. They gave it a “clean bill of health” and advised that we should increase the dust control measures by spraying roads three times per day with water instead of the present twice per day.

9. Achievements and awards

9.1 The client at Djwaneng (Job 00786) awarded the XYZ site first position in the housekeeping competition conducted bi-monthly by the client’s SHE managers. The project manager and his team are to be congratulated for this sterling effort.

9.2 Job 0987: Refurbishment of Pretoria Main Railway Station has just completed 1 million compensation claim free days. This was no easy achievement if we consider the conditions being worked under after the extensive fire that caused major damage.

SHE Risk Manager

2014-03-31

Source: SAFCEC Occupational Health and Safety Committee
Guide to risk assessments

1. Nine steps to effective risk assessments

Step 1: Identifying the current as well as emerging hazard, risks or exposures.
Step 2: Aim to identify major hazards, don’t waste time on the minor and detail except if such hazard has the potential be repeat itself on a frequent basis.
Step 3: Involve as many people as possible in the ongoing risk assessment process especially those at risk.
Step 4: Gather all the information and analyse it.
Step 5: Look at what actually could or has occurred including non-routine operations.
Step 6: Use a systematic approach to ensure all hazards are adequately addressed.
Step 7: Assess the risks identified or the risk has occurred by taking into account the effectiveness of current as well as controls under consideration.
Step 8: Ensure the process is practical, realistic, cost and business effective.
Step 9: Always record the assessment in writing including i.e. assumptions, date and why a particular decision has been made.

2. How serious is it?

<table>
<thead>
<tr>
<th>Probability</th>
<th>Consequences</th>
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<tbody>
<tr>
<td>A Common</td>
<td>1 Fatality or permanent disability.</td>
</tr>
<tr>
<td>B Has Happened</td>
<td>2 Major injury.</td>
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<tr>
<td>C Could Happen</td>
<td>3 Average Lost Time Injury.</td>
</tr>
<tr>
<td>D Not Likely</td>
<td>4 Minor Injury.</td>
</tr>
<tr>
<td>E Practically impossible</td>
<td>5 Medical Treatment or less.</td>
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<td>C 3</td>
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<td>D 4</td>
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<td>E 5</td>
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<th>Consequence</th>
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<td>5 5 6 7 8 9</td>
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<thead>
<tr>
<th>Risk rating</th>
<th>Action</th>
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<tr>
<td>1 - 3 =</td>
<td>Serious Immediate (within 1 week).</td>
</tr>
<tr>
<td>4 - 5 =</td>
<td>High Within 1 month.</td>
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<tr>
<td>6 - 7 =</td>
<td>Moderate &gt; 4 weeks.</td>
</tr>
<tr>
<td>8 - 9 =</td>
<td>Acceptable No action but will consider from time to time.</td>
</tr>
</tbody>
</table>
National Department of Health

Annexure 5

List of risk assessments

Proudly prepared by

EMPOWERisk (Pty) Ltd

October 2018
List of risk assessments

Aggregate/Sand Delivery
Arc welding
Brickwork
Compressed gas cylinders-handling
Compressors – Air
Cutting of pipes
Demolition
Distribution boards – Electrical
Drivers – of vehicles
Electrical installation – Maintenance of
Excavation work
Fire prevention and protection
Gas welding-cutting operations
Hand and spray painting
Hand tools
Kerb laying
Landscaping
Levelling – of materials
Loading supervisor
Loading/unloading - of trucks
Making of steel items
Material delivery
Material handling
Placing concrete
Plastering
Portable ladders
Scaffolding
Site establishment
Traffic control
Trenches – Digging of
Use of portable electrical tools
Work in fall risk positions
Working close to existing services i.e. electrical, waste water etc
Working close to traffic
Working in inclement weather
C3.3: HIV/AIDS AWARENESS SPECIFICATION
SECTION

HIV/AIDS SPECIFICATION

HIV/AIDS REQUIREMENTS

1 SCOPE

This specification contains all requirements applicable to the Contractor for creating HIV/AIDS awareness amongst all of the Workers involved in this project for the duration of the construction period, through the following strategies:

• Raising awareness about HIV/AIDS through education and information on the nature of the disease, how it is transmitted, safe sexual behaviour, attitudes towards people affected and people living with HIV/AIDS, how to live a healthy lifestyle with HIV/AIDS, the importance of voluntary testing and counselling, the diagnosis and treatment of Sexually Transmitted Infections and the closest health Service Providers;

• Informing Workers of their rights with regard to HIV/AIDS in the workplace;

• Providing Workers with access to condoms and other awareness material that will enable them to make informed decisions about sexual practices.

2 DEFINITIONS AND ABBREVIATIONS

2.1 Definitions

Service Provider: The natural or juristic person recognised and approved by the Department of Public Works as a specialist in conducting HIV/AIDS awareness programmes.

Service Provider Workshop Plan: A plan outlining the content, process and schedule of the training and education workshops, presented by a Service Provider which has been approved by the Representative/Agent.

Worker: Person in the employ of the Contractor or under the direction or supervision of the Contractor or any of his Sub-contractors, who is on site for a minimum period of 30 days in all.

2.2 Abbreviations

HIV : Human Immunodeficiency Virus.

AIDS : Acquired Immune Deficiency Syndrome.

STI : Sexually Transmitted Infection.

3 BASIC METHOD REQUIREMENT

3.1 The Contractor shall, through a Service Provider, conduct onsite workshops with the Workers.
The Service Provider shall develop and compile a Service Provider Workshop Plan to be presented at the workshops and which will be best suited for this project to achieve the specified objectives with regard to HIV/AIDS awareness.

The Service Provider Workshop Plan shall be based on the following information provided by the Contractor:

- Number of Workers and Sub-contractors on site;
- When new Workers or Sub-contractors will join the construction project;
- Duration of Workers and Sub-contractors on site;
- How the maximum number of Workers can be targeted with workshops;
- How the Contractor prefers workshops to be scheduled, e.g. three hourly sessions per Worker, or one 2.5 hour workshop per Worker;
- Profile of Workers, including educational level, age and gender (if available);
- Preferred time of day or month to conduct workshops;
- A Gantt chart reflecting the construction programme, for scheduling of workshops;
- Suitable venues for workshops.

The Contractor shall submit the Service Provider Workshop Plan for approval within 21 days after the tender acceptance date. After approval by the Representative/Agent, the Contractor shall make available a suitable venue that will be conducive to education and training.

3.2 The Service Provider Workshop Plan shall address, but will not be limited to the following:

3.2.1 The nature of the disease;
3.2.2 How it is transmitted;
3.2.3 Safe sexual behaviour;
3.2.4 Post exposure services such as voluntary counselling and testing (VCT) and nutritional plans for people living with HIV/AIDS;
3.2.5 Attitudes towards other people with HIV/AIDS;
3.2.6 Rights of the Worker in the workplace;
3.2.7 How the Awareness Champion will be equipped prior to commencement of the HIV/AIDS awareness programme with basic HIV/AIDS information and the necessary skills to handle questions regarding the HIV/AIDS awareness programme on site sensitively and confidentially;
3.2.8 How the Service Provider will support the Awareness Champion;
3.2.9 Location and contact numbers of the closest clinics, VCT facilities, counselling services and referral systems;
3.2.10 How the workshops will be presented, including frequency and duration;
3.2.11 How the workshops will fit in with the construction programme;
3.2.12 How the Service Provider will assess the knowledge and attitude levels of attendees to structure workshops accordingly;
3.2.13 How the video will be used;
3.2.14 How the Service Provider will elicit maximum participation from the Workers; 3.2.15 A questions and answers slot (interactive session).

The Service Provider Workshop Plan shall encompass the Specific Learning Outcomes (SLO) as stipulated.
4 HIV/AIDS AWARENESS EDUCATION AND TRAINING

4.1 Workshops

The Contractor shall ensure that all Workers attend the workshops.

The workshops shall adequately deal with all the aspects contained in the Service Provider Workshop Plan. A video of HIV/AIDS in the construction industry, which can be obtained from all Regional Offices of the Department of Public Works, is to be screened to Workers at workshops. In order to enhance the learning experience, groups of not exceeding 25 people shall attend the interactive sessions of the workshops.

4.2 Recommended practice

4.2.1 Workshop Schedule

Presenting information contained in the Service Provider Workshop Plan can be divided in as many workshop sessions as deemed practicable by the Contractor, provided that all Workers are exposed to all aspects of the workshops as outlined in the Service Provider Workshop Plan.

Breaking down the content of information to be presented to Workers into more than one workshop session however, has the added advantage that messages are reinforced over time while providing opportunity between workshop sessions for Workers to reflect and test information. Workers will also have an opportunity to ask questions at a following session.

4.2.2 Service Providers

A database of recommended Service Providers is available from all Regional Offices of the Department of Public Works.

4.2.3 HIV/AIDS Specific Learning Outcomes and Assessment Criteria

Workers shall be exposed to workshops for a minimum duration of two-and-a-half hours. In order to set a minimum standard requirement, the following specific learning outcomes and assessment criteria shall be met.

4.2.3.1 UNIT 1: The nature of HIV/AIDS

After studying and understanding this unit, the Worker will be able to differentiate between HIV and AIDS and comprehend whether or not it is curable. The Worker will also be able to explain how the HI virus operates once a person is infected and identify the symptoms associated with the progression of HIV/AIDS.

Assessment Criteria:
1. Define and describe HIV and AIDS;
2. List and describe the progression of HIV/AIDS.

4.2.3.2 UNIT 2: Transmission of the HI virus

After studying and understanding this unit, the Worker will be able to identify bodily fluids that carry the HI virus. The Worker will be able to recognise how HIV/AIDS is transmitted and how it is not transmitted.
Assessment Criteria:
1. Record in what bodily fluids the HI virus can be found;
2. Describe how HIV/AIDS can be transmitted;
3. Demonstrate the ability to distinguish between how HIV/AIDS is transmitted and misconceptions around transmittance of HIV/AIDS.

4.2.3.3 UNIT 3: HIV/AIDS preventative measures

After studying and understanding this unit, the Worker will comprehend how to act in a way that would minimise the risk of HIV/AIDS infection and to use measures to prevent the HI virus from entering the bloodstream.

Assessment Criteria:
1. Report on how to minimise the risk of HIV/AIDS infection;
2. Report on precautions that can be taken to prevent HIV/AIDS infection;
3. Explain or demonstrate how to use a male and female condom;
4. List the factors that could jeopardize the safety of condoms provided against HIV/AIDS Transmission.

4.2.3.4 UNIT 4: Voluntary HIV/AIDS counselling and testing

After studying and understanding this unit, the Worker will be able to recognise methods of testing for HIV/AIDS infection. The Worker will be able to understand the purpose of voluntary HIV/AIDS testing and pre- and post-test counselling.

Assessment Criteria:
1. Describe methods of testing for HIV/AIDS infection;
2. Report on why voluntary testing is important;
3. Report on why pre- and post-test counselling is important.

4.2.3.5 UNIT 5: Living with HIV/AIDS

After studying and understanding this unit, the Worker will be able to recognise the importance of caring for people living with HIV/AIDS and be able to manage HIV/AIDS.

Assessment Criteria:
1. List and describe ways to manage HIV/AIDS;
2. Describe nutritional needs of people living with HIV/AIDS;
3. Describe ways to embrace a healthy lifestyle as a person living with HIV/AIDS;
4. Explain the need for counselling and support to people living with HIV/AIDS.

4.2.3.6 UNIT 6: Treatment options for people with HIV/AIDS

After studying and understanding this unit, the Worker will be familiar with the various treatments available to HIV/AIDS infected or potentially HIV/AIDS infected people.

Assessment Criteria:
1. Discuss anti-retroviral therapy;
2. List methods of treatment to prevent HIV/AIDS transmission from mother-to-child;
3. Describe the need for treatment of opportunistic diseases for people living with HIV/AIDS;
4. Describe post exposure prophylactics.
UNIT 7: The rights and responsibilities of Workers in the workplace with regard to HIV/AIDS

After studying and understanding this unit, the Worker will be able to identify the rights and responsibilities of the Worker living with HIV/AIDS in the workplace. The Worker will recognise the importance of accepting colleagues living with HIV/AIDS and treating them in a non-discriminative way.

Assessment Criteria:
1. Discuss the rights of a person living with HIV/AIDS in the workplace;
2. Discuss the responsibilities of a person living with HIV/AIDS in the workplace;
3. Report on why acceptance and non-discrimination of colleagues living with HIV/AIDS is important.

4.3 Displaying of plastic laminated posters and distribution of information booklets

The Contractor shall obtain a set of four laminated posters conveying different key messages and information booklets. The contractor should include the costs of posters and information booklets in his/her tender price.

The above-mentioned posters and information booklets have been prepared to raise awareness and to share information about HIV/AIDS and STI’s.

Posters or display stands shall be displayed on site as soon as possible, but not later than 14 days after the date of site handover.

Posters shall be displayed in areas highly trafficked by Workers, including toilets, rest areas, the site office and compounds.

The posters on display must always be intact, clear and readable.

Information booklets must be distributed to all Workers as soon as possible, but not later than 14 days after site handover, or as soon as the Worker joins the site.

5 PROVIDING WORKERS WITH ACCESS TO CONDOMS

The Contractor shall provide and maintain condom dispensers and make both male and female condoms, complying with the requirements of SABS ISO 4074, available at all times to all Workers at readily accessible points on site, for the duration of the contract. The Contractor may obtain condom dispensers from the Department of Health and condoms may be obtained from the Local Clinic or the Department of Health.

At least one male and one female condom dispenser and a sufficient supply of condoms, all to the approval of the Representative/Agent, shall be made available on site within 14 days of site handover. Contractors should note that arrangements to obtain condoms from the Department of Health Clinics prior to site handover may be necessary, to ensure that condoms are available within 14 days of site handover.

Condoms shall be made available in areas highly trafficked by Workers, including toilets, the site office and compounds.
6 ENSURING ACCESS TO HIV/AIDS TESTING AND COUNSELLING FACILITIES AND TREATMENT OF SEXUALLY TRANSMITTED INFECTIONS (STI)

The Contractor shall provide Workers with the names of the closest Service Providers that provide HIV/AIDS testing and counselling and Clinics providing Sexually Transmitted Infection (STI) diagnosis and treatment. Information on these Service Providers and Clinics must be displayed on a poster of a size not smaller than A1 in an area highly trafficked by Workers.

7 APPOINTMENT OF AN HIV/AIDS AWARENESS CHAMPION

7.1 Within 14 days of site handover the Contractor shall appoint an Awareness Champion from amongst the Workers, who speaks, reads and writes English, who speaks and understands all the local languages spoken by the Workers and who shall be on site during all stages of the construction period. The Contractor shall ensure that the Awareness Champion has been trained by the Service Provider on basic HIV/AIDS information, the support services available and the necessary skills to handle questions regarding the HIV/AIDS programme in a sensitive and confidential manner.

7.2 The Awareness Champion shall be responsible for:

7.2.1 Liaising with the Service Provider on organising awareness workshops;
7.2.2 Filling condom dispensers and monitoring condom distribution;
7.2.3 Handing out information booklets;
7.2.4 Placing and maintaining posters.

8 MONITORING

The Contractor shall grant to the Representative/Agent reasonable access to the construction site, in order to establish that the Contractor complies with his obligations regarding HIV/AIDS awareness under this contract.

The Contractor must report problems experienced in implementing the HIV/AIDS requirements to the Representative/Agent.

The attached SITE CHECKLIST (SCHEDULE A) shall be completed and submitted at every construction progress inspection to the Representative/Agent.

The attached SERVICE PROVIDER REPORT (SCHEDULE B) shall be completed and submitted on a monthly basis to the Department’s Project Manager, through the Representative/Agent.

The attached CONTRACTOR HIV/AIDS PROGRAMME REPORT (SCHEDULE C), a close out programme report, shall be completed by the Contractor at the end of the contract.
SCHEDULE A: HIV/AIDS PROGRAMME: SITE CHECKLIST

Date of commencement of construction: _________________________  Name of Departmental Project Manager: ____________________________

Please refer to HIV/AIDS Programme activities during the reporting period

<p>| Tick the block if Contractor satisfactorily complied with specifications |
|---------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| DATE                      | PI D | PI M | PI D | PI M | PI D | PI M | PI D | PI M |
| Programme implemented within 14 days of site handover |     |     |     |     |     |     |     |     |
| Awareness champion on site |     |     |     |     |     |     |     |     |
| HIV/AIDS awareness service provider report |     |     |     |     |     |     |     |     |
| Male condom dispenser |     |     |     |     |     |     |     |     |
| Sufficient male condoms available |     |     |     |     |     |     |     |     |
| Male condom dispenser in a highly trafficked area |     |     |     |     |     |     |     |     |
| Female condom dispenser |     |     |     |     |     |     |     |     |
| Sufficient female condoms available |     |     |     |     |     |     |     |     |
| Female condom dispenser in a highly trafficked area |     |     |     |     |     |     |     |     |
| All four types of posters displayed |     |     |     |     |     |     |     |     |
| Posters in a good condition |     |     |     |     |     |     |     |     |
| Posters in a highly trafficked area |     |     |     |     |     |     |     |     |
| Posters displayed on local support services: clinic &amp; VCT centre |     |     |     |     |     |     |     |     |
| Support service poster/s in highly trafficked area |     |     |     |     |     |     |     |     |
| Support service poster/s in a good condition |     |     |     |     |     |     |     |     |</p>
<table>
<thead>
<tr>
<th>Please indicate the applicable number for the reporting period</th>
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<tbody>
<tr>
<td>Workers on payroll (at PI)</td>
</tr>
<tr>
<td>Sub-Contractors who will be on site for longer than 30 days (at PI)</td>
</tr>
<tr>
<td>Workshop attendees</td>
</tr>
<tr>
<td>Number of workshops held</td>
</tr>
<tr>
<td>Scheduled workshops according to approved workshop plan</td>
</tr>
<tr>
<td>Booklets distributed</td>
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<tr>
<td>Male condoms distributed</td>
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<tr>
<td>Female condoms distributed</td>
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_________________________    __________________________
Representative/Agent             Date

_________________________    __________________________
Contractor                     Date
SCHEDULE A

Date of progress inspection: (ccyy/mm/dd)

Reporting period: (ccyy/mm/dd) ________________ to (ccyy/mm/dd) ____________________

Deviations from HIV/AIDS awareness programme plan:

Corrective actions:

Representative/Agent

Date

Departmental Project Manager

Date

Page 3 of 3
SCHEDULE B

HIV/AIDS AWARENESS PROGRAMME: SERVICE PROVIDER REPORT

Reporting period: (ccyy/mm/dd) ________________ to (ccyy/mm/dd) ________________

Number of workshops conducted in reporting period: ______________________________________

Number of scheduled workshops according to approved workshop plan: ______________________

Deviations from workshop plan:

__________________________________________________________________________________

State reasons for deviating from workshop plan:

__________________________________________________________________________________

Corrective actions:

__________________________________________________________________________________

Service Provider

__________________________________________  ________________________________

Date  Date

SCHEDULE B  Page 1 of 3
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Content of workshop:
(Mark the content included)

- SLO1
- SLO2
- SLO3
- SLO4
- SLO5
- SLO6
- SLO7

HIV/AIDS in construction video

Indicate the duration of the workshop in hours

Total number of Workers

Indicate workshop venue
### HIV/AIDS AWARENESS PROGRAMME: ATTENDANCE REGISTER

Fill in your name and indicate attendance by ticking the appropriate date

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CONTRACTOR HIV/AIDS PROGRAMME REPORT

Project name: ________________________________________________________________

Project Location: ____________________________________________________________

Contract value of project: R____________________________________________________

Department of Public Works Project Manager: ______________________________________

HIV/AIDS Programme duration: (ccyy/mm/dd) __________________ to (ccyy/mm/dd) __________

AWARENESS MATERIAL

Describe location of posters displayed during the programme: __________________________

__________________________________________________________

Comments on posters: __________________________________________________________

Indicate total number of booklets distributed: _______________________________________

Comments on booklets: __________________________________________________________

CONDOMS

Indicate total number of male condoms distributed: _________________________________

Indicate total number of female condoms distributed: _______________________________

Describe where male condom dispenser was placed: _________________________________

Describe where female condom dispenser was placed: _______________________________

HIV/AIDS WORKSHOPS

Indicate the total number of HIV/AIDS workshops conducted: _________________________

Indicate the duration of workshops: _______________________________________________

Indicate the total number of Workers that participated in the HIV/AIDS workshops: __________

Indicate the total number of Workers that were exposed to the video on HIV/AIDS in the Construction Industry:

___________________________________________________________

Comments on HIV/AIDS workshops on site: _________________________________________

___________________________________________________________
GENERAL

Briefly describe programme activities and satisfaction with outcome:  

________________________________________________________________________  

________________________________________________________________________  

________________________________________________________________________  

________________________________________________________________________  

Additional comments, suggestions or needs with regard to the HIV/AIDS awareness programmes on site:  

________________________________________________________________________  

________________________________________________________________________  

________________________________________________________________________  

________________________________________________________________________  

Please indicate if your company has a formal HIV/AIDS policy focussing on HIV/AIDS awareness raising and care and support of HIV/AIDS Workers:  

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>Currently developing one</th>
</tr>
</thead>
</table>

Please indicate if, to your knowledge, you have lost any workers during the duration of the project to HIV/AIDS related sicknesses. One or more of the following might indicate an HIV/AIDS related death:

- Excessive weight loss
- Reactive TB
- Hair loss
- Severe tiredness
- Coughing or chest pain
- Pain when swallowing
- Persistent
- Fever
- Diarrhoea
- Vomiting
- Meningitis
- Memory loss
- Pneumonia

Contractor

Date

Departmental Project Manager

Date

Schedule C  Page 2 of 2
C3.4: DRAWING AND TECHNICAL SPECIFICATIONS
ELECTRICAL SPECIFICATIONS
PARTICULAR SPECIFICATIONS:

EELP – ELECTRICAL/ELECTRONIC: EARTHING AND LIGHTNING PROTECTION

PRELUDE

This particular specification details the successful supply, manufacturing, factory inspection test at the contractors premises, careful handling / transportation to the clients premises, safe storage as required and successful installation and commissioning for the above mentioned.

The contractor will furthermore responsible to uphold the electrical equipment during the Defects Liability Period.

This particular specification should be read in conjunction with the following:
- Section C3.4 of the tender document – Variation and additions to the Electrical / Electronic standard and particular specifications; and
- Associated drawings as issued with the Tender document; and
- Schedule of Quantities as per project specific.

Whereas conflicts in the above mentioned exits, this should be brought under the attention of the Engineer within a week before the Tender closes.

All materials and equipment to be supplied shall be new and of the best quality available.

All equipment shall bear the SABS mark.
<table>
<thead>
<tr>
<th>EELP</th>
<th>SPECIFICATION</th>
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<tbody>
<tr>
<td>EELP 1</td>
<td>SCOPE OF WORKS</td>
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<tr>
<td>EELP 2</td>
<td>STANDARDS AND TESTS</td>
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<td>EELP 3</td>
<td>GENERAL REQUIREMENTS</td>
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<td>EELP 4</td>
<td>OPERATING CONDITIONS</td>
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<td>EELP 5</td>
<td>GENERAL PRINCIPLES</td>
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<td>EELP 6</td>
<td>AIR-TERMINATION SYSTEM</td>
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<td>EELP 7</td>
<td>LIGHTING PROTECTION SYSTEM</td>
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<tr>
<td>EELP 8</td>
<td>EXTERNAL LIGHTING PROTECTION SYSTEM</td>
</tr>
<tr>
<td>EELP 9</td>
<td>INTERNAL &amp; EXTERNAL LIGHTNING PROTECTION SYSTEM</td>
</tr>
<tr>
<td>EELP 10</td>
<td>EARTH-TERMINATION SYSTEM</td>
</tr>
<tr>
<td>EELP 11</td>
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EELP EARTHING AND LIGHTNING PROTECTION

EELP 1 SCOPE OF WORKS
As specified in the project specifications.

EELP 2 STANDARDS AND TESTS
The earthing and lightning protection shall conform to and be in accordance with the latest applicable South African Bureau of Standards Codes and Standards:

The following Standard Specifications and drawings shall apply;

Table 1: Applicable Standards

<table>
<thead>
<tr>
<th>Standard No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OHSA</td>
<td>Occupational Health and Safety Act</td>
</tr>
<tr>
<td>SANS 10089-1</td>
<td>Electrical Code for Petroleum Industry</td>
</tr>
<tr>
<td>SANS 10121</td>
<td>Cathodic Protection of Buried and Submerged Structures</td>
</tr>
<tr>
<td>SANS 10123</td>
<td>The Control of Undesirable Static Electricity</td>
</tr>
<tr>
<td>SANS 10142</td>
<td>Code of Practice for the wiring of Premises</td>
</tr>
<tr>
<td>SANS 10198-12</td>
<td>Installation of Earthing System</td>
</tr>
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<td>SANS 10199</td>
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</tr>
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<td>The Design and Installation of an Earth Electrode</td>
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<tr>
<td>SANS 10200</td>
<td>Neutral Earthing in Medium Voltage Industrial Power Systems</td>
</tr>
<tr>
<td>SANS 10292</td>
<td>Earthing of Low Voltage (LV) distribution systems</td>
</tr>
<tr>
<td>SANS 10313</td>
<td>The protection of structures against lightning</td>
</tr>
<tr>
<td>SANS 1063</td>
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</tr>
<tr>
<td>SANS 1063</td>
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</tr>
<tr>
<td>SANS IEC 61000-5-2</td>
<td>Electromagnetic Compatibility (EMC) Part 5: Installation and mitigation</td>
</tr>
<tr>
<td>SANS IEC 61024-1</td>
<td>Protection of Structures against Lightning Part 1: General principles</td>
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<tr>
<td>SANS IEC 61024-2</td>
<td>Protection of Structures against Lightning Part 2: Risk Management</td>
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<tr>
<td>SANS IEC 61024-3</td>
<td>Protection of Structures against Lightning Part 3: Physical damage to</td>
</tr>
<tr>
<td></td>
<td>structures and life hazard</td>
</tr>
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<td>SANS IEC 61024-4</td>
<td>Protection of Structures against Lightning Part 4: Electrical and</td>
</tr>
<tr>
<td></td>
<td>electronic systems within structures</td>
</tr>
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<td>SANS IEC 61312-1</td>
<td>Protection against Lightning Electromagnetic Impulse Part 1: General</td>
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<tr>
<td></td>
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</tr>
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<td>SANS IEC 61312-4</td>
<td>Protection against Lightning Electromagnetic Impulse Part 4: Protection</td>
</tr>
<tr>
<td></td>
<td>of Equipment in existing structures</td>
</tr>
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<td>SANS IEC 61643-1</td>
<td>Surge Protective Devices Connected to Low Voltage Power Distribution</td>
</tr>
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<tr>
<td>SANS IEC TS 61312-2</td>
<td>Protection against Lightning Electromagnetic Impulse (LEMP) Part 2:</td>
</tr>
<tr>
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</tr>
<tr>
<td>SANS IEC TS 61312-2</td>
<td>Protection against Lightning Electromagnetic Impulse (LEMP) Part 2:</td>
</tr>
<tr>
<td></td>
<td>Shielding of structures, bonding inside structures and earthing</td>
</tr>
</tbody>
</table>
The lightning protection system shall be designed to protect lives and property from the destructive effects of lightning. The lightning designer shall assess corrosion effects of the lightning protection system and design accordingly.

The installation shall satisfy the requirements of all relevant South African Statutory Regulations.

Where applicable, equipment items shall carry the SABS mark to demonstrate compliance with the regulations.

EELP 3 GENERAL REQUIREMENTS

Equipment and materials to be used, shall be of high quality, and shall comply with all relevant specifications, codes as mentioned in this particular specification as well as the Occupational Health and Safety Act of 1993 (Act 85 of 1993).

Where equipment and material does not comply with the relevant particular specifications it shall be submitted to Engineer for approval before installation.

All materials used for the earthing and lightning protection system shall withstand the electric and electromagnetic effects of lightning current and predictable stresses without being damaged.

Materials and sizes shall be chosen bearing in mind the possibility of corrosion of either the earthing and lightning protection system or the structure to be protected.

The installation shall be in accordance with SANS 10313: Code of Practice for the protection of structures against lightning and the requirements of this specification.

All equipment and material shall comply with the relevant National and International standard standards as listed in the specification. Where equipment does not comply it shall be submitted to the Engineer for approval.

The system of protection will be finials/air terminals, down conductors and earth spike or roof conductors, down conductors and earth spike.

EELP 4 OPERATING CONDITIONS

All material and equipment supplied and fitted must be designed and manufactured for successful operation under the prevailing environmental conditions.

EELP 5 GENERAL PRINCIPLES

Evaluation of Risk: The risk of lightning strike shall be evaluated as described in SANS 10313 and SANS IEC 61024-2.
Effective height of a structure: The effective height of the highest point shall be determined by considering the average height of building, trees and structures and land profile of the surrounding area.

Ground flash density (Ng): The ground flash density (Ng) for general buildings, structures and installations shall be estimated from the average ground flash density given in Annexure C of SANS 10313 as a general guide.

**EELP 6 AIR-TERMINATION SYSTEM**

The air-termination system should be composed of any combination of the following elements:

- Rods;
- Stretched wires;
- Meshed conductors.

For the design of the air-termination system the following methods should be used:

- Protective angle method
- Rolling sphere method
- Mesh size method

The air-termination system shall be designed and installed in accordance with all the relevant SABS / SANS / IEC standards as mentioned in this document.

**EELP 7 LIGHTING PROTECTION SYSTEM**

The requirement of the SANS 62305-3 shall comply for the system. The lighting protection system earthing shall be bonded to the fixed electrical installation protective earthing in accordance with the requirements of SANS 10142-1.

**EELP 8 EXTERNAL LIGHTNING PROTECTION SYSTEM**

The requirement of the SANS 62305-3 and SANS 10313 shall comply for the system. Earth electrodes shall be designed in accordance with SANS 10199.

**EELP 8.1 General**

External down-conductors shall be installed between the air-termination system and the earth termination system.

The average distance between the down-conductors shall comply with SANS IEC 62305-3.

Down-conductors shall be uniformly placed along the perimeter of the structure and with a symmetric configuration. Down-conductors shall be arranged in such a way that from the point
of strike to earth several parallel current paths exist and the length of the current paths is kept to a minimum. The formation of loops shall be avoided.

In order to reduce the probability of damage due to lightning current flowing in the lightning protection system, the down-conductors shall be arranged in such a way that from the point of strike to earth:

a) several parallel current paths exist;
b) the length of the current paths is kept to a minimum;
c) equipotential bonding to conducting parts of the structure is performed according to the requirements

The down-conductor system shall be designed and installed in accordance with all the relevant SABS standards as mentioned in this document.

EELP 8.2  Construction

The down-conductors shall be installed so that, as far as practicable, they form a direct continuation of the air-termination conductors. Down-conductors shall be installed straight and vertical such that they provide the shortest and most direct path to earth.

Down-conductors shall not be installed in gutters or down-spouts even if they are covered by insulating material.

Down-conductors of an lightning protection system not isolated from the structure to be protected may be installed as follows:

a) wall is made of non-combustible material, the down-conductors may be positioned on the surface or in the wall;

b) wall is made of readily-combustible material the down-conductors may be positioned on the surface of the wall, provided that their temperature rise due to the passage of lightning current is not dangerous for the material of the wall;

c) wall is made of readily-combustible material and the temperature rise of down conductors is dangerous, the down-conductors shall be placed in such a way that the distance between them and the wall is always greater than 0,1 m. Mounting brackets may be in contact with the wall.

When the distance from down-conductor to a combustible material cannot be assured, the cross-section of the conductor shall be not less than 100mm².

EELP 8.3  Natural components

The following parts of the structure should be considered as natural down-conductors:

a) The metal installations provided that:

The electrical continuity between the various parts is made durable in accordance with SANS 62305-3.
Their dimensions are at least equal to that specified in SANS 62305-3 for standard down conductors.

b) the metal of the electrically-continuous reinforced concrete framework of the structure;

c) the interconnected steel framework of the structure;

d) the facade elements, profile rails and metallic sub-constructions of facades, provided that Dimensions conform to the requirements for down-conductors shall be as SANS 62305-3 and that for metal sheets or metal pipes thicknesses shall be not less than 0,5mm.

Electrical continuity in a vertical direction conforms to the requirements of the SANS 62305-3.

EELP 8.4 Test Joints

At the connection of the earth termination, a test joint should be fitted on each down conductor, except in the case of natural down-conductors combined with foundation earth electrodes. For measuring purposes, the joint shall be capable of being opened with the aid of a tool. In normal use it shall remain closed.

The joint should be capable of being opened with the aid of a tool for measuring purposes, but normally it should be closed.

EELP 9 INTERNAL & EXTERNAL LIGHTNING PROTECTION SYSTEM

The SANS 62305-3 shall apply. For the protection against over-voltages of internal systems, see SANS 62305-4.

EELP 10 EARTH-TERMINATION SYSTEM

The design shall cater for the dispersion of the lightning current into the ground, whilst minimizing any potentially dangerous over-voltages, the shape and dimensions of the earth-termination system are the important criteria.

The lightning protection system earthing shall be bonded to the fixed electrical installation protective earthing in accordance with the requirements of SANS 10142-1. **ALL EARTHING AND BONDING ABOVE GROUND SHALL BE DONE WITH KWENA-ANTI THEFT CABLE.**

The requirements of SANS 62305-3 apply with the additions given in 10.2 and 10.3. Earth rods shall comply with the requirements of SANS 1063, and earth electrodes shall be installed in accordance with the requirements of SANS 10199. Specific attention is drawn to the requirements for explosive manufacturing and storage areas.

**ALL EARTHING AND BONDING ABOVE GROUND SHALL BE KWENA ANTI-All earthing and Bonding may it be above ground**
EELP 10.1 Earth Resistivity and Electrode

Necessary earth resistivity tests on site, and invite to the Engineer for inspections must be arranged. Tests will be in accordance with the requirements of BS 1013.

After all earth electrodes/trench earth’s have been installed, an earth megger shall be used to test the earth resistance at the earth bar or connection point to the main station earth and the results recorded. Note that all ECC connections, and any other bonding material shall be disconnected from the earth connection point whilst the earth is being tested.

The following are the maximum acceptable earth electrode resistances: Electrical Earth
a) Main substation - 1 ohm
b) Buildings Ring Earth - 1 ohm
c) Transformer Yard - - 1 ohm
d) Miniature substations and kiosks - 1 ohm
e) High masts - 5 ohms
f) Instrument Earth - < 1 ohm

EELP 10.2 Type B Arrangement

Type B arrangement as per SANS IEC 62305-3 shall be used.

Ring conductor external to the structure which will be in contact with the soil for at least 100% of its total length, or a foundation earth electrode. Earth electrodes may also be meshed.

The number of electrodes shall not less than the number of the down-conductors, with a minimum of two.

EELP 10.3 Installation of earth electrodes

The embedded depth and the type of earth electrodes shall be such as to minimize the effects of corrosion, soil drying and freezing and thereby stabilize the conventional earth resistance.

The requirements of SANS 62305-3 apply with the additions given in 10.2 and 10.3.

Earth rods shall comply with the requirements of SANS 1063, and earth electrodes shall be installed in accordance with the requirements of SANS 10199.

EELP 11 COMPONENTS

Components of an lighting protection system shall be manufactured from the materials listed in SANS IEC 62305-3 or from other materials with equivalent mechanical, electrical and chemical (corrosion) performance characteristics.

Earth electrodes shall be designed in accordance with SANS 10199.

EELP 11.1 Fixing
Air-terminations and down-conductors shall be firmly fixed so that the electrodynamic or accidental mechanical forces will not cause conductors to break or loosen as per SANS IEC 62305-1.

EELP 11.2 Connections

The number of connections along the conductors shall be kept to a minimum. Connections shall be made secure by such means as brazing, welding, clamping, crimping, seamng, screwing or bolting. Connections of steelwork within reinforced concrete structures shall conform to SANS IEC 62305-3.

EELP 12 EQUIPOTENTIAL BONDING

Equipotentialization shall be achieved by interconnecting the lightning protection with all structural metal parts, all below indicated but limited to the following:

a) metal installations,
b) internal systems,
c) external conductive parts and lines connected to the structure.

Have a nominal cross-sectional area of at least 2,5 mm² copper or equivalent for indoor, and outdoor shall be aluminium, the conductors will be either cast in to the concrete or shall be so arranged that it cannot be tampered with.

EELP 12.1 Lightning equipotential bonding for external conductive parts

For external conductive parts, lightning equipotential bonding shall be established as near as possible to the point of entry into the structure to be protected.

Bonding conductors shall be capable of withstanding the lightning current flowing through them evaluated in accordance SANS IEC 62305-1 and SANS 10142.

The requirements of SANS 62305-3 and SANS 10142 shall apply. For the protection against over-voltages of internal systems, see SANS 62305-4.

EELP 12.2 Lightning equipotential bonding for internal systems

Lightning equipotential bonding shall be installed strictly according to SANS 10313, SANS 10142 and SANS IEC 62305-3.

EELP 12.3 Lightning equipotential bonding for lines connected to the structure to be protected

Lightning equipotential bonding for electrical and telecommunication lines shall be installed in accordance with 6.2.3 of SANS IEC 62305-3.

EELP 13 TOUCH AND STEP VOLTAGES

The requirements of SANS 62305-3 apply.
EELP 14 RISK MANAGEMENT

The requirements of SANS 62305-2 apply. The Contractor shall allow for the purchase of the spreadsheet-based risk calculator which has been developed by IEC TC 81 (see annex E in SANS 62305-2:2011). The software program can be purchased directly from the IEC and shall be submitted as proof of design.

EELP 15 MAST PROTECTION FOR THATCHED ROOFS

The requirements of SANS 62305-3 shall apply with the additions given in 11.2 to 11.7. Metals used in the construction of a thatched roof shall be bonded and earthed. Water pipes, vent pipes, tanks, gas pipes, antennas, telephone and bell wires, burglar alarms and electrical wiring and conduit within 1 000 mm of the thatch shall be shielded, bonded and earthed as per SANS 10142-1.

EELP 15.1 Dangerous Sparking

Dangerous sparking between an lightning protection system and a metal, an electrical or a telecommunication installation can be mitigated which is detailed SANS 62305-3.

EELP 15.2 Ageing of thatch

Ageing of the thatch, flammable gases could evolve within the thatch and the thatch could ignite.

EELP 15.3 Metals in or on the thatch

The requirements of SANS 62305-3 shall apply.

EELP 15.4 Protection by masts

At least lightning protection level III (see SANS 62305-3) shall apply in the case of thatched structures.

EELP 15.5 Earthing of masts

All free-standing masts shall be earthed in accordance SANS 10199, and shall comply with SANS 62305-3.

EELP 16 STRUCTURES WITH EXPLOSIVE OR FLAMMABLE SUBSTANCES

The requirements of SANS 62305-3 apply with the additions given in 12.2 and 12.3.

EELP 17 DESIGN REQUIREMENTS
The requirements of SANS 62305-3 and SANS 10313 shall apply.

EELP 18  **INSPECTION OF LIGHTING PROTECTION SYSTEM**

The requirements of SANS 62305-3 apply and all required forms shall be in place for Engineers inspection. An Installation safety report see annex A of SANS 10313 shall be issued in respect of an inspected and compliant lighting protection system by the lighting protection system designer and installer.

EELP 19  **DANGER SIGNS**

Danger signs on aluminium plates shall be supplied on each door and shall be in accordance with the Occupational Health and Safety Act, Act 85 of 1993.

EELP 20  **EARTH BAR**

A copper earth bar shall be provided and mounted not less than 40mm from the wall or fixed structure approximately 1000mm above the final floor level and final position will be confirmed with Engineer in the position as indicated on the drawings and agreed on site. The mounting shall be electrically insulated from the wall.

A solid 200 mm x 30 mm x 5mm copper earth bar shall be provided. The earth bar shall be provided with 6 x 6mm holes evenly spaced along the entire length. 6 mm $\phi$ cadmium plated high tensile steel bolts complete with nuts and lock-washers shall be provided for each hole. Serrated washers shall not be used between the copper earth bar and the lug.

The earth bar shall be connected with a 70mm² Kwena Anti-Theft conductor to the building earth-termination system (system earth mat) and the tenderer shall allow for 100m of Kwena Conductor to the earth bar for tender purpose.

EELP 21  **INFORMATION TO BE SUBMITTED BY THE SUCCESSFUL TENDERER**

The successful Tenderer /Contractor shall submit three prints of the under mentioned drawings to the engineer for approval, before manufacturing.

a) Earthing and Lightning Protection drawings.

b) Multiview Projections including elevations showing dimensional information including details such as, but not limited to, the following:

- Front views
- Side views
- Rear view
- Floor plan view
- Roof view

All drawings will be obtainable from the Engineer.
c) Structure descriptions which will be indicated on Multiview protections and elevations showing the following:
- All Bonding
- All Earthing and Lightning Protection equipment.
- Earth Mat locations
- Conductor Network
- Fixings
- Air terminals
- Conductor Joint clamps
- Earth Electrode Positions
- Earth Inspection Pits
- Other information as required for approval

d) Conduit locations

e) Unit descriptions including information such as, clamps, conductor sizes, earth electrode depth, earth inspection pits all as mentioned above (item c).

f) Design and manufacturer Engineers approved drawings shall be provided to the Engineer in PDF format.

g) Data sheets and publications on all major components including, but not limited to, the following:
- Aluminium Conductor
- KWENA Bonding Conductors
- Clamps
- Control power transformers
- Pilot devices
- Relays
- All clarifications and exceptions must be clearly identified

After completion of the work, the contractor shall submit three final copies of each of the above-mentioned drawings showing the final layout / as built.

EELP 22 MEASUREMENT AND PAYMENT

Measurement and payment will be done in accordance with the methods stated below:

EELP 22.1 Design, Drawings and General

The rate tendered shall include for the provision of the necessary design information for all items measured under the respective schedule. Earthing and Lightning Protection System installation, design information shall include, but limited to, the following:

- Manufacturer's product data of lightning protection and earthing and all related components.
- Dimensioned and Professional Engineer signed drawings of lightning and earthing system showing accurately scaled basic units including, but not necessarily limited to,
auxiliary compartments, unit components and combination units all as specified under PEL 20.

<table>
<thead>
<tr>
<th>Pay Item</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Provide design drawings and design information for Earthing and</td>
<td>Sum</td>
</tr>
<tr>
<td>Lightning Protection System</td>
<td></td>
</tr>
<tr>
<td>(b) Provide operating and maintenance manuals and “as built” drawings as</td>
<td>Sum</td>
</tr>
<tr>
<td>specified</td>
<td></td>
</tr>
<tr>
<td>(c) Provide risk management calculations and IEC Program as specified</td>
<td>Sum</td>
</tr>
</tbody>
</table>

**EELP 22.2 Supply and Delivery to Site**

Rate tendered to include for all material, equipment, plant, testing apparatus, labour, manufacturing, factory applied corrosion protection, factory acceptance testing, transport, import duties, handling and possibly double handling, delivery to and off-loading at Site as well as temporary storage prior to installation. For miniature substation, the rate tendered shall be for the complete miniature substation and shall include, but not limited to, the detailed in this particular specification. Any special devices shall be listed separately in Variations and Additions to the Standard and Particular Specifications Section C3.4.2.

<table>
<thead>
<tr>
<th>Pay Item</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Supply and delivery to site of lightning protection / down conductor</td>
<td>Sum</td>
</tr>
<tr>
<td>system complete as specified, inclusive of all connection points,</td>
<td></td>
</tr>
<tr>
<td>terminals, interconnections, bonding points and test points for the</td>
<td></td>
</tr>
<tr>
<td>entire system, including for “natural components.</td>
<td></td>
</tr>
<tr>
<td>(b) Supply and delivery suitable earth-termination system /earth mat</td>
<td>Sum</td>
</tr>
<tr>
<td>as specified</td>
<td></td>
</tr>
<tr>
<td>(c) Supply and delivery suitable earth bar as specified</td>
<td>Each</td>
</tr>
</tbody>
</table>

**EELP 22.3 Installation**

Rate tendered to include for all plant, tools, labour, rigging, handling, placing into position, aligning, fixing, grouting, but not limited to and getting ready for testing and commissioning

Install of earthing and lightning protection system shall be accordance with the manufacturer's written instructions and recognized industry practices, to ensure that the earthing and lightning protection system complies with the requirements and serves the intended purposes. Comply with the requirements of SABS and IEC standards and applicable portions of "Standard of Installation", for installation of earthing and lightning protection system but not limited to.

<table>
<thead>
<tr>
<th>Pay Item</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Site installation of lightning protection / down conductor system</td>
<td>Sum</td>
</tr>
<tr>
<td>complete as specified, inclusive of all connection points, terminals,</td>
<td></td>
</tr>
</tbody>
</table>
interconnections, bonding points and test points for the entire system, including for “natural components.

(b) Site installation of suitable earth-termination system / earth mat as specified

(c) Site installation of suitable earth bar as specified

(d) Earthing resistance survey upon completion of the excavations and test report

**EELP 22.4 Commissioning**

Rate tendered to include for the drafting of the necessary testing and commissioning plans, attendance of required local and/or overseas specialists, testing apparatus, instruments and equipment, any/all equipment required for testing purposes and to prove performance, any/all temporary works, and compilation of final commissioning report.

Contractor shall submit three copies to the Engineer. Contractor shall notify the Engineer one week in advance of the test so that the Engineer may be present.

<table>
<thead>
<tr>
<th>Pay Item</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Commissioning of complete lightning protection system, inclusive of down conductor, earth-mat and earth spikes, etc.</td>
<td>Sum</td>
</tr>
<tr>
<td>(b) Certificate of compliance of lightning protection system</td>
<td>Sum</td>
</tr>
</tbody>
</table>
PARTICULAR SPECIFICATIONS:

EG&M: ELECTRICAL/ELECTRICAL – GENERAL AND MISCELLANEOUS

PRELUDE

This particular specification details the successful supply, manufacturing, factory inspection test at the contractors premises, careful handling / transportation to the clients premises, safe storage as required and successful installation and commissioning for the above mentioned.

The contractor will furthermore responsible to uphold the electrical equipment during the Defects Liability Period.

This particular specification should be read in conjunction with the following;
- Section C3.4 of the tender document – Variation and additions to the Electrical / Electronic standard and particular specifications; and
- Associated drawings as issued with the Tender document; and
- Schedule of Quantities as per project specific.

Whereas conflicts in the above mentioned exits, this should be brought under the attention of the Engineer within a week before the Tender closes.

All materials and equipment to be supplied shall be new and of the best quality available.

All equipment shall bear the SABS mark.
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EG&M ELECTRICAL DISTRIBUTION SYSTEM

EG&M 1 STANDARDS

The following standards, regulation and drawings, etc. shall be applicable to the electrical installations related to this particular specification, whereas the latest applicable South African Bureau of Standards Codes and Standards should be used;

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<thead>
<tr>
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<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SANS 1507</td>
<td>Electrical cables with extruded solid dielectric insulation for fixed installations (300/500 V to 1900/3300V)</td>
</tr>
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<td>SANS 10199</td>
<td>The design and installation of an earth electrode</td>
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<td>SANS 10292</td>
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<td>SANS 60947-5-2</td>
<td>Low-voltage switchgear and control gear Part 5-2: Control circuit devices and switching elements - Proximity switches</td>
</tr>
</tbody>
</table>

EG&M 2 GENERAL REQUIREMENTS

EG&M 2.1 LAWS, REGULATIONS AND CODES OF PRACTICE TO BE OBSERVED

The work shall be carried out strictly in accordance with the following laws and regulations where applicable;

a) The latest edition of "Code of Practice for the Wiring of Premises", SANS 10142, as amended;
b) Occupational Health and Safety Act (Act No. 85 of 1993);
c) The "Electricity Supply By-Laws and Regulations" of the Local Supply Authority;
d) The local Fire-Office Regulations;
e) The Requirements of the Department of Communications;
f) The Acts and Regulations applicable to the use of explosives;
g) "The Code of Practice for the Installation and Maintenance of Electrical Equipment used in Explosive Atmospheres"

The Contractor will be responsible for serving all notices and paying all fees due in terms of the above laws and regulations.
EG&M 2.2 RADIO AND TV INTERFERENCE

All equipment installed under this Contract shall comply with the Government Notice No. R.2246 and any other applicable rules and regulations in respect of radio and TV interference. Any equipment found producing interference subsequent to commissioning, shall be suppressed or replaced to the satisfaction of the Engineer without any additional cost.

EG&M 2.3 INTERCHANGEABILITY

All equipment must be manufactured to such close tolerances that all similar components and spares must be fully interchangeable without any further alterations or adjustment being necessary.

EG&M 2.4 WATER AND DEBRIS ACCUMULATION

All outdoor equipment shall be designed so that water and debris will not readily accumulate to cause deterioration of equipment or an electrical discharge hazard. Where this cannot be avoided, such places shall be easily accessible for cleaning.

EG&M 2.5 COLOUR AND FINISHING

All metal parts of equipment shall either be finished in baked enamel or powder coating or galvanized (depending on the circumstances) after manufacture and treatment to SANS 064.

Colours of paint to be used shall be confirmed with the Engineer prior to application.

All steel areas subjected to corrosive atmospheres must be hot dip galvanized. The galvanizing must be clean, smooth, of uniform thickness and unblemished. The galvanizing must not affect the mechanical properties of the covered metal.

All drilling, welding, cutting and bending must be complete and the metal must be cleaned of any machining blemishes, mill scale, rust and lubricants before galvanizing. If site trimming, drilling and cutting cannot be avoided then all such denuded surfaces must be dressed with a cold galvanizing paint.

The Engineer must approve any other proposed corrosion protection before it is applied.

Galvanized areas must be kept free of lubricants.

Wire must be galvanized.

EG&M 2.6 INSPECTIONS AND TESTS

All equipment will be inspected by the Engineer and tested in his presence both in the factory during manufacturing and on site during installation. The Engineer will do all inspections accompanied by the Contractor and the Contractor will do all tests with the Engineer as witness.

The Engineer will require seven (7) days notification to avail himself for any test or inspection and the Contractor must arrange for the maximum number of inspections and tests to be done
on the same day. The Contractor must provide all testing facilities and instruments, all equipment required for a test or inspection and all safety clothing prescribed by the Engineer.

The instruments must have valid test certificates issued by an accepted testing authority and the results of the test done must be recorded on a test certificate, of which the Engineer must receive two copies. The Engineer reserves the right to call for a calibration test on any instruments used during the test.

The cost of all tests must be included in the tender price.

**EG&M 2.7 PERFORMANCE TESTS**

On completion of erection and installation the Contractor must carry out the following tests, where applicable, in addition to any other tests, which may be specified elsewhere:

**Before commissioning**
- Cable Insulation test.
- Earth continuity test.
- Tests for correct direction of rotation of motors and reverse if necessary.
- Test for correct operation of control gear, setting of overload protection equipment, etc.
- The Contractor must obtain SABS test certificates for samples of insulating oil in HT switchgear and transformers. These certificates must be submitted to the Engineer.

On completion of installation and putting into proper operation all the plant and equipment, the Contractor will be required to make suitable arrangements for the testing of all plant and equipment supplied under this Contract and running the plant for at least one week, during which time he shall also train all the operators in the correct running of the plant. He shall also explain the maintenance manuals to the operator during this time.

The entire cost of testing, including supply of test equipment, must be borne by the Contractor and an adequate allowance for such tests must be made in the Tendered price.

**EG&M 2.8 OPERATING AND MAINTENANCE INSTRUCTIONS**

Before completion of the testing of the plant, the Contractor shall provide the Employer with adequate and complete working, operating and maintenance instructions in triplicate, with the necessary drawings and diagrams clarifying the instructions.

Instructions are to be made up in book form and particular reference is to be made to:
- Maintenance of equipment;
- Precautions to be taken in running the plant;
- All instruments and components must be fully described in data sheets supplied by the relevant suppliers;
- Wiring diagrams of the complete electrical installation.

The manual must be specific for the plant supplied and all extraneous material not connected with the relevant plant shall be deleted, leaving the manual as a comprehensive coherent document, bound in a professional way such that this may be used frequently without falling
apart. Standard pamphlets may be supplied as addendums, bound separately in a good quality file to serve as reference but will not be allowed as part of the main manual.

The format for the operating and maintenance manual is described in detail elsewhere in this document.

N.B. The prices Tendered in the Schedule of Prices will be held to include for the supply of these operating and maintenance instructions.

**EG&M 2.9 SPARES**

Tenderers shall submit on the appropriate Schedule in this document a list of spare parts and special tools, which is recommended and should be kept by the Employer for maintenance of the plant. Spares, which the Employer decides to order, must be manufactured simultaneously with the rest of the equipment and be subjected to the same tests for dimensions, tolerances, strength, etc. All spares and special tools must be packed separately and the cases appropriately marked. All spares and special tools must be new and unused and where possible should be standard to all sections of the plant.

**EG&M 2.10 LABELS AND INSCRIPTIONS**

The standard labels on equipment regarding the manufacturer, type, class, rating etc., shall be accepted unchanged.

Engraved laminated plastic labels shall however be provided to indicate a numbering system for relays, fuses, links, lights and selector and control switches and shall correspond to the wiring diagram numbering system. These labels shall be fixed with screws, bolts or rivets.

**EG&M 2.11 NAME TAGS**

Identification tags shall be attached to all equipment, sub-assemblies, components such as instruments, fuses etc., cable ends etc. The tags shall be screwed on with brass or plated steel screws (no self-tapping screws will be permitted). Where it is not possible to use screws such as on the cables, other means of attachment must be submitted for approval to the Engineer.

Cables shall be tagged at either end, whether the end terminates in a distribution board or an end box.

All cable cores and internal panel wiring shall be identified at both ends by means of durable colour coded wire marking ferrules in accordance with numbering systems in cable and wiring diagrams. Only closed ring interlocking type identification ferrules shall be used.

Outdoor tags shall be of stainless steel or brass type.

Tags mounted indoors or protected by an enclosure shall be made of Ivorene or similar sandwich material with black letters on a white background.

All lettering and text shall be approved by the Engineer.
Letter sizes must be compatible with the application, e.g.

- For fuses, terminals, relays etc: 3 to 5 mm
- For panels or cubicles: 12 to 20 mm
- For switchboard or MCC board names: about 50 mm
- For building or structure names: about 80 mm

**EG&M 3**

**EMERGENCY STOP PUSH BUTTONS AND WEATHERPROOF ISOLATORS**

Each of these units shall consist of a totally enclosed outdoor type heavy duty "push and turn to lock" stop push button station with a cable gland entry at the bottom to accommodate a 4 core 2,5mm² LT PVC SWA PVC cable.

This push button station and weatherproof isolator shall be mounted on a rigid 1 meter high grade 304 stainless steel pedestal with 2mm radius rounded edges, designed to be bolted to a concrete floor. (Refer to the relevant drawing.)

An emergency stop push button station shall be installed near the coupling between each motor and its associated pump and shall be connected to the relevant starter panel via the specified cable to stop the motor.

The pedestal shall be securely bolted to the floor by means of stainless steel foundation bolts grouted into the concrete and care shall be taken to ensure that it is installed plumb.

Emergency stop pedestals for submersible pump sets shall be large enough to accommodate a motor cable termination box to facilitate submersible motor cables on DIN rail mounted termination blocks.

**EG&M 4**

**CONDUCTOR ENDS**

**EG&M 4.1 NUMBERING OF CONDUCTOR ENDS**

Every conductor end whatsoever, with the exception of AC power cables at any terminal shall be numbered.

These numbers shall correspond with those on the circuit diagram and shall consist of the slip on type numbering system (clipped on numbering system will not be accepted). It shall not be possible to remove the number holder without damaging it or cutting off the lug.

**EG&M 4.2 CONNECTION OF CONDUCTOR ENDS**

All conductors whatsoever shall be connected at terminals by means of lugs and/or ferrules suitable for the specific conductor and terminal.
EG&M 5  EARTHING

The contractor shall do all the bonding and earthing in accordance with the latest addition of the "Code of Practice for the Wiring of Premises" SABS 10142.

EG&M 6  LIGHTNING PROTECTION

EG&M 6.1  PLANT

The lightning protection of the lighting structures, poles and plant of the works, including all the buildings and handrails on the new plant, form part of this contract.

The lightning protection must be a SABS approved scheme and SABS approved drawings of the scheme must be submitted to the Engineer.

EG&M 7  SURGE PROTECTION

Tenderers shall allow in their Tender prices for adequate protection of the equipment supplied and installed under this contract against direct as well as induced voltage surges and spikes which may be experienced on the system.

Surge arrestors shall be provided on each phase as well as neutral on the incoming power supply terminals of each board.

All arrestors shall be connected directly to earth along the shortest possible route and only conductors of adequate rating for the discharge currents catered for shall be used for connections to arrestors.

Tenderers shall submit full particulars of the arrestors offered as well as written confirmation that it will provide adequate protection for the relevant equipment against possible voltage surges and spikes on the system.

EG&M 7.1  SURGE PROTECTION UNITS

The following surge arrestors shall be supplied and installed for surge protection complete with base element.

EG&M 7.1.1  MAIN SUPPLY PROTECTION.

Single Din rail mounted mains surge arrestors shall be supplied and installed for each phase and neutral conductor of an electrical board. The surge arrestors shall be of sufficient voltage rating and shall withstand a max discharge current of 8/20 magnitude and 40kA rating.
EG&M 8 NOTICES AND DANGER PLATES

EG&M 8.1 SCOPE

This specification deals with the provision of Notices and Danger Plates as required in terms of the Occupational Health and Safety Act No. 85 of 1993, as well as any other notices that may be required by law or by the nature of the finished Works.

The following standard specifications are referred to in this specification:

- SANS 10140; Parts I to IV: Identification colour marking.
- SANS 1186: Symbolic safety signs.
- Occupational Health and Safety Act No 85 of 1993

EG&M 8.2 MATERIALS AND FINISH

Outdoor signs shall be either of vitreous enameled type or of cast aluminum with raised or embossed letters.

Indoor notices shall be of non-deteriorating plastic, Perspex or fiberglass.

The colours and sizes of letters and colours of background shall be in accordance with requirements of SANS 0140 and as approved by the Engineer.

Symbolic signs shall conform to the requirements of SANS 1186.

Signs shall be pre-drilled for fixing.

All fixing accessories shall be of non-corrosive material.

EG&M 8.3 INSTALLATION AND ERECTION

The Contractor shall supply and fix permanently in position the signs and notices required by law for all the relevant working areas of the Works. The Engineer shall as prescribed by the relevant Regulations and as agree positions of signs.

EG&M 9 FIRE EXTINGUISHERS

5kg CO2 and powder fire extinguishers shall be supplied and installed in all pump stations and treatment plant buildings in accordance with the requirements of the Local Authority.

EG&M 10 MEASUREMENT AND PAYMENT

Measurement and payment will be done in accordance with the methods stated below:
### EG&M 10.1 SUPPLY AND DELIVERY TO SITE

<table>
<thead>
<tr>
<th>Pay Item</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>Supply and delivery to site of emergency stop stations</td>
</tr>
<tr>
<td>(b)</td>
<td>Supply and delivery to site of emergency stop stations with built in motor cable termination box</td>
</tr>
<tr>
<td>(c)</td>
<td>Supply and delivery to site of fire extinguishers</td>
</tr>
<tr>
<td>(d)</td>
<td>Supply and delivery to site of all notices as may be required and specified</td>
</tr>
<tr>
<td>(e)</td>
<td>Supply and delivery to site of all earthing requirements in terms of hand rails and building lightning protection as required and specified</td>
</tr>
</tbody>
</table>

### EG&M 10.2 INSTALLATION

<table>
<thead>
<tr>
<th>Pay Item</th>
<th>Unit</th>
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</tbody>
</table>

### EG&M 10.3 COMMISSIONING

<table>
<thead>
<tr>
<th>Pay Item</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>Commissioning of emergency stop stations</td>
</tr>
<tr>
<td>(b)</td>
<td>Commissioning of emergency stop stations with built in motor cable termination box</td>
</tr>
</tbody>
</table>
PEDESTAL FOR EMERGENCY STOP AND START STATIONS ONLY

Square key lock on cover

Procress welded to channel

Square key lock on cover

Cover

Unfolded material consisting of 2mm thick gr. 304 s/s sheet.

Folded view

Weld

Motor number

Folded section showing base plate and cover in position. Base plate to consist of 250 x 250 x 6mm thick gr. 304 s/s plate with cutout to suit pedestal.

PEDESTAL FOR EMERGENCY STOP STATIONS ONLY
PARTICULAR SPECIFICATIONS:

EMCA – ELECTRICAL/ELECTRONIC: MULTICORE CABLES AND EARTH WIRES

PRELUDE

This particular specification details the successful supply, manufacturing, factory inspection test at the contractors premises, careful handling / transportation to the clients premises, safe storage as required and successful installation and commissioning for the above mentioned.

The contractor will furthermore responsible to uphold the electrical equipment during the Defects Liability Period.

This particular specification should be read in conjunction with the following:

- Section C3.4 of the tender document – Variation and additions to the Electrical / Electronic standard and particular specifications; and
- Associated drawings as issued with the Tender document; and
- Schedule of Quantities as per project specific.

Whereas conflicts in the above mentioned exits, this should be brought under the attention of the Engineer within a week before the Tender closes.

All materials and equipment to be supplied shall be new and of the best quality available.

All equipment shall bear the SABS mark.
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PCA

MULTICORE CABLES AND EARTH WIRES

EMCA 1
SCOPE OF WORKS
As specified in project specifications

EMCA 2
STANDARDS AND TESTS

Cables shall conform to and be in accordance with the latest applicable South African Bureau of Standards Codes and Standards:

The following Standard Specifications and drawings shall apply:

<table>
<thead>
<tr>
<th>Standard No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SANS 97</td>
<td>Electric cables - Impregnated paper-insulated metal-sheathed cables for rated voltages 3,3/3,3 kV to 19/33 kV</td>
</tr>
<tr>
<td>SANS 1339</td>
<td>Electric cables - Cross-linked polyethylene (XLPE) insulated cables for rated voltages 3,8/6,6 kV to 19/33 kV</td>
</tr>
<tr>
<td>SANS 1507</td>
<td>Electrical cables with extruded solid dielectric insulation for fixed installations (300/500 V to 1900/3300V)</td>
</tr>
<tr>
<td>SANS 1713</td>
<td>Electric cables - Medium-voltage aerial bundled conductors for voltages from 3,8/6,6 kV to 19/33 kV</td>
</tr>
<tr>
<td>SANS 10142</td>
<td>Code of Practice for the wiring of Premises</td>
</tr>
</tbody>
</table>

EMCA 3
CONSTRUCTION DETAILS

EMCA 3.1
LOW VOLTAGE CABLES

All multi core cables shall be stranded metal annealed copper conductor, PVC insulated, PVC bedded, single wire armoured and PVC sheathed in accordance with SANS 1507 as amended to date for cables with copper conductors and insulated for 500/3300 volt grade.

Cables for status and analogue signals shall consist of the requisite size and number of copper twisted pairs, individually and overall screened, PVC sheathed, steel wire armoured and PVC covered, complying with the requirements of SANS 1507 where applicable.

Cables and earth wires for a specific application shall be selected strictly in accordance with the requirements laid down in SANS 10142 in respect of current rating and voltage drop. Where practicable the earth continuity conductor shall form an integral part of the cable.

EMCA 3.2
MEDIUM VOLTAGE CABLES

These cables shall be manufactured in accordance with NRS. 013-1991 and comply with SANS 97 - 1991. All the 11 kV cables shall have copper conductors and shall be suitable for use on an unearthed system.
Three core cables shall be of the fully impregnated belted type. The cable shall have a helical fibrous bedding, lead alloy E sheath, single wire armour and a PVC serving as laid down in the Variations and Additions to the Standard and Particular Specifications, all in accordance with SANS 97 - Table 18. Single core cable shall be fully impregnated, screened general purpose cable with copper conductors suitable for an earthed system. The cables shall be in accordance with Table 11 of SANS 97, shall have a lead alloy E sheath and a PVC anti-electrolytic over sheath. (Type PEC)

**EMCA 3.3 FIBRE OPTIC CABLES**

The cables shall have a GRP centre strengthening member, colour coded fibres in gel filled loose tubes, surrounded by interstitial water blocking gel, aramid strengthening member, paper binder, polyethylene bedding sheath, plastic coated corrugated steel type armour and polyethylene water resistant outer sheath.

The steel armour shall be polymer coated and bonded to the sheath.

The fibre shall be manufactured from pure silica cladding, minimally doped with Phosphorous and Fluorine to achieve a matched cladding and a graded Germanium doped silica core. The primary coating shall consist of two layers of UV curable acryline resin.

Attenuation uniformity shall be checked at both 850nm and 1300nm with a pulse width not exceeding 1 micro s. Fibres with points or steps of discontinuity greater than 0,3dB shall be rejected. For fibre lengths in excess of 1km the attenuation coefficient over the length of fibre shall not vary by more than 0,3dB/km.

The fibre shall withstand a mechanical strain of at least 8N for 1 second and shall have an attenuation increase of less than 0.005dB/turn under a bend resistance test using 100 turns around a 75mm diameter mandrel.

The fibre optic cable shall be of the multi mode type with fibre size of 50/125 for multi mode operation. Single mode cables shall be acceptable for longer distance communication paths.

**EMCA 4 JOINTING OF CABLES**

**EMCA 4.1 LOW VOLTAGE CABLES**
Joints will only be allowed where more than one full drum length of cable is necessary to complete a specific circuit and must be restricted to the absolute minimum. All joints shall be made to the best practice by competent cable jointers using first class material. The contractor shall maintain the electrical continuity of the armouring in an approved manner at all straight through joints.

Heat shrinkable cable joint kids that will suit the relevant cable size shall be used for all low voltage cable joints.

**EMCA 4.2 MEDIUM VOLTAGE CABLES**

On 11 kV cables, straight joints shall be made by means of heat-shrinkable straight through joints for unearthed paper insulated cables up to 11 kV. All cable joint kits shall comply with NRS 053 Specifications.

The joints shall be made to the manufacturer's instructions and with materials stipulated in such instructions.

The cores of the cable shall be joined colour to colour or number to number.

**EMCA 4.3 FIBRE OPTIC CABLES**

Joints in fibre optic cable must be avoided as far as possible due to losses in signal strength when jointed.

The joints shall be made to the manufacturer's instructions and with materials stipulated in such instructions.

**EMCA 5 TERMINATION OF CABLES**

**EMCA 5.1 LOW VOLTAGE CABLES**

Low voltage cables shall be terminated with cable glands manufactured of bronze and comprising a barrel with sealing washer and bush nut screwed into one end and a compression nipple with wire clamping ring screwed onto the other end. The opposite end of the compression nipple must have a male electrical thread with locknut. The glands shall be suitably sized for the relevant cables, be of the adjustable type complete with armour clamps and with watertight neoprene shrouds.

Cable terminating glands for outdoor use shall be IP68 rated and provided with waterproofing double inner seals as well as waterproofing seals on nipples. Cable termination glands for high humidity and possible temporary water submerged conditions as for instance in filter lower gallery areas at water treatment plants shall also be IP68 rated with waterproofing double inner seals as well as waterproofing seals on nipples.

Cable armouring shall be earthed at each end but may not be used as earth continuity conductor.
EMCA 5.2 MEDIUM VOLTAGE CABLES

Medium voltage cable terminations shall be heat shrinkable termination kits and shall comply with NRS 053 Specifications.

The cable terminations shall be made to the manufacturer's instructions and with materials stipulated in such instructions.

EMCA 5.3 FIBRE OPTIC CABLES

Fibre optic cables shall be terminated by means of suitable glands, ST connections and bus terminals capable of direct connection to the bus interfaces on the bus stations. These bus stations will be housed in separate panels of various motor control centres.

EMCA 6 CONCRETE CABLE SLABS

The cable slabs supplied and installed under this Contract shall be formed solidly out of concrete with steel reinforcing and shall have dimensions of 1 000 x 350 x 100 mm. Alternative block sizes will be considered. The following concrete mixture is desired:

1. Portland cement (dry) - 1 part per volume
2. Clean dry river sand - 3 parts per volume
3. Crushed stone (size 10 mm) - 6 parts per volume

EMCA 7 CABLE TRAYS AND CABLE LADDERS

Heavy duty cable trays and cable ladders manufactured from hot dipped galvanised steel or grade 304 stainless steel, as specified in the Variations and Additions to the Standard and Particular Specifications, shall be supplied and installed as indicated on the drawings. The height of the cable ladder sides shall be 76 mm with the width to suit the number and size of cables to be installed.

EMCA 8 INSTALLATION OF CABLES

EMCA 8.1 CABLE TRENCHES

The contractor will be responsible for the excavation, bedding, back-filling, consolidating and making good of all cable trenches along the routes indicated on the drawings, with the exception of those sections of the cable routes where it is specifically indicated on the accompanying drawings that open cable ducts will be provided by others. The Contractor however will be responsible for the bedding and filling soil in cable ducts where necessary. A sealing screed to cover the cable duct shall be provided by others unless otherwise stated in the Variations and Additions to the Standard and Particular Specifications and relevant drawings.
NOTE: Tenderers shall acquaint themselves fully with the nature and formation of the ground in which the cables are to be laid, before submitting a Tender. No subsequent claim for extras due to lack of knowledge in this respect will be entertained by the Employer.

Cable trenches for L.T. power and lighting cables shall be deep enough to facilitate the laying of these cables at a depth of 750 mm below final ground level.

Trenches for H.T. power cables shall be deep enough to facilitate the laying of these cables at a depth of 1 m below ground level. The floors of all cable trenches shall be smooth and free from boulders and sharp rock projections.

Plastic danger tape shall be installed in all cable trenches 300 mm above the cables for cable protection during future excavations.

Each cable shall be laid in a bedding of river sand or sifted soil 75 mm over and 75 mm below the cable. Clayey soil will not be accepted as bedding.

No cable trench shall be back-filled before the cable(s) in the trench has been inspected and approved by the Engineer.

**EMCA 8.2 UNDER GROUND CABLE PIPES**

Cable pipes will be supplied and installed by others unless indicated otherwise on the drawings.

Each cable pipe shall be sealed by the Contractor under this Contract at both ends by means of bitumen impregnated jute bags or similar material, after the cable has been installed.

**EMCA 8.3 CABLE SLABS**

Where electrical cables cross above other services such as water pipes, sewerage pipes, other electrical cables, pilot cables and telephone cables or where danger exists that cables may be damaged due to excavations by others cables shall be protected by means of reinforced concrete slabs. The concrete slabs shall protect the cable for at least 0.5 m in both directions of the crossing.

Where electrical cables cross underneath other services such as water pipes, sewerage pipes, post office cables etc. a concrete slab shall be placed above and axial with the other service and should the free space between the two services be less than 300 mm an additional slab shall be placed axial with the electrical cable between the two services.

Where cables are laid down a grading and a possibility exist that the cables might be washed open due to rain, then cable slabs shall be placed on top of the cables for the entire length of the grading.

The concrete slabs shall be supplied and installed under this Contract.

**EMCA 8.4 CABLE CROSSING WITH OTHER SERVICES**

**EMCA 8.4.1 GENERAL**
Where a cable is laid above another service it shall not be less than 750 mm below ground level, and if this is not possible, the cable shall be laid underneath the other service and shall be protected by means of concrete slabs in the manner prescribed. The deeper or shallower positions of the cable shall only apply for a distance of 1 m on both directions of the crossing.

If not possible to cross underneath the other service the matter shall be referred to the Engineer for a decision.

**EMCA 8.4.2 CLEARANCES**

The following minimum clearances shall be maintained between electrical cables and other services:

<table>
<thead>
<tr>
<th>Service</th>
<th>Vertical</th>
<th>Horizontal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telkom cables</td>
<td>0,3m</td>
<td>0,3m</td>
</tr>
<tr>
<td>Other water pipes</td>
<td>0,3m</td>
<td>0,3m</td>
</tr>
<tr>
<td>Sewerage pipes</td>
<td>0,3m</td>
<td>0,8m</td>
</tr>
<tr>
<td>Storm water pipes</td>
<td>0,3m</td>
<td>0,6m</td>
</tr>
<tr>
<td>Other Electrical cables</td>
<td>150mm</td>
<td>150mm</td>
</tr>
</tbody>
</table>

**EMCA 8.5 CABLES MUST BE LAIRED WITHOUT DELAY**

The cables shall be laid with the minimum of delay in order to backfill the trenches as soon as possible.

The Contractor shall, however not backfill the trench until each length of cable has been tested, inspected and approved by the Engineer.

Only one cable shall be laid at a time and the Contractor shall ensure that cables already laid are not damaged.

**EMCA 8.6 METHOD**

All cables shall be handled with the utmost care and shall be laid in accordance with the best methods observed in good modern practice. All cables shall be run out on rollers in order to prevent abrasion and no cable shall be dragged along the ground. No cable shall be bent to a radius of less than 12 times its overall diameter.

a) In Concrete Ducts

Cables shall be laid neat parallel with each other on the floor of the duct with the maximum spacing. Any other cables shall be installed on cable ladders secured to the vertical sections of the cable ducts.

b) On cable ladders

Cable shall be installed neat and parallel with each other with the maximum spacing. On Horizontal sections the cables shall be secured to the cable ladders with intervals of not more than 2m. On vertical sections or where the cable ladders are installed at an angle the cables
shall be secured to the cable ladders with intervals of not less than 500mm with suitable strapping material approved by the Engineer.

Either stainless steel or hot dipped galvanized steel cable strapping material shall be used on outdoor cable installations depending on the cable rack or ladder material.

Sections of the cable ladders shall be electrically connected and provision shall be made for crimping and expansion of the racks.

c) In Trenches

Two or more L.T. cables in the same trench shall be laid in a straight line and in parallel and not less than 75mm apart between cable route turning points, except where otherwise approved. Cable routes shall always follow routes parallel to permanent structures to facilitate as built information.

H.T. cables in the same trench shall be laid parallel and not less than 150mm apart, except where otherwise approved.

All L.T. power cables shall be laid 750mm below final ground level and H.T. power cables shall be laid 1 m below final ground level.

The contractor shall provide 3m slack at each end in each run of power cable and its associated earth wire and bury the same in the ground as near to the relevant end as possible. Where the cables and earth wires are to be installed in open ducts outside buildings, the slack shall be coiled in the ducts.

The separation between any signal cable and the nearest parallel power cable shall not be less than 150mm.

d) Against Walls

Cables and earth wires to be installed on walls, where approved by the Engineer, shall be neatly installed on heavy-duty hot dipped galvanized steel cable racks. Cables and earth wires on outside walls shall be installed in a similar manner or in suitably sized hot dipped galvanised conduit from 300 mm below up to 2,4 m above final ground level or as required. These conduits shall be secured to the walls by means of hot dipped galvanised steel bat holders at intervals not exceeding 600 mm. (Hospital Saddles).

Saddles shall only be secured by means of round-headed hot dipped galvanized screws and plugs of an approved type. (Wood will not be accepted as plugging material.) Plugs will not be allowed in joints between bricks.

e) On Poles

Cables and earth wires to be installed on poles shall be secured to the poles at intervals not exceeding 600 mm by means of 25 mm x 1,5 mm adjustable Grade 304 Stainless Steel straps. Each cable together with its associated earth wire shall be installed in a suitably sized stainless steel pipe or channel from 300 mm below up to 2,4 m above ground level. This pipe or channel shall be secured to the pole by means of 25 mm x 1,5 mm adjustable stainless steel straps at
intervals not exceeding 600 mm. To avoid metallic action between different materials Neoprene rubber strip shall be installed between the pole and the strap.

(a) Cable Channels on Structures and in Buildings

Where cable channels have been provided on structures and in buildings these must be backfilled with river sand by the contractor.

(b) Cables connected to motors and other equipment

Cables and earth wires connected to motors and other equipment shall be secured between the cable channels, cable rack or cable tray to the point of termination by means of a heavy-duty hot dipped galvanised type of cable support. The cable shall be secured to the cable support by means of steel straps or other acceptable strapping material.

EMCA 8.7 INSPECTION OF CABLES AND CABLE TRENCHES

After the cables have been installed and spaced on top of the 75mm thick layer of sand in the trenches, the installation shall first be inspected and approved by the Engineer before the trenches may be refilled. Should the Contractor not meet with the requirement, or if he fails to give the Engineer sufficient notice of an inspection, portions of the trenches or the complete trench shall have to be re-excavated by the Contractor at his own expense for inspection by the Engineer.

A logbook with three copies per page shall be kept by the Contractor on the site, in which each part of the installation that has been inspected can be recorded after inspection and approval.

EMCA 8.8 BACKFILLING OF TRENCHES

Once the cable has been laid, straightened, inspected, approved and covered with the top layer of bedding soil, the trenches shall be backfilled with soil which does not contain more than 40 % rock or shale and will pass through a sieve with 100 mm diameter holes that has been approved by the Engineer.

Back filling of cable trenches shall be done in layers of 150 mm and shall be compacted and consolidated to 95 % modified AASHTO. Test shall be carried out to ensure the required compaction at the cost of Contractor.

The Contractor shall maintain the closed up sections of the cable trenches in a proper, safe condition for the duration of the contract. Where the soil in the trenches subsides it shall be refilled and compacted to the satisfaction of the Engineer.

EMCA 9 INSTALLATION OF CABLE TRAYS AND CABLE LADDERS

The cable ladders shall be secured on suitable lengths which shall be suspended from the roof slab by means of suitable lengths 8 mm dia threaded hot dipped galvanized steel rods or secured to the walls with suitable sized hot dipped galvanized steel Rawl type bolts and shall be secured to the channel sections by means of two hot dipped galvanized nuts and washers.
The different parts of the trays and ladders must be thoroughly bonded electrically and mechanically to each other.

The cable trays and ladders shall be installed neatly, level and square/parallel to walls.

Cable straps suitable for the specific cable shall be employed to secure the cable onto the tray. Outdoor cable straps shall be stainless steel and cables shall be secured on intervals not exceeding 600mm. Cables on cable trays or ladders in outdoor environments shall be covered with removable cable tray or ladder covers of similar material.
EMCA 10  CABLE SUPPORTS TO MOTORS AND OTHER EQUIPMENT

Cables to motors and other electrical equipment shall be supported by means of hot dipped galvanized cantilever brackets and cable supports. Cables shall be strapped to these supports by means of acceptable strapping material.

EMCA 11  WIRE TRUNKING

Heavy duty hot dipped galvanized wire trunking of sufficient dimensions shall be installed against all large capacity pump set concrete plinths for installation of pump set protection sensor monitoring cables. The monitoring cables shall be installed in hot dipped galvanized conduit from the trunking to the sensor position.

EMCA 12  SENSOR TERMINATION CUBICLE

All large capacity pump set sensor cables shall be terminated in a powder coated mild steel frame mounted termination cubicle with lockable front door secured against the pump set plinth. DIN rail mounted cable conductor termination blocks shall be installed inside the termination cubicle for cable conductor termination.

EMCA 13  CABLE MARKERS

Cable ends shall be properly labelled with reference to equipment, section of plant and other requirements specified by the client at both cable ends.

Cable markers with lead labels cast into the top of the cable markers shall be supplied and installed along the cable routes under this Contract as follows:

Along straight runs of the route, not further than 25 m apart;

At turns - one on each side of the turning point, 900 mm from such turning points;

At each branch, 3 markers - i.e. one on each side of the branch, 900 mm from the branch.

The cable markers shall be installed deep enough to ensure that the top of the marker will protrude 50 mm above final ground level.

EMCA 13.1  NAME TAGS

Identification tags shall be attached to all cable ends. The tags shall be secured to cables by means of cable ties to the approval to the Engineer.

Cables shall be tagged at either end, whether the end terminates in a distribution board or an end box.
All cable cores and internal panel wiring shall be identified at both ends by means of durable colour coded wire marking ferrules in accordance with numbering systems in cable and wiring diagrams. Only closed ring interlocking type identification ferrules shall be used.

Outdoor tags shall be of stainless steel or brass type and shall be secured by means of similar strapping material.

Tags mounted indoors or protected by an enclosure shall be made of Ivorene or similar sandwich material with black letters on a white background.

All lettering and text shall be approved by the Engineer.

Letter sizes must be compatible with the application and shall not be smaller than 8mm.

a) Cable Naming Convention

<table>
<thead>
<tr>
<th>ABC</th>
<th>ABC</th>
<th>123</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cable Number</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cable Destination</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cable Source</td>
</tr>
</tbody>
</table>

b) Table of Areas

Example of area abbreviations:

- ILW - Inlet works
- IMC - Inlet motor control centre

<table>
<thead>
<tr>
<th>Cable Number</th>
<th>From</th>
<th>To</th>
<th>Grade (V)</th>
<th>Size mm²</th>
<th>No. of cores</th>
<th>Length (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ILW-IMC-001</td>
<td>Inlet works</td>
<td>Inlet motor control centre</td>
<td>400</td>
<td>185</td>
<td>4</td>
<td>55</td>
</tr>
<tr>
<td>IMC-SCR-001</td>
<td>Inlet works MCC</td>
<td>Screen 01</td>
<td>400</td>
<td>10</td>
<td>4</td>
<td>25</td>
</tr>
</tbody>
</table>

EMCA 14 WARNING TAPES

Warning tape shall be installed along all trench excavated cable routes 300mm above the cables.

Warning tape shall have a minimum width of 300mm and have a bright orange colour with the wording “Danger”. The minimum thickness shall be 800 gauge.
EMCA 15  EARTH WIRES

Earth wires shall be installed with L.T. cables as and where indicated on the drawings or specified herein and shall consist of bare hard-drawn copper wire.

These earth wires shall be installed at the same depth as the relevant cables, with at least 75 mm clearance between any earth wire and the nearest cable, unless specifically approved otherwise.

No joint will be allowed in any run of earth wire.

Each earth wire shall be terminated at each end by means of a suitably sized bolted lug either sweated or crimped onto the wire. The lugs shall be bolted onto the relevant earth bars or earthing terminals.

EMCA 16  TESTING OF CABLES

EMCA 16.1  LOW VOLTAGE CABLES

On each completed section of laid and jointed cable, the insulation shall be tested to approval with an approved "Megger"-type instrument of not less than 500 V.

EMCA 16.2  MEDIUM VOLTAGE CABLES

On each completed section of laid and jointed high tension cable a high voltage test shall be carried out. The test shall be performed according to SABS 97 of 1991. Alternating or direct current may be used.

A certificate shall be submitted confirming the successful testing of the relevant cable.

EMCA 17  ROUTE PLANS TO BE SUBMITTED BY THE CONTRACTOR

On completion of the works, but before the certificate of completion will be issued, the contractor shall submit to the Engineer, route plans in electronic format indicating in a satisfactory manner:

(a) The exact cable routes with reference to fixed points (e.g. buildings);
(b) The exact lengths of cable (HT and LT) installed between terminating points and between joints where relevant; and
(c) With reference to fixed points the exact positions of cable joints (e.g. buildings).

Electronic copies of the various plans for the marking up of the information required will be supplied to the contractor on request.
EMCA 18 MEASUREMENT AND PAYMENT

The bidder must obtain an electronic Cable Schedule and Schedule of Rates for cables in Microsoft Excel from the engineer. The bidder must complete the Schedule of Rates for cables, this will automatically transfer the Supply, Install and Terminations values for the Cables. From this a total value for each cable will be calculated. A hard copy of the Schedule of Rates must be signed by a person duly authorized to sign and submitted with the returnable schedules. A hard copy of the Cable Schedule must also be signed by a person duly authorized to sign and submitted with the bid. A electronic copy that corresponds with the hard copies must also be submitted to the engineer by the successful bidder.

Measurement and payment will be done in accordance with the methods stated below:

EMCA 18.1 SUPPLY AND DELIVERY TO SITE

<table>
<thead>
<tr>
<th>Pay Item</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Supply and delivery to site of cables, jointing, terminating materials, all earth wires and cable name tags as per the cables schedule supplied electronically</td>
<td>Sum/m</td>
</tr>
<tr>
<td>(b) Supply and delivery to site of cable route markers</td>
<td>Each</td>
</tr>
<tr>
<td>(c) Supply, delivery to site of concrete cable slabs</td>
<td>Each</td>
</tr>
<tr>
<td>(d) Supply, delivery to site of cable trays, ladders and wire trunking</td>
<td>Sum</td>
</tr>
<tr>
<td>(e) Supply, delivery to site of cable supports to motors and other electrical equipment</td>
<td>Sum</td>
</tr>
<tr>
<td>(f) Supply, delivery to site of pump set sensor termination cubicles</td>
<td>Sum</td>
</tr>
<tr>
<td>(g) Supply, delivery to site of cable sleeves</td>
<td>m</td>
</tr>
<tr>
<td>(h) Supply, delivery to site of danger tape</td>
<td>m</td>
</tr>
</tbody>
</table>

EMCA 18.2 INSTALLATION

<table>
<thead>
<tr>
<th>Pay Item</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Installation of cables, jointing, terminating materials, all earth wires and cable name tags as per the cables schedule supplied electronically</td>
<td>Sum/m</td>
</tr>
<tr>
<td>(b) Installation of cable route markers</td>
<td>Each</td>
</tr>
<tr>
<td>(c) Installation of concrete cable slabs</td>
<td>Each</td>
</tr>
<tr>
<td>(d) Installation of cable trays, ladders and wire trunking</td>
<td>Sum</td>
</tr>
<tr>
<td>(e) Installation of cable supports to motors and other electrical equipment</td>
<td>Sum</td>
</tr>
<tr>
<td>(f) Installation of pump set sensor termination cubicles</td>
<td>Sum</td>
</tr>
<tr>
<td>(g) Installation of cable sleeves</td>
<td>m</td>
</tr>
<tr>
<td>(h) Installation of danger tape</td>
<td>m</td>
</tr>
<tr>
<td>(i) Excavating, back filling, consolidation, importation of soil and dumping of all rock and stone removed during excavations including cleaning of cable routes all according to particular specification (including hand excavations where necessary along existing cable routes.</td>
<td>m</td>
</tr>
<tr>
<td>(j) Drilling for sleeves under road surfaces (6m Sleeves)</td>
<td>m</td>
</tr>
</tbody>
</table>
EMCA 18.3 COMMISSIONING

<table>
<thead>
<tr>
<th>Pay Item</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>( a ) Testing and commissioning of cables</td>
<td>Sum</td>
</tr>
<tr>
<td>( b ) Updating, verifying and submission of Electronic Cable schedules with Tag numbers and final agreed lengths</td>
<td>Sum</td>
</tr>
<tr>
<td>( c ) Drawing up of as built cable route plans</td>
<td>Sum</td>
</tr>
</tbody>
</table>
PARTICULAR SPECIFICATIONS:

ESPL – ELECTRICAL/ELECTRONIC: SMALL POWER AND LIGHTING INSTALLATIONS

PRELUDE

This particular specification details the successful supply, manufacturing, factory inspection test at the contractors premises, careful handling / transportation to the clients premises, safe storage as required and successful installation and commissioning for the above mentioned.

The contractor will furthermore responsible to uphold the electrical equipment during the Defects Liability Period.

This particular specification should be read in conjunction with the following;
- Section C3.4 of the tender document – Variation and additions to the Electrical / Electronic standard and particular specifications; and
- Associated drawings as issued with the Tender document; and
- Schedule of Quantities as per project specific.

Whereas conflicts in the above mentioned exits, this should be brought under the attention of the Engineer within a week before the Tender closes.

All materials and equipment to be supplied shall be new and of the best quality available.

All equipment shall bear the SABS mark.
ESPL 12  MEASUREMENT AND PAYMENT.................................................................................. 18
ESPL 12.1  DESIGN, DRAWING AND GENERAL........................................................................ 18
ESPL 12.2  SUPPLY AND DELIVERY TO SITE ...................................................................... 18
ESPL 12.3  INSTALLATION ...................................................................................................... 18
ESPL 12.4  COMMISSIONING .................................................................................................. 18
ESPL – Electrical/ Electronic: SPL Small power and Lighting installations

SPL SMALL POWER AND LIGHTING INSTALLATIONS ON BUILDINGS AND STRUCTURES

ESPL 1 SCOPE OF WORKS
As specified in the Project Specifications.

ESPL 2 STANDARDS
The following standards, regulation and drawings, etc. shall be applicable to the electrical installations related to this particular specification, whereas the latest applicable South African Bureau of Standards Codes and Standards should be used;

Table 1: Applicable Standards

<table>
<thead>
<tr>
<th>Standard No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BS 3676</td>
<td>Switches for household and similar fixed electrical installations. Specification for general requirements</td>
</tr>
<tr>
<td>SANS 156</td>
<td>Moulded-Case Circuit Breakers</td>
</tr>
<tr>
<td>SANS 164</td>
<td>Plug and socket-outlet systems for household and similar purposes for use in South Africa</td>
</tr>
<tr>
<td>SANS 201</td>
<td>Energy Efficiency in Buildings</td>
</tr>
<tr>
<td>SANS 474</td>
<td>Code of practice for electricity metering</td>
</tr>
<tr>
<td>SANS 475</td>
<td>Luminaires for interior lighting, street lighting and floodlighting - Performance requirements</td>
</tr>
<tr>
<td>SANS 890</td>
<td>Ballasts for fluorescent lamps</td>
</tr>
<tr>
<td>SANS 950</td>
<td>Un-plasticized polyvinyl chloride rigid conduit and fittings for use in electrical installations</td>
</tr>
<tr>
<td>SANS 1012</td>
<td>Electric light dimmers</td>
</tr>
<tr>
<td>SANS 1085</td>
<td>Wall boxes for the enclosure of electrical accessories</td>
</tr>
<tr>
<td>SANS 1091</td>
<td>National colour standard</td>
</tr>
<tr>
<td>SANS 1195</td>
<td>Bus bars</td>
</tr>
<tr>
<td>SANS 1213</td>
<td>Mechanical cable glands</td>
</tr>
<tr>
<td>SANS 1239</td>
<td>Plugs, socket-outlets and couplers for industrial purposes</td>
</tr>
<tr>
<td>SANS 1411</td>
<td>Materials of insulated electric cables and flexible cords</td>
</tr>
<tr>
<td>SANS 1619</td>
<td>Small power distribution units (ready boards) for single-phase 230V service connections</td>
</tr>
<tr>
<td>SANS 1765</td>
<td>Machine-made textile floor coverings - Determination of thickness</td>
</tr>
<tr>
<td>SANS 1777</td>
<td>Photoelectric control units for lighting (PECUs)</td>
</tr>
<tr>
<td>SANS 10142</td>
<td>Code of Practice for the wiring of Premises</td>
</tr>
<tr>
<td>SANS 10114-1</td>
<td>Interior lighting Part 1: Artificial lighting of interiors</td>
</tr>
<tr>
<td>SANS 10114-2</td>
<td>Interior lighting Part 2: Emergency lighting</td>
</tr>
<tr>
<td>SANS 60309-1</td>
<td>Plugs, socket-outlets and couplers for industrial purposes Part 1: General requirements</td>
</tr>
<tr>
<td>SANS 60309-2</td>
<td>Plugs, socket-outlets and couplers for industrial purposes Part 2: Dimensional interchangeability requirements for pin and contact-tube accessories</td>
</tr>
<tr>
<td>Standard No.</td>
<td>Description</td>
</tr>
<tr>
<td>---------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>SANS 60570</td>
<td>Electrical supply track systems for luminaires</td>
</tr>
<tr>
<td>SANS 60669-1</td>
<td>Switches for household and similar fixed-electrical installations Part 1: General requirements</td>
</tr>
<tr>
<td>SANS 60669-2-1</td>
<td>Switches for household and similar fixed electrical installations Part 2-1: Particular requirements - Electronic switches</td>
</tr>
<tr>
<td>SANS 60669-2-2</td>
<td>Switches for household and similar fixed electrical installations Part 2-2: Particular requirements - Electromagnetic remote-control switches (RCS)</td>
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<tr>
<td>SANS 60669-2-3</td>
<td>Switches for household and similar fixed electrical installations Part 2-3: Particular requirements - Time-delay switches (TDS)</td>
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<tr>
<td>SANS 60669-2-4</td>
<td>Switches for household and similar fixed electrical installations Part 2-4: Particular requirements - Isolating switches</td>
</tr>
<tr>
<td>SANS 60669-2-5</td>
<td>Switches for household and similar fixed electrical installations Part 2-5: Particular requirements - Switches and related accessories for use in home and building electronic systems (HBES)</td>
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<tr>
<td>SANS 60906-3</td>
<td>IEC system of plugs and socket-outlets for household and similar purposes Part 3: SELV plugs and socket-outlets, 16 A 6 V, 12 V, 24 V, 48 V, a.c and d.c</td>
</tr>
<tr>
<td>SANS 60921</td>
<td>Ballasts for tubular fluorescent lamps - Performance requirements</td>
</tr>
<tr>
<td>SANS 60947-1</td>
<td>Low-voltage switchgear and control gear Part 1: General rules</td>
</tr>
<tr>
<td>SANS 60947-2</td>
<td>Low-voltage switchgear and control gear Part 2: Circuit-breakers</td>
</tr>
<tr>
<td>SANS 60947-3</td>
<td>Low-voltage switchgear and control gear Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units</td>
</tr>
<tr>
<td>SANS 61084-All</td>
<td>Cable trunking and ducting for electrical installations</td>
</tr>
<tr>
<td>SANS 61347-All</td>
<td>Lamp control gear Part</td>
</tr>
<tr>
<td>SANS 10292</td>
<td>Earthing of low-voltage (LV) distribution systems</td>
</tr>
</tbody>
</table>

**ESPL 3 SPL CABLING AND ACCESSORIES**

**ESPL 3.1 PVC INSULATED CONDUCTORS**

PVC insulated conductors shall be of high conductivity, stranded copper with Polyvinyl Chloride insulation of 600/1 000 volt grade.

The wiring of circuits shall be carried out on the "loop-in" system and no jointing of conductors in conduit runs or cutting away of wire strands will be permissible.

Connectors for use in conduit boxes shall be of the heavy brass terminal type mounted in porcelain insulators.

All plug circuits shall consist of 2 x 4mm² PVC insulated conductors plus 1 x 2,5mm² bare copper earth wire in Ø20mm conduit.

All lighting circuits shall consist of 1,5mm² PVC insulated conductors in 20mm conduit. For fluorescent lights an additional 2,5mm² bare copper earth wire shall be provided and thoroughly bonded to each fitting.
Connections between lamp holders of incandescent fittings and the conduit boxes shall consist of asbestos insulated wire or other approved heat resistant conductors.

**ESPL 3.2 CONDUIT AND CONDUIT ACCESSORIES**

Conduit, conduit accessories and conduit fittings shall be hot-dip galvanized both on the inside and outside.

Only brass bushes and bush nuts will be acceptable.

The conduit installation shall be carried out on the "loop-in" system and no conduit shall have a diameter of less than 20 mm. All conduits shall be built into walls, concrete ceilings etc, and no conduit will be allowed on the surface.

All conduit ends shall be remerged and all joints securely screwed together. No inspection bends or elbows will be allowed in the installation. Running joints may only be used where unavoidable and shall be provided with lock nuts. All screwed joints shall be thoroughly painted with "Red Lead" in order to prevent corrosion.

No conductor may be drawn into any conduit, unless all foreign materials, moisture and sharp edges have been removed.

In event of a conduit terminating in any sheet metal box, two lock nuts and a brass bush or one lock nut and a bush-nut shall be used.

Standard round conduit boxes shall be used for light points and draw boxes. Draw boxes shall be provided with enamelled metal cover plates with brass screws.

Standard 100 x 50 x 50 mm hot dipped galvanised pressed steel boxes shall be used for all switch boxes.

Standard 100 x 100 x 50 mm hot-dipped galvanised pressed steel boxes shall be used for all plug boxes and telephone outlets.

Expansion boxes shall be provided at all expansion joints in the building. Such expansion box shall comprise a flush hot dipped galvanised sheet steel box with blank enamelled steel cover plate secured in position by means of brass screws. The conduit on the one side shall be securely fixed to the box, while the conduit on the other side shall be able to move freely in the box in order to provide for movement of the building. The conduit on the one side shall be bonded to that on the other side inside the box by means of flexible copper connections with clamps, bolts and nuts, in order to ensure earth continuity.

The conduit shall be installed in the concrete ceilings along the shortest possible routes, with the cover plates of draw boxes on the final ceiling surface. Conduit shall be installed as near as possible to the neutral axis of concrete beams, slabs and columns and deep conduit boxes shall be used.
All unwired conduits should be equipped with hot dipped galvanized draw wires with at least 200 mm ends on each end of the conduit. The ends of the draw wire shall be neatly coiled in the draw boxes.

**ESPL 3.3 STANDARD 100 X 100 X 50 MM AND 100 X 50 X 50 MM BOXES**

The above mentioned boxes shall be heavy gauge, hot-dip galvanized, pressed steel boxes.

**ESPL 3.4 COVER PLATES**

All cover plates (switch boxes, plug boxes and draw boxes) should be of baked enamelled steel.

The colour to be approval by the Engineer, with input for the Architect and Client.

**ESPL 4 LIGHTING INSTALLATIONS**

**ESPL 4.1 LIGHT SWITCHES**

Light switches shall comply with SANS 10142 and BS 3676.

Standard mounting box for all light switches: 100 x 50 x 50mm, hot dip galvanized and neat rounded corners

Light switches current rating: >16Amp and suitable for the load it is connected to.

Flush mounted switches: micro type with white rocking lever

Watertight switches to be installed in cast iron boxes, inclusive of watertight cover plates and clearly marked with "ON" and "OFF" positions.

The switch lever shall be protected where it protrudes through the cover plate.

**ESPL 4.2 LIGHT FITTINGS**

Light fittings shall be of the latest technology LED lamps and control equipment as prescribed and the project’s lighting schedules.

Where specified, fluorescent light fittings shall be equipped with electronic ballasts.

Light fittings with filament lamps installations: wiring between the terminal box and the lamp holder shall have heat resisting insulation.
ESPL 4.3 INSECT KILLERS

As specified in the project specifications.

ESPL 5 SMALL POWER INSTALLATIONS

ESPL 5.1 POWER OUTLETS

Plug outlets shall be of the combined 3 pin, 13Amp or 16Amp socket and switch combination, complete with 3-pin switched socket outlet with 3-pin switched 6A euro combo switched socket outlet (as per SANS 164-2:2018).

Type: flush mounted units, with a white rocking lever.

Mounting box: 100 mm x 100 mm x 50 mm and neat rounded corners.

The switch lever shall be protected where it protrudes through the cover plate.

ESPL 5.2 THREE PHASE AND MULTI-PIN PLUG OUTLETS

Three phase plug outlets shall be either;

- 63A, 400V, 5 pin units complete with plug and interlocked isolating switch; or
- 32A, 400V, 7 pin units complete with plug and interlocked isolating switch.

ESPL 5.2.1 ISOLATOR INSTALLATION

Isolation installation: 100x50x50mm, IP 65 weatherproof wall box as indicated on the drawings, as required.

Isolators shall be one of the following and as specified;

- 20A double pole;
- 30A double pole;
- 60A double pole;
- 30A triple pole; or
- 60A triple pole.

Mounting height (kitchens and other areas where cupboards are fitted): 1050 mm AFFL
Mounting height (gate motors): 500mm AFFL

Isolator units to be installed in an accessible location and in close proximity to the particular equipment (ex. air-conditioning units, geysers, extractor fans, gate motors, etc.) and as indicated on the drawings.
ESPL 6 DISTRIBUTION BOARDS

Each of the relevant distribution boards shall be built into walls or securely bolted down on the floor or plinth by means of the requisite number of foundation bolts grouted into the floor in the positions indicated on the drawings.

These positions shall be confirmed with the Engineer on site prior to installation as follows;

a. Contractor shall install distribution board in accordance with manufacturer’s instructions.
b. Contractor shall tighten accessible bus connections and mechanical fasteners to the manufacturer’s torque requirements.
c. Contractor shall select and install fuses in fusible switches based upon field requirements.
d. Contractor shall adjust circuit breaker settings based upon field requirements.
e. Contractor shall adjust solid state overloads to match the installed motor characteristics.

ESPL 6.1 WALL SURFACE MOUNTED TYPE MOUNTED LV DB SPECIFICATIONS

DB board type:
- Surface mounted with doors, 1,6 mm sheet steel, with a bonding tray, chassis and removable panel.

Bonding trays:
- Adequately sized in order that all the relevant equipment is installed without cramping and adequately braced with suitable gaskets.

DB Doors:
- Secured with robust and rust proofed hinges. A single door shall not be wider than 600 mm.
- Rust proofed handles and latches. Ball type batches will not be acceptable.

DB chassis:
- Rigid and facilities shall be provided on the chassis for mounting all the relevant equipment.

Mounted:
- Panels shall be mounted in order that all equipment are flush behind the panel with only operating handles and push buttons projecting through neat machine punched slots in the panel.
- Panels shall be provided with chromium plated brass handles to facilitate removal.
- The panel shall be rigid and readily removable without necessitating the disturbance of any of the equipment on the board.

Colouring:
- Interior surfaces of the board shall be powder coated white.
- Exterior surfaces (including panels) in colour B26, SANS 1091 (Electric orange).
- Powder coating shall be of the best quality with high shock and scratch resistance.
- Before powder coating, metal parts shall be thoroughly degreased and cleaned by shot blasting to be free of rust, mill-scale and other foreign materials.
Gland Plate:
- A 3CR12 steel gland
- Fitted to the bottom section of the board to facilitate termination of cables by means of cable glands.

Busbars:
- Shall consist of tinned solid high conductivity copper mounted on suitable busbar insulators.
- Connections to busbars shall be done with suitable lugs sweated or crimped to the conductor ends, and cadmium plated high tensile steel bolts, nuts and washers.

Copper multiway neutral and earth bars:
- Shall be equipped with cadmium plated high tensile steel bolts, nuts and washers for connection of the various conductors.
- The neutral bar shall be mounted on busbar insulators, but the earth bar shall be thoroughly bonded to the metalwork of the board.

The internal wiring of the boards:
- Done with PVC insulated conductors arranged neatly horizontally, vertically and at right angles in front of the chassis.
- The conductors shall be neatly bunched by means of cable ties. (String will not be acceptable.)

Labelling:
- An engraved plastic label of the black on white sandwich type shall be screwed to the panel below each item of equipment.
- For single pole equipment a number system shall be used.
- A neatly typed legend card behind clear "Perspex" in a metal frame should be provided. The frame shall be mounted on the inside of the switchboard doors.

Sundries:
- All bolts, nuts, washers and screws used on should be rustproof.
- The use of self-tapping screws will not be allowed.

ESPL 6.2 WALL FLUSH OR SEMI-FLUSH MOUNTED DB SPECIFICATIONS

Flush and semi-flush mounted distribution boards shall be manufactured as follows;
- Constructed of 1,2mm sheet steel (minimum) and shall comply with SANS 1180 Part 1.
- Including rust hot dipped galvanised wall tray.
- Braced with of suitable gussets.
- Suitable sized to accommodate equipment without cramping as specified in the schedules.
- Expanded metal to be spot-welded at the rear of all wall trays for 110mm walls.
- Formed with bevelled or flat edges and neatly mitred and shall accommodate the panel chassis and door/s.
- The lip for the mounting of the circuit breaker carriers, and front panels shall form part of the architrave frame.
Panels Door specifications:
- Rigid and manufactured with a smooth flat finish.
- Suitably braced to ensure stiffness,
- Recessed flush in the architrave.
- Door catches shall be equal and similar to "Union" manufacture, as follows;
  - Cat No. 51741 (solid, no lock), or
  - Cat No. 5174 (with built-in lock),
- Single doors to be constructed of sheet steel and shall open at least 150 degrees.
- The distance between panel and inside of door(s) shall be not less than 40mm.

Circuit breaker carriers specifications;
- Rigid construction for mounting of equipment.
- Fixed to the architrave frame and provided with the necessary means for fixing of circuit breakers, isolators, etc.
- Width of carriers for compact circuit breakers shall be such that a distance of 10mm is maintained between the carriers.

Mounted:
- Panels shall be mounted in order that all equipment are flush behind the panel with only operating handles and push buttons projecting through neat machine punched slots in the panel.
- Panels shall be provided with chromium plated brass handles to facilitate removal.
- The panel shall be rigid and readily removable without necessitating the disturbance of any of the equipment on the board.
- Panels shall be attached to architrave by means of captive fasteners (with screw driver slots).
- Self-tapping screws are not acceptable.
- Panels can also be fitted by means of two guiding pins at the bottom or on the hinge side of the door.

Slots for equipment:
- Slots for equipment installed separately shall have the exact dimensions to accommodate only the specific equipment, as per example main switches, earth leakage relays, etc.
- A maximum tolerance of approximately + 1mm shall be maintained on all sides between slots and equipment.

Power meters:
- Where required, power meters shall also be flush mounted behind the panels and Contractors are required to co-operate with the supply Authorities in this respect.

Busbars specifications:
- Consist of solid drawn high conductivity copper with a rectangular cross-section in accordance with SANS 1195 for each phase and neutral and are to be installed in a group in the top section of all distribution boards.
- Busbars to be installed either horizontally or vertically.
• Busbars must be so arranged that horizontal bars are placed one above the other and vertical bars placed side-by-side, with the flat surface facing front wards to facilitate connections and clear of all equipment.

• Where necessary, busbars shall either be twisted to a 45° angle or shall be stepped in the horizontal plane.

• 50mm spacing between bars to be provided.

• A set of busbars should be installed in each section of a distribution board feeding more than two three phase connections including future equipment.

• These busbars shall not be mounted directly onto the terminals of any triple pole circuit breakers, fuse-switches or isolators.

• Busbars shall be mounted on coloured "ceramic" or "paxalene" or similar insulators. Colour of insulators shall be in phase colours, red, white, blue and black for neutral.

• Busbars for single pole circuit breakers shall consist of solid copper with a minimum cross-section of 1,5mm x 19mm and shall be fixed directly to the terminals of the circuit breakers. Single pole circuit breakers should be grouped distinctly separate for the three phases, in horizontal rows (one above the other) in the following sequence, red, white and blue, starting with red on top.

• Connections to busbars shall be done with lugs, sweated or crimped to cable ends and bolted to busbars with cadmium plated 6mm diameter steel bolts (machined bolts) and nuts. Bolts shall be of the hexagonal head type, with 6mm thread and must be provided with washers, spring washers and hexagonal nuts.

• Busbars are to be drilled and tapped and bolts must be screwed into the busbars from the rear. Connection facilities to busbars shall make provision for the number of three phase connections as well as spare connections specified.

• Spare bolts, complete with washers and nuts, are to be screwed into each busbar, to allow for future extensions.

• Busbars shall be mounted on a rigid chassis and the use of two chassis for the mounting of a busbar will not be permitted. Only similar metals shall be used for busbars and connections thereto.

• Each busbar shall be provided with one large terminal for the main conductor. All busbars must be accessible from the front.

Wiring specifications;

• Wiring is to be carried out from the sides and in front of the chassis with conductors neatly arranged in horizontal, vertical and at right angles rows and bound together by means of perforated plastic tape (string will not be acceptable).

• Each conductor within the harness shall be kept parallel to the others without twisting or spiralling and shall be free of links.

• Only one conductor per connection point will be permitted

• All wiring is to be kept free and away from any exposed terminals, or other non-insulated current carrying parts.

• Looping from terminals of main switch, circuit breakers, or isolators will be limited to a maximum of only two outgoing circuits per DB, more than two circuits shall be connected to the busbars.

• Only copper conductors will be permitted.

• Internal wiring in the DBs, shall consist of stranded conductors and shall be in the colours of the relevant phases being red, white, blue and black for neutral.

• Colour taped conductors will not be permitted
• Switch boards shall be supplied completely wired and ready for connection.

DB powder coated finish specifications:
• All metal parts shall be degreased, rinsed, pickled, rinsed, phosphate, neutralized and then to be thoroughly dried.
• The above process is to be followed by the following powder coating process, before distribution boards are delivered for installation.
• Powder coating finishing shall be colour B26, SANS 1091 (Electric orange) or a colour as described by the Architect. Care to be taken that all edges are properly covered with powder coating.

Labelling:
• Screwed-on, engraved labels, of the white-on-black type, shall be provided on the front of the DB to identify the equipment and instruments as indicated on the proposed layout.
• Inscriptions shall be 6mm high lettering on Ivorene labels. Fixing screws shall be chrome or brass 6BA roundhead.
• **Note:** All grouped SP circuit-breakers on distribution boards and cubicles must be numbered with suitable engraved printed plastic or Ivorene plates indicating numbers of circuit controlled.
• A neatly typed legend card behind clear "Perspex in a metal frame shall be provided for this purpose.
• The frame shall be spot welded on the inside of the switchboards doors.

**ESPL 7 ACCESSORIES FOR SWITCHBOARDS**

**ESPL 7.1 MAINS SURGE ARRESTORS**

When a surge arrester is installed in systems with a main breaker with 250Amps or 5kA fault current, the surge arrester shall be pre-fused to prevent the units creating a danger when subjected to high fault currents. Surge arrestors shall be pre-fused to the manufactures requirements. All surge arrestors shall be connection type 2 as per the latest addition of the SANS 10142.

**ESPL 7.2 BUILDING WITH EXTERNAL LIGHTNING PROTECTION**

The main distribution board surge arrestors shall be combined type 1 & 2 and voltage compatible to the relevant installation and shall be able to withstand a lightning impulse current wave form 10/350µs at a maximum discharge current of 100kA.

Any distribution board feeding from the main distribution board shall have surge arrestors and shall be type 2 and voltage compatible to the relevant installation and shall be able to withstand a lightning impulse current wave form 8/20µs at a maximum discharge current of 40kA.

Each distribution board shall be equipped with mains surge arrestors.
ESPL 7.3 BUILDING WITH NO LIGHTNING PROTECTION

The surge arrestors shall be type 2 and voltage compatible to the relevant installation and shall be able to withstand a lightning impulse current wave form 8/20µs at a maximum discharge current of 40kA.

Each distribution board shall be equipped with mains surge arrestors.

ESPL 7.4 MOULDED CASE CIRCUIT BREAKERS

All moulded case circuit breakers shall be as specified in the schedules of equipment for distribution boards and shall comply with SANS 156.

The required frame sizes or rupturing capacities required are specified in the schedules for each board.

Each circuit breaker shall be provided with non-adjustable time-delayed trips.

ESPL 7.5 CURRENT LIMITING CIRCUIT BREAKERS

The current limiting circuit breakers shall be capable of remaining in service and of carrying their normal rated current after having interrupted the maximum short circuit current of 200 kA RMS at least three times.

ESPL 7.6 CONTACTORS

All contactors shall be of the totally enclosed, three pole, double air break per pole, automatic magnetic type complying with the requirements of BS 775 for "CLASS UR" contactors of the "CLASS II MECHANICAL DUTY CLASS" and "A3 Make and Break Category".

All contactors shall be provided with arc extinguishers, and readily replaceable silver or silver-alloy contacts rated for at least 2-million "on" and "off" switching operations at rated current.

Each contactor shall be provided with an AC, closing coil suitable for continuous operating and at least 15 closing operations per hour at system voltage. The contactor may not hum or chatter in service and the contacts may not bounce on closing.

ESPL 7.7 TIME SWITCHES

The time switches shall be suitable for use on a 230 volt, 50 cycle per second AC supply and shall be of the microprocessor type.

The time switches shall be digital timers suitable for rail or surface mounting and shall be programmable with daily and weekly programs, switching intervals of 1 minute and switching accuracy precise to the second.
The time base shall be of the quartz type with LED display for time, weekday, holiday program, switching position and manual override and shall have a power reserve of 250 hours at full operation. The time switches shall have a switching capacity of 16 A at 230V.

**ESPL 7.8 EARTH LEAKAGE UNITS**

The earth leakage units shall consist of a combination of a earth leakage relay and a moulded case circuit breaker and shall have a sensitivity as specified, it shall conform to SANS 767.

**ESPL 8 EARTHING**

The contractor shall do all the bonding and earthing in accordance with the latest addition of the "Code of Practice for the Wiring of Premises" SABS 10142.

Earth resistivity measurements of **less than 1 ohm** will be acceptable at motor control centers and distribution boards.

**ESPL 9 DANGER SIGNS**

Danger signs on aluminum plates shall be supplied on each door of an outdoor motor control center or distribution board and shall be in accordance with the Occupational Health and Safety Act, Act 85 of 1993.

**ESPL 10 INSPECTIONS AND TESTS**

All equipment will be inspected by the Engineer and tested in his presence both in the factory during manufacturing and on site during installation. The Engineer will do all inspections accompanied by the Contractor and the Contractor will do all tests with the Engineer as witness.

The Engineer will require seven (7) days notification to avail himself for any test or inspection and the Contractor must arrange for the maximum number of inspections and tests to be done on the same day. The Contractor must provide all testing facilities and instruments, all equipment required for a test or inspection.

The cost of all tests must be included in the tender price.

**ESPL 10.1 TESTING OF DISTRIBUTION/MOTOR CONTROL BOARDS**

Each distribution/motor control board shall be subjected to the following tests in the manufacturer's works after manufacture:

a. A thorough inspection shall be carried out to ensure compliance with the specification and approved drawings and wiring diagrams and to ascertain that all connections are properly made.
b. A high voltage test on all primary connections to check the insulation between phases mutually and between each phase and earth.

c. The polarities and ratios of all potential and current transformers shall be checked.

d. Primary and secondary injection tests shall be carried out on all switching, protection, metering interlocking and indication circuits.

The manufacturer shall submit three copies of test certificates giving details of conditions and results of tests carried out to the Engineer.

**ESPL 10.2 OPERATING AND MAINTENANCE INSTRUCTIONS**

Before completion of the testing of the plant, the Contractor shall provide the Employer with adequate and complete working, operating and maintenance instructions *in triplicate*, with the necessary drawings and diagrams clarifying the instructions. The Contractor will also provide 3 x *"soft copies"* of the complete manual in PDF format on a suitable sized USB Flash Drive (Memory Stick).

Instructions are to be made up in book form and particular reference is to be made to:

- Maintenance of equipment;
- Precautions to be taken in running the plant;
- All instruments and components must be fully described in data sheets supplied by the relevant suppliers;
- Wiring diagrams of the complete electrical installation.

The manual must be specific for the plant supplied and all extraneous material not connected with the relevant plant shall be deleted, leaving the manual as a comprehensive coherent document, bound in a professional way such that this may be used frequently without falling apart. Standard pamphlets may be supplied as addendums, bound separately in a good quality file to serve as reference but will not be allowed as part of the main manual.

**ESPL 11 SUPPORTING DOCUMENTATION**

**ESPL 11.1 INFORMATION TO BE SUBMITTED WITH TENDERS: 400V DB**

Before manufacturing, the following information shall be submitted with each tender in respect of all boards offered:

a. Full technical details and descriptive literature regarding all equipment and instruments offered;

b. Three paper prints of an outline drawing of each motor control centre and distribution board indicating the main overall dimensions and general lay-out of the boards; and

c. Three paper prints of an outline drawing of the front end processor cabinet indicating the main overall dimensions, general layout and type of material employed on the face of the panel.
ESPL 11.2 INFORMATION REQUIRED WITH TENDER SUBMISSION

The following information regarding the switch- and distribution boards shall be submitted with each tender.

a. The name and address of the switchboard manufacture.
b. Descriptive literature and technical information of all equipment and instruments offered with the boards.
c. Wiring diagrams of all distribution boards.
d. Schematic single line diagrams of all distribution boards.
e. Elevations showing dimensional information including details such as, but not limited to, the following:
   • Distribution boards height (less any removable lifting angles or eyes)
   • Distribution boards width
   • Distribution boards depth
   • Location of shipping splits
f. Structure descriptions showing the following:
   • Bus ratings
   • Enclosure ratings
   • Short-circuit withstand ratings
   • Other information as required for approval
g. Conduit locations
h. Required bus splices
i. Unit descriptions including information such as, starter sizes, circuit breaker frame sizes, circuit-breaker continuous ampere ratings, and pilot devices
j. Nameplate information
k. Manufacturer drawings shall be provided in PDF format
l. Data sheets and publications on all major components including, but not limited to, the following:
   • Motor starters
   • Overload relays
   • Circuit breaker and fuse information including time current characteristics
   • Control power transformers
   • Pilot devices
   • Relays
   • All clarifications and exceptions must be clearly identified

After completion of the work, the contractor shall submit three final copies of each of the above-mentioned drawings showing the final layout and wiring diagram of the boards.

ESPL 11.3 AS BUILT INFORMATION

On completion of the works, but before the certificate of completion will be issued, the contractor shall submit to the Engineer, as built information in electronic format indicating in a satisfactory manner:

a) The exact position of all electrical installation equipment in the buildings
b) Distribution board as built wiring diagrams
c) Certificate of Compliance for all building installations

Electronic copies of the various plans for the marking up of the information required will be supplied to the contractor on request.

**ESPL 12 MEASUREMENT AND PAYMENT**

Measurement and payment will be done in accordance with the methods stated below:

**ESPL 12.1 DESIGN, DRAWING AND GENERAL**

The rate tendered shall include for the provision of the necessary design information for all items measured under the respective schedule. For distribution board’s installation, design information shall include, but limited to as listed in this Particular Specifications.

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<th>Unit</th>
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</thead>
<tbody>
<tr>
<td>(a) Provide design drawings and wiring diagrams (“as-built” drawings) as specified</td>
<td>Sum</td>
</tr>
<tr>
<td>(b) Provide operating and maintenance manuals as specified</td>
<td>Sum</td>
</tr>
<tr>
<td>(c) Allowance for short circuit analysis and coordination study and protection setting calculations</td>
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**ESPL 12.2 SUPPLY AND DELIVERY TO SITE**

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**ESPL 12.3 INSTALLATION**

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**ESPL 12.4 COMMISSIONING**

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<td>Sum</td>
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SAKHIWO HEALTH SOLUTIONS
UPGRADING OF SILOAM HOSPITAL – PHASE 2

CONTRACT NO: (2023-40-00)

UPGRADING OF MORTUARY- MENTAL HEALTH AND TEMPORARY MENTAL FACILITIES

ELECTRICAL SOW

REV. 01: 15 November 2018

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CONTRACT NO: (2023-40-00)

UPGRADING OF MORTUARY- MENTAL HEALTH AND TEMPORARY MENTAL FACILITIES

C3.4 CONSTRUCTION SPECIFICATIONS

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C3.4.1 STANDARD SPECIFICATIONS FOR ELECTRICAL AND ELECTRONIC WORKS

C3.4.1.1 STATUS OF SPECIFICATION

Clauses under Section C3.4.2 should be read in conjunction with Particular Specifications for Electrical and Electronic Engineering Works which are numbered by adding a “PS” prefix to the numbering of the Particular Specification. As per example, any variation to the Particular Specification pertaining to Electrical: Standby Generator System (ESGS) will be numbered “PS-ESGS” followed by the relevant clause number as detailed within the Particular Specifications.

Refer to Section C3.4.3 for the list of Particular Specifications as applicable to this project.

Any additional project specifications not referring to particular specifications have been added at the end of the section. These will be number PSE1, PSE2 and PSE3 respectively if required.

The full extent of the Electrical and Electronic Engineering Works are specified on the Drawings, the General Clauses provided under section C3.4.1, and the Project Specifications included under section C3.4.2. Cognisance shall also be taken of the mechanical specifications in regard to electrical supplies and/or connections of mechanical items as included under the Mechanical Contract. These documents shall be treated as mutually explanatory. However, should there be any ambiguity in the requirements stated therein, the priority of documents shall be (a) General Clauses; (b) Variations and Additions to Standard and Particular Specifications; (c) Particular Specifications, (d) Drawings and (e) Standard Specifications (if applicable).

The following Variations and Additions to the Standard and Particular Specifications will be applicable to this Contract.

C3.4.1.2 SCOPE OF CONTRACT

This contract provides for the supply, delivery to site, installation, testing, commissioning, maintenance and handing over in good working order of the complete electrical and electronic installation as specified or implied herein and/or in the accompanying specifications and on the drawings.

The Tenderer shall allow in his Tender price for all material, labour, supervision, transport, tests, commission and all other items necessary to complete the contract in its entirety and to the satisfaction of the Engineer.

In the event where the supply and/or installation of any item, material or equipment does not form part of this contract, it will be specifically indicated as such in this specification and/or on the accompanying drawings.
C3.4.1.3 MATERIALS AND EQUIPMENT RECOVERED

All materials and equipment recovered under this contract remains the property of the Employer and shall, unless expressly otherwise agreed, be handed to the Employer’s Official in charge for storage and safekeeping.

C3.4.1.4 MECHANICAL SCOPE OF PROJECT

Should there be conflicting specifications between the specifications in this Electrical Project Specifications with regard to equipment as specified in the Mechanical Contract, this must be brought to the attention of the Engineer not later than one week before the tender close, who will give clarity to the matter or issue an addendum in this regard.

C3.4.1.5 ALTERNATIVE PROPOSALS

Alternatives may be proposed for sections of the Works. These alternatives will be considered in the adjudication of the bids. If alternative mechanical proposals under the Mechanical Contract are submitted the electrical scope may be amended to allow for the mechanical change as part of the alternative offer. Any alterations to the scope must be approved by the Engineer.

Acceptance of an alternative proposal or offer shall not relieve the Contractor of any of his obligations in terms of the Contract. The Contractor’s cost of preparation and sub-mission of an alternative proposal shall be deemed to be included in the rates as quoted for the execution of the Work.

C3.4.1.6 EQUIPMENT

All equipment offered under this contract shall be selected to be equal and similar of make as the existing equipment installed on site as far as possible and the contractor shall do a site inspection prior to submission of the tender to ensure that they do comply with this requirement (if applicable to existing structure and buildings).

Contractor shall provide electrical equipment for motor starter panels / DB’s with at least Type 2 coordinated capabilities, where required and so indicated. If moulded case circuit breakers and miniature circuit breakers are cascaded and / or discrimination all proven documentation must be supplied by the contractor.
Portion 2: Contract

Part C3: Scope of Work

Section C3.4: Specifications for Electrical/Electronic Works

C3.4.1.7 ABBREVIATIONS

- **AFFL**  Above Final Floor Level
- **AI**  Analogue Inputs
- **AO**  Analogue Outputs
- **BMS**  Building management system
- **C&I**  Control and Instrumentation
- **COC**  Certificate of Compliance
- **CPU**  Central Processing Unit
- **DB**  Distribution Board
- **DI**  Digital Input
- **DO**  Digital Output
- **EC&I**  Electrical, Control and Instrumentation
- **FT**  Flow Transmitter
- **GA**  General Arrangement
- **HMI**  Human Machine Interface
- **HVAC**  Heating, Ventilation and Air Conditioning
- **JB**  Junction Box
- **LT**  Level Transmitter
- **LV**  Low Voltage
- **FM**  Flow Meter
- **MCC**  Motor Control Centre
- **MV**  Medium Voltage
- **O&M**  Operations & Maintenance
- **OHL**  Overhead Line
- **PLC**  Programmable Logic Controller
- **PT**  Pressure Transmitter
- **RCC**  Regulatory Conformance Certificate
- **RIO**  Remote I/O
- **SABS**  South African Bureau of Standards
- **SANS**  South African National Standards
- **SLD**  Single Line Diagram
- **SoW**  Scope of Work
- **TT**  Temperature Transmitter
- **VSD**  Variable Speed Drive
The Siloam Hospital, in the Vhembe district in Limpopo, was identified as a National Presidential Priority after a visit to the facility by President Zuma on the 8th July 2011.

The hospital has also been identified as a provincial priority for the replacement of the hospital, the gateway clinic, the nurse’s school and the upgrading of the hospital grounds and staff accommodation.

For Phase 2 of Siloam Hospital upgrades, the Mortuary and Mental Health facilities will be refurbished and upgraded to meet national standards.

As part of the contract, temporary male- and female mental health facilities have been identified which need to be upgraded. These buildings will be utilised as decanting structures during the period the main mental health building is upgraded.

During the refurbishment of the Mortuary, a temporary refrigeration container will be used.

### C3.4.1.9 ELECTRICAL PROJECT SPECIFICATIONS

All materials and equipment supplied under this Contract must be new and of the best quality available. All materials must comply with the requirements of the latest editions of the relevant SABS and NRS Specifications.

a) General

The project specification must be read together with the particular specifications, bill of quantities, and applicable drawings.

All work shall be carried out strictly in accordance with:

- The SANS code of Practice for Wiring of Premises, SANS 10142-1 & 2: 2017 as amended.
- The project-, particular- and standard electrical specifications.
- Any municipal by-laws and regulations.
- The local authority requirements.
- All applicable SANS, BS & IEC equipment specifications.
All material/equipment shall bear the SABS mark of approval. Where it is not practical and/or furnished on the material/equipment, full RCC’s (Regulatory Conformance Certificates) will be provided to the Engineer. The contractor will note, on the Certificate of Compliance (CoC), the RCC’s and exclude them accordingly from his responsibility. The aforementioned shall apply to any other material/equipment and CoC’s, which must be provided under this contract, but will not be directly supplied, installed etc. by the appointed subcontractor e.g. Lightning Protection System material/equipment and CoC’s.

As stated previously and further in this document, all equipment must comply with all relevant standards, specifications and requirements indicated respectively. In addition, there may be materials/equipment not specified in the project specification etc., which may have to be used in order to achieve the required outcome e.g. masts, flood lights etc. Alternatively, there may be certain equipment mentioned in the specification that will not be project specific and shall be ignored unless otherwise specified.

In instances where materials are not specified accordingly, it will be the responsibility of the Contractor to furnish the Engineer with the manufacturer’s details, designs, recommendations, and instructions etc. of the specific product, for relevant approvals prior to order or installation. The aforementioned will be in conjunction with all other relevant clauses pertaining to information provision to the engineer for approval.

The manufacturer’s details, designs, recommendations, instruction etc. shall complement all statutory regulations & standards. Where the manufacturer’s details, designs, recommendations, instruction etc. are in conflict with the project specifications and requirements, the Contractor shall inform the Engineer accordingly as to which requirements to use in order to accomplish project requirements.

Where it is indicated in the Bill of Quantities, or any other part in this document, the information required for approval by the Engineer, it should be seen to form part of the specifications and requirements.

The Contractor shall inform the Engineer of any equipment that is ready for dispatch, in which case the Engineer will arrange for an inspection at the factory of the manufacturer if deemed necessary. Such notification of the Engineer must be 10 days prior to dispatch.

Three copies of all equipment test reports, whether these tests have been carried out in the presence of the Engineer or not, shall immediately after they become available, be submitted to the Engineer.
UPGRADING OF MORTUARY- MENTAL HEALTH AND TEMPORARY MENTAL FACILITIES

C3.4 CONSTRUCTION SPECIFICATIONS

C3.4.2 Variations and Additions to Standard and Particular Specifications: Construction of Electrical and Electronic Works
The electrical SoW for the Mortuary, Mental Health and Temporary Mental Health Buildings include the strip and removal of existing electrical services, which includes redundant light fittings, plug outlets, other potential small power equipment, LV cabling, distribution boards, etc.

All existing electrical services need to be removed in order to upgrade to the electrical/electronic services to the latest technologies and standards.

A) THE ELECTRICAL SCOPE OF WORK IS AS FOLLOWS;

Items covered under the electrical Scope of Work include, but not limited to the following

a) Supply, installation, and connection of all circuit equipment for small power and lighting installation, i.e. socket outlets, light switches, isolators, etc.
b) Supply, installation, and connection of all luminaires.
c) Connection of electrical power to all mechanical equipment and systems, i.e. pumps, compressors, HVAC equipment, etc.
d) Supply, installation, and connection of all cable trays, wire ways, conduit, draw and outlet boxes, and sleeves for electrical cabling.
e) Supply, installation, and connection of electrical cables, control circuit, wiring and conductors (as required).
f) Supply, installation, connection, and testing of an earthing/bonding system.
g) Excavations for all cable trenches, compaction, backfill, and making good of existing surfaces.
h) Testing, commissioning, and handing over of the complete electrical installation, in accordance with the requirements of the Electrical Contracting Board of South Africa and the issue of a Certificate of Compliance for each and every distribution point / DB.

The following returnable documentation should be submitted with the tender documentation;

- Local DB specifications, inclusive of circuit breaker specifications
- Lightning protection specifications and technical details
- Detailed lighting schedules, indicated type of light fittings, lumen outputs, etc.
- Cable schedules
- Cable layouts
- Technical schedules
B) THE CONTROL AND INSTRUMENTATION SCOPE OF WORK IS AS FOLLOWS;

a) Supply and installation of conduit and wire-ways as required for the building management system (BMS), such as access control equipment, IT network equipment, data and telephone points, specific monitoring points (standby generators, specialised hospital equipment), etc.

b) Supply and installation of conduit and wire-ways for the fire detection system.

C) REFERENCE DRAWINGS;

The following reference drawings will be part of the electrical/electronic tender;

1) 2023-40-VA-07-U401: Electrical Services: Mental Health (Block Q) Lighting layout
2) 2023-40-VA-07-U402: Electrical Services: Mental Health (Block Q) Small power layout
3) 2023-40-VA-07-U403: Electrical Services: Mental Health (Block Q) Fire Detection layout
4) 2023-40-VA-07-U404: Electrical Services: Temporary Mental Health (Block W) Lighting layout
5) 2023-40-VA-07-U405: Electrical Services: Temporary Mental Health (Block W) Small power layout
6) 2023-40-VA-07-U406: Electrical Services: Temporary Mental Health (Block W) Fire Detection layout
7) 2023-40-VA-07-U407: Electrical Services: Mortuary (Block U) Lighting layout
8) 2023-40-VA-07-U408: Electrical Services: Mortuary (Block U) Small power layout
9) 2023-40-VA-07-U409: Electrical Services: Mortuary (Block U) Fire Detection layout
10) 2023-40-VA-07-U404: Electrical Services: Temporary Female Mental Health (Block X) Lighting layout
PS-EMVS: MEDIUM VOLTAGE SWITCHGEAR

PS-ESGS-1  SCOPE OF WORK

Upgrades to the Medium Voltage switchgear and new hospital main supply MV cable ring will be completed under the Phase 3 contract.

PS-ESGS: STANDBY GENERATOR

PS-ESGS-1  SCOPE OF WORK

The standby generators at the Mortuary and Mental Health buildings will be upgraded during the Phase 3 contract and are not part of this contract.

PS-ESPL  ELECTRICAL INSTALLATION IN BUILDINGS AND ON STRUCTURES

PS-ESPL-1  SCOPE OF WORKS

The scope for the distribution board sections shall include everything to provide a complete small power distribution and lighting system. The design of the distribution board will allow for single and three phase supplies to equipment on site.

PS-ESPL-4  LIGHTING INSTALLATIONS

Note: All luminaires must be approved by the Engineers representative prior to the installation of or any order being placed. Only light fittings as well as all light fitting components carrying the SABS mark of approval will be acceptable.

Refer to Appendix A for the Lighting Schedule

PS-ESPL-4.1  LIGHTING SWITCHES / CONTROL

Lighting control will be installed as indicated on the drawings and as stated below;
1. Lever switches, as indicated on the drawings, mounted 1.40m AFFL.
2. Motion sensors, as indicated on the drawings
3. Lights in mental health wards to be controlled from the nursing station
4. The integrated night lights in the mental health wards should also be controlled from the nursing station.
PS-ESPL-4.2  LIGHT FITTINGS

Light fittings shall be equal and similar to the requirements set out in the lighting schedule;

The mounting height will be as indicated on the drawings or as stated below;

- Luminaries fitted against outside walls – 2.2 m AFFL

PS-ESPL-5  SMALL POWER INSTALLATIONS

Note: All power outlets should adhere to the latest SANS 164 standards and should carry the SABS mark of approval.

PS-ESPL-5.1  SOCKET OUTLETS

Socket outlets shall be equal and similar to the requirements set out in the small power schedule.

The mounting height will be as indicated on the drawings.

The following Isolations will be utilized for the equipment as listed below;

Refer to Appendix B for the Small Power Equipment Schedule.

PS-ESPL-5.2  THREE PHASE AND MULTI-PIN SOCKET OUTLETS

Three phase socket outlets to be installed as indicated on the drawings.

Refer to Appendix B for the Small Power Equipment Schedule.

PS-ESPL-5.3  UNDERFLOOR HEATING

Underfloor heating needs to be supplied and installed for the two seclusion rooms in the Mental Health Building. The underfloor heating shall be a complete under-tile/vinyl heating system, with the following specifications:

- 750W, normal 7-strand flexible standard heating cable
- Pre-spaced on resin-coated fibreglass mesh
- Thermostat control, remotely installed at Nurse’s base
New distribution boards will be installed in the following areas:

### Table 1: New DB Schedule

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Construction</th>
<th>Location</th>
</tr>
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<tbody>
<tr>
<td>DB-MH-1</td>
<td>Mental Health Main DB</td>
<td>Recessed</td>
<td>Mental Health – Nursing Station</td>
</tr>
<tr>
<td>DB-MH-1-3</td>
<td>Mental Health OPD DB</td>
<td>Recessed</td>
<td>Mental Health – West block</td>
</tr>
<tr>
<td>DB-MH-1-4</td>
<td>Mental Health Student DB</td>
<td>Recessed</td>
<td>Mental Health – East block</td>
</tr>
<tr>
<td>DB-MH-1-1</td>
<td>Mental Health Activity Room DB1</td>
<td>Recessed</td>
<td>Mental Health – Activity rooms – West</td>
</tr>
<tr>
<td>DB-MH-1-2</td>
<td>Mental Health Activity Room DB2</td>
<td>Recessed</td>
<td>Mental Health – Activity rooms – East</td>
</tr>
<tr>
<td>DB-MORT-1</td>
<td>Mortuary Main DB</td>
<td>Recessed</td>
<td>Mortuary Building</td>
</tr>
<tr>
<td>DB-MORT-2</td>
<td>Mortuary Mechanical DB</td>
<td>Surface/Floor standing</td>
<td>Mortuary Mechanical Room</td>
</tr>
</tbody>
</table>

**Type:** Indoor wall mounted with front access, shall be as specified under the particular specifications and be built from 3CR12 stainless steel.

The main DB in the Mental Health and Mortuary Buildings will consist of a normal and Standby Generator sections.

The distribution board shall be tested as per the SANS 1973-1, SANS 1973-3, SANS 1973-8, SANS 1473-1, SANS 1765 and SANS 10142-1.

**Supply:** As indicated on the drawings

**Fault level:** As indicated on the drawings
PS-EELP  EARTHING AND LIGHTNING PROTECTION

PS-EELP-1  SCOPE OF WORKS

This specification, read together with the applicable Particular Specifications included under section C3.4.2.2 covers the performance specifications, design parameters, manufacture, supply and delivery to site, installation, testing, adjustment and commissioning of the earthing and lightning protection to be provided under this Contract.

PS-EELP-6  AIR-TERMINATION SYSTEM

The Contractor shall use air-termination system, and shall be composed combination of the following elements:

- Rods;
- Stretched wires;
- Meshed conductors.
- Any exposed conductors shall be completed with Kwena anti-theft conductors
- All bonding which is exposed shall be completed with Kwena anti-theft conductors

PS-EELP-10  INTERNAL & EXTERNAL LIGHTNING PROTECTION SYSTEM

A Class 3 earthing and lightning protection system will be installed for all the buildings.

The lightning protection system shall be designed and installed by a qualified specialist sub-contractor who will submit approved SABS drawings and all calculations. Lightning protection certificate (COC) for each building and structure shall be completed and approved by a registered Engineer and only then submitted to the Engineer for approval.

Adequate quantity earth bars must be allowed for each building at close proximity to the main distribution boards.

All exposed external earthing and bonding shall be completed with Kwena Anti-Theft Cable.

Generally the roof natural conductive components such as metal roofs, columns and framing, reinforcement, foundations and piling shall be utilised as part of the lightning protection system. Where building elements are to be used as part of the lightning protection system they shall be tested during construction to ensure that the resistance is low enough for the purpose. A formal record shall be kept of the resistance readings taken. If readings are higher than acceptable, suitable measures shall be taken, in consultation with the engineer and the appropriate construction methods to reduce the resistance to an acceptable value. The weatherproofing of the building shall not be impaired in any way by fixings or by any part of the lightning protection system. Work on flat roofs shall be co-ordinated with the Civil contractor.
PS-EG&M-2 GENERAL REQUIREMENTS: MATERIALS AND FINISH

Outdoor signs shall be either of vitreous enamelled type or of cast aluminium with raised or embossed letters.

The colours and sizes of letters and colours of background shall be in accordance with requirements of SANS 0140 and as approved by the Engineer.

Symbolic signs shall conform to the requirements of SANS 1186.

PS-EG&M-8 NOTICES AND DANGER PLATES

This specification deals with the provision of Notices and Danger Plates and signage as required in terms of the Occupational Health and Safety Act No. 85 of 1993, as well as any other notices that may be required by law or by the nature of the finished Works.

All building signage on equipment shall be covered under this contract; it is the Contractor’s responsibility to familiarize himself with applicable standards referred to the particular specification and supply all necessary signage.

The following standard specifications are referred to in this specification:

- SANS 10140; Parts I to IV: Identification colour marking.
- SANS 1186: Symbolic safety signs.
PS-EMCA MULTI CORE CABLES AND EARTH WIRES

PS-EMCA-1 SCOPE OF WORKS

Schedules of cables associated with sections of works are listed below under the relevant sections.

1. All earth wires shall be bare copper conductors, unless otherwise specified and cables shall be of the type as specified.

2. These cables (sizing and quantities) are only a guide and Contractors must make due allowance for all cabling to complete the works in its entirety.

3. Before ordering cables the contractor shall obtain the correct cable lengths by measuring required cable lengths on site.

PS-EMCA-7 CABLE TRAYS AND CABLE LADDERS

All cable trays and cable ladders shall be galvanized mild steel.

Cable trays will only be acceptable for cable supports where small cables are involved.

Vertically installed cable ladders shall be used for floor mounted cable support purposes.

PS-EMCA-8 INSTALLATION OF CABLES

The cable length (UNIT m) is measured from one termination point to another termination point per cable length. To determine the total length of cable, cables in parallel must be multiplied by the number of cables installed in parallel.
SAKHIWO HEALTH SOLUTIONS

CONTRACT NO: (2023-40-00)

UPGRADING OF MORTUARY- MENTAL HEALTH AND TEMPORARY METAL FACILITIES

C3.4 CONSTRUCTION SPECIFICATIONS

LIST OF APPENDICES

Appendix A: Lighting Schedule
Appendix B: Small Power Schedule
SAKHIWO HEALTH SOLUTIONS

CONTRACT NO: (2023-40-00)

UPGRADING OF MORTUARY- MENTAL HEALTH AND TEMPORARY METAL FACILITIES

C3.4 CONSTRUCTION SPECIFICATIONS

C3.4.3 Particular Specifications for Electrical and Electronic Works

The following particular specifications will form part of this Contract, as attached.

1. ESPL  Particular Specifications for Small Power and Lighting Installations
2. EG&M  Particular Specifications for General and Miscellaneous
3. EMCA  Particular Specifications for Multicore Cables and Earth wires
4. EELP  Particular Specifications for Earthing and Lightning Protection
SAKHIWO HEALTH SOLUTIONS
UPGRADING OF SILOAM HOSPITAL – PHASE 2

CONTRACT NO: (2023-40-00)

UPGRADING OF MORTUARY- MENTAL HEALTH AND TEMPORARY MENTAL FACILITIES

ELECTRICAL SOW – RETURNABLE DOCUMENTATION

REV. 01: 15 November 2018

Electrical Engineer – Bigen Africa
Mr. C Scheepers (Pr. Eng)
Bigen Africa Services (Pty) Ltd
Allan Cormack Street
Innovation Hub, Pretoria
Tel: 012 842 8700
E-Mail: chris.scheepers@bigengroup.com

Electrical Engineer – S&W
Mr. S. Wessels (Pr.Tech.Eng)
S&W Consulting (Pty) Ltd
99 Fascia Street
Silvertondale, Pretoria
Tel: 012 804 7815
E-Mail: shane@swconsulting.co.za
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<thead>
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<th>Description</th>
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<td>PAIR OF ENDS (CONDUIT)</td>
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<td>SOCKET OUTLETS</td>
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<td>CIRCUIT BREAKERS</td>
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<td>ISOLATORS</td>
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<td>TRANSPORT, MATERIALS AND EXCAVATIONS</td>
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Contractor  Witness 1  Witness 2  Employer  Witness 1  Witness 2

T2.2-2
ALTERATIONS BY TENDERER

Should the Tenderer desire to make any departures from or modifications to the General Conditions of Contract, Contract Data, Scope of Work, Pricing Data or the Drawings, or to qualify his tender in any way, he shall set out his proposals clearly hereunder or alternatively state them in a covering letter attached to his tender and referred to hereunder, failing which the tender will be deemed to be unqualified.

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Signature of Tenderer : ___________________________ Date : ________________
WORKS PREVIOUSLY EXECUTED

The following is a statement of major works successfully executed by myself/ourselves in recent years:

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<thead>
<tr>
<th>Employer</th>
<th>Consulting Engineers (incl. contact person and contact details)</th>
<th>Nature of Works</th>
<th>Value of Works</th>
<th>Duration and Completion Date</th>
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Failure to detail the required information, shall signify that the tender is submitted by an inexperienced tenderer.

Signature of Tenderer : ___________________________  Date : ___________________________
**PRESENT COMMITMENTS**

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<th>Employer</th>
<th>Consulting Engineers (incl. contact person and contact details)</th>
<th>Nature of Works</th>
<th>Value of Works</th>
<th>Duration and Completion Date</th>
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Signature of Tenderer: ___________________________  Date: ___________________________
## SUPERVISORY AND SAFETY PERSONNEL

PREVIOUS EXPERIENCE ON WORKS OF A SIMILAR NATURE DURING THE LAST FIVE YEARS

<table>
<thead>
<tr>
<th>Name</th>
<th>% Time on Site</th>
<th>Position (Current)</th>
<th>Service (Years)</th>
<th>Name of Project And year executed</th>
<th>Value of Works</th>
<th>Position Occupied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contracts Manager</td>
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<tr>
<td>Contractor’s Site Agent</td>
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<tr>
<td>Contractor’s Foremen</td>
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<tr>
<td>Construction Health and Safety Officer</td>
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</tbody>
</table>

Tenderers shall indicate the percentage of working time these persons will be engaged on site. Tenderers are required to provide copies of curriculum vitae of all supervisory and safety personnel.

Signature of Tenderer: ___________________________  Date: ___________________________
COMPLIANCE WITH OHSA (ACT 85 OF 1993)

Tenderers are required to satisfy the Employer and the Engineer as to their ability and available resources to comply with the above by answering the following questions and providing the relevant information required below.

1. Is the Contractor familiar with the OHSA (ACT 85 OF 1993) and its Regulations?  YES / NO

2. Who will prepare the Contractor's Health and Safety Plan? (Provide a copy of the person/s curriculum vitae/s or company profile).

3. Does the Contractor have a health and safety policy? (If yes, provide a copy).  YES / NO
   How is this policy communicated to all employees?

4. Does the Contractor keep records of safety aspects of each construction site?  YES / NO
   If yes, what records are kept?

5. Does the Contractor conduct monthly safety meetings? If yes, who is the chairperson of the meeting, and who attends these meetings?  YES / NO

6. Does the Contractor have a safety officer in his employment, responsible for the overall safety of his company?  YES / NO
   If yes, please explain his duties and provide a copy of his CV.

7. Does the Contractor have trained first aid employees? If yes, indicate who.  YES / NO

8. Does the Contractor have a safety induction training programme in place?  YES / NO
   (If yes, provide a copy).

_____________________________  ____________________________
Signature of Tenderer Date
**PLANT AND EQUIPMENT**

1. **Major Plant and Equipment available for this Contract:**

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Size, Description, Capacity, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. **Major Plant and Equipment that will be acquired for this contract if my/our tender is accepted:**

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Size, Description, Capacity, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Signature of Tenderer ___________________________ Date ___________________________

Contractor ___________ Witness 1 ___________ Witness 2 ___________ Employer ___________ Witness 1 ___________ Witness 2 ___________
**PROPOSED SUB-CONTRACTORS**

The tenderer shall list below any subcontractors he intends to employ to carry out part(s) of the Works.

The acceptance of this tender shall not be construed as being approval of all or any of the listed subcontractors. Should any or all of the subcontractors be not approved subsequent to the acceptance of the tender, it shall in no way invalidate this tender, and the tendered unit rates for the various items of work shall remain final and binding in the event of a subcontractor not listed below being approved by the Employer.

<table>
<thead>
<tr>
<th>Company</th>
<th>Portion of Contract</th>
<th>Approx. Value</th>
</tr>
</thead>
</table>

Signature of Tenderer ___________________________ Date ______________

Contractor Witness 1 Witness 2 Employer Witness 1 Witness 2
VOLTAGE DISTRIBUTION

Table 1: MEDIUM VOLTAGE CABLES

<table>
<thead>
<tr>
<th>No</th>
<th>Item description</th>
<th>Units</th>
<th>Technical Particulars</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Manufacturer</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Supplier</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Installation contractor</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2: LOW VOLTAGE CABLES

<table>
<thead>
<tr>
<th>No</th>
<th>Item description</th>
<th>Units</th>
<th>Technical Particulars</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Manufacturer</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Supplier</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Installation contractor</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3: MULTI CORE CABLES

<table>
<thead>
<tr>
<th>No</th>
<th>Item description</th>
<th>Units</th>
<th>Technical Particulars</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Manufacturer</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Supplier</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Installation contractor</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CONDUIT (GALVANISED)

Supply and installation of welded, galvanised, screwed conduit per meter length, including waste, couplings and sets;

Table 4: Conduit

<table>
<thead>
<tr>
<th>Conduit Size</th>
<th>Cast in concrete (R/m)</th>
<th>Fixed on surface (R/m)</th>
<th>Built into brick (R/m)</th>
<th>Chased into concrete (R/m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
PAIR OF ENDS (CONDUIT)

Terminate one pair of ends, including 2 locknuts and bush at one end and one box, either round or 100 x 100 mm or 100 x 50 mm and locknuts and bush at the other end;

### Table 5: Pair of ends

<table>
<thead>
<tr>
<th>Description</th>
<th>Completely installed (R each)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 mm (Including box)</td>
<td></td>
</tr>
<tr>
<td>25 mm (Including box)</td>
<td></td>
</tr>
<tr>
<td>32 mm (Bushes and locknuts only)</td>
<td></td>
</tr>
<tr>
<td>40 mm (Bushes and locknuts only)</td>
<td></td>
</tr>
<tr>
<td>50 mm (Bushes and locknuts only)</td>
<td></td>
</tr>
</tbody>
</table>

SOCKET OUTLETS

Supply, fitting and connecting of the following complete with box, cover plate and plug top where applicable per unit;

### Table 6: Socket outlets

<table>
<thead>
<tr>
<th>Unit Box</th>
<th>Flush mounted (R/m)</th>
<th>Surface Mounted (R/m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 Amp 3-pin single phase switched socket outlet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40 Amp 5-pin 3-phase welding plug complete with isolator and plug top</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Socket outlet manufacturer: ________________________________

CIRCUIT BREAKERS

Supply, mounting and connecting in a pre-fitted distribution board per unit;
Table 7: Circuit breakers

<table>
<thead>
<tr>
<th>Description</th>
<th>Completely installed (R each)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 30 Amp SP (5 kA)</td>
<td></td>
</tr>
<tr>
<td>Up to 20 Amp TP (5 kA)</td>
<td></td>
</tr>
<tr>
<td>20 Amp up to 60 Amp TP (5 kA) SF3-G3</td>
<td></td>
</tr>
<tr>
<td>50 Amp CBI</td>
<td></td>
</tr>
<tr>
<td>250 Amp CBI</td>
<td></td>
</tr>
<tr>
<td>600 Amp CBI</td>
<td></td>
</tr>
<tr>
<td>1 SAT-R time switch</td>
<td></td>
</tr>
<tr>
<td>20 Amp CBI Earth Leakage Relay</td>
<td></td>
</tr>
</tbody>
</table>

Circuit Breaker manufacturer: _____________________________

**ISOLATORS**

Supply, mounting and connecting in a pre-fitted distribution board per unit;

Table 8: Isolators

<table>
<thead>
<tr>
<th>Description</th>
<th>Completely installed (R each)</th>
</tr>
</thead>
<tbody>
<tr>
<td>80 Amp TP CBI SH3-GO</td>
<td></td>
</tr>
<tr>
<td>100 Amp TP CBI SH3-GO</td>
<td></td>
</tr>
<tr>
<td>200 Amp TP CBI JSO</td>
<td></td>
</tr>
</tbody>
</table>

Isolator manufacturer: _____________________________
DAYWORK

The following rates are for work not covered by any scheduled rates;

Table 9: Daywork

<table>
<thead>
<tr>
<th></th>
<th>Normal (R/Hour)</th>
<th>Overtime (R/Hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrician and Labourer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrician and apprentice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labourer</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TRANSPORT, MATERIALS AND EXCAVATIONS

The following rates are for work not covered by any scheduled rates;

Table 10: Transport, materials and excavations

<table>
<thead>
<tr>
<th></th>
<th>Per unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traveling for vehicles not exceeding 1000 kg capacity</td>
<td>R/Km</td>
</tr>
<tr>
<td>Materials, net cost plus</td>
<td>%</td>
</tr>
<tr>
<td><strong>Excavations:</strong></td>
<td></td>
</tr>
<tr>
<td>i) In soft pickable soil.</td>
<td></td>
</tr>
<tr>
<td>ii) In soft rock (use of power tools)</td>
<td></td>
</tr>
<tr>
<td>iii) In hard rock per m³ (use of explosives)</td>
<td></td>
</tr>
</tbody>
</table>

END OF SECTION
SAKHIWO HEALTH SOLUTIONS

UPGRADING OF SILOAM HOSPITAL – PHASE 2

CONTRACT NO: (2023-40-00)

UPGRADING OF MORTUARY- MENTAL HEALTH AND TEMPORARY MENTAL FACILITIES

FIRE DETECTION SYSTEM

REV. 01: 15 November 2018

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E-Mail: chris.scheepers@bigengroup.com

Electrical Engineer – S&W
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E-Mail: shane@swconsulting.co.za
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<td>2 - 12</td>
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<td>2 - 33</td>
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<tr>
<td>22.</td>
<td>Wire Ways</td>
<td>2 - 33</td>
</tr>
</tbody>
</table>
SAKHIWO HEALTH SOLUTIONS

CONTRACT NO: (2023-40-00)

UPGRADING OF MORTUARY- MENTAL HEALTH AND TEMPORARY MENTAL FACILITIES

C3.4 CONSTRUCTION SPECIFICATIONS

C3.4.1 Project specifications: Fire Detection System

1. GENERAL

This part of the specification, called the project specification, covers the detail requirements regarding material, equipment, installation, testing and commissioning of the complete installation and shall be read in conjunction with the conditions of contract, general specification, schedules and the bills of quantities.

The complete installation shall comply with the requirements of this specification. Should any differences or contradictions exist between other parts of this specification and the project specification, then the latter shall take preference.

2. SCOPE OF WORK

The scope of work includes the supply, delivery, installation, testing, commissioning and handing over in good working order of a Fire Detection and Nurse Call system installation with associated peripherals.

General Electronic Installation

This contract will allow for the provision of:

- Fire Detection Installation

Fire detection System
The allowance for the fire detection system will be as per SANS 322:2005 and consists of the following:

(a) The supply and installation of all cabling, wiring, connectors, distribution frames, mounting brackets, etc., and all the equipment required by the contractor to install a complete and neat workable installation, excluding all conduiting, outlet boxes, distribution boards and sleeves indicated on the relevant drawings.

(b) The supply and installation of all material and equipment that are not specifically stated in this specification, but which are nonetheless necessary to execute the contract in accordance with the requirements of this specification, regulations, statutes and codes of practice which are applicable to the installation.

(c) The supply and installation of a central fire detection control panel (non-addressable analogue type) connected to the relevant break glass units, ionisation smoke detectors, door closers, magnetic door release, isolators, etc., in a special made surface box, mounted over the flush wall mounted terminal box (supplied by others). A display unit as part of the central detection panel that can display the number, room description of each detector or break glass unit must be provided.

(d) The supply and installation of a 600 x 600 mm (minimum) mimic panel flush mounted against the wall as part of the control panel indicating all the zones per floor with two high intensity leds. (If stated/ required in Bill of Quantities)

(e) The supply and installation of a fire resistant 2-core transmission medium connected to the detectors or break glass units, enabling the pre-fire alarm and buzzer signal.

(f) The supply and installation of a 2-core transmission medium connected to magnetic door releases, enabling the closing of doors on activating of a fire signal (Door closers shall not be installed as part of this contract).

(g) The supply and installation of a 2-core transmission medium connected to the air conditioning units and fire drenching system, enabling the cut-off of air conditioning units and extraction fans in the case of a “Double-Knock” trip condition.

(h) The supply and installation of optical smoke detectors, break glass unit, buzzers, and sirens, as indicated on the drawings. No conduit will be installed in the ceiling void and detectors shall be mounted on 65mm ø steel outlet boxes. The wiring should be glanded to the outlet boxes and open wiring shall be fixed to the roof structure. No wiring laying in the
ceiling will be allowed. Wiring shall be installed in conduit in areas with concrete ceilings.

(i) The supply, installation and cabling of the UPS power supply to all the equipment supplied under this contract.

(j) The testing, commissioning and handing over of all the systems that form part of the contract.

All wire ways will be provided by the electrical contractor.

3. GENERAL REQUIREMENTS

Tenderers shall supply full detail of the equipment offered at tender stage and shall make full allowance for the design, supply, wiring, installation and commissioning of the total system. Approval of equipment shall only be considered after samples have been approved and/or a working installation inspected. The cost of this inspection shall be for the contractors account.

All the control equipment for the Fire Detection systems shall be installed where indicated on the drawings with alarms where indicated.

For calculating of his tender price the tenderer must take the following into consideration:

(a) It is essential that a layout showing the equipment positions and any changes that the contractor requires, shall be submitted for approval within two weeks after the tender has been awarded so as to ensure that the conduit system, provided by others, is to the Contractor's specification. Changes at a later stage required by the Contractor, due to bad planning at this point in time, shall be for his own account.

(b) During the time of installation there will be a number of other contractors and workers on site and tenderers must make ample allowance for co-ordination with others.

(c) The Contractor have to co-ordinate his program with the building program and will ensure that under no circumstances any delays are caused due to his interfering with the building program or for that matter with any other contractor on site.

(d) Although the conduit system will be provided by the Electrical Contractor to the Building Contractor, the onus is on this Contractor to ensure that the conduit is installed to the specific requirements, regarding position of outlets and size of conduits, sleeves, distribution boxes, etc. However the quality of the conduit installation will be determined by the Engineer.
Any instructions that the Contractor wishes to issue to the Electrical Contractor doing the conduiting shall be timeously requested from the Engineer to be issued to the Electrical Contractor via the Main Contractor.

Supply and install the complete fire detection system to comply with the current applicable provisions of the following standards:

(a) Local electric codes

(b) National fire protection standards:

NFPA 71 : Central station signalling systems - protected premises unit

NFPA 72A : Local protective signalling systems

NFPA 72D : Proprietary protective signalling systems - protected premises unit

NFPA 72E : Automatic fire detectors

(c) Local and state building codes

(d) All requirements of the local authorities having jurisdiction

(e) The system and all components shall be listed by Underwriters Laboratories Inc for use in fire protective signalling systems under the following standards as applicable:

UL 864 Control units for fire protective signalling systems

UL 268 Smoke detectors for fire protective signalling systems

UL 268A Smoke detectors for duct applications

UL 217 Smoke detectors, single and multiple station

UL 521 Heat detectors for fire protective signalling systems

UL 228 Door closer-holders for fire protective signalling systems

UL 464 Audible signalling appliances

UL 1638 Visual signalling appliances
4. WORKING DRAWINGS AND TECHNICAL INFORMATION

4.1 General

Only the main equipment and devices have been shown on the drawings and specific wiring or cabling between equipment has not been shown.

It shall be the responsibility of the contractor to ensure that the method of installing wiring or cabling, and the wiring used, between the equipment shall optimize the use of such equipment and that the optimum parameters specified can be obtained.

4.2 Submittals During Tender Period

All tenderers shall submit the following information with their tenders:

(a) Outline drawings showing the dimensions (size) and configurations of all equipment in the spaces allocated to these equipment.

(b) Any information that may have a direct effect on the architectural or structural features of the building, which features may upon the proposal of the contractor be subject to modification.

(c) Certification of ISO compliance for the equipment and cabling that will be used during the execution of the contract.

(d) Brochures and specifications of all equipment offered for the execution of the contract.

(e) Brochures and specifications of all software offered for the execution of the contract.

(f) Full details regarding the proposed training to be given on the hardware, software and the operation and maintenance of the systems.
A letter of compliance also indicating which of the items offered does not comply with this specification and what the differences are and the implications thereof.

4.3 **Submittals During Contract Period**

The contractor shall submit complete documentation showing the type, size, rate, style, catalogue number, manufacturer's names, photos, and/or catalogue data sheets for all items offered enabling the Engineer to ensure compliance of the equipment with this specification.

This information shall be submitted to the Engineer within seven (7) calendar days after award of this contract and shall be subject to his approval.

Equipment must not be ordered without this approval.

Furthermore the contractor shall submit for approval the complete layout of the entire system, showing wiring and all equipment.

All equipment proposed as equal to that specified herein, shall conform to the standards herein.

For equipment other than specified, the contractor shall supply proof that such substitute equipment does in fact equal or exceed the features, functions, performance and quality of the specified equipment. However the Engineer shall have the final decision of acceptance and his decision shall be final.

4.4 **Submittals On Completion Of The Installation**

Detail "as-built" transparent drawings of each part of the complete installation shall be submitted to the Engineer on completion of the installation.

Such detail drawings shall include complete and fully dimensional drawings of the equipment, full schematic diagrams of all circuits, terminal numbers, resistance values, capacities of all equipment, supply voltages, component characteristics and values, block diagrams and line diagrams, etc.

Three user manuals as specified in this specification, bound in hard cover ringbinders, shall be submitted to the Engineer on completion of the installation.

4.5 **Approval of Drawings**

The approval of drawings shall not relieve the contractor of his responsibility to supply the installation according to the requirements of this specification or to obtain the highest quality of craftsmanship possible.
5. **ENVIRONMENTAL CONDITIONS**

The installation shall operate satisfactorily in the following environmental conditions:

- **Average monthly maximum temperature**: 30°C (Summer condition)
- **Average monthly minimum temperature**: 5°C (Winter condition)
- **Absolute minimum temperature**: 4°C
- **Absolute maximum temperature**: 40°C

(The aforementioned figures are the prevailing outside weather conditions)

6. **SUPPLY VOLTAGE**

The low voltage power distribution system in both buildings will be a 400/231 Volt ± 10%, 3-phase, 4 wire, 50 Hz AC supply.

All the equipment offered shall be able to function at this voltage and at this tolerances.

All the equipment associated with the system shall be able to operate from the low voltage power distribution system for twenty-four hours per day without overheating or degradation.

7. **SITE AMENITIES**

Tenderers should liaise with the building contractor, regarding site accommodation and storage facilities and should allow for all cost in this tender, including the storage and safe keeping of materials, as well as assurance against loss or damage.

8. **PROJECT MANAGEMENT**

The contractor shall provide adequate project management during the installation, implementation and training period.

The project management shall at least include:
9. QUALITY CONTROL OF MATERIAL

All materials shall be the best of their respective kinds described in the specification and shall in every way be suitable for the purpose for which they are intended to be used.

All materials and equipment supplied shall fully comply to the requirements laid down in this specification and the latest editions of the relevant SABS, BS, IEEE, CCITT, EIA, ISO and DIN specifications or as otherwise specified.

Any item not complying with the following shall be substituted with an approved new component at no cost to the Administration, the acceptance or rejection of such work being determined by the Administration's representative.

The contractor shall maintain adequate and effective quality control standards while manufacturing or installing of the specified equipment.

The Administration's representative shall have the prerogative of inspecting the equipment in the contractor's factory or on site, or to call for manufacturer's test certificates of such equipment at any reasonable time. The Administration's representative shall ensure accuracy of dimensions, completeness, configuration, quality of workmanship, correct identification, proper use of and type of materials, equipment used and finishes to equipment.

Samples of all equipment must be submitted for approval before installation is commenced.

Such approval shall not relieve the contractor of his responsibility for design, detail and dimension and shall in no way exonerate him from his liability to
carry out the work in accordance with the terms of the contract and specification.

All such samples may be retained until completion of the contract. All such samples must have labels securely attached thereto designating the contract by name and number, the name of the contractor and any further relevant information.

10. **WORKMANSHIP**

The contractor shall only employ competent Engineers, Technicians and Artisans to erect the installation on site.

The contract shall be executed with the best workmanship in a workmanlike manner to the satisfaction of the Administration's representative.

The contractor must maintain a high quality of workmanship and the Engineer shall be in full control to determine whether the installation or individual portions thereof are acceptable or not.

The contractor shall be informed in writing should the equipment or workmanship not be to the satisfaction of the Engineer and thus not acceptable. In such a case the contractor shall replace the equipment and/or perform the remedial work immediately at the cost of the contractor. All rejected material shall be removed from site.

The Engineer may upon request of the contractor visit existing installations or prototype assemblies in the factory to determine that the workmanship are of the required standard.

If required the contractor shall provide the Engineer with equipment of facilities to examine all equipment and if necessary test this equipment to preclude malfunctioning of the equipment.

The contractor shall be held liable for all damage to other services and if such damage is not repaired to the satisfaction of the Engineer within a reasonable period the Engineer shall be entitled to appoint another contractor to repair such damage and debit the account of the contractor.

11. **COMPETENCY OF WORKMEN**

The Administration reserves the right to call upon the contractor to remove any workman or representative who, in their opinion, is incompetent or whose presence would have a deleterious effect on the progress of the works.
12. **TRAINING OF OPERATORS**

A suitable qualified person, preferably one who has been involved with a similar installation, or the installation on site and who is conversant with the English language shall train and instruct operators employed by the Administration in operating the installation.

Such a person shall be available to instruct and train the persons involved by means of lectures and practical instructions on site for a period of one day minimum, commencing two days before the commissioning and handing over of the installation.

The contractor shall supply full details of the proposed training to be given on all hardware and software as specified in this specification detailed as follows in the bills of quantities:

- Cost per person
- Duration of the course
- Course outline

The training cost shall cover training for two persons on the premises of the Administration.

The contractor shall supply additional software support on any problems and questions asked by the trained personnel during the one year guarantee period.

13. **TRAINING OF TECHNICAL PERSONNEL**

A suitable qualified person, preferably one who has been involved with a similar installation, or the installation on site and who is conversant with the English language shall train and instruct technical personnel employed by the Administration in maintaining the functionality of the installation at the end of the guarantee period.

Such a person shall be available to instruct and train the persons involved by means of lectures and practical instructions on site with regards to operation, routine maintenance and inspection of the installation for a period of one day minimum, commencing two days before the commissioning and handing over of the installation.

Irrespective of the above, the contractor shall perform revision training of the technical personnel six months after acceptance of the installation and the first training session. The contractor shall determine whether the personnel is familiar with and adequately trained to utilize the installation fully and submit a report after this revision training to the Administration's representative.
The contractor shall supply full details of the proposed technical training to be given on all hardware detailed as follows in the bills of quantities:

- Cost per person
- Duration of the course
- Course outline

The training cost shall cover training of two persons on the premises of the Administration. The technical and operational manuals to be supplied by the contractor must be explained fully to the personnel.

The contractor shall supply any additional technical support training during the one year guarantee period, the cost of which shall be allowed for in the tender price.

14. REQUIREMENTS OF THE FIRE DETECTION SYSTEM

14.1 General Information

This part of the specification is for the supply, delivery, installation, testing and commissioning of a Fire Detection System and must be read in conjunction with the General Specification. Where it deviates from any of the specifications listed or accepted as general practice those deviations must be brought to the Engineer's attention at tender stage.

14.2 Equipment Manufacturers

All references to manufacturers, supplies, model numbers and other pertinent information herein is intended to establish minimum standards of performance, function and quality.

Equivalent equipment from other manufacturers or suppliers may be submitted for that specified providing the submittals are of the same or higher quality, standards and performance and conforms with this specification.

14.3 Equipment And Material Requirements

All equipment and material shall be new and unused.

All equipment and material shall be designed for continuous duty without undue heating or degradation of function or performance.

All equipment, materials, accessories, and other facilities covered by this specification or noted on the contract drawings shall be the best suited for their intended use and shall be provided by a single manufacturer or, if provided by
different manufacturers, recognised as compatible by both manufacturers (written proof/statement shall be provided by the manufacturers).

14.4 **Terminology**

The functions of the equipment or components of the equipment shall be indicated by means of identification labels.

Identification shall preferably be in the form of universally accepted symbols.

The terminology shall be in the English language.

The contractor shall submit a complete schedule of symbols and/or terms of the identification of equipment to the Administration's representative for approval before any labels are engraved and installed.

14.5 **Engraving of Loose Equipment**

All loose equipment and tools supplied under this specification shall be indelibly engraved in a suitable position with the words King Edward VIII Hospital.

14.6 **Basic System**

The system shall be a commonly known "non-addressable system", i.e. with non-addressable detectors and break glass units.

Wiring shall be in such a way that 7 (plus x 2 spare) zones can be established as indicated on the drawings.

14.7 **System Requirements**

The following are the basic system requirements, which requirements are the minimum and not exhaustive.

(a) The system needs to function properly, so that a fire in any place in the building can be detected before it gets out of hand and before extensive damage is caused.

(b) Detectors shall be optimally spaced and break glass units positioned for easy access along escaping routes, while bells shall be spaced for total coverage.

(c) The system shall be designed in such a way that it is simple to operate and that no adjustments shall be required after installation.
(d) The equipment shall preferably be manufactured in the RSA and equivalent all replacement equipment shall also be available in the RSA.

(e) Equipment shall have been installed in the RSA in a similar installation as the one specified and shall have operated reliably and satisfactory for at least one year.

(f) All components for the system offered and installed shall be available for a period of at least 10 years from the date of the contract. A certificate of guarantee to this effect shall be submitted by the supplier of such components.

(g) Detectors mounted in hidden areas, or areas which may be kept locked for specific reasons, shall each be provided with a permanently marked remote indicator LED light mounted in a conspicuous position on the wall/ceiling outside the area and close to the point of entry into such areas.

(h) If the system offered is software driven then the software program shall be burnt into EPROM, after all parties agreed that the system is operating in a satisfactory manner. Backups of software shall be supplied to the Administration for future use.

(i) Devices shall be grouped into zones as indicated on the drawings and each zone shall be wired separately. A wiring fault in one zone shall thus not disable any other zone or device throughout the building.

(j) Spare capacity of 20% shall be allowed for in the design of the control panels, loops, zones, etc.

(k) The control panel shall have facilities to accommodate a further two detector circuits (zones), additional to the required number of zones, without having to be replace or to add additional cabinets (extensions) to the control panel.

14.8 Equipment Specification

14.8.1 Detectors

Detectors shall be designed for mounting on a standard C-type round electrical outlet box having 50mm hole centres. In the case of ceilings the base of the detector shall be mounted flush with the ceiling. Detector heads shall be a bayonet or screw fit into the base to facilitate their easy replacement and repeated insertion and removal of the head shall not damage the base. Bases for all types shall be interchangeable.
Detectors shall operate satisfactorily on a nominal 24 V DC non-polarized 2 wire system within a voltage range of 20 to 27 V. Automatic 24 hour sensitivity adjustment shall be software controlled from the panel. Reverse polarity or faulty circuit wiring shall not cause damage to the detector head or base.

All units shall be suitable to operate reliable under all conditions normally excepted in the positions where they are installed.

Detectors shall be as supplied by "ZITON" or "ARITECH" or "BOSCH" or other approved make, fitted with red LED status indicator.

Extended status indication is required where indicated on the drawings.

This extension will consist of a red LED mounted on a 65mm round coverplate, properly labelled, i.e. "Matron's Office".

The base shall be provided with wire terminals for wire sizes up to 1,5mm², which terminals shall be of the screw and clamp plate type to hold a lug firmly pressed against its contact surface. Spring-loaded push-in contacts will not be acceptable.

The removal of a detector from the base shall not affect the operation of other detectors on the line.

The control panel shall indicate when a detector head has been removed and also the address where it has been removed. Likewise it shall indicate when the wrong type of head is inserted in a base, as well as its address.

The detector shall be suitable to operate on a wire system carrying both power and signals for the operation of each and every detector in the system. The detector shall be able to receive, and decode signals transmitted to it by the control panel. Upon receipt of a signal directed at its particular address, the detector shall transmit data back to the control panel for processing and storage thereof by the control panel. Such data transmitted shall represent the analogue values present in the electronic circuits of the detector head/base combination at that point in time.

The detector when addressed by the control panel shall transmit data to enable the control panel to deduct the following basic information:

(a) The type of head generating the data (i.e. ionisation, heat, etc.)
(b) The address of the detector.
(c) The reference limits of calibration of the detector.
(d) The percent visible or invisible combustion particles per meter present in the detected chambers at that point in time, or the temperature measured at the detector.

14.8.2 Break Glass Units

These units shall be as manufactured by KAC Alarm Company (Ltd) Model KR1/SR/C supplied by Messrs "Fire Fight" of Cape Town or Messrs "CDP" of Johannesburg or other approved type and shall be in accordance with BS 5839-2, except that it shall be resettable.

Units to be installed with bottom of outlet at 1400mm AFFL. Address cards which will make communication with the control panel shall be fitted.

These units shall have normal open contacts rated at 5 A which shall make contact when the glass front breaks.

Units shall be red in colour, clearly marked "FIRE/BRAND" with all other instructions normally required. Mounting shall be surface over a C-type round box where indicated on the drawings. Wiring shall be to screw and clamp plate type terminals.

Two (2) spare glasses and testing keys must be provided.

14.8.3 Control Unit

The control panel shall be supplied and installed by the contractor in the entrance lobby of the building complex.

Unit to be installed with bottom unit at 1600mm AFFL. The control panel shall house all control units and the mimic and shall be manufactured by extruded aluminium, giving 20% spare space for expansion.

The contractor must liaise with the supplier of the equipment console to ensure a matchable, neat and proper control panel and console.

The system shall be functional for 24 hours of the day and be operated automatically. All controls and lamps shall be accessible on the units front panel/s. All loose interface equipment, power supplier, etc. shall be neatly installed in the control panel or equipment rack.

Matching blank panels shall be fitted into the spare section of the console to accomplish the requirements stated in this specification.
Plugs and sockets shall be fitted to the rear of the equipment to allow the equipment to be unplugged for maintenance purposes. Sufficient cable and connecting wire slack shall be allowed for to enable the withdrawal of equipment on site for adjustments without the need to unplug.

This unit shall conform with BS 5839 Part 4 or EN 54-2 and shall be approved by Telkom in the RSA. It shall make provision for at least the following functions:

- The control panel shall continuously monitor a number of parameters of the field devices, makes decisions and takes actions based on the information received.
- Sensing devices shall not switch into an alarm state. All decisions shall be taken by the control panel only.
- To enable the system to be tailored to suit the protected building and to permit future changes, the alarm management shall be configurable from the control panel via a keypad. This configuration shall be maintained under power failure conditions in non-volatile memory.
- The front panel of the control panel shall comprise a keyboard, alpha numeric display, text and indicator LED, etc. The occurrence and location of an event shall be displayed on the screen.
- Outputs for communication with devices such as remote text display units, graphic display units, computers, printers and intelligent mimic panels shall be provided where necessary.
- The control panel shall be supplied complete with printout facilities. Connections (a printer port and 24 Vdc power connector) for a portable printer shall be required.
- The control panel shall further have the facilities to execute the following functions, via potential free 2A rated contacts:
  - Monitored switching off of air conditioning equipment in case of a general “Double-knock” fire alarm. (5 x Potential free relay outputs).
  - Monitored switching off of water drenching system in case of a general “Double-knock” fire alarm. (2 x Potential free relay outputs).
  - Monitored alarm outputs, e.g. voice evacuation system.
- The control unit shall be of a high degree of engineering design and of high level of workmanship. The design shall be modular so as to ensure rapid fault finding and replacement of faulty circuit boards or components.
Monitoring of detector circuits shall be such that the following conditions shall be detected and displayed as a "FAULT" condition on the control panel:

(a) Open circuit line

(b) Short circuit line

The system shall operate in the "Fail Safe" mode, that is, the presence and functional condition of each and every detector head and signal line shall be proven by a small current flowing continuously through a monitoring circuit.

A bleeper shall be provided on the control panel with the facility to be switched off.

A "Fault Alarm" shall operate this local buzzer only and shall not be extended to the alarm bells.

Consecutive alarms shall be stored by the control panel in chronological order and shall have the ability to determine the priority order of alarms by means of repetitive receipt of data from detectors.

A "Fire Alarm" shall operate a local buzzer only and shall not extend to the main alarms in the passages. These alarms shall be activated by a special fool proof switch only after confirmation of a fire condition by the appropriate personnel.

The control panel shall be able to function as a stand-alone unit, together with its own power supplies and shall not be dependant on external control equipment, such as computers, for functioning.

Provision in the form of suitable terminals, connectors, or ports, shall be made on the control panel for the connection of peripheral equipment, such as computers, printers and interface equipment, to ensure that the accumulation of data generated by detectors and the control panel, to be used for future reference, or for the relaying thereof to remote monitor or control equipment.

The transmission of all data shall be via a two-wire system, which shall carry both the supply voltage and the data.

The type of wire or cable used shall be suitable for the speed of data transmission so that signals can be carried over without loss of information or corrupted data. Wiring shall meet the requirements of the detection system manufacturer, which requirements shall be published in a formal wiring specification.

The control panel shall be fully programmable through the keypad on the front of the panel, and through an RS 232 port by using a separate computer.
It shall be possible to make back-ups of the programmed data onto separate magnetic media by means of an external computer linked to an RS 232 port on the control panel.

Communications with other equipment, such as computers, shall be achieved through RS 232 ports using a fully documented public domain protocol. The protocol documentation shall also be included in the Maintenance Manual so that it will be possible for another party to communicate with the control panel without the approval of the control panel manufacturer. All communications with other equipment shall be bi-directional, and at least the functions and displays available on the front of the control panel shall be possible through the communications port. Programming of the control panel by means of other equipment is not required (except as described earlier).

The control panel shall be equipped with a alpha numeric display capable of displaying at least 80 characters. A message of at least 40 characters long per device shall be programmable and displayable on the display.

The display of the following reports/information shall be possible:

- Device information
- List of the devices isolated
- List of devices that need maintenance
- List of the most recent events
- I/O mapping
- Device messages

Each sensing device shall be numbered individually and uniquely to correspond with its address on the control panel.

If a detector head is moved from its base to another base, the address of such a detector shall remain at its original location indicated on the control panel, i.e. the base shall be addressed and not the head. The address of each device shall be manually set to the desired value.

Addressable devices shall be polled by the control panel and the equipment condition and analogue status shall be read and stored in the control panel.

The varying status of each device shall be assessed by software algorithms and the control panel shall indicate the following conditions:

(i) **Analogue Detectors**

- Detector removed
- Incorrect type of Detector
- Detector failed
- Detector contaminated
Pre-alarm
Fire Alarm
Detector healthy

(ii) **Interface to Contracts**

Fire Alarm
Interface removed
Interface faulty
Contact wiring open circuit
Contact wiring short circuit
Contacts normal

A printer shall be provided.

The printer shall provide a hard copy of the following:

- Alarms
- Faults
- Maintenance date
- Control panel operations
- Outputs Operated
- Configuration report
- Status report

The printer shall print out the following information for each alarm or signal:

- Type of alarm or fault
- Device type
- Device number
- Zone number
- User message
- Day
- Date
- Time

It shall be possible to set the printer to print out alarms, faults, control panel operations, and outputs operated, either individually or in any combination.

Control panels shall utilize electronic devices specially designed for minimum power usage in both battery and main power supply modes.

Battery charging equipment mounted in the control panel, or elsewhere shall be mounted in such a way that 231 V terminals and wiring and other mains voltages are shielded against accidental contact. All shields shall be marked 231 V. No 220 V terminals shall be placed directly next to other terminals containing wiring at other voltages.
The power pack of the control panel shall be able to accept an incoming 231 ± 10% Volt single phase supply and shall be equipped with transformers, rectifiers, inverters, condensers and integrated circuits for the supply of stabilised power to the control panel equipment and detector circuits. The power supply unit shall be equipped with over voltage protection and spike arrestors to prevent damage to the equipment by lightning or other spikes, or damage due to over voltages.

The battery charger shall be able to deliver the full charging current to discharged batteries, and thereafter the charger shall automatically vary the charging current to the batteries as may be required by battery voltage conditions. Batteries shall not be subjected to overcharging. The battery charger shall be protected against reverse polarity and short circuits on the DC supply side.

The power pack of the control panel shall regulate the supply voltage to detectors so that detectors or bases are operated in their nominal supply voltage range.

Upon loss of mains power, the power supply unit shall automatically revert to battery power, where after the system shall remain fully operational for a period of 24 hours of which at least 1 hour is at the total alarm status. The unit shall automatically revert back to mains power upon mains power restoration and manual resetting of the unit shall not be necessary.

The power supply shall be equipped with the following indications on the front of the unit:

(a) "Mains On" : green LED
(b) "Charger Fault" : amber LED

Batteries shall be mounted in a separate ventilated padlockable cubicle in such a way that contamination of other equipment cannot take place by utilizing a special plastic container to contain any possible spillage. Any supply fault, charging fault or low battery voltage shall be transmitted to the control panel so that an alarm can be generated. No fuses or switches shall be accessible on the front of the power supply unit without opening the door. Batteries shall be of the sealed lead acid type and the sizes of the batteries to be used shall be indicated on a label in the battery cubicle. Batteries shall be charged to 85% of their capacity within 24 hours.

Wiring terminals shall be clearly marked with a label strip for identification so as to simplify installation and connection of wires on site, during installation. All outgoing and incoming terminals and all other equipment in the control panel, shall be suitable labelled to simplify maintenance and installation and all panel mounted equipment shall likewise be labelled. Outgoing and incoming power.
and field wiring shall be individually and correspondingly, numbered at each point of termination.

The control panel shall have knock-outs in the bottom plate thereof to terminate conduiting for all power cabling and knock-outs in the topplate thereof, to terminate conduiting for signal and other electronic cabling or wiring. Holes drilled on site for this purpose will not be acceptable.

All identification labels, as well as wire terminal numbers shall be clearly shown on all wiring diagrams in the maintenance manual.

It shall be possible to silence the audible alarms without influencing the visual alarms or alarm transmissions to the Fire Brigade.

Two (2) spare fuses shall be provided.

14.9 **Wiring**

The Contractor must take note that it is a specific requirement that only fire proof multicore stranded wires and cables shall be used where wiring is done outside of steel conduit.

All wires and circuits shall be clearly identified by either using colour coded cable or plastic label tags.

Wiring shall be arranged in a return loop (ring), in such a manner that, in the event of an open circuit or a short occurring on the line, the control panel communicates with the detectors from both sides of the loop.

The arrangement shall be such that during an open of short circuit no more than 50% of any zone shall be deactivated. To enable this, line isolators shall be provided on the line on each side of each zone.

Cable ends shall be terminated in approved terminal blocks as supplied by MS², Klippon, Waco or other approved type, *Chease blocks* are not acceptable. In the distribution board the Contractor shall use terminal blocks that are specially designed for this function and in which the terminals are easily accessible, clearly labelled, well supported and easy to wire, using a spring mechanism to grip the wire.

The wires of each circuit shall be strapped together and clearly labelled in all wire ways.

Where coloured wires are used, the wiring shall be done in such a way that the same colour is used throughout for a specific circuit.
Identification shall be such that any circuit can be clearly identified and traced from the line diagrams.

The Contractor shall determine the various wire sizes to ensure that the voltage drop in any circuit shall not exceed 2 V under alarm conditions. This requirements also include the alarm circuits.

Cables shall be terminated on each detector base or break glass unit. The wiring shall be arranged in the "loop" method and no "T-offs" or joints shall be permitted.

All draw boxes shall be clearly indicated on the "As Built" drawings.

The insulation resistance of all circuits must be tested individually with a suitable insulation tester at 50 V and shall not be less than 1 Megohm with detector heads plugged in.

14.10 \textbf{Installation}

14.10.1 \textbf{Control panel}

\textbf{Mechanical design}

The control panel shall be housed in a cabinet designed for mounting in joinery. The back box and door shall be constructed with provisions for electrical conduit connections. The door shall provide a key lock and shall include a glass or other transparent opening for viewing of all indicators.

The control unit shall be horizontal modular in structure for ease of installation, maintenance and future expansion. Typical example:
The typical maximum dimensions are as follows:

**System Capacity**

The control panel shall provide and be capable of expansion to the following capacities:

- **Non-Addressable loops** ............................................................... 1
- **Devices per loop** ................................................................. 127
- **Non-addressable devices per loop** ........................................ 127
- **Total non-addressable devices or control modules** .................... 127

The control panel shall be wall-mounted at the main entrance where indicated on site. Cabling between the control panel and auxiliary equipment shall be neat and tidy in conduit channels supplied by others. The printer shall be mounted on a shelf below the control panel or form part of the unit.

The contractor shall provide a neat floor plan/block plan drawing (600 x 600mm) of the total building showing the position of each device with the address and zone (if required). This information shall correspond with the display on the control panel as well as the printout. This drawing, when approved, shall be framed and mounted next to the control panel at a position indicated on site.
14.10.2 **Detectors**

Detectors shall be ceiling mounted and break glass units at 1500mm above finished floor level, over the outlet provided under the electrical contract. The onus is on the contractor to contact the engineer for a ruling whenever there is any uncertainty regarding the position of installation of any piece of equipment. Failure to comply to this specification might require later movement of such equipment at the contractor's expense.

14.10.3 **Cables and Wiring**

Installation shall be in strict compliance with the manufacturer's recommendations. The manufacturer must be consulted for all wiring diagrams, schematics, sizes, outlets, etc before installing the equipment and wiring.

All equipment shall be held firmly in place. Fastening and supports shall be adequate to support the loads with a safety factor of five.

The fire alarm control panel shall be connected to a separate dedicated uninterrupted power supply branch circuit of maximum 20 amperes. (Supplied by others)

This circuit shall be labelled as "Fire Alarm" and supplied by others as a dedicated plug or single phase outlet at the entrance foyer.

All wiring shall be completely supervised. In the event of a primary failure, disconnected standby battery, disarrangement of any components, or any open circuits in the system, an audible and visual trouble signal will be activated until the system is restored to normal.

Zones shall be clearly indicated on the fire alarm control and mimic panel. The names and the position of the zones shall be co-ordinated with the engineer and client and shall meet with their approval.

Air conditioning system(s) shall be indicated on a separate zone.

Open cable shall be allowed above ceilings, in attic's and in other areas allowing surface wiring.

Cable shall be the type "listed for the use" as specified under NEC article 760-30 (bell wire, intercom or telephone wire are not approved). Enclosed cable installed in 20 mm diameter conduit shall be of 0,5 to 1 mm screened (shield) "Belden" or equivalent type.

Open cable installed on the surface in open roof (void) spaces shall be of 0,5 to 1 mm "Perilli" or "Alpha Pyron" special fire cable.
All cable shall be installed as per NEC article 760.

Leave 150 mm wire tails at each device box and 1 m wire tails at the fire alarm control panel.

Cable for the initiating devices (manual stations, heat detectors, smoke detectors, etc) shall be looped. Cable shall be installed from the monitor module to the first device, then to each succeeding device within each address line and back to the monitor module.

Cable shield continuity must be maintained and connected to earth ground only at the control panel. Intelligent detector wiring must not be routed power wiring, 240 V AC power wiring or other high current circuits.

Cable for the control of the air conditioning units must be installed in 20mm steel conduit installed by others.

The air conditioning units of the entire complex must be shut down should a fire alarm occur. The fire alarm sub-contractor shall allow in his tender for one control cable and the control panels as indicated on the drawings. The control wiring from the air conditioning control panel to the air conditioning unit shall be done by others.

The system shall be wired such that the air conditioning system shall shut-down after detection of a fire by a detector. Steel conduit (20 mm diameter) shall be installed by others for wiring to the break glass unit as indicated on the electrical drawings. Steel conduit (20 mm diameter) shall be installed by others for the door closer units.

No conduits shall be installed for the wiring to the fire detection detectors. All wiring shall be installed above the ceiling and shall be surface mounted open wiring.

The surface fire cable shall be held in place at the device by means of two special cable glands fixed to a 65 mm diameter drawbox. The wiring/cable shall be installed as shown on detail sketches.

The surface wiring/cable shall be held in place at the device box, by means of gripper glands. The cable must be stapled or strapped per NEC or at 1 m maximum spacing.

Cables must be separated, minimum 50 mm from any open conductors of light, power and shall not be placed in any outlet or draw box or containing these conductors, as per NEC article 760-29.
All splices or connections shall be made within approved junction boxes and with approved fittings. Boxes shall be red and/or labelled "Fire Alarm System" or other approved markings.

14.10.4 Detection Lines

Detection lines may have a capacity of detectors or devices as decided upon by the manufacturer, but this capacity shall not exceed 127 devices per line.

These detectors/elements shall be freely distributable over any one of the individual alarm zones.

Zones must be clearly defined and quick and precise identification of a fire must be possible. Each line shall be capable of all the self-monitoring functions.

The control Unit with its mimic panel shall be utilised to indicate the exact position of triggered detectors/elements in any line.

A triggered detector/element shall not cause any other detectors on the line to seize monitoring.

The Central Control Unit shall be capable of switching off air conditioning units in the case of a fire alarm.

In the specific zone where a fire has been detected it shall be possible to control the equipment. Any detector when triggered, shall be capable of causing specific control functions.

Any individual zone or detector in an alarm line shall be capable of being isolated without affecting the operation of the remaining zones or detectors in the line and without raising the fire alarm. However during this condition an isolation indication per zone, shall be displayed on the Control Unit.

15. SYSTEM ALARM DETECTION

When a fire alarm condition is detected by one of the system initiating devices, the following functions shall immediately occur:

(a) The system alarm LED shall flash.
(b) A local sounding device in the panel shall be activated.
(c) Local sounding devices on the floor that a fire the condition was detected shall activate a prepare to evacuate sound.
(d) The 80-character LCD display shall indicate all pertinent information associated with the alarm and its location.

(e) The LED mimic panel shall indicate the zone and level which is activated.

(f) All automatic programs assigned to the alarm point shall be executed and the associated indicating devices and relays activated.

(g) Local trained personnel will investigate the possible fire condition and communicate with the fire officer, at the panel via the intercom system. On confirmation of a fire condition, the alarm must be activated by hand and sounding devices on the floor and the bells on ground floor activated.

16. SYSTEM TROUBLE DETECTION

When a trouble condition is detected by one of the system initiating devices, the following functions shall immediately occur:

(a) The system alarm LED shall flash

(b) A local sounding device in the panel shall be activated.

(c) The 80-character LCD display shall indicate all pertinent information associated with the trouble condition and its location. However, unacknowledged alarm messages shall have priority over trouble messages and if such an alarm must also be displayed, the trouble message shall not be displayed on the LCD.
17. **CONTROL SWITCH OPERATION**

17.1 **Acknowledge Switch**

Activation of the control panel acknowledge switch in response to a single new trouble or alarm condition the system alarm or trouble LED's from flashing to steady-on.

If additional new alarm or trouble conditions exist in the system, activation of this switch shall advance the display to the next alarm or trouble condition that exists, and shall not silence the local audible device or change the LED's to steady until all new conditions have been so acknowledged. New alarm conditions shall always be displayed before new trouble conditions. Occurrence of a new alarm or trouble condition shall cause the panel to "resound" and the sequences described above shall repeat.

17.2 **Signal Silence Switch**

Activation of the signal silence switch shall cause all appropriate indicating appliances and relays to return to the normal condition after an alarm condition. The selection of indicating circuits and relays silenced by this switch shall be fully programmable and changeable in the field.

17.3 **System Reset Switch**

Activation of the system reset switch shall cause all electronically-latched initiating devices or zones, as well as all associated output devices and circuits, to return to the normal state. If alarm conditions exist in the system after the system reset switch activation, the system shall then resound the alarm.

17.4 **System Test Switch**

Activation of the system test switch shall initiate an automatic test of all intelligent detectors in the system. Such test shall activate the electronics in each intelligent device, simulating an alarm condition. A report summarising the results of this test shall be displayed automatically on the front panel.

17.5 **Lamp Test**

Activation of the lamp test switch shall turn on all LED indicators, LCD display and local sounder and then return to the previous condition.

17.6 **Automatic Detector Test**

The system shall include a special automatic detector test which permits a serviceman to test all intelligent detectors from the main control panel.
17.7 Watch-Dog Timers Test

The system shall include independent "Watch-Dog" timers to detect and report failure of any microprocessor circuit, memory, or software.

17.8 Programming

The system shall be programmable, configurable and expandable in the field without the need for special tools or PROM programmers and shall not require replacement of memory IC’s. All programming may be accomplished through the standard control panel keyboard. All programs shall be stored in non-volatile memory.

The programming function shall be entered with a special password that may be selected when the system is installed. The password may be changed in the field to a new value at any time by entering the old password and requesting a password change.

18. TESTING AND COMMISSIONING

The Contractor shall test each and every detector and break glass unit in the system and only after he is satisfied that the system is in a hundred percent working condition shall the Engineer be notified that the system is ready for hand over.

The Contractor shall provide all the latest equipment used in the testing of ionisation and heat detectors.

19. UNINTERRUPTABLE POWER SUPPLY

19.1 General

This item is for the supply, installation, connecting up, testing and commissioning of a 230 V 50 c/s - locally designed UPS as supplied by Meizner or other approved manufacturer. The UPS will supply the alarm panel with 230 V AC.

This unit shall be installed as shown on the drawings and schedules on the ground floor of the Building. The contractor shall calculate the load of the equipment to be connected to the unit and submit same to the Engineer for approval. In the "Statement of Compliance" the tenderer shall state the capacity of the UPS offered.

19.2 Sizing
The UPS shall be 20% over sized to continuously supply a clean, inverted, 50 Hz, 230 V sine wave to the following equipment:

(a) Fire Detection System

Tenderers shall submit their calculations at tender stage.

19.3 **Operation**

Only an "on-line" UPS which continuously converts DC utility power to AC, which is then the source for clean AC power and simultaneous internal battery charging and in which no power switching or load interruption takes place at any time will be accepted.

The output shall be a sine wave in accordance with the technical specification and the inverter shall supply power to the load at all times, however, static switching to mains under peak load conditions, without interruption of the output, will be allowed.

The UPS shall be able to operate effectively in the prevailing environmental conditions encountered on site.

Silent operation is required and an acoustic noise level of 55 dBA will be the maximum allowed.

19.4 **Cabinet Design**

All the equipment and batteries shall be housed in a well-designed, attractive looking, floor standing, epoxy powder coated, metal enclosure. The enclosure will be well ventilated to ensure that components do not overheat during extreme ambient temperatures and full load conditions, however, the cabinet shall be vermin proof.

A separate compartment shall be provided for the batteries at the bottom of the enclosure in such a way that the batteries can be easily serviced and replaced.

The battery compartment shall be fully sealed off from the compartment housing the electronic components to prevent corrosion and to ensure that the installation is no fire hazard. If this requirement is not met to the approval of the Engineer then the Contractor shall supply a separate battery container at no cost to the Administration.

19.5 **System Description**
The Uninterruptable Power Supply shall consist of a system which in essence comprises four basic components, i.e.:

(i) the charger/rectifier  
(ii) storage battery  
(iii) inverter  
(iv) static transfer switch

19.5.1 **The Rectifier/Charger**

The incoming mains shall be rectified by a phase controlled thyristor bridge which simultaneously supplies power to the inverter and charges the batteries. To ensure reliability the rectifier shall be adequately oversized. The AC ripple content of the output shall not exceed 0,1% to achieve maximum battery life expectancy.

19.5.2 **The Inverter**

The DC output from the rectifier, with the batteries in parallel, shall be used as input to a microprocessor controlled transmitter inverter which shall invert the DC to a 50 Hz frequency controlled, pure sine wave AC output.

Frequency stability shall be ensured by the use of a crystal controlled oscillator, while the output shall be force-corrected to ensure a THD of 3% typically.

Total drainage of the batteries shall be prevented by incorporation of a "sleep mode" which shall disconnect the batteries, during a power failure, when the battery voltage reaches the preset lower limit, when mains returns, the unit will automatically restart and initiate the recharge cycle.

The inverter shall be fully protected by utilizing magnetic and electronic overcurrent/short circuit protection and fail safe transistor switching protection. Audible and visual warning shall be provided as batteries are being discharged with an additional one minute to shutdown warning.

19.5.3 **Static Transfer Switch**

Ultra high speed solid state devices shall be employed to guarantee transient-free, no break transfer between the inverter output and the mains during overload peak demands.

19.6 **Electrical Specifications**

Electrical specifications to be complied with are as follows:

**Input:**

[Contractor  Witness 1  Witness 2  Employer  Witness 1  Witness 2]
* Input voltage : 220 V AC ± 15%
* Input frequency : 50 Hz ± 1 Hz

**Output:**
* Output voltage : 230 V AC
* Zero load to full load variance : ± 3%
* Variance over DC voltage range : ± 2.5%
* Continuous overload rating : 120 %
* Automatic current limiting at : 150 %
* Output frequency : 50 Hz crystal controlled
* THD : Less than 5%
* Short circuit protection : Continuous

**Charger:**
* Voltage regulation : ± 0.2 %
* AC ripple content : ± 0.1 %

### Batteries

The unit shall be supplied with high quality, sealed, lead acid, rechargeable batteries with an 8 year life expectancy, sized to provide 8 hours full load output.

### Cabling

The contractor is fully responsible for the cabling from the UPS including all DB’s fully equipped with circuit breakers, contactors, isolators, etc. as well as all cabling and system wiring required under this contract to provide the components of the systems of this specification with an uninterruptable power supply. Only conduiting and conduit outlet boxes with draw wires will be supplied under the electrical sub-contract. The onus is however on the contractor to assure that the conduiting system supplied under the electrical contract is in accordance with the specifications.

All cabling shall be in accordance with SANS 10142-1 "The Code of Practice for the Wiring of Premises" and Part 1 of this specification. A Compliance Certificate in terms of the OHS Act of the RSA shall be issued by the Contractor on completion of the installation and before hand-over will be considered.

### Power Distribution

A 20 A 1-phase supply will be made available under the electrical contract in the Room specifically for the UPS. This supply will be from the emergency power generator. A 20 A isolator with grip cord facilities will be wall-mounted from which the contractor shall supply the UPS.
20. **Maintenance**

Tenderers must note full particulars of the year free maintenance as specified in the general specification Section 1.

Each tenderer shall give full particulars of the maintenance, spare parts and service facilities which are available either locally or in the RSA.

The tenderer shall list the centres where maintenance facilities can be readily provided and shall state if repairs under guarantee or maintenance agreement can be undertaken at these centres. Local Companies or subsidiaries thereof, other than the main supplier, who only offer replacement of malfunctioning printed circuit boards, etc., cannot be considered to be maintenance centres under this clause. When replacing faulty cards, the new cards, when inserted, must automatically initialise themselves.

21. **Literature Required**

The installation shall not be handed over if any of the following are outstanding:

(a) An instruction card at the control panel indicating in English the procedure to be followed in the event of an ALARM.

(b) Operating, maintenance and fault-finding instructions in triplicate.

(c) Schematics and wiring diagrams in triplicate.

(d) "As Built" drawings.

22. **Wire Ways**

Conduit, sleeves and draw boxes shall be provided by others, however it is the responsibility of the contractor to ensure that this installation is to his requirements. He will thus submit a conduit layout within two weeks after the tender has been awarded and shall be responsible, during the construction stage, to ensure that the conduit system is installed to his requirements regarding positions and height of outlet boxes. No claims shall be entertained at a later stage due to the wire ways not complying with the contractor's needs.

To ensure that this requirement is met it is essential that the contractor closely liaises with the Electrical contractor to the Main Contractor.

It is also a requirement that tenderers should indicate at tender stage whether they are satisfied with the basic layout as per the drawings.
SAKHIWO HEALTH SOLUTIONS
UPGRADING OF SILOAM HOSPITAL – PHASE 2

CONTRACT NO: (2023-40-00)

UPGRADING OF MORTUARY- MENTAL HEALTH AND TEMPORARY MENTAL FACILITIES

FIRE DETECTION SYSTEM – RETURNABLE DOCUMENTATION

REV. 01: 15 November 2018

Electrical Engineer – Bigen Africa
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Bigen Africa Services (Pty) Ltd
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Innovation Hub, Pretoria
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E-Mail: chris.scheepers@bigengroup.com

Electrical Engineer – S&W
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Silvertondale, Pretoria
Tel: 012 804 7815
E-Mail: shane@swconsulting.co.za
SAKHIWO HEALTH SOLUTIONS

CONTRACT NO: (2023-40-00)

UPGRADING OF MORTUARY- MENTAL HEALTH AND TEMPORARY MENTAL FACILITIES

C3.4 CONSTRUCTION SPECIFICATIONS

C3.4.3 Schedules: Fire Detection System

1. **GENERAL**

   This section of the specification forms part of, and must be read in conjunction with, Section 1 and 2 as well as the drawings.

2. **SCHEDULE OF DRAWINGS**

   The fire detection drawings where the complete installation is shown form part of the specification.

3. **SCHEDULE OF DETAIL DRAWINGS**

   The following detail drawings as which minor details of the installation is indicated form part of the specification and must be read in conjunction therewith:

   1) 2023-40-VA-07-U403: Electrical Services: Mental Health (Block Q) Fire Detection layout
   2) 2023-40-VA-07-U406: Electrical Services: Temporary Mental Health (Block W) Fire Detection layout
   3) 2023-40-VA-07-U409: Electrical Services: Mortuary (Block U) Fire Detection layout

4. **SCHEDULE OF ADDITIONAL LABOUR (Rand/hour)**

   These tariffs shall be used for the recharging of labour costs not included in other tariffs. P & G amounts are excluded. These tariffs will be subject to negotiation by the Engineer or his representative during the installation phase.

<table>
<thead>
<tr>
<th>Supervisor (R)</th>
<th>Foreman (R)</th>
<th>Artisan (R)</th>
<th>Registered Apprentice (R)</th>
<th>Labourer (R)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Time</td>
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<td></td>
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</tbody>
</table>

   [Table containing tariffs for different labour categories]
5. **SCHEDULE OF ADDITIONAL TRANSPORT (Travelling Costs)**

Should the contractor be successful in tendering, the following costs per kilometre shall pertain to the cost of all additional travelling.

<table>
<thead>
<tr>
<th>Vehicle Gross Mass</th>
<th>Cost per Kilometre</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tarred Surface Road</td>
</tr>
<tr>
<td>CAR</td>
<td>R /km</td>
</tr>
<tr>
<td>1000 Kg</td>
<td>R /km</td>
</tr>
<tr>
<td>3000 Kg</td>
<td>R /km</td>
</tr>
</tbody>
</table>

6. **SCHEDULE OF PROFIT FOR MATERIAL FOR VARIATIONS**

The following profit percentage is applicable to all materials not included in other tariffs, P & G items excluded, and will be subject to negotiation by the Engineer or his representative during the installation phase.

If the Contractor is successful with the tender the following percentage profit shall be applicable on the cost of all materials specified for variation order purposes for which unit prices have not been included in this tender document.

The stated percentage profit is not fixed and the Engineer may negotiate for a lower percentage during variation.

The Engineer shall be at liberty to call for adjustment of individual prices, as considered necessary, on the basis of the average ruling prices as determined by the Engineer for similar work in the industry, in the area in which the work is being carried out.

<table>
<thead>
<tr>
<th>Variations</th>
<th>Percentage Profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additions</td>
<td>%</td>
</tr>
</tbody>
</table>
7. **SCHEDULE OF EQUIPMENT**

Should the Contractor be successful in tendering, the following material/equipment will be used.

The Contractor shall submit full details regarding the information required when submitting the tender.

This includes equipment that was not specified in this document, but may form part of the installation.

Failure to include full details regarding the information required might invalidate the tender.

<table>
<thead>
<tr>
<th>Description</th>
<th>Manufacturer or Trade Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Fire Detection Control Panel</td>
<td></td>
</tr>
<tr>
<td>2. Ionization Smoke Detector</td>
<td></td>
</tr>
<tr>
<td>3. Heat Detector</td>
<td></td>
</tr>
<tr>
<td>4. Break Glass Unit</td>
<td></td>
</tr>
<tr>
<td>5. Bells</td>
<td></td>
</tr>
<tr>
<td>6. Sirens</td>
<td></td>
</tr>
<tr>
<td>7. Schematic Block Diagram</td>
<td></td>
</tr>
<tr>
<td>8. Buzzers</td>
<td></td>
</tr>
<tr>
<td>9. Fire Resistant Cable</td>
<td></td>
</tr>
<tr>
<td>10. Internal &amp; General Wiring</td>
<td></td>
</tr>
<tr>
<td>11. Uninterrupted Power Supply</td>
<td></td>
</tr>
<tr>
<td>12. Amplifiers</td>
<td></td>
</tr>
<tr>
<td>13. Microphones</td>
<td></td>
</tr>
<tr>
<td>14. Speakers</td>
<td></td>
</tr>
</tbody>
</table>

8. **SCHEDULE OF WORK COMPLETED BY TENDERER (Previous Contracts)**

The Tenderer must, in the space below, supply a list of at least four customer/s contracts of a similar/comparable nature (reference sites) that was completed or where similar systems have been installed during the last three to five years. Arrangements will be made with the Contractor during the evaluation period, to visit at least one of the sites, where a successful installation of a similar/comparable nature has been made.
Projects Completed

<table>
<thead>
<tr>
<th>Client Name and Tel. No.</th>
<th>Consulting Engineers Name and Tel. No.</th>
<th>Type of Work (Contract)</th>
<th>Value of Work</th>
<th>Year of Completion</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
</tr>
</tbody>
</table>

Projects Currently under Construction

<table>
<thead>
<tr>
<th>Client Name and Tel. No.</th>
<th>Consulting Engineer Name and Tel. No.</th>
<th>Type of Work (Contract)</th>
<th>Value of Work</th>
<th>Year of Completion</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>

9. **SCHEDULE OF SUB-CONTRACTORS**

The Contractor shall state in the schedule below the names of all sub-contractors he wishes to employ for the works and shall define their duties and outline their experience. Acceptance of this tender should not be seen as acceptance of all or any of the sub-contractors. If any of the sub-contractors is not approved after acceptance of the tender it will not invalid the tender and the tender tariff for the various items will stay final and binding, even should the engineer approve a sub-contractor this was not mentioned in the tender document.

<table>
<thead>
<tr>
<th>Name of Sub-Contractor</th>
<th>Proposed Duties</th>
<th>Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10. **SCHEDULE OF PROPOSED PERSONNEL AND LABOUR**

Tenderers must here under indicate the personnel and labour that will be utilized with the completion of the contract.
<table>
<thead>
<tr>
<th>Personnel and Labour</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Technical Personnel</td>
<td></td>
</tr>
<tr>
<td>(b) Clerical Personnel</td>
<td></td>
</tr>
<tr>
<td>(c) Artisan</td>
<td></td>
</tr>
<tr>
<td>(d) Skilled Labour</td>
<td></td>
</tr>
<tr>
<td>(e) Un-skilled Labour</td>
<td></td>
</tr>
<tr>
<td>TOTAL PERSONNEL AND LABOUR</td>
<td></td>
</tr>
</tbody>
</table>

SIGNATURE OF TENDERER: ______________________________________________________

DATE: ______________________________

NAME OF (SIGNATURE) TENDERER: _______________________________________________

ADDRESS OF TENDERER: _______________________________________________________

_________________________________________________________________________

_________________________________________________________________________

TELEPHONE NO.: ______________________________

FAX NO.: ______________________________
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>LED life</th>
<th>Colour Temp.</th>
<th>Lumens</th>
<th>Lamp</th>
<th>Image</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></td>
<td>General Indoor lighting - Fluorescent &amp; LED Tubes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A1</td>
<td>Decorative surface type, 1260mm x 175mm x 53mm LED luminaire, with mild steel powder coated body, MIR04 louvre. Supplied by Voltex Lighting. Cat No.: SL95-37W-LED, SL95-S-37W-LED or similar and approved.</td>
<td>&gt;60,000hrs</td>
<td>4000K</td>
<td>5980</td>
<td>37W LED</td>
<td><img src="image1.png" alt="Image" /></td>
</tr>
<tr>
<td>A2</td>
<td>Decorative surface type, 1260mm x 175mm x 53mm LED luminaire, with mild steel powder coated body, MIR04 louvre. Supplied by Voltex Lighting. Cat No.: SL95-27W-LED, SL95-S-27W-LED or similar and approved.</td>
<td>&gt;60,000hrs</td>
<td>4000K</td>
<td>4640</td>
<td>27W LED</td>
<td><img src="image2.png" alt="Image" /></td>
</tr>
<tr>
<td>A3</td>
<td>Corrosion Proof Luminaires, IP65, Colour temperature 4000K, UV stabilised, self-extinguishing polycarbonate diffuser with photoengraved interior and smooth outer surface, Anti-tamper polycarbonate snap-lock latches, Complete with mounting accessories, Emergency options available, 37W LED, Supplied by Voltex Lighting. Cat No.: C10-37W-LED or similar and approved.</td>
<td>&gt;60,000hrs</td>
<td>4000K</td>
<td>5980</td>
<td>37W LED</td>
<td><img src="image3.png" alt="Image" /></td>
</tr>
<tr>
<td>A4</td>
<td>Corrosion Proof Luminaires, IP65, Colour temperature 4000K, UV stabilised, self-extinguishing polycarbonate diffuser with photoengraved interior and smooth outer surface, Anti-tamper polycarbonate snap-lock latches, Complete with mounting accessories, Emergency options available, 27W LED, Supplied by Voltex Lighting. Cat No.: C10-27W-LED or similar and approved.</td>
<td>&gt;60,000hrs</td>
<td>4000K</td>
<td>4640</td>
<td>27W LED</td>
<td><img src="image4.png" alt="Image" /></td>
</tr>
<tr>
<td>A5</td>
<td>Vandal proof luminaire, designed to operate LED light sources of up to 53W in an ambient temperature (Tq) environment of up to 35°C, without reducing the useful lifetime of up to 50 000 hours, Corrosion-resistant high-pressure die-cast aluminium body, One-piece injection-moulded clear polycarbonate diffuser, Removable gear tray for ease of maintenance, Nightlight (10% of lumen value). Supplied by Beka lighting. Cat No: BEKA ROUGHGUARD LED 9W</td>
<td>&gt;60,000hrs</td>
<td>4000K</td>
<td>1365</td>
<td>9W LED</td>
<td><img src="image5.png" alt="Image" /></td>
</tr>
<tr>
<td>A6</td>
<td>Vandal proof luminaire, designed to operate LED light sources of up to 53W in an ambient temperature (Tq) environment of up to 35°C, without reducing the useful lifetime of up to 50 000 hours, Corrosion-resistant high-pressure die-cast aluminium body, One-piece injection-moulded clear polycarbonate diffuser, Removable gear tray for ease of maintenance, Nightlight (10% of lumen value). Supplied by Beka lighting. Cat No: BEKA ROUGHGUARD LED 19W</td>
<td>&gt;60,000hrs</td>
<td>4000K</td>
<td>2530</td>
<td>19W LED</td>
<td><img src="image6.png" alt="Image" /></td>
</tr>
<tr>
<td>A7</td>
<td>Vandal proof luminaire, designed for psychiatric hospitals / prison cells / high security areas, tridonic LED module and driver, tamper proof screws, optic diffuser, complete with additional night light (on second electrical circuit) and available emergency options. Both light circuits be controlled from nursing station. Supplied by Lighting Innovation. Cat: TP LED or similar and approved.</td>
<td>&gt;60,000hrs</td>
<td>4000K</td>
<td>5980</td>
<td>37W LED</td>
<td><img src="image7.png" alt="Image" /></td>
</tr>
<tr>
<td>A8</td>
<td>Decorative recessed type luminaire, high power LED, low glare diffuser, 4000K colour temperature complete with adequately sized wattage LEDs (REFER TO ELECTRICAL DRAWINGS), 595mm x 595mm x 82mm, SABS approved, Dali &amp; motion sensor &amp; emergency option as required and indicated on drawings. Supplied by Lighting Innovations Cat.: Allure LED or similar and approved.</td>
<td>&gt;50,000hrs</td>
<td>4000K</td>
<td>From 2770 Lumens to 4740 Lumens</td>
<td>From 23W to 42W Refer to datasheet</td>
<td><img src="image8.png" alt="Image" /></td>
</tr>
<tr>
<td>A9</td>
<td>Decorative recessed type luminaire, high power LED, low glare diffuser, 4000K colour temperature complete with adequately sized wattage LEDs (REFER TO ELECTRICAL DRAWINGS), 1195mm x 595mm x 82mm, SABS approved, Dali &amp; motion sensor &amp; emergency option as required and indicated on drawings. Supplied by Lighting Innovations Cat.: Allure LED or similar and approved.</td>
<td>&gt;50,000hrs</td>
<td>4000K</td>
<td>From 5540 Lumens to 8470 Lumens</td>
<td>From 46W to 84W Refer to datasheet</td>
<td><img src="image9.png" alt="Image" /></td>
</tr>
<tr>
<td>A10</td>
<td>Clean, stylish and high quality LED luminaire. High powered LED, low energy consumption, SABS approved, low maintenance, low glare, Dali system optional, 595mm x 595mm x 27mm. Supplied by Lighting Innovation. Cat.: FIERO SLIP or similar and approved.</td>
<td>&gt;50,000hrs</td>
<td>4000K</td>
<td>3360/4130</td>
<td>27W / 36W LED</td>
<td><img src="image10.png" alt="Image" /></td>
</tr>
<tr>
<td>Code</td>
<td>Description</td>
<td>LED life</td>
<td>Colour Temp.</td>
<td>Lumens</td>
<td>Lamp</td>
<td>Image</td>
</tr>
<tr>
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</tr>
<tr>
<td>A11</td>
<td>Clean, stylish and high quality LED luminaire. High powered LED, low energy consumption, SABS approved, low maintenance, low glare, Dali system optional. <strong>1396mm x 595mm x 27mm</strong>. Supplied by Lighting Innovation Cat.: FIERO SLIP or similar and approved.</td>
<td>&gt;50,000hrs</td>
<td>4000K</td>
<td>6720/8260</td>
<td>54W / 72W</td>
<td>54W / 72W</td>
</tr>
<tr>
<td>A12</td>
<td>Vandal proof luminaire, designed to operate LED light sources of up to 53W in an ambient temperature (Tq) environment of up to 35°C, without reducing the useful lifetime of up to 50 000 hours, Corrosion-resistant high-pressure die-cast aluminium body, One-piece injection-moulded clear polycarbonate diffuser, Removable gear tray for ease of maintenance. Supplied by Beka lighting, Cat No: BEKA ROUGHGUARD LED 53W</td>
<td>&gt;50,000hrs</td>
<td>4000K</td>
<td>7560</td>
<td>53W LED</td>
<td>53W LED</td>
</tr>
<tr>
<td>A13</td>
<td>Industrial, corrosive proof, LED luminaire for Zone 21/22 applications. Robust corrosion-resistant housing and diffuser, stainless steel latched, IP 65 complete with mounting kit and glands. Supplied by Beka lighting, Cat No: BEKA VAPOURLINE LED 40W.</td>
<td>&gt;50,000hrs</td>
<td>4000K</td>
<td>4710</td>
<td>40W LED</td>
<td>40W LED</td>
</tr>
<tr>
<td>B1</td>
<td>Ceiling / Surface mounted decorative bulkhead fitting with IP65 rating, high pressure die-cast aluminium base, high impact acrylic, complete with 21W LED Lamp and control gear. Supplied by Beka Lighting Cat No.: Series 300 Bulkhead LED 21W or similar and approved.</td>
<td>&gt;50,000hrs</td>
<td>4000K, CRI &gt;80%</td>
<td>2500</td>
<td>21W LED</td>
<td></td>
</tr>
<tr>
<td>B2</td>
<td>Interior decorative pendant light with satin chrome body. Complete with IP20 rating and 18Watt compact fluorescent energy saving lamp. Supplied by Radiant Lighting Cat No.: JC40 or similar and approved.</td>
<td>-</td>
<td>-</td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>B3</td>
<td>Surface red indicator light to be mounted on a 65mm round box with a 7W 230V lamp</td>
<td>-</td>
<td>-</td>
<td></td>
<td>7W LED</td>
<td></td>
</tr>
<tr>
<td>B4</td>
<td>Emergency LED signage, NiMH battery, includes LED charge indication light, 3 hour standby time , electrical protection: Class II, luminaire Class F, mountable on normally inflammable surfaces, lifespan of 7 years. Supplied by Beka Lighting Cat No.: LISU (single sided - P or double side - AD)</td>
<td>7 years</td>
<td>-</td>
<td>60 / 100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C1</td>
<td>Wall mounted decorative bulkhead fitting with IP65 rating, high pressure die-cast aluminium base, high impact acrylic, complete with 21W LED Lamp and control gear. Supplied by Beka Lighting Cat No.: Series 300 Bulkhead LED 21W or similar and approved.</td>
<td>&gt;50,000hrs</td>
<td>4000K, CRI &gt;80%</td>
<td>2500</td>
<td>21W LED</td>
<td></td>
</tr>
<tr>
<td>C2</td>
<td>Wall mounted outdoor weatherproof rectangular bulkhead fitting with IP66 rating, high pressure die-cast aluminium base, high impact clear prismatic acrylic diffuser, complete with 9W LEDs and control gear, 50,000 hours LED lifetime. Supplied by Beka Cat No.: Series 40 Bulkhead LED 9W/Black clear or similar and approved.</td>
<td>&gt;60,000hrs</td>
<td>4000K</td>
<td>1370</td>
<td>9W LED</td>
<td></td>
</tr>
<tr>
<td>Code</td>
<td>Description</td>
<td>LED life</td>
<td>Colour Temp.</td>
<td>Lumens</td>
<td>Lamp</td>
<td>Image</td>
</tr>
<tr>
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</tr>
<tr>
<td>C3</td>
<td>IP65 Round Die Cast Aluminium Bulkhead with low glare high efficient helicoils and UV stabilized opal diffuser, low energy consumption, low maintenance, built-in LED driver, 4000K, SABS safety mark, supplied by Lighting Innovation Cat No.: COBALT MAXI or similar and approved.</td>
<td>50,000hrs</td>
<td>4000K</td>
<td>1600</td>
<td>15W LED</td>
<td><img src="image1.png" alt="Image" /></td>
</tr>
<tr>
<td>C4</td>
<td>Outdoor weatherproof ground mounted upright with IP67 rating, numerous light distributions, photometry adjustable on-site (0-20°), Static or colour changing (RGB) LEDs for unlimited creativity, high quality and resistant materials, load capacity of up to 2,500kg, surge protection 4kV/4kA. Supplied by BEKA Lighting Cat.: BEKA ILUMup 22W or similar and approved.</td>
<td>&gt;70,000hrs</td>
<td>4250K</td>
<td>1132</td>
<td>22W LED</td>
<td><img src="image2.png" alt="Image" /></td>
</tr>
<tr>
<td>C5</td>
<td>Outdoor weatherproof bulkhead, ingress protection – IP 65, corrosion-resistant high-pressure die-cast aluminium, injection-moulded high-impact acrylic diffuser complete with 18W LED lamp and control gear. Supplied by BEKA Lighting Cat.: BEKABulk 18W or similar and approved.</td>
<td>&gt;60,000hrs</td>
<td>4000K</td>
<td>2400</td>
<td>18W LED</td>
<td><img src="image3.png" alt="Image" /></td>
</tr>
<tr>
<td>D1</td>
<td>Recessed mounted down-lighter, die-cast aluminium trim, good heat dissipation with aluminium heat sink, option for DALI dimmable, 4000K colour temperature, PF 0.98 – THD &lt; 10% – Ripple (Flicker) &lt; 5%, Emergency Battery Backup options, 5 Year Guarantee, Lifetime &gt; 50 000 Hrs. Supplied by Lighting Innovations Cat No. Atom Mini or similar and approved.</td>
<td>&gt; 50,000hrs</td>
<td>4000k</td>
<td>880 / 1240 Lumens</td>
<td>10W / 15W LED</td>
<td><img src="image4.png" alt="Image" /></td>
</tr>
<tr>
<td>D2</td>
<td>Recessed mounted down-lighter, die-cast aluminium trim, good heat dissipation with aluminium heat sink, option for DALI dimmable, 4000K colour temperature, PF 0.98 – THD &lt; 10% – Ripple (Flicker) &lt; 5%, Emergency Battery Backup options, 5 Year Guarantee, Lifetime &gt; 50 000 Hrs. Supplied by Lighting Innovations Cat No. Atom Midi or similar and approved.</td>
<td>&gt; 50,000hrs</td>
<td>4000k</td>
<td>1560 / 2150 / 2950 / 3570 Lumens</td>
<td>12W / 18W / 25W / 34W</td>
<td><img src="image5.png" alt="Image" /></td>
</tr>
<tr>
<td>D3</td>
<td>Recessed mounted down-lighter, die-cast aluminium trim, good heat dissipation with aluminium heat sink, option for DALI dimmable, 4000K colour temperature, PF 0.98 – THD &lt; 10% – Ripple (Flicker) &lt; 5%, Emergency Battery Backup options, 5 Year Guarantee, Lifetime &gt; 50 000 Hrs. Supplied by Lighting Innovations Cat No. Atom Maxi or similar and approved.</td>
<td>&gt; 50,000hrs</td>
<td>4000k</td>
<td>2950 / 3570 / 3950 / 4790 Lumens</td>
<td>25W / 34W / 38 W / 47W</td>
<td><img src="image6.png" alt="Image" /></td>
</tr>
<tr>
<td>E1</td>
<td>Low bay LED Down-lighter luminaire range with IP66 rating, surface mounted rectangular powder coated steel body complete with 90W LEDs and removable control gear. Supplied by BEKA Lighting Cat.: BEKA LEDTec-SM (40LEDs) 90W/White or similar and approved.</td>
<td>90 000 hrs (L70)</td>
<td>4000K</td>
<td>11553</td>
<td>90W LED</td>
<td><img src="image7.png" alt="Image" /></td>
</tr>
<tr>
<td>E2</td>
<td>Low bay LED Down-lighter luminaire range with IP66 rating, recessed mounted rectangular powder coated steel body complete with 90W LEDs and removable control gear. Supplied by BEKA Lighting Cat.: BEKA LEDTec-RE (40LEDs) 90W /White or similar and approved.</td>
<td>90 000 hrs (L70)</td>
<td>4000K</td>
<td>11553</td>
<td>90W LED</td>
<td><img src="image8.png" alt="Image" /></td>
</tr>
<tr>
<td>Code</td>
<td>Description</td>
<td>LED life</td>
<td>Colour Temp.</td>
<td>Lumens</td>
<td>Lamp</td>
<td>Image</td>
</tr>
<tr>
<td>------</td>
<td>-------------</td>
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<td>------</td>
<td>-------</td>
</tr>
<tr>
<td>F1</td>
<td>Outdoor weatherproof ground mounted spotlight with IP66 rating, removable control gear, separate connector block compartment, easy lamp and control gear replacement and corrosion resistant aluminium complete with 24 x LEDs and control gear. Supplied by BEKA Lighting Cat.: BEKAFOCUS LED 38W wide or similar and approved.</td>
<td>&gt;100,000hrs (25degC)</td>
<td>4000K</td>
<td>5378</td>
<td>38W LED</td>
<td><img src="image1.jpg" alt="Image" /></td>
</tr>
<tr>
<td>F2</td>
<td>LED floodlight luminaire range with surface mounted high pressure die cast aluminium housing, low maintenance and precise light control complete with 24/55W LEDs. Supplied by Beka Lighting Cat No BEKA LEDFLOOD 24/55W LEDs or similar and approved.</td>
<td>&gt;100,000hrs (70%) (25degC)</td>
<td>4000K</td>
<td>7012</td>
<td>55W LED</td>
<td><img src="image2.jpg" alt="Image" /></td>
</tr>
<tr>
<td>F3</td>
<td>LED floodlight luminaire range with surface mounted high pressure die cast aluminium housing, low maintenance and precise light control complete with 48/108W LEDs. Supplied by Beka Lighting Cat No BEKA LEDFLOOD 48/108W LEDs or similar and approved.</td>
<td>&gt;100,000hrs (70%) (25degC)</td>
<td>4000K</td>
<td>13864</td>
<td>108W LED</td>
<td><img src="image3.jpg" alt="Image" /></td>
</tr>
<tr>
<td>H1</td>
<td>Straight galvanized streetlight pole with 5.5m mounting height complete with streetlight fitting, IP66 rating and 3000K light rendering as supplied by BEKA Lighting Cat No.: BEKA LEDlume-mini XP 38W (16 LEDs) or similar and approved.</td>
<td>&gt;70,000hrs (25degC)</td>
<td>4000K, CRI ≥70</td>
<td>4701</td>
<td>38W LED</td>
<td><img src="image4.jpg" alt="Image" /></td>
</tr>
<tr>
<td>H2</td>
<td>Straight galvanized pole with 10m mounting height complete with three (3) light fittings, IP66 rating and 5700K white light as supplied by Beka Lighting Cat No.: BEKA LED Flood-midi (24 LEDs), 3x 55W or similar and approved.</td>
<td>&gt;70,000hrs (25degC)</td>
<td>4000K, CRI ≥70</td>
<td>3984 per lamp</td>
<td>55W LED</td>
<td><img src="image5.jpg" alt="Image" /></td>
</tr>
<tr>
<td>H3</td>
<td>Outdoor weatherproof bollard type fitting with robust design, low glare rating, high pressure die cast head containing the LED light source and optic, as well as pole assembly and IP66 lamp compartment complete with 12 LED lamps and control gear. Supplied by Beka Lighting Cat No.: BEKA LED post (12 LEDs) 23W/ Black or similar and approved.</td>
<td>&gt;100,000hrs (25degC)</td>
<td>5000K</td>
<td>2610</td>
<td>23W LED</td>
<td><img src="image6.jpg" alt="Image" /></td>
</tr>
<tr>
<td>H4</td>
<td>Outdoor weatherproof decorative post type fitting with IP66 rating, elegant design for low height installation, surge protection 10kV/10kA, Including daylight switch, asymmetrical light distribution, SABS approved, complete with 5m mounting height pole - buried according to SANS 1749. Supplied by BEKA Lighting Cat.: ZELA LED 55W or similar and approved</td>
<td>&gt;100,000hrs (25degC)</td>
<td>4000K, CRI ≥70</td>
<td>6490</td>
<td>55W LED</td>
<td><img src="image7.jpg" alt="Image" /></td>
</tr>
<tr>
<td>H5</td>
<td>Outdoor weatherproof decorative post type fitting with IP66 rating, elegant design for low height installation, surge protection 10kV/10kA, Including daylight switch, symmetrical light distribution, SABS approved, complete with 5m mounting height pole - buried according to SANS 1749. Supplied by BEKA Lighting Cat.: ZELA LED 55W or similar and approved</td>
<td>&gt;100,000hrs (25degC)</td>
<td>4000K, CRI ≥70</td>
<td>6490</td>
<td>55W LED</td>
<td><img src="image8.jpg" alt="Image" /></td>
</tr>
<tr>
<td>Code</td>
<td>Description</td>
<td>LED life</td>
<td>Colour Temp.</td>
<td>Lumens</td>
<td>Lamp</td>
<td>Image</td>
</tr>
<tr>
<td>------</td>
<td>-------------</td>
<td>----------</td>
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<td>--------</td>
<td>------</td>
<td>-------</td>
</tr>
<tr>
<td>I1</td>
<td>Light switch (1 to 6 levers / 2 way as specified), either 50mm x 100mm or 100mm x 100mm, rated at 16A / 250VAC, conformity to SANS ans IEC standards.</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td><img src="image1" alt="Light switch" /></td>
</tr>
<tr>
<td>I2</td>
<td>Modular upmarket light switch with LED (1 to 6 levers / 2 way as specified), either 50mm x 100mm or 100mm x 100mm, rated at 16A / 250VAC, conformity to SANS ans IEC standards.</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td><img src="image2" alt="LED switch" /></td>
</tr>
<tr>
<td>I3</td>
<td>Single load Occupancy Sensor without remote, 230V-10A, 360° - Lux and time adjustable. Supplied by Clipsal Cat No.: SAE-UE-MS-CSAWE or similar and approved.</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td><img src="image3" alt="Sensor" /></td>
</tr>
<tr>
<td>I4</td>
<td>16 A Industrial type photo cell switch in weather proof luminaire casing</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td><img src="image4" alt="Switch" /></td>
</tr>
</tbody>
</table>

**J Hospital Lighting**

| J1   | Wall mounted 820mm x 240mm x 170mm, medical examining light, IP54, 4500K, as supplied by HUTZ Cat.: Hugo-W complete with extendable arm and fixing plate with electrical male/ female adapter plug and capable of operation from 230V and 12V/12W lamp or similar approved type luminaire | -        | -            | -      | -    | ![Wall light](image5) |
| J2   | Ceiling mounted 1030mm x 530mm x 180mm, medical examining, IP54, 4500K, light as supplied by HUTZ Cat.: Hugo-C complete with extendable arm and mounting requirements and capable of operation from 230V and 12V/12W lamp or similar approved type luminaire | -        | -            | -      | -    | ![Ceiling light](image6) |
| J3   | Ceiling mounted double operating theatre light with extension as supplied by HUTZ Cat.: Solaris LED 500/500 complete with mounting requirements and with cover plate and cover or similar approved type luminaire | -        | -            | -      | -    | ![Theatre light](image7) |

**K UV Sterilisation Lighting**
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>LED life</th>
<th>Colour Temp.</th>
<th>Lumens</th>
<th>Lamp</th>
<th>Image</th>
</tr>
</thead>
<tbody>
<tr>
<td>K1</td>
<td>Germicidal Ultra-Violet (GUV) range of air disinfection fittings are designed to protect Health Care Workers, Patients, Doctors and Teachers in the spread of Tuberculosis (TB) and other airborne viruses such as Measles, Influenza, SARS and Bird Flu. Corner Mounted Covers 12m². Designed for specialist consulting rooms.</td>
<td>2xPL-S 9W lamps</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K2</td>
<td>Germicidal Ultra-Violet (GUV) range of air disinfection fittings are designed to protect Health Care Workers, Patients, Doctors and Teachers in the spread of Tuberculosis (TB) and other airborne viruses such as Measles, Influenza, SARS and Bird Flu. Wall Mounted Covers 25m². Designed for Hospital wards and passages.</td>
<td>4xPL-S 9W lamps</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K3</td>
<td>Germicidal Ultra-Violet (GUV) range of air disinfection fittings are designed to protect Health Care Workers, Patients, Doctors and Teachers in the spread of Tuberculosis (TB) and other airborne viruses such as Measles, Influenza, SARS and Bird Flu. Ceiling Mounted Covers 36m². Designed for large public waiting areas.</td>
<td>6xPL-S 9W lamps</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Item</td>
<td>Description</td>
<td>Material</td>
<td>Colour</td>
<td>Images</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>-------------</td>
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<td>--------</td>
<td>--------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A1</td>
<td>Single plug circuits</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Complete 16A, 240V Euro Combo Switched Socket outlet with PVC cover plate. Dimensions: height 50mm and width 100mm</td>
<td>PVC</td>
<td>White</td>
<td><img src="image1.png" alt="Image" /></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Complete 16A, 240V Euro Combo Switched Socket outlet with PVC cover plate. Dimensions: height 100mm and width 100mm</td>
<td>PVC</td>
<td>White</td>
<td><img src="image3.png" alt="Image" /></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Complete 16A Slimline / 6A, 240V Euro Combo Switched Socket outlet with steel cover plate. Dimensions: height 100mm and width 100mm</td>
<td>Steel</td>
<td>White</td>
<td><img src="image4.png" alt="Image" /></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Complete 16A Tamperproof Slimline / 6A, 240V Euro Combo Switched Socket outlet with steel cover plate. Dimensions: height 100mm and width 100mm. (Supplied with tamper proof screws)</td>
<td>Steel</td>
<td>White</td>
<td><img src="image5.png" alt="Image" /></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A2</td>
<td>Dedicated single plug circuits</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Complete 16Amp, 240V dedicated switch socket outlet for computer equipment. Dimensions: height 100mm and width 100mm.</td>
<td>PVC/Steel</td>
<td>Red</td>
<td><img src="image6.png" alt="Image" /></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Complete 16Amp, 240V dedicated switch socket outlet for UPS supply. Dimensions: height 100mm and width 100mm.</td>
<td>PVC/Steel</td>
<td>Black</td>
<td><img src="image7.png" alt="Image" /></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Complete 16Amp, 240V dedicated switch socket outlet for Generator supply. Dimensions: height 100mm and width 100mm.</td>
<td>PVC/Steel</td>
<td>Blue</td>
<td><img src="image8.png" alt="Image" /></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Complete 16Amp, 240V dedicated switch socket outlet for Luminaires. Dimensions: height 100mm and width 100mm.</td>
<td>PVC/Steel</td>
<td>Yellow</td>
<td><img src="image9.png" alt="Image" /></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Complete 16Amp, 240V dedicated switched socket outlet for unearthed safety isolation Transformer. Dimensions: height 100mm and width 100mm.</td>
<td>PVC/Steel</td>
<td>Green</td>
<td><img src="image10.png" alt="Image" /></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Complete dedicated switch socket outlet for low voltage less than 230V. Dimensions: height 100mm and width 100mm.</td>
<td>PVC/Steel</td>
<td>Purple</td>
<td><img src="image11.png" alt="Image" /></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Double plug circuit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Complete double slimline socket, 2x16A, 240V with PVC cover plate. Dimensions: height 100mm and width 50mm with tamper proof screws</td>
<td>PVC</td>
<td>White</td>
<td><img src="image12.png" alt="Image" /></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Complete Classic Quatro Socket outlet, 2x 16Amp standard SA sockets, 2x16A Slimline sockets, 240V with steel cover plate. Dimensions: height 100mm and width 150mm</td>
<td>Steel</td>
<td>White</td>
<td><img src="image13.png" alt="Image" /></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Complete Tamperproof Classic Quatro Socket outlet, 2x 16Amp standard SA sockets, 2x16A Slimline sockets, 240V with steel cover plate. Dimensions: height 100mm and width 150mm. (Supplied with tamper proof screws)</td>
<td>Steel</td>
<td>White</td>
<td><img src="image14.png" alt="Image" /></td>
<td></td>
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</tr>
<tr>
<td>C</td>
<td>Other plug circuits</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>1</td>
<td>Complete 16A, 240V double Switched Socket outlet with 2x USB port and cover plate.</td>
<td>PVC</td>
<td>White</td>
<td><img src="image15.png" alt="Image" /></td>
<td></td>
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<tr>
<td>2</td>
<td>Complete 4x 16A, 240V ZA Switched Socket outlet with cover plate. Dimensions: height 100mm and width 100mm</td>
<td>PVC</td>
<td>White</td>
<td><img src="image16.png" alt="Image" /></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### D Isolators / Special plugs

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Amps</th>
<th>Volts</th>
<th>Type</th>
<th>Dimensions</th>
<th>Material</th>
<th>Colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Complete 60 Amp, 240V, 2 pole isolator with PVC cover plate. Dimensions: height 100mm and width 100mm</td>
<td>60</td>
<td>240</td>
<td>PVC</td>
<td></td>
<td>White</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Complete 30 Amp, 240V, 2 pole isolator with PVC cover plate. Dimensions: height 100mm and width 100mm</td>
<td>30</td>
<td>240</td>
<td>PVC</td>
<td></td>
<td>White</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Complete 60 Amp, 240V, 3 pole isolator with PVC cover plate. Dimensions: height 100mm and width 100mm</td>
<td>60</td>
<td>240</td>
<td>PVC</td>
<td></td>
<td>White</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Complete 60 Amp, 240V, 2 pole stove isolator with metal cover plate. Dimensions: height 100mm and width 100mm</td>
<td>60</td>
<td>240</td>
<td>Metal</td>
<td></td>
<td>White</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Complete 60 Amp, 400V, 3 pole stove isolator with metal cover plate. Dimensions: height 100mm and width 100mm</td>
<td>60</td>
<td>400</td>
<td>Metal</td>
<td></td>
<td>White</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Complete 30 Amp, 240V, 2 pole geyser isolator with PVC cover plate. Dimensions: height 100mm and width 100mm</td>
<td>30</td>
<td>240</td>
<td>Metal</td>
<td></td>
<td>White</td>
<td></td>
</tr>
</tbody>
</table>

### E Three phase power outlet / Industrial plug

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Amps</th>
<th>Volts</th>
<th>Type</th>
<th>Dimensions</th>
<th>Material</th>
<th>Colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Complete (16-60) Amp, 400V, Three phase 5 pin industrial plug IP67</td>
<td>16-60</td>
<td>400</td>
<td>PVC</td>
<td></td>
<td>Red</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Complete 32 Amp, 240V, 3 pin industrial plug IP67</td>
<td>32</td>
<td>240</td>
<td>PVC</td>
<td></td>
<td>Blue</td>
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</tr>
</tbody>
</table>

### F Power skirting and accessories

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Amps</th>
<th>Volts</th>
<th>Type</th>
<th>Dimensions</th>
<th>Material</th>
<th>Colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Complete three or double or single compartment power skirting with accessories</td>
<td></td>
<td></td>
<td>PVC/Steel/Aluminium</td>
<td>Grey, Beige, Oak,black</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Standard compartment power skirting accessories external elbow, internal elbow/standard Tee, end cap, flat elbow, flat tee and duct divider (31x21x3000mm)</td>
<td></td>
<td></td>
<td>PVC/Steel/Aluminium</td>
<td>Grey, Beige, Oak,black</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Complete 16Amp, 240V dedicated switch socket outlet in power skirting with white cover plate.</td>
<td>16</td>
<td>240</td>
<td>PVC/Steel/Aluminium</td>
<td>Grey, Beige, Oak,black</td>
<td>(As per SANS 164-2:2018)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Complete 16Amp, 240V dedicated switch socket outlet in power skirting with red cover plate.</td>
<td>16</td>
<td>240</td>
<td>PVC/Steel/Aluminium</td>
<td>Grey, Beige, Oak,black</td>
<td>(As per SANS 164-2:2018)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Complete 16Amp, 240V dedicated switch socket outlet in power skirting with purple cover plate.</td>
<td>16</td>
<td>240</td>
<td>PVC/Steel/Aluminium</td>
<td>Grey, Beige, Oak,black</td>
<td>(As per SANS 164-2:2018)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Ethernet (RJ45)</td>
<td></td>
<td></td>
<td>PVC/Steel/Aluminium</td>
<td>Grey, Beige, Oak,black</td>
<td>(As per SANS 164-2:2018)</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Telephone (VoIP- RJ45)</td>
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<td>PVC/Steel/Aluminium</td>
<td>Grey, Beige, Oak,black</td>
<td>(As per SANS 164-2:2018)</td>
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</tr>
</tbody>
</table>
MECHANICAL SPECIFICATIONS
Part V- DETAILED TECHNICAL SPECIFICATION

5.00 DETAILED TECHNICAL SPECIFICATION

This section contains the detailed technical requirements for the Phase 2 Siloam mortuary and Mental health facility Siloam, Limpopo, South Africa. This document should be read with Section 4.00 of the technical specification of the plant. If anything in this section is in conflict with Section 4.00, or if there are any additional requirements over and above those set out in Section 4.00, this section will take preference.

5.01 SPECIAL NOTE

The successful Tenderer shall enter into a contract with the Main Contractor as a Selected Sub-Contractor, subject to the terms and conditions applicable to the “Nominated/Selected Subcontract Agreement”.

5.02 SITE CONDITIONS

Altitude
Electricity Supply 230/400 Volt 50 Hz
Design outdoor conditions for Siloam
Summer 40°C DB 45% RH
Winter 0°C DB 35% RH
Container to maintain set temperature as stated below:
Summer 4°C DB
Winter 4°C DB

5.03 SCOPE OF THE WORKS

This tender provides for the supply, delivery to site, installation, testing, commissioning, putting into service, maintenance for a 12 month period and handing over in good working order the complete installation as specified or implied herein and in conjunction with the accompanying drawings:

<table>
<thead>
<tr>
<th>Drawing No:</th>
<th>Drawing title:</th>
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<tbody>
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</table>
The tender provides for the installation of a new Mechanical works for the newly renovated Siloam Mortuary and Mental ward at the district hospital in Siloam.

The mechanical installations scope includes the following:

- Refurbishment of cold room evaporator units
- Installation of hot water system and pipe reticulation and Motor control centre for plant equipment.
- Procurement of mortuary body cabinets, racking and associated equipment
- Refrigerated container
- Plumbing and sanitary adhoc works
- Underfloor heating
- HVAC installations for Mental health facility
- Plumbing works for Mental health facility

The design is based on air loads required by statutory standards implicated by IUSS Primary health care requirements. These statutory health care guidelines implicate large air changes and air volumes. This results in considerably larger cooling and heating loads required by HVAC equipment.

After the new HVAC system has been completed in all respects the contractor shall maintain the system for 12 months before handing the system over to the client.

Tenderers are required to base their main tender offers on the preferred equipment. Should they wish to offer alternative makes or types they may do so as an alternative to the main tender and shall complete returnable schedules as provided in the bills of quantities. **Failure to complete returnable schedules and engineering data for equipment proposed will render tender incomplete and non-responsive.**
SILOAM PHASE 2 DETAILED SPECIFICATION OF EQUIPMENT

5.04.01 TEMPORARY Container Facility

Description

The temporary container facility will be comprised of a standalone refrigerated container. Container is to be insulated. Container to have built in refrigeration and motor control of compressors. Scope of works includes delivery to site and placement. Dimensions of the container are to be as follows:

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>12192mm</td>
</tr>
<tr>
<td>Width</td>
<td>2438mm</td>
</tr>
<tr>
<td>Height</td>
<td>2896mm</td>
</tr>
<tr>
<td>Internal length</td>
<td>11950mm</td>
</tr>
<tr>
<td>Internal width</td>
<td>2284mm</td>
</tr>
<tr>
<td>Internal height</td>
<td>2549mm</td>
</tr>
<tr>
<td>Door opening width</td>
<td>2290mm</td>
</tr>
<tr>
<td>Door opening height</td>
<td>2596mm</td>
</tr>
</tbody>
</table>

Design cooling load:

- 2 of 1.8kW 2 stage compressors
- 2 of 4 fan inline mounted

Internal furnishings

The temporary facility is to be fitted with the following equipment:

- 1 of Standard hydraulic lifting trolley
- 18 of pressed body tray standard size
- 3 of pressed body tray obese size
- 1 of Obese single body rack, 3 tier
- 1 of 3 tier double body rack with capacity for 18 bodies
- 3 of Corrosion Proof Luminaires, IP65, Colour temperature 4000k, UV stabilised, self-extinguishing polycarbonate diffuser with photoengraved interior and smooth outer surface, Anti-tamper polycarbonate snap-lock latches, Complete with mounting accessories, Emergency options available, 37W LED , Supplied by Voltex Lighting Cat No.: C10-37W-LED or similar and approved.
- (inside container)
- 1 of Outdoor weatherproof bulkhead, ingress protection – IP 65, corrosion-resistant high-pressure die-cast aluminum, injection-moulded high-impact acrylic diffuser complete with 18W LED lamp and control gear. Supplied by BEKA Lighting Cat.: BEKABulk 18W or similar and approved.
- (at compressor area)
- All lighting to have local isolator and local distribution board
Detailed specification of internal furnishings

1) Standard hydraulic lifting trolley

Transport Trolley SPECIFICATION MODEL TT: Transport trolley 2000 x 672 x 850 mm high manufacture from grade 304 stainless steel tubular frame. Trolley fitted with 125 mm diameter bolt type castors and rubber bumpers. - Grade 304 stainless - Castors 125 mm diameter non marking grey rubber - TRANSPORT TROLLEY 2000x672x850mm 2630073

2) Pressed body tray standard

Pressed Body Tray SPECIFICATION: Pressed stainless steel body tray manufactured from grade 304 (18/10) stainless steel 1,2mm thick, with a 20mm square tubing frame all round, two 25mm diameter support fitted longitudinally to the underside for the Rapid Transfer System and two 20mm diameter stainless steel handles. - Grade 304 1.2mm Stainless Steel - Hygienic and durable. STANDARD BODY TRAY 2095x567mm 2630062

3) Pressed body tray obese

Pressed Body Tray SPECIFICATION: Pressed stainless steel body tray manufactured from grade 304 (18/10) stainless steel 1,2mm thick, with a 20mm square tubing frame all round, two 25mm diameter support fitted longitudinally to the underside for the Rapid Transfer System and two 20mm diameter stainless steel handles. - Grade 304 1.2mm Stainless Steel - Hygienic and durable. OBESE BODY TRAY 3042095x667mm

4) Obese body racking

Obese Single Body Rack SPECIFICATION: Single Body Racks 3 tier. All racks manufactured from grade 304 stainless steel with 40 x 40 x 1.5 mm gauge square tubing Post and 3 mm gauge stainless steel “U” shaped Bearers. All shafts to be from solid 16 mm Ø stainless steel and fitted with nylon rollers and stainless steel circlips. All joints to be fuse welded. All racks to be joined together at the top of each fixing post with a 40 x 40 x 6 mm gauge stainless steel angle stay to stabilize the banks body trays. All bearers and stays shall be bolted with 8 mm stainless steel bolts and each post shall be fitted with an adjustable stainless steel foot piece.

5) Standard body racking

Three tier standard Body Rack SPECIFICATION: Model Double Body Racks connected in series to form bank of 7 including obese body rack. All racks manufactured from grade 304 stainless steel with 40 x 40 x 1.5 mm gauge square tubing Post and 3 mm gauge stainless steel “U” shaped Bearers. All shafts to be from solid 16 mm Ø stainless steel and fitted with nylon rollers and stainless steel circlips. All joints to be fuse welded. All racks to be joined together at the top of each fixing post with a 40 x 40 x 6 mm gauge stainless steel angle stay to stabilize the banks body trays. All bearers and stays shall be bolted with 8 mm stainless steel bolts and each post shall be fitted with an adjustable stainless steel foot piece.
6) Body tilting trolley

Tilting Trolley SPECIFICATION MODEL standard Tilting trolley 2000 x 672 x 858 mm high manufacture from grade 304 stainless steel tubular frame. Trolley fitted with 125 mm diameter bolt type castors and rubber bumpers. - Grade 304 stainless - Castors 125 mm diameter non marking grey rubber - Designed to suit sliding body trays TILTING TROLLEY 2000x672x858mm 2630075

7) Body trolley

Transport Trolley 2000 x 672 x 850 mm high manufacture from grade 304 stainless steel tubular frame. Trolley fitted with 125 mm diameter bolt type castors and rubber bumpers. - Grade 304 stainless - Castors 125 mm diameter non marking grey rubber TRANSPORT TROLLEY 2000x672x850mm 2630073

Body transporter

Procure, deliver and train users of battery operated golf cart with stretcher fitted to transport deceased bodies to and from the mortuary. The cart is to be provided with standby battery and charging station located in the mortuary.
5.04.02 COLD ROOM PERMANENT FACILITY

The current cold body room is to be refurbished. Scope of works includes the following:

1) Refurbishment and relocating of the existing evaporator fridge units.
   a. Fan belts replaced
   b. Fan motors serviced

2) Pumping down of fridge compressors

3) Rerouting of the evaporator refrigerant piping
   a. Refrigerant piping to be Maksel DX refrigerant piping. All refrigerant piping to be insulated with 1 (one) inch armour flex.

4) Pumping down of freezer compressors
   a. Additional piping connection

5) Racking the freezer compressors

6) Relocating the fridge compressor unit

7) Installation of axial wall mount fan

8) Wiring up of MCC and isolators for fridge and freezer unit

9) Recommissioning of fridge compressor

10) Connection of existing freezer compressors to new body cabinets.

11) Recommissioning of freezer compressors

12) All racking to be relocated from temporary container to permanent cold room.

Temperature sight glass installed on outside of new cold room door

Condensate drainage is to be drained to nearest drainage connection pipe with 25mm uPVC piping.

Design outdoor conditions for Siloam

<table>
<thead>
<tr>
<th>Season</th>
<th>Temperature</th>
<th>Humidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer</td>
<td>40°C DB</td>
<td>45% RH</td>
</tr>
<tr>
<td>Winter</td>
<td>0°C DB</td>
<td>35% RH</td>
</tr>
</tbody>
</table>

Fridge room to maintain set temperature as stated below:

<table>
<thead>
<tr>
<th>Season</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer</td>
<td>4°C DB</td>
</tr>
<tr>
<td>Winter</td>
<td>4°C DB</td>
</tr>
</tbody>
</table>

Freezer cabinets to maintain set temperature as stated below:

<table>
<thead>
<tr>
<th>Season</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer</td>
<td>-12°C DB</td>
</tr>
<tr>
<td>Winter</td>
<td>-12°C DB</td>
</tr>
</tbody>
</table>

Detailed specification of body cabinets

Internal structure: with a tubular frame system provided with “C” shape slides to prevent the tilting of the body-tray when partially extracted. The whole frame and slides are realized in stainless steel 18/10 AISI 304.

Body trays: Nr 3, realized in stainless steel 18/10 AISI 304. The body trays slope to its centre to avoid fluids losses. They include at the sides plastic rollers, to make easy the extraction/insertion operations and double-end handles for an easy and safe hand-grip.

Internal lighting: Nr 1 LED tube, mounted in the side wall, with activation through a special switch located on the control panel. It grants energy saving and prevent the internal heating produced by the traditional neon tubes.
Control panel: located in the front part of the chamber, including main switch, switches to adjust the inside temperature (SET switch, to see the programmed temperature; ARROW UP switch, to increase the programmed temperature; ARROW DOWN, to decrease the programmed temperature) and the display that show actual temperature inside the room. Also, in the control panel there are another 4 led, the first, it signals that the compressor is running, the second, it signals that the evaporator’s fan is running, the third, it signals that the defrosting is in progress and the fourth, it signals that there is a malfunctioning in the cold room.

Motor: monoblack type, top mounted (in the chamber ceiling) with hermetic industrial grade compressor, air cooled condenser and ventilated evaporator. The mounted compressor has a power of 1,7 HP

Defrosting: completely automatic, thermostat controlled, hot-gas type. The condensate water is automatically channelled into an heated tray, located in the motor compartment, for the automatic evaporation of the condensate water. Temperature range : infinitely adjustable between -5°C / -20°C • Voltage (V/ph/Hz) : 220-230/1/50 • Noise level (dB(A)) : ≤ 54 •

The mounted compressor has a power of 1,7 HP • Structure of the motor : in metal sheet white coated and embossed aluminium, with a removable panels to facilitate the maintenance

Refrigerant : R404a CFC-free • Refrigeration : forced-air, through a fan, granting the maximum temperature uniformity and stability inside of the cabinet
5.04.03 Scope of work for the Mental health facility

1. Forced ventilation of tempered air into wards, reception and living areas.

1.2 Mechanically assisted ventilation from two supply duct from the symmetrical centre of the building. The supply duct provides cold tempered air to the building using 2x 16kW rooftop packaged units. This air is routed through ducts to required facilities. This is done using fans in the rooftop packaged unit of capacity 3600 m3/hr inline axial fans.

1.3 Strategically located grills and louvres location as indicated and specified on drawing to allow for displacement of warm air with cooler fresh air.

1.4 Ducted exhaust air systems as indicated on the drawings and in compliance with design norm for Air Change Per Hour.

1.4 Air Conditioning Unit for comfort control and functional requirement in critical locations such as offices, Isolation & server room as indicated on drawing.

1.5 Electrical work and controls as specified.

1.6 Builder's work as specified.

5.04.03.01 Drawings

The following tender drawings form part of this specification:

<table>
<thead>
<tr>
<th>Drawing No</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2023.50.10.AAB.13.U00</td>
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</tr>
<tr>
<td></td>
<td>Layout</td>
</tr>
</tbody>
</table>

5.04.03.02 Builders work

The Principal Contractor shall provide all concrete plinths for AC equipment. The HVAC Contractor shall be responsible for all other builder's work required for his contract. Only "core" drilling will be permitted.

The HVAC contractor may at his discretion negotiate a price with the Principal Contractor for the required builder's work.

5.04.03.03 Electrical work

The power supply is 220 Volt, 50 Hz, 1 phase. Single phase power shall be provided into the main isolating switch for all HVAC equipment.

5.04.03.04 Air conditioning units

Supply and install Air Conditioning Unit in a position as indicated on the drawings.
The Air Conditioner shall be of the split or cassette design with a single rotary compressor.

Design particulars of the unit are as follow:

<table>
<thead>
<tr>
<th>Air Conditioner Capacity (kW)</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
</tr>
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<tbody>
<tr>
<td>Half mental Ward</td>
<td>16</td>
<td>16</td>
<td>3.5</td>
<td>3.5</td>
<td>3.5</td>
<td>2.1</td>
<td>5.1</td>
</tr>
</tbody>
</table>

The Air Conditioners shall deliver the above capacities at an altitude of 1170m and an ambient temperature of 35ºdb. Each shall deliver cooling and heating simultaneously or separately as required. Air Conditioners shall be LG or approved equal.

5.04.03.05 Pipework and fittings

Supply and install the pipework and fittings as indicated on the drawings.

Pipework shall be Class Medium steel piping to SANS 62

The Pipework shall be flanged. Flanges shall comply to SANS 1123.

Pipework from the pressurisation vessels shall be copper Class O.

Refrigerant piping shall be insulated with polyurethane with a thickness of 25 mm for pipes 65 mm diam and smaller and 40mm for pipes 65mm and larger.

Exposed piping shall be cladded with galvanised sheet metal with a thickness of 0.8 mm.

Drainage pipings is to be made of PVC and no larger than 40mm in diameter.

5.04.03.06 Air handling equipment

Supply and install air supply unit in a position as indicated on the drawing.

The entire unit shall be suitable for outdoor installation and use.

Performance Schedule:

The Air handling Equipments shall comply with the following performance data:

Main Supply fan: 3600m³/Hr @ 250 Pa (x2)

Air Supply fan, Switch Room: 200 L/s @50 Pa

Ablution extraction fan type 1: 500m³/Hr @ 150 Pa (x3)

Ablution extraction fan type 2: 210m³/Hr @ 150 Pa (x2)

Ablution extraction fan type 3: 90m³/Hr @ 150 Pa (x8)

Temporary Ablution extraction fan 1: 2250 m³/Hr (x2)

Temporary Ablution extraction fan 2: 540 m³/Hr (x2)

Temporary Ablution extraction fan 1: 1440 m³/Hr (x1)

5.04.03.07 Supply air and ductwork

Supply and install the ductwork as indicated on the drawings.

Rectangular ductwork shall be classified as medium pressure ductwork.

Pod-type circular sound attenuators shall be fitted on the air intake and discharge sides of the fan.

The duct work shall be uninsulated.

Circular supply ductwork shall of the spiral reinforced type externally insulated.

Duct dimensions indicated on the drawings are clear internal dimensions.

5.04.03.08 Diffusers, grilles and louvres

Supply and install the diffusers, grilles and louvres as indicated on the drawings.

Supply air diffusers shall be circular with a white epoxy powder coated finish. The diffusers shall be TROX or BRIAN RICKARD or approved equal.

Ceiling mounted return air grilles shall be of the egg-crate type.

Door louvres and wall mounted louvres for air relief shall be anodised aluminium. The blade configuration shall have an inverted Y profile.
5.04.04 Testing and commissioning
Upon physical completion of the air conditioning and ventilation installations all systems shall be tested to ensure compliance to this specification and the performance data. Performance values shall be logged systematically for verification by the Engineer. Adjustments and replacements of system parts shall be made timeously to ensure conformance to specification values and to prevent any delays regarding the overall completion and hand-over of entire installation.

5.04.05 1st hand over
Upon complete commissioning of the air conditioning and ventilation installation the air conditioning contractor shall prepare three sets of Operating & Maintenance Manuals for hand-over to the Owner. The O & M Manuals shall inter alia contain all the commissioning and test data. A 1st hand-over of the installation shall be affected with the Owner and Engineer present. A certificate of Acceptance will be issued by the Engineer on the day of 1st Hand-over.

5.04.06 Maintenance guarantee
From the day of 1st hand-over a 12 month maintenance and guarantee-period of the installation will commence. During this period the air conditioning contractor will maintain the entire installation free of charge to the Owner. Maintenance will include regular cleaning of filters and attendance to breakdowns or unsatisfactory performance of the plant. A routine inspection will be carried out every 3 months to ensure optimum plant performance. An inspection report shall be documented after each inspection and send to the relevant Client representative.
The air conditioning contractor will guarantee the entire installation against patent and latent defects during the 12 month period. Any unserviceable part or item shall be repaired or replaced by the contractor during the guarantee period with no charge to the Owner. Any call-out by the Owner due to a breakdown or unsatisfactory performance of the plant shall be attended by the air conditioning contractor without delay.
5.05 DX spit type midwall installation

Outdoor units shall be equipped with the appropriate drain pans and drainage pipes. Drainpipes shall drain to the nearest full bore drain or existing drainage system.

Outdoor units shall be factory assembled with a sturdy weatherproof housing constructed of rust proofed mild steel panel coated with baked enamel finish. The outdoor units shall be tested and charged with refrigerant in the factory. The outdoor units should be modular with the option to install several outdoor units (more than two) on the same refrigerant circuit.

Each outdoor unit shall have a multi-step capacity control to meet load fluctuations using speed control of compressor motor and loading/unloading compressor in the case where more than one compressor is used in the same outdoor unit. An automatic cooling/heating changeover system shall be supplied for each refrigeration system that shall be controlled by the Centralised Control System.

The outdoor unit shall be suitable to match a variety and number of indoor units types specified in section 5.00 and indicated on the Drawings in Appendix B. The contractor shall supply the frames/bases and mount all outdoor units on these frame/base as per the requirements of the manufacturer. Should the contractor be required to install outdoor units on top of existing waterproofing material, the contractor shall repair the water proofing material after the installation of the units. In the event where a slab is not available, the contractor shall cast a concrete slab of not less than 150 mm thick large enough to accommodate the footprint of the outdoor unit. The unit shall rest on tico pads, the units being bolted through the pads to the plinths using galvanized chemical anchor type bolts.

Outdoor units shall be installed in such a manner as to enable easy access and maintenance. Units shall be positioned in such a manner to prevent short-circuiting of condenser fan suction and delivery as well as suction and delivery air between units. The main units required will be installed in the plant room provide and indicated on the drawing and it will be required to provide a duct system to extract the hot air from the system out of the plant room to atmosphere. The contractor shall provide the required ducting and mountings for the proposed ducting.

The Electrical contractor will supply a 3 phase connection in the plant equipment. The AC contractor will be required to supply the internal plant room DB to house all switchgear, meters, and isolators required for the operation of all installed equipment in the plant room. One single phase and one 3-phase socket outlet shall be supplied in the plant room of the outdoor units for the purposes of maintenance and lighting.

5.04.06 Indoor (Evaporator) Units

5.04.06.01 Condensate drainage

All indoor units shall be supplied with a drainage pipe. Drainage header pipes shall be insulated and follow the route to the nearest drain point. Drainage pipes need to be sealed where passing through walls.

5.04.06.02 Refrigerant piping

Refrigerant pipe fittings, joints and headers to be utilized with proprietary variable refrigerant flow systems shall be sourced from the manufacturer of the equipment supplied. The AC contractor shall not supply home-made fittings, joints or headers.

The preferred refrigerant type is R410A. The contractor should note that due to the nature and working pressures, R410A requires special materials and installation precautions. The working pressure of systems using R410A is higher than conventional R22 system. The contractor shall ensure that refrigerant pipework and the installation thereof complies with...
SANS/SABS standards such as SABS 0147-2002 as well as the manufacturer’s requirements.

Refrigerant piping shall be installed using the existing routes currently installed. In the case where refrigerant pipe crosses offices or examination rooms pipework shall be installed in a fireproof sleeve vented to the outside of the building as required by SABS 0147-2002.

NOTE: The successful Contractor is to submit with tender pricing the proposed manufacturer’s specific refrigerant piping diagrams and sizing including specification of piping class.

5.04.06.03 Local control of indoor units

Each indoor unit shall be equipped with an electronic expansion valve that controls the refrigerant flow rate depending on heating/cooling load. Each indoor unit shall have its own local controller that will be linked to a master intelligent touch controller from where the master control will occur. All units shall be equipped with a self-diagnosis function for easy maintenance. All indoor units, including cases where more than one indoor unit is located in the same room, shall have one dedicated remote control per unit. Local remote control units shall be integrated with the special surface mounted switch panel as per the architect’s requirements. The Air Conditioning Contractor shall coordinate this activity with Building Contractor.

Cable connecting the indoor-indoor and indoor-outdoor units (Electrical)

All indoor units within a floor zone shall be connected with a 2 wire or other suitable cable to enable communication between each indoor unit and the outdoor unit. Interconnecting cables shall preferably follow the same route as refrigerant piping.
IT SPECIFICATIONS
SILOAM DISTRICT HOSPITAL
PHASE 2

CONCEPT REPORT AND DESIGN
ELECTRONIC, ICT, UNIFIED COMMUNICATIONS,
SECURITY AND ACCESS CONTROL

REV. FINAL: 05 NOVEMBER 2018
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<td>5</td>
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<td>Multi-mode Fibre Optic cable and Patch lead</td>
<td>15</td>
</tr>
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<td>7</td>
<td>Positioning of cables in wire basket</td>
<td>18</td>
</tr>
</tbody>
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Disclaimer

Willowstream Business Consultants (Pty) Ltd t/a iSAHA (hereinafter referred to as iSAHA) has prepared this document, taking all reasonable care and diligence required. This proposal provides high-level overview of our approach and methodology and does not purport to be advice on options or strategies.

While we have used all reasonable endeavours to ensure the information in this document is as accurate as practicable, the team, its members, director and employees shall not be liable (whether in contract, tort (including negligence), equity or on any other basis) for any loss or damage sustained by any person relying on this document whether the cause of such loss or damage.

The document is intended for the sole use of “Limpopo Provincial Government – Department of Health and Social Development”, and we request that it not be circulated to third parties without the express permission of iSAHA.

Contact Person
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Title CEO Willowstream Business Consultants (Pty) Ltd t/a iSAHA
Cell +27 82 775 2877
Email nfh@isaha.co.za
1. INTRODUCTION

The Siloam Hospital, in the Vhembe district in Limpopo, was identified as a National Presidential Priority after a visit to the facility by President Zuma on the 8th July 2011.

The hospital has also been identified as a provincial priority for the replacement of the hospital, the gateway clinic, the nurse’s school and the upgrading of the hospital grounds and staff accommodation. The hospital was first opened in July 1940 and by 1961 had five wards including male, female and children’s acute wards, maternity and TB. 1970 four new wards were added as well as nurse’s home. By the 1980’s, there were 300 – 400 beds. Nurse training started in 1943

1.1. Referenced Documents

The design rationale presented in chapter XXX below should be read in conjunction with the *IUSS Information Infrastructure Proposal V1.*

2. SCOPE OF WORK: ELECTRONIC SERVICES

2.1. Introduction

The Siloam Hospital in the Vhembe District in Limpopo is in the process of being upgraded in its entirety, to meet the requirements of a modern fully functional facility. This is a multi-phased multi-staged project.

Electronic services incorporate several systems, disciplines and integrates most of the disciplines as an enabler. It is therefore imperative to work with all the engineering disciplines and the Health Technology planners.

The disciplines and responsibilities are best depicted in the diagram below:
The diagram above is extremely detailed and in the case of Phase 2 most are not applicable.

### 2.2 ICT Infrastructure Network

The ICT infrastructure network forms the backbone of all the electronic services. This portion deals with the fixed and wireless networks that connect all electronic services together. It typically starts with a server room where all information is stored and controlled.
The server room is connected via an optic fibre network to all TDB’s. The number of TDB’s for a certain facility are determined on the size of the facility and services required. The data communications network performance degrades with distance so there are set design rules that determine optimum distance and connectivity. This portion of the network is known as the **core**.

The TDB’s in turn connect to all IP devices that require connectivity to the core network. This is defined as the **last mile connectivity**. This terminates for example at a data point for each fire detector device, each CCTV camera, each telephone, each computer etc. This is normally terminated utilizing CAT 6 Ethernet cable and WiFi points. This portion is depicted in the diagram below.

**Figure 3: ICT Schematic Layout – Overview of Equipment**

Once the ICT network is in place and all the positions of the data point connections are defined the actual equipment to enable the functioning of the network needs to be installed. The various categories of equipment are indicated in the diagram above.

A switch cabinet will typically be divided up into sections indicating the connectivity to the various services included in the cabinet. These would-be sections for security, nurse call, telephones etc.
Figure 4: Switch Cabinet

In summary, the Voice and Data Network (the LAN) cabling needs to be installed in the different blocks of the new Siloam Hospital. The network outlets will be connected via new switches to the main Server Room. The new LAN Infrastructure will be connected to the external Telkom Voice and Broadband infrastructure respectively.
3 CONCEPT DESIGN: ELECTRONIC SERVICES

3.1 Introduction

The Siloam Hospital Phase 2 design rationale is based on the service required and services get refined and updated as the project progresses. This is largely due to technology advancements and new requirements. This design approach is therefore high level and is intended to create a robust infrastructure that will serve that will remain relevant through several technology cycles.

3.2 Facilities

The ICT Backbone requires temporary servers to be placed at both the Mortuary and Psychiatric facilities and these will be limited in scope only to give adequate functionality until the main ITC backbone comes on line. Switch rooms are required in both facilities however in the mortuary the switch will be located in the Manager office. A switch room will be allowed in the Psychiatric ward and this will also house the temporary server. The number of points are being determined to accommodate the services and CAT 6 cabling is utilized that cannot be longer than 90 meters.

3.2.1 Hospital Information Services

Not Required for Phase 2

3.2.2 Server Rooms

No special server rooms required for Phase 2.

3.2.3 Switch Rooms

A single switch room is allowed in the Psychiatric facility. The switch rooms are where the fibre cables (core network) connects to the CAT 6 cabling to reach the individual data points throughout the building. The CAT 6 cable must not have lengths from the switch point to the device point of more than 90 m. The number of required switch rooms is therefore dependent on the floor size of the facility.

The size of Switch rooms will also depend on the equipment to be housed. These switch rooms must house all equipment required by Security, Fire Detection, Nurse Call and TV that then connects to the Core Network.

The minimum size of the switch rooms must therefore be 2.8m x 3m and if possible increased to 2.8m x 4m to make it less cramped once all equipment is fitted. The number of switch rooms will be determined once the floor layout and size of the facility are known.
3.2.4 Security Control Room
Temporary security facilities will be placed for Phase 2.

3.2.5 IT Training Room
Not required for Phase 2.

3.3 Assumptions
Assumptions will be different for each facility however it is important to understand the basic assumptions on which the Concept Design Rationale is based.

i. Power
1. Electrical power is available at all required points.
2. A backup generator will supply power within 15 minutes in case of a power failure and that the size and scaling is adequate.

ii. Data and Voice solution
3. A Unified Communications/VOIP system combining voice and data will be deployed.
4. This solution addresses only the LAN within the building. The WAN requirements are out of scope; however, broadband is recommended and a total broad band strategy should be developed.
5. The voice software, PBX and handsets form part of the selection of Service Provider. Peripheral equipment and software are acquired at the last moment before hand over of the facility or during the commissioning stage. Temporary existing facilities will be utilized or a mobile option.
6. The LAN will be designed at 10Gb/s or faster on single mode fibre to ensure maximum speed and efficiency.

iii. ICT Infrastructure
7. Fibre and cable networks including the distribution boxes and associated switch gear and UPS’s are installed during the last few months of the build phase.
8. Wireless network access (WiFi) is allowed for throughout the facility.
9. All computer peripheral and server equipment is acquired towards the end of the project just before handing over the facility.

iv. ICT System Commissioning
10. ICT System Commissioning includes Peripheral hardware, software and software integration required based on the medical service offered at each clinic.
11. The design enables primarily a paperless system. However, in our experience this will be a paper-light system as there are no true paperless systems.

v. Security and Access Control

12. Design and specification of access control systems, detail specification for security alarm systems, CCTV camera placement and network specification are based on the client security risk profile.
13. Limited requirements have been requested and no CCTV is allowed for at client request.
14. Mortuary requires additional security that has not been allowed based on client preference.

vi. Building Management and Facilities Management

15. The large units such as HVAC systems normally require a fair amount of telemetry equipment installation that is performed by the various disciplines, however the integration and dash boarding for management falls into the ICT requirements. This should be done towards the end of the project, however coordination with all engineering disciplines is required throughout to ensure standards are adhered to, and the required data points and connectivity is achieved.

vii. Nurse Call including Code Blue

16. No nurse call is required and not allowed. This will be limited to a panic button system for staff.

3.4 ICT Infrastructure Network

This chapter deals with the design rationale and the philosophy forming the basis for the ICT Network that ultimately gets deployed and supports all the applications required in the hospital facility.

viii. Design Rationale

Detailed scope requirements are given for the various functional areas. The design specifies requirements and indicates available services per functional area. The design backbone caters for future additional functionality that can be introduced as technology matures. The summarised design scope is as follows:

Voice over IP (VoIP) telephone solution (Unified Communications)
17. Data and voice share the network.
18. Two outlets per office desk or where a telephone and/or computer or IP device connectivity is required.
19. Any outlet in the building can be used as a telephone outlet, telephones can be moved from one office to the next without the need to change numbers.

![Diagram of VOIP (UC Coms) Connectivity]

Figure 5: VOIP (UC Coms) Connectivity

Receptionist / Switchboard
20. Receptionist can be placed at any desk in the building because of VoIP deployment.
21. Any desktop computer can fulfil the role of a switchboard (depends on telephone solution).
22. Recommend seating for operators in the administrative section.

Televisions
23. No Televisions are allowed.

Wireless
24. Wireless connectivity is available throughout the building and is a secure network.

Building Management System
25. The IP points for the BMS system will be included and it is recommended that the client requirements are clearly understood to enable the installation of the system during the build phase. Due to the sophistication of these systems it might be advisable not to utilize such a complex system and rely more on manual systems where deployment is in the rural areas away from the support infrastructure.
Access and Security System
26. The Access and Security system are allowed for on the ICT backbone and will have a control centre.

Code Blue System
27. Code Blue will form part of the Nurse Call system and is not stand-alone. Not included.

Patient Queuing System
28. Not for Phase 2.

Other disciplines
29. The various disciplines requiring access to the ICT Backbone are coordinated and allowed for during the build phase.
ix. **Network Philosophy**

The ICT Network philosophy is diagrammatically indicated in the table below.

The ICT network is designed for full redundancy and to allow various routes to the numerous switch rooms. The Fibre utilized will be single mode to ensure the speed required for video streaming and thus enabling telemedicine and X-ray image sharing.

![Multi-mode Fibre Optic cable and Patch lead](image)

*Figure 6: Multi-mode Fibre Optic cable and Patch lead*

The schematic below depicts the philosophy and interconnectivity between the ICT Backbone and the various functional equipment.
The above philosophy will be further developed during the subsequent phases to indicate the detailed positioning of equipment and points as per this philosophy.

**CAT 6 cabling, patch Leads, and patch panels are utilized for all IP connectivity.**

### 3.5 Installation and Commissioning

This document specifies the requirements for the installation and commissioning of the Information and Communications Technologies (ICT).

The design rationale includes the following:

30. The Voice and Data Network (the LAN) cabling needs to be installed. The network outlets will be connected via switches to the main Server Room. The LAN Infrastructure will be connected to the external selected service provider Voice and Broadband infrastructure respectively.
31. This design will allow for (this list is not all-inclusive and gives only an indication of the extent):
   a. Supply, Install, Configure, and Commission LAN Switches and WAN Routers at the Hospital;
   b. Supply and Install Krone Certified CAT6 cables to all network outlets;
   c. Supply and Install Standing and Wall mounted Cabinets where required;
   d. Supply and Install optical fibre cables between the switches in each referenced section and the server room;
   e. Supply and install wall plates with relevant connectors for each network cable – wall plates and connectors must be Krone certified;
   f. All the ducting and conduits inside the ceiling voids will be supplied and installed by the electrical contractor. This design requires the supply and install of ducting and/or wire-ways from the ceiling to the cabinets in the respective ICT rooms where data cabinets are housed as well as in the server room inside the raised floor;
   g. Supply, install and commission a 12-channel television (TV) distribution system, excluding television sets and mounting brackets.
   h. The TV sets and brackets to be acquired and installed just before completion of the Build Phase.

32. The installation must be a KRONE certified installation and adhere to the standards as specified in the respective Department of Health Network Standards.

x. Distribution Layout

The data and telephone cables must range in length between 50m to 80m radius where the cables converge into the IT rack mounted cabinets spaced throughout the building. These IT rack mounted cabinets usually host several switches, including the Universal Power Supply Unit (UPS).

xi. Rack layout

A rack layout diagram indicating the positioning of all the equipment inside the rack as well as all the connections between the equipment will be developed with the detailed design. The design must consider all services that converge in a rack. The entrance positions of cables from the ceiling and/or floor must be considered when positioning the cabinets.

Cable differentiation in ducts

Cables from all the disciplines will be routed in the same wire basket (duct). To differentiate between the cables two different measures must be in place:

i. Positioning: The data, telephone and building management cables must be positioned on the right-hand side of the basket as seen from above and with the outlet to your back and the
cable running to the switch in front of you. The security and access control cables must be positioned on the left-hand side of the basket as seen from above. The nurse call cables must be positioned in the middle of the basket. All disciplines accommodated in a wire duct must be clearly marked and differentiated for easy diagnostics in the future. See the figure below as an example.

![Positioning of cables in wire basket](image)

**Figure 7: Positioning of cables in wire basket**

ii. **Tags**: Each bundle of cables from each different discipline must be tagged at least every 5 meters in the tray. The tags must indicate which discipline is responsible for the cables, i.e.

a) Data & Telephone  
b) Building management (including A/C control)  
c) Nurse Call  
d) Security  
e) Access control

### 3.6 Network Infrastructure Characteristics

The network infrastructure should adhere to the following characteristics:

33. **Secure**: Controls should be in place to prevent any non-authorised personnel member, or member of the public, from interfering or gaining access to any part of the network infrastructure, whether it be physical or using any software.
34. **Robust**: The infrastructure must be able to carry a peak time load without a noticeable increase in response times.

35. **Reliable**: The system must not fail in the event of a general power failure or damage to a cable from the main Server Room to any one of the IT rooms. For the latter, at least one alternative data flow route to the main data flow route – from the main Server Room to an IT room – should be catered for.

36. **Uninterrupted** service: The network must not be affected by any break in power supply from the national grid

   a. Each ICT network cabinet, floor standing and wall-mounted, must have its own UPS which in turn should be connected to an alternative power supply in the event of an extended breakdown in power supply from the national grid. (The electrical engineers on the project should be consulted to establish how this can be accomplished).

37. **Redundancy**: Provision must be made for at least a 40% redundancy in terms of catering for maximum volumes in traffic load and the connection of all equipment in the critical areas (nurse stations, theatres, etc.).

xii. **Network – General Requirements**

The Krone industry standard should be used for cabling links between the switch rooms and between the server room and the switch rooms.

The guidelines as given in the TIA 942 Telecommunications Infrastructure Standards for Data Centres should be followed. The document: TIA-942 Data Centre Standards Overview White Paper, describes the key elements of the TIA-942 standard and covers the following:

38. Site space and layout;
39. Cabling infrastructure;
40. Tiered reliability; and
41. Environmental considerations

The key support staff responsible for the ICT network should get informed automatically about any irregularities and faults. It is suggested that automated SMS messaging is used for this purpose.

Air conditioning will be supplied. BTU requirements per IT room must be determined.

Electrical power requirements must be determined to ensure adequate supply.

**General Design and Installation Principals**
42. The Voice and Data Network should be designed and built to guarantee a high availability, through reliable and maintainable communication services and products, at optimum Life Cycle Cost (LCC). International, national, and local regulations, codes, and industry telecommunication standards should be adhered to;

43. Installations should be per the manufacturer’s specifications;

44. Cabinets (racks) and wall-mounted boxes should be installed per departmental standards;

45. The cable system and cable containment system shall be earthed for safety and electromagnetic compatibility requirements;

46. The contractor shall take the necessary measurements to decrease Electromagnetic Interference (EMI);

47. The preferred products for connecting hardware and enclosures are the Krone product range.

48. Cables, distribution frames and boxes and distribution points should be marked and labelled per the departmental specifications; and

49. There should be no loss in transmission on the network during switchover from normal power to standby power.

**Power over Ethernet (PoE)**

All the switches are PoE capable. PoE extends the capabilities of the Ethernet by delivering both data and reliable DC power over the same cables to endpoint devices such as VoIP phones, IP security and surveillance cameras, and wireless access points. Because PoE runs data and power together over the same cable to each device attached to the local area network, devices can be installed without the need for a dedicated AC outlet. This saves money by eliminating the cost and time associated with AC outlet installations, while providing the flexibility to locate PoE devices where performance is optimum.

With a robust infrastructure providing power, the devices can take advantage of centralized UPS backup systems supporting other devices on the network.

**Universal Power Supply (UPS)**

A UPS is required for each cabinet. The contractor must confirm that the size of the UPS is such that it can fit in the required cabinet and still can deliver a minimum of 20 minutes of operation in the case of a power outage.

In the case of a power outage the backup power of the hospital will be switched on within 15 minutes and the ICT equipment will draw power from this power source.

**xiii. Server Room**

No server rooms allowed.
xiv. Cables and Connections

Data and Telephone

50. All cables to the outlets must be ADC KRONE CAT6
51. All cables must be less than 90m in length
52. All cables are Power over Ethernet: 10/100 PoE 15.4W PoE 802.3af
53. All I/O connections at the outlets must be RJ45
   a. Connectors must be Krone
   b. A mix of VoIP and full functionality UC communications telephone sets will be used
      and the outlets must be wired accordingly
   c. Labelling at the connectors must be clear to identify its function
   d. Outlets must be flush-mounted inside the supplied skirting and the wall-outlet boxes supplied by the electrical contractor.
54. Cabling must comply with the Krone standards.
55. Krone certification is required for this installation.

Optical Fibre

56. Optical Fibres must connect the switches in all the buildings to the LAN/Internet server situated in the main server room.
57. All Optical Fibres must be minimum 24-core Cable – see the Bill of Quantities and related drawings for details. A 40% redundancy should be allowed when determining the number of fibre cores required.
58. Each switch must have redundant Optical Fibres installed
59. Must comply with the Krone standards.
60. Krone certification is required for this installation.

Labelling

61. At all terminations, the cables must be visibly labelled. This includes but is not limited to:
   a. Patch leads
   b. Data and Telephone outlets
   c. Pigtails
62. All equipment inside the cabinets must be labelled for clear identification of their function, e.g. Data Patch Panel 1.
63. All patch leads in the cabinets must be colour coded as per the Client Network Standards.

Patch leads

All patch leads that are used at the cabinets must be colour coded as per the Client Network Standards. The patch lead itself must be the specified colour.
xv. **Equipment**

**Switches**

64. All switches must be POE.
65. The relevant supplier should authorise and approve the proposed network architecture
66. Switches must be able to support a 10Gb/sec backbone
67. An 8-business hour (on site) replacement of switches is essential in the form of a 5 year extended warranty.
68. A 4-hour (on site) fix of problems related to the switches in the ICU departments is required.

**Cabinet**

The cabinets must be sized to allow for the installation of patch panels, fibre panels, telephone patch panels, access switches and cable managers. A mix of floor standing cabinets and wall-mounted cabinets are required and detailed in the Bill of Quantities. Cabinets to have 2 x 5 way dedicated power distribution unit, 4 fans, a 300mm cable tray installed vertically within the cabinet for cable reticulation. Front and rear doors of floor standing cabinets to be perforated. Include blank plates.

**Wireless Access Points**

Wireless connectivity is required in all areas and must be supplied by suitable wireless Access Points.

The exact positioning of the wireless Access Points must be determined on site as to supply the best coverage and access. The service provider must be able to prove upon inspection that coverage is available in all indoor areas.

**Equipment list**

The list in the Bills of Quantities indicates the minimum equipment required for an installation. The BOQ forms part of the detailed design.

The Service Provider should ensure that all additional equipment that is required and which is not mentioned in the list is included in the detailed design. This includes, but are not limited to, equipment like:

69. Transceivers
70. Gbic modules
71. Power distributor units
72. Fan units
73. Gland plates
74. Brush panels
75. Blanking panels
76. Cagenut/screws/washers
77. Pigtails
78. Fly leads
79. Patch leads
80. Trunking
81. Etc.

P&G’s must be included in the “Preliminaries” bill. These include, but are not limited to:
82. Operating & Maintenance Manuals including as built drawings
83. Testing & Commissioning
84. Project Management
85. Etc.

xvi. Wireless Network

Although provision is made for wireless data transfer, the core data, communication, nurse call, security and access control services will rely on physical cables for data transfer. The main use for wireless communication will be for mobility of clinical staff and granting access to patient data as the clinicians move through the facilities. This should be a secured network and a separate network should be considered for visitors and students.

The positioning of the wireless access points must be determined at installation to give the best signal coverage.

3.7 Television Installation

No TV allowed.

3.8 Environmental Conditions

The entire system shall operate satisfactorily in the following environmental conditions:
86. Average monthly maximum temperature: 35°C
   (Summer condition)
87. Average monthly minimum temperature: 5°C
   (Winter condition)
88. Absolute minimum temperature: -10°C
89. Absolute maximum temperature: 45°C
   *(The above quoted figures are the prevailing outside weather conditions)*
3.9 Supply Voltage

The low voltage power distribution system will be a 400/231 Volt ± 10%, 3-phase, 4 wire, 50 Hz AC supply.

All the equipment should be able to function at this voltage and at this tolerance.

All the equipment associated with the system shall be able to operate from the low voltage power distribution system for twenty-four hours per day without overheating or degradation.

3.10 Quality Control of Material

All materials shall be the best of their respective kinds described in the specification and shall in every way be suitable for the purpose for which they are intended to be used.

All materials and equipment supplied shall fully comply to the requirements laid down in this specification and the latest editions of the relevant SABS, BS, IEEE, CCITT, EIA, ISO and DIN specifications or as otherwise specified.

3.11 General Specification, Policies and Information

The design of all the ICT and related solutions will comply to the following minimum standards:

90. ICASA Regulations;
91. National Building Regulations;
92. ANSI Fibre Channel specifications;
93. ICT technical limitations, requirements and specifications;
94. The Occupational Health and Safety Act of 1993, as amended, which include the code of practice for the wiring of premises: SANS 10142-1 of 2004, as amended, in terms of regulation C175 of the act;
95. The regulations of the local Municipality;
96. The regulations of the local Supply Authority;
97. The regulations of the local Fire Brigade;
98. The regulations of Telkom SA Inc.;
99. The regulations of the Post Office;
100. The regulations of any Government Department or public service company, where applicable;
101. Government Notices; and
102. Radio Act No. 3 of 1952.
103. Exclusions that form part of the Commissioning phase
104. E-Health software
3.12 Additional Applications

When referring to Figure 1: Responsibility / Scope, there are additional applications that require specific additional cabling and equipment installation. These applications are addressed in the Annexure that follow.
DRAWINGS
01 12 mm Avonite Surfaces (or similar), applied to a 20mm Supawood Substrate (colors to be defined)

02 32mm Supawood Substrate with a 2MM Fenix NTM laminate (or similar). Color to be defined.

03 Outer counter vertical decorative face: 5mm Max on Top Advance Pal (or similar) on a 32 mm substrate with a non decorative brown backer on the alternative side (colors to be defined)

04 Decorative outer panel, with a Max on Top laminate (or similar) applied to 16mm Supawood substrate with a non decorative brown backer on the alternative side. Color to be defined.

05 Aluminium sheet skirting panel, bonded with adhesive to 16mm Supawood skirting panel.

P1 Small partition (P1) consisting of 20mm Varia panel from 3Form-Ergo System, translucent partition made of 40% recyclable material, with decorative inlay or similar. Design inlay to be confirmed. As per detail

P2 Large partition (P2) consisting of 20mm Varia panel from 3Form-Ergo System, translucent partition made of 40% recyclable material, with decorative inlay or similar. Design inlay to be confirmed. As per detail
12 mm Avonite Surfaces (or similar), applied to a 20mm Supawood Substrate (colors to be defined)

32mm Supawood Substrate with a 2MM Fenix NTM laminate (or similar). Color to be defined.

Outer counter vertical decorative face: 5mm Max on Top Advance Pal (or similar) on a 32 mm substrate with a non decorative brown backer on the alternative side (colors to be defined)

Decorative outer panel, with a Max on Top laminate (or similar) applied to 16mm Supawood substrate with a non decorative brown backer on the alternative side. Color to be defined.

Aluminium sheet skirting panel, bonded with adhesive to 16mm Supawood skirting panel.

Small partition (P1) consisting of 20mm Varia panel from 3Form-Ergo System, translucent partition made of 40% recyclable material, with decorative inlay or similar. Design inlay to be confirmed. As per detail

Large partition (P2) consisting of 20mm Varia panel from 3Form-Ergo System, translucent partition made of 40% recyclable material, with decorative inlay or similar. Design inlay to be confirmed. As per detail
Aluminium sheet skirting panel, bonded with adhesive to 16mm Supawood skirting panel. 12 mm Avonite Surfaces (or similar) applied to a 20mm Supawood Substrate (colors to be defined).

Outer counter vertical decorative face: 5mm Max on Top Advance Pal (or similar) on a 32 mm substrate with a non decorative brown backer on the alternative side (colors to be defined).

Decorative outer panel, with a Max on Top laminate (or similar) applied to 16mm Supawood substrate with a non decorative brown backer on the alternative side. Color to be defined.

32mm Supawood Substrate with a 2MM Fenix NTM laminate (or similar). Color to be defined.

Small partition (P1) consisting of 20mm Varia panel from 3Form-Ergo System, translucent partition made of 40% recyclable material, with decorative inlay or similar. Design inlay to be confirmed. As per detail.

Large partition (P2) consisting of 20mm Varia panel from 3Form-Ergo System, translucent partition made of 40% recyclable material, with decorative inlay or similar. Design inlay to be confirmed. As per detail.
Suspended bulkhead, made of 16mm Supawood substrate and finished with Max on Top Advance Pal (or Similar)

Bulkead suspended by steel cables and secured to the roof structure

Counter glazing as per window schedule

Aluminium sheet skirting panel, bonded with adhesive to 16mm Supawood skirting panel.

Small partition (P1) consisting of 20mm Varia panel from 3Form-Ergo System, translucent partition made of 40% recyclable material, with decorative inlay or similar. Design inlay to be confirmed. As per detail

Large partition (P2) consisting of 20mm Varia panel from 3Form-Ergo System, translucent partition made of 40% recyclable material, with decorative inlay or similar. Design inlay to be confirmed. As per detail

Wheelchair accessible counter

12 mm Avonite Surfaces (or similar) applied to a 20mm Supawood Substrate (colors to be defined)

32mm Supawood Substrate with a 2MM Fenix NTM laminate (or similar). Color to be defined.

Outer counter vertical decorative face: 5mm Max on Top Advance Pal (or similar) on a 32 mm substrate with a non decorative brown backer on the alternative side (colors to be defined)

Decorative outer panel, with a Max on Top laminate (or similar) applied to 16mm Supawood substrate with a non decorative brown backer on the alternative side. Color to be defined.
Counter glazing as per window schedule

Suspended bulkhead, made of 16mm Supawood substrate and finished with Max on Top Advance Pal (or Similar)

Bulkead suspended by steel cables and secured to the roof structure

Aluminium sheet skirting panel, bonded with adhesive to 16mm Supawood skirting panel.

01 12 mm Avonite Surfaces (or similar), applied to a 20mm Supawood Substrate (colors to be defined)

02 32mm Supawood Substrate with a 2MM Fenix NTM laminate (or similar). Color to be defined.

03 Outer counter vertical decorative face: 5mm Max on Top Advance Pal (or similar) on a 32 mm substrate with a non decorative brown backer on the alternative side (colors to be defined)

04 Decorative outer panel, with a Max on Top laminate (or similar) applied to 16mm Supawood substrate with a non decorative brown backer on the alternative side. Color to be defined.

05 Large partition (P2) consisting of 20mm Varia panel from 3Form-Ergo System, translucent partition made of 40% recyclable material, with decorative inlay or similar. Design inlay to be confirmed. As per detail

Small partition (P1) consisting of 20mm Varia panel from 3Form-Ergo System, translucent partition made of 40% recyclable material, with decorative inlay or similar. Design inlay to be confirmed. As per detail

01 03 05

02 04 05

03

04

05

01 03 05

823000

Q-001-03

1 : 50

Q-001-04

1 : 50

FL Rep M. Health

01 03 05

04

02 04 05

823000

FL Rep M. Health

01 03 05

04
Top of counter
824100

Top of Lower Counter
823780

FL Rep M. Health
823000

12 mm Avonite Surfaces (or similar), applied to a 20mm Supawood Substrate (colors to be defined)

32mm Supawood Substrate with a 2MM Fenix NTM laminate (or similar). Color to be defined.

Outer counter vertical decorative face: 5mm Max on Top Advance Pal (or similar) on a 32 mm substrate with a non decorative brown backer on the alternative side (colors to be defined)

Decorative outer panel, with a Max on Top laminate (or similar) applied to 16mm Supawood substrate with a non decorative brown backer on the alternative side. Color to be defined.

Aluminium sheet skirting panel, bonded with adhesive to 16mm Supawood skirting panel.

Small partition (P1) consisting of 20mm Varia panel from 3Form-Ergo System, translucent partition made of 40% recyclable material, with decorative inlay or similar. Design inlay to be confirmed. As per detail

Large partition (P2) consisting of 20mm Varia panel from 3Form-Ergo System, translucent partition made of 40% recyclable material, with decorative inlay or similar. Design inlay to be confirmed. As per detail

SILOAM DISTRICT HOSPITAL

BLOCK Q COUNTER 002 ELEVATIONS

PROJECT: 4383
DRAWN: JPT
DATE: 2018/11/14
ISSUED: 2018/11/14

SCALE:
REV. NO
DET. NO

As indicated
Q-045-203

CONTRACT NR: NDOH2/2016
DRAWING DESCRIPTION:
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04  Decorative outer panel, with a Max on Top laminate (or similar) applied to 16mm Supawood substrate with a non decorative brown backer on the alternative side. Color to be defined.

05  Aluminium sheet skirting panel, bonded with adhesive to 16mm Supawood skirting panel.

P1  Small partition (P1) consisting of 20mm Varia panel from 3Form-Ergo System, translucent partition made of 40% recyclable material, with decorative inlay or similar. Design inlay to be confirmed. As per detail

P2  Large partition (P2) consisting of 20mm Varia panel from 3Form-Ergo System, translucent partition made of 40% recyclable material, with decorative inlay or similar. Design inlay to be confirmed. As per detail

As indicated

PROJECT: 4383  SCALE:  REV. NO:  DET. NO: Q-045-204
DRAWN: JPT  DATE: 2018/11/14
ISSUED: 2018/11/14

SILOAM DISTRICT HOSPITAL
Aluminium sheet skirting panel, bonded with adhesive to 16mm Supawood skirting panel.

Small partition (P1) consisting of 20mm Varia panel from 3Form-Ergo System, translucent partition made of 40% recyclable material, with decorative inlay or similar. Design inlay to be confirmed. As per detail

Large partition (P2) consisting of 20mm Varia panel from 3Form-Ergo System, translucent partition made of 40% recyclable material, with decorative inlay or similar. Design inlay to be confirmed. As per detail
12 mm Avonite Surfaces (or similar), applied to a 20mm Supawood Substrate (colors to be defined)

32mm Supawood Substrate with a 2MM Fenix NTM laminate (or similar). Color to be defined.

Outer counter vertical decorative face: 5mm Max on Top Advance Pal (or similar) on a 32mm substrate with a non decorative brown backer on the alternative side (colors to be defined)

Decorative outer panel, with a Max on Top laminate (or similar) applied to 16mm Supawood substrate with a non decorative brown backer on the alternative side. Color to be defined.

Aluminium sheet skirting panel, bonded with adhesive to 16mm Supawood skirting panel.

Small partition (P1) consisting of 20mm Varia panel from 3Form-Ergo System, translucent partition made of 40% recyclable material, with decorative inlay or similar. Design inlay to be confirmed. As per detail

Large partition (P2) consisting of 20mm Varia panel from 3Form-Ergo System, translucent partition made of 40% recyclable material, with decorative inlay or similar. Design inlay to be confirmed. As per detail
Aluminium sheet skirting panel, bonded with adhesive to 16mm Supawood skirting panel.

32mm Supawood Substrate with a 2MM Fenix NTM laminate (or similar). Color to be defined.

Outer counter vertical decorative face: 5mm Max on Top Advance Pal (or similar) on a 32 mm substrate with a non decorative brown backer on the alternative side (colors to be defined)

Decorative outer panel, with a Max on Top laminate (or similar) applied to 16mm Supawood substrate with a non decorative brown backer on the alternative side. Color to be defined.

Small partition (P1) consisting of 20mm Varia panel from 3Form-Ergo System, translucent partition made of 40% recyclable material, with decorative inlay or similar. Design inlay to be confirmed. As per detail

Large partition (P2) consisting of 20mm Varia panel from 3Form-Ergo System, translucent partition made of 40% recyclable material, with decorative inlay or similar. Design inlay to be confirmed. As per detail
Aluminium sheet skirting panel, bonded with adhesive to 16mm Supawood skirting panel. 12mm Avonite Surfaces (or similar) applied to a 20mm Supawood Substrate (colors to be defined)

Outer counter vertical decorative face: 5mm Max on Top Advance Pal (or similar) on a 32mm substrate with a non decorative brown backer on the alternative side (colors to be defined)

Decorative outer panel, with a Max on Top laminate (or similar) applied to 16mm Supawood substrate with a non decorative brown backer on the alternative side. Color to be defined.

32mm Supawood Substrate with a 2MM Fenix NTM laminate (or similar). Color to be defined.

Small partition (P1) consisting of 20mm Varia panel from 3Form-Ergo System, translucent partition made of 40% recyclable material, with decorative inlay or similar. Design inlay to be confirmed. As per detail

Large partition (P2) consisting of 20mm Varia panel from 3Form-Ergo System, translucent partition made of 40% recyclable material, with decorative inlay or similar. Design inlay to be confirmed. As per detail

Counter glazing as per window schedule
Signage Legend:

Double Sided: All signs to be 190mm x 190mm photo - luminescent, with white back ground
1. DRAWINGS NOT TO BE SCALED.

5. A COMPLETE SET OF DRAWINGS TO BE AVAILABLE

Wall mounted Vista Directory VBS500x998mm

Note:

- ABS insert needs to be vinyl application
- Signs need to be secured with screws on wall
- Photo-luminescent sign needs to be mounted with silicone in frame to ensure safety of patients.

BESKRYWING

Vista Frame V60x150mm with Metal End Caps -
Aluminium sliding window outer frame to consist of a two-part configuration (with or without opening sections) as shown. Waterproof part 1 & 2.

Install obscure glass (a) in all ablution and change room windows, all centres, minimum of 75mm form end of window cill and bedded in and projecting from the finished face of wall, all in accordance with the manufacturer’s recommendations. Paint to manufacturer’s specification. Colour to Architect.

Obscure glazing to Architect’s approval

All frames to be purpose made aluminum frames to suit applicable wind authority standards and to Architects approval.

Stainless Steel Mesh to be H Systems Type 316 Stainless Steel

Aluminium profiles to be priced utilizing the Category X2 or X3 range. Colour to be confirmed.

Glazing to be 6mm glass in panes smaller than 1.5 sqm, 5mm in panes 1.5-2.1 sqm, 6mm in panes 2.1-3.2 sqm and 6mm safety glass for all panels lower than 900mm above FFL. Glazing is to be carried out in and projecting from the finished face of wall, all in accordance with the manufacturer’s recommendations. Paint to manufacturer’s specification. Colour to Architect.

Butchery

Stainless Steel Mesh to be H Systems Type 316 Stainless Steel

Fibre cement external window cill 15mm thick and length to suite with window cill lug screwed to underside of cill at 400mm

All aluminium surface to be painted in accordance with SABS 1578, Class II mortar with plastic slip joints at end of cills at plater reveals with window cill lug screwed to underside of cill at 400mm

None

GENERAL

Assembled with mechanical corner cleats, and replaceable track inserts. Drainage slots are punched on the outer frame to allow for panel which will be glazed into the sliding (Acacia) panels assembly.

REMAIN
### Door Schedule

**Door Height:**
- 1650
- 2100
- 2100
- 2100
- 1798

**Door Finish:**
- Masonite finish both sides with viewing panel
- Sand down and prepare wood surfaces. Apply one coat Plascon Wood Primer, one coat Plascon Universal Undercoat and two coats Plascon Velvaglo Polyurethane Enamel paint to new interior general wood surfaces. Colour to Architects approval.

**Frame Description:**
- 1.6mm Pressed single rebate mild steel single door frame, suitable for door to suit wall thickness as shown on plan
- Prepare frame and apply one coat Plascon Universal Undercoat and two coats Plascon Velvaglo Polyurethane Enamel paint on new interior primed steel surfaces. Colour to Architects approval.

**Ironmongery:**
- Notes: All ironmongery to be similar and approved.
- 1.5 pair hinges by manufacturer
- 1x Continues Hinge
- 1x pair 187211 AR3903 Anti-Ligature BTB flush pull set
- 0.5 x 187253 AR3901 Anti-Ligature euro profile cyl escutcheon
- 1x JD213/111 BT GEZE B thr ss p/hnd 130x111x19
- 1x IG950930308 N/PL cyl 60mm std
- 1x AZ2003SR 2000G-SE O H door closer with guide rail size
- 2x Flushbolt by manufacturer 1x GZZWDUSTK dust excluding keep for flush bolt n/p

**Door Schedule Details:**
- Toilet
- Diesel Tank
- Storm water drainage

**Health Ward and OPD - Door Schedule**

**Frame Description:**
- Purpose made aluminium frame as per H systems or similar approved to suit required wind load. All to AAMSA Standards
- All aluminium surface to be painted in accordance with SABS 1578, part 1 & 2.

**Ironmongery:**
- Notes: All ironmongery to be similar and approved.
- 1.5 pair hinges by manufacturer
- 1x Continues Hinge
- 1x pair 187210 AR3904 Anti-Ligature 45 Lever set on rose
- 2-5 SE
- 1x PA PA
- 1x PM
- 1x K1.2
- 1x H
- 1.1.5
- KD

**General:**
- Storm water drainage
- Shop drawings and sample to be approved by Architect prior to any manufacturing.
NOTES:
ON SITE AND WHERE APPLICABLE TO MATCH EXISTING STRUCTURE.

WINDOW SCHEDULE

DOOR SCHEDULE

1. All dimensions to be controlled on site.
2. Shop drawings and samples to be approved by Architect prior to any manufacturing.

GENERAL

1. 1.6mm Pressed single rebate mild steel double door frame with fanlight, suitable for door to suit wall thickness as shown on plan.
2. 4x 963/03 5.4mm patent f/screw np 40-55mm for p/plates
3. 1x 120/150 Flushbolt 150mm st/c
4. 1x GZZWDUSTK dust excluding keep for flush bolt n/p
5. 1x 140/69 GEZE s/steel f/mnt doorstop
6. 1x 642/35 Deadlock euro cyl N/S S/S 35mm B/S
7. 1x 325/51 GEZE 76mm prof cyl sashlock 22mm CP
8. 1x AZ2003SR 2000G-SE O H door closer with guide rail

GLAZING

1. 5mm in panes 1.5-2.1 sqm, 6mm in panes 2.1-3.2 sqm
2. Windows, all other windows to receive clear glass (b) or solid aluminium panel (s). Obscure glazing to Architect’s approval.

FRAME DESCRIPTION

1. Sand down and prepare wood surfaces. Apply one coat Plascon Wood Primer, one coat Plascon Universal Undercoat and two coats Plascon Velvaglo Polyurethane Enamel paint to new interior general wood surfaces. Colour to Architects approval.

DOOR DESCRIPTION

1. Door Finish: Painted 2 sides masonite finish with ventilation louvre to eng. specification.

DOOR SCHEDULE

1. All dimensions to be controlled on site.
2. Shop drawings and samples to be approved by Architect prior to any manufacturing.

TABLE OF CONTENTS

1. Windows
2. Doors
3. Frames
4. Glazing

DRAWING DESCRIPTION

1. 1:50
2. SUPPLIED WITH DOOR
3. NOTED: All ironmongery to be similar and approved.
Standard ND4 size 1511 x 1245mm, 3mm thick cold-rolled m/s sections residential type window, finished in oxide primer, all to Architects approval. 

Drainage slots are punched and assembled with mechanical corner cleats, and replaceable track inserts. Approved silicone to prevent water from penetrating the outer frame. Aloe Fly Screen to be made up of stainless steel mesh.

All to local authority standards and to Architects approval.

SABS 1578, part 1 & 2.

Prepare frame and apply one coat Plascon Universal Undercoat and two coats Plascon Velvaglo Polyurethane. Noble, and 25 year warranty that is available to special request on certain finishes. All aluminium profiles to be priced utilizing the Category X2 or X3 range. Colour to be

All window panes to be 6mm safety glass for all panels lower above FFL. Glazing is to be carried out in accordance with SABS 0137. Install obscure glass (a) in all ablution and change room windows, all other windows to receive clear glass (b) or obscure glazing to Architect’s approval.

Fibre cement external window cill 15mm thick and length to be manufactured in accordance with SANS 803:2005 and installed below window with window cill.

External: Brick on edge to match existing wall, all in accordance with the manufacturer’s recommendations. Paint to manufacturer’s recommendations.

Plaster reveals and projecting from the finished face of wall, all in accordance with the manufacturer’s recommendations.

GENERAL

No Change. See Plan for all alterations, also contact

No Change.
PART C4: SITE INFORMATION
C4.1: SITE INFORMATION

<table>
<thead>
<tr>
<th>Project Name:</th>
<th>SILOAM HOSPITAL UPGRADING OF MENTAL HEALTH WARD AND MORTUARY PHASE 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tender No:</td>
<td>NDOHF01/2019-2020</td>
</tr>
</tbody>
</table>

C4 Site Information

**Location**

THE SITE IS AT:
Portion 1 of the farm Siloam No. 199 – MT
Siloam Village
Makhado
22°54’03.01”S
30°11’37.03”E

**SITE INFORMATION**

Site Information

**ADJACENT BUILDINGS**

Prospective bidders must acquaint themselves with the positions and areas of buildings being renovated or newly constructed on site and must take cognisance of the functional buildings adjacent to these areas.

Prospective bidders must take cognizance of the fact that construction of the Siloam Hospital – Phase 1 will take place on the existing Siloam Hospital site, a fully operational hospital for the full duration of the Building Contract.

Bidders attention is drawn to the following specific requirements:

- Dust control
- Noise control – works executed after 5pm – 8am weekdays, works over weekends and public holidays shall be agreed with the Principal Agent prior commencement.
- All construction workers shall be contained to the designated portion of the existing site as defined by the Principal Agent

SITE PLAN
1. ALL DIMENSIONS AND LEVELS TO BE CHECKED ON SITE AND WHERE APPLICABLE TO MATCH EXISTING STRUCTURE.

2. ANY DISCREPANCY OR CONTRADICTION TO DRAWINGS NOT TO BE SCALED.

3. USE PROFILE COLUMNS AT 85mm CENTRES FOR DIFFERENTLY.

4. NORTH 6. ALL DIMENSIONS AS SHOWN ON PLAN TO BE PLOTTED ON SITE AT A HORIZONTAL LEVEL.

7. THE CONTRACTOR IS RESPONSIBLE FOR THE CORRECT LAYOUT OF BUILDINGS ON SITE IN RELATION TO SITE BOUNDARIES AND BUILDING EXISTING.

PHASE 2 AS PHASE 2 temporary mental health ward.