NATIONAL RESEARCH FOUNDATION/
NATIONAL ZOOLOGICAL GARDENS OF SOUTH AFRICA
UPGRADES AND REFURBISHMENT OF THE WATERHOLE
COMPLEX

Bid NO: NRFNZG-001-2015/16

TENDER DOCUMENT
VOLUME 1- TECHNICAL

TENDERER ………………………………………………………………………………………………………
CIDB REGISTRATION NUMBER……………………………………………………………………………
CIDB GRADING……………………………………………………………………………………………

BID CLOSING : 21 August 2015

<table>
<thead>
<tr>
<th>Issued by</th>
<th>Prepared by</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Research Foundation/ National Zoological Gardens of SA P O BOX 754 Pretoria 0001 Tel: 012 328 3265 Fax 012 323 4549 Email: <a href="mailto:info@nzg.ac.za">info@nzg.ac.za</a></td>
<td>CA duToit Consulting Engineers 1st Floor, Brooklyn Place, 266 Dey Street, Nieuw Muckleneuk, Pretoria 0181 PO Box 2145, Brooklyn Square 0075 Tel: 012 460 3450; 012 460 3451 Fax: 012 460 4544</td>
</tr>
</tbody>
</table>
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## PART T1:

**TENDERING PROCEDURES**

**INVITATION TO BID (SBD 1)**

---

**YOU ARE HEREBY INVITED TO BID FOR THE FOLLOWING SPECIFIED SUPPLY REQUIREMENTS**

<table>
<thead>
<tr>
<th>BID NUMBER:</th>
<th>NRFNZG-001-2015/16</th>
<th>CLOSING DATE:</th>
<th>21 August 2015</th>
<th>CLOSING TIME:</th>
<th>11h00</th>
</tr>
</thead>
</table>

### BID DESCRIPTION

**UPGRADES TO AND REFURBISHMENT OF THE WATERHOLE COMPLEX**

Bidders are required to fill in and sign the written offer form (SBD7 Contract Form – Part 1) at end of this Invitation.

Preferential Procurement System applicable (points for price : points for procurement preference): 90:10

<table>
<thead>
<tr>
<th>Briefing Session / Site Visit</th>
<th>Compulsory</th>
<th>Date and Time:</th>
<th>12 August 2015 @ 10H00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location:</td>
<td></td>
<td>Location:</td>
<td>Waterhole Complex, National Zoological Gardens of SA, 232 Boom Street, Pretoria</td>
</tr>
</tbody>
</table>

**DOCUMENTS DEPOSITED IN THE TENDER BOX EITHER PHYSICALLY OR BY COURIER AT:**

**ENVELOPE ADDRESSING:**

National Zoological Gardens of South Africa,, Admin Block, 232 Boom Street, Pretoria, 0001

Bid Number and Name, Postal Address, Contact Name, Telephone Number and email address on the envelope

National Zoological Gardens of South Africa, PO Box 754, Pretoria, 0001

Bidders are required to deliver Bids to the correct address timeously. If the Bid is delivered late to the NRF address, it will not be considered.

All Bids must be submitted on the official forms in this invitation (not to be re-typed) with additional information supplied on attached supporting schedules.

This Bid is subject to the preferential procurement policy framework act and its 2011 regulations, the general conditions of contract (NRF website) and special conditions of contract as stipulated in this invitation.
**ANY ENQUIRIES REGARDING THE BIDDING PROCEDURE DIRECTED TO:**

<table>
<thead>
<tr>
<th>Contact Person</th>
<th>Tel</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Donald Mokgohloa</td>
<td>012 339 2832</td>
<td><a href="mailto:donald@nzg.ac.za">donald@nzg.ac.za</a></td>
</tr>
<tr>
<td>Nthabeleng Ntelekoa</td>
<td>012 339 2746</td>
<td><a href="mailto:nthabeleng@nzg.ac.za">nthabeleng@nzg.ac.za</a></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NAME OF BIDDER</th>
</tr>
</thead>
<tbody>
<tr>
<td>REPRESENTED BY</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSTAL ADDRESS</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>PHYSICAL ADDRESS</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>TELEPHONE NUMBER</th>
<th>CODE</th>
<th>NUMBER</th>
</tr>
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<tbody>
<tr>
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</table>

<table>
<thead>
<tr>
<th>CELL PHONE NUMBER</th>
<th>CODE</th>
<th>NUMBER</th>
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<thead>
<tr>
<th>FACSIMILE NUMBER</th>
<th>CODE</th>
<th>NUMBER</th>
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<table>
<thead>
<tr>
<th>E-MAIL ADDRESS</th>
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<td></td>
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</table>

<table>
<thead>
<tr>
<th>VAT REGISTRATION NUMBER</th>
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</thead>
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<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>COMPANY REGISTRATION NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>
### DESCRIBE PRINCIPAL BUSINESS ACTIVITIES:

---

#### TYPE OF COMPANY/FIRM [Tick applicable box]

<table>
<thead>
<tr>
<th>Partnership/Joint Venture/Consortium</th>
<th>One person business/sole proprietor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Close Corporation</td>
<td>Company</td>
</tr>
<tr>
<td>(Pty) Limited</td>
<td>Other</td>
</tr>
</tbody>
</table>

#### COMPANY CLASSIFICATION [Tick applicable box]

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional Service Provider</td>
<td>Other service providers e.g. transporter, etc.</td>
</tr>
</tbody>
</table>

---

Has an original and valid tax clearance certificate been submitted? [Tick Applicable Box]

- [ ] Yes
- [ ] No

Has a Preference Claim form claiming your Preference Points (SBD6.1) been submitted?

- [ ] Yes
- [ ] No

(a B-BBEE status level verification certificate must support preference points claimed)

If Yes, who was the B-BBEE certificate issued by [Tick Applicable Box]

- [ ] An accounting officer as contemplated in the Close Corporation Act (CCA)
- [ ] A verification agency accredited by the South African Accreditation System (SANAS)
- [ ] A registered auditor

Are you the accredited representative in South Africa for the goods/services/works offered? If Yes, please enclose proof.

- [ ] Yes
- [ ] No

Is the Bid Pack split into “Technical” and “Awarding” sections?

- [ ] Yes
- [ ] No

Are certified copies of Certificate of Incorporation (as per entity type) enclosed?

- [ ] Yes
- [ ] No
1. **FORM OF CONTRACT**

JBCC Series 2000 Minor Works Agreement (August 2007 edition) prepared by the Joint Building Contracts Committee are applicable to this Contract. The JBCC Series 2000 Minor Works Agreement (August 2007 edition) make several references to the Contract Data for specific data, which together with these conditions collectively describe the risks, liabilities and obligations of the contracting parties and the procedures for the administration of the Contract. The Contract Data shall have precedence in the interpretation of any ambiguity or inconsistency between it and the JBCC Series 2000 Minor Works Agreement (August 2007 edition).

2. **SPECIAL CONDITIONS OF CONTRACT**

   2.1 Employer: National Zoological Gardens
   2.2 Agent: CA du Toit (Pty) Ltd
   2.3 The Works: Upgrade & Refurbishment of the Waterhole Complex at the National Zoological Gardens – Pretoria, including for: HVAC, Disabled lift, Electrical, Fire services, Audio Visual and associated building works.
   2.4 The Site: National Zoological Gardens – Pretoria
   2.5 Securities: The employer shall not be required to issue a payment guarantee, omit clauses 2.5, 2.6 and 5.1.1 of the agreement.
   2.6 Guarantees: All works and equipment provided by the contractor shall be guaranteed for a period of 365 days after commissioning.
   2.7 Handover of site: TBC
   2.8 Completion date: TBC
   2.9 Penalties: R2000.00 per day
PART T2:
RETURNABLE DOCUMENTS

T2.1: Requirements for Tendering

Name of Tenderer ........................................................................................................................................

Address of Tenderer ................................................................................................................................

..............................................................................................................................................................

..............................................................................................................................................................

..............................................................................................................................................................

Telephone Number .....................................................................................................................................

Fax Number .................................................................................................................................................

<table>
<thead>
<tr>
<th>Closing of Tenders</th>
<th>21 August 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Submission of tenders</td>
<td>Sealed tenders, including a copy of the priced provisional Bills of Quantities, endorsed with the relevant contract title shall be handed in at no 232 Boom Street, Pretoria 0001</td>
</tr>
<tr>
<td>It shall be a fixed price tender with no escalation of rates tendered</td>
<td></td>
</tr>
<tr>
<td>The bid document</td>
<td>Bid documents are to be downloaded from <a href="http://www.nrf.ac.za">www.nrf.ac.za</a> or <a href="http://www.nzg.ac.za">www.nzg.ac.za</a></td>
</tr>
<tr>
<td>Tenders Binding</td>
<td>Tenderers will hold their tenders valid for a period of One hundred and fifty (150) days</td>
</tr>
<tr>
<td>Surety</td>
<td>10% of Contract Value</td>
</tr>
<tr>
<td>Acceptance</td>
<td>The employer does not bind itself to accept the lowest or any tender and reserve the right to accept any such tender as he may deem expedient</td>
</tr>
<tr>
<td>Site Visit/ Compulsory briefing</td>
<td>12 August 2015</td>
</tr>
<tr>
<td>Contract</td>
<td>The Contractor shall enter into a contract with the Employer, National Zoological Gardens, for the</td>
</tr>
</tbody>
</table>
execution of this Contract in accordance with the Form of agreement and furnish a Surety in the form stated. JBCC Series 2000 Minor Works Agreement (August 2007 edition) prepared by the Joint Building Contracts Committee, shall be the agreement.

**Sufficiency of tender**
The tenderer shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of his tender for the works and the rates and prices he has stated in the Bill of Quantities which rates and prices shall cover his obligations under the contract and all matters and things necessary for the proper completion of the works.

**Verbal instructions**
Attention is drawn to the fact that the verbal information, given at any time prior to the Award of the Contract, will not be registered as binding on the Employer or the engineer and only information given formally in writing to the Contractor by the Engineer will be regarded as amending the contract documents.

**Data to be furnished**
The employer (or the engineer on his behalf) reserves the right to call upon the tenderer for further information and the tenderer shall furnish such additional within seven (7) days of being called upon to do so.

**Extend of Work**
Refer to Part C3: Scope of Works

**Contract period**
Not more than 6 months. The completion date is not negotiable and tenderers shall confirm acceptance of this to validate this tender
T2.2: Form of Tender, General Information & Qualifications

1. FORM OF TENDER

1.1. DESCRIPTION OF WORKS: Upgrade & Refurbishment of the Waterhole Complex at the National Zoological Gardens – Pretoria, including for: HVAC, Disabled lift, Electrical, Fire services, Audio Visual and associated building works.

TYPE OF TENDER: Bills of Quantities.

1.2. I (We), the undersigned, hereby tender and, should this tender be accepted, undertake to execute the whole of the works comprised and described and referred to in the annexed Form of Agreement, Conditions of Contract, Specifications and Bill of Quantities and to enter into the formal Agreement with National Zoological Gardens, embodying the said Conditions, Specification and Bill of Quantities, in consideration for the fixed price sum of

R……………………………………………………………………………………………………

(Non-Escalatable)

TOTAL SUM OF TENDER IN WORDS:

……………………………………………………………………………………………………

……………………………………………………………………………………………………

based on the unit rates incorporated by me/us in the said Bill of Quantities or such sum as may be ascertained in accordance with the abovementioned documents and in particular the said unit rates, and to complete such works within 6 months weeks of acceptance of tender.

NOTE: TENDER INVALID IF NOT SIGNED HERE

……………………………………………………………...

DATE SIGNATURE

ADDRESS …………………………………………………………………………………

………………………………………………………………………………
I (We) further undertake to lodge within one (1) week of notification from the Engineer of acceptance of this tender the prescribed bank guarantee/surety as security for the due fulfillment and completion of the Contract failing which National Zoological Gardens shall be entitled to cancel the Contract.

State, in cases where the Tenderer is a Company, Corporation or Firm, by what authority the person signing does so, whether by Articles of Association, Resolution, Power of Attorney, or otherwise, as follows:

I (We) the undersigned, am (are) authorized to enter into this Contract on behalf of

PROVE OF AUTHORIZATION MUST BE PROVIDED

By virtue of ................................. dated the ..............................

WITNESSES

1. ........................................... ...........................................

[PLEASE PRINT] SIGNATURE

2. ........................................... ...........................................

[PLEASE PRINT] SIGNATURE

(TO BE COMPLETED ONLY WHEN TENDER IS BY A COMPANY, CORPORATION OR FIRM).
1.3 I/WE further, to the discretion and to the satisfaction of the Engineer, undertake to supply one of the following types of surety to ensure proper execution of the Contract:

(a) A cash deposit (10,0% of the Contract value) ……………………….*YES or NO
*Delete which is not applicable

(b) A Bank guarantee (10,0% of the Contract value) ………………….*YES or NO
*Delete which is not applicable

Unless and until a formal agreement is prepared and executed, this Tender, together with the written acceptance thereof by yourselves or the Engineer acting on your behalf, shall constitute a binding contract between the Employer and ourselves, and shall be deemed for all purposes to be the Contract Agreement.

I/We understand that you are not bound to accept the lowest or any tender you may receive and that you will not defray any expenses incurred by us in tendering.

I/We undertake to supply, install, erect, complete, commission and deliver the complete installation. I/We agree to their being corrected, the Works as tendered for in the following delivery periods, accepting that such delivery periods will run from the date of acceptance of my/our tender, such a date being the date of the Engineer's letter informing me that my/our tender has been accepted.

1.4. I/We enclose herewith the following supporting or explanatory documents:

(i) Letters …........................................................................................................

(ii) Catalogues ......................................................................................................

(iii) Drawings ........................................................................................................

(iv) Other (specify) ............................................................................................
2. STATEMENT OF COMPLIANCE OR OF QUALIFICATIONS BY CONTRACTOR

This tender complies in every respect with the Conditions of Contract, Specification and Drawings **YES/NO**

If "NO", detail qualifications hereunder. Failure to detail qualifications shall signify compliance.

<table>
<thead>
<tr>
<th>Part No</th>
<th>Clause No</th>
<th>Qualification</th>
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</table>

SIGNATURE OF CONTRACTOR: ............................................
3. **SCHEDULE OF COMPANY DIRECTORS**

The Tenderer shall list all the names, addresses, race and % share of the directors of this company.

<table>
<thead>
<tr>
<th>Name and address of director</th>
<th>% Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
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<tr>
<td>2.</td>
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<td>3.</td>
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<td>4.</td>
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<td>5.</td>
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<td>6.</td>
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<tr>
<td>7.</td>
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</tbody>
</table>

**SIGNATURE OF CONTRACTOR:** .................................
4. SCHEDULE OF SUB-CONTRACTORS PROPOSED BY THE CONTRACTOR

The Contractor shall state in the Schedule below the names of all sub-contractors he wishes to employ in the Works and shall define their duties and outline their experience.

<table>
<thead>
<tr>
<th>Name of subcontractor</th>
<th>Proposed duties</th>
<th>Experience</th>
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<tbody>
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</table>

SIGNATURE OF CONTRACTOR: ...........................................
5. **SCHEDULE OF WORKS PREVIOUSLY CARRIED OUT**

The Contractor shall list details and value of similar work previously carried out successfully, below:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>R...........................</td>
</tr>
<tr>
<td>b)</td>
<td>R...........................</td>
</tr>
<tr>
<td>c)</td>
<td>R...........................</td>
</tr>
<tr>
<td>d)</td>
<td>R...........................</td>
</tr>
</tbody>
</table>

**SIGNATURE OF CONTRACTOR:** .................................
6. **FORM OF AGREEMENT**

**THIS AGREEMENT** made and entered into by and between

.................................................................................................................................

(hereinafter called the Contractor) represented herein by

.................................................................................................................................

duly authorised as shown on the Form Tender and National Zoological Gardens
(herinafter called the Employer) represented herein by

.................................................................................................................................

WHEREAS the Employer is desirous that certain Works should be constructed:

Upgrade & Refurbishment of the Waterhole Complex at the National Zoological Gardens – Pretoria, including for: HVAC, Disabled lift, Electrical, Fire services, Audio Visual and associated building works.

**NOW THIS AGREEMENT WITNESSETH** as follows:

1. In this Agreement words and expressions shall have the same meaning as are respectively assigned to them in the JBCC Contract.

2. The following documents shall be deemed to form and be read and construed as part of this Agreement, viz.:

   (a) The said Tender
   (c) The Specification
   (d) The priced Schedule of Quantities:
   (e) Annexures, Amendments, Appendices and Schedules to the above documents:
   (f) The Letters of Acceptance

3. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned the Contractor covenants with the Employer to construct complete and maintain the Works in conformity in all respects with the provisions of the Contract:

4. The Employer hereby covenants to pay to the Contractor in consideration of the construction completion and maintenance of the Works the Contract Price at the times and in the manner prescribed by the Contract.
SIGNED AT .......................................................... for and on behalf of the

EMPLOYER on this...................................... day of ...................... 20.............

AS WITNESSES:

1. ............................................. 2. .............................................
   EMPLOYER

1. ............................................. 2. .............................................
   CONTRACTOR

7. AUTHORITY TO SIGN DOCUMENTS / CONTRACTOR

I/We ...........................................................................................................

do ..............................................................................................................

hereby authorize ..........................................................................................

in his capacity as ..........................................................................................to
sign all documents appertaining to this Contract by Resolution of the Board of
Directors / Power of Attorney / Written Delegation of Authority.

..................................................
SECRETARY

..................................................

DATE

Page 17 of 34
**TECHNICAL EVALUATION CRITERIAS FOR THE WATERHOLE COMPLEX UPGRADE**

Total Technical Points Scored is the evaluations score per category multiplied by the weighting percentage for the category. Total Technical Score is the sum of the categories expressed as a percentage. Each evaluator's total score percentage is aggregated and divided by the number of evaluators to establish an overall percentage mark. The evaluation criteria are as follows:

<table>
<thead>
<tr>
<th>MANDATORY CRITERIA</th>
<th>YES (Available)</th>
<th>OR</th>
<th>NO (Unavailable)</th>
<th>Comments/Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide proof of CIDB registration:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Minimum Grading Required:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Level 3 GB OR Level 2GB PE</strong></td>
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<tr>
<td>Must have and provide a valid letter of Good Standing from Compensation commission.</td>
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<tr>
<td>*Proof of public liability insurance for not less than R 5milion rands (Letter of Intent from an insurance company will also be accepted).</td>
<td></td>
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</tr>
<tr>
<td>Proposed construction programme should not be longer than 6 months. Any duration longer than 6 months will be disqualified</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WEIGHTED CRITERIA</td>
<td>WEIGHT</td>
<td>SCORE</td>
<td>COMMENTS</td>
<td></td>
</tr>
<tr>
<td>----------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td><strong>Company Experience (min of 2 contracts):</strong></td>
<td>20</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Current and previous Contracts with positive reference &gt; 1000000 = 5 points.</td>
<td></td>
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</tr>
<tr>
<td>Current and previous contracts with positive reference &gt; 2000000 = 10 points.</td>
<td></td>
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</tr>
<tr>
<td><strong>Company Specialty - Proof of past projects experience on the following specialised disciplines (proposed subcontractors expertise will also be accepted):</strong></td>
<td>30</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>HVAC ≥ R500000.00 = 10 points</td>
<td></td>
<td></td>
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<tr>
<td>Electrical ≥ R500000.00 = 10 points</td>
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<tr>
<td>Lifts ≥ R300000.00 = 10 points</td>
<td></td>
<td></td>
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<tr>
<td><strong>Personnel Experience and Expertise (copies of qualifications and CV’s to be enclosed):</strong></td>
<td>20</td>
<td></td>
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</tr>
<tr>
<td>Director/Owner has National Diploma or degree in Building related field = 5 points.</td>
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</tr>
<tr>
<td>Project manager to be deployed to our site has acquired National Diploma/degree in Building related field = 5 points.</td>
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<tr>
<td>Project manager to have at least 5 years of construction experience = 10 points.</td>
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</tr>
<tr>
<td><strong>Construction Program with activities and timelines:</strong></td>
<td>20</td>
<td></td>
<td>Note: The shorter the duration, the more the resources to be deployed to site.</td>
<td></td>
</tr>
<tr>
<td>Programme ≤ 3 months = 20 points</td>
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<tr>
<td>Programme ≤ 4 months = 15 points</td>
<td></td>
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<tr>
<td>Programme ≤ 5 months = 10 points</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Programme ≤ 6 months = 5 points</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Safety Risk mitigation plan addressing all safety risks identified in the risk assessment.</strong></td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL POINTS ALLOCATED</strong></td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Threshold</strong></td>
<td>70</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Qualified for the Next stage of Evaluation</strong></td>
<td>YES/NO</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Evaluator’s Name:</strong></td>
<td>Date:</td>
<td>Signature:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1. Background to the National Research Foundation and its Business Units

The National Research Foundation (“NRF”) is a juristic person established in terms of Section 2 of the National Research Foundation Act, Act 23 of 1998 and a Schedule 3A Public Entity in terms of the Public Finance Management Act. The NRF is the government’s national agency responsible for promoting and supporting research and human capital development through funding, the provision of National Research Facilities and science outreach platforms and programs to the broader community in all fields of science and technology, including natural science, engineering, social science and humanities.

2. Scope/Summary of Supply

The scope of work can be summarized as follows:
- Upgrade of the facility to comply with fire regulations
- Refurbishment of facility, including repainting, installation of ceilings, and replacement of floor tiles, etc.
- Installation of air conditioning and ventilation
- Installation of a disabled lift
- Audio Visual systems
- Associated electrical installations
- Associated building works

3. DOCUMENTS REQUIRED

The service provider must submit the following documents:

Envelope 1 – Functional / Technical Proposal

Mandatory Documents which will result in an automatic disqualification if not submitted:

a) Provide proof of CIDB registration with the minimum grading requirement of Level 3 GB OR Level 2GB PE
b) A valid Letter of Good standing from the compensation commission
c) Proof of public liability insurance for not less than R 5mil (Letter of Intent from an insurance company is also acceptable)

The following printed documents must accompany the bid documents in Envelope 1 for technical evaluation:

a) An invitation to bid (SBD 1 form attached).
b) Provide a proposal as per the scope of work above and expected deliverable.
c) Supplier Profile, including currently procured services.
d) The names and contact details of a minimum of two contactable references.

e) Track record of delivery.

f) All terms, conditions and paperwork requiring legal review should be included in the response.

g) Business registration documents and ID copies of the members.


**Accreditation forms:**

i. An up to date and original tax clearance certificate issued by SARS (attached is explanation to obtain the tax certificate – SBD 2).

ii. Certified copies of certificates of incorporation (as per entity type - Pty, etc.)

iii. Declaration of interest (SBD 4 form attached).

iv. Preference claim form (SBD 6.1 form attached) supported by your B-BEE contribution level certificate. Refer to the SBD 6.1 form for further details.

v. Declaration of Bidder’s Past Supply Chain Management Practises (SBD 8 form attached).

vi. Competitive bidding declaration (SBD 9 form attached).

vii. Submission of the General Conditions of Contract (conditions attached).

**Envelope 2 – Tender Price**

The following printed documents must accompany the bid documents in envelope 2 for pricing evaluation:

a) A price schedule (SBD 3 forms attached). As the envisaged details will not fit on the form, attach detail schedules to the form.

b) The cost schedules must clearly stipulate costs by type and breakdown together with all the relevant assumptions and information as outlined in this bid invitation.

**Payment Intervals**

The NRF undertakes to pay validated invoices in full within thirty (30) days from the monthly statement date. The NRF does not accept predating of invoices.

4. **Tender Pricing / Costing**

Price must be fully inclusive of all costs; value added tax and other taxes.

Bid price must be in South African currency, foreign exchange risk is for the account of the bidder.
Price summary to be recorded on the Pricing Document bill of quantities (SBD 3 series attached) with reference to scope of works which provides all detail required for evaluation.

Companies may place a management fee and mark up on their quoted price; however the lowest acceptable bid (minimum acceptable amount) will score the highest points for price.

Bidders are required to include their overheads in their bid price, but these must be indicated and explained fully.

The NZG does not bind itself to accept the lowest bid or any other bid and reserves the right to accept the whole or part of the bid.

5. Selection and Awarding of Contract

This bid is evaluated through a two stage process.

**Functional Evaluation of Proposals Received**

This bid is evaluated on functional and on price for those bidders that qualified under the functional evaluation.

To enable a fair, transparent and unbiased process, this bid’s evaluation requires two envelopes per each proposal submitted:

Stage 1 - Technical/Quality/Functionality Proposal (Envelope 1 - Technical) including bid administrative requirements and accreditation of supplier requirements (as per the index provided.)

Stage 2 – Pricing evaluation followed by Preference scoring in accordance with the 2011 Preference Regulations (Envelope 2 - Price).

**Qualifying Thresholds for Functional Evaluation**

Bids scoring less than the minimum threshold of 70% are marked as failed and are not considered in the next stage of evaluation.

**Price Evaluation**

All bidders qualifying are evaluated in terms of price. All bids are evaluated on a fair comparable basis with the lowest priced bid being awarded the maximum price score. Comparable basis includes total cost of ownership over the equipment lifespans.

**Preference System**

In terms of the PPPFA Regulations 2011, preference points are added to the price ranking score obtained from the price evaluation. The preference system used is the 90 (price):10 (BEE Level) point system and 80 (price):20 (BEE Level) for bids above R1 million and below R1 million rands respectively. The allocation of preference points
is according to the PPPFA Regulations 2011 utilising the B-BBEE Transformation Levels as the award base.

**Presentation of Proposal**

If deemed necessary, short listed service providers may be requested to give a presentation of their bid proposal to the Evaluation Committee.

The Evaluation Committee reserves the right to request evidential documentation to support any or all of the technical criteria to enable it to evaluate the bidder’s competence and ability to deliver the scope of work in the Bid Invitation document.

Such presentations may include proof of concept including the testing of the service provider’s expertise and software utilising the NRF’s resources.

### 6. Pricing Schedule for the Duration of the Contract (Standard Bidding Document 3.1 and 3.3)

<table>
<thead>
<tr>
<th>NOTE</th>
<th>Only firm prices will be accepted. The price quoted is fully inclusive of all costs and taxes. No changes or extensions or additional ad hoc costs are accepted once the contract has been awarded.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Detailed information is optional and is provided as annexures to the details provided below.</td>
</tr>
<tr>
<td></td>
<td>Bid price in South African currency, foreign exchange risk is for the account of the Bidder.</td>
</tr>
<tr>
<td></td>
<td>Pricing is subject to the addition of Preference Points as stipulated in the section below - Standard Bidding Document 6.1 Preference claim form</td>
</tr>
</tbody>
</table>

**OFFER TO BE VALID FOR** 150 days FROM THE CLOSING DATE OF BID.

**BID PRICE IN RSA CURRENCY (ALL APPLICABLE TAXES INCLUDED)**

<table>
<thead>
<tr>
<th>ITEM NO</th>
<th>QUANTITY (unit of measure)</th>
<th>DESCRIPTION OF SUPPLIES</th>
<th>RATE/UNIT PRICE (per unit of measure)</th>
<th>BID/QUOTE PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>See the bill of quantities of Volume 2 of the document</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL INCLUSIVE OF VAT 14%**

<table>
<thead>
<tr>
<th>B-BBEE STATUS LEVEL OF CONTRIBUTION (Per SBD 6.1 below) Are detailed price schedules attached?</th>
<th>Level</th>
<th>Preference Points Claimed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
7. PREFERENCE POINTS CLAIM FORM (STANDARD BIDDING DOCUMENT 6.1)

POINTS AWARDED FOR B-BBEE STATUS LEVEL OF CONTRIBUTION

In terms of Regulation 5 (2) and 6 (2) of the Preferential Procurement Regulations, preference points must be awarded to a Bidder for attaining the B-BBEE status level of contribution in accordance with the table below:

<table>
<thead>
<tr>
<th>B-BBEE Status Level of Contributor</th>
<th>Number of points (90/10 system)</th>
<th>Number of points (80/20 system)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>9</td>
<td>18</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

B-BBEE STATUS LEVEL OF CONTRIBUTION CLAIMED IN TERMS OF THE ABOVE TABLE:

\[
\text{\underline{\text{Score}}} = \text{\underline{\text{Score}}} \quad \text{(maximum of 10 or 20 points)}
\]

(Points claimed must be in accordance with the table reflected above and must be substantiated by means of a B-BBEE certificate issued by a Verification Agency accredited by SANAS or a Registered Auditor approved by IRBA or an Accounting Officer as contemplated in the CCA).

SUB-CONTRACTING

Will any portion of the contract be sub-contracted? \hspace{1cm} Yes \hspace{1cm} No

If Yes, indicate:

(i) What percentage of the contract will be subcontracted? \hspace{2cm} %

(ii) The name of the sub-contractor?

Page 24 of 34
(iii) The B-BBEE status level of the sub-contractor?

(iv) Whether the sub-contractor is an EME? Yes □ No □

I/we, the undersigned, who is/are duly authorised to do so on behalf of the company/firm, certify that the points claimed, based on the B-BBEE status level of contribution of the foregoing certificate, qualifies the company/ firm for the preference(s) shown and I/we acknowledge that:

i. The information furnished is true and correct;

ii. The preference points claimed are in accordance with the General Conditions as indicated in Paragraph 1 of this form.

iii. In the event of a contract being awarded as a result of points claimed as shown above, the contractor may be required to furnish documentary proof to the satisfaction of the purchaser that the claims are correct;

iv. If the B-BBEE status level of contribution has been claimed or obtained on a fraudulent basis or any of the conditions of contract have not been fulfilled, the purchaser may, in addition to any other remedy it may have –
   a) Disqualify the Bidder from the bidding process;
   b) Recover costs, losses or damages it has incurred or suffered as a result of that Bidder’s conduct;
   c) Cancel the contract and claim any damages which it has suffered as a result of having to make less favourable arrangements due to such cancellation;
   d) Restrict the Bidder or contractor, its shareholders and directors, or only the shareholders and directors who acted on a fraudulent basis, from obtaining business from any organ of state for a period not exceeding ten (10) years, after the audi alteram partem (hear the other side) rule has been applied; and forward the matter for criminal prosecution;

v. A Bidder will not be awarded points for B-BBEE status level if it is indicated in the Bid documents that such a Bidder intends sub-contracting more than 25% of the value of the contract to any other enterprise that does not qualify for at least the points that such a Bidder qualifies for, unless the intended sub-contractor is an EME that has the capability and ability to execute the sub-contract.

vi. A Bidder awarded a contract may not sub-contract more than 25% of the value of the contract to any other enterprise that does not have an equal or higher B-BBEE status level than the Bidder concerned, unless the contract is sub-contracted to an EME that has the capability and ability to execute the sub-contract.
8. The NRF’s Conditions of Contract

a) BID RESPONSE PREPARATION COSTS

The NRF is **NOT** liable for any costs incurred by a bidder in the process of responding to this Bid, including on-site presentations and the proposal a service provider may make and/or submit.

b) CANCELLATION PRIOR TO AWARDING

The NRF has the right to withdraw and cancel the Bid.

c) LATE BIDS.

Bids submitted after the stipulated closing date (and time) are not considered.

d) COLLUSION, FRAUD AND CORRUPTION

Any effort by Bidder/s to influence Bid evaluation, Bid comparisons or Bid award decisions in any manner may result in the rejection of the Bid concerned.

e) CONFIDENTIALITY

The successful Bidder agrees to sign a general confidentiality agreement with the NRF.

f) VALIDITY PERIOD

The Bid has a validity period of 150 days from date of closure of the Bid.

g) VALIDATION OF SUBMITTED DOCUMENTATION

The NRF has the right to have any documentation submitted by the Bidders inspected by another technical body or organisation.

h) PRESENTATIONS AND PROOF OF CONCEPT

The NRF has the right to call interviews/presentations/pitching sessions as well as proof of concept sessions with short-listed service providers before the final selection is done.

i) INTELLECTUAL PROPERTY PROVIDED IN THE BID INVITATION

All the information contained in this document is intended solely for the purposes of assisting Bidders to prepare their Bids. Any use of the information contained herein for other purpose than those stated in this document is prohibited.

The ownership and intellectual property rights of all designs, specifications,
programming code and all other documentation provided by the NRF to the Bidder, both successful and unsuccessful, remain the property of the NRF.

j) INTELLECTUAL PROPERTY CONTAINED IN THE DELIVERABLES

The ownership and intellectual property rights of all designs, specifications, programming code and all other documentation required as part of the delivery to the NRF reside with the NRF.

9. SUPPLIER DUE DILIGENCE

DECLARATION OF INTEREST (STANDARD BIDDING DOCUMENT 4)

Any legal person, including persons employed by the State¹, or persons having a kinship with persons employed by the State, including a blood relationship, may make an offer or offers in terms of this invitation to Bid (includes an advertised competitive Bid, a limited Bid, a proposal or written price quotation). In view of possible allegations of favouritism, should the resulting Bid, or part thereof, be awarded to persons employed by the State, or to persons connected with or related to them, it is required that the Bidder or his/her authorised representative, declare his/her position in relation to the evaluating/adjudicating authority where:

- The Bidder is employed by the State; and/or
- The legal person on whose behalf the Bidding Document is signed, has a relationship with persons/s person who is/are involved in the evaluation and or adjudication of the Bid(s), or where it is known that such a relationship exists between the person or persons for or on whose behalf the declarant acts and persons who are involved with the evaluation and/or adjudication of the Bid.

In order to give effect to the above, the following questionnaire must be completed and submitted with this Bid.

Full Name of Bidder or his/her representative:

Identity Number:

Position occupied in the Company (director, trustee, shareholder², member):

Registration number of company, enterprise, close corporation, partnership agreement or trust:

Tax Reference Number:

VAT Registration Number:

The names of all directors/trustees/shareholders/members, their individual
identity numbers, tax reference numbers and, if applicable, employee/PERSAL numbers must be indicated in a separate schedule including the following questions:

Schedule attached with the above details for all directors/members/shareholders

Are you or any person connected with the Bidder presently employed by the state? If so, furnish the following particulars in an attached schedule:

Yes ☐ No ☐

Name of person/director/trustee/shareholder/member:

Yes ☐ No ☐

Name of state institution at which you or the person connected to the Bidder is employed

Yes ☐ No ☐

Position occupied in the state institution

Yes ☐ No ☐

Any other particulars:

Yes ☐ No ☐

If you are presently employed by the State, did you obtain the appropriate authority to undertake remunerative work outside employment in the public sector? If Yes, did you attach proof of such authority to the Bid document? If No, furnish reasons for non-submission of such proof as an attached schedule

Yes ☐ No ☐

(Note: Failure to submit proof of such authority, where applicable, may result in the disqualification of the Bid.)

Did you or your spouse or any of the company's directors/trustees/shareholders/members or their spouses conduct business with the State in the previous twelve months? If so, furnish particulars as an attached schedule:

Yes ☐ No ☐

Do you, or any person connected with the Bidder, have any relationship (family, friend, other) with a person employed by the State and who may be involved with the evaluation and/or adjudication of this Bid? If so, furnish particulars as an attached schedule:

Yes ☐ No ☐

Are you, or any person connected with the Bidder, aware of any relationship (family, friend, other) between any other Bidder and any person employed by the State who may be involved with the evaluation and/or adjudication of this Bid? If so, furnish particulars as an attached schedule:

Yes ☐ No ☐
Do you or any of the directors/ trustees/ shareholders/ members of the company have any interest in any other related companies whether or not they are bidding for this contract? If so, furnish particulars as an attached schedule:  

Yes □ No □

DEALERATION OF BIDDER’S PAST SUPPLY CHAIN MANAGEMENT PRACTICES
(STANDARD BIDDING DOCUMENT 8)

<table>
<thead>
<tr>
<th>Item</th>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Is the Bidder or any of its directors listed on the National Treasury’s Database of Restricted Suppliers as companies or persons prohibited from doing business with the public sector? If Yes, furnish particulars as an attached schedule:</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>The Database of Restricted Suppliers and Register for Tender Defaulters resides on the National Treasury’s website (<a href="http://www.treasury.gov.za">www.treasury.gov.za</a>) and can be accessed by clicking on its link at the bottom of the home page.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Is the Bidder or any of its directors listed on the Register for Tender Defaulters in terms of Section 29 of the Prevention and Combating of Corrupt Activities Act (No 12 of 2004)? If Yes, furnish particulars as an attached schedule:</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Was the Bidder or any of its directors convicted by a court of law (including a court outside of the Republic of South Africa) for fraud or corruption during the past five years? If Yes, furnish particulars as an attached schedule:</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Was any contract between the Bidder and any organ of state terminated during the past five years on account of failure to perform on or comply with the contract? If Yes, furnish particulars as an attached schedule:</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

CERTIFICATE OF INDEPENDENT BID DETERMINATION (STANDARD BIDDING DOCUMENT 9)

I, the undersigned, in submitting this Bid in response to the invitation for the Bid made by the NATIONAL RESEARCH FOUNDATION, do hereby make the following statements that I certify to be true and complete in every respect:

I have read and I understand the contents of this Certificate;
I understand that the Bid will be disqualified if this Certificate is found not to be true and complete in every respect;

I am authorised by the Bidder to sign this Certificate, and to submit the Bid, on behalf of the Bidder;

Each person whose signature appears on the Bid has been authorised by the Bidder to determine the terms of, and to sign, the Bid on behalf of the Bidder;

For the purposes of this Certificate and the accompanying Bid, I understand that the word “competitor” shall include any individual or organisation, other than the Bidder, whether or not affiliated with the Bidder, who:

a) Has been requested to submit a Bid in response to this Bid invitation;

b) Could potentially submit a Bid in response to this Bid invitation, based on their qualifications, abilities or experience; and

c) Provides the same goods and services as the Bidder and/or is in the same line of business as the Bidder

The Bidder has arrived at the accompanying Bid independently from, and without consultation, communication, agreement or arrangement with any competitor. However communication between partners in a joint venture or consortium will not be construed as collusive bidding.

In particular, without limiting the generality of paragraphs above, there has been no consultation, communication, agreement or arrangement with any competitor regarding:

a) Prices;

b) Geographical area where product or service will be rendered (market allocation);

c) Methods, factors or formulas used to calculate prices;

d) The intention or decision to submit or not to submit, a Bid;

e) The submission of a Bid which does not meet the specifications and conditions of the Bid; or

f) Bidding with the intention not to win the Bid.

In addition, there have been no consultations, communications, agreements or arrangements with any competitor regarding the quality, quantity, specifications and conditions or delivery particulars of the products or services to which this Bid invitation relates.

The terms of this Bid have not been, and will not be, disclosed by the Bidder, directly or indirectly, to any competitor, prior to the date and time of the official Bid opening or of the awarding of the contract.

I am aware that, in addition and without prejudice to any other remedy provided to combat any...
restrictive practices related to Bids and contracts, Bids that are suspicious will be reported to the Competition Commission for investigation and possible imposition of administrative penalties in terms of Section 59 of the Competition Act No 89 of 1998 and or may be reported to the National Prosecuting Authority (NPA) for criminal investigation and or may be restricted from conducting business with the public sector for a period not exceeding ten (10) years in terms of the Prevention and Combating of Corrupt Activities Act No 12 of 2004 or any other applicable legislation

³ Joint venture or Consortium means an association of persons for the purpose of combining their expertise, property, capital, efforts, skill and knowledge in an activity for the execution of a contract.

10. CONTRACT FORM - PURCHASE OF GOODS/WORKS/SERVICES
   (STANDARD BIDDING DOCUMENT 7)

11. PART 1 – WRITTEN OFFER (To Be Filled In By the Bidder)

I hereby undertake to supply all or any of the goods and/or works described in the attached bidding documents to the NATIONAL RESEARCH FOUNDATION in accordance with the requirements and specifications stipulated in this Bid document at the price/s quoted. My offer/s remains binding upon me and open for acceptance by the purchaser during the validity period indicated and calculated from the closing time of Bid.

The following documents shall be deemed to form and be read and construed as part of this agreement even where integrated in this document:

| Invitation to Bid (SBD1) | Technical Specification(s); |
| Bidder’s responses to technical specifications, capability requirements and capacity as attached to this document |
| Pricing Schedule(s) (SBD3); | Tax Clearance Certificate |
| Preference claims for Broad Based Black Economic Empowerment Status Level of Contribution in terms of the Preferential Procurement Regulations 2011 (SBD6.1); |
| Declaration of Interest (SBD4); | Declaration of Bidder’s past SCM practices (SBD8); |
| Certificate of Independent Bid Determination (SBD9) | General Conditions of Contract |

I confirm that I have satisfied myself as to the correctness and validity of my Bid; that the price(s) and rate(s) quoted cover all the goods and/or works specified in the bidding documents; that the price(s) and rate(s) cover all my obligations and I accept that any mistakes regarding price(s) and rate(s) and calculations will be at my own risk.
I accept full responsibility for the proper execution and fulfilment of all obligations and conditions devolving on me under this agreement as the principal liable for the due fulfilment of this contract.

I declare that I have had no participation in any collusive practices with any Bidder or any other person regarding this or any other Bid.

I certify that the information furnished in these declarations (SBD4, SBD6.1, SBD 6.2 where applicable, SBD8, SBD9) is correct and I accept that the state including the NRF may reject the Bid or act against me should these declarations prove to be false.

I confirm that I am duly authorised to sign this contract.

<table>
<thead>
<tr>
<th>NAME (PRINT)</th>
<th>WITNESSES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>CAPACITY</td>
<td>2</td>
</tr>
<tr>
<td>SIGNATURE</td>
<td></td>
</tr>
<tr>
<td>NAME OF FIRM</td>
<td>Date</td>
</tr>
<tr>
<td>DATE</td>
<td></td>
</tr>
</tbody>
</table>

12. PART 2 – ACCEPTANCE OF WRITTEN OFFER

The National Research Foundation acceptance of this written offer is authorised by a duly delegated official of the NRF and is communicated through either a written Letter of Award or, dependent on the complexity, a written purchase order and such proof of authority is available upon request.
C1.2: Occupation Health & Safety Agreement

C6 HEALTH AND SAFETY SPECIFICATIONS

The SHE Plan (File) should contain the following:

- The contractor SHE policy statement
- Notification and Appointments;
  - Notify the Provincial Director (Dept. of Labour)
  - Construction supervisor (full-time)
  - Assistant construction supervisor
  - Construction Safety Officer (part-time or full time)
  - Competent First Aider
  - Excavation Work Supervisor (if applicable)
  - Scaffolding supervisor (if applicable)
  - Formwork Operations Supervisor (if applicable)
  - Demolition Work Supervisor (if applicable)
  - Plant Operators (if applicable)
  - Letter of good standing with the Compensation Commissioner (Compulsory)

- Documentation:
  - The above should be presented in writing with qualifications where possible
  - Register of persons completing safety induction
  - Safety induction training
  - Copies of completed and signed site regulations
  - Register of safety training talks
  - Register of skill training provided
  - Copies of certificates issued for skills training

- Training and Induction:
  Only suitably trained and competent persons may be employed on construction works
The Principal Contractor must provide written proof of general safety induction training and task specific training

- **Personal Protective Equipment (Safety Equipment)**
  - All employees, visitors or officials should be issued with appropriate PPE’s
  - All equipment’s on site should be of good quality
  - PPE and equipment registers should be kept

- **Public and Environmental Issues**
  - Principal Contractor to develop and implement measures to safeguard the public and environment from hazards that may arise as a result of the construction work.
  - Emergency plan
  - Environmental Impact Assessment for construction
  - Environmental Management Plan for construction

- **Risk Assessment:**
  - Site Risk Assessment should be conducted prior to any construction work
  - Copies of Risk Assessment

- **Incidents and Accidents:**
  - Register of incidents and injuries
  - Copies of incident investigation reports
  - Copies of the persons reporting injuries to Comp. Comm

Prior to commencement of any construction work, the contractor must attend a safety induction. An appointment should be made through this office.

**Contact person:**
Alex Ntuli: Occupational Health and Safety Practitioner: NZG
012 339 2849
NATIONAL RESEARCH FOUNDATION/
NATIONAL ZOOLOGICAL GARDENS OF SOUTH AFRICA
UPGRADES AND REFURBISHMENT OF THE WATERHOLE
COMPLEX

Bid NO: NRFNZG-001-2015/16

TENDER DOCUMENT - VOLUME 2- PRICING

TENDERER ………………………………………………………………………………………………………

AMOUNT TENDERED ………………………………………………………………………………………

AMOUNT IN WORDS……………………………………………………………………………………

CIDB GRADING…………………………………………………………………………………………

BID CLOSING : 21 August 2015

<table>
<thead>
<tr>
<th>Issued by</th>
<th>Prepared by</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Research Foundation/ National Zoological Gardens of SA P O BOX 754 Pretoria 0001 Tel: 012 328 3265 Fax 012 323 4549 Email: <a href="mailto:info@nzg.ac.za">info@nzg.ac.za</a></td>
<td>CA duToit Consulting Engineers 1st Floor, Brooklyn Place, 266 Dey Street, Nieuw Muckleneuk, Pretoria 0181 PO Box 2145, Brooklyn Square 0075 Tel: 012 460 3450; 012 460 3451 Fax: 012 460 4544</td>
</tr>
</tbody>
</table>

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   C3.2: Technical Specification – Building Works  Page 29
   C3.3: Technical Specification – HVAC  Page 32
   C3.4: Technical Specification – Disabled Lift  Page 57
   C3.5: Technical Specification – Electrical  Page 90
PART C2:

PRICING DATA

Part C2.1

Bill of Quantities

1. **PREAMBLES TO THE BILL OF QUANTITIES**

   Preambles to the Bill of Quantities is included to assist the contractor in pricing the various items within the Bills notwithstanding the content of the bills of contractors’ attention is referred to the other contract document viz, the Form of Tender, the Conditions of Contract and the Specifications which are to be read in conjunction with the Bills.

2. **PRICES**

   A price must be entered against each item in the bill. Items against which has not been entered shall be considered as being covered by other itemized items as listed by the tenderer in the bill.

   The prices in the bill of quantities shall fully reflect the contractor’s proposed method of working as separately identified in detail elsewhere in its’ tender submission. 

   **NOTE; ALL PRICES INSERTED SHALL BE EXCLUSIVE OF VAT.** The VAT amount shall be included by the tenderer as a single sum where indicated on the form of tender. All prices, however, include for all other duties, taxes and all other obligations arising from the conditions of tender.

   The prices inserted in the bill of quantities shall be the full inclusive value of the work as described under the items, including all costs and expenses which may be required in an for the speedy, efficient and safe execution of the work described together with all general risks, liabilities and obligations set forth or implied in these documents on which the tender submission is based.

   The prices are deemed to include (unless otherwise specifically stated in the bill of quantities or herein) but shall be not limited to the following:

   - Materials and consumables, including waste, necessary for the completion of the work.
   - Receiving, checking and inspecting for defects before incorporation into the works.
- Storing and protecting against deterioration, contamination, loss or damage, including the provision for any necessary pallets, racks, waterproof sheeting, etc.
- Transportation from the point of delivery, placing in position, fixing, assembly of components, adjustment, lubrication and the like, all in accordance with the works standards.
- Provision and use of contractors’ and/or supplied equipment.
- Overhead charges and profit.
- Overtime working necessary to complete the works in accordance with the completion date.
- Payments to labour in respect of time worked and all other payments and costs relating to labour of any denomination.
- Stoppage for inspection purposes by the engineer or other authorized company personnel.
- Protecting all services.
- Extension of all temporary services of every kind as required to facilitate the progress of the works.
- Transportation, erection and subsequent removal of all temporary supports, working platforms, hard standings, scaffolding and associated works necessary for the safe execution of the works.
- Removal and disposal of contractors’ plant and equipment off site.
- Maintenance of all temporary equipment used and/or installed by the contractor.
- Testing and completion in accordance with the specification.

3. BILL OF QUANTITIES

Included herein is a bill of quantities which the tender must complete and which will be used for any additional work to be performed. **THE CLIENT RESERVES THE RIGHT TO OMIT OR ADD ANY ITEM AS PRICED FOR IN THIS BILL OF QUANTITIES**
## NZG: Waterhole Complex Refurbishment

### Bill No 1: Preliminary & General

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Unit</th>
<th>Qty</th>
<th>Tariff R</th>
<th>Amount</th>
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<tr>
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<td>Plant, equipment and tools</td>
<td>item</td>
<td></td>
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<tr>
<td>1.2</td>
<td>Scaffolding / ladders for normal heights</td>
<td>item</td>
<td></td>
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<tr>
<td>1.3</td>
<td>Scaffolding at high level</td>
<td>item</td>
<td></td>
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<tr>
<td>1.4</td>
<td>Sheds, stores and offices</td>
<td>item</td>
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<tr>
<td>1.5</td>
<td>Transport, etc.</td>
<td>item</td>
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<tr>
<td>1.6</td>
<td>Operating and maintenance manuals</td>
<td>item</td>
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<td>1.7</td>
<td>Issue of shop drawings / samples</td>
<td>item</td>
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<td>1.8</td>
<td>Regular cleaning and clearing of rubbish</td>
<td>item</td>
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<td>1.9</td>
<td>Others [please specify]</td>
<td>item</td>
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<td>Scaffolding / ladders for normal heights</td>
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<tr>
<td>2.3</td>
<td>Scaffolding at high level</td>
<td>item</td>
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<tr>
<td>2.4</td>
<td>Sheds, stores and offices</td>
<td>item</td>
<td></td>
<td></td>
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<tr>
<td>2.5</td>
<td>Site supervision and management</td>
<td>item</td>
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<tr>
<td>2.6</td>
<td>Programming of the works and attending regular site meetings</td>
<td>item</td>
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<tr>
<td>2.7</td>
<td>General site security</td>
<td>item</td>
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<tr>
<td>2.8</td>
<td>Company overhead costs</td>
<td>item</td>
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<td>2.9</td>
<td>Others [please specify]</td>
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<td>Scaffolding / ladders for normal heights</td>
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<td>3.3</td>
<td>Scaffolding at high level</td>
<td>item</td>
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<td>3.4</td>
<td>Sheds, stores and offices</td>
<td>item</td>
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<tr>
<td>3.5</td>
<td>Site supervision and management</td>
<td>item</td>
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<td>Programming of the works and attending regular site meetings</td>
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<td>3.7</td>
<td>General site security</td>
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<td>Company overhead costs</td>
<td>item</td>
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<tr>
<td>3.9</td>
<td>Others [please specify]</td>
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Amount Carried forward to summary : Bill No 1
NZG: Waterhole Complex Refurbishment

# Bill No 2: Building Works

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<tr>
<th>Item</th>
<th>Description</th>
<th>Unit</th>
<th>Qty</th>
<th>Tariff R</th>
<th>Amount</th>
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<tbody>
<tr>
<td>1.</td>
<td>Refurbishment of ablution areas</td>
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<tr>
<td>1.1</td>
<td>Ground Floor - Male &amp; Female</td>
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<tr>
<td>1.2</td>
<td>First Floor - Male &amp; Female</td>
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<td>Provisional Amount</td>
<td>7 300.00</td>
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<td>1.3</td>
<td>First Floor - Living quarters</td>
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<td></td>
<td>Provisional Amount</td>
<td>13 600.00</td>
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<td>2.</td>
<td>Removal of existing doors &amp; windows</td>
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<tr>
<td>2.1</td>
<td>Timber door &lt; 2.5m²</td>
<td>no</td>
<td>5</td>
<td></td>
<td></td>
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<tr>
<td>2.2</td>
<td>Window &lt; 1.5m x 2.m, and prepare for installation of sliding door &amp; gate</td>
<td>no</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Breaking open of existing walls</td>
<td></td>
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<tr>
<td>3.1</td>
<td>Break open of double brick walls and removal of material from site</td>
<td>m²</td>
<td>14</td>
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<td>3.2</td>
<td>Making neat of above to sizes shown on drawings</td>
<td>item</td>
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<td>4.</td>
<td>Brick up openings at double brick walls</td>
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<tr>
<td>4.1</td>
<td>813 x 2033 - 2 Hour fire rated</td>
<td>m²</td>
<td>16</td>
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<tr>
<td>5.</td>
<td>Doors &amp; Ironmongery</td>
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<tr>
<td></td>
<td>Supply &amp; Install new fire rated doors, complete with frame, hinges, etc.</td>
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Amount Carried forward to next page
### Amount brought forward

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<tbody>
<tr>
<td>5.1</td>
<td>813 x 2033 - 2 Hour fire rated</td>
<td>no</td>
<td>8</td>
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<tr>
<td></td>
<td>Supply &amp; Install new fire escape doors complete with frame, hinges, etc.</td>
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<td></td>
</tr>
<tr>
<td>5.2</td>
<td>813 x 2033 - Solid Timber</td>
<td>no</td>
<td>4</td>
</tr>
<tr>
<td>5.3</td>
<td>Solid double doors</td>
<td></td>
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<td>Provisional Amount</td>
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<td>16 000.00</td>
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<tr>
<td>5.4</td>
<td>Reverse door direction</td>
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<td>6</td>
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<tr>
<td>5.5</td>
<td>Ironmongery</td>
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<tr>
<td></td>
<td>Provisional Amount</td>
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<td>38 000.00</td>
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</tbody>
</table>

### 6. Ceilings & Bulkheads

Suspended Ceiling below concrete slab -
250 - 1000mm below slab 4mm - 595 x 595mm
Embossed White Vinyl Ceiling boards complete with hangers, aluminium frames, shadow line, etc.

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>6.1</td>
<td>Conference room 1</td>
<td>m²</td>
<td>61</td>
</tr>
<tr>
<td>6.2</td>
<td>Conference room 2</td>
<td>m²</td>
<td>72</td>
</tr>
<tr>
<td>6.3</td>
<td>Conference room 3</td>
<td>m²</td>
<td>57</td>
</tr>
<tr>
<td>6.4</td>
<td>Meeting room 1</td>
<td>m²</td>
<td>15</td>
</tr>
<tr>
<td>6.5</td>
<td>Meeting room 2</td>
<td>m²</td>
<td>18</td>
</tr>
<tr>
<td>6.6</td>
<td>Meeting room 3</td>
<td>m²</td>
<td>18</td>
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<tr>
<td>6.7</td>
<td>Passage</td>
<td>m²</td>
<td>56</td>
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<td>6.8</td>
<td>Ablution</td>
<td>m²</td>
<td>60</td>
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Plaster board bulkheads

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<td>6.9</td>
<td>Plaster board bulkheads</td>
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<tr>
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<td>Provisional Amount</td>
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<td>11 000.00</td>
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### 7. Floor Tiling

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<tbody>
<tr>
<td>7.1</td>
<td>Remove existing floor tiles and take away from site</td>
<td>m²</td>
<td>125</td>
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<td>Amount brought forward</td>
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<td>---</td>
<td>----------------------------------------------------------------------------------------</td>
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<td></td>
</tr>
<tr>
<td>7.2</td>
<td>400 x 400 x 9mm floor tiles (to be selected with contractor on site)</td>
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<td></td>
<td>Supply - Provisional Amount</td>
<td>m²</td>
<td>215</td>
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<td>7.3</td>
<td>Install with class II mortar with 5 - 10mm joints with two coats tile sealant - on screed floor</td>
<td>m²</td>
<td>215</td>
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<td>8.</td>
<td>Plastering</td>
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<tr>
<td>8.1</td>
<td>Internal plaster on brickwork</td>
<td>m²</td>
<td>185</td>
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<td>9.</td>
<td>Paintwork</td>
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<td>9.1</td>
<td>One coat primer &amp; 2 coats PVA emulsion paint on previously painted surfaces - internal</td>
<td>m²</td>
<td>845</td>
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<td>9.2</td>
<td>One coat primer &amp; 2 coats PVA emulsion paint on previously painted surfaces - external</td>
<td>m²</td>
<td>560</td>
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<td>Pit for lift</td>
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<td>8000.00</td>
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<td>Closing of eaves at thatch roof</td>
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<td>12.</td>
<td>Glazing</td>
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<tr>
<td></td>
<td>Replace existing windows with Georgian Wire type - 60 minute fire rating</td>
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<td></td>
<td>Replace glass pane, including for all consumables</td>
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<td>12.1</td>
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<td>12.2</td>
<td>900 x900mm</td>
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<td>13.</td>
<td>Weather treatment of timber surfaces</td>
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**Amount Carried forward to next page**
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<tbody>
<tr>
<td><strong>15. Fire fighting upgrade</strong></td>
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<tr>
<td>15.1 30M fire hose reel complete with 2x 4.5kg DCP fire extinguishers</td>
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<tr>
<td>Fire extinguishers, including wooden back Plate</td>
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<tr>
<td>15.2 4.5kg DCP fire extinguisher</td>
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<tr>
<td>15.3 5.0kg CO₂ fire extinguisher</td>
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<tr>
<td>15.4 Fire water piping</td>
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<td>15.5 Fire Signage</td>
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<td>15.6 Door hold open</td>
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<td>15.7 Testing &amp; Commissioning</td>
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Amount Carried forward to summary : Bill No 2
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<td>[including refrigerant piping, condensate drain, electrical work]</td>
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<td>C01 - 5.6 Kw</td>
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<td>Without miniature condensate pump</td>
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<td>Without miniature condensate pump</td>
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<td>Without miniature condensate pump</td>
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<td>C06 - 5.6 kW</td>
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<td>Without miniature condensate pump</td>
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<tr>
<td>1.7</td>
<td>W01 - 3.6 kW</td>
<td>Supply &amp; Deliver</td>
<td>no 1</td>
<td></td>
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</tr>
<tr>
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<td>Including for miniature condensate pump</td>
<td>Install &amp; Commission</td>
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<tr>
<td>1.8</td>
<td>W02 - 3.6 kW</td>
<td>Supply &amp; Deliver</td>
<td>no 1</td>
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<tr>
<td></td>
<td>Including for miniature condensate pump</td>
<td>Install &amp; Commission</td>
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<td>1.9</td>
<td>W03 - 3.6 kW</td>
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<td>no 1</td>
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<td>Including for miniature condensate pump</td>
<td>Install &amp; Commission</td>
<td>no 1</td>
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Amount Carried forward to next page
<table>
<thead>
<tr>
<th>Amount brought forward</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Ablution Extraction Systems [including all builders work]</td>
</tr>
<tr>
<td>2.1 Extraction Fans EF01 - EF09: 25 l/s</td>
</tr>
<tr>
<td>Supply &amp; Deliver no 9</td>
</tr>
<tr>
<td>Install &amp; Commission no 9</td>
</tr>
<tr>
<td>2.2 Door Grilles DG01 - DG09: 400W x 350H</td>
</tr>
<tr>
<td>Supply &amp; Deliver no 9</td>
</tr>
<tr>
<td>Install &amp; Commission no 9</td>
</tr>
<tr>
<td>2.3 Ground Floor Ablution ventilation Provisional Amount 15 000.00</td>
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</table>

<table>
<thead>
<tr>
<th>3. Miscellaneous</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1 Drawings item</td>
</tr>
<tr>
<td>3.2 Manuals item</td>
</tr>
<tr>
<td>3.3 Training item</td>
</tr>
<tr>
<td>3.4 12 Months Maintenance item</td>
</tr>
<tr>
<td>3.5 Other (Please list)</td>
</tr>
<tr>
<td>..........................................................</td>
</tr>
<tr>
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</tr>
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Amount Carried forward to summary : Bill No 3
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<th>Tariff R</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Disabled lift - complete as specified</td>
<td>Supply &amp; Deliver</td>
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<td></td>
<td></td>
</tr>
<tr>
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<td></td>
<td>Install &amp; Commission</td>
<td>no 1</td>
<td></td>
<td></td>
</tr>
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<td>2.</td>
<td>Aluminium Shaft for Lift</td>
<td>Supply &amp; Deliver</td>
<td>no 1</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Install &amp; Commission</td>
<td>no 1</td>
<td></td>
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<tr>
<td>3.</td>
<td>Department of Labour applications and approvals</td>
<td>item</td>
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<tr>
<td>4.</td>
<td>Miscellaneous</td>
<td>item</td>
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<td>4.1</td>
<td>Drawings</td>
<td>item</td>
<td></td>
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<td>4.2</td>
<td>Manuals</td>
<td>item</td>
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<td>Training</td>
<td>item</td>
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<td>12 Months Maintenance</td>
<td>item</td>
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<td>4.5</td>
<td>Other (Please list)</td>
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Amount Carried forward to summary : Bill No 4
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<th>Unit</th>
<th>Qty</th>
<th>Tariff R</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Supply and installation of copper PVC/SWA/PVC cables</td>
<td>Supply</td>
<td>Install</td>
<td>m</td>
<td>m</td>
</tr>
<tr>
<td></td>
<td>Lain in ducts, trenches, horizontal racks or vertical ducts. Rates shall include the supply and fixing of supports with regard to installation of cables. Rates shall include the PVC cable ties as required.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1</td>
<td>25mm² x 4 core</td>
<td>Supply</td>
<td>Install</td>
<td>m</td>
<td>m</td>
</tr>
<tr>
<td>1.2</td>
<td>16 mm² BCEW</td>
<td>Supply</td>
<td>Install</td>
<td>m</td>
<td>m</td>
</tr>
<tr>
<td>2.</td>
<td>Supply and installation of the following earth wire lain in ducts, trenches, horizontal racks. The rate for installation shall include the supply and installation of strapping with PVC cable ties where applicable and terminations.</td>
<td>Supply</td>
<td>Install</td>
<td>m</td>
<td>m</td>
</tr>
<tr>
<td>2.1</td>
<td>16 mm² BCEW</td>
<td>Supply</td>
<td>Install</td>
<td>m</td>
<td>m</td>
</tr>
<tr>
<td>3.</td>
<td>Termination of cable ends. The rate shall include all labour and material for making off of one cable end, complete with gland, lugs and connecting the conductors and shall be for PVC insulated, armoured cables with copper</td>
<td>Supply</td>
<td>Install</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>3.1</td>
<td>25mm² x 4 core</td>
<td>Supply</td>
<td>Install</td>
<td>no</td>
<td>no</td>
</tr>
</tbody>
</table>

Amount Carried forward to next page
4. **DISTRIBUTION BOARDS**

Supply and install distribution boards, complete with doors where applicable, frames, subframes, chassis, fixtures, fittings, spare space, busbar etc. as per specification and drawings.

4.1 DB-AC-G (Dwg: J8307E01/S)

<table>
<thead>
<tr>
<th></th>
<th>Supply</th>
<th>Install</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>no 1</td>
<td>no 1</td>
</tr>
</tbody>
</table>

Supply and install new switchgear to existing distribution panels as follows:

4.3 15A; 20A - 5 kA MCB - Din Rail

<table>
<thead>
<tr>
<th></th>
<th>Supply</th>
<th>Install</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>no 21</td>
<td>no 21</td>
</tr>
</tbody>
</table>

4.4 80A - 5 kA MCB - Din Rail

<table>
<thead>
<tr>
<th></th>
<th>Supply</th>
<th>Install</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>no 2</td>
<td>no 2</td>
</tr>
<tr>
<td>Amount brought forward</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. Supply and installation of conduit as specified for lighting, power and auxiliary outlets, including couplings, bushes, locknuts, bending, draw boxes and fixing, etc. In accordance with non-metallic conduit and accessories as per SABS 950

Fixed to surface of brickwork, concrete or in roof space

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Supply</th>
<th>Install</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 mm</td>
<td>m 150</td>
<td>m 150</td>
</tr>
<tr>
<td>25 mm</td>
<td>m 150</td>
<td>m 150</td>
</tr>
</tbody>
</table>

Chased into brickwork or concrete

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Supply</th>
<th>Install</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 mm</td>
<td>m 260</td>
<td>m 260</td>
</tr>
<tr>
<td>25 mm</td>
<td>m 25</td>
<td>m 25</td>
</tr>
</tbody>
</table>

6. Pressed galvanised steel boxes

6.1 100 x 100 x 50 mm deep in roof space or on surface

<table>
<thead>
<tr>
<th>Supply</th>
<th>Install</th>
</tr>
</thead>
<tbody>
<tr>
<td>no 10</td>
<td>no 10</td>
</tr>
</tbody>
</table>

6.2 100 x 100 x 50 mm deep chased into brick or concrete

<table>
<thead>
<tr>
<th>Supply</th>
<th>Install</th>
</tr>
</thead>
<tbody>
<tr>
<td>no 15</td>
<td>no 15</td>
</tr>
</tbody>
</table>

6.3 50 x 100 x 50 mm deep in roof space or on surface

<table>
<thead>
<tr>
<th>Supply</th>
<th>Install</th>
</tr>
</thead>
<tbody>
<tr>
<td>no 5</td>
<td>no 5</td>
</tr>
</tbody>
</table>

6.4 50 x 100 x 50 mm deep chased into brick or concrete

<table>
<thead>
<tr>
<th>Supply</th>
<th>Install</th>
</tr>
</thead>
<tbody>
<tr>
<td>no 15</td>
<td>no 15</td>
</tr>
<tr>
<td>Amount brought forward</td>
<td></td>
</tr>
<tr>
<td>------------------------</td>
<td></td>
</tr>
</tbody>
</table>

7. **PVC conductors**  
Supply and drawn in of copper PVC insulated conductors in conduit or trunking system in floor or roof space for lights, plugs and power points, including connection to switches and equipment  
7.1 2,5 mm²  
<table>
<thead>
<tr>
<th>Supply</th>
<th>Install</th>
</tr>
</thead>
<tbody>
<tr>
<td>m 1650</td>
<td>m 1650</td>
</tr>
</tbody>
</table>

7.2 4 mm²  
<table>
<thead>
<tr>
<th>Supply</th>
<th>Install</th>
</tr>
</thead>
<tbody>
<tr>
<td>m 660</td>
<td>m 660</td>
</tr>
</tbody>
</table>

8. **Earth conductors**  
Supply and drawn in of stranded copper earth conductors in conduit or trunking system in roof space for lights, plugs and power points, including connection to switches and equipment  
8.1 2,5 mm²  
<table>
<thead>
<tr>
<th>Supply</th>
<th>Install</th>
</tr>
</thead>
<tbody>
<tr>
<td>m 1155</td>
<td>m 1155</td>
</tr>
</tbody>
</table>

9. **Surfix cable**  
Supply, installation and connection of Surfix cable in ducts or on surface, complete with saddles at 500mm intervals.  
9.1 4mm² x 3 core  
<table>
<thead>
<tr>
<th>Supply</th>
<th>Install</th>
</tr>
</thead>
<tbody>
<tr>
<td>m 495</td>
<td>m 495</td>
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</tbody>
</table>

9.2 4mm² x 5 core  
<table>
<thead>
<tr>
<th>Supply</th>
<th>Install</th>
</tr>
</thead>
<tbody>
<tr>
<td>m 280</td>
<td>m 280</td>
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10. **Light switches**  
Supply, installation and connection of 16 Amp light switches in flush 50 x 100 x 50 mm boxes, including white coloured cover Plates  
10.1 Single lever  
<table>
<thead>
<tr>
<th>Supply</th>
<th>Install</th>
</tr>
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<tbody>
<tr>
<td>no 12</td>
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Amount Carried forward to next page
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<tr>
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<th>Amount brought forward</th>
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<tr>
<td>11.</td>
<td>Dimmer Switches</td>
</tr>
<tr>
<td>11.1</td>
<td>Dimmer Switch</td>
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<td></td>
<td>Supply no 8</td>
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<td></td>
<td>Install no 8</td>
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<tr>
<td>12.</td>
<td>Switched socket outlets</td>
</tr>
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<td>12.1</td>
<td>16 Amp 3 pin</td>
</tr>
<tr>
<td></td>
<td>Supply no 8</td>
</tr>
<tr>
<td></td>
<td>Install no 8</td>
</tr>
<tr>
<td>12.2</td>
<td>16 Amp 3 pin double</td>
</tr>
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<td></td>
<td>Supply no 24</td>
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<td>Install no 24</td>
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<tr>
<td>13.</td>
<td>ISOLATORS</td>
</tr>
<tr>
<td>13.1</td>
<td>20 Ampere - double pole</td>
</tr>
<tr>
<td></td>
<td>Supply no 14</td>
</tr>
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<td></td>
<td>Install no 14</td>
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<tr>
<td>13.2</td>
<td>30 Ampere - double pole</td>
</tr>
<tr>
<td></td>
<td>Supply no 11</td>
</tr>
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<td></td>
<td>Install no 11</td>
</tr>
<tr>
<td>13.3</td>
<td>30 Ampere - triple pole</td>
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<td>Supply no 4</td>
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<td>Install no 4</td>
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Amount Carried forward to next page
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<tbody>
<tr>
<td><strong>Amount brought forward</strong></td>
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<tr>
<td>14.</td>
<td><strong>Floor Pedestal</strong></td>
</tr>
<tr>
<td></td>
<td>Supply, installation - complete</td>
</tr>
<tr>
<td>13.1</td>
<td><strong>FD3 - Floor Pedestal - Including for 2 x SSO’s</strong></td>
</tr>
<tr>
<td></td>
<td>Supply</td>
</tr>
<tr>
<td></td>
<td>Install</td>
</tr>
<tr>
<td>15.1</td>
<td>76 mm x 76 mm - including cover plates</td>
</tr>
<tr>
<td></td>
<td>Supply</td>
</tr>
<tr>
<td></td>
<td>Install</td>
</tr>
<tr>
<td>15.2</td>
<td>127 mm x 76 mm - including cover plates</td>
</tr>
<tr>
<td></td>
<td>Supply</td>
</tr>
<tr>
<td></td>
<td>Install</td>
</tr>
<tr>
<td>15.</td>
<td><strong>Galvanised ducts. The rate shall include for the supply and fixing of ducts on concrete surfaces, assuming low level work or alternatively high level with scaffolding provided. Fixing shall be done by means of shot fired, threaded studs or bolted rods. Including galvanised cover plates.</strong></td>
</tr>
<tr>
<td>15.1</td>
<td>76 mm x 76 mm - including cover plates</td>
</tr>
<tr>
<td></td>
<td>Supply</td>
</tr>
<tr>
<td></td>
<td>Install</td>
</tr>
<tr>
<td>15.2</td>
<td>127 mm x 76 mm - including cover plates</td>
</tr>
<tr>
<td></td>
<td>Supply</td>
</tr>
<tr>
<td></td>
<td>Install</td>
</tr>
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<tr>
<td>Amount brought forward</td>
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<tr>
<td>------------------------------------------------------------</td>
<td></td>
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<tr>
<td>16. LUMINAires</td>
<td></td>
</tr>
<tr>
<td>Supply and install the following luminaires as indicated on</td>
<td></td>
</tr>
<tr>
<td>the drawings complete with lamps, including bolts, nuts,</td>
<td></td>
</tr>
<tr>
<td>brackets, cabtyre with 5A plug/top where required, cut</td>
<td></td>
</tr>
<tr>
<td>outs in ceiling, etc.</td>
<td></td>
</tr>
<tr>
<td>16.1 Type A</td>
<td></td>
</tr>
<tr>
<td>Supply m 52 Install m 52</td>
<td></td>
</tr>
<tr>
<td>16.2 Type B</td>
<td></td>
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<tr>
<td>Supply m 28 Install m 28</td>
<td></td>
</tr>
<tr>
<td>16.3 Type C</td>
<td></td>
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<tr>
<td>Supply m 25 Install m 25</td>
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<tr>
<td>16.4 Type D</td>
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</tr>
<tr>
<td>Supply m 25 Install m 25</td>
<td></td>
</tr>
<tr>
<td>16.5 Type E</td>
<td></td>
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<tr>
<td>Supply m 22 Install m 22</td>
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</tr>
<tr>
<td>16.6 Other lighting replacement</td>
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<tr>
<td>Provisional Amount</td>
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<tr>
<td>9 500.00</td>
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<tr>
<td>16.7 Remove existing luminaires and dispose of no 72</td>
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<tr>
<td>17. Miscellaneous</td>
<td></td>
</tr>
<tr>
<td>17.1 Earthing &amp; Lightning Protection</td>
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</tr>
<tr>
<td>Provisional Amount</td>
<td></td>
</tr>
<tr>
<td>15 500.00</td>
<td></td>
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<tr>
<td>17.2 Removal of existing redundant installation item</td>
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<td>17.3 Manuals item</td>
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<td>17.4 Training item</td>
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## NZG: Waterhole Complex Refurbishment

### Bill No 6: Audio Visual System

<table>
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<th>Unit</th>
<th>Qty</th>
<th>Tariff R</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Data Projector - Ceiling Mounted 4500 Ansi Lumens</td>
<td>Supply &amp; Deliver</td>
<td>no 3</td>
<td></td>
<td></td>
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<td></td>
<td>Install &amp; Commission</td>
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<td></td>
</tr>
<tr>
<td>2.</td>
<td>Data Projector - Support Bracket</td>
<td>Supply</td>
<td>no 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Install</td>
<td>no 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Wall Mounted input device</td>
<td>Supply</td>
<td>no 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>AV, HDMI, VGA &amp; Audio</td>
<td>Install</td>
<td>no 3</td>
<td></td>
<td></td>
</tr>
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<td>4.</td>
<td>Motorised Screen 2130mm (H) x 1600mm (W)</td>
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<td></td>
<td>Install &amp; Commission</td>
<td>no 3</td>
<td></td>
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<td>2.</td>
<td>Building Works</td>
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<td>3.</td>
<td>HVAC</td>
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<td>4.</td>
<td>Disabled Lift</td>
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<td>Electrical Installation</td>
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<td>6.</td>
<td>Audio Visual Systems</td>
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| Contingency.                      | R 95 000.00 |
| Subtotal                          |            |
| 14% VAT                           |            |

**TOTAL TENDER SUM**                      

(To be carried forward to tender form)
PART C3:

SCOPE OF WORKS

Part C3.1

Project Specification

1. GENERAL

This document deals with the proposed refurbishment of the Waterhole Complex at the Pretoria Zoo, for the National Zoological Gardens. The purpose of the refurbishments is to ensure compliance with the relevant fire regulations, as well as to improve the functionality of the facility.

Detailed requirements of the refurbishments are as per the following parts of this document:

- C3.2: Building Works and fire upgrades
- C3.3: HVAC
- C3.4: Disabled Lift
- C3.5: Electrical Installation
- C3.6: Audio Visual Installation

2. SUPPLIER QUALIFICATION

The contractor shall have extensive experience with similar types of projects successfully completed. Included in the tender submission should be an installation list giving details of the above requirement.

3. CONTRACTOR’S PROJECT MANAGER

The Contractor shall assign a single person, fluent in the English language, who is responsible for the Contractor’s project management functions.

The key responsibilities of the Contractor’s Project Manager are:

- Project Management and Control of the Works
- Co-Ordination between the Contractor and the Engineering Consultant as well as the client
- Project Co-Ordination
- Leadership
The project management responsibility includes:

- Development of a Project Plan of Execution
- Resource Structuring of the Project
- Managing of Interfaces
- Engineering Management
- Planning
- Cost Control and Cash Flow Management
- Schedule and Schedule Deviation Control

The co-ordination between the Contractor and the Engineering consultant and the client shall be:

- Reporting Functions
- Actions required to optimize and accelerate the project wherever possible
- Quality Control
- Progress Monitoring and Control
- Notifications
- Expediting

4. **PROJECT/PROGRESS MEETINGS**

Weekly project and progress meeting shall be held with representatives from the contractor to ensure timeous resolution of problems and clashes.

5. **SCOPE OF THIS CONTRACT**

The scope of this contract is as follows:

- Upgrade of the facility to comply with fire regulations
- Refurbishment of facility, including repainting, installation of ceilings, and replacement of floor tiles, etc.
- Installation of air conditioning and ventilation
- Installation of a disabled lift
- Audio Visual systems
- Associated electrical installations
- Associated building works

The Bidder shall give a complete list of the scope included in his tender submission, and specifically mention what is not included.
6. **WORKS PROGRAMME**

   Site Handover to contractor: 1 September 2015
   Practical Completion: 28 February 2016
   Handover of installation to client: 14 March 2016

7. **SITE INFORMATION**

   The Waterhole Complex is located at the Pretoria Zoo, 232 Boom Street, Pretoria.
   It is important to note that the facility will be partially utilized while construction takes place and the works are to be scheduled as to avoid disruption of events.
   A roster of the events during the proposed construction period shall be confirmed.

8. **POWER SUPPLY**

   The power distribution on the site will be 400/232 Volt, 50Hz, 4 wire supply with solidly earthed neutral.

9. **AMBIENT CONDITIONS**

   The installation shall meet the specified requirements under the following ambient conditions:
   - Location: Pretoria, South Africa
   - Altitude: 1350m
   - Ambient Temperature: 0º C - 40º C
   - Relative humidity: 50%

10. **SUBCONTRACTING**

    The Contractor shall submit statements from the suppliers of all equipment to the effect that the suppliers are the authorized agents of the manufacturers of the equipment and consequently are fully empowered to support the manufacturer's warranty.
    Subcontracting of any part of the work will be subject to approval and the Bidder shall submit full detail of any sub-contractors to be employed, at tender stage.
11. **MAKING GOOD**

The successful Bidder will be responsible for making good in all trades, any damage or disturbance to the building, installation, tarred surfaces, concrete surfaces, paved surfaces, drains and other surfaces his employees may have caused during the construction of the installation.

12. **PERSONNEL ON SITE**

The contractor shall have a technically competent representative on site at all times when work is taking place. The person shall be required to attend to all technical matters, receive instructions behalf of the contractor and co-ordinate installation work with other contractors on site, but must arrange with client and the engineer for access to building.

13. **PROGRAM AND CO-ORDINATION**

Bidders shall include with the return of this document proposed works programmes for each site, consisting of the following minimum completion dates:
- Ordering of equipment
- Delivery of equipment
- Completion of workshop drawings of manufactured equipment
- Assembly of generator plant and fuel systems, including all testing required at this stage
- Installation of generator plant and fuel systems
- Final Commissioning of all systems

The contractor shall submit an execution plan within two weeks of contract placement that shall detail the various steps in the execution works.

14. **SITE FACILITIES**

The Bidder shall make allowance for all lifting equipment, scaffolding and transport required on the site. Electrical power shall be available at the time of construction.
15. **DRAWINGS**

The following drawings form part of this tender:

- J8307B01/G – Rev 2 - Waterhole Complex – Building Works & Lift – Ground Floor
- J8307B02/1 – Rev 2 - Waterhole Complex – Building Works & Lift – First Floor
- J8307M02/G – Rev 2 - Waterhole Complex – HVAC – Ground Floor
- J8307M02/1 – Rev 2 - Waterhole Complex – HVAC – First Floor
- J8307E01/G – Rev 2 - Waterhole Complex – Electrical – Ground Floor
- J8307E01/1 – Rev 2 - Waterhole Complex – Electrical – First Floor
- J8307E01/S – Rev 2 - Waterhole Complex – Electrical – Schematic Layout
Part C3.2
Technical Specification – Building Works

1. **GENERAL**

This part of the deals with the building works associated with the refurbishment project.

2. **SCOPE OF WORK**

The builders work to consist of the following:
- Refurbishment of ablution areas
- Breaking open of walls
- Installation of new doors, including fire doors
- Modification of existing doors
- Installation of new ceilings and bulkheads
- Replacement and new floor tiles
- Installation of firefighting equipment
- Repainting of internal & external walls
- Closing off of eaves at thatch roof
- Provision of pit for disabled lift

3. **SPECIFICATION OF WORKS**

Detail specification of the works shall be as per the Bill of Quantities.
All builders work shall comply with PW 371: Department of Public Works: Specification of Materials and Methods to be Used.

4. **FIRE PROTECTION**

4.1 **General**

Material and equipment shall be of a type and size approved by the local Fire Department.

Systems as installed shall meet the requirements of the local Authorities having jurisdiction.

4.2 **Pipes & Fittings**

Pipe shall be galvanized steel pipe to SANS 62 heavy. Fittings shall be screwed or flanged as specified and shall be suitable for a WWP with no-
shock water of 25 bar.

4.3 Valves

Isolating Valves shall be cast iron or steel body with bronze or stainless steel trim gate valves.

Valves shall be suitable for the pressure duty required, and shall be of a suitable pressure class, depending on the monitoring location. Valves shall be sealed or locked in the correct position by means of an approved lock and chain. Check valves shall be cast iron or steel body with bronze or stainless steel trim.

Check valves shall be spring loaded silent type swing check with adjustable opening and closing period.

4.4 Hose Reels

Hose reels shall be red enamelled type of all steel construction, and provided with wall mounting bases, spindles and glands and shall be securely fixed to the wall with suitable bolts and plates washers.

Hose reels shall be fitted complete with supply pipe, nozzle cook and hose guide in conformity with SANS 54.3 Fire hose shall be reinforced rubber 20mm nominal bore, having 32mm diameter shall be in 30m lengths, unless otherwise specified.

Hose reels valves shall be 20mm CP bronze off valve, globe type with threaded ends. Valves shall be suitable for a WWP or 16 bars with non-shock water and shall be clearly marked with an arrow and the words “open” in red.

4.5 Fire Extinguishers

Portable fire extinguisher shall be of the size and type specified and installed in the positions as indicated on the drawings. Fire extinguishers shall be provided with brackets and fixed to and including 230mm x 760mm x 22mm chamfered oiled hardwood backboard bolted with and including four 9mm bolts with plate washers cut and pinned to brick or concrete wall.

Fire extinguisher shall be in accordance with and shall bear the SABS mark and shall be approved by the Authorities having jurisdiction over the site.
Soda acid water shall be in accordance with SANS 889 and shall be of the cartridge type.

Dry powder type extinguishers shall be in accordance SANS 810 and shall be of the gas cartridge specifically suitable for use in the kitchen area.

4.6 Signage

Fire signage is as required to be provided.

Part C3.3
Technical Specification – HVAC

1. GENERAL

This part of the specification is for the supply, delivery, installation and commissioning of the air conditioning and ventilation installations at project.

If any of the requirements as stated in this part of the specification is at variance or contradictory with requirements contained in other parts of the specification or the drawings, then the requirements of this part shall have preference.

Tenders shall confirm strictly to the requirements of this document. Alternative offers put forward by a tenderer, shall be submitted as fully separate alternative offers.

If any of the requirements of the specification or the tender drawings are contradictory, it shall be referred to the Engineer before tender closing date as no claims whatsoever shall be entertained after the tender closing date.

2. SCOPE OF WORK

2.1 Main offer

The general scope of the HVAC installation, inter alia, comprises the supply, delivery, installation, testing and commissioning of the air conditioning and ventilation equipment and installations in the new building.

- Split type air conditioning units – all as shown on the drawings
- Extract fan systems for ablution and kitchen areas
2.2 **General**

All sheet metal and flexible ducting, supply air diffusers, return air grilles, and all other air distribution equipment, whether shown on drawings or not, and which are required to complete the installation, form part of this air conditioning and mechanical ventilation installation and must be allowed for in the tender pricing.

The complete and all electrical installation work as required to supply power to and to control all air conditioning equipment and ventilation fans, form part of this subcontract.

All insulated refrigeration piping and condensate drain piping including all fixing and brackets and accessible trunking form part of this subcontract.

All concrete bases, concrete plinths, steel frames, brackets and hangers required to fix and support all equipment, form part of this Specialist Air Conditioning Installation.

3. **MAKE OF EQUIPMENT**

The Air conditioning contractor will be allowed to offer equivalent equipment for consideration, under the following explicit conditions:

3.1 The equipment shall comply in all respects with the requirements specified and shall be subject to approval by the Engineer.

3.2 Equipment shall be of equivalent quality and performance.

3.3 The delivery period for such equipment shall not jeopardize the construction programme.

3.4 The local manufacturer or supplier shall have adequate service facilities and/or keep sufficient stocks of spares required for servicing.
3.5 The equipment shall be offered as an ALTERNATIVE if offered at tender stage with the accompanying cost saving.

3.6 The Air conditioning contractor shall supply such information regarding the equipment as required by the Engineer.

4. **QUALITY**

The Air conditioning contractor shall use only new materials of the best quality. A high standard of workmanship shall be maintained. The Engineer shall have the right to approve or disapprove any part of the installation if he deems it necessary in accordance with his professional judgement, interpretation of the Specification and accepted practice.

*The Contractor will be notified of any such disapproval of a part or parts of the installation and he will then rectify or replace that specific part or parts of the installation to the satisfaction of the Engineer. Any such instruction will not be deemed contrary to the Contract and will not relieve the Contractor of his responsibility to complete the installation on the originally agreed completion date.*

5. **COMPLETION DATE**

The installation shall be fully completed, tested, commissioned and taken over by the Client on the completion date stated in the Contract Agreement.

The Air conditioning contractor shall execute his contract work in accordance with a programme and schedule of activities drawn up in consultation with the Owner and Project Manager and in co-ordination with the main contract programme.

6. **DESIGN DATA**

Outside air conditions:

- **Summer**
  - 34°C DB
  - 22°C WB
- **Winter**
  - 0°C DB
  - 0°C WB

Outside design condenser air inlet temperature - 40°C

*Maximum anticipated outside temperature* - 45°C

7. **GUARANTEES**

The Air Conditioning Contractor shall, in the preparation of his manufacturing drawings and execution of the construction phase, take the necessary precautions and care to be able to guarantee:

- That the installation shall function without excessive draughts, noise or vibrations.
That equipment shall be installed, commissioned and set properly in order to attain the design conditions specified.

That an installation will be erected which will function in a safe and satisfactory manner in every respect.

8. **DRAWINGS**

Unless otherwise specified, the Engineer's drawings are not manufacturing drawings and the dimensions given are only sufficient for tendering purposes or to enable the Air Conditioning Contractor to complete manufacturing drawings. It is the responsibility of the Air Conditioning Contractor to verify all dimensions from drawings and on site.

The Air conditioning contractor will be furnished with the relevant Engineer’s drawings as well as the drawings of the other professional disciplines as available.

The Air conditioning contractor shall supply three (3) copies of all workshop drawings. The Air conditioning contractor shall allow three (3) weeks for drawing approval. After a marked-up copy with all the comments has been returned, the Air Conditioning Contractor shall update the original which shall then be submitted for signature. This will ensure that all prints used for construction will be certified as approved.

In the production of the workshop drawings the Air Conditioning Contractor shall be responsible to ensure coordination with the structure and other services.

Unless otherwise specified, cable routes shall be superimposed on the mechanical layout drawings.

Any work done by the Air Conditioning Contractor without an approved signed drawing, will be at the risk of the Air Conditioning Contractor.

The Air conditioning contractor shall be required to finalise and coordinate routes for refrigeration piping, interconnecting cables and condensate drains and shall indicate these in detail on the drawings.

The Air conditioning contractor shall update all drawings (“as built”) drawings on an ongoing basis. Three (3) sets of final paper prints and one (1) set of final sepia copies plus a compact disc copy of all the drawings in AutoCad format, shall be supplied to the Engineer as part of the Operating and Maintenance Manual.
The Air conditioning contractor shall include for his representative to keep a diary recording the progress of the works and details of all instructions received. The diary shall be at the disposal of the Engineer when required.

The Air conditioning contractor shall provide working drawings of all items of equipment, with a detailed technical specification of the equipment, for approval before placing an order for the equipment.

9. **REFERENCE SPECIFICATIONS AND STANDARDS**

The latest revision of any specification referred to in this specification, will be applicable.

Where a specification or standard is not specifically referred to, it will be assumed that the relevant SABS, ISO, JIS, BSS, DIN or equivalent American standard, listed in order of preference, will apply (see Section 11.)


10. **OPERATING AND MAINTENANCE MANUAL**

The Air conditioning contractor shall, at his cost, supply a detailed operating and maintenance manual to enable proper operation and maintenance of the installation.

Six (6) weeks prior to the commencement of commissioning, the Air Conditioning Contractor shall supply a draft of the manual for approval. Two (2) weeks after commissioning, the Air Conditioning Contractor shall supply three (3) additional manuals which have been updated and include all commissioning data and “as built” drawings. These manuals shall contain the following information:
INDEX OF CONTENTS

SECTION 1: SYSTEM DESCRIPTION
A comprehensive description of the installation and the systems operation at various room requirements, with cross reference to other sections of this manual and manufacturer's brochures and pamphlets.

SECTION 2: OPERATING INSTRUCTIONS
2.1 Starting and stopping instructions
2.2 Pre-start checks
2.3 Equipment running checks
2.4 Maintenance period check list(s) with acceptable levels of operation
2.5 Detailed explanation of setting and "programming" of regulator for each system.

SECTION 3: MECHANICAL EQUIPMENT
The following information shall be provided in full for each new item of equipment:
3.1 General information:
Description, make, model number, name and address of supplier, manufacturer, etc.
3.2 Design information:
3.2.1 Design data sheet containing all design and selection parameters, calculations, selection curves, etc.
3.2.2 Flow diagrams that indicate the flow rates, temperatures, pressures and pressure drops amongst others in the system.
3.3 Manufacturer's brochures and pamphlets including performance curves/tables for all individual items of equipment.
3.4 Maintenance data and schedules:
The lapse of time between services and the description of the service required for each part, lubrication requirements, etc.
3.5 Schedule of all spares: Mechanical, electrical, instrumentation and control.
SECTION 4: ELECTRICAL EQUIPMENT
The following information shall be provided for all new electrical equipment whether in a switchboard or field mounted:

4.1 A complete electrical equipment schedule:
   Description, make, model number, rating and other design criteria, commissioned setting, name and address of supplier.

4.2 Maintenance information
4.3 Manufacturers brochures and pamphlets
4.4 Electrical and instrumentation wiring diagrams(s)
4.5 Electrical and instrumentation wiring diagram(s) shall be displayed in each control panel.

SECTION 5: INSTRUMENTATION AND CONTROL
5.1 Detail description of the operation of the electrical and control systems
5.2 Design information
5.3 Manufacturers brochures and pamphlets
5.4 Settings and values recorded during commissioning
5.5 Maintenance data and schedules

SECTION 6: TESTING, BALANCING AND COMMISSIONING
6.1 Comparison of equipment design information against settings and values recorded during commissioning, with explanation of differences.
6.2 Chart recorded temperature recordings during testing of system

SECTION 7: DRAWINGS
7.1 The Air conditioning contractor will be required to produce the following detailed “as built” design drawings for inclusion in the manual:
   (a) Builder's work drawings.
   (b) Mechanical drawings:
       These are all workshop and equipment layout drawings required for the manufacture and erection of the installation.
   (c) Instrumentation drawings:
       Detailed schematic control diagrams giving all terminal numbers and general arrangement drawing of control board.
(d) Detailed electrical power drawings.
(e) As well as other drawings requested elsewhere in this specification.

7.2 General arrangement drawing of switchboard.
7.3 Circuit diagrams and interconnecting diagram giving cable schedules with numbers and sizes corresponding with the circuit diagrams and interconnection diagram.

11. CODING, LABELLING AND NOTICES

11.1 General

Codes and number of wiring shall be in interlocking endless expanding markers.
Lettering shall be marked in black on a white background.
Provide and install the following coding as well:
- Numbering of both ends of power and control conductors.
- Numbering of both ends of field cables.

Numbering of both ends of individual field conductors within cables of control circuits only where such conductors are not uniquely identified by means of insulated colour codes.

11.2 Labelling

Labelling shall be CRITCHLEY UNILABEL cable marker, as supplied by CABLE ACCESSORIES or engraved "IVORENE" or "TRAFLITE" labels.

11.3 Equipment

All mechanical, electrical and instrumentation equipment shall be identified by means of an equipment code — lettering 10 mm.

11.4 Electrical

To identify each outgoing control circuit – lettering 4 mm.
Identify the function of equipment on the outside face of the switchboard.
Identify rating of fuses – lettering 4 mm.

11.5 Coding, labelling and notices

The Air conditioning contractor shall submit a schedule of labels and notices to the Engineer for approval prior to manufacturing.
The Air conditioning contractor shall ensure that all labelling, coding, numbering and notices are to specification and that they comply with all legal requirements.

12. **INSPECTIONS AND TESTING**

12.1 **Inspections**

The Engineer shall have general supervision and direction of the contract works. Supervision shall comprise such periodic visits as the Engineer may consider necessary to inspect the contract works for conformity with the contract documentation and to provide clarification and further information as necessary.

The Engineer shall have the power at any time to inspect and examine any part of the contract works or any materials intended for use in or on the contract works, either on the site or at any factory, workshop or other place where same are laying or from where they are being obtained, and the Air Conditioning Contractor shall give all such facilities as the Engineer may reasonably require to be given for such inspection and examination.

12.2 **Testing**

The Air conditioning contractor shall supply all test equipment, test facilities and everything necessary, to perform these tests.

The Air conditioning contractor shall record all specified parameters with accurate equipment and chart recorders for a period of at least five (5) working days in all air conditioned spaces.

Prior to switching on each system, the Air Conditioning Contractor shall ensure that all the statutory safety requirements are complied with. The Air conditioning contractor shall record all measurements taken during testing and shall do the necessary adjustments until the Engineer is satisfied with the results.

The Engineer shall be notified one (1) week in advance of any tests so that he may witness such tests.

Unless otherwise specified, the Air Conditioning Contractor will be required to perform, inter alia, the following tests and measurements:
(1) **Electrical switchboards**

A simulated functional test in the factory to ensure the correct operation of equipment, control, interlocks and measuring circuits.

A 2,5 kV pressure test in the factory.

(2) **Electrical wiring circuits**

A megger test of all circuits prior to energizing the switchboard for pre-commissioning.

(3) **Fans**

Capacity tests with measurements of air flows, static pressures, motor running amperages, rotation speeds.

(4) **Refrigeration circuits and compressors**

Capacity tests with measurements of suction, discharge and oil pressures and temperatures.
Motor start and running amperages.
Condensing air flows and inlet and discharge temperatures.
Condensing and suction temperatures.

(5) **Factory test of packaged cooperative cooling units**

Prior to shipment, a full, operational test of the packaged unit shall be conducted in the factory.

(6) **Ducting**

Balance of ducting system shall be confirmed by measurements at all outlets.

(7) **General capacity and performance testing of air conditioning and Ventilation systems**

The Air conditioning contractor shall perform all tests and demonstrations as the Engineer may reasonably direct and require to properly verify and demonstrate that the installations are performing as specified and are delivering the capacities as specified.
Inter alia, the following types of tests and measurements may be required:

- Air flows and velocities
- Temperatures
- Air distribution (smoke) test
- Temperature and humidity chart recordings
- Pressures

13. **COMMISSIONING AND HANDING-OVER**

13.1 **General**

Commissioning shall be performed by the Air Conditioning Contractor after the installation is completed to specification. The Air conditioning contractor shall follow recognised standard commissioning codes such as SABS, SMACNA, CIBSE. The Air conditioning contractor shall submit the proposed codes and his commissioning plan to the Engineer for approval in good time.

**The following general procedure shall be followed:**

**Form A**

After physical completion of the erection of each phase of the installation, the Engineer will upon request issue a Form A certifying that commissioning can proceed. Erection items which would not influence commissioning, but which shall be attended to during commissioning, will be recorded on the Form A.

**Form B**

After commissioning the Engineer will issue a Form B. Any outstanding work will be recorded on the Form B.

**Form C**

After completion of all outstanding items and receipt of all manuals and drawings as recorded on Form B, the Engineer will issue a COMPLETION CERTIFICATE: Form C. Form C shall under no circumstances be issued before all items on punch list are completed to the satisfaction of the Engineer.

The maintenance and guarantee period of **two years** will commence on the date on Form C.
Samples of Forms A, B and C shall be made available, upon request, to the Air Conditioning Contractor before the commencement of commissioning.

13.2 Training

The Air conditioning contractor shall provide a suitable qualified and trained person to train the Owner’s staff in the correct operation and maintenance of the installation. The Air conditioning contractor shall allow for this person to be based on site for a period of at least one (1) month after the hand-over date.

14. MAINTENANCE DURING THE GUARANTEE PERIOD

The contractual guarantee period shall be at least one (1) year on faulty materials and workmanship.

During the guarantee period, the Air Conditioning Contractor shall be fully responsible for complete maintenance of the installation. The guarantee period on material, equipment and labour performed commences on the date as specified above and when the completion certificate is issued by the Engineer and expires one calendar year later.

Maintenance of the installation shall mean the regular servicing, lubrication, repairing, cleaning and adjustment of the installation as well as the free of charge replacement of any defective components during the guarantee period.

A suitably qualified and trained person shall routinely and regularly examine and test the installation once every month and shall also perform all the necessary maintenance tasks to ensure smooth and faultless operation.

Breakdown/emergency calls shall immediately, on the day of first call-out, be attended to by the Air Conditioning Contractor. In the event of non-performance by the Air Conditioning Contractor in this respect, the owner shall be entitled to make such other arrangements as are necessary on the Air Conditioning Contractor's cost.

A logbook shall be kept in the main plant room and all servicing and repairs shall be recorded in this logbook with meticulous care. The logbook shall at all times be put at the disposal of the Engineer. Logbook of detailed services and repairs shall be provided to the owner by the Air Conditioning Contractor after the guarantee period has expired.
15. **LAYOUT OF PLANT**

The plant shall comply in capacity and general layout with the details given in the specification and drawings.

The general layout may be altered or modified to suit equipment, but a sketch showing the intended layout must be submitted to the Engineer before the tender is awarded.

Dimensions shown on the drawings are sufficiently accurate for tendering purposes, but when workshop drawings are being prepared and before construction of the plant is commenced critical dimensions together with the position of roof members, etc., must be verified on site by the Air Conditioning Contractor and the plant must be drawn and constructed accordingly. If the Air Conditioning Contractor requires alterations to the structure, these must be described at the time of tendering. Minor structural alterations which might facilitate the work can, where possible, be arranged with the Engineer as the work progresses, but no claims will be entertained for alterations to ductwork and plant, etc. which were constructed before the necessary dimensions and details had been verified.

16. **UNITARY SPLIT AIR CONDITIONING UNITS**

16.1 **General**

Supply, deliver, install, test and commission all split air conditioning units as are shown on the drawings and as specified and described hereinafter.

All split-type air conditioning units shall utilize the **R 410a refrigerant gas**.

Split units shall be one of the following configurations of split unit, as indicated on the drawings or as listed in the schedules, and as suitable for the size and configuration of the space served. Units shall be on the Client's approved list.

- Mid-wall type mounted against the wall
- Cassette type mounted in ceiling

Split air conditioning units offered for this contract shall be of a well-known, high quality make which is well established on the South African market and for which stock, spares and service back-up is easily available.
Only the following makes of equipment will be considered for this tender:
- PANASONIC
- DAIKIN
- MITSUBISHI
- GENERAL
- LG
- DUNHAM BUSH
- SAMSUNG

or units of equal capacity and quality as approved by the Engineer.

*The tenderer shall only offer units which are suitable for the length and route of refrigeration pipe runs shown on the drawings.*

Split units shall be configured as follows:

**Indoor unit**

*The indoor unit shall comprise the following principal components:*
- A sturdy decorative cabinet and casing
- A cooling coil (evaporator)
- An evaporator fan and drive
- Condensate tray and condensate disposal system
- Refrigerant piping connections and thermostatic expansion device
- Electrical wiring and controls
- Air filter
- Unit face panels or cabinets which are visible inside the air conditioned space, shall have a neat unobtrusive decorative finish.

**Outdoor unit**

*The outdoor unit shall comprise of the following principal components:*
- Weather proof, corrosion proof frame and casing
- Condenser fan and drive
- Condenser coil
- Compressor
- Refrigerant gas piping and accessories
- Integral electrical wiring and switchgear
- Electronic control and protection systems
Interconnecting piping and cables
The indoor and outdoor unit shall be interconnected by refrigerant gas piping and electrical power and control cabling.
The type, number, location and capacity of the split units shall be in accordance with the drawings and the schedules of capacity hereinafter.

16.2 Specification for split air conditioning unit systems

The split air conditioner units shall have the following components and features:

(1) Indoor unit: casing

Unit cabinets which are visible within air conditioned spaces, shall be of a sturdy, attractive, unobtrusive design. Metal finishes shall be electro-galvanizing followed by a high quality baked epoxy powder coating or baked enamel.

All internal support frame and cabinet members are to be steel, properly protected against corrosion by a suitable surface treatment such as galvanizing or zincho-metal plus powder coating.

All plastic cabinet components shall be of modern high strength, high impact thermoplastic mouldings.

(2) Supply fans (evaporator fans)

All split units shall be fitted with a centrifugal supply fan. The impellers of the supply fan shall be directly driven from an extended shaft electric drive motor.
The fan motor shall have multiple speeds selectable from the unit control pad.

The fan shall be statically and dynamically balanced and shall be resiliently mounted. The fan construction shall be corrosion proof aluminium or plastic.

The fan motor shall be fitted with a current and temperature sensitive overload protection device.
(3) Cooling coil

The evaporator coil shall be constructed of copper tubes and aluminium fins in accordance with the best modern practice. Coils shall be fully factory leak tested, evacuated and charged.

(4) Condensate tray and condensate disposal system

Supply and install a condensate tray and complete condensate disposal system at each split air conditioning unit.

Condensate trays shall be leak and corrosion proof. Each condensate tray shall be drained to a suitable outside condensate disposal point as part of this contract. Condensate piping shall be constructed of minimum size 20 mm UPVC or copper piping. Condensate piping, where it would otherwise be visible, shall be chased into brickwork.

The Air conditioning contractor is responsible to make all arrangements to supply and install condensate drains. Drains shall be laid to a fall to allow proper and complete drainage. All openings, brackets, etc. required for condensate piping forms part of this Specialist Air Conditioning Installation.

The Air conditioning contractor shall supply and install automatic miniature condensate pump units in the condensate pans of all the air conditioning units where these units cannot drain by gravity.

Unless shown otherwise on the drawings the Air conditioning contractor shall allow in his price for a condensate drain pipe length of 40 metres for each and every split air conditioning unit.

(5) Air filter (indoor unit)

Each split unit shall be fitted with an easily accessible, removable, washable air filter. The filter medium shall have been developed specifically for optimum performance in unit air conditioners and shall have the following general features:

- Washable
- Arrestance of 65% minimum (ASHRAE 52/76)
• Consistently low resistance

Filters shall be properly housed and supported in a filter frame with a hinged or tray type access panel. The filter shall be easily removable.

(6) Electrical wiring and switchgear

Each split unit system shall be equipped with all necessary integral electrical wiring and switchgear to supply power to and to control the electrical motors and devices which form part of the split unit.

Each split unit shall be properly wired and electrically tested in the factory.

The electrical wiring, harnesses, switchgear and protection devices shall be fully in accordance with the relevant International IEC Codes or SABS Code of Practice and the unit shall be certified to this effect.

All power circuits shall be fully protected against current overload or short circuit conditions by magnetic circuit breakers or thermal/current type fusible links or fuses or electronic sensing devices.

Electric wiring shall be fully colour coded and shall be in accordance with a standard wiring diagram. Wiring bundles or harnesses shall be properly strapped and securely fastened.

(7) Insulation

The evaporator discharge chamber shall be internally insulated with a durable efficient thermal insulation material of closed cell polyethylene foam or equivalent.

(8) Supply grilles

All split system evaporator (indoor) units shall be fitted with adjustable supply air discharge grilles, vanes or louvres. It shall be possible to adjust the vertical elevation (up/down) of the air stream as well as the horizontal spread of the air stream.
(9) **Mounting of indoor unit**

The Air conditioning contractor shall neatly and adequately mount and support the indoor unit. Concealed fixing shall be used where possible.

(10) **Condensing unit: compressor**

The unit shall be fitted with a rotary or reciprocating, fully hermetic refrigeration compressor. The compressor shall be of a well-known make acceptable to the Engineer. The compressor shall be resiliently mounted.

The compressor shall be internally fitted with temperature and current sensitive overload protection devices. The compressor shall utilize R22 as refrigerant.

(11) **Condenser fans (outdoor unit)**

Condenser fans shall be of the propeller type and shall be directly driven by an electric motor. The motor shall be rubber mounted and vibration free. The fan wheel and shroud shall be fully corrosion resistant.

(12) **Cabinet: outdoor unit**

The outdoor (condensing) unit shall be housed in a fully weather proof enclosure. The enclosure shall be in metal, fully corrosion protected.

*The Air Conditioning Contractor shall ensure that all details regarding the position, surroundings and air flow obstructions at the outdoor condensing units are made available to the equipment supplier/agent and that he accepts and approves this at the outset.*

(13) **Condenser coil**

The condenser coil shall be constructed of copper tubes and aluminium fins in accordance with the best modern practice. Coils shall be fully factory leak tested, evacuated and charged.

Condenser coils and refrigerant piping condensing units in the factory or in the distributors workshop shall be coated with an approved anti-
corrosive lacquer coating such as "TECTYL".

(14) **Refrigerant piping system**

Each unit shall be fitted with a fully factory leak tested, dehydrated and refrigerant charged refrigerant circuit. The refrigerant circuit shall be constructed of silver soldered copper tubing.

The refrigerant circuit shall incorporate all necessary accessories, such as:

- Charging valves
- Filter / dryer / sight glass
- Expansion device

(15) **Electronic controls and user remote control pad**

Each individual split air conditioning unit shall be equipped with its own electronic control system.

The control system shall be microprocessor based and shall generally have the following control features:

- Adjustable room temperature control
- Adjustable fan speed
- On / Off
- Fan only
- Heating

The following safety features shall be built in:

- Delay timers on compressor re-start.
- Filter dirty or de-ice sensor.
- Manual resettable NO VOLT relay which will switch the unit out if electric power is interrupted, or if there is an unacceptable voltage drop.

The control system shall be coupled by wire to a neat, easily accessible user control panel with clearly legible graphic symbols and legend. LED status indicator lights shall be provided. Wiring to control pads shall be in concealed conduit. The supply and installation of conduits and all wiring draw boxes required for the installation of all control pads forms part of
the Air Conditioning Contractor’s work.

*Wireless (infrared) remote control devices shall be considered only for use in individual office spaces.*

The user control panels shall be wall mounted in the room in the positions indicated on the architectural drawings. The control wiring shall be located in conduit chased into the brickwork. The control unit shall be mounted on a neat metal back plate located over a 100 x 100 mm draw box. The Air conditioning contractor shall prepare workshop drawings showing the precise location and height of the air conditioning control points in all spaces and shall submit these for approval. Samples of the control pad and back plate shall be submitted for approval. A sample installation shall also be done for and approved by the Engineer before the Air Conditioning Contractor can proceed with this work.

(16) **Power supply for split air conditioning unit systems**

A power supply point for all the split air conditioning units shall be supplied, as specified elsewhere in this document at a point in the areas where the condensing units are located. The power supply will be in the form of isolators.

All other electrical wiring and switchgear form part of this Specialist Air Conditioning Installation. The Air conditioning contractor shall therefore – timeously – confirm the total load to the Electrical Specialist to enable him to supply and install the correct size supply cable.

All interconnecting wiring between each power supply breaker and the corresponding outdoor condensing unit, as well as between each indoor and outdoor unit, form part of this Specialist Air Conditioning Installation and shall each be done in PVC insulated armoured cable in a trunking system with the refrigerant piping.

All interconnecting wiring systems shall conform to the SABS Code of Practice.

The Air conditioning contractor shall be required and will be held responsible to ensure that the necessary power supply isolators of the correct type (single phase or three-phase) and of the correct capacity
are provided and installed in the correct positions at each outdoor condensing unit position.

Over and above the specified equipment, the A/C (Sub) contractor shall supply and install all equipment and auxiliary equipment which may be considered necessary for the proper operation of the complete electrical installation, to fully comply with the requirements of the specification.

All equipment and materials supplied for this contract shall fully comply with the requirements laid down, shall be of good quality and bear the SABS mark where applicable.

The entire electrical installation associated with A/C and Ventilation installation shall be executed under the supervision of an accredited person for three phase work in accordance with the Code of Practice for the Wiring of Premises [SANS 10142-1], the requirements of the local supply authority and to the approval of the Engineer or his representative.

A Certificate of Compliance [C.O.C.] shall be issued to the engineer by the accredited person at completion of the electrical work. The contractor is reminded that only armoured electrical cable ["Suffix": "Norse"] may be used.

(17) Trunking

Interconnecting copper refrigerant gas piping, condensate drains and all interconnecting electric cables that are exposed to the weather or to damage, shall be housed in neat accessible metal trunking systems as part of the Specialist Air Conditioning Installation.

Trunking shall have neatly fitting "clip-in" removable covers.

Metal trunking systems shall be galvanised. After installation, trunking systems shall be painted with an appropriate paint procedure in a colour to the Engineer's choice.

(18) Heating

All units shall be equipped with heating by reversible heat pump.
operation. The heating capacity shall be at least 80% of the corresponding cooling capacity. All necessary safety interlocks and time delays to allow for safe changeover from cooling to heating shall be built into the units.

(19) Safety requirements

All split air conditioning units shall in respect of safety, comply with and be tested in accordance with the following international standards:


or of the equivalent SABS specification:

SABS IEC 335-2-40.

The successful tenderer shall certify that all split units comply with the above standards or with an equivalent international safety standard acceptable to the Engineer.

(20) Refrigerant piping installation

All refrigeration piping installations between the outdoor condensing units and the indoor units form part of the specialist air conditioning installation. Piping shall be done in refrigeration quality copper tubing. Tubing shall be done in soft drawn tubing with a minimum number of joints where possible.

Refrigeration piping shall be suitable for R 410a refrigerant gas.

Joints in copper tubing shall be done by silver or approved eutectic solder to the best refrigeration practice.

The Air conditioning contractor shall ensure that piping connections are correctly sized in accordance with the procedure as prescribed by the equipment manufacturer. If the total effective length of the piping connections as planned on the site exceed the maximum length as recommended by the equipment manufacturer, then the Air Conditioning Contractor shall ensure that a specific design calculation is undertaken and that the pipe sizing is adjusted to accommodate the excess length.
In order to demonstrate that each and every pipe connection is properly and correctly sized, the Air Conditioning Contractor shall produce a schedule of all the air conditioning units on which the following information is tabulated:

- Capacity of air conditioning unit.
- Actual effective length of refrigerant pipe connection (as measured from the drawing or on site).
- Recommended pipe sizing as per manufacturer (for connections within recommended maximum length).
- Calculation of required sizing (for connections which exceed the maximum recommended length).
- The schedule shall be approved and countersigned by the technical representative of the Supplier Company.
- The refrigeration pipe sizing schedule shall be submitted to the Engineer for approval before any work is put in hand.

For tender pricing purposes, a refrigeration pipe interconnecting route length of at least 40 metres shall be allowed for each split unit unless clearly indicated otherwise on the drawings.

17. **ABLUTION EXTRACTION SYSTEMS**

The Contractor shall supply & install the ablution extraction system as indicated on the drawings.

Extraction fans shall be installed at existing brick wall. The contractor shall allow in his tender price for the breaking open of the walls and making good.

Door grilles shall be installed into existing timber doors. The contractor shall allow in his tender price for the cutting of the doors and making good.

The contractor shall confirm in the tender submission the fans and door grilles proposed.
Part C3.4

Technical Specification – Disabled Passenger Lift

1. GENERAL REQUIREMENTS

1.1 General information

(1) This general technical specification covers the general requirements regarding material, equipment, installation, testing and commissioning of the installation and shall be read in conjunction with the conditions of tender, conditions of subcontract and the Detail Specification for the specific installation.

(2) The complete installation shall comply with the requirements of this specification. Should any differences or contradictions exist between this specification and the Detail Specification for the specific installation, then the latter shall take preference.

(3) It is in the interest of the Contractor to notify the Engineer when the installation reaches various stages of completion so that the Engineer may inspect the installation and point out deficiencies. These inspections will be informal and under no circumstances will they partly or wholly invalidate the requirements of the documents. Any costs incurred in correcting deficiencies shall be for the Subcontractor's account.

1.2 Compliance with regulations

- Regulations

The installation shall be erected and commissioned in compliance with the latest amendments of the following acts and regulations:


(3) The local Municipal bye-laws and regulations as well as the regulations of the local Supply Authority.

(4) The local Fire Regulations.


(6) The regulations of the Department of Posts and Telecommunication.
(7) The regulations of the local Gas Board, where applicable.
(8) The standard regulations of any Government Department or public service company, where applicable.

- **Notices and amendments to regulations**

(1) In addition the Subcontractor shall issue all notices and pay all the required fees in respect of the installation to the local authorities and shall exempt the Employer from all losses, costs or expenditures which may arise as a result of the Subcontractor's negligence to comply with the requirements of the aforementioned regulations.

(2) It is assumed that the Subcontractor is conversant with the abovementioned requirements. Should any requirement, bye-law or regulation which contradicts the requirements of this specification, apply or become applicable during erection of the installation, such requirement, bye-law or regulation shall overrule this specification. The Subcontractor shall immediately inform the Engineer of such a contradiction. Under no circumstances shall the Subcontractor carry out any variations to the installation in terms of such contradictions without obtaining the written permission to do so from the Engineer.

1.3 **Compliance with standard specifications**

Equipment, material and quality standards shall comply with the requirements of the specifications in the following schedules. The latest amendments of a specification shall be consulted.

- **Quality control**

(1) The Subcontractor shall apply the codes of practice for quality systems as outlined in SABS ISO 9000 to SABS ISO 9004.

(2) The particular codes of practice for quality systems to be applied during all stages of design, development, production, installation and servicing to be carried out by the Subcontractor are as follows:

| Quality management and quality assurance standards Â Guidelines for selection and use | SABS ISO 9000 |
| Quality systems Â Model for quality assurance in design/development | SABS ISO 9001 |
production, installation and servicing ..........  

| Quality systems Å Model for quality assurance in production and installation .... | SABS ISO 9002 |
| Quality systems Å Model for quality assurance in final inspection and test....... | SABS ISO 9003 |
| Quality management and quality system elements Å Guidelines ....................... | SABS ISO 9004 |

- Safety rules and testing procedure of lifts

(1) The following safety rules and testing procedures of electric and hydraulic lifts shall be applied:

| Safety rules for the construction and installation of electric lifts ................... | SABS 1545 Part 1 |
| Safety rules for the construction and installation of hydraulic lifts ................... | SABS 1545 Part 2 |
| Testing and inspection of electric and hydraulic lifts................................... | SABS 1545 Part 10 |

(2) On completion of the complete lift installation, the Subcontractor shall submit to the Engineer and Employer a copy of the schedule in SABS 1545 Part 10 (Addendum A, Table 2) duly completed, giving the technical detail of the passenger lifts and goods lifts as installed.

1.4 Equipment, material and apparatus

(1) The equipment, materials and apparatus used in the installation shall be new and of best commercial quality with a high reliability and shall be selected for ease of maintenance.

(2) All materials shall be suitable for the conditions on site. These conditions shall include weather conditions as well as conditions under which the materials are installed and used. Should the materials or components not be suitable for use under temporary site conditions, the Subcontractor shall at his own cost provide suitable protection until these unfavourable site conditions cease to exist.

(3) Samples of all equipment shall upon request of the Engineer be submitted for approval before installation is commenced. All such
samples may be retained until completion of the subcontract. All such samples shall have securely attached thereto labels designating the subcontract by name and number (if any), the name of the Subcontractor and any further relevant information.

(4) Individual components or apparatus such as batteries, terminal blocks, electrical control equipment, etc., shall when used in the installation be of the same make, type or series for each item used throughout the installation. Standardisation and mutual interchangeability of parts and components are essential and the aforementioned requirements must be considered in the Subcontractor’s approach to the interpretation of the specification, and may be subject to approval by the Engineer following demonstrations of the equipment capability by the Subcontractor.

(5) The aim must be to standardize component types, series and make, thus reducing the number of items to be held by the Employer as spare parts.

(6) Equipment shall also be readily available. It must be possible to have imported equipment available in South Africa on an agency basis. Upon request the Subcontractor shall guarantee that such equipment or components may be available in South Africa.

(7) Manufacture of subunits or subassemblies forming part of a system shall be jig-built if required in quantities more than five to ensure uniformity and final manufacture to close tolerances to ensure smooth operation of such systems.

(8) Notwithstanding the a foregoing, and to best serve the Employer’s needs and interests, tenders will only be considered for currently manufactured reliable equipment of good reputation which can properly be maintained and serviced without the necessity of the Employer carrying an extensive spares stock or being subjected to the inconvenience of long periods of interrupted service due to the unavailability of parts.

1.5 **Standard of craftsmanship**

(1) All work for this installation shall be executed according to the latest professional standards.

(2) The Subcontractor shall nominate a senior and competent member of his staff to supervise all his staff on site throughout the period of
installation in order that standards of craftsmanship are maintained and safety regulations are adhered to. This nominated person shall also liaise with other contractors, where necessary, and with the Architect and Engineer on a day-to-day basis where applicable.

(3) Site staff shall be experienced and competent personnel, adequately trained to execute the various duties assigned to them.

(4) Before equipment is installed, all installed wiring shall be checked to ensure that routes are correctly followed, category segregation is maintained, and that no accidental damage has occurred to the cables during installation. All metal conduits shall be connected by a low impedance path to earth.

(5) The Subcontractor shall liaise with the Contractor to ensure that areas where major equipment items, such as racks, control consoles, etc., are to be installed, are finished clean and dry and secure before the installation of these items commence.

(6) Material or workmanship which is not to the satisfaction of the Engineer, shall be rectified at the cost of the Subcontractor. All rejected material shall be removed from site at the cost of the Subcontractor.

(7) The Subcontractor shall be responsible for the correct and complete erection of the installation to comply with the requirements of the Project Specification for the installation.

1.6 Workshop assembly and identification of subsystems and components

(1) To assist in the erection and installation activities on site, components, equipment and subsystems must be assembled in the workshop, after manufacture. Individual units shall be clearly marked by employing an identification code in such a manner that actual re-assembly, erection and installation on site could be done in a minimum of time with a minimum of fitting and adjustment on site.

(2) Equipment should be delivered to site in the largest subsystems which are practical.
(3) Where practical according to the discretion of the Engineer, complete electronic and other control units shall be assembled in the workshop for preliminary tests. This shall be done to check whether the equipment complies with predetermined set values and produces certain predetermined set results.

(4) The Engineer may upon request of the Subcontractor visit existing installations or inspect prototype assemblies of subsystems in the factory to determine whether such units and the workmanship are of the required standard for the installation. This may be done to obviate certain tests on subsystems in the factory related to electronic and other control units.

1.7 **Inspections and tests**

**Routine inspections and tests**

(1) The equipment and components of the installation will be inspected by the Engineer on a routine basis during the manufacture of the equipment and during installation on site. For this purpose the Engineer must be allowed access at all reasonable times to the workshops of all manufacturers of equipment and components for the installation.

(2) Such inspections shall not exempt the Subcontractor from his responsibility in respect of the control of quality of equipment and workmanship.

(3) The Subcontractor must execute all tests in the workshops of manufacturers or at any other venue or on site during or before erection of the installation in compliance with the requirements of this specification.

(4) Any additional tests which according to the judgement of the Engineer may be necessary to determine whether the installation or equipment complies with the requirements of the specification, must be done upon instruction of the Engineer. All such tests must be done in the presence of and to the satisfaction of the Engineer at the place, date and time mutually agreed to.

(5) The Subcontractor shall provide all test equipment, test apparatus and other auxiliary equipment and must prepare test certificates as specified.
or as requested by the Engineer.

(6) The Subcontractor must report to the Engineer on a routine basis regarding the progress of manufacturing the equipment and the progress of installing the equipment on site, so that the Engineer may decide when progress inspections should be undertaken as necessary to inspect workmanship and quality of material.

(7) The Subcontractor must, when necessary, arrange with the Inspector of Machinery for tests to be done as required by the Inspector of Machinery. The Engineer must be timeously informed of such tests to be conducted.

**Testing in the workshops of the manufacturer**

(1) Where necessary, equipment must be fully mounted in the workshop such that all moving and operational systems may be practically tested to ensure proper and smooth operation. Where required, such tests must be conducted in the presence of the Engineer or representatives of the Employer.

(2) Before such tests are undertaken, the general arrangement, alignment and interchangeability of components and equipment shall be inspected by the Engineer or representative of the Employer to determine whether the specified requirements have been met.

(3) After the equipment and components have been inspected in the workshop, any modifications or adjustments other than final adjustments for commissioning shall not be undertaken without the full knowledge of the Engineer and unless prior written approval has been received from the Engineer in this respect.

**Testing on site**

(1) After the equipment has been installed on site, the Subcontractor shall undertake performance tests of the equipment to ensure that the equipment is fully operational in compliance with the requirements of this specification. These tests shall be undertaken during the commissioning of the equipment on site.
(2) Should the Subcontractor be satisfied that such tests meet all the requirements of the specification, the Engineer shall be informed thereof so that inspections and tests may be undertaken by the Engineer and representatives of the Employer to determine whether the specified requirements have been met.

(3) All equipment, instruments and test equipment, including all interconnections for executing such tests, must be supplied by the Subcontractor.

(4) The Contractor or Employer shall provide the electrical supply at the specified voltage and rating free of charge where required to test the equipment on site.

(5) Should the results of such tests prove that the equipment does not comply with the requirements of this specification, the Subcontractor shall, without delay, at his own cost undertake modifications and adjustments as required, to ensure that the installation and equipment is modified to comply with the requirements of this specification. These modifications and adjustments shall be carried out with the full knowledge and approval of the Engineer.

Test schedule

(1) The Subcontractor shall supply the Engineer with a recommended test schedule two (2) months before tests are conducted in the factory or final tests are conducted on site.

(2) This test schedule shall furnish details on how the equipment will be tested. If necessary, the Engineer shall modify the proposed test schedule. The final schedule shall be used when conducting the tests.

(3) The test schedule will determine the tests and the sequence of tests to be done on site and must include the following:

(a) A detail test procedure to prove and ensure proper operation of the apparatus and equipment,

(b) A method how results will be tabulated under certain test conditions including the proposed measurement and observation of tolerances,
extreme values and normal operational values, and

(c) Test apparatus to be supplied by the Subcontractor to execute the particular tests.

2. **STRUCTURAL STEELWORK**

2.1 **General**

(1) All structural steel members, or assemblies, or frameworks in combination with floors and walls and other structural parts of the buildings, shall be capable of sustaining in a structurally stable manner and without exceeding the permissible stresses and limits of deflection hereinafter stated, the total dead and superimposed loads and forces acting on such members, assemblies, or frameworks.

(2) The maximum deflection as a result of distributed or point type applied loads on any beam with the exception of cantilever beams, must not exceed 1/1000 of the span length. The maximum deflection of cantilever type beams must not exceed 1/500 of the length of the beam fixed at one end. The aforementioned requirements must be adhered to unless alternative requirements are specified elsewhere in the Project Specification.

(3) Each part of the structural installation shall be correctly designed, constructed and erected. The construction and design shall comply with the SABS specifications covering structural steelwork.

(4) All welded joints shall comply with the requirements as specified in this General Technical Specification.

(5) Where applicable allowance shall be made for expansion and contraction of structural steel members to prevent undue stresses due to thermal variations in the environmental conditions.

2.2 **Holes**

(1) Holes shall be accurately drilled to a template. Burrs and rises shall be removed from the edges of holes before the work is assembled. Wherever possible, holes shall be drilled through all mating members or components
in one operation.

(2) The accuracy of all holes shall be such that when the work is assembled, a steel gauge of 0.8 mm less than the diameter of the holes can be passed through irrespective of the number of plates. Drift pins shall only be used for bringing the work together and no drifting enlargement of any holes will be allowed.

2.3 **Bolts**

(1) Bolts shall have well-formed heads forged from solid steel. Nuts shall closely fit the bolts so that they can only just be turned by hand and at least one clear thread shall project beyond the nut when fully tightened.

(2) All bolts shall have one serrated or spring type lock washer under the nuts or bolt heads, whichever is to be rotated during the tightening operation, and shall be so tightened that the threaded portion does not bear on the members connected. Where bolt heads or nuts bear upon bevelled or tapered surfaces they shall be provided with tapered washers of 2.3 mm mean thickness to provide a seating square with the axis of the bolt.

(3) Where holding down bolts, brackets, etc, are to be embedded in concrete they are to be fixed in their individual exact positions. Any cost incurred by subsequent repositioning of bolts, etc, resulting from the incorrect setting will be for the Subcontractor’s account.

2.4 **Connections**

All steelwork shall be shop welded and site bolted. Site welding will not be allowed without the approval of the Engineer. All end connections shall develop the full strength of the respective connected members.

2.5 **Erection**

(1) The method of erection shall be approved by the Engineer.

(2) The Subcontractor shall take all precautions to ensure safety and stability of the steelwork during erection and shall ensure that all steelwork is set in the exact position both horizontally and vertically as shown on the workshop drawings.

(3) Should the Subcontractor find it expedient to erect any of the individual
structural units in sections, he must obtain the Engineer's written approval of the position of the joints in the unit and the details of the splicing, etc, he intends using.

(4) No loading by stacking or placing materials or plant on any portion of the steel structures will be allowed without the prior permission of the Engineer.

(a) "Erection" shall include the installation of all items specified in the specification and shown on workshop drawings.

(b) Where machine baseframes or steel structural members are supported on concrete floors or fixed against concrete walls, the steel structures shall be properly aligned by installing supporting steel plate shims and then bolting the machine frames and steel structures to the concrete by means of the specified anchor bolts. Timber wedges shall not be acceptable.

(c) The Subcontractor shall set out, check and measure the line, level and plumpness of all steelwork using suitable recognised measuring instruments such as levels, theodolites, etc.

(d) After the steel bases have been properly aligned and fixed as specified, the support points of steel bases and structures shall be provided with grouting by the Subcontractor to fill and close off all open spaces between steel shims and the lower face of the steel machine bases and structures. This grouting shall be neatly tapered to prevent any water or moisture from collecting against the steel machine bases or steel structures, and a proper bond between the grouting and the concrete structure shall be ensured.

(e) Unless otherwise specified, the grouting shall be of 30 mPa strength.

(f) All cutting of steel plates and sections shall be done with profile cutters.
2.6 **Concrete bases and holding down bolts**

(1) All concrete bases and general concrete structural work shall comply with the general requirements as specified in the Project Specification.

(2) The Subcontractor shall be responsible for the accurate positioning of holding down bolts in concrete foundations and bases. The Subcontractor shall be required to check on site the location of the holding down bolts to satisfy himself as to their accuracy prior to the delivery of steel structures and in any event seven (7) days before erection.

(3) Holding down bolts shall be supplied in groups welded to form a grid with the grid holding straps at least 15 mm under the finished surface of the concrete.

(4) After the steel machine bases or steel structures have been anchored by means of the holding down bolts after the members have been properly aligned by the installation of steel plate shims, grouting shall be provided as infill at all spaces below such steel structures similar to the grouting as specified.

2.7 **Accuracy of fabrication and tolerances**

(1) All steelwork shall be fabricated to an accuracy so as to enable erection to the specified tolerances to take place without introducing permanent erection stresses into the structure.

(2) The following fabrication tolerances shall apply:

   (a) Deviation from line on any edge or surface Å 1:1000 but not more than 6 mm.
   (b) Length of member Å ± 1 mm.
   (c) Distance between bolt or rivet holes and/or welded connections Å ± 1 mm.
   (d) Machined surfaces Å ± 0,025 mm.
3. **WELDING**

   (1) Welding must be done under the supervision of a qualified person, who must decide on the sequence and welding procedure to be adhered to.

   (2) The welders employed by the Subcontractor during manufacture and erection must if required by the Engineer or Employer, undergo a test in welding.

   (3) The surfaces to be welded and the surrounding metal for a distance of at least 15 mm shall be cleaned and free from rust, scale, paint or other forms of foreign material. Fusion faces may be cut by shearing, clipping, machining or machine gas cutting. If the fusion face is rough, it shall be ground smooth before welding.

   (4) Welding shall be carried out in a manner which will prevent any distortion of the weld or the parent steel section.

   (5) Welds shall be of full strength without flaws, grooves or pits. Crater effects shall be prevented at the end of all welding joints.

   (6) All welds shall have adequate root fusion and shall be free from cracks, porosity or other irregularities and any undercutting shall be made good by the deposition of additional runs of weld metal. Any completed welds showing cracks, cavities or other defects shall be cut out and made good at the Subcontractor's own cost.

   (7) Intermittent welding joints and butt welding joints without sufficient penetration shall not be used. Joints in all main structures shall be annealed where necessary.

   (8) Welding shall only be done in the workshop or on level concrete floors on site only. In situ joints shall all be of the bolted type, unless specifically approved by the Engineer. In the latter case the Subcontractor might be called upon by the Engineer to have tests and inspections conducted of such joints in terms of the requirements stated.

   (9) When welding is done on site on steel plates and/or brackets cast into concrete, the plates shall be cooled by a cooling method which prevents the heat generated from damaging the concrete.
(10) All welding joints must be thoroughly cleaned after welding.

(11) The Engineer may at his discretion have welding joints inspected and tested by experts or a recognised Bureau of Standards to determine whether such joints comply with the specification. Should any doubt on the strength of a joint exist the Engineer may at his discretion instruct the Subcontractor to have such joints subjected to X-ray inspection.

4. **FIXING OF STEELWORK COMPONENTS TO CONCRETE FLOORS, CONCRETE WALLS AND CONCRETE CEILINGS**

(1) Steelwork or any other components of the installation shall be fixed where necessary to concrete floors, concrete walls and concrete ceilings only.

(2) Where steel components must be fixed to concrete walls by means of bolts and nuts, this shall be done by means of a self-drilling anchoring system or by means of bolts inserted in holes drilled in the concrete and fixed by means of the "Chemset" type anchoring system.

(3) Where steel components must be fixed to concrete floors, the steel must be fixed by means of holding down bolts as specified or alternatively by means of the "Chemset" type anchoring system or expansion bolts.

(4) In the event of any such bolts striking reinforcing steel in existing concrete structures, the bolts will have to be repositioned as specified by the Engineer. Base plates or gusset fixing brackets and plates will also have to be amended accordingly.

(5) Alternatively a diamond tip drill may, with the approval of the Engineer, be utilized to drill into concrete and steel simultaneously for installing such anchor bolts.

(6) No claims for additional cost in respect of such adjustments or modifications will be entertained. The Subcontractor must utilize a suitable testing device for ascertaining the position of reinforcing steel before drilling such holes for installation of anchor bolts.

(7) Where load-bearing steel components must be installed in areas where brick walls are provided, special steel angle, channel or I-sections shall be installed spanning the brick wall section and bolted to concrete sections of
the wall. Components shall then be welded to the latter sections.

(8) Where non-direct load-bearing steel components are installed, these may, with the approval of the Engineer, be fixed to brick walls by means of bolts and nuts fixed with expansion bolts.

5. **MECHANICAL INSTALLATION EQUIPMENT AND COMPONENTS**

5.1 **General**

(1) All material, equipment and components shall be of the best quality for the purpose and shall be new and manufactured of materials that are completely free of all obvious imperfections such as slag inclusions, cracks and blowholes.

(2) No castings, forgings or any other materials that are obviously faulty shall be acceptable, not even under guarantee of replacement in case of failure.

(3) No painting or filling-up of castings shall be permitted prior to inspection by the Engineer. No repair shall be undertaken on castings without the written consent of the Engineer.

(4) All castings irrespective of type shall be thoroughly cleaned and annealed prior to final machining.

(5) All holes and all securing bolts for equipment and components shall be properly fitted in the relevant holes and shall be accessible and must be securely locked, generally complying with the requirements as specified in this Part 4 of the specification.

6. **PAINTING AND FINISH OF STRUCTURAL STEELWORK AND MECHANICAL EQUIPMENT**

6.1 **General**

(1) All surfaces of structural steel members and general components manufactured of cast iron, steel or any other alloy which under normal environmental conditions would be subject to corrosion shall be suitably protected as specified.

(2) Paint shall be supplied in containers clearly marked with the
manufacturer's name and the identifying brand number or name.

(3) The paint shall be used as prepared by the manufacturer without thinning or other admixture unless epoxy based paints are utilized.

(4) All painting shall be done on dry surfaces which have been thoroughly power wire brushed or sand blasted so as to be free from rust, scale, grease or any other foreign matter to the satisfaction of the Engineer.

(5) The type of paint utilized for structural steelwork and mechanical components shall comply with the requirements of the appropriate SABS specification and the correct primer coat shall be utilized with the appropriate final coat of paint as specified.

(6) Galvanised components to be painted must initially be rinsed with a galvanised metal cleaner and thereafter a galvogrip calcium plumbate metal primer shall be applied before the final coat of paint to the surfaces is applied.

(7) Should alternative paints be offered which do not comply specifically to SABS specifications, complete detail of the specification to which such paints apply or detail of the particular paints as offered, must be submitted at tender stage.

(8) It is important that detail technical information be submitted should alternative paints be utilized, e.g. water based paints on structural steelwork, steel components or other type of metals.

6.2 **Preparation of steel surfaces before painting**

(1) Depending upon the condition of the steel surfaces, the process of preparing these surfaces must be such that physically adhering contaminants are removed and, if required, chemical bonding contaminants must be removed according to the requirements of SABS 064.

(2) Millscale, corrosion, weathered and disintegrating paint must be removed by means of scraping and brushing by hand or other mechanical means. Should this method not be possible, an acceptable sand blasting process must be utilized to prepare steel surfaces for painting.
(3) After the cleaning process has been completed, a method of protecting the steelwork against corrosion must be applied according to the requirements of SABS 1200 HC. Dust, debris and decaying material which is present on the substrates of the steel surfaces must not exceed the recommended minimum of 0.3% as described in SABS SM 769 before the primer coat of paint is applied.

6.3 **Painting of structural steelwork**

(1) Before despatch from the factory, all structural steelwork used in the installation shall be painted with a zinc chromate or equivalent primer coat suitable for an epoxy based paint in compliance with the requirements of the appropriate SABS specification for structural steelwork. The paint shall be applied within 4 hours after wire-brushing or sand-blasting. The minimum film thickness shall be 0.025 mm.

(2) A type 1 grade 1 primer shall be used throughout. The primer coat shall be applied before any portions are assembled.

(3) All field bolting and welds and abrasions of the initial coats of paint shall be spot painted with the paint used for the final coat.

(4) Structural steelwork must be covered with a single layer of corrosion inhibiting primer coat and thereafter with two separate coats of paint in agreement with SABS 1200. Structural steel exposed to the atmosphere must be provided with such coats of paint as specified in clause 5.8 of SABS 1200 HC and special care must be taken that the requirements of this specification are complied with.

(5) Depending upon alternative type of water based paints as offered, the Engineer will determine whether such a primer coat is required before steelwork is dispatched from the factory.

(6) Certain paints of the type presently not complying to the SABS specification, include special corrosion neutralising additives which ensure that the paint is best applied after erection on site.

(7) This alternative approach must however be done under strict control to ensure that steelwork is painted before corrosion has occurred in excess of the effective neutralising additives treatment can be effected.
6.4 **Mechanical equipment and components**

Equipment and components must be painted with a suitable primer and a minimum of one coat of paint of the final colour before being dispatched from the factory and shall comply with the requirements specified for structural steelwork.

7. **LUBRICATION**

7.1 **Methods to be used**

(1) The various methods of lubrication to be used throughout the installation shall be to the satisfaction of the Engineer. Centralized and/or automatic lubrication systems shall be used where such systems have a practical advantage. Full details of the proposed system shall be submitted by the tenderers which shall clearly indicate for what purpose centralized and/or automatic lubrication systems will be supplied.

(2) Provision shall be made to protect all bearings and moving parts against debris, dust, sand, etc, and cleanliness and neatness of operation shall be maintained throughout the installation.

(3) As specified for bearings, ball and roller bearings shall (where possible and available) be of the sealed type. Where such bearings are not of the sealed type, the bearings shall be provided with grease nipples and orifices to inject the grease. The bearings shall be packed with grease as specified by the manufacturer. Each side of the bearings shall be protected by means of a dust cover seal.

7.2 ** Provision of lubricants**

(1) All lubricating oils and grease shall be supplied by the Subcontractor for the full duration of the twelve months maintenance period.

(2) The type of lubricants for the installation shall be selected and based upon the recommendations for the manufacturers of the gearboxes, bearings, bushes, chains, ropes, etc, and shall comply with the requirements of such recommendations.

(3) Where no such recommendations are made, the following requirements shall be adhered to:
(a) General purpose grease used for lubricating bearings, bushes, links, etc, shall be of the lithium based type.

(b) Where the lubricant will be exposed to high environmental temperatures, the grease shall be of the calcium based type; and when exposed to moisture and water, the lubrication shall be of the general purpose type.

(c) Lubricating oils shall be of the mineral oil type, the viscosity of the oil being selected to comply with the requirements of the suppliers of the mechanical equipment and components.

7.3 **Lubricating schedule**

(1) A lubricating schedule for each machine unit and equipment shall be supplied by the Subcontractor when the installation is completed.

(2) A part from the aforementioned requirements, the Subcontractor shall make a recommendation regarding the type of lubrication which shall be utilized for each component. The Subcontractor shall give the trade names as well as the names of two suppliers and type of lubricants that shall be utilized for the lubrication of the equipment.

(6) The viscosity at two standard temperatures and the required physical characteristics of the lubricant shall be given.

(7) The lubricating data which shall be supplied by the Subcontractor shall include the following:

(a) Approximate quantity required for initial filling.

(b) Expected rate of use of the lubricant and/or recommended intervals for a complete replacement of lubricant.

(c) A lubricating chart showing all lubrication points. All methods of lubrication which are provided shall be arranged so that maintenance personnel will be able to thoroughly and effectively lubricate all wearing surfaces.

8. **SPARE PARTS**

(1) One (1) month before completion of the installation, the Subcontractor shall supply to the Engineer a recommendation containing a list of components which
should be acquired as spares for maintenance purposes. The list (in triplicate) shall include the number of components which should be kept in stock as well as the unit price of such components (the date and exchange rate of prices, if applicable, shall be stated).

(2) The following information shall be submitted with the list:
   (a) The exact code or identification number of the component.
   (b) The firm or agency in South Africa from whom or through which an additional number of the components could (if necessary) be acquired.
   (c) Cross-reference numbers of such components referring to identification numbers given in the maintenance and instruction manuals. When tendering, the tenderer shall recommend which component values shall be acquired as spares for the installation.

9. **SCOPE OF WORKS**

The supply, delivery, installation & commissioning of a two (2) stop disabled passenger lift, as specified further hereto.

The contractor shall be responsible for compliance with all regulations as required by the Occupation Health & Safety Act, 1993 (Act 85 of 1993) and shall obtain all approvals and arrange for inspections from the Department of Labour.

10. **DRAWINGS & TECHNICAL INFORMATION**

Drawings for approval

Four weeks after award of the subcontract, the contractor shall submit two (2) copies of the following drawings to the Engineer for approval. The cost thereof shall be included in the tender price. These drawings shall be approved by the Engineer prior to commencement of manufacture or prior to purchasing any equipment or components. The approval of any drawings, material or equipment, shall not in any way relieve the Contractor of his responsibilities for the successful and correct operation of the installations.

(1) General layout (plans and sections) of the lift installations.

(2) Drawings indicating all structural requirements of the installation. The Contractor shall carefully study all architectural and structural drawings and shall give information regarding structural changes, additional structural provisions, e.g. holes in concrete, concrete upstands, etc, and any other
information having an influence on the structure as shown on the drawings at tender stage. This cannot be accommodated at a later stage. The Contractor will be held responsible for any of the abovementioned changes not mentioned at tender stage.

(3) Drawings showing all loads and the position of the loads that will be exerted on the structure.

(4) Detailed layout (plans and sections) showing all driving systems and equipment, e.g. motors, gearboxes, etc.

Final drawings

(1) After the Engineer has approved in writing the drawings submitted for approval, the Contractor shall supply the Engineer with two (2) copies of the drawings showing all detail as required including all changes indicated by the Engineer on the approved drawings.

(2) Where drawings are amended during the execution of the subcontract, the Contractor shall immediately replace the drawings with amended copies at his own cost.

(3) All final drawings shall be certified as correct by the Contractor.

(4) At least one copy of each relevant drawing shall be kept on site by the Contractor and shall at all reasonable times be available to the Engineer for reference purposes.

Maintenance manuals

(1) Upon completion of the installation, two (2) maintenance manuals in hard copy format as well as a copy on CD shall be supplied.

(2) In general the maintenance manuals must include the following:

(a) A general description of the complete mechanical, electrical and electronic system and ancillary equipment.

(b) A general description of the control system in detailed block diagram format.

(c) Final "as built" drawings and schedules. The drawings shall include all
interconnecting cable information forming part of the installation.

(d) Complete wiring diagrams of the installations.

(e) A schedule of all interconnecting and interlocking control systems including interface switches, sensors, PC boards, etc.

(f) Schedule of all mechanical, electrical and electronic components and equipment complete with all model numbers, modifications to standard and existing equipment, electrical power requirements, catalogue numbers, suppliers of the equipment, ordering numbers of equipment, etc.

(g) A list of the suppliers of the equipment including the addresses and telephone numbers in South Africa and a list of their overseas suppliers where applicable.

(h) Lubricant table and cleaning instructions for the lifts.

(i) Factory commissioning report and tabulated commissioning data of all equipment detailing adjustment settings to be adhered to during re-commissioning of the installation.

(j) SANS 50081 Annexure A certificates.

**Keys**

A set of standardised keys for each car operating panel shall be supplied.

11. **QUALITY CONTROL**

(1) The contractor shall maintain adequate and effective quality control standards while manufacturing the specified equipment. The Engineer shall have the prerogative of inspecting the equipment in the contractor's factory at any reasonable time to ensure accuracy of dimensions, completeness, configuration, quality of workmanship, correct identification, proper use of and type of materials, equipment used and finishes to equipment.

(8) The contractor must maintain a high quality of workmanship. The Engineer shall have the prerogative (irrespective of any other control which he may have in terms of this subcontract) of specifying the standard of quality and shall be in full control to determine whether the installation or individual portions thereof are acceptable or not acceptable.

(9) The Contractor shall be informed should the equipment or workmanship not be acceptable. In such a case the Contractor shall replace the equipment and/or perform the remedial work immediately.
(10) If required, the contractor shall provide the Engineer with equipment and facilities to examine all equipment and if necessary, test this equipment to preclude malfunctions of the equipment.

(5) The Engineer reserves the right to witness all tests conducted in accordance with the final acceptance of the installation. The Engineer shall be informed 14 days in advance prior to actual tests being done.

12. **ENVIRONMENTAL CONDITIONS**

As per National and Local Environmental legislations of South Africa.

13. **SITE SURVEY**

(1) Before any manufacture or erection work is done by the contractor, a site survey shall be conducted by the Contractor to determine exact site dimensions.

(2) In the manufacture of the supporting steelwork and equipment, the Contractor shall make allowance for any deviation of actual site dimensions when compared with actual dimensions shown on the drawings. Claims due to adjustments made on site, due to lack of a comprehensive site survey, shall not be entertained.

(3) All deviations shall immediately be reported to the Engineer in writing.

14. **CRANES AND HOISTING EQUIPMENT**

(1) The contractor shall supply or hire all cranes or hoisting apparatus required for erecting the installation.

(2) Before any cranes and hoisting machinery are used, the Engineer must be informed of the position, nature of the load and the method of supporting the crane on concrete slabs.

15. **PROTECTION OF ELECTRICAL/ELECTRONIC EQUIPMENT**

(1) Electrical/electronic equipment shall be properly protected against damage, faulty operation or interference by any external source in the building, for example static electricity, induced voltages, magnetic forces, radio waves, etc.
(2) Equipment sensitive to interference and spikes in the electrical supply or variations in the frequency and voltage (as normally occurs in the electrical reticulation network and municipal supply to the building) shall be equipped with the necessary stabilizers, over- and undervoltage protection, suppressors, etc.

(3) Equipment shall be manufactured and installed in such a manner to prevent interference or have an effect on the operation of other equipment.

16. **LIFT SPECIFICATION**

<table>
<thead>
<tr>
<th><strong>Position</strong></th>
<th>As shown on drawings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Quantity</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td>Lift for disabled persons</td>
</tr>
<tr>
<td><strong>Capacity</strong></td>
<td>300 kg (1 x disabled + 1 x assist or 4 person)</td>
</tr>
<tr>
<td><strong>Speed</strong></td>
<td>0.15 m/s</td>
</tr>
<tr>
<td><strong>Travel</strong></td>
<td>3200 mm</td>
</tr>
<tr>
<td><strong>Shaft type &amp; dimensions</strong></td>
<td>Aluminium structure – outdoor - 1530 mm x 1540 mm</td>
</tr>
<tr>
<td><strong>Guide rail position</strong></td>
<td>Left</td>
</tr>
<tr>
<td><strong>Overhead</strong></td>
<td>2900 mm</td>
</tr>
<tr>
<td><strong>Minimum lift car internal dimensions</strong></td>
<td>1000 mm x 1300 mm x 2000 mm (H)</td>
</tr>
<tr>
<td><strong>Number of landings</strong></td>
<td>Ground &amp; First Floors</td>
</tr>
<tr>
<td><strong>Lift operation control system</strong></td>
<td>Simplex collective control</td>
</tr>
<tr>
<td><strong>Type of lift machine</strong></td>
<td>Hydraulic</td>
</tr>
<tr>
<td><strong>Lift and landing doors</strong></td>
<td>Automatic swing doors – Panoramic aluminium with transparent glass; natural anodized aluminium</td>
</tr>
<tr>
<td><strong>Minimum clear door width and height</strong></td>
<td>900 mm wide x 2000 mm high</td>
</tr>
<tr>
<td><strong>Landing operating panel</strong></td>
<td>Brushed stainless steel</td>
</tr>
<tr>
<td><strong>Pit dimensions</strong></td>
<td>1560mm x 1560mm x 120mm Deep</td>
</tr>
<tr>
<td><strong>Lift Car profile</strong></td>
<td>Anodised aluminium – natural</td>
</tr>
<tr>
<td><strong>Lift Car push button box</strong></td>
<td>Brushed stainless steel – Car sling side</td>
</tr>
</tbody>
</table>
17. **CONTROL SYSTEMS**

(1) The lifts shall be equipped with modern technology microprocessor based control systems. Each control system shall have an advanced state-of-the-art microcomputer which shall be used for group and individual lift car control.

(2) The control system shall be designed in such a fashion to exercise control over the various traffic flow patterns which may be encountered in the building.

(3) A detailed description of the control systems shall be submitted with the tender.

(4) All wiring of the lift installations shall be clearly marked in accordance with the wiring diagrams.

18. **CAR OPERATING PANELS**

(1) Each lift shall be equipped with two flush mounted car operating panels. The type and layout of the car operating panels shall be specifically approved by the Engineer before manufacturing thereof may commence.

(2) The panel shall be equipped with the following:

   (a) Push buttons for each landing. All push buttons shall be of modern design, but shall however be sufficiently robust to withstand heavy duty vandal proof operation. All push buttons shall have raised numerals for the convenience of visually impaired persons.

   (b) An alarm push button.

   (c) A "door open" push button.

   (d) A "door close" push button.

(3) The bottom part of one car operating panel in each lift shall have a lockable recessed panel to accommodate the following:

   (a) A lift light switch.

   (b) A lift fan switch.

   (c) An inspection switch.

   (d) An independent control key switch.

   (e) An "ON/OFF" switch.
(4) The push buttons for selecting a level shall utilize solid state electronic technology and light emitting diodes (LED's) for illumination. The push buttons shall illuminate when a call is registered and shall remain illuminated until a call has been answered.

(5) The alarm push button shall be identified with an international accepted symbol. The alarm shall be connected to a 50 mm dia alarm bell mounted underneath the lift car.

(6) The "door open" and "door close" push buttons shall be identified with internationally accepted symbols. The symbols shall be neatly engraved on the push buttons.

(7) The inspection key switch shall enable an authorised lift maintenance official to control the lifts during maintenance operations.

(8) The layout of the car operating panels and all engraving shall be approved by the Engineer before installation and for this purpose a drawing of a typical panel shall be submitted to the Engineer.

(9) The particulars of the lifts as required by regulation, i.e. name, number, maximum load and maximum number of persons, shall be engraved on the car operating panels.

(10) Warning signals shall be shown on the car operating panels when an overload situation occurs in a lift.

(11) The car operating panels shall be installed at a height convenient for the use thereof by persons in wheelchairs.

19. **LIGHTING**

The illumination level in each lift at floor level with the ceiling diffuser installed and the lift doors closed, shall be at least 160 Lux.

20. **LIFT DOORS**

(1) Supply and install automatic swing doors.

(2) Glass lift doors shall consist of toughened safety glass.

(3) The doors shall be electro-mechanically driven.
(4) A modern technology door detection shall be supplied and installed for the lift doors to prevent the door from closing when persons are entering or leaving the car or when stretchers or goods are being loaded or unloaded. A description of the detection system being offered shall be included in this tender.

21. **DOOR INTERLOCKS**

The hoist way entrances shall be suitably interlocked to:

1. Prevent movement of a car from that landing until the door is locked in the closed position and prevent opening of a door at any landing from the corridor side (except by means of a special key by an authorised person) unless the car is at that landing.

22. **NO SMOKING SIGN**

A "NO SMOKING" sign according to the regulations shall be engraved on the car operating panels.

23. **OVERLOAD FACILITIES**

When a lift is loaded to more than the lift capacity, then the lift shall not move from the landing until the overload condition ceases to exist. A warning light and buzzer on the car operating panel shall indicate this overload condition.

24. **GUIDES**

1. Guides shall be solid machined T-section guides of ample size with milled tongued and grooved joints. The set of guides shall be constructed as a double set for the two perpendicular directions. The guides shall be fixed to the concrete wall at distances not exceeding 2.5 m. Guides shall be accurately installed to prevent lateral deflection of the lift cars when in motion.

2. Guides shall not become distorted when the safety gear is applied, or by eccentric loading of the lift car.

25. **LANDING EQUIPMENT**

**Push buttons**

1. The lifts shall be equipped with flush mounted push buttons at each level. All
push buttons shall be of modern design, but shall however be sufficiently robust to withstand heavy duty vandal proof operation. All push buttons shall have raised numerals for the convenience of visually impaired persons. A sample of the type of push button shall be submitted to the Engineer for approval before installation.

(2) All push button boxes shall have suitable stainless steel cover plates.

(3) All push buttons shall be installed at a height convenient for use by persons utilising wheelchairs.

Hoistway architraves

(1) Supply and install stainless steel door architraves for all the hoistway entrances.

(2) The contractor shall prepare a drawing of a typical architrave and submit it to the Engineer for approval before the manufacture of the architraves commence.

26. **STANDBY BATTERY SET**

Each lift shall be equipped with a standby battery/battery charger set to provide power to the lift to ensure the lift car returns to Ground in the event of a power failure.

2.1 **MAINTENANCE**

Service period

(1) The successful contractor shall undertake the servicing of the installation covered by the contract for a period of twelve (12) months after acceptance. During this period statutory inspections shall be made by the successful tenderer's own employees, who shall be responsible for the cleaning, lubrication, adjustment and replacement of parts due to normal wear and tear.

(2) In addition, the Owner shall have the right to demand breakdown service, free of charge, throughout the 24 hours a day, 7 days a week, for the period of twelve (12) months covered by the service period.
The successful contractor shall submit a proposed maintenance agreement for consideration.

**Part C3.5**

**Technical Specification – Electrical Installation**

1. **GENERAL**

1.1 The electrical contractor shall obtain all rules, regulations and standard technical requirements from the local authorities and allow for the implementation thereof in the tender price.

1.2 The work shall at all times for the duration of contract be carried out under the supervision of a skilled and competent representative of the contractor, who will be able and authorized to receive and carry out instructions on behalf of the contractor. A sufficient number of workmen shall be employed at all times to ensure satisfactory progress of the work.

2. **SETTING OUT OF WORK**

2.1 The contractor shall be responsible for marking out and setting out of all items of equipment and plant. The positions of items of electrical equipment and plant indicated on the drawings are to be taken as approximate. The exact positions for fixings shall be obtained by site measurements. In case of doubt, decisions shall be obtained from the consulting engineers.

3. **SCOPE OF THE ELECTRICAL INSTALLATION**

The following items form part of this contract, the general electrical contract:

- Replacement of existing luminaires
- Installation of new power outlets and isolators
- LV cabling & wiring
- Installation of new distribution panels
- Upgrade of existing distribution panels
4. **LOW VOLTAGE CABLES**

a. All low voltage cables shall be terminated inside distribution boards with glands (Pratley, similar and/or equal). Should the contractor wish to use other cable glands than the type specified above, a sample of each size of such glands shall be submitted to the engineer for approval beforehand.

b. The individual cable cores shall be connected to the connecting terminals by means of crimped cable lugs of the correct size.

c. Only hydraulic crimping tools shall be used for crimping. No hand crimping tools will be allowed on cable sizes above 16mm².

d. All LV cables shall be of the 600/1000V grade, PVC insulated, PVC bedded, armoured and unarmoured as specified, black extruded PVC outer sheaf and be manufactured in accordance with SABS 1507 except where otherwise specified.

e. Only copper cables and busbars shall be used throughout. Preliminary routes of cables are as indicated on drawings. The exact routes and positions must be determined on site in collaboration with the consulting engineer. The subcontractor is advised to determine from actual size and exact length of cables required as he will not be paid for surplus cables. Cable joints will not be permitted where possible.

5. **DISTRIBUTION BOARDS**

5.1 **GENERAL**

5.1.1 All distribution boards shall be manufactured in accordance with the given single line drawings. Tenderers shall ensure that the distribution boards offered to them by suppliers conform in all aspects with SABS specifications 1180, Parts 1, 2 and 3 as applicable.

5.1.2 The subcontractor shall submit workshop drawings (single line) and layout drawings of all distribution boards to the engineer for approval prior to manufacturing. These drawings shall be stamped and approved by the subcontractor before they are handed to the engineer. The engineers' approval, however, does not exempt the subcontractor of the requirements of this specification.

5.1.3 It is the contractors’ responsibility to check whether the space provided for...
distribution boards are of adequate size to accommodate the boards and the cable distribution. Any revisions to provided space must be pointed out by the contractor before it is built.

5.1.4 All switchgear used on the boards shall have a current braking capacity of not less than 5 kA unless alternatively specified and shall carry the SABS mark of approval.

5.2 DISTRIBUTION BOARDS - FLUSH, SEMI-FLUSH OR SURFACE TYPE

5.2.1 BONDING TRAY

5.2.1.1 The bonding tray shall be pressed and welded construction using 1.6 mm galvanized sheet steel. The outside lip shall be flanged out for 6 mm and knockouts shall be provided at both top and bottom of the tray. These knockouts shall mainly be 20 mm but two 25 mm shall be provided at each end. The total number of 20 mm knock-outs on each shall not be less than the number of circuit breakers (including spares) carried on the board. The back of the tray shall be fitted with diamond mesh spot welded to the tray to facilitate plastering where applicable.

5.2.1.2 An architrave frame formed with bevelled edges, which shall accommodate equipment cover and doors(s) shall be fixed for the bonding tray in a suitable manner so as to allow for adjustment for depth, out of plumb, and for wall finish inequalities. The architrave shall overlap the tray by not less than 26 mm all round.

5.2.1.3 Chassis for mounting of equipment fixed to bonding tray, shall be rigid construction made of 2 mm sheet steel and provided with the necessary means for fixing of circuit breakers, isolators, etc.

5.2.1.4 Panels of flat sheet steel with machine punched slots to allow for flush mounting of circuit breakers and isolators where required.

5.2.1.5 Semi-flush boards must be provided with 40 mm architrave extension frames.

5.2.2 DOORS

5.2.2.1 Doors of smooth flat finish suitably braced to ensure stiffness and recessed flush in the architrave. Catches shall be of an approved manufacture, as specified.
5.3 PAINT FINISH

5.3.1 FINISH REQUIRED

Metal components of the framework, panels and chassis shall be finished with a high quality paint applied according to the best available method. Baked enamel, electrostatically applied powder coating or similar proven methods may be used. Care shall be taken to ensure that all edges and corners are properly covered.

5.3.2 BAKED ENAMEL FINISH

Prior to painting, all metal parts shall be thoroughly cleaned of rust, millscale, grease and foreign matter to a continuous metallic finish. Sand or shot blasting, or acid pickling and washing may be employed for this purpose. Immediately after cleaning all surfaces shall be covered by an electrolytically applied rust inhibiting, tough, unbroken metal phosphate film and then thoroughly dried. Within forty eight (48) hours after phosphatising, a passivating layer consisting of a high quality zinc chromate primer shall be applied, followed by two (2) coats of high quality baked enamel to SABS 783 type 1. The minimum paint thickness after baking shall be 0.06 mm. The paint shall have a shock resistance of 25 kg - cm on 0.9 mm soft steel plate and a scratch resistance of 2 000 grams.

5.3.3 POWDER COATED FINISH

Prior to painting, all metal parts shall be thoroughly cleaned of rust, millscale, grease and foreign matter to a continuous metallic finish. Sand or shot blasting, or acid pickling and washing may be employed for this purpose. The metal parts shall be preheated and then covered by a micro structured paint powder applied electrostatically. The paint shall be baked on and shall harden within 10 minutes at a temperature of 190°C. The minimum paint thickness after baking shall be 0.05 mm and shall have a shock resistance of 25 kg - cm on 0.89 mm soft steel plate and a scratch resistance of 2 000 grams.

5.3.4 COLOUR

The colour shall be white on the outside for non-essential boards and white on the inside for all boards unless specified to the contrary. Red for essential and blue for UPS sections on the outside.
5.3.5 **MAKING GOOD**

Before the installation is handed over, the electrical subcontractor shall ensure that all paint surfaces are clean and undamaged.

5.3.6 **BUSBARS**

Copper busbars, provided for each phase and neutral shall be mounted on insulators or fixed directly to the terminals of single pole miniature circuit breakers only. Boards shall be suitably sized to accommodate, without undue cramping, the equipment.

A substantial brass earth bar, solidly bonded to the metal work of the board, is to be provided with connectors for the incoming earth conductor and the earth wires of outgoing circuits on non-essential power sections. Essential and UPS power sections shall have a separate busbar mounted on insulators and all earth wires to and from this earth busbar shall be insulated.

5.3.7 **BOLTS & NUTS**

Only cadmium-plated high tensile steel bolts and hexagonal nuts may be employed at busbar joints and connection points. All nuts shall be provided with spring washers or be of the "NYLOCK" type with washers. The largest possible size bolt that will fit into holes in lugs and fixing holes of equipment shall be used in every instance. Bolts shall be of sufficient length that at least two but no more than five threads protrude beyond the nut.

5.3.8 **WIRING**

The current rating of conductors for the internal wiring shall be sufficient for the maximum continuous current that can occur in the circuit.

The wiring shall in all cases conform to SABS 0142. Connections to busbars are to be made by means of lugs suitably bolted and locked using cadmium-plated high tension steel bolts and in equipment, the end strands must be neatly and tightly twisted together and secured. The cutting away of wire strands will NOT be permitted.

5.3.9 **DISTRIBUTION BOARD MANUFACTURERS**
Only reputable distribution board manufacturers shall be considered.

6. **CONDUIT**

6.1 **CONDUIT GENERAL**

6.1.1 The type of conduit and accessories required for this service shall consist of plain end metallic galvanized conduit and accessories as per SABS 1065 for surface installations as well as non-metallic conduit and accessories as per SABS 950 for cast in conduiting. Unless other methods of installation are specified for certain circuits, the installation shall be in conduits throughout. No open wiring will be permitted for lights and socket outlet circuits other than on cable baskets where twin and earth must be used.

The conduit to be used shall have an external diameter of not less than 20 mm. In all other instances the sizes of conduits shall be in accordance with the wiring code for the specified number and size of conductors, unless otherwise directed or indicated on the drawings. All metallic conduits shall be manufactured of mild steel with a minimum thickness of 0.9 mm for plain end. The use of plain end conduit in reinforced concrete slabs will be limited to conduit having a wall thickness of not less than 1.2 mm.

6.1.2 Bending and setting of conduit must be done with special bending apparatus manufactured for the purpose and which are obtainable from the manufacturers of the conduit systems. Damage to conduits caused by the use of incorrect bending apparatus or methods applied must, on indication by the consulting engineer, be completely removed and rectified. Any wiring already drawn into such damaged conduits must be completely renewed at the contractor's expense.

6.1.3 Where non-metallic conduits have been specified to be installed on surface in ceiling voids for a particular service, the conduits are to be supported and fixed with saddles with a maximum spacing of 450 mm throughout the installation. The contractor shall supply and install all additional supporting timbers in the roof space as required. Stranded bare copper conductors shall be installed in the conduits and fixed securely to all metal appliances and equipment, including metal switch boxes, socket outlet boxes, switchboards, luminaires, etc. The securing of earth conductors by means of self-threading screws will not be permitted.
6.1.4 In order not to delay building operations, the contractor must ensure that all conduits and other electrical equipment which are to be cast in the concrete columns and slabs are installed in good time. The contractor shall have a representative and attendance at all times when the casting of concrete takes place.

7. **WIRING**

7.1 Unless otherwise specified in this specification, shall wiring be carried out in the following manner:

7.1.1 Insulated conductors in conduit, wire trunking, power skirting for all circuits enclosed over its full length.

7.1.2 Twin & earth on cable baskets, in conduiting etc. for circuits not enclosed for any section of its length.

7.2 No wiring shall be drawn into conduit until the conduit installation has been completed and all conduit ends provided with bushes. All conduits must be cleared of moisture and debris before wiring commences. The cost of electrical circuit wiring in the bills of quantities shall include draw wires in conduit where required.

7.3 Unless otherwise specified in this specification or indicated on the drawings, the wiring of the installations shall be carried out in accordance with the wiring code. Further to the requirements concerning the installation of earth conductors to certain light points, as set out in the wiring code, it is a specific requirement of this document that where plain or metallic conduit or non-metallic conduit has been used, earth conductors must be provided and drawn into the conduit with the main conductors to all points, including all lighting points throughout the installation.

7.4 Wiring of lighting circuits is to be carried out with 2.5 mm² conductors and a 2.5 mm² bare copper earth conductor (loose conductors or twin & earth where applicable). In certain instances (as will be directed elsewhere in this specification or indicated on the drawings), the sizes of the aforementioned conductors may be increased for specified circuits. Sizes of conductors not specified must be determined in accordance with the wiring code. All wiring shall be done in PVC insulated 600 / 1 000 Volt cable to SABS 1507 standard or twin & earth where required.
7.5 Where conductor ends connect onto switches, fittings, etc the end strand must be neatly and tightly twisted together and firmly secured. Cutting away of wire strands of any conductor will not be allowed.

7.6 All twin & earth and surfix terminations to boxes and equipment shall be secured by compression glands.

7.7 All earth wires connected to the dedicated socket earth system shall be insulated and fed from the insulated earth bar in DB’s. The size of the insulated earth wire shall be equal to the size of the associated live wire. The system earth shall have no connection to the building earth.

8. **EARTHING OF THE INSTALLATION**

8.1 **GENERAL**

All hot and cold water pipes shall be connected with 12mm x 0,3mm perforated or solid copper strapping (not conductors) to the nearest switchboard. The strapping shall be fixed to the pipework with brass nuts and bolts and against walls with brass screws at 150mm centres. In all cases where metal water pipes, down pipes, flues, etc are positioned within 1,6m of switchboards, an earth connection consisting of copper strapping shall be installed between the pipework and the board. In vertical building ducts accommodating both metal water pipes and electrical cables. All the pipes shall be earthed at each distribution board.

8.2 **SUB-DISTRIBUTION BOARDS**

A separate earth connection shall be supplied between the earth busbar in each sub-distribution board and the earth busbar in the main switchboard. These connections shall consist of armoured cables with separate earth continuity conductors or insulated stranded copper conductors in the same conduit as the supply conductors.

8.3 **SUB-CIRCUITS**

The earth conductors of all sub-circuits shall be connected to the earth busbar in the supply board in accordance with SABS 0142.

8.4 **RING MAINS**
Common earth conductors may be used where various circuits are installed in the same wireway in accordance with SABS 0142. In such instances the sizes of earth conductors shall be equivalent to that of the largest current carrying conductor installed in the wireway, alternatively the size of the conductor shall be as directed by the engineer. Earth conductors for individual circuits branching from the ring main shall be connected to the common earth conductor with T-ferrules or soldered. **THE COMMON EARTH SHALL NOT BE BROKEN.**

8.5 NON-METALLIC CONDUIT

Stranded copper earth conductors shall be installed in the conduits and fixed securely to all metal appliances and equipment, including metal switch boxes, -socket outlet boxes, switchboards, luminaires, etc. The securing of earth conductors by means of self-threading screws will not be permitted.

8.6 FLEXIBLE CONDUIT

An earth insulated conductor shall be installed in all flexible conduits. This earth conductor shall not be installed externally to the flexible conduit but within the conduit with the other conductors. The earth conductor shall be connected to the earth terminals at both ends of the circuit.

8.7 CONNECTIONS

Under no circumstances shall any connection points, bolts, screws etc used for earthing be utilized for any other purpose. It will be the responsibility of the contractor to supply and fit earth terminals or clamps on equipment and materials that must be earthed where these are not provided. Unless earth conductors are connected to proper terminals, the end shall be tinned and lugged.

8.8 SYSTEM GROUNDING REQUIREMENTS

All earth wires connected to the dedicated socket earth system shall be insulated. The size of the insulated earth wire should be equal to the size of the associated live wires. The resistance of the earth on a dedicated power outlet to the earth reference point shall not exceed 1 Ohm.

All essential power circuits and distribution cables shall have dedicated insulated earth conductors with it throughout.
9. **GEYSER OUTLETS AND ELECTRICAL CONNECTIONS TO VENTILATION FANS AND AIR CONDITIONING UNITS**

9.1 Connections to ventilation fans shall be done in conduit, wiring and double pole and triple pole surface isolators. Final connections from isolators to fans as well as the supply and installation of fans will be the responsibility of others. Cables shall be used for large supplies to large fans and other mechanical equipment.

9.2 Separate distribution boards are to be installed under this contract, exclusively for air conditioning unit feeds. Cabling & terminations from this board to the units shall be done by the air conditioning contractor.

10. **WITCHED SOCKET OUTLETS**

10.1 16 Amp 230 V single phase switched socket outlets shall be similar and equal to Lumex, Crabtree and MK, complete with ivory cover plates.

10.2 Light switches, isolator switches and switched socket outlets shall be of the same manufacturer.

10.3 Unless alternatively indicated on the drawings, all switched socket outlets shall be mounted in 100 x 100 x 50 mm draw boxes at 300 mm above finished floor level to the centre of the box. Power to outlet points for switched socket outlets shall be catered for by their relevant distribution boards, recessed conduit and wiring in brick wall and floor slabs.

10.4 CEE-form type three phase and single phase switched sockets shall be supplied complete with plug top and be of the AMPCO or WACO types or equivalent with 3 ph + N + EARTH and 1ph + N + EARTH pins plug interlocked with switch 32 Amp and 63 Amp.

10.5 The red and black Crabtree or Lumex type 16 Amp switched socket outlet with insulated earth complete with plug top shall be used for dedicated sockets. All essential circuits shall be wired with green insulated earth wires. Essential power sockets shall be the red type an UPS outlets shall be black.

10.6 The incoming insulated earth conductor to dedicated sockets shall be connected to the insulated earth terminal of dedicated sockets in power skirting and utility boxes where an electrical earth exists. The insulated earth shall be bridged to the electrical earth (socket frame terminal) in cases where no electrical earth exists. In such cases care must be taken not to bridge the
insulated earth system to the electrical earth system through steel contact.

11. **UNSWITCHED SOCKET OUTLETS**

11.1 Unswitched socket outlets shall only be used in the case of 6 Amp 220/250 V, 3 pin socket outlets intended for the connection of recessed light fittings installed in false ceilings. The socket outlets shall have shuttered live and neutral openings.

11.2 The socket outlets shall be suitable for installation in pre-punched wiring channels, deep round conduit boxes, or 50 x 100 x 50mm boxes mounted on cable baskets.

12. **LIGHT SWITCHES**

12.1 **GENERAL**

12.1.1 This section covers the requirement for switches for use in general installations under normal environmental conditions.

12.1.2 Flush and surface mounted switches are to be installed.

12.1.3 All switches shall be suitable for mounting in 50 x 100 x 50 mm boxes, shall comply with SABS 163 and shall bear the SABS mark.

12.1.4 Switches shall be of tumbler operated microgap type rated at 16A, 220/250V.

12.1.5 Switches shall have protected terminals for safe wiring.

12.1.6 Contacts shall be of silver material.

12.1.7 On multi-lever switches, it shall be possible to individually change any of its switches.

12.1.8 The yoke strap shall be slotted to allow for easy alignment.

12.1.9 The covers of surface mounted switches shall have toggle protectors.

12.2 **WATERTIGHT SWITCHES**

12.2.1 Watertight switches shall be of the microgap type suitable for surface mounting and shall bear the SABS mark.
12.2.2 The housing shall be of galvanized cast iron or die cast aluminium with watertight cover plate and toggle.

12.2.3 The housing shall further be suitable for back entry only, having a manufactured 20mm conduit thread.

12.2.4 The switch shall have a porcelain base and a quick acting spring mechanism and shall be rated at 16A, 220/250V.

12.2.5 The “ON”/“OFF” positions shall be clearly marked on the switch housing.

12.2.6 Alternatively industrial surface type switched sockets could be installed in water proof boxes with sliding lid.

12.3 COVER PLATES

12.3.1 Standard steel cover plates shall be finished in ivory coloured baked enamel. Cover plates shall overlap the outlet to cover all imperfections. Cover plates shall comply with SABS 1084.

13. CABLE TRAYS, CABLE LADDERS AND CABLE BASKETS

13.1 CABLE TRAYS

13.1.1 All cable trays shown on the drawings shall be of the heavy duty perforated hot dipped galvanized type. It shall have 76mm upstands and have a material thickness of 2,0mm for trays up to a width of 150mm and 2,5mm for trays up to a width of 600mm.

13.1.2 Cable trays shall be supported at 1500mm centres. The price for cable trays in the bill shall include all splicers, bolts, nuts and all other accessories.

13.1.3 Where final connections of cable is done to boards on surface and where single cables are run on surface and no cable trays are shown on the drawings, light duty perforated cable trays shall be used to support cables. Light duty cable trays shall directly be fixed to the surface via spacers by means of Hilty nails at short intervals.

13.1.4 Cables shall be tied to cable trays by means of PVC cable ties at 500mm intervals.
14. **LIGHTING INSTALLATION**

14.1 The electrical contractor shall be responsible for the supply, installation and commissioning of all luminaires required for the installation as per the following schedule:

<table>
<thead>
<tr>
<th>No</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.1.1 Type A</td>
<td>600mm x 600mm, 3 x 24 W T5 Lamps Recessed fluorescent luminaire, double parabolic louvers, Infill panel spacing. Control Gear: Electronic Control Gear. 3m Cord and 5A plug.</td>
<td></td>
</tr>
<tr>
<td>14.1.2 Type B</td>
<td>LED Round Panel 10W – 180mm Diameter x 18mm Deep 620 Lumen</td>
<td></td>
</tr>
<tr>
<td>14.1.3 Type C</td>
<td>LED Round Panel 18W – 300mm Diameter x 18mm Deep 1200 Lumen</td>
<td></td>
</tr>
<tr>
<td>14.1.4 Type D</td>
<td>1200mm - 2 x 28W T5, Moisture proof Surface luminaire Control Gear: Electronic Control Gear. Injection moulded UV stabilised polycarbonate body and diffuser.</td>
<td></td>
</tr>
<tr>
<td>14.1.5 Type E</td>
<td>2 x 18W Round Bulkhead luminaire Cast aluminium body with opal polycarbonate diffuser 360mm x 155mm deep</td>
<td></td>
</tr>
</tbody>
</table>

14.2 The contractor should note that the above luminaires shall be of superior quality and that sample approval from the client and project team shall be obtained prior to ordering these.

14.3 Only Osram and Philips lamps shall be offered.

14.4 Only Osram, Tridonic, Helvar and Philips control gear shall be offered.

14.5 All luminaires shall have SABS approval.
15. **DRAWINGS**

15.1 A complete set of “as built” drawings of the work as it progresses shall be kept by the electrical contractor in his site office. Paper drawing(s) showing the electrical design as done by the consultant shall be furnished to the contractor for this purpose on request. The contractor shall indicate on this drawing(s) all work completed as well as all required dimensions.

15.2 All site dimensions shall be taken from easily identifiable fixed points or lines, e.g. walls or columns.

15.3 The penultimate recommendation for payment shall not be made before the aforementioned drawings have been handed to and approved by the engineer.

16. **TESTING OF THE INSTALLATION**

16.1 The electrical contractor shall make allowance in his tender for the complete testing and commissioning of the installation. All tests are to be carried out in the presence of the client/engineer or their representatives. Notice of any envisaged test date shall be given at least five (5) days beforehand in writing.

16.2 The electrical contractor shall make provision in his tender for the supply of instrumentation materials and tests required to commission the installation, before the client/engineer is invited to the testing of the installation.

16.3 The contractor shall ensure that the installation complies with the specification and has been carried out in workmanlike manner. Should any part of the installation fail during a test, or should the equipment in the opinion of the engineer or client not meet with the requirements, the electrical contractor shall replace, repair or correct such equipment at his own expense, to the satisfaction of the engineer.

17. **INSPECTION AND HANDING OVER PROCEDURE**

17.1 When the electrical contractor has satisfied himself that the installation complies with all the requirements of the specification and workmanship is of the required standard, the engineer and client shall be invited to perform the handing over inspection.

17.2 The installation then shall be inspected in the presence of the client, the engineer and the electrical contractor. Should the installation not pass
inspection in whole or in part, the contractor shall rectify such fault and apply for re-inspection. One (1) re-inspection of the contract as a whole shall incur a penalty of R1000.00 (One thousand rand) for every subsequent re-inspection required on the installation. This amount shall be deducted from the next payment due to the contractor.

17.3 When the complete installation has passed handing over inspection, the contractor shall submit a completion and handing over certificate for signing by the client. The retention period of 12 (twelve) months for the installation shall commence on the date when the final inspection has been signed as passed.

**Part C3.6**

**Technical Specification – Audio Visual Systems**

1. **GENERAL**

1.1. The Audio Visual Systems shall be supplied and installed by a specialist contractor, to be approved by the engineer.

2. **SCOPE OF THE AUDIO VISUAL INSTALLATION**

The following items form part of this contract, the general electrical contract:

2.1 Supply & Installation of motorized screens
2.2 Supply & Installation of data projectors
2.3 Wall mounted – AV, HDMI, VGA & Audio interface
2.4 Wi-Fi VGA Dongle
2.5 Associated Cabling

3. **MOTORISED SCREEN**

3.1 Motorised screens shall be: 2130mm (W) x 1600mm (H).
3.2 The screens shall be installed recessed in new ceilings, with wall mounted control.
3.3 The screens shall be of the front project type.
3.4 Cabling from wall mounted control to screen to be included.
3.5 All supporting brackets shall be provided.

4. **DATA PROJECTOR**

4.1 Data projectors shall of reputable type and spare components shall be held locally
4.2 Data projectors shall be 4500 Ansi Lumens.
4.3 The data projectors shall be suspended through the ceiling.
4.4 Cabling from wall mounted input units shall be included.
4.5 All supporting brackets shall be provided.